



# Powered by Innovation

Doosan Infracore  
2018 Integrated Report



About This Report

**Reporting Purpose** Doosan Infracore strives to embody corporate social responsibility (CSR) in its overall corporate management. To this end, the company publishes an integrated report to disclose its financial and non-financial performance results generated through the interaction of diverse CSR factors, based on which corporate values are created. This is Doosan Infracore's seventh Integrated Report, and continued discussions and improvements are taking place for more effective and transparent disclosure of information.

**Reporting Process** 35 departments related to the company's strategy, R&D, production, sales, investor relations, and communications have participated in the planning of this Integrated Report in order to enable comprehensive reporting on Doosan Infracore's financial and non-financial performance as well as social and environmental values, with a particular focus on 2018 performance results and future plans of the company.

**Reporting Period** This report presents quantitative data about the company's performance during the 2018 calendar year. However, the company's qualitative activities mentioned in the report, including the composition of the BOD, include developments recorded until the end of April 2019.

**Reporting Scope** This report is mainly on the activities and accomplishments made by the company's worksites in Korea and China. Some qualitative activities, however, include those undertaken at the company's overseas worksites. The CSR Facts & Figures section includes the quantitative outcomes of the worksites in Korea for the last three years. Figures on the worksites in China are on activities and accomplishments since 2016, after the execution of the overseas worksite CSR roll-out.

**External Assurance** This report has been assured by Samjong KPMG, an independent assurance service provider, to ensure the propriety and integrity of the reporting processes as well as the accuracy and credibility of its contents. The Independent Assurance Report is attached in the Appendix section.

**Disclaimer** This report contains details of some future activities, events and situations based on the company's plans and estimations of future financial outcomes, which may turn out to be inaccurate in the event of changes in the global business landscape. The plans and estimations draw upon the best information available at the time of completion of this report, with due consideration given to future business environments as well as the company's elaborate business strategies. Doosan Infracore, therefore, would like to remind its stakeholders that this report contains some predictions that may be affected significantly due to the risks, uncertainties and other factors involved in the company's global operations.

Reporting Method



**Printed Material**  
This report is published in Korean, English, and Chinese to communicate better with our global stakeholders



**PDF**  
This report is available in PDF format which can be downloaded at [www.doosaninfracore.com](http://www.doosaninfracore.com)

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Integrated Report

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The oldest and one of  
the fastest growing in Korea

#### 2018 Financial Highlights

(Unit: KRW million;  
based on consolidated financial statements)

18,172,167

Sales

1,215,881

Operating Income

28,880,282

Total Assets

7,145,046

Total Equity

**Our Heritage** With 123 years of history, Doosan is the oldest enterprise in Korea. It is also a company with the great potential, having undergone continuous changes and achieving significant growth throughout the years. Doosan has continued to grow since its inception. In the twentieth century, it emerged as one of the country's strongest consumer goods companies specializing in beer and beverages. At the dawn of the new millennium, however, Doosan embarked on a massive transformation to become a global company by developing new growth engines and entirely overhauling its business portfolio. Through a series of successful mergers and acquisitions, Doosan has completely transformed itself from a consumer goods company into an infrastructure solution provider, specializing in a wide range of industrial infrastructure such as construction equipment, energy, and production facilities. Backed by a diverse business portfolio and clear sense of purpose, Doosan continues to pursue innovation and change with a clear focus on businesses, needed to establish and operate social infrastructure, and thus enhances the value of lives of humankind.

**Our Growth Engine** Behind the success of Doosan is its unwavering “trust in people.” This belief is well summed up in our 2G Strategy – Growth of People, Growth of Business. The 2G strategy has been the driver of our past successes and will guide us through our journey toward prosperity in the future. At the heart of the 2G Strategy is the virtuous circle of “growth of people laying the foundation for the growth of the company, and the latter leading back to the former.” With its trust in its staff and continuous investment in human capital, Doosan was able to successfully complete bold restructuring and innovative business portfolio transformation.

**Our Future** Doosan aims to become a ‘Proud Global Doosan,’ with ‘firm belief and trust in people.’ ‘Proud Doosan’ means becoming a company of which all stakeholders are proud, including employees, customers, shareholders, and society as a whole. Our vision is to become a company in which all of our stakeholders can take pride.

#### Doosan Credo – Our Beliefs and Philosophy

##### Doosan Credo

The Doosan Credo is a stipulation of Doosan's management philosophy and way of business with a history of 100 years that have been inherited and developed. The Doosan Credo contains nine core values which serve as standards for all decision-making and conduct at Doosan. Through this, Doosan achieves its ultimate goal. The Doosan Credo is accomplished through Doosan's aspiration and core values.

All of us at Doosan practice the nine core values of the Doosan Credo every day. To create ‘Proud Global Doosan,’ Doosan employees around the world practice the nine core values of the Doosan Credo in all places where they operate. These values guide the way we do business, the way we treat each other, and the way we work with all of our partners. The nine core values of the Doosan Credo are as follows:

##### Core Values

People	Cultivating People	Integrity and Transparency
Inhwa	Customers	World-class Technology and Innovation
Profit	Social Responsibility	Safety and Environment



More information on the Doosan Way and our core values is available at <http://www.doosan.com/en/belief/credo>



More information on the subsidiaries of Doosan Group is available at <http://www.doosan.com/en/intro/affiliate>

A world-leading company in  
infrastructure solutions based on  
world-class competitiveness

#### 2018 Financial Highlights

(Unit: KRW million;  
based on consolidated financial statements)

7,730,108

Sales

848,127

Operating Income

11,029,167

Total Assets

3,820,815

Total Equity

#### Company Profile

Doosan Infracore was founded in 1937 as Chosun Machine Works, the first large-scale machine manufacturing factory in Korea. Through continuous growth for more than 80 years, it has become the nation's top machine manufacturing company. Its product line-up includes construction equipment, engines, a variety of attachments, and utility equipment. Based on its world-class competitiveness, Doosan Infracore is moving forward to grow into a global leader in the infrastructure solutions.

Company Name	Doosan Infracore Co., Ltd.
Year Founded	1937
CEO	Sohn Dong-youn
Main Business Areas	Production and sales of construction equipment and engines
Employees	4,468 (Including overseas worksites; as of December 31, 2018)

#### Business Overview

**Construction Equipment** The Construction Equipment Business Area has supplied high-quality medium and large heavy equipment to industrial sites since 1977, contributing to the development of the global infrastructure industry. The Construction Equipment Business Area has prestigious global brands, such as Doosan, Bobcat, and Geith, with product line-up ranging from compact to medium and large construction equipment. It has production bases in Korea, North America, China, and Europe. It provides world-class products in construction equipment and attachments, portable air compressors, lighting systems, and portable power equipment.

**Engine** Established in 1958, the Engine Business Area produced the first diesel engine in Korea, and has continued to expand its business portfolio. It supplies diesel and gas engines for buses and trucks, power generators and ships, as well as various industrial engines across the world. Based on its product line-up that meets increasingly stringent world-wide environmental regulations, the Engine Business Area is emerging fast as the world's top-tier engine manufacturer. It has been enhancing its global competitiveness by attracting new customers for existing products and exploring new markets and new business opportunities.

#### Brand

Doosan Infracore's brand represents Doosan's proud history and remarkable growth, and receives worldwide recognition.



For more information on Doosan Infracore's brand, visit our website at [www.doosaninfracore.com](http://www.doosaninfracore.com) or scan this QR code with a smartphone

## CEO Message



### I thank you sincerely for your interest and encouragement.

For Doosan Infracore, 2018 was a very meaningful year. We improved product quality and enhanced other sources of fundamental competitiveness. We actively carried out sales activities in emerging markets as well as in China, our key market, and increased our construction equipment market share in North America, Europe, and other advanced markets. We also proactively responded to the changes in the business environment brought on by the Fourth Industrial Revolution and digital revolution, and made preparations for the future by further developing such new businesses as Digital Transformation and the Concept-X project.

In 2018, Doosan Infracore achieved sales of KRW 7,730.1 billion, a year-on-year rise of 17.7%, despite growing uncertainties worldwide. As we stayed focused on improving profitability and product mix backed by a stable market demand, operating income rose 28.4% year-on-year to KRW 848.1 billion, a record in our history.

These accomplishments were made possible by your interest and encouragement. Grateful for the support, we will strive to solidify our stature as a world-leading construction equipment company.

#### Outlook and Plans for 2019

The global construction equipment market forecasts to decrease in growth rate and then start to turn downward in 2020. Even the Chinese market, which has continued to grow recently, is expected to diminish starting in the second half of 2019. The engine market is also expected to decline in the second half of the year.

Throughout its long history of more than 80 years, Doosan Infracore has experienced countless ups and downs. We have overcome many crises and grown into a global construction equipment company mainly because we have prepared for tomorrow rather than today, and chosen change and innovation over complacency. This year, we will preemptively respond to the market environment which will more likely be difficult, and secure the fundamental competitiveness to overcome any challenges. We will stride forward ‘Powered by Innovation.’

#### Powered by Innovation

Digital innovation, which is leading the Fourth Industrial Revolution, is the reality and the future of not only the Internet, IT, and electronic industries but the manufacturing industry as well. Doosan Infracore fully understands that change and innovation, including digital innovation, are the very foundation for increasing competitiveness. To further expand this mindset, we have adopted a new slogan – ‘Powered by Innovation.’

Under the ‘Powered by Innovation’ slogan, R&D and production, sales and support, and technical staff will proactively communicate and collaborate with one another, and think collectively. Through these efforts, we will focus our energies on developing new customer-centered products and services as well as on transforming Doosan Infracore into an innovative company that discovers new opportunities using digital technology. In addition to products, we will offer customers smart solutions and services, and other premium value, and thus realize our vision of ‘Global Leader in Infrastructure Solutions.’

In addition to change and innovation, Doosan Infracore will focus on three tasks this year – strengthening financial soundness, diversifying products and services, and expediting digital transformation and new business implementation.

#### Strengthening financial soundness

First, we will further strengthen our financial soundness by diversifying sales in preparation for market slowdown or stagnation, and by further strengthening bond and cash flow management. While managing risks in slowing markets, we will rebuild our dealer network and strengthen sales promotion by focusing on developing promising markets. In China, we will strengthen our sales network in regions where we underperform, concentrate on bond and cash flow management, and increase external sales of engines and after market (AM) sales by implementing diverse strategies.

#### Maximizing customer satisfaction with more competitive products and services

We will diversify and customize products and services. We will expand the line-up of mini excavators and build a sales foundation, while also expanding our special equipment business, such as rotary drill rigs and rippers. In preparation for enforcement of next-generation emission regulations, including EU Stage V and China’s Stage IV emissions standards, we will strengthen quality management of new products, in addition to increasing service solutions through product diversification and customization by region.

#### Expediting digital transformation and new business implementation

We also plan to actively prepare for the future through digital transformation and new business development. In April 2019, Doosan Infracore established a partnership with Palantir Technologies, a data analysis technology unicorn. By building a big data platform, we will optimize our business operations, streamline the decision-making process, and substantially enhance business efficiencies. In November 2019, a proving ground (PG) is scheduled to be completed in Boryeong City, South Chungcheong Province. At the performance testing site, we plan to build a prototype of the Concept-X project to develop future construction equipment technologies and verify their feasibility, with the goal of establishing a business model for commercialization.

The business items that we have discovered and been developing will be introduced to relevant markets and be fully commercialized. Moreover, we will continue to develop new business opportunities by building a system of investing in and cooperating with diverse start-ups.

We believe that the foundation for a company to be sustainable for 100 or 200 years is the deep trust they enjoy from their stakeholders, including customers, shareholders, suppliers, and employees. Accordingly, we will earn more trust by strengthening management transparency and maintaining communication, not to mention strengthening products, quality, and other sources of competitiveness.

Complying with laws and standards is a basic requirement for a global corporate citizen. We are therefore carrying out sustainable management activities that befit a global leader, such as reducing greenhouse gas emissions, minimizing environmental impact, and building a win-win labor-management culture. To ensure that our employees and suppliers work in a safe environment, we will further strengthen worksite safety management. We will also render our trade practices more transparent and fairer by strengthening our compliance programs (CP) and subcontract management. By doing so, Doosan Infracore will grow into a ‘Proud Global Doosan.’ We look forward to your interest and encouragement. Thank you.

**Sohn Dong-young**

Chief Executive Officer  
Doosan Infracore Co., Ltd.



Our Business Model

Doosan Infracore strives to maximize its corporate value by effectively investing its financial and non-financial resources in its value chain. We actively address social and environmental issues related to our business operations, while pursuing our vision of becoming a ‘Global Leader in Infrastructure Solutions’ as a means to ensure sustainable growth and contribute to social development.

Capital Input

Financial

Funds that are procured through management, investments or financing, and that can be used by an organization to produce products or provide services

Manufactured

Manufactured articles, such as facilities and buildings that can be used by an organization to produce products or provide services

Intellectual

An organization’s knowledge-based intangible assets, such as patents, copyrights, software rights, and licenses

Human

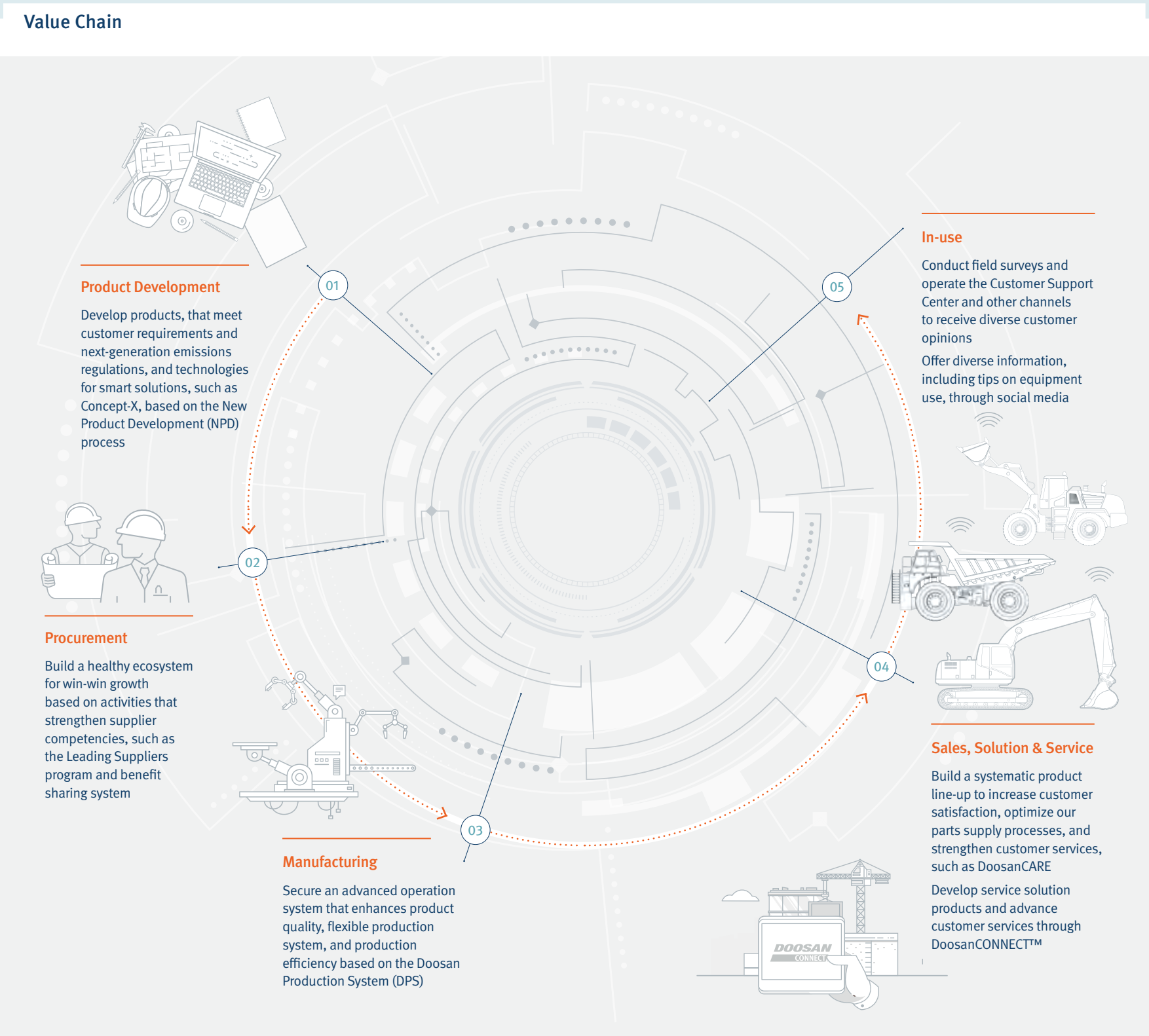
Members’ capabilities, experiences, and drives towards innovation that allow the understanding, development, and execution of an organization’s strategies

Social/Network

Stakeholder relations and trust, and other intangible assets related to brands and reputation developed by an organization

Natural

All environmental resources that are renewable or not renewable and that can be used to provide products or services



Key Performance In 2018

Financial <sup>1)</sup>	
Sales	KRW 7,730.1 billion
Increased by 17.7% year-on-year as a result of enhancing product competitiveness and sales channels	
Operating income	KRW 848.1 billion
Rose by 28.4% year-on-year, posting the highest figure ever, thanks to our efforts to improve profitability and product mix backed by stable market demand	
Net income	KRW 394.2 billion
Assets	KRW 11,029.2 billion
Liabilities	KRW 7,208.4 billion
Equity	KRW 3,820.8 billion
Manufactured	
Production facility investments	KRW 135.1 billion
Investments to increase production capacity and improve the plant environment	
PRODUCTION	
Excavators and wheel loaders	27,612
Engines	96,654
Intellectual	
Domestic and overseas intellectual property rights <sup>2)</sup>	Won the Grand Prize at the 2018 IoT Innovation Awards
Applications	3,576
Registrations	2,467
Human	
CELL – a new learning organization	Selected four Meisters – the best in class technician
Launched CELL (Community of Employee-Led Learning) to assist employees with their self-led learning and operated around 70 CELLS	
Chose four of our technical staff as Meisters in order to foster expert technicians and raise their self-esteem	
Social/Network	
Leading Suppliers (cumulative)	27
Operated programs designed to help our suppliers improve their own capabilities and secure fundamental competitiveness	
Dream School participants (cumulative)	763
Continued to run the Dream School, a mentoring-based dream discovery program, participated by our employees, for youth since 2012	
Continued to conduct social contribution activities, including the Doosan Day of Community Service, equipment to support disaster relief, and the Hope Elementary School in China	
Natural <sup>3)</sup>	
Energy consumption	2,067 TJ
Achieved a 5% improvement in energy intensity (energy costs/production) year-on-year despite an increase in production by continuously identifying tasks to reduce energy consumption and taking action	
Greenhouse gas emissions	108,244 CO <sub>2</sub>
Achieved our GHG emissions reduction target by 103%, set in the beginning of the year, as a result of company-wide efforts led by the GHG/Energy Reduction Council	
Reused and recycle water	67,742 tons

<sup>1)</sup> Based on consolidated financial statements  
<sup>2)</sup> Based on consolidated entities as of 2018 year-end  
<sup>3)</sup> Based on business sites in Korea

Performance Review & Outlook

2018 Performance Summary

Sales

7,730.1

KRW billion

Operating Income

848.1

KRW billion

Net Income

394.2

KRW billion



87.4%

Percentage of premium eco-friendly or eco-friendly products



Tele-Operation

Successful demonstration in Bauma China 2018



DoosanCONNECT™

Grand Prize at the 2018 IoT Innovation Awards



108,244 tCO<sub>2</sub>

Greenhouse gas emissions



8 consecutive years

Agreed on collective bargaining agreements without dispute



Best CSR

One of top Korean companies with the best CSR reputation in China



9 consecutive years

Listed in DJSI Korea the machine and electric equipment categories



A

Rated Class A in the ESG Evaluation by the Korea Corporate Governance Service



Received Honors for the 2017 Integrated Report

International ARC Award

Performance Overview

In 2018, the global market for construction machinery continued its growth from 2017, with the exception of the Middle East, Africa, and Korea. This growth was driven by major infrastructure investment, increased demand for infrastructure and mining equipment as prices rose for raw materials, and the replacement cycle for existing equipment. The global market for engines also expanded in 2018 mainly attributable to increased demand for construction machinery in North America and China, with demand for engines for gas generators and large generators in particular growing strongly due to rising oil prices.

In these changes and market growth, Doosan Infracore was successfully able to increase its sales by flexibly responding to changing demand and stably acquiring business rights to sell heavy equipment in the advanced markets. The company is now preparing for potential market uncertainties and a slowdown in the near future by enhancing its fundamental competitiveness. It will do this by improving product quality and cost structure, undertaking a digital transformation, and establishing the future direction of new business through the Concept-X project.

Doosan Infracore is also fully committed to fulfilling its responsibilities as a leading global company not only in terms of profitability but also in creating social value. The company has set out detailed corporate social responsibility (CSR) strategies, led by the CSR Committee empowering all its staff to join in with the efforts. In addition, it is promoting cooperation between advanced and developing nations. Doosan Infracore has thus linked its core business activities with the UN's Sustainable Development Goals (SDGs), and it also uses KPMG's 'True Value' methodology to analyze the social value that the company generates in its overall value chain.

Financial Performance

1. Sales Records

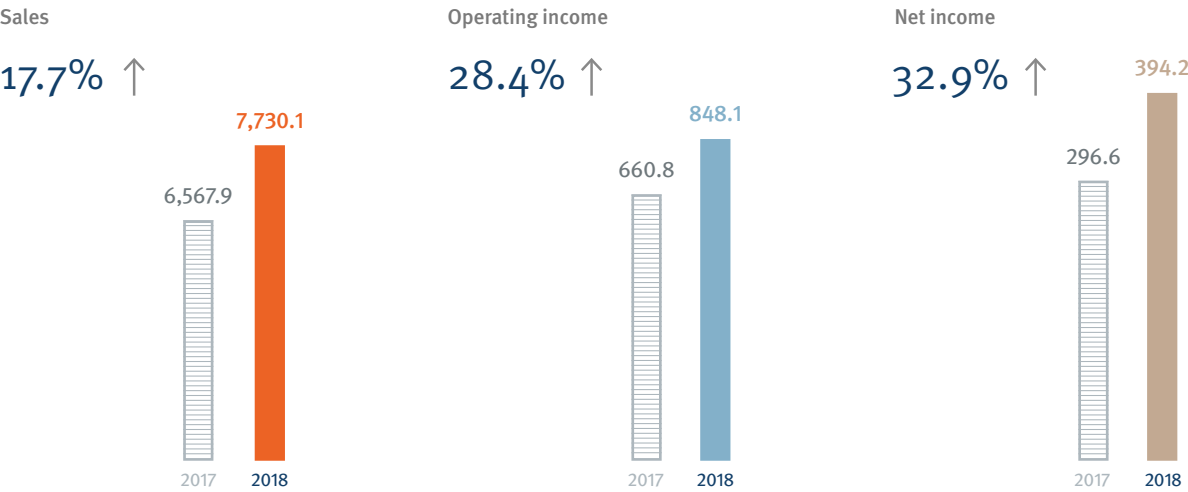
In 2018, Doosan Infracore expanded its presence in global markets based on competitive products and innovative business strategies. As a result, the company achieved remarkable financial results, including record-breaking operating profits. Annual sales increased by 17.7% year-on-year to reach KRW 7,730.1 billion, while operating profits rose by 28.4% to KRW 848.1 billion, the highest ever. This was largely due to strong market demand and the company's efforts to improve profitability and its product mix. Net income increased by KRW 97.5 billion year-on-year to KRW 394.2 billion.

Sales Records

(Unit: KRW million; based on consolidated financial statements)

	2016	2017	2018
Sales	5,729,550	6,567,897	7,730,108
Cost of sales	4,404,459	5,024,999	5,936,246
Gross profit	1,325,091	1,542,898	1,793,862
Selling and administrative expenses	834,273	882,129	945,734
Operating income	490,818	660,769	848,127
Other non-operating income	56,182	64,153	36,084
Other non-operating expenses	213,312	72,932	63,697
Net income before income tax	82,050	489,627	616,426
Income tax expense	162,640	192,984	222,257
Net income	115,985	296,643	394,170

(Unit: KRW billion; based on consolidated financial statements)





2. Financial Status

As of the end of 2018, total assets were KRW 11,029.2 billion, up KRW 753.1 billion year-on-year, while total liabilities grew by KRW 105.4 billion to KRW 7,208.4 billion. The company's total equity surged by KRW 647.7 billion year-on-year to KRW 3,820.8 billion.

Financial Status

(Unit: KRW million; based on consolidated financial statements)

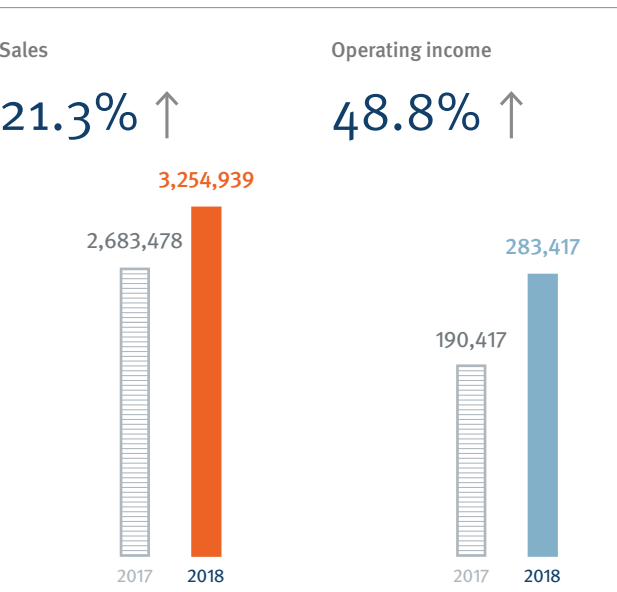
	2016	2017	2018
Current assets	3,049,571	3,767,434	4,426,822
Non-current assets	6,977,238	6,508,656	6,602,345
Total assets	10,026,809	10,276,090	11,029,167
Current liabilities	3,653,194	3,695,646	3,778,574
Non-current liabilities	2,925,238	3,407,283	3,429,778
Total liabilities	6,578,432	7,102,929	7,208,352
Total equity	3,448,377	3,173,161	3,820,815

3. Performance by Business

**3.1 Construction Equipment** The global market for construction machinery grew in most regions in 2018, including in major advanced markets, China, and emerging markets. Doosan Infracore's Construction Equipment BG improved its profitability by increasing sales of finished vehicles and parts backed by the market growth. In particular, sales in China, the world's largest market for construction equipment, increased significantly in 2018. This was attributable both to a strong market and the company's efforts to be cost competitive, enhance customer value through differentiated products and services, and ensure competitive advantage in its sales channels. Amidst changes in the market, Doosan Infracore is continuing to launch new products which reflect customer needs, improving dealer service, and always striving to improve quality.

In addition, Doosan Infracore has expanded the presence of DoosanCONNECT™, an upgraded version of its telematics remote equipment management solution, in the global market, and launched a new mobile app to help customers better manage their equipment. The company has also further strengthened its customer service through intensive training of the technicians for DoosanCARE services and the staff at its dealerships, and by developing service solutions connected to DoosanCONNECT™. With the construction industry seeing widespread adoption of information and communication technology (ICT), the company has been making continuous investment in the latest technologies, including unmanned and automation technologies.

Doosan Infracore's Construction Equipment BG achieved annual sales of KRW 3,254.9 billion in 2018, a year-on-year increase of 21.3%, and Operating income also rose by 48.8% to KRW 283.4 billion.



Construction Equipment

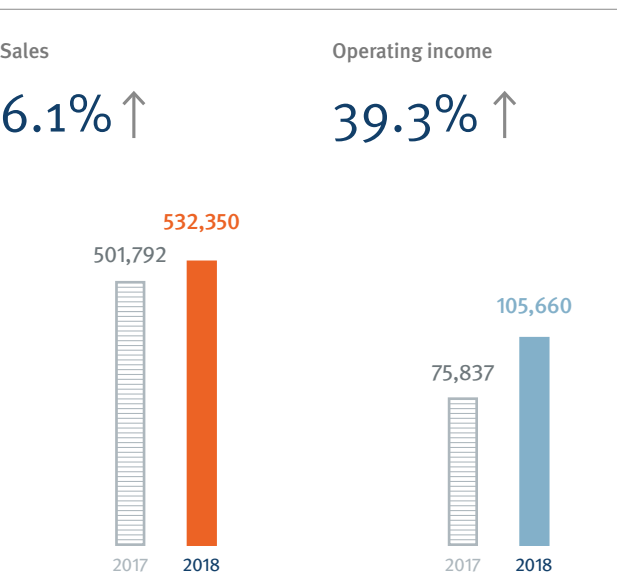
(Unit: KRW million)

	2016	2017 <sup>1)</sup>	2018
Sales	1,351,718	2,683,478	3,254,939
Operating income	18,031	190,417	283,417

**3.2 Engine** There have been increasing challenges for companies from fast-growing prices for raw materials, rising labor costs, and intensifying competition in global markets especially from Chinese companies. Nevertheless, Doosan Infracore's Engine BG achieved significant increases in both sales and profitability in 2018 due to growth in the market for construction machinery and increased demand for generator and commercial vehicle engines.

<sup>1)</sup> On January 1st 2018, the heavy equipment business operation of Doosan Bobcat in North America and Europe was transferred to Doosan Infracore's Construction Equipment BG, so the related financial figures of Doosan Bobcat for 2017 are therefore reclassified to those of Doosan Infracore's Construction Equipment BG

The Engine BG saw a number of notable achievements in 2018, including the development of a Stage V engine which meets the latest European emissions regulations; the addition of new, major overseas customers; the development of products tailored for the Chinese market through the Lovol Doosan Engine Company Joint Venture (LDEC JV); and visible growth in the Vietnamese automotive market. In Indonesia, Doosan Infracore is pursuing a strategic alliance with a state-owned enterprise which will help the company diversify its business and also serve as a springboard for entry into markets in South-East Asia. The Engine BG has undertaken extensive R&D and investment into the development of electronic engines and after-treatment systems to meet increasingly strict regulations on emissions and hazardous substances, and has now successfully launched engines which meet the latest emissions regulations. It is also continuing to focus on customers' mid- to long-term requirements by developing LNG engine technologies to meet demand for alternative fuels, expanding its line-up of gas engines, and developing hybrid powertrains.



Engine

(Unit: KRW million)

	2016	2017	2018
Sales	498,699	501,792	532,350
Operating income	58,781	75,837	105,660

4. Cash Flow & Solvency

In 2018, cash flows from operating activities increased by KRW 172.1 billion year-on-year to reach KRW 837.8 billion due to increased sales and improved profitability. In 2018, cash and cash equivalents reflecting changes in foreign exchange rates increased KRW 109.5 billion year-on-year from KRW 943.5 billion at the beginning of the year to KRW 1,053.0 billion at the end of the year.

Liquidity risk may arise when a consolidated entity fails to fulfill a payment obligation for financial debt due to insufficient liquidity, or finds it impossible to raise the funds needed for normal business. Doosan Infracore draws up three month and annual financial balance plans to minimize the influence of business, investment, and other financial activities on its monetary balance. Through this financial balance planning, the company calculates, secures, and maintains liquidity, in preparation for possible liquidity risks.

Cash Flow

(Unit: KRW million; based on consolidated financial statements)

	2016	2017	2018
Cash flows			
Cash flows from operating activities	512,993	665,691	837,778
Cash flows from investing activities	909,634	(256,289)	(312,848)
Cash flows from financing activities	(1,454,380)	32,267	(422,558)
Cash and cash equivalents			
Cash and cash equivalents, beginning of the year	560,003	538,578	943,481
Cash and cash equivalents, end of the year	538,578	943,481	1,053,016

5. Production Assets

Consolidated entities' facilities and equipment include land, buildings, structures, machines, and assets under construction. The book value of facilities and equipment was KRW 1,782.6 billion as of the end of 2018, a year-on-year decrease of KRW 4.3 billion. Cumulative new acquisitions and capital expenditures in 2018 were KRW 170.0 billion, and depreciation costs totaled KRW 142.2 billion.

## 6. Intellectual Assets

Doosan Infracore improves its product competitiveness and builds the foundations for long-term growth by expanding investment into R&D. R&D at the company consists of heavy product development, which undertakes research into the company's key products, such as excavators and wheel loaders; engine product development, which focuses on meeting emissions and fuel efficiency regulations; product design and high-stiffness materials; and the technology center, which focuses on the virtual verification and analysis of R&D. All these R&D activities are aimed to create a distinct technological advantage for the company, and to establish an advanced engineering process.

Based on non-consolidated financial statements, Doosan Infracore's R&D expenses in 2018 increased KRW 23.3 billion year-in-year to stand at KRW 135.1 billion, equivalent to 4.4% of total sales. As of the end of 2018, the number of intellectual property rights applications made in Korea and overseas by consolidated entities had reached 3,576, and the number registered totaled 2,467.

### Non-Financial Performance

#### 1. Social Performance

**1.1 Customers** Doosan Infracore has endeavored to meet customer needs by developing engines which meet the latest stringent emissions regulations, such as EU Stage V and China's Stage IV emissions standards, and by launching special equipment, including giant rippers and rotary drilling rigs. The company has also sought technological innovations and improvements in its fundamental quality, thereby expanding its market presence.

In addition, it has been expanding regions where customers manage their equipment more efficiently through the DoosanCONNECT™ service which provides real-time information on equipment location, operational status, and parts including engines. In 2018, the company introduced DoosanCONNECT™ in Korea, followed by its launch in North America, Europe, China, and some emerging markets. Doosan Infracore also offers a range of convenient services, including 'Smart Maintenance' service solution product which provides preemptive maintenance services based on the information collected through DoosanCONNECT™.

**1.2 Employees** Doosan Infracore has been establishing a human rights risk management system in order to protect the rights of all of its stakeholders, including employees. To this end, the company distributes a manual on the prevention of human rights risk, operates the Human Rights Protection Center, offers employee education on human rights, and operates the Women's Council. In 2018, the company conducted an online survey to identify the level of awareness of issues surrounding human rights among its employees with the goal of raising their awareness on human rights. In addition, it expanded the scope of online education on human rights to all employees.

In addition, Doosan Infracore launched 'CELL' (Community of Employee-Led Learning) in 2018 to help its staff with self-led learning. CELL is a new learning support system which promotes and supports small, task-related group learning throughout the company. Doosan Infracore employees formed more than 70 CELLS in 2018.

**1.3 Suppliers** Doosan Infracore helps its suppliers enhance their competitiveness through a wide range of support programs, covering the development of technology, quality improvement, and financial support. In particular, the company runs the Doosan Supplier Excellence Program (DSEP) and the Leading Supplier program in order to help its suppliers improve their fundamental competitiveness. In addition, it has implemented a multi-party benefit sharing system through which its first- and second-tier suppliers work together to create and share excellence.

Doosan Infracore strives to prevent industrial accidents by improving health and safety management of its suppliers and building a cooperative partnership with them. To this end, the company offers safety education to staff at its suppliers, assesses their safety risks, and provides them with technical support relating to hazard management through the Safety and Health Symbiotic Cooperation Program. This program not only offers technological support but also other supports through various means, including safety banners and environment and EHS guidelines.

**1.4 Local Communities** Doosan Infracore undertakes a wide range of social contribution activities, so that it can grow in partnership with local communities, and fulfill its role as a global corporate citizen. Every year since 2014, the company hosts the 'Doosan Day of Community Service' event, with participation of Doosan Group employees around the world, including Korea, helping local communities to develop. Since 2012, the company has run the 'Dream School,' a program through which its staff and specialist life coaches help young people find the right career paths, including through activities that promote self-growth.

In addition, the company signed a 'safety culture social contribution' agreement with the Korean Ministry of Public Safety and Security in 2016 in order to promote safety in local communities, and has been carrying out a range of activities to create a culture of safety. These include using its health and safety facilities, such as the Disaster Prevention Center, company-affiliated hospitals and other specialist facilities, to provide firefighting, emergency treatment, and medical support to residents near its Incheon Plant.

## 2. Environmental Performance

Doosan Infracore is subject to the Korean Emissions Trading System. In 2018, the company launched the GHG/Energy Reduction Council in its efforts to reduce energy consumption and GHG emissions. All departments related to energy and GHG take part in the Council which is responsible for creating sophisticated climate change strategies, including managing the performance of its Energy Management System (EMS), establishing a mid- to long-term roadmap for emissions trading, and setting emissions reduction targets. In particular, the setting out of a mid- to long-term roadmap to respond to the emissions trading system has enabled the company to conform with the system that will be in place from 2020 through preemptive emissions trading. The company's GHG emissions in 2018 were 108,244 tCO<sub>2</sub>, a year-on-year increase about 10%. This was due to the substantial increase in its production volumes, but the intensity of its emissions has been declining continuously since 2016.

### Outlook 2019

#### 1. Financial Outlook

**1.1 Construction Equipment** Demand for construction equipment in advanced markets is expected to slow a little in 2019 due to the global economic downturn. Followed by the business right acquisition from Doosan Bobcat in 2018, Doosan Infracore will gradually expand its market share in 2019 by strengthening its sales capabilities in advanced markets and increasing sales of mini excavators (MEX) through its improved dealer networks. In particular, the company will improve customer service in North America by establishing a Parts Distribution Center (PDC) and the North America Customization Plant (NaCup). In China, with the market possibly slowing down, Doosan Infracore will improve its position by increasing sales of mid- to large-sized models, focusing on profitable sales, and improving the soundness of account receivable. In emerging markets, the company will focus on profitability and the management of accounts receivable as global economies slow. Doosan Infracore will also improve channel competitiveness, and increase sales of large-sized models in regions with potential for rapid growth.

**1.2 Engine** The Engine BG is expected to grow in 2019, despite a slowing global economy, due to increased sales of Construction Equipment BG and Doosan Bobcat products, as well as additional external sales and as a result of its efforts to find new markets, such as power generation and vehicle engine products. In 2019, Doosan Infracore will actively put into place a wide range of measures to increase sales to outperform market growth.

These will include expanding its coverage by strengthening networks; diversifying markets and products; launching next-generation engines ahead of the implementation of the EU Stage V and China's Stage IV emissions standards; securing new, major customers; developing localized engines through LDEC JV; and increasing sales of large-sized generator engines and gas generator engines in North America. It will also meet customer requirements by expanding its engine line-up through the development of new, large-sized electronic engines and other advanced technologies, as well by improving productivity and minimizing the impact of increases in the cost of raw materials to make its products more cost competitive while increasing customer satisfaction.

#### 2. Non-Financial Outlook

As seen at the 2019 Davos Forum held in early 2019, the whole world is paying close attention to such concepts as the Fourth Industrial Revolution, eco-friendly economic development, a fair economy, international leadership, and sustainable economic development. Accordingly, there has been increasing emphasis on managing extreme weather, climate change, and the risk of natural catastrophes.

In order to manage these risks, Doosan Infracore examines the results of its materiality analysis and external environmental, social and governance (ESG) evaluation, and then correlates them with each department's business plans. The CSR Committee then reviews these results and decides CSR strategic tasks of the company. Doosan Infracore's eight strategic CSR tasks for 2019 include establishing a management system and strengthening monitoring for raising awareness of human rights; identifying suppliers with high CSR risks and helping them make improvements in order to strengthen CSR management system of its supply chain; and reducing GHG emissions. In 2019, the company will establish an ESG framework and indicators in order they make improvements the correlation between its CSR tasks and business strategies. To this end, Doosan Infracore will involve relevant departments in discussions on how it can achieve sustainable growth, and based on these discussions, the company will motivate all of its staff to reflect the CSR in every aspect of their daily work.



# Sustainable Value Creation

The positive and negative impacts that a company have on society can be an element that either contributes or hinders development of the global human society, and they are also connected to the value that a company provides to its shareholders. Doosan Infracore therefore pays close attention to the relevance between corporate value and social value, and seeks to enhance its capability in creating social values. To this end, we applied the ‘True Value’ methodology developed by KPMG to analyze our performance in creating social values in 2018, as we did in the previous year. We plan to reflect the calculation results in our management decision-making and risk management processes.

### 1. Selecting Indicators

We selected major topics and quantitative indicators, with our net income, a financial value, serving as the baseline, in order to identify the societal added value resulting from our business operations from economic, social and environmental perspectives. We analyzed global research data to determine each indicator’s monetary value per unit. In August 2018, we completed our voluntary soil remediation work and acquired confirmation thereof from the government. We have thus excluded the ‘soil contamination’ index from this year’s list.

	Index	Type	Details
Finance	Net income	Baseline	Financial performance from income generated during the year
	Employee salaries	+	Economic effects of monetary compensation for employees
Economy	Support for suppliers	+	Economic effects from investments in suppliers' competencies and win-win support (Win-Win Growth Fund, etc.)
	Dividends and interest expense	+	Economic effects created by paying dividends and interest payments to investors and creditors
	Corporate tax	+	Economic effects from corporate tax paid to the governments of countries in which we do business
Society	Investment in human resources development	+	Social effects of HRD investments in employees' capacity-building education and training
	Investment in social contributions <sup>1)</sup>	+	Social effects from our local community education programs, such as the Dream School, and donations
Environment	Greenhouse gas emissions <sup>2)</sup>	-	Impact on climate change due to GHG emissions (Scope 1 & Scope 2)
	Air pollutants emissions <sup>3)</sup>	-	Impact on air quality due to NOx, SOx, and PM emitted during business operations
	Water usage volume <sup>4)</sup>	-	Impact of water consumption on water environment, including water-scarce regions
	Waste treatment volume <sup>5)</sup>	-	Environmental impact of waste treatment, such as sales and incineration
	Waste recycling volume <sup>5)</sup>	+	Reduction of environmental impact due to the recycling of waste

### 2. Value Measurement

Economic, social, and environmental costs and benefits were measured by multiplying monetary value, based on the latest global research materials, to quantitative input data. The data includes the amount of money used to support major management activities and make investment, as well as environmental pollutant emissions and contaminated area due to management activities. Monetary value then was adjusted in consideration of the price fluctuation rate depending on the time of research and base country, and exchange rates on the last day of 2018 were used.



\* Calculation results are explicit information that was derived to set up a direction for social impact management and value creation based on several assumptions, and do not indicate integrity. Also, the monetary value applied in the current approach can be additionally complemented or adjusted in accordance with announcement of new research results. There is thus a chance that impact valuation figures of the same year will change. This information therefore cannot be deemed as part of the company's disclosure of financial performance.

<sup>1)</sup> G.Psacharopoulos and H.A. Patrinos, Returns to investment in education: a further update (2004)

<sup>2)</sup> EPA, Technical update of the social cost of carbon for regulatory impact analysis (2013)

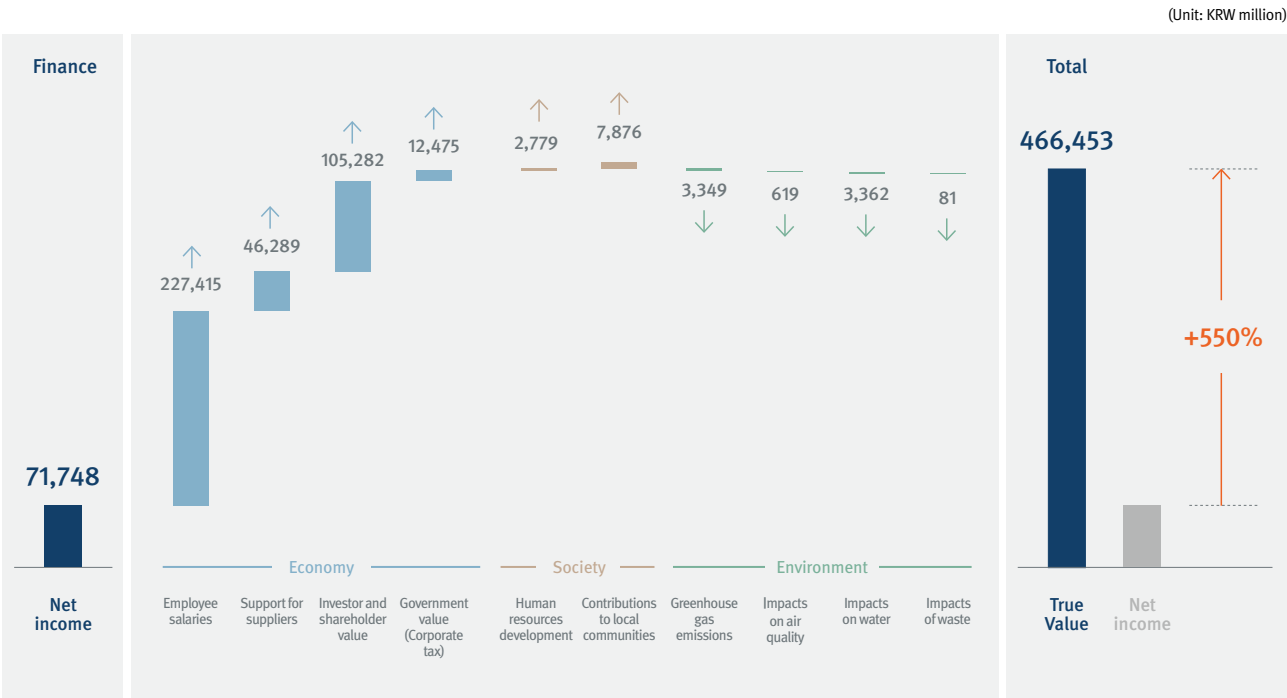
<sup>3)</sup> EEA, Revealing the cost of air pollution from industrial facilities in Europe (2011)

<sup>4)</sup> TruCost PLC, Natural capital at risk: the top 100 externalities of business (2013)

<sup>5)</sup> A. Rabl, J. V. Spadaro and A. Zoughaib, Environmental impacts and costs of solid waste: a comparison of landfill and incineration (2009)

### 3. 2018 Sustainability Management Value

True Value of Doosan Infracore, including its added economic, social, and environmental values, amounted to KRW 466,453 million as of the end of 2018, representing 6.5 times more than its financial value.

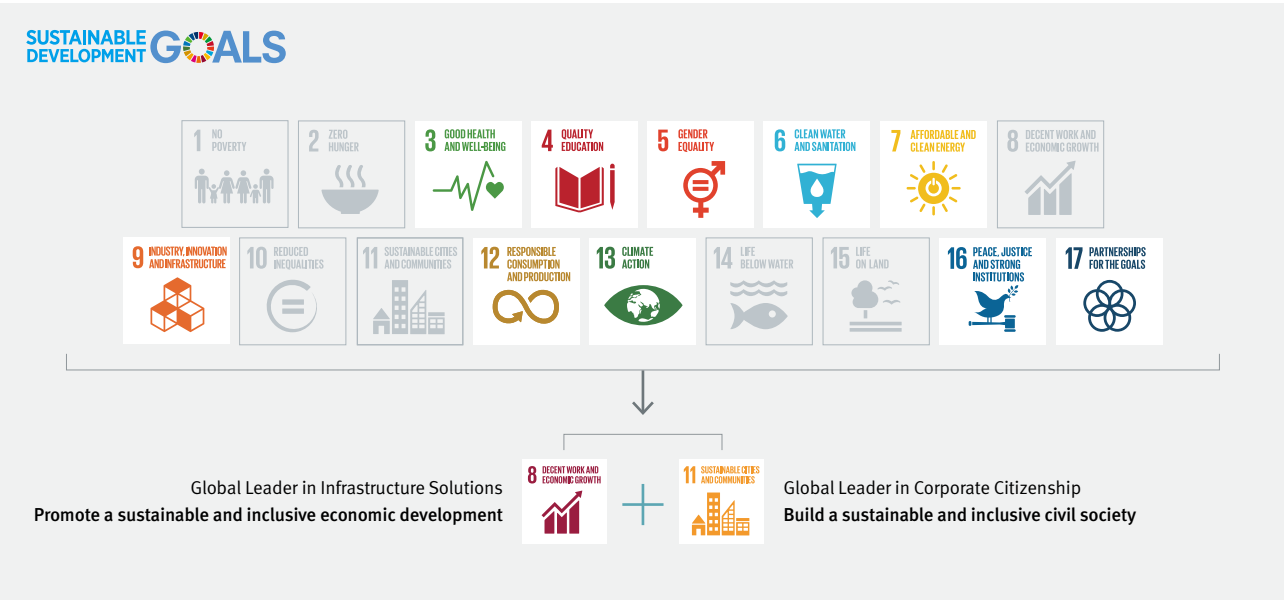


Finance	In 2018, our net income (in the non-consolidated basis) increased by 18.7% year-on-year to KRW 71.7 billion, mainly attributable to a surge in sales of construction equipment in advanced markets, China, and emerging markets, as well as an increase in profitability of our engine business (P. 8-9).
Economy	Our economic net benefit generated in 2018 amounted to KRW 391.5 billion, a year-on-year decrease of 19%, as no dividend was paid out for hybrid capital instruments on the basis of the accounting standards, although there was a slight increase in support for our suppliers, including the Shared Growth Fund and the win-win encouragement fund (P. 87), as well as our corporate tax payments. We also introduced a paper ballot and an electronic voting system (P. 79) to enhance shareholder value, and expanded our compliance program in order to comply with the government's policy, rules, and regulations (P. 82).
Society	Our social net benefit generated in 2018 increased by 29.3% year-on-year to reach KRW 10.7 billion due to the increase in our CSR investment, such as disaster relief and other social contribution activities (P. 109), as well as Dream School operations (P. 96).
Environment	In 2018, our net environmental costs from business operations amounted to KRW 7.4 billion, a year-on-year decrease of 42.3%. There was a slight increase in our GHG emissions, air pollutants emissions, and waste disposal due to an increase in production volume. However, we offset a part of this increase by implementing a mid- to long-term roadmap and an action plan to meet the requirements of the emissions-trading system (P. 74), and through the recycling of waste recycling (P. 75). In August 2018, we completed our voluntary soil remediation work and obtained government approval for purification, which significantly reduced our environmental costs. In addition, we are currently working to reduce our impact on air quality by installing dust collectors, new painting facilities, and concentrated catalyst oxidation facilities, and also by improving our odor processes (P. 75). In improving water quality, we are promoting the automation of the entire wastewater treatment process and installing facilities to reduce nonpoint pollution source (P. 75).

UN SDGs Alignment

Doosan Infracore seeks to strategically aligns its key businesses with the UN Sustainable Development Goals (SDGs) guided by its direction to contribute to the development of society through cooperation between developed and developing countries as well as development of new market and new businesses (Global Leader in Infrastructure Solutions). Doosan Infracore also does its utmost to go beyond CSR activities to create social values across the overall value chain with an aim to systematically implement the SDGs as a global corporate citizen (Global Leader in Corporate Citizenship).

Through constant communication and strategic partnerships with its stakeholders, Doosan Infracore will create synergies. Furthermore, it will focus on strengthening its corporate competitiveness by identifying business opportunities for the future and creating sustainable values for the company and society as a whole.



1. Approach

Doosan Infracore approaches UN SDGs from the perspective of People, Product, and Processes (3P), and define the activities designed for each goal on its own. This report shows how the company has contributed to SDGs through its strategic performance and CSR activities in 2018 by categorizing them into three levels and providing major activities for each level to ensure in-depth analysis of its contributions.

3P		LV	
01 PEOPLE	Activities to support and nurture ‘People’ – one of Doosan Group’s core values (Employees, customers, suppliers, and local communities)	Level 1	<b>Corporate activities that do not hinder the support for SDGs</b> Establishing an environment for seamless implementation of SDGs and the process of responding to laws and policies that the company should observe as a corporate citizen
02 PRODUCT	Activities to consider eco-friendliness and sustainability from such initial stage as R&D and product design	Level 2	<b>Promoting activities that contribute to achieving SDGs</b> Making additional efforts to facilitate the implementation of SDGs, while executing an implementation process that is more systematic than the prior step
03 PROCESS	Activities to increase positive impacts while reducing negative social and environmental impacts of manufacturing process	Level 3	<b>Innovation that promotes long-term change</b> Long-term vision and strategies to promote social innovation, create Doosan Infracore’s corporate value, and develop future growth engines

2. 2018 Activities by Goal

	Corporate activities that do not hinder the support for SDGs	Promoting activities that contribute to achieving SDGs	Innovation that promotes long-term change
	LEVEL 1	LEVEL 2	LEVEL 3
<b>People</b>			
3 GOOD HEALTH AND WELL-BEING	<ul style="list-style-type: none"><li>Maintained smoke-free workplaces</li><li>Conducted activities to prevent occupational diseases</li><li>Expanded the installation of automated external defibrillators (AEDs)</li></ul>	<ul style="list-style-type: none"><li>Continued to run work-related stress management programs</li><li>Helped employees, including those of suppliers, improve their health and quality of life</li></ul>	<ul style="list-style-type: none"><li>Developed a digital physical examination record management system</li><li>Developed eco-friendly technologies that prioritize customers’ health and safety</li></ul>
4 QUALITY EDUCATION	<ul style="list-style-type: none"><li>Upgraded the functional competency (FC) system for employees in Korea and overseas</li><li>Provided capacity-building training through a self-led learning system</li></ul>	<ul style="list-style-type: none"><li>Operated the integrated global HR system</li><li>Ran the Dream School to help youth to discover their dreams</li><li>Ran the Junior Engineering Class based on employees’ talent donations</li></ul>	<ul style="list-style-type: none"><li>Operated the Leading Supplier program based on the Doosan Supplier Excellence Program (DSEP)</li></ul>
5 GENDER EQUALITY	<ul style="list-style-type: none"><li>Eliminated all forms of gender discrimination against women in job allocation</li><li>Operated flextime to promote a work-life balance</li></ul>	<ul style="list-style-type: none"><li>Offered gender equality education to employees</li><li>Expanded the percentage of female managers (position holders)</li></ul>	<ul style="list-style-type: none"><li>Operated the Women’s Council and held the HR Executive Meeting to build a culture of gender equality</li></ul>
16 PEACE, JUSTICE AND STRONG INSTITUTIONS	<ul style="list-style-type: none"><li>Operated reporting channels, such as the Human Rights Protection Center (Help Line) and the Internal Reporting Center</li><li>Offered human rights education and conducted campaigns</li><li>Implemented the annual workplace EHS compliance evaluation</li></ul>	<ul style="list-style-type: none"><li>Developed and distributed a manual on the prevention of human rights risks based on the results of focus group interviews (FGIs)</li><li>Maintained a transparent information disclosure system</li></ul>	<ul style="list-style-type: none"><li>Developed an in-house due diligence tool to check the level of awareness on human rights</li><li>Expanded the Gender Equality Center into the Human Rights Protection Center</li></ul>
17 PARTNERSHIPS FOR THE GOALS	<ul style="list-style-type: none"><li>Strengthened the alignment between corporate values and social values</li><li>Planned and carried out social contribution activities tailored to local communities</li></ul>	<ul style="list-style-type: none"><li>Aligned the company’s key businesses with UN SDGs</li><li>Formed a partnership with Palantir Technologies to build a data-based collaboration platform</li></ul>	<ul style="list-style-type: none"><li>Analyzed social values by using the ‘True Value’ methodology</li><li>Began to establish an ESG framework and indices</li></ul>
<b>Product</b>			
9 INDUSTRY INNOVATION AND INFRASTRUCTURE	<ul style="list-style-type: none"><li>Conducted the DRAW (Digital edge Reinforcement AT Work) session to nurture talents for the Fourth Industrial Revolution</li></ul>	<ul style="list-style-type: none"><li>Introduced hybrid excavators, construction equipment with unmanned and automation technologies, and equipment management solutions by using telematics</li></ul>	<ul style="list-style-type: none"><li>Operated the Concept-X project and applied optimized technologies for future construction sites, such as unmanned autonomous equipment and 5G</li><li>Developed prerequisite technologies for hybrid powertrain</li></ul>
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	<ul style="list-style-type: none"><li>Established definitions and standards for eco-friendly products, and calculated the portion of eco-friendly products</li></ul>	<ul style="list-style-type: none"><li>Reflected eco-friendly product management processes in new product development processes</li><li>Developed LNG engine technologies to cope with the growing alternative fuel market</li></ul>	<ul style="list-style-type: none"><li>Expanded the gas engine line-up</li><li>Developed technologies and products to secure alternative fuel and engine electrification technologies</li></ul>
13 CLIMATE ACTION	<ul style="list-style-type: none"><li>Developed and produced vehicle engines that satisfy emissions standards of each country</li></ul>	<ul style="list-style-type: none"><li>Fostered GHG and/or energy experts</li><li>Enhanced the competitiveness of diesel engines</li><li>Supplied engines that meet the new Chinese emission standards which is scheduled to be enacted in 2020</li></ul>	<ul style="list-style-type: none"><li>Improved combustion and post-processing technologies to cope with the next-generation emissions regulations</li></ul>
<b>Process</b>			
3 GOOD HEALTH AND WELL-BEING	<ul style="list-style-type: none"><li>Complied with the EHS laws and guidelines in Korea and overseas</li><li>Expanded safety facilities at worksites and distributed safety manuals</li></ul>	<ul style="list-style-type: none"><li>Helped suppliers improve safety management capacity through the Safety and Health Symbiotic Cooperation Program</li><li>Provided on-site inspection and EHS technology support for outside suppliers</li><li>Operated the process safety management (PSM) system to prevent fatal accidents</li></ul>	<ul style="list-style-type: none"><li>Promoted safety culture social contribution activities through a private-public partnership</li><li>Obtained the Safety Zone Certification, the only voluntary corporate safety evaluation system in Korea</li></ul>
6 CLEAN WATER AND SANITATION	<ul style="list-style-type: none"><li>Operated the wastewater recycling system</li><li>Expanded the wastewater reclamation and reuse system and constructed separate rainwater-exclusive intake facilities for industrial water conservation</li></ul>	<ul style="list-style-type: none"><li>Maintained pollutants below 40% of the legal requirement through the automation of all wastewater treatment processes</li></ul>	<ul style="list-style-type: none"><li>Put a preventive maintenance process in place by establishing and implementing regular air/water quality environmental facility maintenance</li></ul>
7 AFFORDABLE AND CLEAN ENERGY	<ul style="list-style-type: none"><li>Built an energy intensity management system</li><li>Reviewed the way to use renewable energy</li></ul>	<ul style="list-style-type: none"><li>Operated the Energy Management System (EMS)</li><li>Identified new energy conservation items for continuous energy conservation</li></ul>	<ul style="list-style-type: none"><li>Enhanced EMS data reliability by establishing an energy measuring device monitoring system</li><li>Upgraded the energy monitoring/management systems</li></ul>
9 INDUSTRY INNOVATION AND INFRASTRUCTURE	<ul style="list-style-type: none"><li>Stabilized an ICT-based production processes and promoted industrial development</li></ul>	<ul style="list-style-type: none"><li>Promoted operational innovations through digital transformation</li><li>Operated DoosanCONNECT™, a remote equipment management solution</li></ul>	<ul style="list-style-type: none"><li>Launched a mobile DoosanCONNECT™ app and upgraded its main features</li><li>Developed ‘Smart Maintenance’ service offering preemptive maintenance services</li><li>Established a global MES platform and promoted smart factory</li></ul>
13 CLIMATE ACTION	<ul style="list-style-type: none"><li>Made investment in energy efficiency and strived to reduce GHG emissions</li><li>Analyzed the GHG emissions scenario and established reduction goals based on the government’s reduction roadmap</li></ul>	<ul style="list-style-type: none"><li>Managed disaster risk systematically by operating a business continuity management (BCM) system at the Group level</li><li>Launched the GHG/Energy Reduction Council</li><li>Implemented in-house climate change prevention campaigns</li></ul>	<ul style="list-style-type: none"><li>Established an action plan to set and achieve emission reduction goals</li></ul>



# Our Strategy

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Innovation

Relentless innovation is what drives Doosan Infracore forward.

At the center of the tectonic change called the Fourth Industrial Revolution, we will grow into a global leader in infrastructure solutions by transforming not only what we do but also how we do it in step with the digital era.

## Strategy Overview

The construction equipment industry is vulnerable to flows of the global economy, government policy, infrastructure investment, and other macro factors. It also has a characteristic of undergoing ups and downs on a regular basis. Recently, the industry has been growing on increasing infrastructure investments, a continuing growth momentum of emerging markets, and a booming mining industry fueled by soaring prices of raw materials. In response to rapid market changes, global construction equipment makers are actively attracting customers with distinctive products and services, while also developing communication technology (ICT)-linked solutions and other new technologies in pursuit of competitive advantage.

In preparation for market uncertainty, Doosan Infracore is focusing on rebuilding its dealer networks, securing a position of advantage in markets, and strengthening bond and cash flow management through strategic resource allocation into markets with high growth potential in order to enhance financial soundness. We also strive to bolster product and service competitiveness and thus maximize customer value by expanding the product line-up of mini excavators and other equipment and building sales foundations for the products; expanding rotary drill rig, ripper, and other special equipment production and parts sales; and developing new products that meet EU Stage V and China's Stage IV emissions standards.

In addition, we expanded DoosanCONNECT™-based solutions to a global level and launched the Concept-X project which centers on converging the latest in ICT and unmanned and automation technology with construction equipment to take the lead in future construction sites. As such, Doosan Infracore is speeding up its pursuit of digital transformation and implementation of new businesses in response to the fast-changing global business environment.

In 2018, Doosan Infracore stayed focused on growth and innovation amid rapidly-changing market conditions, and strived to leave a positive impact on society and stakeholders.

Taking a step further, under the slogan 'Powered by Innovation,' Doosan Infracore will preemptively respond to market uncertainties in 2019 and conduct value-focused corporate management, thereby solidifying its reputation as a world-leading company in the construction equipment industry.

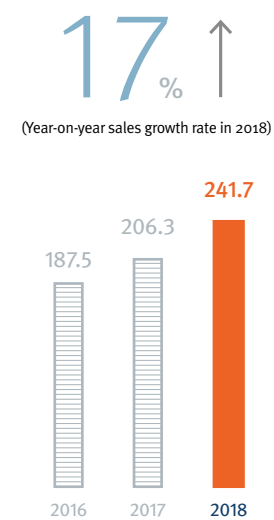




### Global growth of construction equipment business



### Global growth of parts business (Unit: KRW billion)



# SUSTAINABLE GROWTH

- 01 Strengthening Market Competitiveness
- 02 Enhancing Product Competitiveness
- 03 Building a Foundation for Stable Profits



## Strengthening Market Competitiveness

01



### North American/European Markets

Advanced markets, including North America, which is the second largest market in the world (single country basis), are growing on increasing infrastructure investments. As the construction and oil and gas industries have been on an upward trend in North America, demand for equipment in regions where these industries are well developed is expected to grow and thus lead to market growth. The European market is expected to gradually grow, with Southern and Eastern Europe leading the growth, followed by lower growth trends in major markets, such as Germany and the UK.

Doosan Bobcat had handled sales of Doosan Infracore's construction equipment in advanced markets. However, Doosan Infracore reorganized its construction equipment business with a focus on core products, as part of its plan to enhance overall business competitiveness, and took over the sales operations effective January 1, 2018. The company also re-established its business strategies, and worked on developing outstanding mid-to large-sized dealers and improving channel coverage to build a strong sales network. The Parts Distribution Center (PDC) in Atlanta was rebuilt to improve its responses to North American market demands for parts and to increase supply availability. Also, a PDC was opened in Seattle in April 2019 in response to a growing demand for parts in the northwest region. As a result, sales increased 11.9% over the previous year to KRW 759.8 billion indicating a successful takeover of the sales operations for the North American and European markets.

In 2019, advanced markets are forecast to grow at a bit lower rate due to a global economic downturn. To maintain its growth momentum and achieve qualitative growth in the North American and European markets, Doosan Infracore will secure mega dealers based on its strong global leadership, operate Customization Plants, and enhance fundamental product competitiveness by improving parts availability. The company will also expand product line-ups by launching a mini excavator (MEX) which is high in proportion to overall sales, improve profits by increasing sales of large heavy equipment, and lead the Concept-X project-based ICT solution business. Moreover, Doosan Infracore will improve business efficiency and product competitiveness across the value chain, including sales, product development, and production.

### Emerging Markets

Asia, South America, Africa, and other emerging markets grew at a higher rate on the strengths of rising material prices, increasing infrastructure investments, and robust growth of India and other major regions despite sharp exchange rate fluctuations fueled by uncertainties in some emerging countries in the second half of 2018. In the past, demand for mid- to large-sized equipment was high in emerging markets, reflecting the high proportion of large infrastructure projects, such as road, railroad, and port, within the market. However, the compact equipment market has been steadily growing as a result of a recent rise in labor costs and a spreading urbanization of farming villages.



DX75, a crawler-type MEX





Articulated dump truck (ADT)

DL450-5L, a wheel loader of Doosan Infracore

Against this backdrop, Doosan Infracore has categorized countries into two regions – one for risk management and the other for sales expansion – in consideration of each country's situations, and is taking a different approach to each category based on its continued efforts at expanding coverage and strengthening channel competitiveness in emerging markets. In addition, the company is steadily solidifying the foundation for growth in consideration of market characteristics and situations by building a revenue structure that ensures a stable inflow of sales even in a slowing market and by making continued efforts to diversify its customer mix. Accordingly, Doosan Infracore is employing different strategies for different category regions – a high concentration of sales resources in high-potential regions and a conservative sales approach in such risky markets as Turkey, Argentina, and Russia. In Indonesia and the Philippines, the company will steadily increase sales of 20-ton mid-sized products while targeting the compact equipment market with DX75, DX140 and other products that have yet to be exported. In Chile, the company is increasing sales in underperforming markets, such as mining and forestry, by developing additional new customers.

In addition to increasing overseas presence and market share, Doosan Infracore seeks to diversify its customer mix and thus expand the sustainable income structure

by focusing on high-price large equipment sales and fleet deals. To this end, the company has broken away from the simplicity of selling products and instead introduced 'Smart Maintenance' service, a pilot program offering genuine parts and maintenance service solutions based on information collected through the DoosanCONNECT™. The company also implemented a value-selling strategy in emerging markets, such as South America and Southeast Asia, and thus secured a series of highly-profitable mega deals and special equipment supply contracts.

In July 2018, Doosan Infracore took part in INNOPROM-2018, the largest industry expo in Russia, and established the foundation for market expansion by showcasing its equipment and cutting-edge technologies, including wheel loaders and DoosanCONNECT™. As a majority of worksites in Russia are located in remote areas, which makes it very difficult for customers to access dealer services, visitors showed a great interest in the remote equipment monitoring features of DoosanCONNECT™.

In Iraq, Doosan Infracore secured a supply contract for 45 22-ton excavators through competitive bidding, the largest of single-item public tenders held in emerging markets. In Africa, the company signed fleet deals in Sudan, Algeria, and Ghana as a result of its strategic approach to local markets and based on distinctive services.

In Sudan, in particular, the company won a supply contract for 44 excavators and 16 wheel loaders from a large civil engineering company that carries out irrigation and public works projects due to DoosanCARE and other distinctive customer-oriented services. In Algeria, the company signed a contract to supply 27 wheel loaders to a mining company, as a result of its implementation of a strategy that is based on an accurate analysis on public companies which make up a majority of the domestic market. Also signed was a contract to supply 20 excavators to a gold mining company in Ghana. These and other fleet deals led the company's 2018 construction equipment sales to KRW 1,180.0 billion in emerging markets which represents a year-on-year rise of 8.5%, thereby maintaining its growth trend for the past three years.

Doosan Infracore continues to sign fleet deals in emerging markets in 2019. In January, the company signed articulated dump truck (ADT)<sup>1)</sup> supply contracts with Singapore and Hong Kong companies. The contract to supply 30 ADTs to KTC, Singapore's largest engineering construction company, is the largest deal among Doosan Infracore's ADT supply contracts. Including the 20 ADTs sold to KTC in 2018, it will be operating a total of 73 Doosan ADTs. In Hong Kong, 10 ADTs will be used by the local construction company Luen Yau for the new airport construction project. As the ADTs will be used for expanding the Hong Kong airport terminal and constructing additional runways, the probability of

generating additional sales is high once construction is launched. The company's consecutive winning of large ADT supply contracts in emerging markets is the result of its efforts to increase customer satisfaction, such as combining of outstanding products and DoosanCONNECT™ and other innovative service solutions.

In Saudi Arabia, Doosan Infracore identified local market demands and preemptively respond to them with products competitive in performance quality and price. As a result, the company won contracts to supply 46 excavators and wheel loaders to be used in mining, infrastructure construction, as well as oil and gas pipeline construction. In Uzbekistan, supply contracts for 47 excavators and wheel loaders were obtained from equipment rental and large companies due to outstanding product and service quality, and based on the company's long-established trustworthiness.

In 2019, Doosan Infracore will choose key areas with high potential and focus on strengthening its sales channels and selling large equipment in the selected areas. It will further strengthen product and service competitiveness by releasing products customized to emerging markets, bolstering its sales network, and differentiating services. In light of a slowing global economy, the company will focus on managing profitability and receivables in emerging markets.

### Chinese Market

The Chinese construction equipment market, which had been showing signs of recovery since the second half of 2016, grew at a rate higher in 2018 than before thanks to increasing national infrastructure investments, a robust development of mining fueled by rising raw material prices, and growing needs to replace the aging equipment sold in 2010 to 2011. In particular, sales of mid- to large-sized equipment rose considerably in proportion due to a robust demand driven by infrastructure and mining projects across the country.

<sup>1)</sup> Articulated Dump Truck (ADT): Large dump truck mainly used in rough areas, such as mines and quarries. A special articulation system is applied to Doosan Infracore's ADT to ensure stable and powerful driving performance, while a six-wheel drive system delivers even distribution of an object's weight across the truck, thereby increasing grip force



In addition to product sales, Doosan Infracore has been focusing on enhancing profitability in preparation for an economic downturn. Specifically, the company strived to strengthen channel competitiveness through expansion of highly-competitive dealerships; enhance bond management and expand cash sales; and increase high-margin product sales in proportion, and thus achieved stable business growth in 2018. In addition, the company is providing finance packages customized to local circumstances and expanding the special equipment business, while improving its service quality to enhance customer satisfaction and providing customer-tailored equipment information using social media, including WeChat, in order to proactively respond to customer needs. As a result of these and other efforts to increase market share and profitability, Doosan Infracore recorded sales of KRW 1,315.1 billion which represents an over 40% increase in the Chinese market over the past two to three years and more than a four-fold increase in the past four years.

In 2018, Doosan Infracore also focused on bolstering dealership competitiveness and providing locally-tailored finance packages to increase product sales through building of strong customer relations. As dealership competitiveness is an important factor in China, the company made continuous efforts to increase the percentage of highly-competitive dealerships, including channel restructuring and performance-linked incentive programs. As a result, the percentage of A-grade dealerships (a market share of around 10%) grew from 19% in 2017 to 24.3% in 2018. Locally-customized finance packages were designed and offered in consideration of circumstances by region, with a focus on preferred sales conditions offered to preferred customers (different installment payment arrangements depending on the size of cash deposits) and a next-generation finance system. To minimize mid- to large-sized equipment supply shortages caused by a sudden surge in market demand, the company supported a smooth product supply by assigning each dealership a number of equipment deemed optimal for the local environment.

Doosan Infracore maintains its competitive edge in the 30-ton excavator sector of the Chinese market. Demand for mid- to large-sized equipment has been increasing in China with a recent infrastructure and mining expansion. In response, the company has been bolstering its large excavator line-up by launching the DX700, following with the DX800LC, an ultra-large 80-ton excavator equipped with Doosan Infracore's latest technologies as a flagship model. Since its 2017 launch, it has received a highly favorable response from the market and customers, attested by its steadily-rising sales. In 2016, Doosan Infracore started to change over from dealership to directly-managed chain stores in select areas of Shanxi Province, including Inner Mongolia, Beijing, and Hebei Province in order to advance into mining or rocky regions where large-scale infrastructure projects abound. By the second half of 2017, the company has completed the network of sales outlets and started to attract customers.

As a result of its active efforts to expand presence in the mid- to large-sized equipment market, the company's mid- to large-sized excavator sales continue to grow in 2019 as in 2018. In January 2019, Doosan Infracore signed a supply contract for 36 large excavators, including ultra-large 80-ton excavators, with Neimenggu MengXin Group, a mining leader in China. The Neimenggu Group, mining around 20 million tons of coal a year from its four coal mines, signed the contract after a two-month thorough review of the work performance and efficiency, including fuel consumption, as well as the details of the DoosanCARE service program. The supply contract is significant in that the company has won over a leading customer of the Chinese mining market as a long-term strategic partner; and expected to have a positive influence on other large potential customers in need of quality mining equipment.



Introduction of  
Doosan DX800LC-5B



DX800LC, a ultra-large 80-ton excavators to be supplied to  
Neimenggu MengXin Group



As Chinese customer needs steadily become segmented, a demand is rising for special equipment, such as the rippers<sup>1)</sup> and rotary drill rigs<sup>2)</sup>. To cease upon such an opportunity to grow its special equipment business and secure a presence in its key market, Doosan Infracore has organized a sales unit and set up work processes, and it is now in the process of strengthening its strategic alliances with local companies. As an outcome, Doosan Infracore signed a memorandum of understanding (MOU) in January 2019 with China's Zhengzhou Yutong Heavy Industries Company on supplying 1,200 upper structures<sup>3)</sup>, worth around KRW 250 billion, of excavators necessary for production of rotary drill rigs. Zhengzhou Yutong Heavy Industries Company is a machinery manufacturer of Zhengzhou Yutong Group, the No. 1 bus manufacturer in China. Since 2011, the Chinese partner has been supplied around 200 upper structures for production of rotary drill rigs, cranes and other special equipment. Doosan Infracore plans to use this supply contract as an opportunity to expand its special equipment market in cooperation with Zhengzhou Yutong Heavy Industries Company.

China's construction equipment market in 2019 is forecast to grow at a rate similar to that of 2018 as the government is likely to maintain its infrastructure investment policy and market demand to continue in line with the equipment replacement cycle, while environmental regulation to become more stringent. Despite concerns over a slowdown of the Chinese market, Doosan Infracore will achieve sales targets by improving its product mix through mid- to large-sized product sales increase and by strengthening channel competitiveness through special management of regions where its sales are relatively weak. The company will focus on increasing profit-centered sales and the percentage of cash sales, improving receivables soundness, and engaging in other risk management efforts, with the goal of achieving qualitative growth and continue its 2018 growth momentum in 2019.

<sup>1)</sup> Ripper: Special equipment with a hook-shaped attachment instead of an excavator bucket to dig up solid soil or soft rocks

<sup>2)</sup> Rotary drill rig: Special equipment with a rotating crawler drill attached to the excavator's arm; and it is used mainly for vertical digging during foundation work

<sup>3)</sup> Upper structure: An excavator consists of an upper frame, which comprises a cockpit and arm, among others, and a lower frame for moving and stabilizing



## Enhancing Product Competitiveness

02

### Direction for Mid- to Long-term Product Development

To develop products more competitive and lay the foundation for long-term growth, Doosan Infracore constantly updates its direction for product development, and formulates and implements strategies for developing technologies and products in line with the direction. The company sets a product development direction in consideration of such customer preferences as product durability and convenience, such market trends as use of eco-friendly fuels, and such base technologies as ICT. Doosan Infracore is preparing for and responding to the market through development of ICT solution connection and unmanned and automated equipment; zero-emissions equipment; and global platform equipment development.

In partnership with Trimble Inc., Doosan Infracore is realizing machine controls (MC) and developing service solutions linked with DoosanCONNECT™. It is also developing unmanned and autonomous equipment in cooperation with external solution-specializing firms. In addition, electric excavators are being developed in response to emissions regulations toughening mainly in advanced countries. As such, Doosan Infracore is enhancing product competitiveness by reflecting changes in customer, social, environmental, and technological development.



To produce more competitive engine products, the company has shifted its product development direction toward technologies for alternative fuel and engine electrification, while focusing on the performance, fuel efficiency, durability, and reliability. To prepare for next-generation emissions standards, the company is expanding the scope of its combustion technology R&D to include CNG, LNG, and other alternative fuels. The company is preparing for engine products of the future by accumulating engine electrification technologies, including hybrid engines.

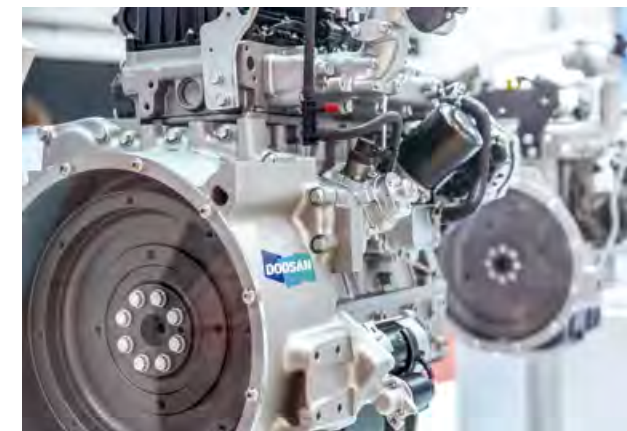
Under the direction, Doosan Infracore is developing hybrid engine technology in the industrial engine sector. By developing an advanced 48V industrial hybrid powertrain<sup>1)</sup> and conducting research on electrification of mechanical parts, the company seeks to secure relevant prerequisite technologies and build the foundation for growing into a total powertrain solution company.

### Developing New Engines to Strengthened Emissions Regulations

According to its mid- to long-term product roadmap, Doosan Infracore is focusing on developing new products that meet next-generation emissions standards, including EU Stage V<sup>2)</sup> and China's Stage IV emissions standards, while also expanding its engine line-up and attracting customers overseas.

In January 2017, the company developed a compact G2 Stage V pilot engine in response to a scheduled enforcement of EU Stage V emissions standards, and after a series of thorough durability and quality tests, it plans to mass-produce an improved version in 2019 when the regulation takes effect. The ultra-low fuel-consumption combustion (ULFC) technology, an upgraded version of the combustion technology used in the production of an earlier model of compact G2 engines, has been applied to the G2 Stage V model. Improved in fuel efficiency up to 6% higher (based on D24) than the previous model, the compact G2 Stage V engine boasts a best-in-class performance in terms of power, torque, durability, and reliability. The company also took actions to promote the sales of G2 Stage V engines, such as operating of a group of teams dedicated to serving prospective customers and provision of distinctive services. Thanks to the actions and to the superior performance features of the engine, the company signed large-scale supply contracts with global companies, including KION of Germany in 2017, and Baoli of China and Arbos of Italy in 2018.

Prior to launching new products equipped with the Stage V engine, including excavators and wheel loaders, Doosan Infracore trained service personnel assigned in European markets for two weeks, covering technologies applied to



the new products, concepts related to parts information, and equipment inspection. In particular, R&D personnel who have worked on the designing of the products, took part as an instructor and provided an in-depth education on diverse subjects, ranging from development concept to product operation, helping trainees improve their understanding of the products. Service personnel of the company's European subsidiary who has completed advance training participated as a teaching assistant and shared their practical know-how with trainees. Through both theoretical and practical training on a continued basis, the company will deliver as much information as possible to service personnel and thus establish its Stage V engine as a competitive and sustainable product in Europe.

Lovol Doosan Engine Company (LDEC), a joint venture of Doosan Infracore and Lovol, has been developing a 3.4-liter G2 engine (D34) as part of its plan to mass-produce an engine that meets China's Stage IV emissions standards, slated to be in effect at the end of 2020. The engine will first be used in agricultural machinery to be manufactured by Lovol, and then introduced to the construction machinery and generator engine markets in China, to be followed by emerging markets with emissions standards similar to those in China. Doosan Infracore will develop mid- to long-term growth drivers by mass-producing next-generation engines to meet EU Stage V and China's Stage IV emissions standards through advance quality management.

<sup>1)</sup> Powertrain: Main components that generate power and deliver it to the road surface, which include transmission, drive shaft, final drive, wheels, and tires

<sup>2)</sup> Stage V: Emissions regulations enacted by the EU in relation to non-road engines that went into effect starting in 2019 (regulates particulate matter and nitrogen oxide, etc.)



### Strengthening Manufacturing Capabilities

Doosan Infracore upgraded its Incheon excavator plant in 2016 into a production system flexible enough to reflect market conditions. The company has since adopted a number of advanced systems, including production quality monitoring, modularized design application, and efficient production line operations, and as a result, it was able to streamline job processes, reduce standard work hours, shorten the distribution distance, increase per-capita production, and achieve other productivity-related improvements. Moreover, the company expanded the Fool Proof<sup>1)</sup> system to major processes with the goal of reducing production defects to zero and ensuring product quality. It has also established a pull-based supply chain system which allows the supply of materials just enough for production of one unit at a time, thereby minimizing the waste of materials and lead time.

Doosan Infracore operates its unique Doosan Production System (DPS) based on the Lean production method<sup>2)</sup> in order to ensure the production of consistently high-quality products at all of its plants around the world. The DPS reflects Doosan Infracore's unique systems of synchronize production, standardized manufacturing processes, and constant production line innovation. The DPS is composed of six principles – upkeep and constant upgrade of quality, on-time production, stable operation, full management support, and Team Doosan – and 22 subsequent modules. In order to institute the DPS, the company implements continuous activities such as conducting annual current-state assessments of plants per module, establishing goals and plans for improvement, and tracking the status of improvement. As a result, the Incheon Plant improved its manufacturing lead time by 13% year-on-year in 2018; and the Gunsan Plant enhance its standard man hour by 9.3%. Doosan Infracore aims at a 15% productivity improvement in the mid- to long-term future by continually reducing production and work loss, improving standard MH, and adjusting line of balance (LOB)<sup>3)</sup> at its assembly lines.

<sup>1)</sup> Fool proof: A device designed to prevent human errors

<sup>2)</sup> Lean production method: Production system that maximizes production efficiency while keeping production capacity and resources, such as personnel and production facilities at the minimum required level

<sup>3)</sup> Line of balance (LOB): The efficiency of each unit process of production is analyzed so that improvements can be made to prevent bottlenecks

## Building a Foundation for Stable Profits

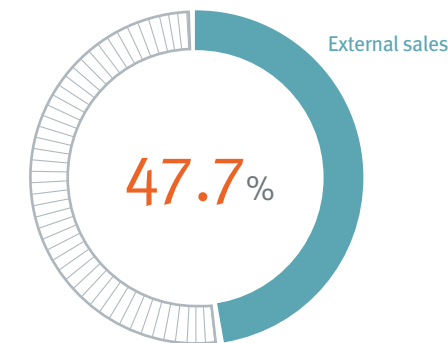
03



### Increasing External Sales of Engines

The global engine market turned upward in 2018 as industry demand started to recover thanks to rising oil and raw material prices in the second half of 2017. Riding on such market growth, Doosan Infracore set a record in engine business sales and increased profit by making product mix improvements, such as increasing sales of gasoline and large generator engines.

Average portion of external sales of engine for the past three years



Doosan Infracore has been seeking to diversify its customer mix to better respond to changes in the global engine market and ensure stable sales even in a slowing market. In addition to internal sales for construction equipment and Doosan Bobcat, the company has been increasing external sales by extending its market to include vehicle, ship, and power generation. It is also pursuing business diversification and developing technologies relevant to engine upstream and downstream sectors, as well as electronic and hybrid powertrains in an effort to proactively respond to changes to come. In particular, the company is developing new products, including a compact G2 Stage V-standard engine, that meet next-generation emissions standards to increase external sales, thereby securing long-term supply contracts and large captive customers, such as LDEC JV.





## DX22



High-performance,  
eco-friendly engine



Produce 20% more  
power than the existing  
mechanical-type engine  
of the same class



The best-in-class fuel  
and oil efficiency



As a result, Doosan Infracore signed a contract with Germany's KION, a world-leading forklift company, in June 2017 to supply around 67,000 compact G2 engines by 2028. Three more engine supply contracts followed in 2018 from global companies, including Baoli in China and Arbos in Italy, totaling some 43,000 engines. To Baoli, the Chinese fork lift subsidiary of KION, the company will be supplying around 13,000 compact G2 Stage V engines by 2025 which will be used to power the buyer's main export models. The company also has signed a letter of intent (LOI) with Arbos, a tractor manufacturer in Italy, on diesel engine development and supply. A 1.8- to 3.4-liter G2 engines will be developed for agricultural machinery and a total of 27,000 units will be supplied for six years starting in 2020. Thanks to this LOI, Doosan Infracore now has a complete line-up of engines to cover all European markets for engines, ranging from those for construction equipment and forklifts to engines for agricultural use, and has thus secured opportunities for further business expansion. By establishing a strategic partnership with a global brand, as a follow-up to that with Doosan Bobcat, the leader of the compact construction equipment markets in North America and Europe, and to that with Germany's KION, the world's second-largest forklift company, Doosan Infracore is steadily strengthening its position in the engine market and stably expanding external sales.

As the shale gas markets has recently recovered in North America and Europe, which had remained stagnated in the past weighed down by low oil prices, demand for diesel and gas generator engines has been on the rise. Leveraging its full line-up of generator engines, ranging from mechanical-type engines to the latest in electronic engines, Doosan Infracore is meeting market demands not only in the Middle East but also in North America and Europe, while also focusing on attract new customers. At the Middle East Electricity (MEE) held in March 2019, the company unveiled seven generator engine models, including the DX22 mass-production model unveiled last year as a pilot product. The 22-liter large electronic engine DX22 produces superior power compared to its competitors in the same class. This high-performance, eco-friendly engine can produce 20% more power than the DV22, its mechanical-type predecessor of the same class. Its improved compatibilities and extended parts replacement cycle have led to improved customer convenience. In fuel and oil consumption as well, the engine outperforms its competitors. With the launch of the DX22, Doosan Infracore plans to enter the large electric generator engine market.

In addition to a Stage V engine, Doosan Infracore develops vehicle engines to emissions standards of all countries, and have them installed in buses, trucks, and commercial vehicles across the world. The company has been

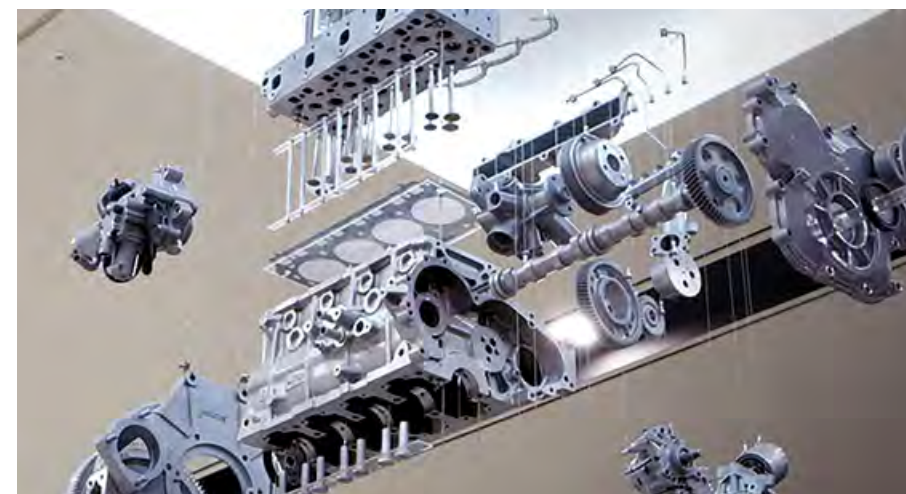
increasing the market confidence in its vehicle engines and bolstering the competitiveness of its vehicle engine business by further strengthening the market competitiveness of the Euro 6 diesel engines which were launched in 2017, and continuously improving quality and expanding customer PR activities. Targeting the vehicle engine markets of Asian countries which has been relatively lagging behind on emissions regulation, the company is expanding its sales beginning with Vietnam. Vietnam's commercial vehicle market is growing fast, and its vehicle engine market is forecast to grow with the strengthened CO<sub>2</sub> emissions regulations. Accordingly, Doosan Infracore is expanding its business portfolio beyond supplying of complete engines to include supplying half-finished products more suitable for vehicle production. In August 2018, Doosan Infracore signed a three-party LOI on the Indonesian National Engine Manufacturing Project to advance into the Indonesian market, the largest of engine markets in Southeast Asia. The other two parties are PT Boma Bisma Indra (BBI), a local state-run engine manufacturer, and a local dealer. This LOI is in line with the Indonesian government's diesel engine localization policy which aims at promoting the manufacturing industry. By signing the LOI, Doosan Infracore has effectively established the foundation for targeting the Indonesian engine market, including parts supply, sale, and production. The LOI has also served as an opportunity for the company to go beyond generator engine sales and expand sales of diverse engines, including vehicle, industrial, and vessel engines, in Indonesia. By taking an integral part in the Indonesia project after its entry of the Vietnamese vehicle engine market, the company has secured a strategic beachhead from which to advance into a high-potential Southeast Asian engine market. Doosan Infracore will strengthen its global stature as a power solution provider.

The establishment of LDEC JV in March 2018 with Lovol, the largest agricultural machinery company in China, has made it possible for high-quality engines produced in Korea for advanced markets and economic ones produced in China for emerging markets to complement each other. The joint venture also is expected to generate a great deal of synergy in the engine business as it sources engine parts and resources in China through Lovol's extensive business network and exports finished products through Doosan Infracore's global sales network. In September 2018, LDEC JV held a start-up ceremony for its 3.4-liter G2 engine (D34) produced in China. This engine is the product of localizing the eco-friendly, high-efficiency compact G2 engine developed by Doosan Infracore to meet China's Stage IV emissions standards, slated for 2020. The D34 engine will be first applied to Lovol's agricultural machinery. In March 2019, a groundbreaking ceremony was held for LDEC JV's engine plant. Scheduled to be completed in June 2020, the plant will comprise such production facilities that reflect Doosan Infracore's engine production know-how, as an engine block processing line, engine assembly line, and parts warehouse, as well as a research lab proto shop, parts quality measurement lab and other research facilities. Once completed, the plant can produce up to 50,000 compact G2 engines (D18, D24, D34), and with an additional production line soon afterward, another 50,000 units, which brings total units to over 100,000. As LDEC JV plans to make inroads into emerging markets with emissions standards similar to those of China, Doosan Infracore will provide full support so that the joint venture can perform as well as it has done in the generator engine and construction equipment engine markets in China.

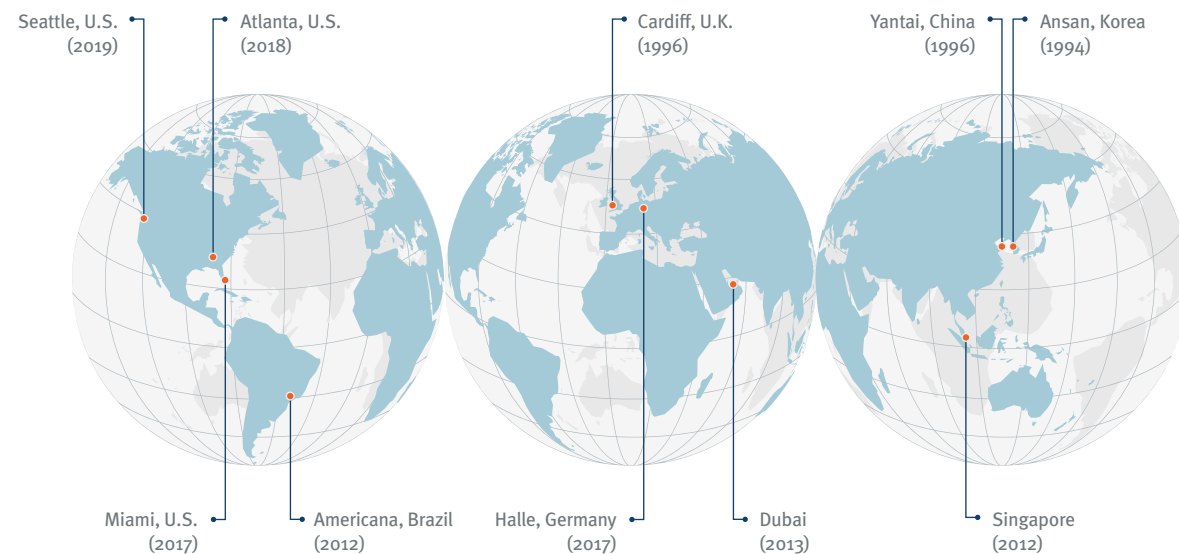
### Increasing AM Sales

Doosan Infracore has been increasing its efforts to expand after market (AM) business and diversify the customer mix to build a revenue structure that can generate stable sales even in slowdown of markets. To expand AM business, the company focused on several areas in 2018 – bolstering the fundamental competitiveness of products through parts captive<sup>1)</sup> and development of economy-type parts; optimizing global PDC-centered parts supply networks; launching remanufactured engine business; developing part kits, such as filter kit and engine overhaul kit; enhancing service quality by improving AM personnel skills; and expanding marketing through service solution development and customer communication. As a result of these efforts, sales amounted to KRW 241.7 billion (excluding special equipment and attachment performance), a year-on-year rise of 17%.

<sup>1)</sup> Parts captive: Making parts that go into finished products into a company brand



## PDC Network (As of April 2019)



Doosan Infracore has been developing genuine parts through its Parts Captive Project since 2017. Parts captive has such benefits as increased sales of genuine parts, smooth development and modification R&D activities application, and minimization of the price influencing factors of new products. Doosan Infracore included parts captive in its new product development (NPD) process. At a monthly council meeting participated by around 20 working-level managers from relevant departments, the company shares and discusses a list of parts selected for parts captive and moves forward with internalization. As a result of such efforts, the percentage of genuine parts carrying the Doosan Infracore brand rose from 40% in 2017 to 45% in 2018. In addition, the company develops and sells economy-type parts for more price-conscious customers. Quality of economy-type parts is assured and guaranteed by Doosan Infracore.

It is important for customer satisfaction that rights parts become available and the repair gets done correctly as soon as possible upon receipt of a customer request for equipment repair. Doosan Infracore therefore operates 10 Parts Distribution Centers (PDCs) and has established a global parts supply system. In 2018, the company increased parts availability and the speed of its responses to parts quests in the mid-west and east regions of North America by rebuilding its Atlanta PDC in the U.S. The company also established an engine PDC in Halle, near Leipzig of Germany, covering the entire European market.

The operation of the German PDC has substantially improved the company's ability to respond to European market demands for engine parts. The regular order shipment cycle substantially improved from monthly to weekly, while the time it takes to meet an urgent order from customers or dealers was considerably reduced from an average of seven days to no more than two days. In April 2019, Doosan Infracore opened its Seattle PDC to better serve customers and dealers in the northwest region of North America.

Doosan Infracore has integrated global planning and master data, including Service Parts Planning (SPP), a module the company uses to unify inventory and parts availability standards which had been different per subsidiary in the past, with the goal of supplying parts in a more systematic and efficient manner. As a result, the company's ability to supply parts to customers has improved markedly. In addition, the company operates Manufacturer Managed Inventory (MMI), a method of forecasting parts demand and suggesting to dealers a list of recommended parts to have in stock. This enables acquisition of necessary parts in advance, stabilizes parts supply and minimizes lead time. In 2018, MMI was carried out to 10 countries, resulting in a number of positive outcomes. It will be carried out to an additional 11 countries in 2019.

Continued collaboration between Doosan Infracore and dealers is important for increasing AM sales and profits as well as improving service quality. The company therefore held the '2018 Parts & Service Sales Representative (PSSR) Seminar' in Asia, the Middle East, Africa, Latin America, and Oceania, and trained PSSRs on how to improve AM sales and service in their respective region. Through PSSR Seminars, the company strengthened dealers' PSSR capabilities by providing its unique, specialized training as part of the task, 'generating profits through excellent services.' Dealers and PSSRs were educated on the characteristics and strengths of genuine parts, effective sales skills and strategies, and operating DoosanCONNECT™. Also included in the trained were equipment operation and maintenance.

Doosan Infracore has developed the 'Smart Maintenance' service, a product that provides genuine parts and maintenance service solutions based on equipment status information collected through DoosanCONNECT™, and conducted a pilot project targeting Southeast Asian countries in 2018. Smart Maintenance consists basically of three sub-products of different capacity – Light, Standard, and Premium. The main difference among the sub-products is the degree to which detailed program contents can be adjusted depending on the market environment and the dealer's program execution capabilities. Doosan Infracore will develop a set of Smart Maintenance service solution products, each of which reflecting the respective region's needs and strategic direction, and sell the regionally-customized service solution products together with its global DoosanCONNECT™ service plan.

Doosan Infracore will offer more improved products and service solutions that enable customers to save more on equipment operation costs, while providing parts and services trusted by customers.

## Expanding Value-selling

Doosan Infracore implements a value-selling strategy which looks beyond selling products to offer solutions, such as product consulting and services based on understanding of customer needs and trust. This strategy enables the company to establish strong customer relations based on which it is attracting large-scale customers and signing highly-profitable fleet deals. In 2018, the company chose value-selling target countries by region and provided field training to dealers' sales personnel as well as various tools for increasing their understanding of equipment. The company also practiced value-selling by explaining about diverse solutions that are of great interest to customers and can be used at training and sales sites. 'Doosan Equipment Sales,' an application developed to combine and integrate data that are dispersed among different channels, contributes to expand value-selling. This application enables dealers to carry out value standardized sales focused on delivering value to customers. It is used at sales sites and helps imprint Doosan Infracore's expertise and quality in the minds of customers. In fact, the Doosan Equipment Sales application was used in the presentation of Doosan product strengths, productivity comparisons and total cost of ownership (TCO) to a South American mining company, resulting in winning of a contract.

Doosan Infracore will systematize its value-selling strategy by dealer competency and customer and gradually develop construction site consulting capabilities in connection with the Concept-X project. To this end, the company will further fine-tune the value-selling strategy and expand the application of the strategy to on-site sales, thereby achieving stable growth and striking the right growth-profit balance.



'Doosan Equipment Sales' application



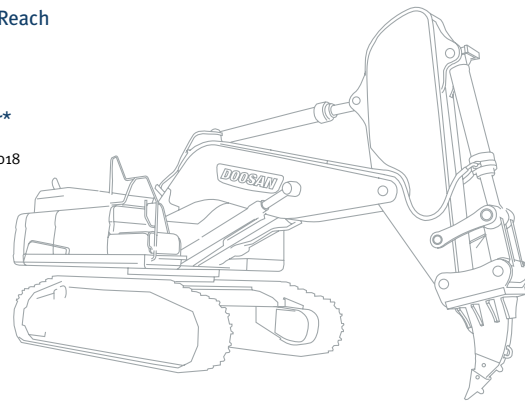
## Special Equipment

Material Handler  
Amphibious Excavator  
Demolition  
Log Loader  
Electric Excavator  
Front Shovel  
Car Dismantler  
Super Long Reach



Giant Ripper\*

\* Launched in 2018



9 Product Line-up

## Awards

### DL280-5 wheel loader

Made the top 50 annual list among heavy duty equipment by ForConstructionPros.com and Equipment Today



### DoosanCONNECT™

Received the Grand Prize at the 2018 IoT Innovation Awards organized by KIPFA



# CUSTOMER VALUE

- 01 Enhancing Product Quality
- 02 Developing Products to Meet Customer Needs
- 03 Enhancing Service Competitiveness



# Enhancing Product Quality

01



## QMS Operation Process

### QMS Diagnosis

- Target: Construction equipment (including DICC) and engine businesses
- Scope: Operation, R&D, sales, services

### Define Tasks

- Agree on diagnosis findings
- Establish plans to execute tasks



### Verify Improvements

- Verify improvements through site audit, etc.
- Document the improvement measures

### Task Management

- Review remedial steps by task
- Report remedy-related issues to management

## Strengthening PDCA<sup>1)</sup>-based Process Operation

In 2018, Doosan Infracore created the Quality Management Team dedicated to diagnosing and verifying all quality controls in its construction equipment (including DICC) and engine business operations in a bid to strengthen the structure and management of its quality controls, and further strengthened quality control and risk management systems. The company had previously operated its quality management system (QMS), which covers quality strategy and key performance indicators (KPIs), organization, management, quality awareness, and competency based on the ISO 9001:2008. Doosan Infracore added diverse contents to the existing QMS, such as findings of its review of internal/external environmental changes; improvement measures it derived by evaluating potential issues in the QMS; and the need to expand the diagnosis to areas outside of production, purchase, and quality. By doing so, the company re-established the way to diagnose its QMS in 2018 and re-defined operational management measures

## Risk Management Framework



to be strengthened. The newly-established QMS reflects the latest ISO 9001:2015 content, including stakeholder needs and anticipations as well as risk management, and consists of items diagnosis related to management responsibility, development/parts/manufacturing/market quality, and resource management.

Doosan Infracore plans to conduct a regular QMS diagnosis twice a year of production/purchase/quality, R&D, and sales and service units of its construction equipment (including DICC) and engine businesses starting in 2019. Based on diagnosis results, the company seeks to create a virtuous cycle of identifying of tasks, monitoring of improvement on the tasks, and verifying of the effectiveness of improvements made, thus continuing to upgrade the QMS. In particular, to strengthen the execution capability in making improvements, the company will review diagnosis results and set up how to improve the tasks together with diagnosed departments, share the progress of each task at the Integrated Quality Conference, and strengthen monitoring. Through systematic operations of the new QMS, Doosan Infracore will quickly reflect internal/external requirements and changes in its operations, and faithfully act on improvements derived from QMS diagnoses.

Doosan Infracore operates a risk management system in order to preemptively manage various risks common in today's uncertain business environment, and quickly and effectively responds to emerging risks from a perspective covering the entirety of its value chain. For the purpose of systematic risk management, the company has established a risk management framework consisting of five items – policy & strategy, process, management organization, system, and organizational culture – and detailed operation plans by item which have been applied to departments

related to its construction equipment (including DICC) and engine operations since January 2019. Based on the operational risks identified through the risk management framework, such as risks related to production/purchase/quality/technology/sales, the Quality Management Team identifies key risks to be managed and sets up contingency plans accordingly, thereby establishing systematic risk management measures.

## Continually Improving Basic Quality

Doosan Infracore is conducting quality-improvement activities and building a work environment that honors the basics and standards with the goal of substantially improving its basic quality level. Every year, the company identifies the most urgent of quality issues to be addressed and accordingly takes appropriate steps in order to enhance quality and customer satisfaction. In 2018, 61 issues were identified and 95% of them were addressed, and as a result, basic quality issues dropped by 27%.

## Verifying Equipment Durability

Doosan Infracore conducts various tests and thorough reliability evaluations on all its products, including excavators and engines, to ensure that they perform to their full specifications in any environments as long as their lifespan. In 1996, the company established the Reliability Evaluation Center at its Incheon Plant equipped with the latest in testing facility and equipment, including an environmental tolerance laboratory, large unechoic chamber, and vibration test laboratory. The center tests and evaluates product durability and structural safety in a wide range of work environments.

Construction equipment is used mostly in deserts, plateaus, wetlands, and other harsh environments. Doosan Infracore therefore tested the performance and durability of its construction equipment in extremely cold areas in 2014, for the first time in the history of Korea's construction equipment industry, and has continued the test in a bid to overcome limits of the low-temperature testing facility at the Reliability Evaluation Center.

Doosan Infracore plans to construct a proving ground (PG) in the second half of 2019 in Boryeong City, South Chungcheong Province to more thoroughly test its construction equipment products. With completion of the Boryeong PG, the company is expected to test and evaluate its products in a more realistic environment and to ratchet up its product quality and performance to another level.

<sup>1)</sup> PDCA: Technique used to achieve goals through plan-do-check-act repetition



## Developing Products to Meet Customer Needs

02



### Special Equipment that Reflects Customer Needs

Doosan Infracore preemptively analyzes market needs, and based on that, it releases special equipment and attachments and diversifies its product portfolio in order to expand into new markets. The company has developed and sells diverse special equipment product groups that meet specific local needs and fit customer work environments, including a material handler, amphibious excavator, demolition, log loader, and electric excavator. As a result, special equipment and attachment sales reached KRW 85.4 billion in 2018.

In 2018, Doosan Infracore expanded its special equipment line-up by launching a giant ripper DX520 RP especially for areas where rocks are either too weak for breaker work or too strong for bucket work. Encouraged by the DX520 RP's strong sales performance in the Chinese market, the company plans to release it in emerging markets.

Doosan Infracore also launched the DL280-5, a wheel loader of improved capabilities, including the ability to raise its bucket higher than before when loading materials onto a truck. Developed for use in industrial waste and recycling treatment facilities, the DL280-5 is built with key components of enhanced durability and air filter with extended life-time. Also equipped with devices that respond to DoosanCONNECT™, the equipment's current location, work hours, fuel consumption rates, and other data can be remotely monitored real time. In September 2018, the DL280-5 made the top 50 annual list among heavy duty equipment by ForConstructionPros.com and Equipment Today, well-respected industry magazines in North America. Introduced in 2011, the top 50 annual list is based on customer opinions of new products introduced through on/offline media during the year. The selection of Doosan Infracore's DL280-5 is another testimony to the high popularity that the new product enjoys.



DX520 RP Giant Ripper

Doosan Infracore will provide job solutions customized to different work environments and continue its robust growth through market diversification based on its portfolio of special equipment and attachments whose diverse usage was developed in line with customer needs. To this end, the company will expand the cross-adoption of models developed for different regions in 2019. It will also strengthen the product line-up through in-house development and ODM expansion, and further expand its sales coverage by strengthening cooperative ties with global special equipment organizations.

### Strengthening Customer Relations through Customization Plant

Doosan Infracore has been operating the Europe Customization Plant (EuCup) in Rotterdam, the Netherlands, a nation with the most cargo volume in Europe, since 2016. Using a semi knock down (SKD) supply method, the EuCup imports main body and front parts, such as arm and boom, and produces finished products to customers' specifications.

Prior to the operation of the EuCup, all of Doosan Infracore's products sold in Europe were 100% produced and supplied from Korea, with very few exceptions in which specifications were modified to customer or dealer needs. In particular, when no products were ordered with specifications specified by customers in European, the lead time used to take as long as 16 weeks from production to shipment and delivery. Also, even after products were brought to Europe from Korea, difficulties arose due to differences among customer requirements. For this reason, Doosan Infracore came to the decision to operate an EuCup that can customize equipment to varying needs of European customers and enhance efficiencies in the operation of production facilities.

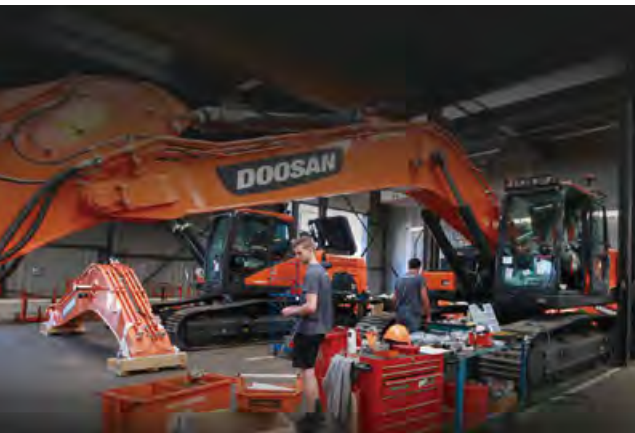
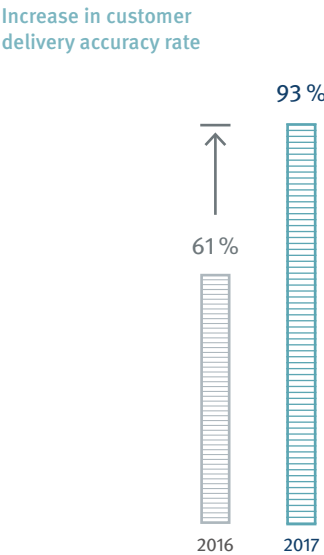
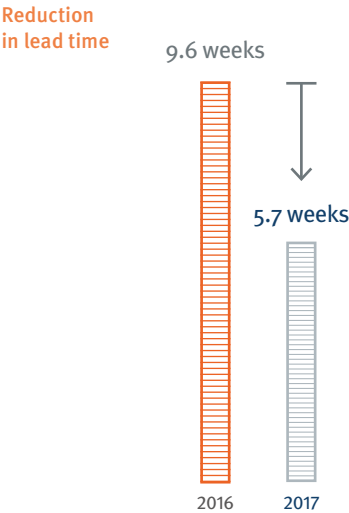


Customized equipment production at the EuCup consists of inspecting products, upon their arrival from Korea in accordance with customer specifications, which is followed by assembly, testing, cleaning, painting, pre-delivery inspection (PDI), and final delivery. Stability regulation standards in Europe are diverse as environmental standards are high. The plant therefore is equipped with a total of 257 types of basic equipment and outsources product assembly, specification change, and painting.

The EuCup focuses its overall production, scheduling, and inventory efforts on improving the accuracy of its sales forecasts and strengthening the ability to accommodate a wider array of customer demands. Having stabilized its operations, the plant has substantially reduced the lead time from 16 weeks to 5.7 weeks as of 2017, with customer delivery accuracy rate improved to 93%. In addition, logistics cost is expected to decrease with the expanded application of the SKD production method. The two main reasons the EuCup became stable in operations in a short period are the ability to improve its production flexibility through the adoption of the SKD method and the mindset and attitude of its employees solely focused on keeping promises with customers. Another factor is the clear and effective communication between sales and production that led to proactive responds to customer demands. The EuCup’s next goals are to further reduce the lead time to five weeks through improvement of the accuracy of its demand forecasts and to enhance profit by customizing production to specific specifications. And in order to achieve these goals, the plant is looking into various measures.

With the North American and European market transfer in 2018, Doosan Infracore is establishing a North American Customization Plant (NaCup) based on the success of the EuCup with the goal of strengthening its ability to meet customer needs in the North American market. NaCup is scheduled to be completed in 2019 in the south-eastern area of Georgia, the U.S. based on the results of a feasibility study carried out in 2018. By continually expanding customer need-based production, with local customization plants performing a central role, Doosan Infracore will increase customer satisfaction, enhance production efficiencies, and thus expand its presence in advanced markets.

Results of EuCup Operations



Manufacturing site of the EuCup

Special equipment and attachment of Doosan Infracore





## Enhancing Service Competitiveness

03



Scan this QR code with a smartphone to find out more about DoosanCONNECT™

### Advancing the DoosanCONNECT™ Service

Telematics combines wireless communication and the global positioning system (GPS), enabling the collection and analysis of information, such as equipment location and operational status, which in turn enables users to monitor operations using PCs, tablets, and mobile devices. Through telematics, users can remotely identify where their equipment is, how much work has been completed, and how it is operating. They can also ascertain the status of consumables, and see if any of them need be replaced. Customers can thus remotely monitor and diagnose their equipment, which can substantially increase their work efficiencies. Dealers can determine if there are errors in equipment and what parts are needed, and act accordingly, thereby improving service quality. Manufacturers can analyze information collected through telematics and improve their product quality by reflecting it in production. In addition, it is possible to perform big data analysis based on information thus accumulated.



Doosan Infracore began offering telematics services in 2005 in China, and in 2015, it launched DoosanCONNECT™, Doosan Infracore's telematics service brand, to provide a distinctive customer service.

DoosanCONNECT™ enables the user to monitor the operational status of major parts, including engines and hydraulic systems, of all Doosan Infracore's construction machinery equipped with telematics devices through the DoosanCONNECT™ website ([www.doosanconnect.com](http://www.doosanconnect.com)) or the mobile application. Doosan Infracore has also created a user interface (UI) based on opinions of customers, dealers, and regional service personnel about functions and design of DoosanCONNECT™, and thus continues to improve user convenience and functionalities. And based on these improvements, Doosan Infracore officially launched the DoosanCONNECT™ mobile application in the Korean market in November 2018. New and existing features were either added or strengthened in the application, such as those that allow sales dealers and customers to chat, guide service personnel to customer locations via the shortest route possible, enable fleet dealers to report, allow the user to check fuel status on their equipment, and filter out data by region.

Doosan Infracore is making progress in developing telematics-based solution services to help customers better check the operation status of their equipment and manage them. 'Fleet Management Report' is an analysis of data – equipment operation and work rates, real-time fuel efficiency, and error code – collected through the telematics service. The report has improved the company's access to the status of its products in the possession of customers, for it enables data comparison of equipment or equipment groups. The plan for 2019 is to provide equipment operation guide and consulting services in connection with the Fleet Management Report function.

In addition, as DoosanCONNECT™ makes possible an instant checking of equipment locations, operational information, and the replacement status of parts, customers can manage their equipment and business more efficiently and economically. Based on diverse equipment and operation data collected through DoosanCONNECT™, Doosan Infracore developed a Smart Maintenance service product providing a preemptive maintenance service to customers in addition to warranty services.

Doosan Infracore started to use data collected through DoosanCONNECT™ for quality improvement to further enhance customer value, and thus made a 'Global Field Quality Information System' in 2018, which has strengthened the real-time analysis and visualization of information and field claim data collected through DoosanCONNECT™. Through the system, users can check

### Strengths of DoosanCONNECT™



#### Efficiency

- Increase worksite management efficiency
- Increase equipment management efficiency
- Increase work efficiency and curtail costs



#### Productivity

- Enhance work productivity
- Improve equipment management convenience
- Increase equipment life expectancy



#### Safety

- Prevent safety accidents
- Protect workers
- Prevent equipment defects

quality status of equipment in operation via a dashboard; analyze issues by region, equipment type and part; and analyze parts quality and defects by equipment type. This has enabled the company to reduce the time needed for quality data analysis, thus establishing a system that enables a quick analysis and response. It can also be used by relevant departments, such as R&D and service.

For such diverse and superior features of Doosan CONNECT™, Doosan Infracore received the Grand Prize at the 2018 IoT Innovation Awards organized by Korea Internet Professionals Association (KIPFA). The IoT Innovation Awards is presented to companies and services that lead IoT innovation and development in various industry groups. Its receipt of the award is a confirmation of the industry's view that Doosan Infracore maximizes equipment operation efficiencies and user convenience by proactively offering IoT services in the construction equipment field as well as an acknowledgement of its technological prowess.



DoosanCONNECT™ mobile app



Features of DoosanCONNECT™



Worksite management

Location check; and daily, weekly, and monthly report



Increased work efficiency

Equipment operation analysis; and fuel efficiency management



Preventive inspection and management

Management of consumables, including filters and oil



Strengthened service

Detection of equipment abnormality signals and communication rupture

Doosan Infracore will continue to upgrade Doosan CONNECT™ to offer more advanced information and functions. We will develop service solution products based on collected information through DoosanCONNECT™ and establish an internal data analysis environment with the goal of further enhancing customer value.

Expanding DoosanCARE Services

Doosan Infracore offers DoosanCARE to build up relationships and grow together with customers. DoosanCARE is a customer-tailored support service in which service experts visit customers, irrespective of whether they have product or warranty issues, and offer equipment management consulting and maintenance training. In the process of providing this service, the company listens to customer opinions so as to identify and address any problems that customers may have experienced while using Doosan Infracore products.

In 2018, the company has made a new version of DoosanCARE led by its headquarters, and is providing DealerCARE in some countries, including Indonesia and Colombia. To this end, the company offered DoosanCARE guidelines and relevant training to dealers so that local customers can receive a DealerCARE service of which quality is as high as DoosanCARE offered by the headquarters in Korea.

As a result of the DoosanCARE service jointly offered by headquarters and dealers in 2018, 852 units of equipment were examined in 35 countries, thereby more proactively responding to customer requirements. In Korea, Doosan Infracore has developed a training program for customers as well as actual equipment users on equipment characteristics and major maintenance points, which has helped prevent equipment breakdowns and contributed to further improve customer value.

Customers who have experienced the effectiveness of DoosanCARE are becoming buyers of Doosan Infracore's products. In 2019, the company plans to further expand DoosanCARE to North American and European markets, while expanding DealerCARE in emerging markets, mainly Chile and Myanmar.

Doosan Infracore will not only resolve customer complaints on product issues but also find new ways to maximize customer satisfaction by improving the quality of DoosanCARE.

Strengthening Dealer Service Capabilities

Doosan Infracore has been continuously improving the service capabilities of its dealers by providing quality training based on its standardized education and training systems, such as Doosan Partners Academy (DPA), the company's flagship online training program for dealers; and Hands-on Training in which experts at headquarters use actual equipment identical to those found at worksites to train dealer service personnel on how to identify and deal with some of the most common causes of customer complaints. By doing so, Doosan Infracore is fostering dealer service personnel into a product service expert. These efforts of improving dealer service capabilities have not only led to higher customer value but also evolved into a competitive advantage unique to Doosan Infracore.

To train dealer service personnel in line with market size and growth rates as well as in a systematic and coherent manner, Doosan Infracore opened up a training center in Colombia in 2018 for the South American region. The training center was established to overcome limits of the previous training method – trainers used to visit individual dealers, and the level and quality of training depended on dealer circumstances and resources different by market, such as expertise of training personnel and availability of budget. By equipping the training center with an array of equipment necessary for complete and thorough training, the company has enabled hands-on training that is more



Doosan Partners Academy (DPA), online training program



systematic and professional for service personnel serving South American customers. In 2019, the company plans to open training centers in Mexico, the largest market in Central America, Singapore, the hub of Southeast Asia, and Ghana, an emerging market force in western Africa.

In 2018, Doosan Infracore expanded off-the-job as well as in-depth training courses to strengthen its service expertise and quality. For two weeks from June 24 through July 5, 2018, the first off-the-job training, titled 'Technical Service Training', was conducted to improve the skills of service personnel of major dealers in Africa, including Egypt, Algeria, and Sudan. The off-the-job training, of which curriculum consisting of electric and hydraulic courses, is developed for trainees who have completed the required online courses offered by the DPA. The off-the-job courses were conducted in a hands-on manner, enabling trainees to test their learned knowledge on equipment and thus improve their understanding of equipment and parts. After the training, trainees were tested on their knowledge and skills and accordingly certified. The second off-the-job training was an in-depth hydraulic training course organized by the headquarters PS Team and held in Korea in the September. Provided to service personnel of dealers in emerging markets, the hydraulic training is the last step of the technical service training consisting of three steps—elementary, intermediate and advanced. Outstanding dealer service personnel selected among those who had locally completed the elementary and intermediate courses were trained on diagnosing and fixing problems related to hydraulic parts, using the in-house developed learning material Trouble Shooting Guide (TSG). As the last

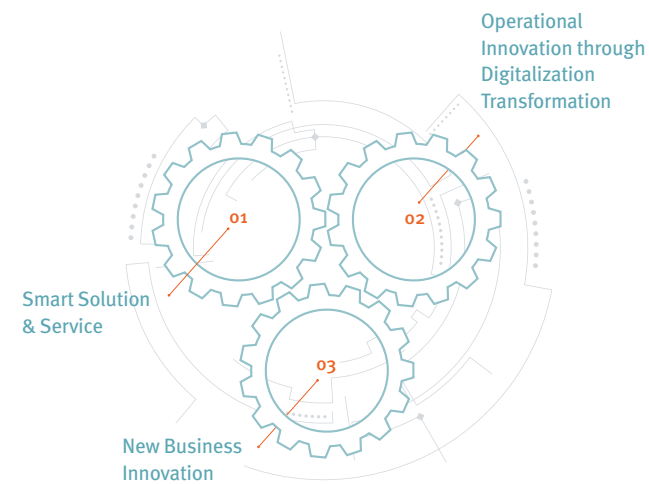
off-the-job-training, 'hydraulic and electrical device service certification training' was conducted for two weeks from November 26 through December 4 at the Colombia training center. The trainees were selected among outstanding service personnel of dealers in seven Latin American countries, including Colombia, Chile, and Argentina, who had completed the DPA with excellent grades. It is the first certification training course conducted at the Colombia training center. Doosan Infracore plans to continue the certification training at the Colombia training center in 2019 to strengthen the service capabilities of its Latin American dealers.

Doosan Infracore also holds 'Doosan Service Contest' to motivate dealer service personnel and boost their pursuit of excellence in customer service. Following up on the first contest held in 2014, the company held the second contest in 2018, participated by 45 service personnel from 30 emerging markets. The finals of the 2nd Contest will be held in Korea in July 2019. A headquarters training program will be provided to participants of the finals. Doosan Infracore plans to expand the contest into advanced markets and develop it into a global contest where dealers and their service experts from all over the world gather at one place and share their passions for excellence.



## New Technology

### Directions for Digital Transformation



### Tele-Operation

Succeeded transnational ultra-long range remote control for the first time in the global construction equipment industry



Shanghai, China

880 km



Doosan Infracore Incheon Plant



Munich, Germany

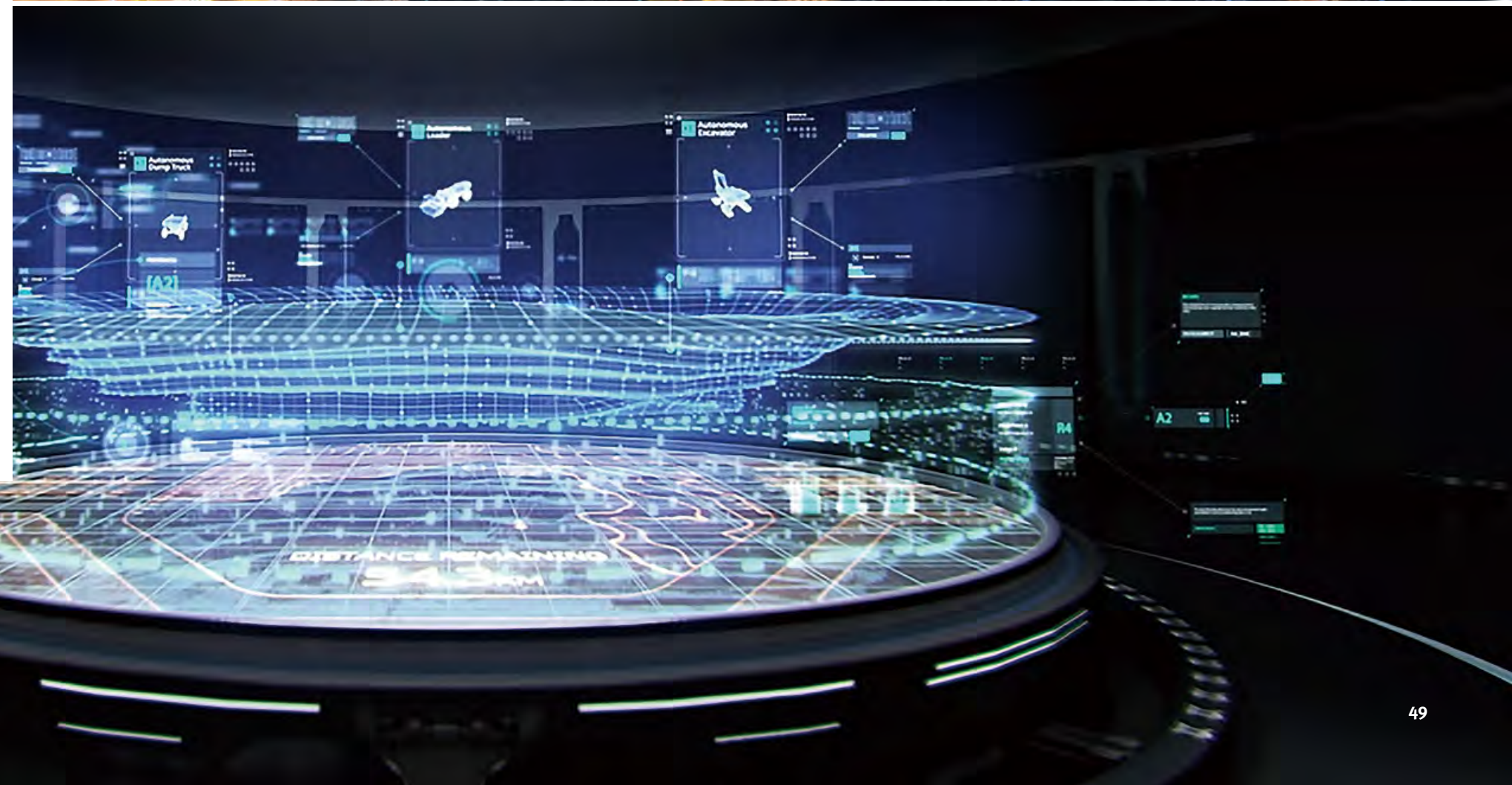
8,537 km



Doosan Infracore Incheon Plant

# INNOVATION

- 01 Concept-X
- 02 Operational Innovation through Digital Transformation
- 03 New Business





The infrastructure industry is one of the slowest in adopting digitalization despite many inefficiencies within the industry. To break away from this industry trait and to keep its growth sustainable amid fast changes in customer and industry landscapes, Doosan Infracore launched the Digital Transformation project in 2018. Rather than simply adopt digital technologies, the company seeks to innovate construction and construction equipment operation industries, and thus create sustainable customer value through digital transformation of the business.

Doosan Infracore's digital transformation consists of three pillars – smart solution & service, operational innovation through digital transformation, and new business innovation. The 'smart solution & service' envisions a digital innovation that provides total infrastructure solutions, going beyond manufacturing operations. Included in infrastructure solutions are such digital technologies as telematics, electrification, and unmanned and automation technologies. 'Operational innovation through digitalization' involves more than improving internal operations, and it centers on connecting the upstream and downstream value chain and optimizing work using data. Lastly, 'new business innovation' signifies integration and innovation transcending industry boundaries. To this end, the company is making various attempts, including investment in and collaboration with start-ups as well as new business incubation.

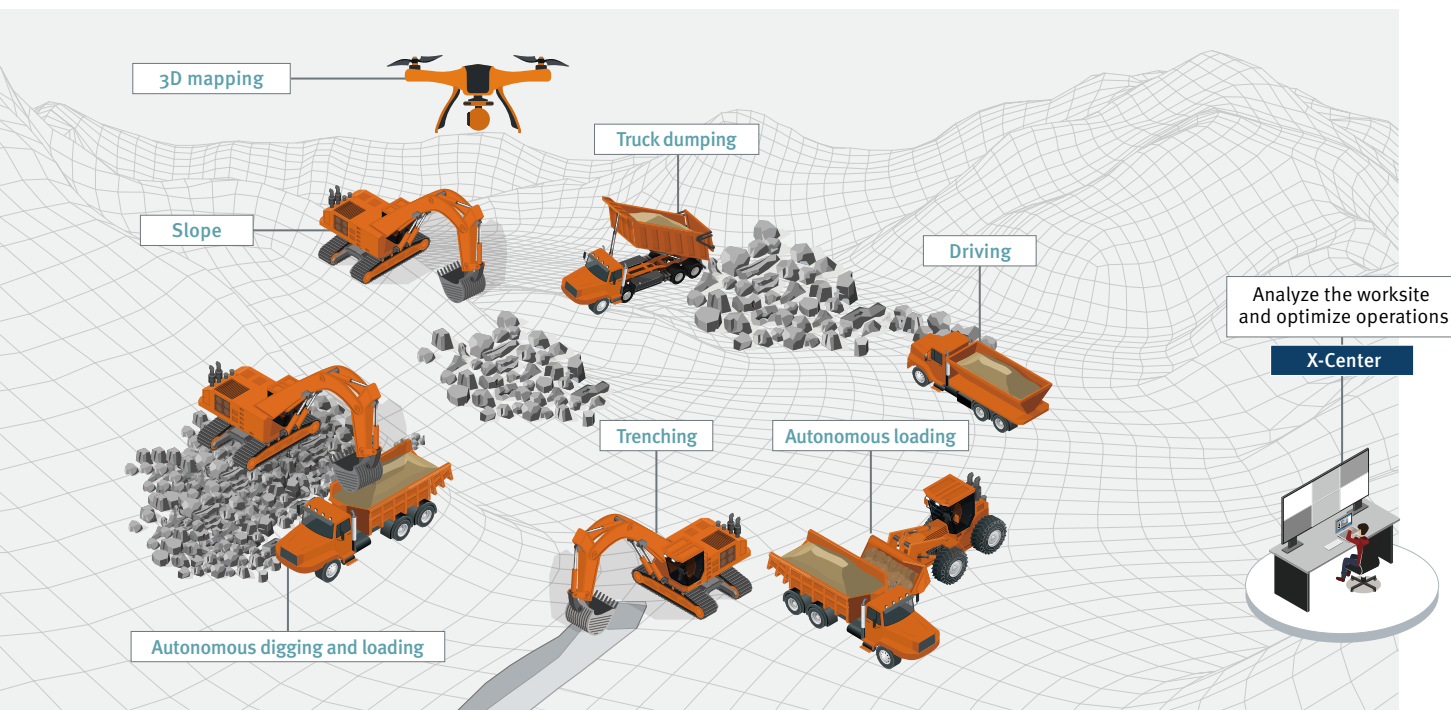
## Concept-X

01



Doosan Concept-X

### Concept of the Concept-X



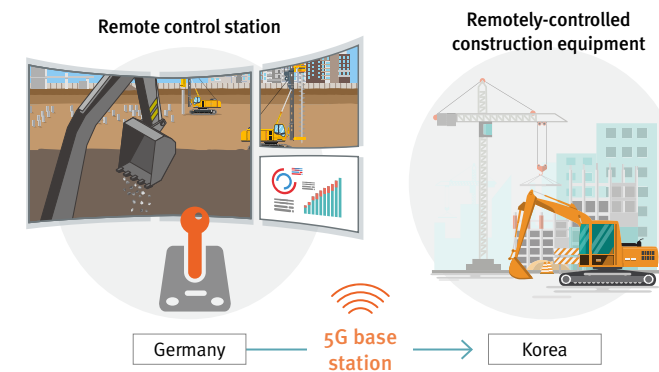
### Concept-X – Shaping the Future of Construction Equipment

Information and communications technology (ICT) and artificial intelligence (AI)-related technologies are rapidly emerging as key future technologies. Against this backdrop, unmanned and automation technologies developed mainly in the automobile industry are quickly spreading throughout construction equipment business, resulting in creation of new products and services.

Doosan Infracore launched the Concept-X project centering on testing the feasibility of new technologies prior to adopting them to construction equipment in 2017, with the goal of satisfying customer needs and

### Concept of 5G-based remote control of construction equipment

- Install cameras on equipment (overall, left, center, right); and film the work environment  
→ Send to the remote control station
- Attach sensors to the boom, arm, bucket, and other parts of the excavator; and measure three-dimensional site information  
→ Support the remote control operator by using MG and machine control technologies



creating opportunities to generate new added value. Once completed, the Concept-X will contribute to improving productivity at construction sites, reducing safety risks, and alleviating labor shortages in the aging era by testing technologies that are optimized to future construction sites, such as unmanned and autonomous equipment, construction site measurement using drones, and 5G<sup>1)</sup>-based remote control. At the center of the Concept-X is 'X-Center' which monitors and controls the overall work process, including work site analysis and vehicle control; and drones are used to ascertain and measure the worksite environment through 3D scanning. Also, equipment can be operated unmanned based on topographical data. To complete the Concept-X, the company is focusing on securing unmanned and automation technologies for construction sites, such as drone survey, plan-based worksite analysis, unmanned/manned construction equipment control systems, unmanned excavator/wheel loader equipment, and remote construction equipment control. For successful construction of the Concept-X, Doosan Infracore is carrying out diverse forms of open innovation, such as collaboration and technological development with professional companies, investments in start-ups, and industry-academia cooperation. Moreover, the company is moving forward with full speed to develop technologies of diverse application in partnership with various players in order to secure a distinctive competitive advantage. An initial cooperation with Trimble Inc. was followed by an alliance with LG Uplus for 5G-based remote control technology development, an equity investment in PoteNit, a soaring start-up in the autonomous driving area, collaboration with Bosch and ASI, superior in AI and unmanned technologies, respectively, as well as cooperation with Hanyang University for development of integrated control systems.

As one of the outcomes of such collaboration, the company unveiled 'Tele-Operation,' a 5G-based technology for remote control of construction equipment. Jointly developed with LG Uplus, the tele-operation technology was first demonstrated at the Bauma China 2018 in a remote control of an excavator located about 880 km away from the Incheon Plant, which was an industry record in transnational distance of real-time remote equipment control. Video images of the excavator at work taken by five attached cameras (overall, left, center, right, bottom) were live-streamed through an ultra-low latency<sup>2)</sup> network and shown on the monitors at the exhibition, giving viewers a sense of feeling that they were at the actual work site watching the excavator in operation. Also introduced at the demonstration is Doosan Infracore's '3D Machine Guidance (MG)' system which precisely measures the dimensions of the excavation work area, using sensors attached to the boom, arm, bucket, and other parts of the excavator. Therefore, the combined application of the tele-operation and 3D MG technologies supports the remote operation of unmanned machinery at worksites, as it enables the operator, watching precise topographical data and video images on the screen, carry out work without the help of a surveyor.

At the Bauma 2019 held in Munich, Germany in April, the company succeeded in remote control of an excavator 8,537 km away, which is around 10 times of the distance (880 km) covered in the remote control demonstration at the Bauma China. In addition to the 3D MG, the company unveiled such machine control technologies as 'Auto Grading Assist' which assists high-skilled leveling work, and 'E-fence', a safety function that stops the equipment if it moves outside the pre-set parameters of the work area.

Doosan Infracore is preparing for demonstration of an integrated vehicle recognition and control system using overall Concept-X technologies and solutions at the Boryeong PG, slated for completion in November 2019. With completion of the Concept-X, which is a product and solution optimized for future construction sites, Doosan Infracore will take the lead in expanding and shifting into construction site solutions that support safer and more efficient work, and contribute to customer convenience and value creation.

<sup>1)</sup> 5G: A network service that can transmit data 100 times more and 20 times faster than LTE, enabling hyper-connected, ultra-high-speed, ultra-low-latency (End-to-end delivery time is extremely short in machine-type communication) services

<sup>2)</sup> Ultra-low latency: Terminology for extremely short end-to-end delivery time in machine-type communication



## Operational Innovation through Digital Transformation

02



### Digital Innovation of Operations

Digital technology is being applied to all industries in an all-encompassing way, including construction equipment manufacturing, thus facilitating innovation. Accordingly, companies are responding to the change by moving forward with a digital transformation of their own centering on expanding data collection, strengthening connection and analysis, and improving data visibility in a bid to enhance operation efficiencies and generate new value.

In 2018, Doosan Infracore held active discussions with professional consulting firms on digital transformation, and as a result, established the direction for and a roadmap of digital transformation with regards to innovating operations. Beginning with tasks related to data collection, the company is focusing on securing data visibility and building a data-based collaboration platform.

Doosan Infracore has been moving forward with operation efficiency enhancement and optimization by adopting diverse IT systems. To make further progress, the company seeks operation optimization by strengthening the collection and connection as well as increasing visibility of all data being generated throughout the whole value chain, ranging from all of its operations, including production, R&D, quality control, and sales, to customers based on the establishment and execution of strategies of innovating operations through mid- to long-term digital transformation. By doing so, Doosan Infracore aims to become a more efficient company.

Doosan Infracore has established the direction and is promoting successful execution of the operation optimization through digital transformation. The direction consists of operation management and data collection (Base Process & System), gaining data visibility and building a data-based collaboration platform (End-to-end Visibility), optimizing data analysis-based operations (Optimal & Flexible Operation), and changing how work is done (Efficient & Easy Way of Working).

In 2018, the company worked on strengthening operation management and data collection by building a global Manufacturing Execution System (MES)<sup>1)</sup> platform under the strategy of IT platform integration. IT platform integration centers on setting standards for IT platforms and overhauling and linking all IT systems in the entire value chain, including product development, supply chain management, production/quality/facility, and sales and services. Once all IT platforms are fully integrated and linked, including those related to production operation, material/process distribution, process/parts quality control, facility maintenance/control and other stand-alone systems, it will become possible to manage all work processes and use all data across the entire value chain, thereby improving both work efficiency and product quality.

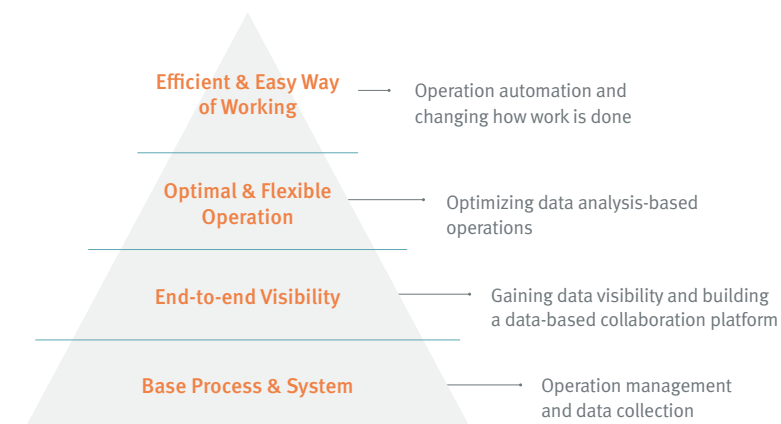
To build a more advanced global MES platform, Doosan Infracore is working on system integration and standardization with a focus on integrating and linking different data related to processes, facilities and products; strengthening real-time field controls; improving data visibility across the whole value chain; and establishing the foundation for an autonomous plant where real-time process control is possible. Begun in July 2018, the global MES platform project is scheduled to be completed in early 2021. Once the global MES platform is upgraded, production/process plans and execution data, all fully integrated and connected with one another by then,

will be available for use at worksites in the form of comprehensive information, such as logistics flows of process materials and quality-related information, thus enabling more efficient production activities. Doosan Infracore seeks cost/quality/customer service innovations, such as improving production efficiencies, shortening the order-to-delivery (OTD) lead time, optimizing inventory, and reducing production defects by operating the global MES platform, with an aim to build a smart, intelligent factory and thus secure a global top-tier manufacturing advantage.

In April 2019, Doosan Infracore established a strategic partnership with Palantir, a US-based unicorn start-up<sup>2)</sup> in the area of big data. Palantir provides a big data platform for use in diverse fields, including government, finance, and manufacturing, and provides support for financial risk preemption as well as corporate productivity and quality enhancement. Through its strategic partnership with Palantir, Doosan Infracore plans to build a big data platform and thus optimize its business operations and improve the decision-making process. Doosan Infracore continues to focus on visualizing all data across its entire operations and cooperating based on the data with the goal of improving organizational efficiency of the company.

Moreover, Doosan Infracore plans to expand the range of management beyond its production operations and quality support for supplier to include distribution in order to achieve digital transformation across the entire value chain. Moving forward, the company will go beyond digitalization of work processes, and reflect, in its mid- to long-term business plan, its unique digital transformation strategy of creating substantive customer value in line with its strategic direction. By doing so, Doosan Infracore will introduce new value based on digital technology to the market, and engage in diverse activities so as to grow into an innovative company that constantly capitalizes on business opportunities.

### Doosan Infracore's direction to achieve operational innovation through digital transformation



<sup>1)</sup> Manufacturing Execution System (MES): Production management system that indicates production plan, work order, material requirement, productivity analysis, etc.

<sup>2)</sup> Unicorn start-up: A start-up that is assessed as having corporate value of at least USD 1 billion



### Building Up Competitiveness through New Business

Developing solutions in machinery manufacturing is crucial to creation of new business opportunities and thus a survival in a global market of increasing uncertainty and rapid evolution. In particular, convergence of various technologies is required to build a total solution system that can provide greater value to customers. The construction equipment industry is going beyond traditional equipment sales and maintenance to provide solutions to productivity improvement. Its business areas are expanding in the direction of offering diverse value to customers. Major advanced construction equipment companies are therefore breaking away from the traditional framework of equipment manufacturing, and instead are seeking to offer customers products and solutions that reflect the latest in digital technology. These include hybrid excavators, products equipped with unmanned and autonomous technologies, and telematics-based equipment management solutions. There has been a sharp increase in the spread of solutions and technologies that maximize operation efficiencies through the automation of equipment and digitalization of worksites throughout various industries, ranging from mining and agriculture to manufacturing, distribution, and construction.

As a company that has been holding fast to its vision and thus preparing for the next logical step, Doosan Infracore strives to develop new technology and new business in cooperation with professional firms specializing in the technological, environmental and social areas, and thus securing competitiveness for future growth, while diligently adopting itself to various market environments. For construction sites, the company is fine-tuning solutions to the problems of falling productivity, a rising accident rate, and a growing manpower shortage in the aging society. To this end, it is carrying out technology development, including unmanned and autonomous equipment, aerial survey of construction sites using drones, and remote control based on high speed network technology. Also being developed are future eco-friendly technologies, such as electricity and hybrid.

Doosan Infracore is also looking into ways of cooperating with various start-up not only at home but also abroad, including those in Silicon Valley, in order to develop cutting-edge technologies. A particular focus is on discovering start-ups with digital technologies that can complement Doosan Infracore's business, including autonomous driving and industrial internet of things, and on exploring various modes of cooperation, such as partnership and equity investment. In April 2018, the company signed an investment contract with PoteNit, Korea's leading autonomous driving start-up, thus shifting into high gear in its drive for developing unmanned and

autonomous construction equipment. Through such an investment, the company seeks to further advance the unmanned and automation technologies that it has been developing jointly with PoteNit since 2015 and to expand the technologies to areas outside construction equipment.

In addition to external cooperation in diverse areas, the company is building a virtuous cycle by implementing an internal process in which development of new business ideas as well as viable ways to commercialize them are encouraged. In 2019, Doosan Infracore plans to launch and commercialize new businesses that it has been developing.

Under the vision 'Global Leader in Infrastructure Solutions,' Doosan Infracore will continue to grow its existing businesses based on its global competitiveness, while actively developing new business leveraging its cutting-edge technologies. By doing so, the company will secure additional revenue sources and growth drivers, thereby continually expanding its business scope as a total solution provider.

## New Business

# 03





# Our Responsibility

At the center of Doosan Infracore's management is sustainability.

As a global market force and local community member, we will keep our business growth sustainable by creating outstanding economic, social, and environmental values across our global operations.

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CSR Structure

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Communities



CSR Management System

CSR Promotion System

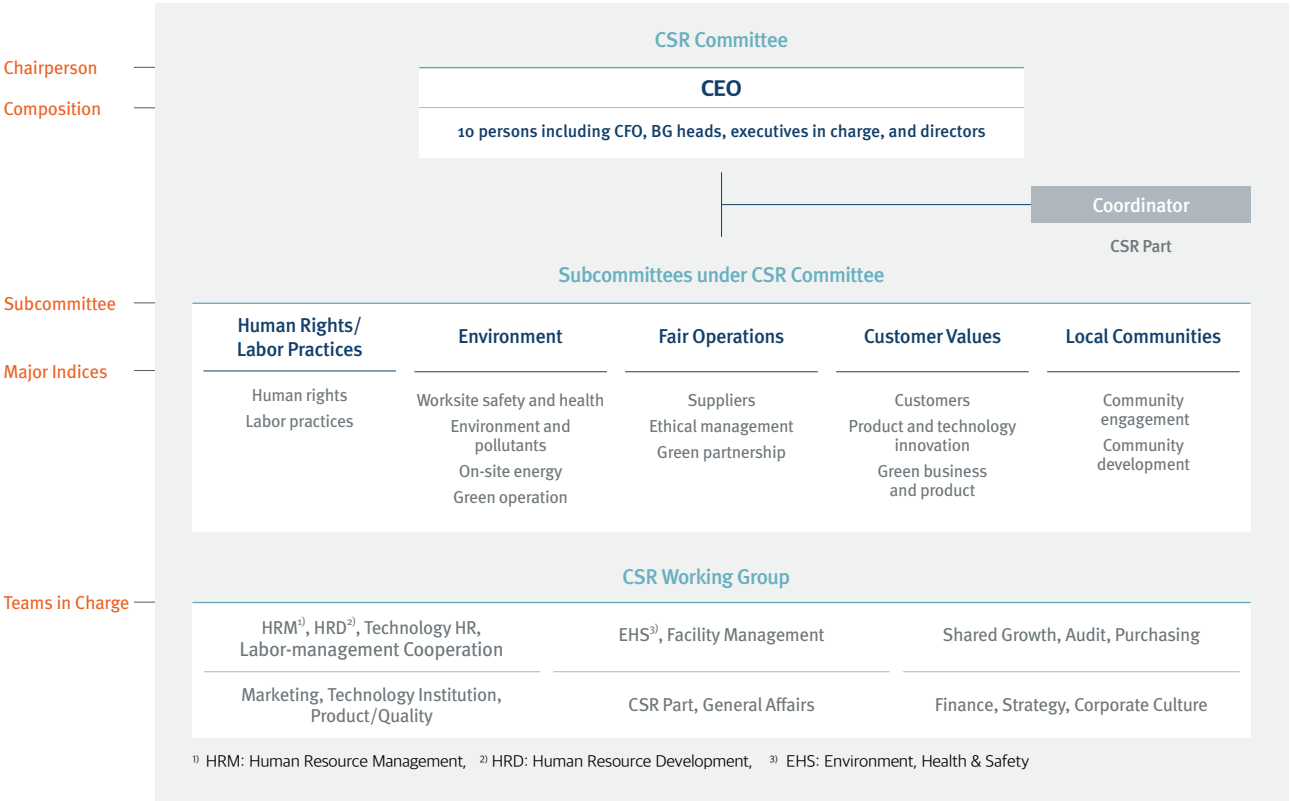
Doosan Infracore conducts its CSR activities, in cooperation with its business sites around the world, led by the CSR Part and CSR Committee at its headquarters in Korea. The CSR Part, as the coordination organization responsible for promoting the company’s overall CSR initiatives, is in charge of establishing CSR strategies, identifying stakeholder issues and needs, diagnosing CSR levels at domestic and overseas business sites, formulating strategic CSR tasks, monitoring CSR activities, and responding to external evaluations.

The CSR Committee, as the company’s top decision-making body in CSR, not only promotes the company’s sustainable growth and socially responsible activities, but is also responsible for reviewing risks and opportunities in line with ongoing changes in CSR issues, making decisions about CSR strategies and policies, generating strategic CSR tasks, and reviewing the performance results. Doosan Infracore runs one CSR Committee at the company headquarters in Korea and another in China. The headquarters’ CSR Committee, under the direct control of the CEO, is composed of five subcommittees –

Human Rights and Labor Practices, Environment, Fair Operations, Customer Values, and Local Communities subcommittees. Led by BG (Business Group) heads and division heads, the subcommittees are flexibly organized and run according to strategic CSR tasks, thereby improving efficiency in decision-making and administrative processes. Once the CSR Committee makes decisions about major issues, including generation, operation, and process of CSR strategic tasks, the CSR Working Group, composed of working-level staff, draws up and implements specific action plans. The headquarters’ CSR Committee had been convened every quarter until 2017 since 2015 when it was launched, and it is now held three times per year, beginning in 2018, to improve its operational efficiency.

The CSR Committee in China was formed in 2017. Chaired by the Regional Head, the Committee consists of five subcommittees (as same as the headquarters) led by the leaders of each business unit in the country, and it is in charge of operating CSR tasks as well as reviewing and approving their process.

CSR Organization



CSR Strategies and Strategic Tasks

Doosan Group aims to grow into one of the Top 100 Global CSR Leading Companies by 2025, and has been establishing its CSR strategy system accordingly. Doosan Infracore strives to lead the realization of the Group’s CSR goal and satisfy the requirements of various stakeholders at home and abroad by embodying CSR in its business operations based on the group-level strategy.

Each year, Doosan Infracore puts together the results of a materiality analysis, external ESG evaluations, and a company-wide CSR diagnosis in order to draw up and implement its CSR strategic tasks for the year. In 2018, the company set new tasks, which includes establishing GHG emissions reduction targets and action plans, strengthening the supply chain CSR management system, and making improvements in quality, while also focusing on existing tasks that it had been promoting since 2015 and strengthening its ability to implement them. In 2019, in addition to further advancing the 2018 CSR strategic tasks, Doosan Infracore plans to

implement eight CSR strategic tasks, including the establishment of an ESG framework and indicators, test-driving of the Concept-X and development of new business model, and development of prerequisite technologies for hybrid powertrain, through collaboration between all of relevant departments in the company and led by the CSR Committee.

Of the tasks set for 2019, the establishment of an ESG framework and indicators shows the company’s efforts to more closely align its business strategies with CSR in a bid to further enhance its corporate values.

Doosan Group CSR Value Structure



<sup>1)</sup> Based on the announcement of the World Economic Forum (Davos Forum)



CSR Strategic Tasks by Year

	2017	2018	2019
CSR Governance	<ul style="list-style-type: none"><li>Support overseas worksites disclose their CSR information</li></ul>	<ul style="list-style-type: none"><li>Support overseas worksites disclose their CSR information</li></ul>	<ul style="list-style-type: none"><li>Establish an ESG Framework and indicators</li></ul>
Human Rights/ Labor	<ul style="list-style-type: none"><li>Strengthen regular monitoring to enhance the human right mindset: Provide employees with human rights education</li></ul>	<ul style="list-style-type: none"><li>Build a management system and strengthen monitoring to enhance the human rights mindset: Develop a due diligence tool for the monitoring of human rights risks</li></ul>	<ul style="list-style-type: none"><li>Strengthen monitoring and establish management system to enhance the human rights mindset: Conduct advanced human rights education for relevant departments and provide human rights consultation by organization</li></ul>
Environment	<ul style="list-style-type: none"><li>Reduce worksite energy use and increase energy efficiency</li><li>Establish a mid- to long-term roadmap to respond to carbon trading</li></ul>	<ul style="list-style-type: none"><li>Establish a GHG emissions reduction target and an action plan</li></ul>	<ul style="list-style-type: none"><li>Reduce GHG emissions</li></ul>
Fair Operations		<ul style="list-style-type: none"><li>Strengthen CSR management system of supply chain: Define core suppliers and identify suppliers with high CSR risks, and establish a management process</li></ul>	<ul style="list-style-type: none"><li>Strengthen CSR management system of supply chain: Identify suppliers with high CSR risks, and support improvement activities</li></ul>
Customer Value	<ul style="list-style-type: none"><li>Develop the REACH<sup>1)</sup>/RoHS 2<sup>2)</sup> IT system</li><li>Two tasks relating to next-generation emissions regulations</li><li>One task relating to smart solutions</li></ul>	<ul style="list-style-type: none"><li>Respond to REACH/RoHS 2 and set up an operation system</li><li>One task relating to next-generation emissions regulations</li><li>One task relating to develop new technologies to secure future competitiveness</li><li>One task relating to improve quality</li></ul>	<ul style="list-style-type: none"><li>Expand service solutions: Diversify service products, customize local services, and increase the number of countries where the services are available</li><li>Innovation: Test-drive the Concept-X and develop new business models</li><li>Develop prerequisite technologies for hybrid powertrain</li><li>Manage prior quality of new products: Enhance quality management ahead of the mass-production of new products that meet EU Stage V and China's Stage IV emissions standards</li></ul>

<sup>1)</sup> REACH (Registration, Evaluation, Authorization and Restriction of Chemicals): Chemical substance management system of the E.U. that governs the registration, evaluation, approval and restriction of chemical substances according to their quantity and harmful effects

<sup>2)</sup> RoHS (Restriction of Hazardous Substances, Restriction of the use of Hazardous Substances in EEE) 2: A stricter regulation compared with RoHS, including an increase in the scope of restricted substances, which has been applied in a phased manner since January 2013. It restricts the use of ten substances – four phthalate-related substances were added to the previous six substances, such as lead, mercury, cadmium, hexavalent chromium, and two bromine-based flame retardants

Stakeholder Engagement

Definition of Stakeholders

Doosan Infracore puts communication, participation, and cooperation with internal and external stakeholders at the center of its approach to CSR. In order to promote more systemic communication with its stakeholders, the company selects its major stakeholders, identifies and addresses their interests and issues, and discloses its efforts and outcomes through various communication channels.

Communication Channels and Responses for Stakeholders

	Communication Channels	Major Issues	Responses
Shareholders/ Investors	<ul style="list-style-type: none"><li>Annual general meeting (AGM)</li><li>Disclosure materials</li><li>Investor relations (IR) information on the company website</li><li>Conferences</li><li>IR meetings</li></ul>	<ul style="list-style-type: none"><li>Improve profitability and establish a high dividend policy</li><li>Strengthen disclosures</li><li>Sound corporate governance</li><li>Business opportunity and risk management</li></ul>	<ul style="list-style-type: none"><li>Share the company's mid- to long-term business directions</li><li>Make earnings announcements and provide IR materials</li><li>Hold analyst meetings</li></ul>
Customers	<ul style="list-style-type: none"><li>Field surveys</li><li>Vice of customers (VOCs)</li><li>Call centers</li><li>Joint workshops</li><li>Integrated customer management systems</li></ul>	<ul style="list-style-type: none"><li>Prompt customer complaint handling and feedback</li><li>Make improvement to product quality, performance, safety, and convenience</li><li>Thorough customer information protection</li><li>R&amp;D investment and the strengthening of technological capabilities</li><li>Differentiated customer service</li><li>Develop eco-friendly, high efficiency products</li></ul>	<ul style="list-style-type: none"><li>Product presentation through exhibitions and dealer meetings</li><li>Tasks aiming for eco-friendly products</li><li>Incorporate VOCs into products through the New Product Development (NPD) processes</li><li>Enhance customer accessibility by providing dealers with web-based information and strengthen dealer management</li><li>Boost customer responsiveness through the Happy Call and dealer service training</li></ul>
Employees	<ul style="list-style-type: none"><li>Labor-Management Council</li><li>Grievance handling system</li><li>Intranet</li><li>Doosan Credo surveys</li><li>Dialogue with the management</li></ul>	<ul style="list-style-type: none"><li>Fair evaluation and compensation</li><li>Education and competence development</li><li>Work-life balance</li><li>Win-win labor-management relations</li><li>Active communication within the company</li></ul>	<ul style="list-style-type: none"><li>Implement the Doosan Credo</li><li>Human resources development based on the Functional Competency (FC) system</li><li>Operate the Women's Council</li><li>Publish a human rights risk prevention manual and provide education on human rights</li></ul>
Suppliers	<ul style="list-style-type: none"><li>Supplier Council</li><li>Supplier education</li><li>Consulting, technical support for suppliers</li></ul>	<ul style="list-style-type: none"><li>Share more information with suppliers</li><li>Expand support to boost suppliers' capabilities through financial, technology, education, environment, and ethical management support</li><li>Strengthen fair trade</li></ul>	<ul style="list-style-type: none"><li>Foster Leading Suppliers</li><li>Financial support for suppliers</li><li>Operate the Supplier Hotline</li><li>Share CSR guidelines with suppliers</li></ul>
Local Communities (the environment, NGOs, etc.)	<ul style="list-style-type: none"><li>Meetings with residents</li><li>Workshops for working-level staff in charge of CCI (Corporate Community Involvement)</li><li>Sisterhood relationship with island regions</li></ul>	<ul style="list-style-type: none"><li>Eco-friendly products and production processes</li><li>Improve worksite and surrounding environments, and prevent pollution</li><li>Establish environmental management system</li><li>Communicate with local communities</li><li>Facilitate local communities' economic development</li></ul>	<ul style="list-style-type: none"><li>Operate the Dream School</li><li>The Doosan Day of Community Service</li><li>Proceed CCI (Corporate Community Involvement) programs tailored to local business sites</li><li>Participate in a meeting with residents in the western part of Incheon city regarding air quality improvement</li></ul>
Central/ Local Governments	<ul style="list-style-type: none"><li>Participate in national projects</li><li>Operate joint programs</li></ul>	<ul style="list-style-type: none"><li>Compliance with laws and regulations</li><li>Public-private partnership</li></ul>	<ul style="list-style-type: none"><li>Regulatory monitoring and internal compliance</li><li>Suggest improvement measures through participation in related organizations' activities</li><li>Participate in the government's public policy projects</li></ul>
Media	<ul style="list-style-type: none"><li>Press releases</li><li>Press conferences</li><li>Regular meetings</li><li>Business site visits (field trips)</li></ul>	<ul style="list-style-type: none"><li>Prompt and accurate information sharing</li></ul>	<ul style="list-style-type: none"><li>Issue press releases in a timely manner</li><li>Support press reporters' news coverage</li><li>Find feature items and provide them to the media</li></ul>



Materiality Analysis

Materiality Analysis Process

Doosan Infracore conducts a materiality analysis every year to effectively identify changes in the business environment and various matters of interest and issues of stakeholders, and thus reflects them in business activities. The company's activities, achievements, and future plans for major issues that are derived from the materiality analysis are disclosed to stakeholders through its integrated report.

Step 01

Issue Pool Selection

- Doosan Infracore conducts a CSR diagnosis every year to identify the level of internal competencies and improvements, and then selects internal CSR issues. In 2018, the company continued to apply Doosan Group's CSR model of diagnosis and performed a self-diagnosis on seven major CSR areas, including customer values, HR, EHS, fair operations, and local communities for its business sites in Korea and China.
- Doosan Infracore ascertains CSR issues and interests of the international community and stakeholders by analyzing media coverage as well as CSR-related international standards and guidelines, such as Global Reporting Initiative (GRI), RobecoSAM, Sustainability Accounting Standards Board (SASB), etc.
- Doosan Infracore selects issue pools by putting together internal opinions and stakeholder issues regarding CSR, and carries out industry benchmarking to identify the status of responses in the global market.

Step 02

Prioritization

- The company evaluates issues by maturity, business importance<sup>1)</sup>, value chain influence<sup>2)</sup>, and interest levels of stakeholders, and puts the results together to define priorities.

Step 03

Review and Feedback

- The CSR Committee reviews the connection between top priority issues and business activities, and finalizes the company's core issues and CSR strategic tasks. Throughout the year, the Committee discusses and manages these core issues through CSR strategic tasks, and relevant business units manage any remaining issues by monitoring industry peers and social changes.

<sup>1)</sup> Business importance: The company assesses the importance of each issue in terms of 'profit, cost, reputation, and compliance' in the course of business conduct by reviewing the related mid- to long-term strategies and business plans and major industry trends among other factors.

<sup>2)</sup> Value chain influence: The company assesses the socio-economic/environmental impact and relative importance of each issue in the value chain.

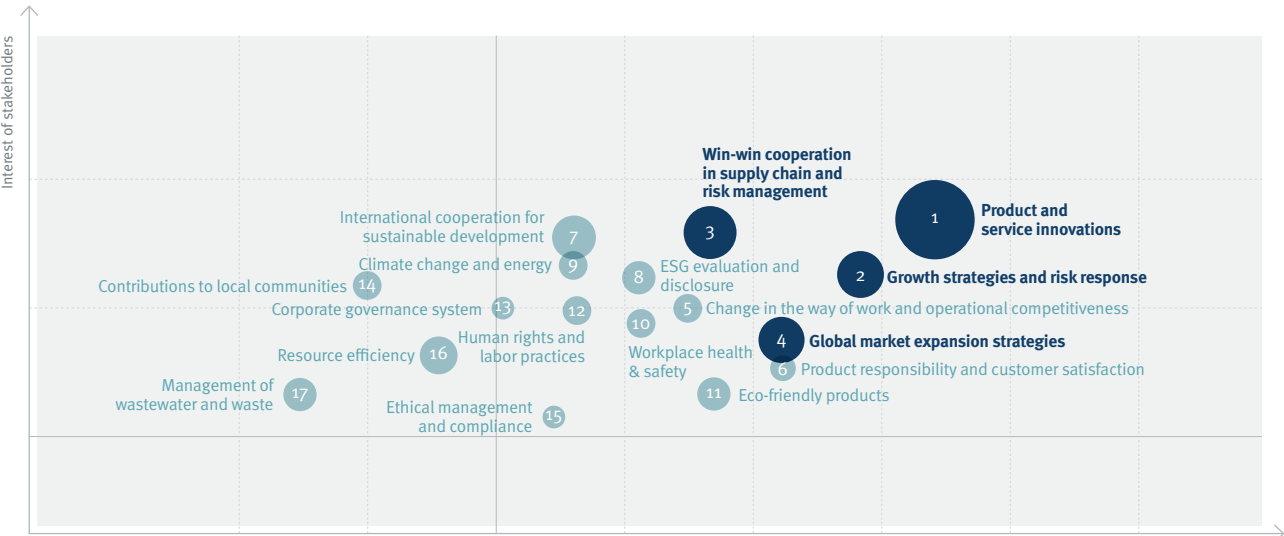
Results of Materiality Assessment

Out of 17 CSR issues, Doosan Infracore selected core issues which have high stakeholder interest and business impact – product and service innovations, growth strategies and risk response, win-win cooperation in supply chain and risk management, and global market expansion strategies.

In the 2018 Integrated Report, the company is disclosing its major activities, achievements, and plans concerning its CSR issues with a particular focus on the four core issues. In Our Strategy section, the company presents key information on its business strategies and products. In Our Responsibility and CSR Facts & Figures sections, the company provides information on different CSR areas, including activities and achievements related to its CSR strategic tasks.

Materiality Matrix

Material Issue	Contents	SDGs	Page
1 Product and service innovations	Management Analysis	17 PARTNERSHIPS	p.02-15
2 Growth strategies and risk response	Our Strategy	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE, 12 RESPONSIBLE CONSUMPTION AND PRODUCTION, 13 CLIMATE ACTION	p.16-55
3 Win-win cooperation in supply chain and risk management	Our Responsibility		
4 Global market expansion strategies	CSR Structure		p.58-63
5 Change in the way of work and operational competitiveness	Employees	4 DECENT WORK AND ECONOMIC GROWTH, 5 GENDER EQUALITY, 10 REDUCED INEQUALITIES	p.64-70
6 Product responsibility and customer satisfaction	Environment, Health & Safety	3 GOOD HEALTH AND WELL-BEING, 6 CLEAN WATER AND SANITATION, 7 AFFORDABLE AND CLEAN ENERGY, 13 CLIMATE ACTION	p.71-78
7 International cooperation for sustainable development	Governance & Integrity	13 CLIMATE ACTION, 16 PEACE, JUSTICE AND STRONG INSTITUTIONS	p.79-84
8 ESG evaluation and disclosure	Suppliers	3 GOOD HEALTH AND WELL-BEING, 4 INDUSTRY, INNOVATION AND INFRASTRUCTURE	p.85-88
9 Climate change and energy	Product Quality & Stewardship	3 GOOD HEALTH AND WELL-BEING, 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE, 12 RESPONSIBLE CONSUMPTION AND PRODUCTION	p.89-94
10 Workplace health & safety	Communities	4 INDUSTRY, INNOVATION AND INFRASTRUCTURE, 17 PARTNERSHIPS	p.95-97
11 Eco-friendly products			
12 Human rights and labor practices			
13 Corporate governance system			
14 Contributions to local communities			
15 Ethical management and compliance			
16 Resource efficiency			
17 Management of wastewater and waste			



\* Each circle represents an issue, and the size of each circle represents the issue's level of influence in value chain.

Importance to business



Employees



OUR APPROACH

We nurture leaders with expertise and pioneering spirits to drive growth into a global leading company.

Based on a corporate culture where employees are considerate of others and diversity is respected, Doosan Infracore helps its employees achieve personal growth at their own pace according to the Functional Competency (FC) system while applying reasonable standards and principles and providing fair opportunities. Through this, the company has been building a mutually beneficial cycle in which people grow, and the growth of people in turn leads to the growth of business. In addition, the company has been enhancing its organizational culture and win-win labor-management relations with the aim of standing proud based on the Doosan Credo.

CSR STRATEGIC TASK FOR 2018

Build a management system and strengthen monitoring to enhance the human rights mindset: Develop a due diligence tool for the monitoring of human rights risks

Doosan Infracore has been building a human rights management system focused on the prevention aspect through its CSR strategic task of ‘building a management system and strengthening monitoring to enhance the human rights mindset.’ It also takes a step forward from the existing post-management enhancement efforts and education on human rights, and diagnoses the organization’s awareness level on human rights, develops its own due diligence tool to prevent human rights violations from occurring, and takes necessary preventive activities in advance.

- Activities and Achievements: Provided online and offline education for all employees (technical staff and office workers); developed the company’s own due diligence tool for diagnosing the level of human rights awareness among its employees; conducted a survey to all its leaders and office workers, and operated the Women’s Council
- Plans: Continue providing human rights education to all employees; provide departments in charge of external projects with intensive education on human rights awareness; and expand the operation of the Women’s Council

Link to UN SDGs



01

Human Rights and Diversity

Respect for Human Rights

As a participant of the UN Global Compact, Doosan Infracore supports the UNGC’s 10 Principles on Human Rights, Labor Standards, Environment, and Anti-Corruption, and complies with the International Bill of Human Rights and the International Labour Organization (ILO) Declaration on Fundamental Principles and Rights at Work. Moreover, the company respects the human rights of its comprehensive stakeholders, including its own employees and suppliers. It does not tolerate any type of verbal abuse, violence, sexual harassment, or other improper acts that violate the spirit of ‘Inhwa,’ meaning harmony between people, in interactions within the company and with suppliers. Doosan Infracore runs reporting channels, such as the Human Rights Protection Center (Help Line) and the Internal Reporting Center. In the event of a violation, the Personnel Committee will take immediate action according to the relevant regulations and provide education to ensure that the same violation is never repeated and to build up human rights awareness.

**Enhancing the Management of Human Rights Risks** As a global enterprise, Doosan Infracore has run a human rights management system since 2015 to fulfill its obligations regarding human rights and to create a sound corporate culture. The company has gathered information on human rights status through reporting channels and focus group interviews, established response processes for human rights violations, and published and distributed a human rights prevention manual. In addition, the company expands its existing Gender Equality Center into the Human Rights Protection Center in order to raise the employees’ awareness of importance on respecting human rights, and provides human rights education and conducts campaigns continuously, including online and offline education customized to working environment of technical staff and office workers. In 2018, the company conducted a survey to all its leaders and office workers in its efforts to preemptively prevent the occurrence of human rights violations. The questionnaire consists of four areas, including open communication, respect, teamwork, and gender equality, and has been developed to diagnose the level of human rights awareness among its employees and preemptively eliminate potential risks. Doosan Infracore analyzed the results of the survey, and based on that, it made improvements and managed identified risks, with the Human Rights Protection Center taking the lead, while the HR Team was in charge of monitoring progress.

Types and Details of Human Rights Violations

Type <sup>1)</sup>	Details
Discrimination	Gender; Age, position, and employment type; Country of origin and race; and Marriage and childbearing
Verbal and physical abuse	Verbal abuse and violence; Sexual harassment; Alienation and bullying; and Invasion of privacy

**Grievance Reporting Channels and Handling Processes** Doosan Infracore is operating the Help Line at the Human Rights Protection Center (previously called the Gender Equality Center), while also providing all employees with education on gender equality, including prevention of sexual harassment.

The company identifies employees’ grievance through diverse channels, such as the Human Rights Protection Center, the Internal Reporting Center, and the Cyber Reporting Center on the company website, and promptly responds to them. The company protects the privacy of the informant by maintaining anonymity, and handles the grievances in accordance with the relevant company regulations and procedures. As a result, Doosan Infracore has handled all major grievance reports filed in Korea in 2018.

Respect for Diversity

**Protection of Employee Diversity** As of December 31, 2018, there were 4,468 employees across the world at Doosan Infracore, including 2,720 in Korea (excluding those working for Doosan Bobcat after its public listing). Given the characteristics of the machine manufacturing industry, it is not easy to recruit female employees. The company strives to eliminate bias by having its female engineers take part in the interviews for recruiting. To foster the personal growth of female staff, the company does not discriminate against its female staff in their job assignments, nor does it place any restrictions on their assignments. The number of female employees is on the rise, and it is expected that the percentage of female managers will also steadily increase.

**Providing Fair Opportunities** As specified in the Doosan Credo and the company’s Ethics Charter, people at Doosan are respected for their individual characteristics. Their employment, evaluation, and compensation are not discriminated against the grounds of gender, religion, disability, age, social status, country of origin, nationality, ethnic backgrounds, race, skin color, physical conditions, marital status, pregnancy, childbearing, family type or status, ideology, political opinions, sexual orientation, educational backgrounds, or military service. Doosan people are also not treated unfairly depending on their personal relationships with the company’s officials based on their academic or geographical backgrounds.

**Women’s Council** Doosan Infracore expanded the scope of its Women’s Council, launched for the Technology Division in 2014, to company-wide in 2017, thereby listening to the voice of female employees and sharing information on gender equality from an unbiased perspective. In 2018, in order to enhance internal communication channels, each member of the Women’s Council was assigned to a particular department to identify any violations of human rights and collected ideas on improving gender equality in the organization. The Council also held a meeting with HR executives twice in half-year to share the collected feedbacks and took necessary improvement measures. In 2019, it will continue listening to the voice of diverse minorities, and take actions to fully establish a horizontal corporate culture.

02

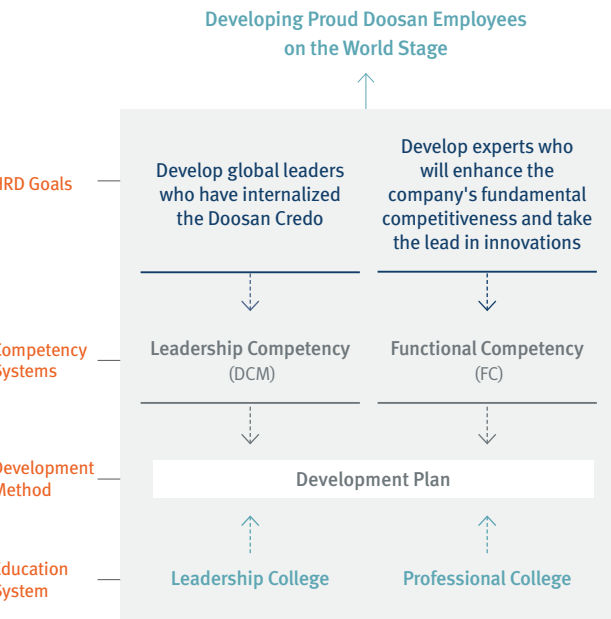
Human Resources Development

Doosan Infracore runs diverse management systems and educational programs designed to share the values and culture of Doosan in order to nurture ‘global leaders who can lead the way in organizational changes and innovation.’ The company also develops those individuals into global experts in their respective fields with leadership.

Global HR Information System

Doosan Infracore has been standardizing and streamlining its HR systems, processes, standards, and data from the Doosan Credo perspective. To this end, the company launched a new HR system called ‘MY HR’ in March 2017 in order to integrate more than 50 HR systems that had been previously used by different subsidiaries in various countries around the world. MY HR is a globally integrated one-stop HR system designed to handle various HR tasks, such as Doosan Competency Model (DCM), management by objectives (MBO), and development plan (DP), as well as training applications. It is available to all Doosan Infracore business sites in Korea, China, the U.S., and Europe. All employees have the right to create or view personal information regarding themselves and their team members (if they are managers) through MY HR. They are thus required to sign the Pledge of Personnel Information Protection to promise to handle and process the personnel information of themselves and their team members according to certain principles.

HRD Directions of Doosan Infracore



<sup>1)</sup> The types of human rights violations are based on the company’s code of conduct and guidelines on the creation of a sound organizational culture.



## Enhancing Functional Competency

Doosan Infracore has put a sophisticated Functional Competency (FC) development system in place, with the head office taking a central role, in consideration of individual employee's unique skill sets and capabilities. The company also encourages its employees to devise their own education plans according to the result of their FC assessment.

**Building the FC Development System** FC enables employees to define the competencies they need to perform their duties successfully and to set their own roadmap for personal growth based on their identified strengths and weaknesses. Doosan Infracore operates an FC-based HR education and development system to help its employees become experts in their respective fields. Since 2015, the company has been publishing the FC Development Directory which contains a list of courses and curricula customized for different competency levels in such areas as R&D, manufacturing, and sales and marketing. In 2016, the company completed the FC development system for R&D, production, and sales, and restructured courses in three areas – R&D, innovations, and sales & marketing – at the Job Academy. In 2017, following the establishment of the FC system for all office staff, the company launched the FC Level-Up program, which is designed to enable mid-level managers and above to draw up and implement their own development plans. In 2019, Doosan Infracore will develop a system which enables the company to systematically manage plans and performance of its FC Level-Up activities.

Doosan Infracore developed a draft proposal for the FC system for is technical staff in 2014, with the goal of nurturing technical staff equipped with professional competencies and a high degree of competitiveness, and then conducted an FC diagnosis for 11 technical job categories in 2017. In 2018, the company developed an FC diagnosis system, conducted a technical staff evaluation, held feedback sessions, and implemented FC-linked job training programs and talent cultivation plans. In 2019, Doosan Infracore will further solidify its FC diagnosis basis by improving and upgrading diagnosis system in association with the National Competency Standards (NCS)<sup>1)</sup>.

**Competency Development Trainings** Doosan Infracore has set up a self-directed learning system so that employees may study voluntarily under their own volition. Employees can search, apply for, or access various courses offered by the company's self-directed learning system on their computers or mobile devices anytime, anywhere through MY HR, an integrated HR system. In December 2017, the company launched CELL (Community of Employee-Led Learning), a new employee learning support system, to promote and support employees' self-directed, small-group, job-related learning activities, currently assembling participants twice a year. Composed of 3-10 persons, members of each CELL make decisions on the study contents and methods by themselves and conduct a group study for five months in a voluntary yet systematic way. 72 CELLS successfully completed their group study in 2018, and as of April 2019, some 50 CELLS are in operation.

In addition, the company launched a DRAW (Digital edge Reinforce-ment At Work) course in April 2018 in order to cultivate experts who can take the lead in making improvements to job performance in the Fourth Industrial Revolution era based on their understanding and knowledge of big data and machine learning. Participated by 45 employees from various fields, including HR, finance, marketing, and purchasing, the course was offered for three months until July.

To improve the technical expertise of its technical staff and support their efforts to develop into technical experts, Doosan Infracore offers job training based on its FC system and supports various study clubs and their efforts to acquire technical certifications. The company has established its job training system for technical staff in line with the development direction of each job category based on the VOCs and feedbacks of production executives and staff at worksites. It prioritized a total of 271 training courses, and has been developing and launching in stages. In addition, the company introduced 22 courses in 2018 for study clubs for the purposes of technology transfer and certificate acquisition, with 160 (including double counting) employees completing the courses. As a result of continuous efforts to foster technical experts, Doosan Infracore nurtured 134 master technicians (11% of total number of regular technical staff) as of December 2018, and 12 of them have obtained their master technician title in more than two areas, meaning that the company has obtained 147 master technician licenses. Those employees who acquire expertise through the company's support system in turn disseminate it throughout the company, creating a virtuous cycle within the organization.

### Outcomes of Development of Technical Staff

(As of December 2018; Accumulated figure)

**134** Master Technicians

**3** Master Craftsmen

<sup>1)</sup> Master Craftsman of Korea<sup>2)</sup>,  
<sup>2)</sup> Incheon Metropolitan City Michuhall Master Craftsmen<sup>3)</sup>

## Developing Global Talent

**Leadership Enhancement** Under the judgment that the future of an organization depends on the commitment of its leaders, Doosan Infracore runs leadership training programs at every level in the organizational hierarchy, including the leader coaching program, partnership coaching program, and team leader workshop designed to equip the participants with necessary understanding and skills of leadership. The leader coaching program was offered from July 2018 to January 2019, and its course was designed to enable team and part leaders to improve their leadership competencies and exercise their leadership in the most effective ways by learning and putting diverse coaching skills into practice. The partnership coaching program was developed to help deputy managers and managers figure out their coaching styles based on their own merits, and use their coaching skills to maximize partnerships within their units. It was offered on two separate occasions in 2018, and the company plans to offer the program twice in 2019 as well.

Doosan Infracore also introduced a group coaching program for technical field leaders of its Gunsan Plant to help them solve on-site issues and bring practical changes to daily operations in order to enhance their leadership and make coaching a part of everyday work. In 2018, based on the role model for technical field leaders established in 2017, the company made improvements in the technical leadership education system, and operated a leadership course while expanding the technical field leader coaching program to the Incheon Plant. In addition, the company has set an education plan to boost organizational vitality in order to nurture YBs<sup>4)</sup> in the technical field, and has been running the 'Vision Camp' since 2016 to enhance their leadership. In 2018, interview was conducted with Vision Camp participants to confirm the high level of expertise, experience, and competence of Doosan Infracore's technical staff, and the interview data will be used for internal education programs.

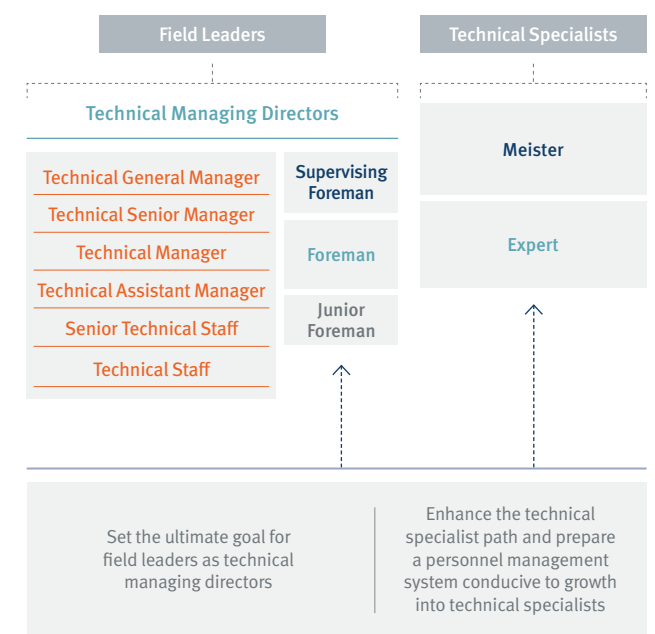
**Education on the Global Work Environment** To help its employees work efficiently in a global business environment without any communication difficulties, the company runs 'Let's Do Biz English,' an 80-hour practical English course, in addition to Chinese and Japanese education courses. In 2015, Doosan Infracore launched a collaboration website called Global Mobility Support (GMS) to provide employees assigned to overseas posts with information on various regulations, welfare benefits, and tips intended to help them enjoy a pleasant life overseas. The company also runs online and offline programs including language courses tailored to its employees and their family members.

## Reorganizing Personnel Management System for Technical Staff

Doosan Infracore has been building human resources development (HRD) systems for its technical staff in line with the Doosan Credo in order to encourage them to pursue personal development and have a clear vision. To this end, the company reformed the systems for job assignment, promotion, and competency evaluation; launched courses to develop technical experts; and established an FC system.

In 2012, it introduced the position and promotion system so as to present its technical staff with a vision for personal growth and pride in their individual ability and status. With the introduction of the assessment system for technical staff, leaders became aware of the importance of nurturing their team members' competency, while team members were encouraged to develop their own strengths. The company also has established technical specialist courses designed to help its technical staff further develop their job competencies and provide them with opportunities for personal growth while working as an Expert or Meister. In 2016, Doosan Infracore overhauled its FC-based HRD system in cooperation with field leaders and changed the titles of its technical staff from entry-level employees to managers, thereby bringing about positive effects of raising their social status.

### Career Development Paths of Technical Staff



<sup>1)</sup> National Competency Standards (NCS): National standards for knowledge, skills, and attitudes required to perform one's duties in an industrial setting

<sup>2)</sup> Master Craftsman of Korea: This is a craftsman who has the highest level of skilled crafts in 96 trades in 22 industrial fields and who is designated by the President as such under 'the Act on Encouragement of Skilled Crafts' among those who have greatly contributed to the development of skilled crafts and the improvement of status of skilled craftsmen by engaging themselves in industrial fields for a long period of time.

<sup>3)</sup> Incheon Metropolitan City Michuhall Master Craftsmen: This refers to those who are designated by Articles 3 and 4 of the 'Ordinance on the Selection and Support of Incheon Metropolitan City Michuhall Master Craftsmen' among those who are equipped with an outstanding spirit of master craftsmen and the highest level of skilled crafts by having worked in the same fields and trades for at least 15 years and having greatly contributed to the development of skilled crafts.

<sup>4)</sup> Young Boy (YB): Technical staff hired in 2004 or after



Doosan Infracore established its Career Development Paths of Technical Staff by creating a technical managing director system and strengthening the existing technical expert system, thereby offering its technical staff a choice of becoming a ‘field leader’ or a ‘technical specialist.’ A technical managing director is a person with leadership and practical skills and plays his/her role as a team leader in the company’s production units, presenting technical staff with a vision to be a top leader. A technical specialist is a field expert with professional skills and strong competitiveness, and the company helps them grow into top technicians. Through this system, technical staff can choose from the two development paths – the technical specialist track which enables them to grow into Meisters or the field leader track in which they develop into executives in charge of production sites.

Following the first appointment of a technical managing director on the company’s 80th anniversary in January 2017, four Meisters were chosen in April 2019. The title of Meister is the highest honor granted to professional technicians who have long been engaged in particular job categories for the purpose of cultivating technical staff and inspiring pride in them. Doosan Infracore selects a Meister through a strict comprehensive evaluation conducted by the Professional Technical Committee that includes evaluation and verification of their personal competencies, fact-checking through 360-degree interviews with their colleagues, and in-depth interviews, during a span of six months. The four Meisters have worked for over thirty years in calibration/testing, welding, engine assembly, and facility maintenance using their top-of-the-line technical competencies, with their colleagues taking them as their role models. Doosan Infracore will continue to foster its technical staff in a systematic way so that they can improve their work engagement with pride, thereby building a virtuous cycle of growth at the corporate level.

## Invigorating Organizational Culture

### Internalization of the Doosan Credo

All members of Doosan implement the Doosan Credo, a set of principles that represents Doosan’s philosophy and unique way of doing business, on the basis of its fundamental competitiveness and highly advanced and scientific ways of doing business. To create sustained positive outcomes through a virtuous cycle structure, all employees of Doosan Infracore strive to internalize the Doosan Credo with its leaders undertaking an exemplary role, and led by Change Agents (CAs). The company promotes and shares the Doosan Credo on a continuous basis by annually discovering and honoring exemplary cases of employees who have made an exceptional contribution to enhancing fundamental competitiveness, making advances in work practices, and promoting core values of Doosan. In 2018, the company identified issues from a work productivity perspective, and designated them as tasks to be addressed. Also, action principles to improve office work productivity have been developed through executive leadership sessions, and promoted to be executed at the company level.

### Improving the Way of Working

**Changes Starting from Leaders** Doosan Infracore emphasizes the need for its leaders to initiate changes and set a strong example for others to follow. The company holds leadership sessions on an annual basis in order to bring together the CEO and senior executives to share the latest changes in business management environments, figure out the implications of such changes, discuss the directions that the company’s organizational culture must pursue, and find ways to make improvements. In 2018, it launched a company-wide campaign and established an action plan aimed at improving its operational efficiency in office work productivity. A specific action plan was devised through in-depth discussions about the need to improve reporting culture by reducing the use of PPT and promoting in-person reporting, to scale down regular meetings, and to eliminate the gray zones in the value chain, which was followed by a strong implementation in both bottom-up and top-down directions.

**CA Channel Operation** Doosan Infracore makes constant improvements in its way of working through the Change Agent (CA) channel run by each executive organization. Serving as a bridge between executives and staff, a CA has a CORE Time on a monthly basis to identify inefficiencies at work, discusses measurement for improvement with leaders and implement necessary tasks.

### Communication and Consideration

Doosan Infracore runs diverse communication channels, including online and offline grievance mechanisms, the Human Rights Protection Center, the company website, and the in-house portal with the goal of boosting employees’ satisfaction at work through genuine communication between the company and its employees. In addition, the company has been sharing media coverage about the company and public notices that it has made externally through ‘D-Briefing’ since 2016. Moreover, the company shares with its employees the corporate vision, including key business strategies, new businesses, and new growth drivers, through CEO Talks in order to ensure transparent communication of corporate activities.

### Work-Life Balance

Doosan Infracore complies with the labor regulations of the countries in which it operates. To further improve its employees’ quality of life, the company offers a wide range of welfare benefits that match each country’s unique situation. In particular, it proactively supports a sound work-life balance through family-friendly management practices, including the operation of childcare centers and the granting of parental leave, reduced working hours, and family care leave. It also carries out customized activities to improve corporate culture by promoting the use of flextime.

**Operation of Flextime** In Korea, Doosan Infracore runs a flextime system to support its employees’ work-life balance. When working hours need to be altered as a means of improving work productivity and efficiency, employees can freely adjust their work hours by receiving pre-approval from their leaders as long as their regular working time per day is eight hours. The company also runs a work schedule selection system (a part-time work system) at its business sites in Korea for part-time workers who cannot follow an existing recruitment form.

**Support for Building a Stable Life** In Korea, the company offers industrial accident insurance, supports medical costs, and carries out regular medical checkups to protect its employees in the events of health emergencies or accidents. It also helps its employees financially through loans for their children’s tuition fees and housing support measures.

**Employee Assistance Program** Doosan Infracore provides its employees with the Employee Assistance Program (EAP) which offers counseling and education on health, finance, and other matters. In Korea, the company has been operating DooHug, an in-house psychological counseling center, since 2014. (Please refer to page 78 of this report for further details about DooHug.) In China, the company offers sand-therapy as a special program for employees and their family members, and operates psychological counseling programs for expatriate employees and their family members.

Support Systems for Family-friendly Business Management (Korea)

	System	Details	Eligibility and Period
Pregnancy	Pregnant employee caring program	Parking tickets for pregnant employees	Pregnant female employees
		Guidebook on pregnancy, childbearing, and childcare	
		Pregnant employee badges, stickers, and parking tickets	
		Use of affiliated hospitals, in-house lounges, internal and external psychological counseling centers, if needed	
	Basic support during pregnancy	Compliance with 8-hour workday and prohibition of holiday work	Pregnant female employees (the entire pregnancy period)
		Support for medical bills during pregnancy and childbearing	Pregnant female employees (from pregnancy to childbearing)
	Shortened working hours during pregnancy	Shortened working hours for the health of pregnant employees and their babies	Pregnant female employees (reduce working time up to 2 hours per day until the 12th week and after the 36th week of pregnancy)
	Leave for prenatal checkup	Parental checkup leaves	Pregnant female employees (once per month until the 28th week of pregnancy; once every two weeks from the 29th to the 36th week; and twice per week after the 37th week)
Childbearing	Leave before or after childbearing	Childbearing leave	Female employees who give birth to a child (90 days / 120 days for twins)
		Miscarriage/abortion leave	Male employees whose wives give birth (5 days)
	Childbirth cash gift	Cash gift in celebration of childbirth	Female employees who have a miscarriage or abortion (Leave duration varies depending on pregnancy period, with a ceiling of 90 days for pregnancy of more than 28 weeks)
Childcare	Leave for childcare	Childcare leave	Employees who have childbirth
	Reduced working hours for childcare	Reduction of working hours for child care (15-30 hours per week)	Employees with children aged less than 8 years or second graders in elementary school (once per child for mother and father, respectively, and reduced working hours for childcare for a total of one year for parents)
	In-house daycare center	Daycare centers in Incheon, Gunsan, and Seoul	Employees with children aged 3-5 years (selected through transparent procedures at a fixed time)
Family	Special leave of absence	Leave of absence to take care of family members suffering from illness or recovering from accidents	Employees (90 days per year)
		Leave of absence intended for family members in need of special care, personal development, and treatment of infertility	Employees (6 months + additional 6 months)



## 04

## Win-Win Labor-Management Relations

### Compliance with Labor Policies

Doosan Infracore complies with the labor standards of the International Labour Organization (ILO)<sup>1)</sup>. Each year, the company conducts investigations to detect any child labor or forced labor practices within the company through the annual CSR assessment of all domestic and major overseas business sites. According to the results of a 2018 self-assessment, none of the company's business sites in Korea and overseas have resorted to child labor or forced labor of any kind. It has also signed the Guidelines on the Protection of the Working Conditions of In-house Subcontractors' Workers with the Korean Ministry of Employment and Labor. Accordingly, the company ensures compliance with relevant regulations through a regular monitoring, and it also complies with the government's guidelines on fair transactions and thus properly operates in-house subcontracting activities.

### Labor-Management Relations

Since the launch of the Win-Win Labor Union in 2011, Doosan Infracore has maintained and developed labor-management relations based on mutual trust and respect, including the strike-free conclusion of collective bargaining agreement for eight consecutive years. Labor and management continue to communicate through diverse channels, including the Labor-Management Council and the Welfare Subcommittee, and share major issues through the quarterly Business Information Session. In 2018, the company held diverse labor-management events, including Hanmaeum Day to encourage its technical staff, participation in the Incheon International Half Marathon, cheering for a professional baseball team, and support for local welfare facilities. In addition, each of its business sites in Incheon, Gunsan, and Ansan holds a Building a Great Workplace Committee meeting every two months, and thus improves work environment based on employees' opinions.

Its Chinese subsidiary has established a special council according to the Trade Union Law of the People's Republic of China which is equivalent to the Labor Standard Act in Korea. The special council's members are elected by vote. The company holds a monthly meeting with the special council to discuss major developments and share opinions on various worksite issues, and discusses wage on an annual basis.

### Joint Customer Support of Labor-Management

The labor union and management of Doosan Infracore have been working in unison to overcome the market downturn since 2016 through the joint customer support program by visiting customers across the country, listening to their voice, and providing customer services. In 2018, Doosan Infracore conducted the customer support activities on three occasions, through which the labor union identified customer requirements and forwarded them directly to the company's production sites, thereby further improving product quality and also enhancing brand value of Doosan Infracore.

Moreover, the company runs a life-cycle design program in cooperation with an external professional organization to help retiring employees with any career shift they may be considering. The life-cycle design program offers one-on-one consulting and open lectures in such areas as career exploration, support for starting a business, life counseling, finance, and liberal arts licenses for up to ten days for around six months depending on the individual lifetime design goals.

**Recharging Opportunities** In Korea, Doosan Infracore encourages its employees to take a two-week vacation (a one-week vacation plus an additional one-week vacation) before or after the first week of August when domestic plants halt their operations. The company has also implemented the Overseas Advanced Culture Exploration Support System for its regular staff – office or technical staff who joins the company before January 1st of the previous year – to help them experience foreign culture on the occasion of their annual vacation periods. The company offers them round-trip air tickets and Eurail passes so that they can take the opportunity to recharge themselves. This is a differentiated benefit program from other companies offered to Doosan employees, thus boosting their pride in the company.

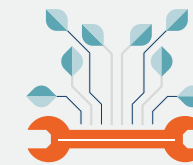
**Family-friendly Management** Doosan Infracore allows its employees to choose childcare leave and family care leave or reduced working hours depending on their situations. The company also runs flextime and leave of absence systems according to the circumstances of the relevant countries.

In Korea, Doosan Infracore runs the Mom's Caring Program, a corporate-wide policy to support pregnant employees. To this end, the company publishes a 'Guidebook on Pregnancy, Childbearing, and Childcare' to offer information on support programs available in and outside the company regarding pregnancy, childbearing, and childcare. Also, it creates a 'Mom and Pop Guidebook' based on the opinions collected through the Women's Council, shares it with all employees, and makes constant updates.

For pregnant employees, the company grants reduced working hours and prenatal checkup leave, while also offering parental leave. It guarantees a recovery period for female employees who have suffered from miscarriage or abortion comparable to that granted for childbearing. In addition, the company allows its employees, regardless of their gender, to choose either childcare leave or reduced working hours, and operates in-house childcare centers in three locations – Incheon, Gunsan, and Seoul. Furthermore, Doosan Infracore allows its employees to use their leave to take care of family members in need, promote personal development, or focus on infertility treatment. In China, the company offers a leave of absence or a shorter workday to female employees who have just given birth to a child.

<sup>1)</sup> Compliance with the ILO labor standards: Doosan Infracore ensures that the labor standards of the ILO are complied with at all its global business sites. The company prohibits all forms of discrimination, child labor, and forced labor while promoting freedom of association.

## Environment, Health & Safety



### OUR APPROACH

At Doosan Infracore, environmental values and safety culture are non-negotiable principles to achieve sustainable growth.

Doosan Infracore is striving to use resources more efficiently and to minimize its environmental footprints by reducing pollutant discharge based on its company-wide integrated Environment, Health & Safety (EHS) management system. The company also participates in response to climate change by making continuous improvements to energy efficiency and managing greenhouse gas (GHG) emissions. Moreover, it has been establishing a safer work environment by raising the safety awareness of all its employees and rigorously managing risk factors at all worksites. As such, Doosan Infracore is striving to minimize EHS risks that may arise in its business process and to make positive impacts on society.

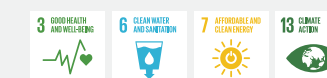
### CSR STRATEGIC TASK FOR 2018

CSR Strategic Task for 2018: Establish a GHG emissions reduction target and an action plan

Doosan Infracore aims to effectively respond to Phase II of the Korea Emissions Trading Scheme which will be enacted from 2018 to 2020 and to secure a stable and sustainable foundation to cope with an emissions trading scheme. To this end, all of its relevant departments, with the GHG/Energy Reduction Council taking a central role, worked together to 'set an emissions reduction target and establish an action plan to achieve the goal.'

- Activities and Achievements Established and operated the GHG/Energy Reduction Council; analyzed GHG emission reduction scenarios and set a reduction target based on the government's reduction roadmap; established a GHG emission reduction investment plan; reviewed detailed activities regarding emission rights associated with suppliers and ways to utilize renewable energy; and fostered GHG/energy experts

### Link to UN SDGs



## 01

## Integrated EHS Management

### EHS Management Strategies

In 1995, Doosan Infracore established the EHS Management Policy in order to share key elements of its environmental management strategies both internally and externally. In 2015, the company amended the Policy for the ninth time to set the current one which consists of five specific principles, including the operation of the EHS management system aimed at promoting a better life for human beings and environmental preservation, through which the company promotes company-wide participation in EHS management. In addition, it declared its EHS management vision of becoming a 'Global Leading Green Company' and established five strategic tasks for achieving sustainable growth.

### 5 Strategic Tasks for EHS Management

## Global Leading Green Company





EHS Management System

Doosan Infracore has been enhancing the level of its EHS management by systematizing relevant organizations under the EHS Policy and strategies, operating an EHS management system at global business sites, obtaining international certifications, and reviewing the status of implementation. In order to promote more systematic EHS management, the company has established an EHS IT system, through which it manages EHS-related information in real time and carries out comprehensive analysis of various information, followed by reinforcement or improvement if needed. In 2019, the company aims to expand EHS support at worksites by developing ‘DooGreen’ which adds such functions as legislation and standards, chemicals, lab safety, firefighting facility management, and employee health checkup record management to the existing EHS IT system.

The company also has developed corporate-wide EHS management evaluation indices and applies them to its business sites in Korea and China. For continued improvement and development of activity performance, Doosan Infracore manages evaluation indices through a performance analysis every year. By reflecting the EHS management evaluation status in the performance indices of top management and executives of relevant departments, Doosan Infracore is improving the implementation capabilities of the EHS management system and enhancing management standards. Based on clear EHS standards and the systems linked to its value chain, such as purchasing and production, the company seeks to enhance its required capabilities and increase implementation capabilities by applying the ‘EHS committee in overseas production subsidiary (China, DIN).’

EHS Policy

- 01

Operation of the EHS System: We establish, operate and continue to develop a system designed to improve EHS impacts of our products, activities, and services.
- 02

Compliance with EHS Regulations: We adhere to national and international EHS regulations and agreements, establish strict internal management standards, and faithfully implement them.
- 03

Development of Eco-friendly Technology to Boost Customer Safety: We develop eco-friendly technologies that place top priority on our customers’ health and safety, and then preserve resources and energy to actively contribute to sustainable environmental conservation and fight against global warming.
- 04

Realization of Zero Occupational Accident: We create a pleasant and safe people-centered work environment, improve the health and quality of the lives of all our employees and suppliers, and aim for zero accident at work.
- 05

Communication with Stakeholders: We expand communication with our stakeholders and disclose EHS performance transparently in order to continue to grow as a trusted and respected company that fulfills its social responsibilities.

**EHS Organization** With central roles performed by the EHS Team at the Incheon Plant, which is the company’s head office, the EHS units at overseas business sites work in unison for systematic and effective EHS management in response to the expansion of overseas business sites and rising concerns about environmental issues worldwide. The CSR Committee, which is composed of the CEO and the BG heads, makes decisions on EHS-related policies, plans, and activities. Each BG holds a monthly EHS steering meeting to discuss EHS issues and share the progress of EHS goals.

Doosan Infracore has been building a global EHS governance and strengthening EHS support and management for its overseas business sites since 2017 with the purposes of communicating more closely with staff regarding EHS philosophies and standards of the company and enabling all its business sites to adhere to the same level of high EHS standards, regardless of the country or region. In 2018, the company improved the level of EHS standards at its overseas business sites by sharing EHS strategic tasks and issues, holding EHS workshops, and visiting worksites. In 2019, Doosan Infracore plans to expand its regular EHS Committee meetings worldwide, starting with the formation and operation of ‘EHS committee in overseas production subsidiary (China, DIN).’

ISO 14001 Certified Worksites

Korea (Incheon, Gunsan, Ansan)  
China (Yantai)

ISO 14001

Safety and Health Management System Certified Worksites

Korea (Incheon, Gunsan, Ansan)  
China (Yantai)

OHSAS 18001

Korea (Incheon, Gunsan)

KOSHA 18001

**Managing the EHS Management System** Doosan Infracore has put an EHS management system in place based on international standards, and examines the operation of the EHS management system and the level of compliance with relevant laws and regulations by conducting internal and external inspections every year. The global business sites of Doosan Infracore continue to put efforts in minimizing environmental pollution and damage that can arise from corporate activities by earning such international standards as ISO 14001 Environmental Management Certification and the Occupational Health and Safety Management System (OHSAS 18001/KOSHA 18001) Certifications, and through safety inspections on hazardous machines and equipment and the process safety management (PSM) system. In addition, they strive to remove industrial accident risk factors.

**Self-evaluation of Global EHS** To further advance its EHS management and strengthen EHS fundamentals, Doosan Infracore conducts Doosan EHS Rating System (DSRS)<sup>1)</sup> evaluations as well as evaluations on compliance with EHS laws and regulations. Developed on the basis of global standards and in consideration of business characteristics, the DSRS is a basis to build an advanced EHS system and create an EHS culture shared by staff. In 2018, the company carried out DSRS evaluations of the Incheon Plant and made the necessary improvements.

Each year, the company conducts EHS compliance evaluations for all its business sites to prepare them for external assessments and inspections, while ensuring that they always comply with relevant laws and regulations. The evaluation is carried out through field guidance to review proper use and management of dangerous machines, equipment, and chemicals, as well as the status of safety training progress. Evaluation results are linked to the management by objectives (MBOs) of relevant executives and the integrated reward system by duty type, which in turn is increasing employee awareness and identifying areas where improvement is needed, thereby leading to actual improvements. In 2018, the company conducted two EHS compliance evaluations at its business sites in Korea and China, and of its in-house suppliers. In particular, one of the two evaluations was carried out through the self-assessment in order to improve worksite execution capability in complying with laws and regulations. In 2019, Doosan Infracore plans to expand the scope of EHS compliance evaluations to include DIN. In addition, the company will expand the integrated EHS reward system to include its internal suppliers to further improve the level of its EHS compliance by raising the suppliers’ awareness of the importance on EHS.

<sup>1)</sup> Doosan EHS Rating System (DSRS): The EHS evaluation system developed by Doosan Group to evaluate the EHS level of its worksites quantitatively and to encourage them to make improvements; Doosan Group has made adjustments to the ISRS applied by global leading companies to suit its own circumstances.

Energy Management and Responses to Climate Change

Global warming and climate change caused by an increase in GHG emissions is influencing the ecosystem as well as all areas related to humankind, including industrial activities. To preemptively respond to climate change risks and opportunities, Doosan Infracore forecasts GHG emissions based on its annual production plan, and makes investment in improving energy efficiency and carries out activities to achieve the target. The company is also expanding the development and sales of highly energy-efficient, low-carbon products, including electric excavators.

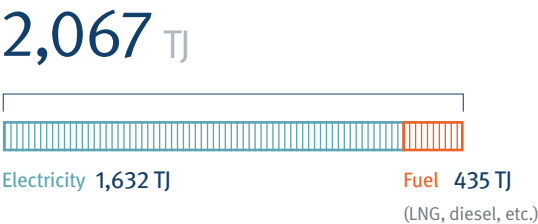
Improving Energy Efficiency

**Reducing Worksite Energy Use and Increasing Energy Efficiency** Doosan Infracore identified and carried out energy conservation tasks, built an energy intensity management system, and upgraded its energy monitoring system according to its CSR strategic task of ‘Reducing worksite energy use and increasing energy efficiency’ from 2015 to 2017 at its business sites in Korea. The company also upgraded the Energy Management System (EMS) to lay the groundwork for energy-related information reporting that would enable the company to monitor its energy consumption and costs, monthly energy consumption trends by energy source, and energy intensity performance in relation to production. It also built an energy measurement equipment monitoring system, thereby enhancing its EMS data credibility. In 2018, the company identified and took actions on energy conservation tasks, such as efforts to improve gas consumption intensity by upgrading facilities at its paint factory, more efficient operations of compressed air and dust collectors, and installation of high-efficiency lamps. As a result, the company’s energy intensity (energy costs / production expenses) improved by 5% over the previous year despite a significant surge in production volume.

Responsible Responses to Climate Change

**GHG Emissions Management** In managing GHG emissions at business sites in Korea, their energy consumption (electricity, LNG, etc.) is gauged by plant and production line, and the data is analyzed through the integrated EHS IT system to identify monthly emissions amount. Given the characteristics of the company’s assembly

Energy Consumption in 2018 (Korea, TJ)





processes, indirect emissions from purchased electricity account for about 73.3% of its total GHG emissions, while the remaining percentage is emitted from manufacturing processes and stationary or mobile combustion. In 2018, the company’s total GHG emissions rose by around 10% to 108,244 tCO<sub>2</sub>, mainly attributable to the increased production of construction equipment and engines during the year.

**Response to Emissions Trading** Doosan Infracore was designated as subject to the Korean government’s GHG & Energy Target Management System in 2010, and fulfilled all its legal obligations by 2014. The government introduced a new emissions trading system in 2015, and the company became subject to the new scheme. Accordingly, Doosan Infracore kept its GHG emissions at around 68% of the quota allocated by the government, recording the average of 313,383 tCO<sub>2</sub> for three years from 2015 to 2017 which was the first phase of the scheme. Only the Incheon Plant is subject to the second phase from 2018 to 2020, and it is now managing its emissions in a stable manner.

Doosan Infracore set ‘establishing a mid- to long-term roadmap on carbon trading’ as one of its 2017 CSR strategic tasks, identified potential GHG emissions reduction amount, and established a roadmap for emissions reduction and decision-making process for trading. By doing so, the company laid the foundation for operating the emissions trading scheme through preemptive emissions trading and establishing a mid- to long-term direction for dealing with the emissions trading scheme. In 2018, to effectively address the second phase of the national emissions trading scheme and lay the groundwork for a stable, sustainable response system to the scheme, all the relevant departments of the company, with the GHG/Energy Reduction Council taking a central role, worked together to ‘set an emissions reduction target and establish an action plan to achieve the goal.’ In addition, the company analyzed GHG emission reduction scenarios and set a reduction target based on the government’s reduction roadmap; established a GHG emission reduction investment plan; reviewed detailed activities regarding emission rights associated with suppliers and ways to utilize renewable energy; and fostered GHG/energy experts.

As a result, the GHG emissions of the Incheon Plant recorded 88,572 tCO<sub>2</sub>, or 43% of the amount allocated by the government for the year, achieving the goal it had set at the beginning of the year by 103%. As such, Doosan Infracore is responding to the scheme in a stable manner.

GHG Emissions in 2018 (Korea, tCO<sub>2</sub>)

108,244 tCO <sub>2</sub>				
Incheon Plant	Gunsan Plant	Ansan Parts Distribution Center	Seoul Office	Leased Office Building (Icheon)
88,572	16,798	1,847	857	170

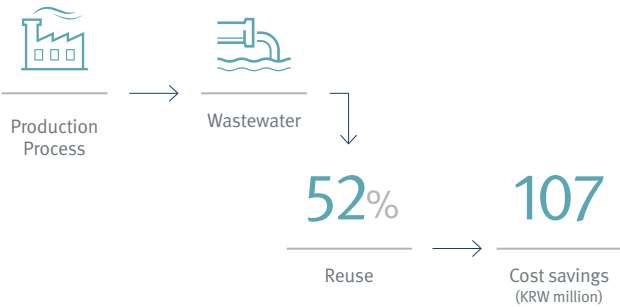
## Improving Resource Efficiency and Reducing Environmental Impact

Doosan Infracore explores better ways of using limited resources more efficiently while striving to minimize the impact of its business activities on the environment and local communities. To this end, the company has adopted various ways of promoting the eco-friendly use of resources and conducts activities to reduce the discharge of pollutants. Doosan Infracore controls its emissions of pollutants more strictly than required by laws in all relevant areas. The company’s performance in using resources and managing emissions over the past three years is found in the ‘CSR Facts & Figures’ section (pages 106-107) of this report.

### Improving Efficiency in the Use of Resources

**Water Reuse** As extreme weather, such as drought and heavy rainfall, becomes more frequent, the importance of managing water resources has been increasing. To reduce water consumption, the Incheon Plant has been operating a wastewater recycling system designed to recycle the effluent discharged from its wastewater treatment facility and reuse it for the manufacturing processes. The Plant has continued to expand the use of recycled effluent, including the sand treatment tower at the casting plant, and reused 52% of its wastewater for manufacturing processes in 2018, thereby saving KRW 107 million on its water bills. It also established a wastewater reclamation and reuse system that enabled it to reuse 4,469 tons of water in 2018. In addition, a separate rainwater-harvesting system was built to reuse 348.5 tons of rainwater for landscaping and coolants.

Wastewater Reuse (Incheon Plant)



**Reuse and Recycling of Waste** To ensure the efficient use of limited resources, Doosan Infracore pursues design optimization, checks its plant facilities, and maintains them in the optimal operational state, thereby conserving resources in its daily operations. In Korea, the company has been implementing its resource recycling policy, enabling the company to reuse 94% of its waste in 2018. Doosan Infracore plans to further increase its resourcization rate by improving additional recycling plans and waste disposal methods such as diversification of recycling methods and segmentation of waste by type.

### Management of Environmental Pollutants

**Water Quality Management** All wastewater generated from production processes go through a physical, chemical, and biological treatment process at the wastewater treatment facility and is purified before final discharge. The company operates nonpoint pollution source reduction facilities to remove the environmental risk of polluting nearby ocean waters with rainwater that may have deposited at plant sites and carry pollutants. The facilities ensure that clean rain water is discharged after going through a vortex device and a fiber-type filter. Also, additional water gates were set up on general drains, thereby building a system that blocks the spread of pollution at its source even in the event of an unexpected leakage of hazardous substances. More than 52% of the wastewater generated at the Incheon Plant goes through in-house treatment and is reused for its manufacturing processes, resulting in minimized outside discharge of pollutants. Wastewater of the Gunsan Plant is purified at a legitimate wastewater treatment facility which then flows into each respective local government’s sewage treatment plant for retreatment. Doosan Infracore also set an internal standard on discharging water pollutants at around 40% of the legal requirement, as part of strenuous efforts to comply with environmental laws and regulations.

**Management of Air Pollutants and Odors** Air pollutants, such as NO<sub>x</sub>, SO<sub>x</sub>, dust, and volatile organic compounds (VOCs), are generated from the company’s production processes, from electric furnaces and painting process. To minimize damage to local communities and reduce environmental hazards, Doosan Infracore sets up dust collectors, new painting facilities, and concentration catalytic oxidation facilities at each worksite unit, leading to reduced discharge of air pollutants. Doosan Infracore conducts strict measurements, more than the self-pollutant measurement cycle that is legally required, and monitors pollutants. The company set a standard so that pollutants are emitted at less than 40% of the legal requirement.

The Incheon Plant conducted an external diagnosis on its processes that generate odors to contribute to improving air quality in the metropolitan area and enhancing residents’ quality of life nearby the Plant. Based on the outcome, it established an improvement plan together with the respective local government, and continues to increase facility investments to improve processes that generate odors and to apply eco-friendly processes. In addition, it has been carrying out monitoring along the worksite border and nearby areas since 2017 with the goal of managing odors in a more systematic manner.

**Management of Soil Contamination** In 2010, Doosan Infracore conducted a voluntary soil contamination survey of the areas where facilities that cause soil contamination were operating in the Incheon Plant, and completed soil remediation in those areas over the following three years. In 2013, it carried out soil contamination surveys of the areas surrounding all its worksites. The company has undertaken additional voluntary soil remediation work since 2014 and completed it in August 2018, receiving confirmation from the municipal government.

### Strengthening Environmental Disaster Response System

Doosan Infracore has established an emergency response system for environmental spills, including a pollutant leakage block system at the Incheon Plant and spill monitoring system, in order to minimize the possibility and impact of environmental accidents. The company increased the number of floodgates from four to six to minimize the risks of pollutant leakage through rainwater. It also further strengthened its infrastructure to respond to the risks by installing pollutant detection sensors and building automatic water gate shutdown systems along with the replacement of old wastewater pipes. In 2018, the company upgraded its environmental utility sign management to strengthen environmental accident monitoring system, and further enhanced its ability to respond to emergency situations. As a result, there were no major environmental accidents during the year. In 2019, Doosan Infracore plans to build an integrated monitoring system for environmental accidents by establishing an environmental accident control center through the upgrade of its IoT-based environmental management data calibration sensors and the integration of different manufacturing process sensors. The company will also operate a preventive maintenance process by establishing and implementing air/water quality environmental facility maintenance intervals. In addition, Doosan Infracore will enhance its capability to respond to environmental emergency by upgrading its environmental accident identification and response scenarios for each process.

### Reducing Environmental Impact on Local Communities

Doosan Infracore has intensified its efforts to minimize environmental impacts of its operations on local communities, and thus making continued improvements to create a clean living environment. In 2015, the company set up a digital signboard to display information on air pollutants in the Incheon area in cooperation with three other companies located in the area. The company fulfills its obligations as a corporate citizen by engaging in precautionary management of factors that may cause resident complaints, such as foul odors, as well as making continuous investments in local communities, including the Hwasu wharf improvement project near the Incheon Plant.



# Enhancing Worksite Safety Risk Management

## Worksite Safety Management with a Focus on Prevention

**Safety Training** In line with the increasingly strict Occupational Safety and Health Act, corporations’ responsibility for industrial accidents has been increasing as they are now subject to such penalties as suspension of work/business even in cases that occur at their suppliers’ premises. Doosan Infracore provides safety education aimed to boost its employees’ safety management capabilities as well as to raise their awareness with the conviction that the root causes of occupational accidents must be removed. In 2019, the company aims to promote voluntary participation in and raise level of EHS throughout the company by enhancing leadership and raising awareness. To this end, it will increase the number of collective training hours for its managers and supervisors from 16 online education hours to 8 online education hours plus 16 offline collective education hours.

**Worksite Hazard Management** Doosan Infracore implements a discussion-based risk factor identification process with its workers to encourage them to manage risk factors by themselves in the first place by observing and improving potentially hazardous behaviors. In 2018, a total of 5,592 risk factors (3,267 in Korea, 2,325 in China) were identified, and necessary corrective actions have been taken.

**Acquisition of Safety Zone Certification** Doosan Infracore’s business sites in Korea are all certified by the government in terms of disaster safety with the Incheon and Gunsan Plants’ acquisition of the Safety Zone Certification in December 2014 and November 2015, respectively. Awarded by Safety Zone-CERTI® and supervised by the National Fire Agency, the Safety Zone Certification is the

country’s only voluntary corporate safety evaluation system and entails a comprehensive evaluation of building design, construction, and maintenance. In 2017, Doosan Infracore received a detailed evaluation on six safety areas, including the safety management system, firefighting, building/fire proof, dangerous goods, machine/electricity/gas, and evacuation/natural disaster, from experts in the field of disaster and safety. The company actively made improvements for matters that were pointed out, and obtained the Safety Zone Certification for the second consecutive time in December 2017 following 2014. The Certification is valid for three years. Investments in safety and firefighting are not expenses but a must to protect its employees. The company therefore will further spread awareness of the importance of fire and disaster prevention and systematically and efficiently manage safety facilities based on the Safety Zone Certification.

**Respond to Process Safety Report Evaluation** Worksites with large harmful, dangerous facilities have risks of fatal industrial accidents, so that they are required to operate the Process Safety Management (PSM) system. Accordingly, they create a report on comprehensive, scientific prevention activities, such as process risk assessment and establishment of a safe operation and emergency plan, and submit to the government, after which the government examines and reviews the report and has the respective worksite implement preventive activities with the goal of preventing fatal industrial accidents. Aiming to earn a better grade in the regular inspection on the PSM report, Doosan Infracore revised the PSM report of its Incheon and Gunsan plants and carried out an internal audit on the Incheon Plant’s PSM in 2017. Based on the results of the internal audit, the company identified improvement measures, such as increasing supplier safety training, expanding the scope of job safety analysis (JSA), and revising safe work permissions, and continues to inspect the implementation status.

### Acquisition of the Safety Zone Certifications



## Expansion of Safety Management Culture

**Building a Culture of Safety** The company continues to promote compliance with the EHS 3-3-3 Basic Rules and engage in safety culture activities, including improvements in the field of safety, to achieve zero accident. Each month, the heads of business groups provide safety reports to employees. The company has designated April as Health and Safety Month during which it strives to improve safety and raise safety awareness through education sessions, promotional campaigns, and inspections. Visitors to its worksites are required to watch a video on safety precautions first to raise their safety awareness.

**Support for Suppliers’ Safety Management Capabilities** Doosan Infracore has been implementing ‘Symbiotic Cooperation Programs’ since 2012 to help its suppliers boost their safety management capabilities in accordance with one of its EHS principles – ‘We aim to create a pleasant and safe people-oriented working environment, improve the health and quality of life of all employees, including those of our suppliers, prevent losses, and thus ultimately realize a zero-accident workplace.’ Launched by the Ministry of Employment and Labor in 2011, the Symbiotic Cooperation Program is designed to urge large companies to improve their suppliers’ health and safety capabilities and to prevent industrial accidents through continuous cooperation. In March 2018, the company held a ceremony to launch a team devoted to the implementation of the ‘2018 Health and Safety Symbiotic Cooperation Program’ with participation of 22 suppliers. Throughout the rest of the year, it focused on improving internal and outside suppliers’ safety practices by identifying and improving their risk factors, providing technical support for their risk assessments, and supporting safety placards and EHS safety guidelines. In particular, it focused on promoting the Safety Observation System (risk factors self-control), a scheme for removing potential risks based on concentrated daily monitoring by not only field supervisors but also ordinary staffers, so that suppliers themselves can identify risk factors and work on them.

In addition, Doosan Infracore offers data on EHS accident prevention cases as part of its efforts to raise safety management awareness at suppliers while conducting field inspections and providing EHS technical support for its outside suppliers.

**Safety Management for Outsourced Projects** Doosan Infracore is further strengthening safety management to prevent supplier safety accidents during outsourced projects at its worksites. The company enhanced on-site patrol operations to check on-site safety status once a day and made the results reported to the management. It also operates the Safety Walk every month in which executives, production managers, and EHS officers carry out a safety patrol and come up with improvements, thereby managing potential safety risks.

**Social Contribution Activities for Safety Culture** In 2016, Doosan Infracore signed a memorandum of understanding on ‘Social Contribution Activities for Safety Culture’ with the Korean Ministry of Public Safety and Security and promoted safety culture in local communities, including its suppliers, by leveraging its expertise. The Social Contribution Activities for Safety Culture constitute a new CSR activity model under which the Korean government and the public and private sectors join forces to utilize corporate expertise in their efforts to establish a strong safety culture in local communities. In 2018, the company conducted on-site inspections of, and provided EHS technical support to its outside suppliers and suppliers participating in the Symbiotic Cooperation Program, while offering fire prevention and first-aid education to residents and children living in the neighborhoods around its business sites.

**Industrial Accident Rate Management** The traditional method used to calculate the industrial accident rate does not faithfully reflect the incidence of minor accidents. Doosan Infracore therefore began to use the LTIR<sup>1)</sup>, TRIR<sup>2)</sup>, and LWSR<sup>3)</sup> indices in 2018, which allowed the company to identify minor accidents that resulted in lost time as well as those who received treatment at the company or its suppliers. By doing so, the company aims to prevent minor accidents from repeating and becoming a major accident, and to further strengthen supplier’s safety management. Accident rate indices are managed as a major key performance indicator (KPI) of respective executives, based on which Doosan Infracore plans to further promote a safety management culture.

<sup>1)</sup> LTIR (Lost Time Incidents Rate): Number of incidents involving more than one-day closure of workday per 100 workers, Total number of lost time cases/Total number of hours worked by employees \* 200,000

<sup>2)</sup> TRIR (Total Recordable Incidents Rate): Number of recordable incidents that require treatment for injuries or illness per 100 workers, Total number of injuries and illnesses/Total number of hours worked by employees \* 200,000

<sup>3)</sup> LWSR (Lost Workday Severity Rate): Number of lost work days experienced per 100 workers, Total number of lost work days/Total number of hours worked by employees \* 200,000



# Enhancing Employee Health Management

## Improving Employee Health Management

**Occupational Disease Prevention** Doosan Infracore holds a monthly meeting of the Musculoskeletal Disorder Improvement Working Council, which is composed of labor union officials, worksite managers, and employees in charge of EHS and production, to discuss physical load risks and identify ways of making improvements. The company also arranges for medical professionals to visit its worksites regularly as part of its efforts to improve employees' health and boost their morale. As the number of workers suffering from hearing problems, such as noise-induced deafness, has been increasing, Doosan Infracore has set a strategic direction to fundamentally minimize noise-generating processes while also offering high-quality earplugs and other protective gears, and providing education on proper use of them. In addition, with the increasing amount of surface particulate matter around the country, the company has developed response guidelines which call for the provision of protective gears and proper work breaks starting at the stage of caution.

**Health Management Programs** In helping its employees manage their health, Doosan Infracore operates various health promotion programs, including the installation of automated external defibrillators (AEDs) and the preparation of a low sodium diet menu. Whenever a healthcare issue such as the spread of an infectious disease arises, the company operates the Emergency Situation Room and promptly offers the relevant information on preventive measures to its employees. The company pays for mandatory vaccinations for six diseases – yellow fever, cholera, malaria, typhoid, hepatitis A, and tetanus – designated internally for employees who go on business trips to countries with limited healthcare.

**IT System for Health Checkup History Management** In December 2018, Doosan Infracore began to develop an Integrated EHS IT system in order to prevent failure to meet deadlines for health checkups and trainings through corporate-wide schedule management; reduce productivity losses caused by delays in the placement of production technical staff; prevent legal risks caused by missing special check-up data; and to promote voluntary health promotion based on management of the health checkup result history of each employee. Scheduled to be launched in May 2019, the system is composed of six items, including health checkup history management, management of chemicals used for each task, and management of working environment measurement results.

**Programs to Manage Job Stress** Doosan Infracore conducts surveys on job stress and implements specialized occupational stress management programs for the benefit of employees' mental health, particularly for high-risk groups. In 2018, it conducted a work-related stress survey to all employees to help them better manage their job stress. Those in need of stress management were offered in-house counseling with 'DooHug' and an external counseling service if needed. Launched in April 2014 for the first time among affiliates of Doosan Group, 'DooHug' is a professional counseling service offered in partnership with an external professional institution. It provides employees with professional counseling services about not only their work-related concerns but also personal worries, including their families and childcare. The company keeps all DooHug counseling details and personal information strictly confidential, and pays all of counseling expenses. Moreover, Doosan Infracore runs a 'healing program' for teams. From August to October 2018, the company provided members of 20 teams who were shown by the survey to need stress management with a healing program comprising a personality test and various stress reduction exercises, such as Mind Touch. In 2019, Doosan Infracore will conduct a company-wide survey and expand the scope of its programs to manage job stress, including DooHug, post-traumatic stress disorder (PTSD) education for field managers, and activities designed to protect the psychological health of emotional workers.

## Certified as Excellent Worksite in Employee Health Promotion

The Incheon Plant was re-certified by the Korean Ministry of Employment and Labor and the Korea Occupational Safety and Health Agency in September 2016 for its excellence in promoting employees' health, following its initial certification in August 2013. The Gunsan Plant was first designated as an Excellent Worksite in Employee Health Promotion in November 2015, and re-certified in February 2019 in recognition of its exemplary in-house health promotion activities customized for the characteristics of workers, including a health management program, a musculoskeletal disorder prevention program, and a job stress prevention program. Designated worksites are awarded the benefit of being exempted from supervision by the Ministry of Employment and Labor for the next three years. The company will continue employee health promotions as part of its efforts to create a better workplace.

# Governance & Integrity



## OUR APPROACH

At the heart of Doosan Infracore's sustainability lies transparent and ethical management for its stakeholders.

Doosan Infracore implements transparent management through independent governance system and prompt information disclosures. Beyond compliance management, the company strives to ensure that ethical management serves as the foundation of all its decision-making. It secures the stability of its management environment by implementing transparent management and strengthening preemptive risk management through strict internal control system.

Link to UN SDGs



# Corporate Governance

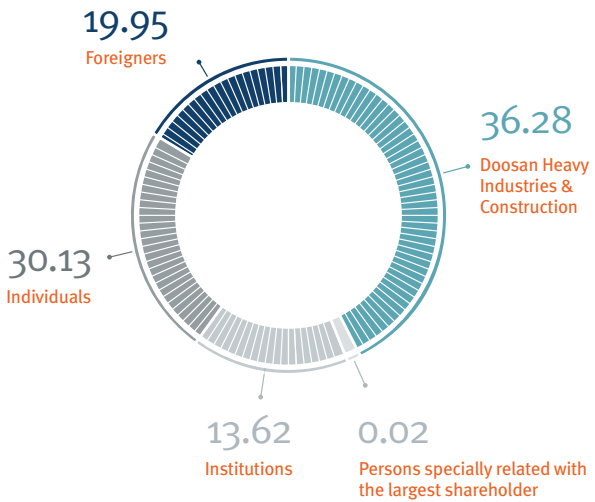
## Composition of Shareholders and Equity

Doosan Infracore is a key subsidiary of Doosan Group and operates 34 financially consolidated or subsidiary companies (based on its annual reports) around the world. By the end of 2018, the number of its shares issued stood at 208,158,077, of which the largest shareholder, Doosan Heavy Industries & Construction, owned a 36.28% stake. Its equity capital stood at KRW 1,040 billion.

## Ownership Structure

(As of December 31, 2018)

(Unit: %)



## Shareholder and Investor Communication

**Communication Channels** Doosan Infracore actively seeks out the expectations and demands of its shareholders, investors, customers, and other stakeholders when making key decisions. The company strives to attract investments in the global market by earning recognition for its genuine values in terms of growth potential and technological prowess. It has therefore established an investor-friendly investor relations (IR) strategy and carries out shareholder-friendly communication. In addition, the company holds company briefings and securities investment conferences, and also invites institutional investors to its worksites to offer them diverse and reliable information.

**Protection of Minority Shareholders** Doosan Infracore has adopted and operates a paper ballot, an electronic voting system, and an electronic proxy solicitation system to protect the voting rights of its minority shareholders. When sending out notices of its annual general meeting (AGM), the company encloses paper ballots so that shareholders can exercise their voting rights if absent. Their votes are valid under the condition that they arrive at the company one day prior to the date of an AGM.



Disclosure of Corporate Information

Doosan Infracore complies with all applicable legal disclosure requirements. It also strives to disclose information in a balanced manner, concerning its financial and non-financial activities, through the voluntary disclosure of the company’s compliance program (CP) status and CSR activities.

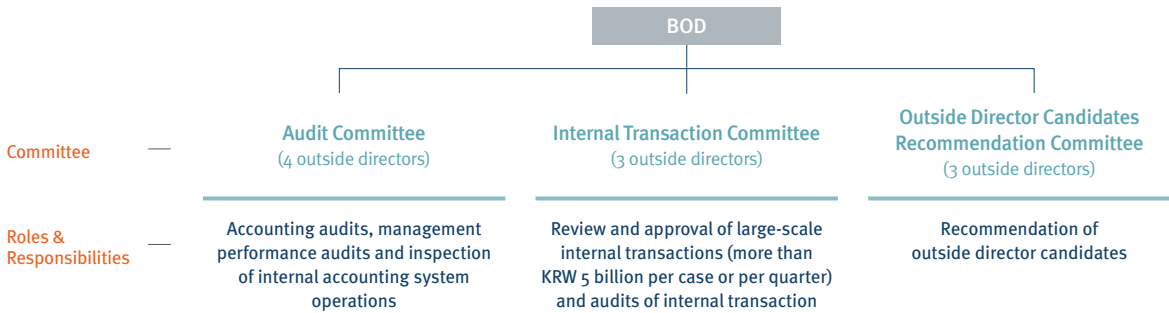
STATUS OF DISCLOSURE ACTIVITIES	
· Financial	Disclosure of provisional statistics on sales performance; Quarterly and biannual reports and statements of affairs; Disclosures relevant to AGM and special shareholders’ meetings; Disclosure of changes in the shareholding structure; and Disclosure on the Online Provision of Enterprises Information (OPNI) system operated by the Korea Fair Trade Commission, etc.
· Non-financial	Status of CP operations; Disclosure of CSR activities including integrated reports; and Disclosure of information through company presentations, etc.

Operation of an Independent BOD

**The BOD and Its Decision-making Systems** As the company’s highest decision-making body in relation to corporate management, the Board of Directors (BOD) oversees and approves decisions on massive investments or borrowings, the consolidation or division of business entities, and other major business issues, from the perspective of long-term growth.

**Composition and Operations of the BOD** The BOD of Doosan Infracore is composed of three internal and four outside directors who were transparently appointed through an AGM. The Outside Director Candidates Recommendation Committee recommends outside director candidates who are suitable for establishing a transparent governance structure and enhancing the BOD’s expertise. Outside directors are appointed in consideration of their ownership of the company’s shares, potential conflicts of interest, careers with the company’s competitors, diversity, and stakeholder representativeness. The BOD

Intra-organizational Decision-making System



Composition of BOD

(As of March 27, 2019)

	Name	Current Position / Role in the BOD	2018 Attendance	Changes
Internal Directors	Park Yong-maan	Director of Doosan Infracore / Chairman of the BOD	78%	Appointed on Mar. 27, 2019
	Sohn Dong-youn	President and CEO of Doosan Infracore	89%	Appointed on Mar. 28, 2018
	Go Seokbum	President and CEO of Doosan Infracore	100%	Appointed on Mar. 28, 2018
Outside Directors	Han Seung-soo	Director of Yuhan Foundation / Chair of the Outside Director Candidates Recommendation Committee, Member of the Audit Committee	67%	Appointed on Mar. 28, 2018
	Yoon Jeung-hyun	President of Yoon Economic Research Institute / Chair of the Audit Committee, Member of the Internal Transaction Committee, Member of the Outside Director Candidates Recommendation Committee	100%	Appointed on Mar. 28, 2018
	Jung Byung Moon	Attorney at Kim & Chang / Chair of the Internal Transaction Committee, Member of the Audit Committee, Member of the Outside Director Candidates Recommendation Committee	100%	Appointed on Mar. 31, 2017
	Yoon Sung Soo	Professor at Business School, Korea University / Member of the Audit Committee, Member of the Internal Transaction Committee	100%	Appointed on Mar. 28, 2018

\* The tenure of a director is by the end of AGM for the third fiscal year after his/her appointment

deliberates and makes resolutions on matters specified under the relevant national laws and the company’s Articles of Incorporation, matters entrusted by the AGM, key management policies, and important matters concerning business execution. It incorporates opinions and suggestions of shareholders, executives, and employees collected through AGMs and IR activities into its decision-making process. It maintains its independence from controlling shareholders and executives, and checks and balances corporate decisions to ensure the company’s transparent management.

There are three committees under the BOD which are entirely composed of outside directors – the Audit Committee, which is responsible for guaranteeing the transparency and independence of audit procedures; the Internal Transaction Committee, which is designed to boost the transparency of corporate management through the establishment of CP; and the Outside Director Candidates Recommendation Committee, which has the authority to recommend outside directors.

**BOD Activities in 2018** All directors are allowed to participate remotely in the BOD meetings via telecommunication devices capable of transmitting audio and video data, which is considered to be present at the actual meeting. Directors shall not delegate their authority to a proxy. Directors with a vested interest in a particular agenda item are prohibited from voting on it so as to maintain transparency in the decision-making process. In 2018, the BOD held nine meetings during which deliberations and resolutions were made on a total of 31 agenda items, including reports on the company’s business performance, an inspection of internal accounting system operations, and the provision of equipment for the earthquake recovery effort in Indonesia. The attendance rate of the directors in 2018 was 85.7%.

**BOD Evaluation and Remuneration** The remuneration of internal and outside directors is determined within the limits approved at the AGM. The company also implements a performance salary system that links executive compensation with business performance. Directors are therefore given a salary corresponding to their pay grade as well as a performance bonus based on the organization’s business results. To ensure their independence from the management and controlling shareholders, members of the Audit Committee receive remuneration only as directors and are prohibited from receiving any other types of compensation.

The total amount of approved pay for directors and auditors in 2018 was KRW 15 billion, of which KRW 6,660 million was actually paid. The payment amount was calculated based on the pay for three registered directors excluding outside directors and members of the Audit Committee, one outside director excluding members of the Audit Committee, and five members of the Audit Committee who were paid from January to December 2018.

Ethical Management

Ethical Management Policies

Doosan Infracore applies the Code of Conduct of Doosan Group established in 2014 to all of its business sites around the world. In this way, the company is enhancing its corporate competitiveness and fulfilling corporate social responsibilities based on the spirit of Inhwa, customer-centered management philosophy, transparent management, and innovation.

It has also connected the company-wide operation system with the ERP, e-procurement, evaluation of internal control, and fair trade compliance systems to improve the transparency and efficiency of its business activities. The Audit Team is in charge of auditing ethical management of the company, while the Internal Control Team develops the internal control system and evaluates its operations.

Communicating and Promoting Ethical Management

Doosan Infracore discloses the Code of Conduct and irregularity reporting process on its website to ensure that both its internal and external stakeholders can access such information easily. In addition, the CEO issues a letter requesting strict compliance with the Code of Conduct to all the company’s first-tier suppliers two times per year. To prevent recurrence of Code of Conduct violations, the company clearly identifies the process and cause of issues that arise during the work process, and creates and shares a white paper. Moreover, to maintain a transparent ethical management system, Doosan Infracore urges newly hired employees to sign a written oath pledging their compliance with the Code of Conduct. It also requires new suppliers to submit a written oath pledging not to engage in unethical business practices. The company requires each of its team leaders, part leaders, and higher level managers, as well as its executives to write and submit a statement of interests form on an annual basis, with an aim to remind them of the strict compliance standards. In 2018, all those required to submit the statement complied with the obligation.

Training on the Code of Conduct is designed to raise employees’ awareness of ethical business practices and control the ethical risks involved in their business transactions in advance. Doosan Infracore provides the training to all its employees, and notifies them of major ethical management issues by posting the details on the bulletin board of each business site. The company expanded the scope of its online training to include managers of its Chinese subsidiary in 2017 in addition to managers at its domestic business sites, and has been continuing to do so.

Completion rate of ethical management training (Korea)

98.5%

Completion rate of ethical management training (China)

95.3%



**Establishment of Fair Trade Practices** Doosan Infracore adopted the Compliance Program (CP) in 2002 to ensure transparent business operations and fair competition, and has been doing its business according to the Code of Conduct that meets global standards. To build a culture of fair trade and horizontal transactions, the company discloses the CEO’s Declaration on Compliance and four major pledges (responsible contracts for win-win cooperation between large companies and SMEs, fair selection and management of suppliers, establishment and operation of the Internal Review Council, and desirable paperwork and its retention in subcontracting transactions) on the company website. The company uses a standard subcontract form for the machinery industry published by the Korea Fair Trade Commission, and carries out all matters related to the selection of suppliers and contract execution through the ERP system. The Internal Review Council, held more than three times each month, reviews contracts with suppliers and price-decision processes. By connecting the CP operating system to the Internal Review Council, the company blocks unfair subcontract transactions in advance with the Council re-validating the justification of executed subcontracts on a quarterly basis. Also, in order to promote a culture of fair trade, the company provides incentives not only to first-tier suppliers that have adopted the CP, but also to first- and second-tier suppliers that sign fair transaction agreements between them.

In 2018, Doosan Infracore further expanded its fair trade organization to enhance the inspection and management of matters related to CP and subcontract execution. It also enhanced the subcontract compliance education for its staff, improvement of data request process such as carryout system, and the prior discussion, and follow-up monitoring processes. The company has been issuing letters for the CP guidelines and action recommendations, offering education on subcontracts and unfair trade practices, and improving the fair transaction monitoring system since 2018. Going forward, Doosan Infracore will build a strong compliance culture by encouraging its employees to voluntary reduce illegal subcontracting risks among other things.

**Compliance with the Anti-graft Law** In Korea, the ‘Improper Solicitation and Graft Act,’ also known as the anti-graft law, went into effect on September 28, 2016. Intended to prevent public officials’ corruption, the Act applies to employees and their spouses of all public institutions, including constitutional agencies, central administrative agencies, and local governments, schools, and media outlets. The Act forbids improper solicitations to public officials and other relevant persons, and prohibits them from accepting financial or other advantages. Since 2016, Doosan Infracore has been carrying out various activities to raise awareness among employees, such as providing education on the prohibition of solicitation to all its employees in Korea and expatriate employees in China, sending out CEO messages, and collecting voluntary compliance pledges signed by the employees. It is also conducting continuous monitoring through a dedicated task team. In addition, the company has added compliance education on the anti-graft law to the Code of Conduct training it provides every year to ensure continued training on the law.

Audit and Monitoring

In line with the increased scope of the company’s management and responsibility with the expansion of its overseas business and the adoption of the International Financial Reporting Standards (IFRS), Doosan Infracore has been operating an independent audit team in China for audit and monitoring since 2012. The Audit Team at its headquarters in Korea is striving to increase overseas subsidiaries’ accounting and management transparency based on respect for subsidiaries’ responsible business management.

Internal Controls Evaluation System

Doosan Infracore established the Doosan Internal Control Assessment System (DICAS), an internal controls evaluation system, in 2006 and since then it has been carrying out regular evaluations for its entire business areas, ranging from finance to sales, purchasing, and production. The results of the evaluations are reported to the Audit Committee, board meetings, and AGM, following the reports to CFO and CEO in accordance with the ‘Act on the External Auditing of Corporations.’ In 2014, the company began applying the same internal controls evaluation system to its subsidiaries in China.

Internal and External Reporting Systems

Doosan Infracore operates various internal and external reporting systems to facilitate immediate reporting of any unethical acts, such as bribery, unfair business transactions, and corruption, as well as violations of the Doosan Credo, its Code of Conduct, regulations, and relevant laws. The reporting channels include website, Cyber Reporting Center, mail, telephone calls, fax messages, and personal visits. The Cyber Reporting Center operates in three languages of Korean, English, and Chinese, and is open to anyone including employees and external stakeholders. Informant’s identity remains confidential, guaranteeing his/her anonymity. Received items are handled promptly according to the applicable procedures, and the company’s actions, including correctives, are notified to the informant and disclosed company-wide, thereby further raising ethical awareness among staff.

Internal Controls

Risk Management

Doosan Infracore is fully aware of various strategic, operational, financial and non-financial risks that may harm its corporate value and incur economic losses. The company therefore has established risk management processes which are designed to enable its executives and working-level employees to detect abnormalities and take prompt actions. The risk management processes ensure effective risk controls through various elements, such as identification of risk factors, evaluation of the potential impacts of risks on the company, establishment of countermeasures, monitoring of changes in risk levels, and constant reporting based on a coherent reporting system.

Financial Risk Management

Doosan Infracore has classified its financial risks into four types – market risk, credit risk, liquidity risk, and capital risk – and monitors and manages them by risk type.

**Market Risk** Foreign exchange risk occurs as a result of changes in currency exchange rates, which may affect the forecasting of future deals, perceived assets and liabilities, and net investment in overseas operations. Doosan Infracore has set basic strategies with an aim to reduce fluctuations in profits and losses due to changes in foreign exchange rates, and carries out hedge trading through exports and imports. Interest rate risks are related largely to adjustable rate deposits and loans. To preemptively deal with such risks, the company minimizes external loans through its reserve funds, reduces high interest rate loans, improves the borrowing structure, monitors changes in interest rates, and establishes countermeasures. Since its financial instruments are exposed to the risk of changes in

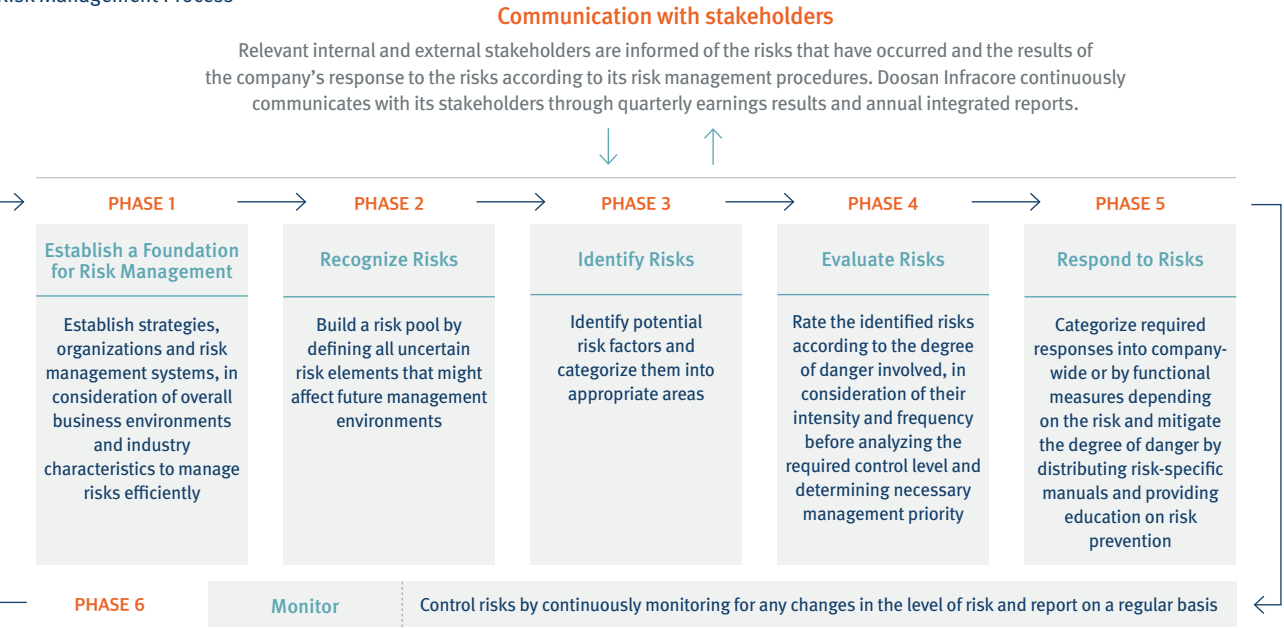
market prices that may negatively affect the fair value of the financial instruments and the company’s cash flow, the management of the company measures risks arising from changes in prices regularly and manages key investment assets separately.

**Credit Risk** Credit risk arises from ordinary transactions or investment activities when customers or business partners do not follow the conditions of the relevant business agreements. It may also arise from cash, cashable assets, derivatives, and deposits in banks and other financial institutions. Doosan Infracore manages its credit risks with the purpose of minimizing losses under its credit policies. For credits in which default is anticipated at the end of the fiscal year, the company properly assesses the risks involved and addresses the results in its consolidated statements of financial position.

**Liquidity Risk** Liquidity risk mainly arises from a shortage of liquidity. It materializes when a corporation fails to fulfill its obligations to pay off financial debts or to finance its normal operations. To prevent such situations, Doosan Infracore establishes quarterly and annual financial balance plans which allow the company to minimize the influence of business, investments, and financial activities on the monetary balance. The forecasts help the company secure and maintain sufficient liquidity in preparation for possible liquidity risks in the future.

**Capital Risk** Capital risk management involves the maintenance of an optimum capital structure to ensure the company’s capabilities, thereby enabling it to provide its shareholders and other stakeholders with corporate profits while reducing capital expenditure. Doosan Infracore maintains its capital in alignment with its debt ratio. It also manages capital risks by adjusting its dividend paid to shareholders, repaying share capital, and issuing new shares and selling assets to reduce debts.

Risk Management Process



Non-financial Risk Management

The company has categorized its non-financial risks into three – environmental, safety, and disaster risks – and built a preemptive risk response system. For full details of the company’s responses to its environmental and safety risks, please refer to the ‘Environment, Health & Safety’ section on page 71.

**Environmental Risk** In order to minimize possible risks from environmental pollution, Doosan Infracore promotes diverse environmental management activities, including efficiency improvement of its resource use, reduction of pollutants through facilities to reduce environmental impacts, and the enhancement of environmental accident prevention and response systems, based on its EHS management system. To minimize climate change risks, the company carries out greenhouse gas emissions reduction activities by making investments for energy efficiency and conducting energy reduction activities. It considers future scenario analysis to examine the impact of climate change on business, and vice versa. The outcomes of such activities are disclosed to external stakeholders, including local residents.

**Safety Risk** Doosan Infracore takes diverse preventive measures to minimize potential risks, and strives to raise employee awareness on health and safety. The company has expanded the scope of its health and safety management to include outsourced projects and outside suppliers, while enhancing monitoring aimed at preventing occupational accidents. It also requires worksite visitors to watch a safety video before entry. Furthermore, the company engages in comprehensive public-private joint disaster response drills, establishes countermeasures for emergency crisis situations, and encourages its staff to be fully aware of them.

**Disaster Risk** Doosan Group has established its own Business Continuity Management (BCM), a risk management framework, at the group level. It has published a BCM manual that is categorized into 20 mandatory infrastructure items. It has developed an emergency notification system that can reach all its employees rapidly in the event of a crisis, so that leaders of business units can check on the safety of their members quickly, and the members can respond systematically according to the company’s emergency response procedures. In 2012, it contracted with International SOS, a medical and travel security services company, and has since provided comprehensive overseas safety management services to its expatriate employees or those traveling overseas on business. All Doosan people across the world have access to emergency medical relief from war, natural disaster, or accident, and information on travel security overseas.

Key Risks and Relevant Responses

	Key Risks	Responsive Measures
Strategic risks	Global economic slowdown	Maximize profitability and strengthen core competitiveness
	Stricter environmental regulations on products	Develop and apply eco-friendly technologies
Financial risks	Market risks	Manage exchange rate fluctuations, interest rates, and price risks
	Credit risks	Manage credit risks and minimize losses through safeguard measures in bonds
	Liquidity risks	Establish quarterly and annual financial balance plans
	Capital risks	Reduce capital costs and manage liabilities
Operational risks	Quality risks	Establish a quality management system
	Ethical management and compliance risks	Audit unethical irregularities, provide employees with ethical training
	Risks related to personal information protection and data security	Establish personal information protection guidelines, build an information management system, and provide employees with information security training
Non-financial risks	Environment: Climate change risks, environmental pollution, and grievance risks	Build a climate change response system, manage environmental pollution materials, and disclose information
	Safety: Worksite fire and occupational accidents	Engage in risk factor management activities, enhance fire safety management (operation of the Disaster Prevention Center), and boost safety management for outsourced work
	Disaster: Natural disasters, man-made hazards	Build the BCM and practice its applications

\* Responses to strategic risks are reflected in all of the company’s business processes and thus they are not mentioned separately

Suppliers



OUR APPROACH

We seek ways to grow together with our suppliers to realize the value of win-win management.

Doosan Infracore considers win-win growth with suppliers as a primary source of its competitiveness. The company therefore shares its technology, quality, and management systems with its suppliers to strengthen their competency and build a virtuous cycle of partnerships. In addition, the company helps them improve CSR capabilities in an effort to fulfill its roles and responsibilities in building a sound economic ecosystem.

CSR STRATEGIC TASK FOR 2018

Strengthen CSR management system of supply chain: Define core suppliers and identify suppliers with high CSR risks, and establish a management process

As the occurrence of CSR issues, such as human rights, environment, and safety of suppliers, has been on the rise, the CSR management system of supply chain has also been gaining importance around the world. Against this backdrop, Doosan Infracore strives to help its suppliers manage their CSR more systematically. To this end, the company set its CSR strategic task for 2016 as to ‘strengthen CSR management system of supply chain: Support EHS improvement activities at suppliers’ which was followed by the 2018 strategic task to ‘strengthen CSR management system of supply chain: Define core suppliers and identify suppliers with high CSR risks, and establish a management process,’ and carried out activities to accomplished the tasks.

- Activities and Achievements Defined core suppliers; set criteria to define suppliers with high CSR risks and conducted surveys to identity current status; and establish relevant processes to manage suppliers with high CSR risks

Link to UN SDGs



Strengthening Suppliers’ Competitiveness

Doosan Infracore focuses on raising its overall competitiveness in purchase and production by helping its suppliers boost their competitiveness. To this end, the company provides a range of support programs, including financial support, competency enhancement training, and on-site guidance. In addition, it is implementing the Leading Supplier (LS) project in order to help its core suppliers grow into small giants based on the Doosan Supplier Excellence Program (DSEP), a system for fostering suppliers. Moreover, Doosan Infracore has been actively promoting the multi-party benefit sharing system, which is designed to expand its supplier development programs to second-tier suppliers, achieve cost reductions and other common goals, and share the outcomes.

Fostering Leading Suppliers

Doosan Infracore conducts an annual survey of core suppliers according to the criteria for core suppliers defined by the analysis of transaction dependency and supplier relationship segmentation. And the company helps them have the capability to supply quality products at competitive prices on time by making innovative improvements in the areas of plant operations, quality assurance, and manufacturing technologies. It also makes continuous efforts to foster them to be Leading Suppliers, setting a benchmark for other suppliers. The LS project aims not only to solve problems that suppliers are facing but also to build capabilities of their own and secure fundamental competitiveness through one- to three-year support programs. With the goal of fostering 50 Leading Suppliers by 2022, Doosan Infracore selected and supported a total of 26 suppliers between 2014 and 2018, and plans to select five more suppliers in 2019.



LS Development Stages



The LS project is aimed at raising suppliers' fundamental competitiveness by enabling them to secure supply capacity and quality competitiveness in terms of a comprehensive ranking evaluation (supplier evaluation).

Expanding Participation in the Benefit Sharing System

The benefit sharing system is an agreement made between large companies and small- and medium-sized enterprises (SMEs) to improve suppliers' capabilities to deliver high quality goods on time and share the benefits with one another. It is an iconic model for the creation of a healthy corporate ecology. The multi-party benefit sharing system has advanced one step beyond the ordinary benefit sharing system to include second-tier suppliers. Doosan Infracore collects suppliers' suggestions regarding quality improvements or design changes through the benefit sharing system, reflects the suggestions into its products, and it shares the outcome, thereby creating win-win partnerships with its suppliers. The company plans to improve its suppliers' fundamental competitiveness by expanding the benefit sharing system to include not only first-tier suppliers but also their second-tier suppliers in order to establish a culture of fair transactions in subcontracting within the industry.

Strengthening the CSR Competencies of Suppliers

Doosan Infracore has established systems and programs designed to enable its suppliers to lay the groundwork for their response to CSR issues, including ethical management, fair trade, human rights, environmental protection, and social problems.

Strengthening CSR Management System of the Supply Chain

Doosan Infracore has developed the Supplier CSR Guidelines, which consist of 27 clauses under 10 categories, such as labor, human rights, health and safety, environment, ethics, and fair trade, and distributed them to its suppliers in the form of newsletters and booklets. The company also reflects the Guidelines in its purchase policies to ensure that consistent principles are applied not only to diagnosis and evaluation but also to purchase, based on which the company urges its suppliers to engage in practical CSR activities.

For more systematic CSR management of its supply chain, Doosan Infracore established criteria to define core suppliers in 2018; conducted a survey on their status; conducted an on-site evaluation on their response to CSR issues, such as human rights protection, ethical management, and EHS; and identified suppliers with high CSR risks. As regards suppliers with high CSR risks, the company required them to make improvements according to the management process, and has been monitoring the progress through on-site inspections.

Doosan Infracore plans to enhance CSR management capabilities of its suppliers through comprehensive supplier evaluation linked to the CSR evaluation and improvements.

**Reflecting CSR Elements into Supplier Evaluation** Doosan Infracore reflects CSR elements, such as employee training, labor management, environmental management, and regulatory compliance, in the evaluation and registration of its new suppliers at all of its business sites in Korea and China. In the area of EHS in particular, such as environment and health, the company evaluates status of building foundations and level of practices including establishment of relevant systems and improvement in risk factors. The company also has been conducting on-site EHS inspections of new suppliers prior to their registration since 2015. In China, the company established the 'Supplier EHS Evaluation Criteria' in 2016, and it has since distributed them to its local suppliers and helped them conduct self-assessment.

Diverse Supplier Support Programs

Competitiveness Enhancement Programs

**Supporting the Enhancement of Suppliers' Competitiveness** An exclusive team, composed of dedicated staff from the Supplier Development Team and Shared Growth Team, visits suppliers if necessary, in order to help them conduct innovative activities. In 2018, 196 Doosan Infracore employees – twice as many as planned at the beginning of the year – helped suppliers with their innovation efforts for more than five consecutive days<sup>1)</sup>. Specifically, Doosan Infracore staff helped suppliers improve their manufacturing capability by providing key technical support for welding, materials manufacturing, and non-destructive inspection; and support for innovation in the fields of 3 P's 6 S's<sup>2)</sup>, Lean<sup>3)</sup>, DTC<sup>4)</sup>, Single PPM<sup>5)</sup>, quality guidance and problem solving, localization, and product development.

**Management Doctor System** Doosan Infracore is an active participant in the Management Doctor System which is currently being promoted by the SME Support Center of the Federation of Korean Industries (FKI). Suppliers recommended by large companies are selected through a review process, whereupon experts from three parties – large companies, suppliers, and the FKI's management consulting team – help them improve management environments and solve problems.

**Competency Building Training for Suppliers' Staff** Doosan Infracore reflects its suppliers' feedback into the Supplier Academy, a customized training program to help suppliers secure competitiveness, and offers the program every year. In 2018, 82 employees from 38 suppliers benefited from the Supplier Academy in 14 areas, including quality, manufacturing, and production costs. In 2019, the company plans to expand the curriculum to include a course to learn how to understand global management situations and respond to markets, and a management course for environmental management. To this end, it has launched nine courses in four areas – management, quality, manufacturing, and production costs – and 201 employees of suppliers are expected to attend. Doosan Infracore will continue to offer a curriculum customized for the level of suppliers while gradually increasing the number of trainees as part of its efforts to help suppliers enhance their fundamental competitiveness.

**Seminars for Suppliers** Starting in 2017, Doosan Infracore has been holding the 'Seminar for People in Charge' for its suppliers twice a year to introduce its win-win growth programs, motivate suppliers to actively participate in and take advantage of the programs, and help them build competency. At the seminars held in 2018, the company introduced the background of adopting the compliance program (CP) and the way of implementing CP, and shared information on the benefit sharing system, EHS management, and suppliers' response to the minimum wage increase in Korea and 52-hour workweek system.

Financial Support

In Korea, Doosan Infracore helps its suppliers enhance their financial soundness by providing them with four types of financial support – direct support, indirect support, mixed support, and special support.

Financial Support for Suppliers in 2018 (Korea)

Programs			Amounts Supported
Direct Support	Facility Investment Fund	Provided suppliers with interest-free facility investment funds	KRW 1.3 billion
	Financial Support for Shaping Fixtures	Provided financial support for shaping fixtures to enhance product competitiveness	KRW 22.8 billion
Indirect Support	Network Loans, Family Corporate Loans	Helped suppliers receive loans to fund operations with low interest rate based on deposits	KRW 30 billion (promised)
Mixed Support	Shared Growth Special Fund	Helped suppliers receive loans to fund operations with low interest rate based on deposits	KRW 78.5 billion (raised) KRW 77.6 billion (loaned)
	Industrial Innovation Campaign 4.0, Special Contribution (the Win-Win Foundation)	Made contributions to shared growth programs for second- and third-tier suppliers	KRW 300 million
Special Support	Contribution to Win-Win Supporters		KRW 100 million

Support for the Creation of Sound Corporate Ecosystem

Beginning in 2017, Doosan Infracore has been running a supplier support program that helps reduce the wage gap and increase welfare benefits for the employees of its second- and third-tier suppliers<sup>6)</sup>, in-house subcontractors<sup>7)</sup>, and service providers. For the employees of those companies, it provides them with KRW 1.2 million per year (KRW 100,000 per month for each person) to reduce their wage gap in the form of Win-Win Encouragement Funds while also offering high school tuition fees to their children and allowing them to use the company's daycare center free of charge in an effort to enhance their welfare benefits.

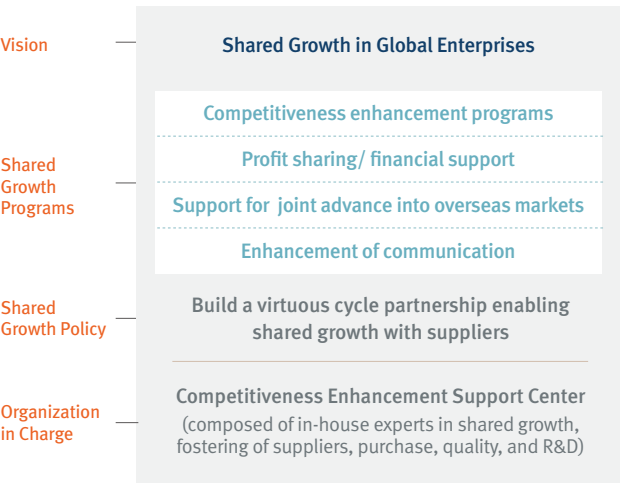
<sup>1)</sup> Criteria of the Korea Fair Trade Commission: 5 days = 1 person (1 day = 8 hours, based on the time and attendance criteria)  
<sup>2)</sup> 3 P's 6 S's: 3 P's (Proper Items, Proper Quantity, Proper Place), 6 S's (Safety, Sort, Straighten, Shine, Standardize, Sustain)  
<sup>3)</sup> Lean: Activities designed to minimize inventories and innovate work processes, thus reducing costs and enhancing productivity  
<sup>4)</sup> DTC: Design to Cost Innovation  
<sup>5)</sup> Single PPM (parts per million): A quality innovation campaign designed to achieve the quality management goal of reducing the ratio of faulty products to under 10:1,000,000 products  
<sup>6)</sup> Second- and third-tier suppliers: Suppliers that depend more than 35% in terms of sales on Doosan Infracore's first-tier suppliers that count on the company by more than 35% in terms of sales  
<sup>7)</sup> In-house subcontractors: Employees of in-house subcontractors (except for large companies and foreign enterprises)

# Establishing a Culture of Shared Growth

## Building Win-Win Partnerships

Doosan Infracore strives to build a virtuous cycle of partnerships for shared growth with its suppliers. Such efforts are led by the Supplier Development Team and the Shared Growth Team, with a focus on improving suppliers’ jobs and technical competencies while enhancing their financial soundness and actively communicating with them through the Integrated Cooperation Council.

### Shared Growth System



**Motivating Shared Growth** Doosan Infracore reflects the shared growth performance of the relevant executives in the evaluation of their management by objectives (MBO), and it also reflects the findings of the benefit sharing system in the MBO of executives in charge of purchasing in order to promote the system. Furthermore, to encourage suppliers to participate in shared growth activities, it reflects their involvement in shared growth and relevant performance in the comprehensive supplier evaluation.

## Strengthening Communication with Suppliers

To enhance communication with its suppliers, Doosan Infracore is running a ‘Supplier Hotline’ and holding agreement ceremonies and meetings. The CEO visits the company’s second-tier suppliers twice a year to listen to their concerns and find solutions to their problems. In China, senior executives attend a meeting with suppliers twice a year, share the purpose of shared growth, and encourage commitment to realizing shared growth.

**Integrated Cooperation Council** For active and effective communication with suppliers, Doosan Infracore launched the Integrated Cooperation Council in 2015. The Council meets twice a year to share the company’s business plans, quality policies, and the latest global trends including environmental restrictions, and to align the strategies of the company with its suppliers and strengthen mutual exchanges.

**Grievance Handling Channel for Suppliers** Doosan Infracore has established the Supplier Hotline on its company website in the Shared Growth section, through which people may express their overall opinions and grievances about the company’s trade practices and shared growth activities or request shared growth programs. In addition, the company has put diverse communication channels in place, such as telephone, fax, and postal service, and notifies to its suppliers. All communication made through the Supplier Hotline is kept strictly confidential, and for those wishing to maintain their anonymity, the Hotline can be used anonymously. Doosan Infracore makes sure that no one faces retaliation for submitting grievance, and critical issues are reported to the CEO and relevant executives.

# Product Quality & Stewardship



### OUR APPROACH

Doosan Infracore provides world-class products, parts, and services with a goal of maximizing customer value.

### CSR STRATEGIC TASK FOR 2018

#### Respond to REACH/RoHS 2 and set up an operation system

Chemical regulations are becoming increasingly strict in Korea and overseas, and prohibition of sales, penalties, and other risks in cases of non-compliance are also rising. Businesses are therefore required to improve their chemicals management system. Doosan Infracore does not use many hazardous chemicals in its production processes or its products given the nature of the industry in which it operates. Nevertheless, in order to minimize negative impacts on its stakeholders, the company has built the REACH<sup>3)</sup>/RoHS 2<sup>3)</sup> IT system in 2017, and based on that, in 2018 it set up response process and operation system by creating a cross function (CF) team to manage hazardous chemicals at the company level; developing a policy to manage restricted materials, providing trainings to staff at suppliers in charge and helping them establish management process; and developing alternative materials.

Doosan Infracore strives to offer customers better value through products that take into account not just performance but also customer safety and environmental impacts. In addition, the company focuses on improving product quality, enhancing customer services, and having more dialogues with customers in order to become a company trusted by customers.

RoHS 3, which has stricter standards than RoHS 2, such as the expansion of restricted materials, will come into effect in July 2019. Accordingly, responsible department and executive office will strengthen monitoring and management of hazardous chemicals use and commence the development of alternative substances as part of continued efforts to minimize risks related to hazardous chemicals.

- Activities and Achievements**
  - Created a CF (Cross Function) Team for company-wide hazardous chemicals management and operations; established a policy to manage restricted materials; distributed work process guidelines to the relevant departments; provided trainings to staff at suppliers in charge and helped them establish management process; developed alternative materials to respond to RoHS 2; established response processes at overseas subsidiaries; requested for input and renewal of REACH/RoHS 2 substances; and included supplier’s obligation for REACH/RoHS 2 in the basic purchase contract form

<sup>3)</sup> REACH (Registration, Evaluation, Authorization and Restriction of Chemicals): Chemical substance management system of the E.U. that governs the registration, evaluation, approval and restriction of chemical substances according to their quantity and harmful effects

<sup>2)</sup> Restriction of Hazardous Substances in EEE (RoHS): The EU directive that restricts the use of hazardous substances, including lead, cadmium, mercury, chromium, and flame retardants, such as PBBs and PBDEs, in the production of electrical and electronic products

RoHS 2: A stricter regulation compared with RoHS, including an increase in the scope of restricted substances, which has been applied in a phased manner since January 2013. It restricts the use of ten substances – four phthalate-related substances were added to the previous six substances, such as lead, mercury, cadmium, hexavalent chromium, and two bromine-based flame retardants

Link to UN SDGs





## Customer-centered Product Development

### Strengthening Product Responsibility

Doosan Infracore is committed to securing customer safety and minimizing environmental impact throughout its entire process ranging from product development to production and sales. To this end, the company strives to ensure customer safety and convenience from the product planning and development stage, and also focuses on expanding the development of eco-friendly products in order to minimize the environmental impact of product manufacturing and use. In addition, it aims to contribute to the improvement of human rights and the environment in areas that produce conflict minerals by continuously monitoring the use of conflict minerals in its products.

**Compliance with International Safety Standards** At the planning stage, the company sets up new product development and verification plans by reviewing various countries' technical regulations and international standards on safety and environment, including fire, explosion, noise, rollover, electromagnetic compatibility, and toxic chemicals. It also reflects the guidelines set forth in major technical regulations when setting up its product development objectives, such as the 'Rules on Construction Machinery Safety Standards' of Korea, the 'Machinery Directive' of Europe, and the 'Guobiao (GB) Standard' of China. The company also ensures that its products are manufactured to meet the regulations of the markets to which they will be exported. Moreover, Doosan Infracore runs the Global Product Compliance Council (GPCC), through which it shares information on the latest trends in global safety regulations and standards and discusses preemptive responses to any changes.

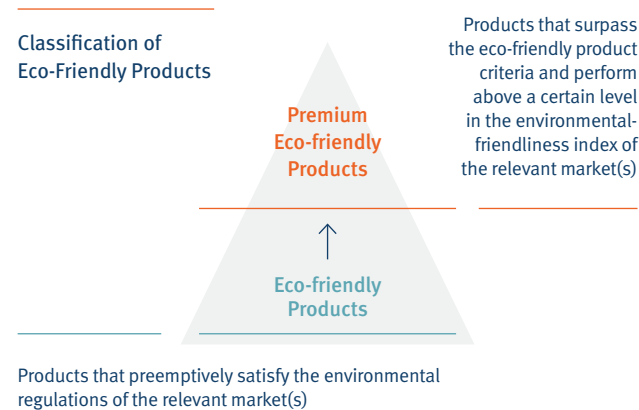
**Management of Hazardous Chemicals** Doosan Infracore seeks ways to respond to various hazardous chemicals regulations, including the EU's REACH/RoHS 3, and the 'Act on the Registration and Evaluation etc. of Chemical Substances' and the 'Chemicals Control Act' of Korea. To this end, the company conducted a total inspection on hazardous chemicals used throughout its work processes in 2015; conducted a study on the possibility of replacing some of hazardous chemicals, and replaced or removed 11 types of chemicals subject to management under The Chemicals Control Act in 2016; and developed a world-leading process and IT system to respond to REACH/RoHS 2 and completed its roll-out at Doosan Infracore China Corporation in 2017. In 2018, to cope with even stricter regulations systematically, the company created a CF team for company-wide hazardous chemicals management and operations; established a policy to manage restricted materials; distributed work process guidelines to the relevant departments; developed alternative materials to respond to RoHS 3; established response processes at overseas subsidiaries; input new REACH/RoHS 3 substances and requested renewal.

The scope of application of the relevant regulations has been expanding from finished products to include parts. In response, Doosan Infracore included supplier's obligation for REACH/RoHS 3 in the basic purchase contract form in order to raise suppliers' awareness of the importance on hazardous substance management. It has also continued to assist suppliers with training and on-site guidance to improve the management competency of their staff, and helped them establish management process. Doosan Infracore will urge the suppliers to respond to the regulations and offer online trainings to support an improvement of relevant competencies.

**Conflict Mineral Management** The international community has designated four minerals – tin, tantalum, tungsten, and gold – that are mined in 10 war-torn countries in Africa, including the Democratic Republic of the Congo, Sudan, and Central Africa, as conflict minerals. These countries are believed to still be caught up in conflict as rebels are raising funds by monopolizing mining and distribution of the minerals. In addition to the loss of lives caused by long-standing disputes, the mining also causes serious social problems, such as forced labor for local residents, human rights problems related to child labor, and pollution caused by over-mining. Use of conflict minerals as core materials for automobiles, mobile phones, and personal computers, has become an issue, and as a result, the international community, including the U.S., the EU, and OECD, has established regulations and guidelines to eradicate the use of conflict minerals. At Doosan Infracore, relevant teams collaborate to respond to the conflict minerals issue based on the guidelines presented by the 'Conflict Minerals Regulatory Response Center' of the Korea International Trade Association. Going forward, the company will establish standards and procedures designed to identify the use of conflict minerals and their origin with the purpose of preventing the use of conflict minerals in the first place.

**Increasing Eco-friendly Products** Doosan Infracore is conducting its business based on its corporate philosophy which defines minimizing environmental footprint as a corporate responsibility through which the company can create values. In accordance with this corporate philosophy, the company established definition and management standards for eco-friendly products in 2015, and reflected the eco-friendly product management process in its new product development process and completed an upgrade of the environmental friendliness index in 2016.

### Classification of Eco-Friendly Products



At Doosan Infracore, products that preemptively meet mandatory environmental regulations of each market in five areas – fuel efficiency, durability, noise control, safety, and emissions control – are defined as eco-friendly products. And those that surpass the mandatory level are defined as premium eco-friendly products. The portion of premium eco-friendly or eco-friendly products has been increasing from 73.9% in 2016 to 84.6% in 2017, and 87.4% in 2018.

## Responsible Customer Service

### Preemptive Response for Customers

Doosan Infracore has been solidifying its relationship with customers based on trust by acting ahead of customers' requests. The company provides information on products for customer safety and increased convenience, and carries out voluntary preemptive correction measures.

**Providing Information for Customer Safety** Doosan Infracore complies with regulations of each country related to increased customer safety, including Safety Standards and the Product Liability Act, and takes all the necessary actions to prevent related accidents. To ensure safe operation and maintenance of its products, the company provides customers with safety labels of three levels – danger, warning, and caution – according to the severity of the safety risks involved. It also specifies matters that are critical to customer safety in a product manual. Doosan Infracore complies with ISO 9244<sup>1)</sup> with respect to the safety labels attached to its construction equipment and publishes operator manuals for its machinery in accordance with ISO 6750<sup>2)</sup>.

**Preemptive Correction Measures** Preemptive correction measures are improvement measures carried out by manufacturers after making notices to customers without any external pressure. For better preemptive correction measures, the company not only utilizes local staff at its overseas business sites but also dispatches its experts from the head office to any location in the world. Construction equipment must be able to withstand rough work environments. The company therefore repeatedly checks the whole range of equipment features, from performance of the specialty parts to simple malfunction, when performing preemptive correction measures, and makes corrections so that the product can be delivered to customers in the best possible state. In addition, the company frequently manages the major correction measure status using a system for quicker preemptive correction measures.

In March 2013, construction equipment and excavators were designated by law as a subject to a recall in Korea. Voluntary recall involves the company making a direct report if it discovers an issue and officially implements preemptive correction measures. In December 2017, Doosan Infracore voluntarily chose one of its products as a subject of recall for it found possible defects in the lower heater of the fuel filter which may cause an inflow of moisture into an inner pin, damage it, overheat the fuel filter and thus make the filter stop functioning. The company sent out a recall notice to customers and offered free repairs at designated maintenance centers or locations preferred by consumers.

### Process to Reflect Customer Feedback

**Collecting and Responding to Customer Feedback** Doosan Infracore collects and promptly handles customer feedback and requests through its dealers and direct visits to major customers. It also regularly holds meetings to share voice of customers (VOC) in which major suppliers participate, and thus uses them as opportunities to analyze and apply market trends.

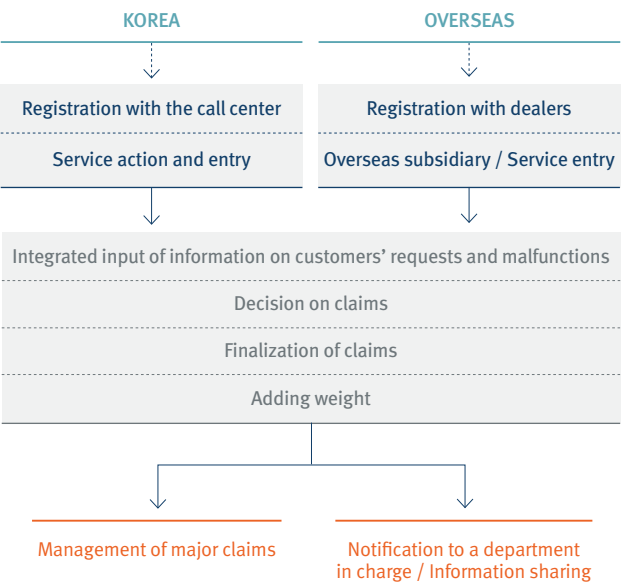
In Korea, the Customer Support Center receives customer requests, and assigns personnel who are in a position to quickly visit customers through the Global Positioning System (GPS). This is followed by the 'Happy Call' with customers one day after in order to check final progress. To smoothly provide services to customers, the company has built a one-stop after market (AM) service system from sales to end-of-life disposal, and continues to enhance its dealer service training. It also carries out trainings for office and field staff of the Customer Support Center on a quarterly basis in line with a new product release. As an outcome of such efforts, the company has achieved 97.6% of claim settlement ratio within the timeline set by customers.

In China, dealers receive customer feedback and requests through the Service Call Center and aim to handle them within 24 hours and complete their services within seven days. VOCs are reflected in product design and quality improvement. Doosan Infracore provides various online and offline trainings to enhance the technical capabilities of its dealers' service personnel. Approximately 20 emergency service engineers make three-month training visits to around 30 dealers throughout China to provide training on mechanical repairs and maintenance while also helping to solve technical issues of the company's C (Chinese) models. As a result of these efforts, in 2018, the company achieved 87% and 88% in claims processing rates for all its models and C models, respectively. It also achieved 87% in making design improvements by successfully working on 26 cases out of 30 design-related VOCs.

<sup>1)</sup> ISO 9244: International standard specifications on general rules regarding construction equipment safety labels

<sup>2)</sup> ISO 6750: International standard specifications on the format of construction equipment manuals (guidance and content)

Customer Feedback Collection and Handling Process



**Standardizing Product Post-sale Management Services** Doosan Infracore offers its customers the 4-One Service – One Hour Contact, One Day Repair, One Touch Repair, One Plus Service – to deal with product malfunctions and provide technical assistance. The company strives to provide One Touch Repair on the day that service requests are made. It therefore continues to make improvements in its technical capabilities and service procedures while building a comprehensive customer support system that leaves no blind spot unaddressed and supplies parts in a timely manner.

**Customer Satisfaction Management** Doosan Infracore has been standardizing its customer services to improve its overall customer service quality, and providing all its service personnel with customer satisfaction (CS) trainings in order to foster them into CS experts. In addition, the company conducts CS surveys on provided services through Happy Calls in Korea and China and strives to keep the satisfaction level above 4.5 points on a scale of 1-5 points. In 2018, the level of satisfaction in Korea stood at 4.73 points.

**NPD Process** Doosan Infracore operates the New Product Development (NPD) process with the participation of such departments as R&D, Advance Quality, Sales Strategy, and Marketing, to reflect VOCs into the new product development. The company's business sites in Korea, China, and Europe operate customer feedback collection channels from diverse perspectives. They have also built the NPD 4.0 in 2013, with improved perspectives in terms of laws, safety, and quality. They are currently operating the NPD 4.3 to ensure quality innovation throughout all steps of product development.

Building Customer Trust in Marketing and Sales Stages

**Responsible Marketing Policies** Doosan Infracore sets and complies with proactive and responsible customer service policies with an aim of building customer trust and enhancing its product values. For responsible marketing, it provides the latest product information via its website and social media channels, along with unique brand guidelines to serve as the yardstick for marketing and communication activities, including advertising and sales promotions. The company complies with legislation related to sales, marketing, and information security, and was not subject to any sanctions for falsehood including exaggerated advertising practices in 2018.

**Protection of Consumer Information** Doosan Infracore has established and implemented its own customer information protection system. It encrypts its personal information database for information security and conducts integrated monitoring of access to its information system, including any activities suspected of abuse or leakage. The company has prepared guidelines on the management of information security and provides education on information security to all its employees every year. Doosan Infracore has not been subject to any sanctions for leakages of its customers' personal information or violations of relevant laws in the past three years.

**Promotion of Digital Marketing** In order to promote direct communication with customers, Doosan Infracore operates digital marketing channels for each country. In China, the company has been using WeChat, the largest messenger service in the market since 2016, to provide product news, information regarding used products and parts, and functions to help customers manage their equipment in a customer-tailored way, and to identify customers' demands for products. As of 2018, the company's WeChat followers totaled around 60,000 which is more than two-fold increase in the last two years, while the running total of WeChat clicks exceeded 1.4 million, and the total number of social media exposures surpassed the 12 million mark. In the massive Chinese market, the company identifies demand for products through digital marketing, including WeChat and other online media, in addition to that identified through its dealerships around the country, which in turn is leading to our sales. In 2018, Doosan Infracore sold some 330 excavators in China through the digital marketing leveraging WeChat and other social media channels.

Following the successful launch of the official Instagram account of Doosan Infracore in 2017, the company opened its Facebook and LinkedIn accounts in 2018, thereby expanding communication with customers across the globe. As such, the company continues to post information on its equipment, news highlights of the company, and customer events by using YouTube and other social media channels, further enhancing the corporate value of Doosan Infracore. Going forward, the company will leverage social media marketing more effectively with an aim of providing information and promoting sales.

Quality Stabilization and Standardization

The Foundation of Quality Management

**Quality Management System** To achieve its vision of developing into a 'Global Leader in Infrastructure Solutions,' Doosan Infracore has established and been operating a customer-oriented quality management system. In 2018, the company set its mid- to long-term quality management direction, which is to focus on strengthening proactive quality and global quality management system, improving mass production quality, and increasing quality capabilities. It also created the Quality Management Team which is in charge of diagnosing and verifying the quality management system of the company. In addition, Doosan Infracore sought to enhance overall quality management across the entire value chain by overhauling the Quality Management System (QMS) which evaluates the quality management level of such areas as production/purchase/quality, R&D, sales, and services, and comes up with measures to make improvements. It also built a risk management framework to better respond to quality risks.

In 2019, Doosan Infracore will continue to place top priority on quality. More specifically, the company will secure a quality competitiveness of new products; enhance its global quality management by establishing differentiated quality strategies for different regions; enhance mass production quality and strengthen proactive quality management by reinforcing suppliers' quality competitiveness and expanding the scope of their quality management; establish an

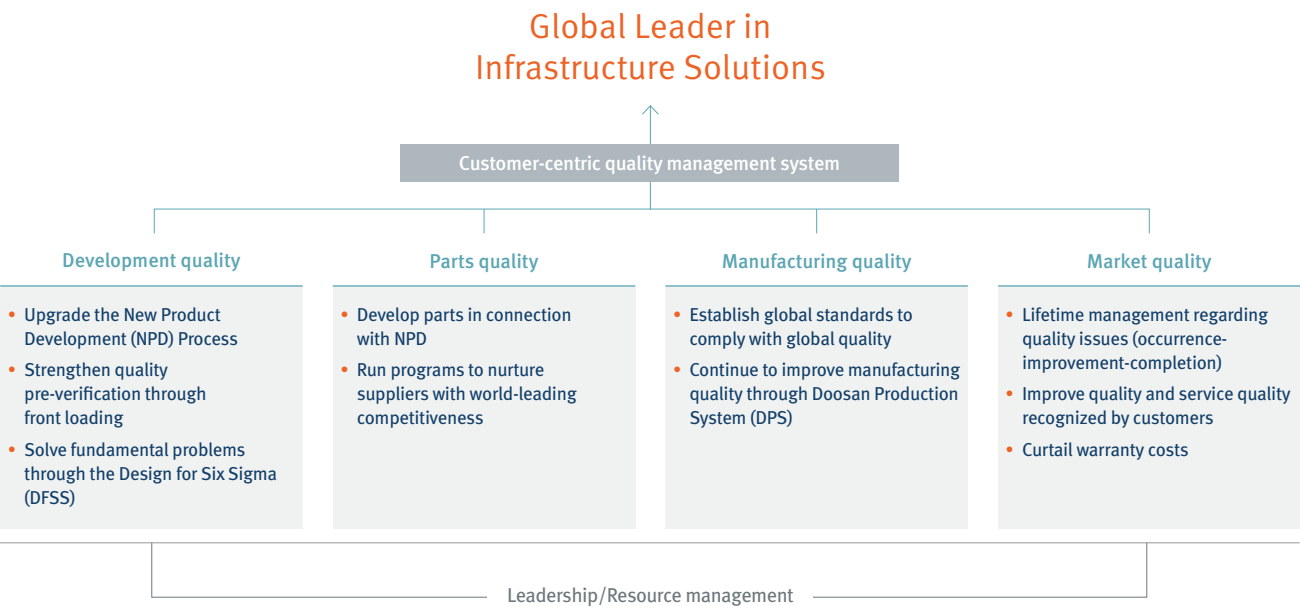
infrastructure system by laying foundations for a quality management system and improving its quality system; and make continuous efforts to improve fundamental quality.

**Company-wide Integrated Quality Conference** Doosan Infracore has been holding the 'Company-wide Integrated Quality Conference,' participated by the CEO, every month since 2010 with the goal of attaining the highest quality from a customer's perspective. The conference agenda reflects results of the product quality analysis and shares improvement points and responses.

**Quality Improvement Index Management** Doosan Infracore focuses on making innovations in parts quality and improving product perfection with a goal of manufacturing products that meet customer needs. The company has selected initial quality and warranty quality as indices for customer recognition, and set an ambitious goal to increase customer satisfaction through quality management.

**Project Tracking System** The Project Tracking System (PTS) is Doosan Infracore's system for managing quality projects. Using PTS, the company checks the progress status of the projects related to market quality, process quality, and advance quality, responses to VOCs, and improvement effects to help the company make improvements to quality and accelerate the pace of improvement. In 2019, Doosan Infracore plans to improve work efficiency and build a regular monitoring system by promoting PTS advancements, such as implementing auto-tracking system to check the progress of quality improvement tasks, complementing supplier audits and manufacturing quality modules, and establishing customer complaints database.

Quality Management System





Considerable Improvement of Fundamental Quality

Doosan Infracore focuses on quick, considerable improvements to its fundamental quality to secure core competitiveness and increase customer value. Aiming to improve the fundamental quality level by more than 7% compared to the current level, the company operates key tasks every year, strengthening compliance with basic quality rules with a focus on plants and suppliers. The company will strive to minimize problems that customers may encounter while using their equipment by gradually improving its quality through various preventive quality management endeavors. These activities include managing the company’s and suppliers’ proactive quality factors, strengthening the pre-shipment inspection process through the re-examination of pre-shipment inspection time and items, and creating a precautionary quality team to strengthen proactive quality management for new products. The company will continue improve the quality of the entire phase from parts to manufacturing and final inspection in order to prevent possible quality problems before equipment is delivered to customers.

Strengthening Quality at the Parts Production Stage

In order to minimize the number of defects at the production stage, Doosan Infracore is continuing to improve parts quality in partnership with its suppliers. As a result, the company’s initial/warranty quality, which serves as a quality index of construction equipment parts, has improved by more than 23% and 42% in Korea and China, respectively, over the past three years. To prevent fluctuations in quality due to personnel change and process improvement, Doosan Infracore assigns different reporting obligations according to the business type of each supplier, while enhancing quality management through pre-inspections. It also holds worst quality supplier meetings to raise suppliers’ awareness on the importance of quality and urge them to implement quality-first policies. It conducts quality audits customized to each supplier’s level of quality and business type to help them improve quality, and inspects their quality systems, processes, and products on a regular basis to prevent quality defects and ensure the consistency in quality management. In 2018, the company conducted quality inspection audit and OSA for 86 suppliers, and in 2019, it plans to expand the target to 93 suppliers. Doosan Infracore will continuously prevent quality issues by diagnosing and checking quality risks in advance, including cases of transfer of suppliers’ contractual status, and modifications in design or processes.

Enhancing Supplier’s Quality Management

Doosan Infracore has put the statistical process control (SPC) system in place and analyze data in order to prevent quality defects and ensure stable manufacturing processes. Through the operation of the SPC system, the company expects to make continuous improvements in fundamental quality and reduce warranty costs; build a foundation for quality data analysis based on big data; secure data reliability by automating data input; and improve work efficiency through the automated transfer of suppliers’ quality information. In 2018, the company registered and managed data on 198 inspection items of 51 suppliers, resulting in continuous improvements. In 2019, Doosan Infracore plans to expand the scope to 256 items of 68 suppliers.

Communities



OUR APPROACH

We are leveraging our capabilities to create a better society by investing in our communities.

Based on its pursuit of sincere corporate community involvement (CCI), Doosan Infracore has established a global CCI system and guidelines that reflect its corporate capabilities and social demands while carrying out CCI activities worldwide guided by a common set of core values. The CCI Committee ensures that donations are spent in a transparent way. Together with its employees around the globe, Doosan Infracore is striving to implement CCI programs that are instrumental to the development of local communities.

Link to UN SDGs



01

CCI Strategies and Directions

CCI System

**CCI Strategies** Doosan Infracore generates not only business opportunities but also social values by leveraging its expertise and competencies in order to grow into a trusted and reputable company that contributes to the sustainable growth of its own and local communities as well. To this end, the company plans and executes corporate community involvement (CCI) activities that take into account characteristics of local communities based on its CCI guidelines and continuous communication with local communities. The CSR Part at the head office is taking a central role and works in partnership with staff in charge at its overseas business sites. In 2018, based on the corporate-wide CCI strategy, the company updated its CCI Portfolio to identify its current CCI status and set directions for selecting focus areas. Going forward, Doosan Infracore will focus on CCI activities related to human resource development, products, and business areas based on the CCI strategy and portfolio.

CCI Strategies



<sup>1)</sup> Based on the announcement of the World Economic Forum (Davos Forum)

**Operation of the CCI Committee and the CCI Council** Doosan Infracore spends donations after carrying out a comprehensive review of the public interest and appropriateness of programs and institutions, and the relevance of programs to the company's CCI direction. For more transparent and proper collection of donations and execution thereof, the company has launched the CCI Committee, an organization that deliberates on and determines all matters related to donation, in 2017 and established relevant regulations. Led by the CEO, who also serves as the chairman of the CSR Committee, the CCI Committee is comprised of the CFO and executives in charge of legal affairs and CSR. The Committee deliberates where to spend donations followed by reviews of how much to spend on each proposed program considering each program's relevance to the company's business and its public nature together with the company's financial situation. Doosan Group's CCI Committee, which is composed of executives from six affiliates of the Group including Doosan Infracore, discusses and makes decisions on policies on donations along with the donation beneficiaries and amounts for each affiliate. In addition, donations worth KRW 500 million or those deemed necessary to be reviewed by the BOD are deliberated and approved by the BOD.

### Support for the Next Generation

**Dream School** Doosan Infracore has been running 'Dream School' since 2012 together with World Vision, an international NGO devoted to humanitarian aid across the world. As one of the company's flagship CCI programs, the Dream School helps youth nurture their dream for five years from second grade of middle school by offering mentoring programs, education for self-discovery, projects to improve problem-solving capabilities, and experiential programs to help them shape their career path. Middle school mentees take part in a mentoring program provided by Doosan Infracore employees for two years – it also includes education for self-discovery, specialist mentoring sessions, and career experiences. High school mentees engage in self-directed activities, including meeting with professionals through Dream Club activities, in an effort to shape their career paths.

The first year of Dream School mainly consists of 'Dream Leaders' activities where a mentor and mentee meet once a month to discover the mentee's area of interest and dream. There are also other activities that form a sense of closeness between mentors and mentees including the 'Summer Camp' where mentees meet friends from other regions, 'Professional Mentoring' where mentees meet professionals, and 'Home Coming Day' where mentees meet Dream School graduates. In the second year, the 'Dream Project' is executed to improve youth's problem-solving capabilities in the Fourth Industrial Revolution era that is changing the world faster than ever. Mentees think about, identify with, and discover solutions for daily life problems that require improvement, and challenge themselves to find solutions, thereby enhancing their independent problem-solving skills.

Doosan Infracore selected mentors and mentees for the 4th class of Dream School in 2017 and the 5th in 2018, carrying out related activities for two years. Throughout the last seven years since 2012, 320 employees and around 400 youth shared the journey to nurture dreams of youth. The company will continue to provide support, such as employee mentoring, experiential activities, professional coaching, and peer activities, so as to enhance independence of the youth and help them grow into active and responsible members of society.

**Construction Support for Hope Elementary Schools in China** Under the slogan of 'We will build a beautiful China together,' Doosan Infracore China Corporation (DICC) has been participating in 'Project Hope,' a public service project that involves the provision of educational support for Chinese youth and improvement of the educational environment in underprivileged regions of China. DICC has been supporting the construction of Hope Elementary Schools, thereby providing local youths opportunities for education and contributing to the development of local education and sustainable development of the country. Out of a total of 37 planned Hope Elementary Schools, 34 Schools have been built, sharing hope with children. DICC also operate an 'honorary school principal system' together with dealerships in China, and it has been holding the 'Doosan Hope Travel Summer Camp' every summer since 2007. Teachers and students of Doosan Hope Elementary Schools from all around the country join the summer camp, which enables students to enjoy cultural experiences while having fun. Under the honorary principal system, the CEOs of Doosan Infracore dealerships are appointed as principals with the aim of encouraging participation of dealers and ensuring continued support for the schools.

### Support for Local Communities

Doosan Infracore carries out corporate community involvement (CCI) activities in consideration of the characteristics and needs of local communities with an aim to grow together with them. The company holds workshops with staff in charge of CCI at its business sites, and shares the CCI direction and major annual schedule, while collecting their opinions. By doing so, Doosan Infracore promotes various CCI activities that address the needs of communities based on cooperation with reputable non-profit organizations in local communities.

**Local Hope CCI Activities** Doosan Infracore carries out a variety of CCI activities with the participation of not only its employees but also their family members in a way that the activities can bring practical assistance to local communities. In Seoul and Gunsan, the company strives to improve the residential environment of the neighborhoods in which its business sites are located. In Incheon, the company offers free packed meals to the undernourished as part of its efforts to improve the welfare of local residents. The company also continues to supply kimchi and briquettes to the underprivileged in local communities. It undertakes the Local Hope CCI activities with funds raised through voluntary financial contributions from its employees as well as the company's donation in the form of a matching grant.

### Support Based on the Company's Core Competencies

Doosan Infracore leverages its business resources to promote its CCI activities, including expertise in construction mechanical engineering and product development.

**Support for Natural Disaster Relief** In the event of a massive disaster such as an earthquake or a typhoon, Doosan Infracore promptly provides construction equipment, such as excavators, wheel loaders, and compact construction machinery, and funds for relief efforts, thus providing support based on its core competencies – one of the company's core CCI strategies. It has provided construction equipment and donations for rapid relief and recovery from devastating natural disasters around the world over the years, such as Hurricane Katrina in the U.S. in 2005, the Sichuan earthquake in China in 2008, the earthquake in Haiti in 2010, the Tohoku earthquake in Japan in 2011, Typhoon Haiyan in the Philippines in 2013, and the devastating earthquake in Nepal in 2015. The company provided construction equipment worth around USD 1 million (around KRW 1.2 billion) for damage recovery from the earthquake that hit Indonesia in October 2018. It recognized the urgency of damage recovery immediately after the earthquake, and through discussions with the Indonesian government, the company chose equipment that were needed for the damaged sites and offered emergency support through a local dealer. The equipment was used for restoration of areas that were damaged due to the collapse of infrastructure, such as buildings and roads.

**Donation of Equipment and Model** Doosan Infracore donates excavators, parts, and engines produced in the course of product development stage for tests to the relevant departments of universities and vocational high schools to be used as educational materials. Moreover, to help soldiers stationed along the country's snow-heavy northern border, the company has donated compact track loaders and attachments to military units in the Gangwondo province in February 2018 to facilitate the soldiers' errands of weeding and clearing snow in hazardous areas.

**The Junior Engineering Class** Launched in 2008, the Junior Engineering Class is a talent donation circle mainly consisting of Doosan Infracore's R&D executives and employees. The volunteers teach elementary school students about scientific principles in fun and easy ways through the assembly of science kits at regional child centers, schools, and hospitals.

## Employee Engagement

### Employee Donation

Participated by approximately 75% of the Doosan Infracore employees in Korea (excluding expatriate employees), the employee donation consists of 'Collection of Small Change from Employees' Salaries' and 'Opening Donation Account.' The company's matching grant amount is added and the funds are donated to the Community Chest. The details of fund execution are disclosed transparently through the company's CCI Information System and in-house portal news service.

### Building a System for Employee Engagement

Doosan Infracore is operating various systems to establish a corporate culture where employees participation in CCI is encouraged. The company built a CCI Information System on the company Intranet to increase employees' awareness of the company's voluntary services while keeping track of their participation and managing the employee donation. In addition to company-led CCI programs, Doosan Infracore operates a support system for voluntary service clubs run by employees. In addition, the company operates diverse support programs, such as the CCI diligence and indolence system and reward system, to encourage voluntary participation of employees in CCI activities.

### Doosan Day of Community Service

Doosan Day of Community Service refers to CCI activities participated by employees of Doosan Group. They figure out the needs of local communities across the globe in which Doosan Group carries out business and lend a helping hand. Doosan Infracore takes part in the Doosan Day of Community Service every year and makes small but meaningful changes. The company also holds a photo/video contest to share heartwarming moments of the event with all the participants. Going forward, Doosan Infracore plans to actively participate in the Doosan Day of Community Service which is based on a corporate culture of voluntary participation.



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# Consolidated Statements of Financial Position

Doosan Infracore Co., Ltd. and Subsidiaries  
December 31, 2018 and 2017

(in Korean won)

	2018	2017
<b>Assets</b>		
<b>Current assets</b>		
Cash and cash equivalents	₩ 1,053,016,029,210	₩ 943,481,141,254
Short-term financial instruments	261,439,186,727	160,166,932,394
Short-term investment securities	14,288,402,916	34,182,400,175
Trade and other receivables	1,353,418,884,045	1,197,046,622,163
Derivative assets	8,956,727,423	1,868,202,287
Inventories	1,524,363,766,335	1,254,963,515,735
Other current assets	211,338,773,310	175,725,123,533
	4,426,821,769,966	3,767,433,937,541
<b>Non-current assets</b>		
Long-term financial instruments	848,391,912	10,500,000
Long-term investment securities	99,008,790,522	93,687,457,663
Long-term trade and other receivables	10,891,458,308	16,150,386,229
Non-current derivative financial assets	7,996,253,597	4,387,862,259
Investments in subsidiaries and associates	67,912,129,252	91,838,684,125
Property, plant and equipment	1,782,632,844,011	1,786,904,298,672
Intangible assets	4,328,656,381,720	4,169,281,753,860
Investment properties	26,308,106,687	20,609,998,094
Deferred tax assets	205,848,185,403	251,122,643,405
Other non-current assets	72,242,380,666	74,662,610,602
	6,602,344,922,078	6,508,656,194,909
<b>Total assets</b>	₩ 11,029,166,692,044	₩ 10,276,090,132,450
<b>Liabilities</b>		
<b>Current liabilities</b>		
Trade and other payables	₩ 1,613,823,764,093	₩ 1,281,736,493,268
Short-term borrowings	937,599,855,700	1,409,287,187,360
Current portion of bonds	505,338,874,285	474,641,545,632
Current portion of long-term borrowings	173,048,137,404	96,310,179,828
Current tax liabilities	25,849,607,446	32,398,041,440
Derivative liabilities	12,301,480,333	4,026,802,750
Provisions	179,066,431,365	167,059,619,793
Other current liabilities	331,546,013,747	230,185,572,715
	3,778,574,164,373	3,695,645,442,786
<b>Non-current liabilities</b>		
Non-current other payables	1,156,747,007	1,218,603,784
Bonds	944,061,136,540	1,154,956,082,362
Long-term borrowings	1,708,761,427,603	1,513,805,807,222
Net defined benefit liabilities	406,106,460,314	451,858,134,854
Non-current derivative liabilities	4,127,632,054	41,708,762,306
Deferred tax liabilities	204,364,376,024	93,587,876,395
Non-current provisions	20,377,900,315	9,584,045,726
Other non-current liabilities	140,821,964,241	140,563,747,861
	3,429,777,644,098	3,407,283,060,510
<b>Total liabilities</b>	7,208,351,808,471	7,102,928,503,296
<b>Equity</b>		
Share capital	1,040,790,385,000	1,040,000,595,000
Capital surplus	213,014,383,085	211,545,565,029
Other components of equity	(129,310,962,134)	(108,457,073,777)
Accumulated other comprehensive income	(256,805,144,728)	(334,050,917,882)
Retained earnings	1,049,189,116,801	784,702,285,730
<b>Equity attributable to owners of the Parent Company</b>	1,916,877,778,024	1,593,740,454,100
<b>Non-controlling interest</b>	1,903,937,105,549	1,579,421,175,054
<b>Total equity</b>	3,820,814,883,573	3,173,161,629,154
<b>Total liabilities and equity</b>	₩ 11,029,166,692,044	₩ 10,276,090,132,450

Consolidated Statements of Profit or Loss

Doosan Infracore Co., Ltd. and Subsidiaries  
Years Ended December 31, 2018 and 2017

(in Korean won)

	2018	2017
Revenue	₩ 7,730,107,942,853	₩ 6,567,897,225,498
Cost of sales	(5,936,246,301,169)	(5,024,999,368,311)
Gross profit	1,793,861,641,684	1,542,897,857,187
Selling and administrative expenses	(945,734,195,514)	(882,128,558,541)
Operating profit	848,127,446,170	660,769,298,646
Finance income	104,252,463,898	296,665,608,495
Finance costs	(303,338,799,287)	(455,734,726,941)
Other non-operating income	36,084,086,449	64,152,908,525
Other non-operating expenses	(63,697,135,116)	(72,931,806,741)
Loss on disposal of investment in subsidiaries and associates	(5,001,734,320)	(3,294,696,326)
Profit before income tax	616,426,327,794	489,626,585,658
Income tax expense	(222,256,598,381)	(192,983,826,788)
Profit for the year	₩ 394,169,729,413	₩ 296,642,758,870
Profit is attributable to:		
Owners of the Parent Company	₩ 246,409,919,128	₩ 148,594,494,986
Non-controlling interests	147,759,810,285	148,048,263,884
Earnings per share attributable to the equity holders the Parent Company		
Basic earnings per share	₩ 1,184	₩ 627
Diluted earnings per share	1,115	620

Consolidated Statements of Comprehensive Income

Doosan Infracore Co., Ltd. and Subsidiaries  
Years Ended December 31, 2018 and 2017

(in Korean won)

	2018	2017
Profit for the year	₩ 394,169,729,413	₩ 296,642,758,870
Other comprehensive income		
Items that will not be reclassified to profit or loss		
Remeasurements of net defined benefit liability	37,545,492,014	(6,717,591,709)
Revaluation reserves of property, plant and equipment	3,000,935,957	34,547,697,525
Gain on valuation of equity instruments at fair value through other comprehensive income	311,745,173	-
Share of other comprehensive income of associates	-	397,099,884
Share of retained earnings of associates	(109,506,066)	(71,846,321)
Items that may be subsequently reclassified to profit or loss		
Changes in the fair value of available-for-sale financial assets	-	(4,403,370,796)
Exchange differences	129,649,536,168	(157,850,633,039)
Cash flow hedges	2,510,805,778	(5,400,168,266)
Other comprehensive income for the year, net of tax	172,909,009,024	(139,498,812,722)
Total comprehensive income for the year	₩ 567,078,738,437	₩ 157,143,946,148
Total comprehensive income for the year is attributable to:		
Owners of the Parent Company	342,631,656,647	70,873,060,791
Non-controlling interest	224,447,081,790	86,270,885,357
	₩ 567,078,738,437	₩ 157,143,946,148

Consolidated Statements of Changes in Equity

Doosan Infracore Co., Ltd. and Subsidiaries  
Years Ended December 31, 2018 and 2017

(in Korean won)

	Attributable to Owners of the Parent Company							Total	Non-controlling Interests	Total Equity
	Share Capital	Capital Surplus	Hybrid Capital Instruments	Other Components of Equity	Other Comprehensive Income	Retained Earnings				
Balance at January 1, 2017	₩ 1,037,276,570,000	₩ 249,488,144,851	₩ 508,259,603,649	₩ (42,440,546,020)	₩ (270,371,100,895)	₩ 578,245,971,895	₩ 2,060,458,643,480	₩ 1,387,918,098,648	₩ 3,448,376,742,128	
Total comprehensive income										
Profit for the year	-	-	-	-	-	148,594,494,986	148,594,494,986	148,048,263,884	296,642,758,870	
Remeasurement of net defined benefit liabilities	-	-	-	-	-	(5,908,110,490)	(5,908,110,490)	(809,481,219)	(6,717,591,709)	
Revaluation reserves of property, plant and equipment	-	-	-	-	33,549,343,476	34,930	33,549,378,406	998,319,119	34,547,697,525	
Changes in the fair value of available-for-sale financial assets	-	-	-	-	(4,403,370,796)	-	(4,403,370,796)	-	(4,403,370,796)	
Share of other comprehensive income of associates	-	-	-	-	368,821,194	-	368,821,194	28,278,690	397,099,884	
Share of retained earnings of associates	-	-	-	-	-	(64,025,578)	(64,025,578)	(7,820,743)	(71,846,321)	
Exchange differences	-	-	-	-	(96,515,360,869)	-	(96,515,360,869)	(61,335,272,170)	(157,850,633,039)	
Cash flow hedges	-	-	-	-	(4,748,766,062)	-	(4,748,766,062)	(651,402,204)	(5,400,168,266)	
Total comprehensive income for the year	-	-	-	-	(71,749,333,057)	142,622,393,848	70,873,060,791	86,270,885,357	157,143,946,148	
Transactions with owners										
Cancellation of share options	-	1,053,454,693		(1,053,454,693)	-	-	-	-	-	
Transfer of capital surplus	-	(82,200,482,487)	-	-	-	82,200,482,487	-	-	-	
Issuance of bonds with warrants	-	41,976,882,023	-	-	-	-	41,976,882,023	-	41,976,882,023	
Exercise of stock warrants	2,724,025,000	1,227,565,949	-	-	-	-	3,951,590,949	-	3,951,590,949	
Dividends paid for hybrid capital securities	-	-	-	-	-	(18,366,562,500)	(18,366,562,500)	-	(18,366,562,500)	
Dividend of subsidiary	-	-	-	-	-	-	-	(28,541,041,200)	(28,541,041,200)	
Repayment of hybrid capital securities	-	-	(508,259,603,649)	(58,904,993,351)	-	-	(567,164,597,000)	-	(567,164,597,000)	
Disposal of subsidiary shares	-	-	-	(6,058,079,713)	8,069,516,070	-	2,011,436,357	133,773,232,249	135,784,668,606	
Total transactions with owners	2,724,025,000	(37,942,579,822)	(508,259,603,649)	(66,016,527,757)	8,069,516,070	63,833,919,987	(537,591,250,171)	105,232,191,049	(432,359,059,122)	
Balance at December 31, 2017	₩ 1,040,000,595,000	₩ 211,545,565,029	₩ -	₩ (108,457,073,777)	₩ (334,050,917,882)	₩ 784,702,285,730	₩ 1,593,740,454,100	₩ 1,579,421,175,054	₩ 3,173,161,629,154	
Balance at January 1, 2018	₩ 1,040,000,595,000	₩ 211,545,565,029	₩ -	₩ (108,457,073,777)	₩ (334,050,917,882)	₩ 784,702,285,730	₩ 1,593,740,454,100	₩ 1,579,421,175,054	₩ 3,173,161,629,154	
Changes in accounting policy	-	-	-	-	-	(899,052,422)	(899,052,422)	(372,370,064)	(1,271,422,486)	
Balance after changes	1,040,000,595,000	211,545,565,029		(108,457,073,777)	(334,050,917,882)	783,803,233,308	1,592,841,401,678	1,579,048,804,990	3,171,890,206,668	
Total comprehensive income										
Profit for the year	-	-	-	-	-	246,409,919,128	246,409,919,128	147,759,810,285	394,169,729,413	
Remeasurement of net defined benefit liabilities	-	-	-	-	-	13,693,307,289	13,693,307,289	23,852,184,725	37,545,492,014	
Revaluation reserves of property, plant and equipment	-	-	-	-	(2,371,378,063)	5,372,314,020	3,000,935,957	-	3,000,935,957	
Gain on valuation of financial assets at fair value through other comprehensive income	-	-	-	-	296,376,151	15,369,022	311,745,173	--	311,745,173	
Share of retained earnings of associates	-	-	-	-	-	(105,025,966)	(105,025,966)	(4,480,100)	(109,506,066)	
Exchange differences	-	-	-	-	79,549,916,777	-	79,549,916,777	50,099,619,391	129,649,536,168	
Cash flow hedges	-	-	-	-	(229,141,711)	-	(229,141,711)	2,739,947,489	2,510,805,778	
Total comprehensive income for the year	-	-	-	-	77,245,773,154	265,385,883,493	342,631,656,647	224,447,081,790	567,078,738,437	
Transactions with owners										
Cancellation of share options	-	1,117,895,000	-	(1,117,895,000)	-	-	-	-	-	
Exercise of stock warrants	789,790,000	350,923,056	-	-	-	-	1,140,713,056	-	1,140,713,056	
Dividend of subsidiary	-	-	-	-	-	-	-	(53,727,499,200)	(53,727,499,200)	
Disposal of subsidiary shares	-	-	-	(19,735,993,357)	-	-	(19,735,993,357)	154,168,717,969	134,432,724,612	
Total transactions with owners	789,790,000	1,468,818,056		(20,853,888,357)	-	-	(18,595,280,301)	100,441,218,769	81,845,938,468	
Balance at December 31, 2018	₩ 1,040,790,385,000	₩ 213,014,383,085	₩ -	₩ (129,310,962,134)	₩ (256,805,144,728)	₩ 1,049,189,116,801	₩ 1,916,877,778,024	₩ 1,903,937,105,549	₩ 3,820,814,883,573	



Consolidated Statements of Cash Flows

Doosan Infracore Co., Ltd. and Subsidiaries  
Years Ended December 31, 2018 and 2017

(in Korean won)

	2018	2017
Cash flows from operating activities		
Cash generated from operations	₩ 1,043,288,274,293	₩ 896,739,191,660
Profit for the year	394,169,729,413	296,642,758,870
Adjustments	731,167,416,259	683,827,770,950
Changes in operating assets and liabilities	(82,048,871,379)	(83,731,338,160)
Interest received	15,117,484,431	11,127,322,178
Interest paid	(166,701,900,364)	(185,853,970,400)
Dividends received	4,265,837,456	2,108,514,977
Income taxes paid	(58,191,953,508)	(58,429,689,782)
Net cash inflow from operating activities	837,777,742,308	665,691,368,633
Cash flows from investing activities		
Decrease in short-term financial instruments	22,809,378,447	25,050,508,204
Disposal of long-term investment securities	229,129,080	3,388,601,075
Decrease in loans	525,036,293	-
Disposal of property, plant and equipment, and investment properties	25,288,647,854	41,292,473,602
Disposal of intangible assets	242,643,718	1,226,414,034
Disposal of investments in associates	36,424,000,000	-
Increase in short-term financial instruments	(101,272,254,333)	(12,141,264,000)
Acquisition of long-term investment securities	(3,393,765,000)	(3,510,363,900)
Increase in loans	(393,666,636)	(168,851,490)
Acquisition of property, plant and equipment	(150,822,172,341)	(134,197,987,710)
Acquisition of intangible assets	(109,604,453,424)	(77,460,993,080)
Acquisition of investments in associates and joint ventures	(18,059,850,000)	(65,864,874,081)
Others	(14,820,807,038)	(33,902,408,352)
Net cash outflow from investing activities	(312,848,133,380)	(256,288,745,698)
Cash flows from financing activities		
Proceeds from borrowings	637,834,889,738	1,380,727,776,826
Proceeds from issuance of bonds	283,474,563,443	1,015,382,768,080
Change in subsidiary equity	140,764,800,002	133,721,600,000
Repayment of borrowings	(909,251,648,286)	(1,115,135,547,875)
Repayment of bonds	(521,653,462,500)	(765,000,000,000)
Dividends paid	(53,727,499,200)	(46,907,603,700)
Exercise of call options from hybrid capital securities	-	(570,521,500,000)
Net cash inflow(outflow) from financing activities	(422,558,356,803)	32,267,493,331
Effects of exchange rate changes on cash and cash equivalents	7,163,635,831	(36,766,746,091)
Net increase in cash and cash equivalents	109,534,887,956	404,903,370,175
Cash and cash equivalents at the beginning of the financial year	943,481,141,254	538,577,771,079
Cash and cash equivalents at the end of the year	₩ 1,053,016,029,210	₩ 943,481,141,254

Independent Auditors’ Report

To the Board of Directors and Shareholders of Doosan Infracore Co., Ltd.

Opinion

We have audited the accompanying consolidated financial statements of Doosan Infracore Co., Ltd. and its subsidiaries (collectively referred to as the “Group”), which comprise the consolidated statements of financial position as at December 31, 2018 and 2017, and the consolidated statements of profit or loss, and the consolidated statements of comprehensive income, and consolidated statements of changes in equity and consolidated statements of cash flows for the years then ended, and notes to the consolidated financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying consolidated financial statements present fairly, in all material respects, the consolidated financial position of the Group as at December 31, 2018 and 2017, and its consolidated financial performance and its consolidated cash flows for the years then ended in accordance with International Financial Reporting Standards as adopted by the Republic of Korea (Korean IFRS).

Basis for Opinion

We conducted our audits in accordance with Korean Standards on Auditing. Our responsibilities under those standards are further described in the Auditor’s Responsibilities for the *Audit of the Consolidated Financial Statements* section of our report. We are independent of the Group in accordance with the ethical requirements of the Republic of Korea that are relevant to our audit of the consolidated financial statements and we have fulfilled our other ethical responsibilities in accordance with the ethical requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Key Audit Matters

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements of the current period. These matters were addressed in the context of our audit of the consolidated financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

(1) Revenue recognition – Estimation of liabilities related to revenue deductions

Why it is determined to be a key audit matter As at December 31, 2018, the Group has recorded ₩ 195,625 million of liabilities related to revenue deductions, including incentives, promotions and rebates. The Group offers customers a variety of incentive and promotion programs. Costs incurred in connection with these programs are recognized as deductions from revenue, and any unsettled amounts are recognized on an accrual basis.

Incentive and rebate arrangements are complex, and judgement of management is required in estimating unsettled amounts. Given the extent of complexity and judgement involved, we consider estimation of revenue deductions related to incentives, promotions and rebates recognized as at December 31, 2018 to be a key audit matter (Note 3).

How our audit addressed the key audit matter We have, utilizing the work of component auditors, performed related audit procedures including the followings. We:

- Assessed appropriateness of the Group’s accounting policies for the incentive and promotion programs
- Evaluated design and tested operating effectiveness of related internal controls
- Performed lookback analysis by comparing the estimation of prior year to actual results

- Evaluated appropriateness of methods used by management and whether they have been consistently used
- Tested completeness of sales quantity information subject to revenue deductions programs
- For selected samples, tested accuracy of the inputs and variables used for the management estimates, including sales quantity information, costs incurred, and associated contractual rate

(2) Impairment assessment of goodwill

Why it is determined to be a key audit matter As at December 31, 2018, the carrying amount of goodwill is ₩ 2,920,112, million, which accounts for 26.5% of the total assets of the Group. The Group performed an impairment assessment on goodwill by using estimated recoverable amount of goodwill allocated to the cash-generating units group (CGU group) and did not recognize goodwill impairment as the recoverable amount of CGU group exceeds its carrying amount. Given the magnitude of goodwill balance in the consolidated financial statement, and the extent of judgement of management estimating in the recoverable amount, we consider impairment assessment of goodwill to be a key audit matter (Note 13).

How our audit addressed the key audit matter Key audit procedures we have performed in relation to the goodwill impairment assessment are as follows. We:

- Obtained an understanding and evaluated how management assessed goodwill impairment
- Evaluated reasonableness of identifying CGU by management for its assessment of goodwill impairment
- Evaluated accuracy of the market capitalization used to measure the net fair value of the CGU group and examined subsequent changes in the market capitalization after the reporting period
- Evaluated reasonableness of key assumptions used in measurement of the net fair value by comparing them with relevant external information available

(3) Impairment assessment of capitalized development costs

Why it is determined to be a key audit matter As at December 31, 2018, the carrying amount of development costs capitalized as intangible asset is ₩ 233,055 million. The Group operates several R&D centers in Korea, the United States, Europe and other regions, and invests significant amounts to develop new products and technologies. Given the magnitude of the balance of development costs capitalized in the consolidated financial statement, and the extent of judgement of management required, we consider impairment assessment of capitalized development costs to be a key audit matter (Note 13).

How our audit addressed the key audit matter Key audit procedures we have performed in relation to the impairment assessment of capitalized development costs. We:

- Obtained the details of capitalized development costs and reconciled the total amount to the amount recorded in the general ledger
- Tested development costs capitalized by examining management’s assessment documentation and assessing whether the criteria set out in the relevant accounting standards have been met on a sampling basis
- Obtained an understanding and evaluated the development progress and prospect of the projects selected as a sample by interviewing with appropriate project manager and performing other procedures, and assessed appropriateness of management’s conclusion on impairment analysis
- Examined whether the actual sales have been generated from the projects selected and evaluated reasonableness of sales and profitability forecasts to assess future economic benefits of the projects capitalized

(4) Evaluation of provision for warranty

The reason it was determined to be a Key Audit Matter As at December 31, 2018, the carrying amount of provision for warranty amounts to ₩ 197,492 million. The Group provides product warranties for certain periods after sales of products and recognizes provision for warranty by estimating expected repair expenses. The performance obligation of warranty is determined based on diverse assumptions such as warranty periods, expected warranty expenses and the nature, extent of the warranties the Group provides. We drew attention to the adequacy of the warranty evaluation considering the fact that the management’s estimation is intervened in measuring the provision for warranty (Note 18).

How the matter was addressed in the audit We performed the following audit procedures in relation to the evaluation of provision for warranty of the Group. We:

- Obtained understanding of accounting policies in recognizing provision for warranty, and understood and evaluated the relevant internal control
- Verified the accuracy of basic information for accounting estimation used by the management
- Compared reasons for the major assumptions, that management used for estimating the relevant liabilities, with the past performance
- Independently recalculated the balance of liabilities as at December 31, 2018

Other Matter

Auditing standards and their application in practice vary among countries. The procedures and practices used in the Republic of Korea to audit such consolidated financial statements may differ from those generally accepted and applied in other countries.

Responsibilities of Management and Those Charged with Governance for the Consolidated Financial Statements

Management is responsible for the preparation and fair presentation of the consolidated financial statements in accordance with Korean IFRS, and for such internal control as management determines is necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, management is responsible for assessing the Group’s ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Group or to cease operations.

Those charged with governance are responsible for overseeing the Group’s financial reporting process.

Auditor’s Responsibilities for the Audit of the Consolidated Financial Statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor’s report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Korean Standards on Auditing will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements.

As part of an audit in accordance with Korean Standards on Auditing, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity’s internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management’s use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group’s ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor’s report to the related disclosures in the consolidated financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor’s report. However, future events or conditions may cause the Group to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide those charged with governance with a statement that we have complied with relevant ethical requirements regarding independence, and to communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

From the matters communicated with those charged with governance, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor’s report unless law or regulation precludes public disclosure about the matter or when, in extremely rare circumstances, we determine that a matter should not be communicated in our report because the adverse consequences of doing so would reasonably be expected to outweigh the public interest benefits of such communication.

The engagement partner on the audit resulting in this independent auditor’s report is Hee-Young Park, Certified Public Accountant.

*Samil PricewaterhouseCoopers*

Seoul, Korea  
March 19, 2019

This report is effective as of March 19, 2019, the audit report date. Certain subsequent events or circumstances, which may occur between the audit report date and the time of reading this report, could have a material impact on the accompanying consolidated financial statements and notes thereto. Accordingly, the readers of the audit report should understand that there is a possibility that the above audit report may have to be revised to reflect the impact of such subsequent events or circumstances, if any.

CSR Facts & Figures

Disclaimer

- <sup>1)</sup> Data on the worksites in China began being included in 2016, when the CSR roll-out to overseas worksites was conducted
- <sup>2)</sup> As the business transfer of Machine Tools Business Group (BG) was completed in 2016, relevant data is excluded from some figures
- <sup>3)</sup> As Doosan Bobcat completed its IPO on the KOSPI on November 18, 2016, its data is excluded

Economic

Economic Growth: Sales Records					
Classification		Unit	2016	2017	2018
Consolidated	Sales	KRW million	5,729,550	6,567,897	7,730,108
	Operating income	KRW million	490,818	660,769	848,127
	Net income (loss)	KRW million	115,985	296,643	394,170
Separate	Sales	KRW million	2,204,890	2,651,329	3,058,277
	Operating income	KRW million	45,924	137,632	181,518
	Net income (loss)	KRW million	(56,312)	60,472	71,748

Financial Soundness: Financial Status					
Classification		Unit	2016	2017	2018
Consolidated	Total assets	KRW million	10,026,809	10,276,090	11,029,167
	Total liabilities	KRW million	6,578,432	7,102,929	7,208,352
	Total equity	KRW million	3,448,377	3,173,161	3,820,815
Separate	Total assets	KRW million	4,846,201	5,053,901	4,923,151
	Total liabilities	KRW million	3,042,101	3,707,435	3,516,787
	Total equity	KRW million	1,804,100	1,346,466	1,406,364

Research & Development					
Classification		Unit	2016	2017	2018
R&D investment	Korea	KRW million	97,552	111,802	135,084
R&D investment per sales		%	4.4	4.2	4.4

\* Based on separate financial statements

Intellectual properties	Application	No. of cases	3,193	3,422	3,576
	Registration	No. of cases	1,936	2,184	2,467

\* Number of intellectual property rights applications and registration made at home and abroad; Based on consolidated financial statements

Transparent Management

Corporate Governance					
Classification		Unit	2016	2017	2018
Participation rate of directors in BOD meetings <sup>1)</sup>	Korea	%	88.1	86.9	85.7

<sup>1)</sup> From 2018, changes in the reporting scope were made from participation rate of outside directors (in 2017 Integrated Report) to the participation rate of internal and outside directors. Accordingly, the participation rate for the past 3 years was revised.

Ethical Management					
Classification		Unit	2016	2017	2018
Ethical management trainings	Korea	%	95.3	98.7	98.5
	China	%	100.0	94.6	95.3

\* Once a year per person

Collection rate of statement of interests form	%	100	100	100
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\* No. of employees who submitted a signed copy of statement of interests form / No. of office worker who has a job title of part leader or higher from among employees in Korea and expatriate employees in China

Compliance					
Classification		Unit	2016	2017	2018
Legal measures on unfair trade conduct	Korea	No. of cases	0	0	1
Fine levied due to a violation of laws or regulations		KRW million	0	0	382

\* The company was subject to corrective measures and a fine from the Fair Trade Commission due to a violation of Article 12-3, Paragraph 3 of the Fair Transactions in Subcontracting Act, and completed payment. In relation to this matter, a cancellation request lawsuit (filed on December 18, 2018) on a correction order and others is underway.

Customers

Protection of Personal Information					
Classification		Unit	2016	2017	2018
Violations of protection of customer’s personal information	Korea	No. of cases	0	0	0
	China	No. of cases	0	0	0

Environment

Environmental Expenses					
Classification		Unit	2016	2017	2018
Environmental investments and operating costs	Korea	KRW billion	8.6	16.7	17.6

Environmental Management System					
Classification		Unit	2016	2017	2018
Worksites with ISO 14001 (EMS) certification	Korea	No. of sites	3	3	3
	China	No. of sites	1	1	1



Energy Usage					
Classification		Unit	2016	2017	2018
Energy usage volume (Including direct and indirect usage)	Total	TJ	812	1,871	2,067
	LNG	TJ	200	216	251
	Electricity	TJ	490	1,463	1,632
	Korea	Diesel	TJ	114	124
		Others (LPG, kerosene, etc.)	TJ	8	75
	China <sup>1)</sup>	LNG	m³	855,611	1,305,168
		Electricity	kWh	9,992,440	14,931,783
		Steam	ton	5,038	5,998
		Diesel	ton	683	1,174

<sup>1)</sup> The scope of disclosure was changed to include all worksites in China (DICI, DICC, DISD) in 2018 which resulted in a slight increase in energy usage compared to previous years

Resources Usage					
Classification		Unit	2016	2017	2018
Fuel usage	Incheon <sup>3)</sup>	Steel plate <sup>1)</sup>	ton	8,001	-
		Steel plate intensity	ton/KRW million	0.004	-
		Scrap metal	ton	17,438	25,170
		Scrap metal intensity	ton/KRW million	0.008	0.009
		Sand (molding sand) <sup>2)</sup>	ton	22,586	14,484
		Sand intensity	ton/KRW million	0.010	0.006

\* Intensity is calculated based on sales of separate financial statements of each year  
<sup>1)</sup> No usage of steel plate at the Incheon Plant since the excavator plant advancement  
<sup>2)</sup> Molding sands are 100% recycled  
<sup>3)</sup> No usage of steel plate, scrap metal, and sand at the Gunsan Plant

Water usage	Korea	Water usage volume	ton	631,849	554,044
		Water usage intensity <sup>1)</sup>	ton/KRW million	0.287	0.209
		Recycled or reused water <sup>2)</sup>	ton	83,365	85,450
	China <sup>3)</sup>	Water usage volume	ton	64,735	64,152

<sup>1)</sup> Intensity is calculated based on sales of separate financial statements of each year  
<sup>2)</sup> Total volume of reused water, including reused waste water, reclaimed water, and recycled rainwater  
<sup>3)</sup> Figures for 2016 and 2017 are data of DICC, and the scope of disclosure was expanded to include all worksites in China (DICC, DISD, DICI) in 2018

Air Emissions						
Classification		Unit	2016	2017	2018	
Emissions of greenhouse gas <sup>1)</sup> (Including direct and indirect emissions)	Korea	Total <sup>1)</sup>	tonCO <sub>2</sub> eq	87,413	97,955	108,244
		Scope 1	tonCO <sub>2</sub> eq	23,707	26,890	28,951
		Scope 2	tonCO <sub>2</sub> eq	63,708	71,067	79,295
		Intensity <sup>2)</sup>	tonCO <sub>2</sub> eq/ KRW million	0.040	0.037	0.035
	Incheon	Total	tonCO <sub>2</sub> eq	71,082	79,625	88,572
		Scope 1	tonCO <sub>2</sub> eq	15,085	16,924	18,102
		Scope 2	tonCO <sub>2</sub> eq	55,997	62,701	70,470
	Gunsan	Total	tonCO <sub>2</sub> eq	13,668	15,518	16,798
		Scope 1	tonCO <sub>2</sub> eq	7,533	8,706	9,636
		Scope 2	tonCO <sub>2</sub> eq	6,135	6,812	7,163
	Others	Total	tonCO <sub>2</sub> eq	2,666	2,812	2,874
		Scope 1	tonCO <sub>2</sub> eq	1,089	1,259	1,214
Scope 2		tonCO <sub>2</sub> eq	1,577	1,554	1,662	
Emissions of greenhouse gas <sup>3)</sup> (Including direct and indirect emissions)	China	Total	tonCO <sub>2</sub> eq	22,486	31,867	
		Scope 1	tonCO <sub>2</sub> eq	6,668	10,049	
		Scope 2	tonCO <sub>2</sub> eq	15,817	21,818	
		Intensity <sup>2)</sup>	tonCO <sub>2</sub> eq/ KRW million	4	4	
	DICC (Yantai)	Total	tonCO <sub>2</sub> eq	14,338	21,500	30,843
		Scope 1	tonCO <sub>2</sub> eq	4,116	6,646	10,021
		Scope 2	tonCO <sub>2</sub> eq	10,222	14,854	20,821
	DISD (Yantai)	Total	tonCO <sub>2</sub> eq	968	1,008	
		Scope 1	tonCO <sub>2</sub> eq	5	11	
		Scope 2	tonCO <sub>2</sub> eq	964	996	
	Others (Including DICI)	Total	tonCO <sub>2</sub> eq	17	17	
		Scope 1	tonCO <sub>2</sub> eq	17	17	
Scope 2		tonCO <sub>2</sub> eq	0	0		

<sup>1)</sup> There is a difference between the total emissions volume by GHG type and the total of worksites which sums up rounding off numbers of each worksite's emissions  
<sup>2)</sup> Intensity is calculated based on sales of separate financial statements of each year  
<sup>3)</sup> Figure was calculated by applying energy usage volume to the "Yantai Energy Reduction Information System", and can be subject to error. Doosan Infracore plans to carry out external verification of GHG emissions to increase reliability.  
– Source of Scope 1 emissions includes LNG, diesel fuel, LPG, gasoline, and carbon dioxide (shielding gas for welding)

Classification		Unit	2016	2017	2018
Emissions of air pollutants <sup>9)</sup>	Incheon	NOx <sup>1)</sup>	ppm	0.8	12.9
		Sox <sup>2)</sup>	ppm	0.0	0.4
		VOCs (Continuous type/Non-continuous type) <sup>3)</sup>	ppm	15.0/5.7	9.8/25.2
		Dust (Electric arc furnace/ Others) <sup>4)</sup>	mg/m³	3.2/3.3	4.6/6.0
	Gunsan	NOx <sup>5)</sup>	ppm	0.10	0.37
		SOx <sup>6)</sup>	ppm	0.20	0.10
		VOCs <sup>7)</sup>	ppm	4.80	6.39
		Dust <sup>8)</sup>	mg/m³	2.40	3.56
	China	VOCs	mg/m³	12.43	10.15
		Dust	mg/m³	14.22	11.12

<sup>1)</sup> Legal limit: 200ppm, company's internal limit: 80ppm  
<sup>2)</sup> Legal limit: 400ppm, company's internal limit: 160ppm  
<sup>3)</sup> Continuous type: Legal limit: 40ppm, company's internal limit: 32ppm / Non-continuous type: Legal limit: 200ppm, company's internal limit: 160ppm  
<sup>4)</sup> Electric arc furnace: Legal limit: 20mg/m³, company's internal limit: 8mg/m³ / Others: Legal limit: 50mg/m³, company's internal limit: 20mg/m³  
<sup>5)</sup> Legal limit: 200ppm, company's internal limit: 80ppm  
<sup>6)</sup> Legal limit: 400ppm, company's internal limit: 160ppm  
<sup>7)</sup> Legal limit: 40ppm, company's internal limit: 32ppm  
<sup>8)</sup> Legal limit: 50mg/m³, company's internal limit: 20mg/m³  
<sup>9)</sup> Due to the amendment to Enforcement Decree of the Clean Air Conservation Act (Act No. 492 of the Ministry of Environment), a boiler was classified as an air pollutants emission facility in 2016, and relevant data has been calculated and managed ever since

Classification		Unit	2016	2017	2018
Emissions of ozone-depleting substances	Incheon	CFC, HCFC, CH <sub>3</sub> Br, R-22	ppm	0	0
	Gunsan	CFC, HCFC, CH <sub>3</sub> Br, R-22	ppm	0	0

\* Zero emissions of ozone-depleting substances

Effluents and Waste						
Classification		Unit	2016	2017	2018	
Emissions of effluents	Korea	ton	67,544	58,953	81,861	
	Incheon	ton	60,139	51,288	74,244	
	Gunsan	ton	7,405	7,665	7,617	
	China	ton	61,498	57,737	58,037	
Emissions of water pollutants	Incheon	BOD <sup>1)</sup>	mg/L	6.2	13.1	17.1
		COD <sup>2)</sup>	mg/L	14.8	23.7	18.4
		Suspended solids <sup>3)</sup>	mg/L	3.8	12.7	3.0
	Gunsan	BOD <sup>4)</sup>	mg/L	89.5	188.7	144.7
		COD <sup>5)</sup>	mg/L	104.6	161.0	169.1
		Suspended solids <sup>6)</sup>	mg/L	13.2	7.0	15.2
	China	COD	mg/L	33.0	23	20.5

<sup>1)</sup> Legal standard 120mg/L, company's internal standard 48mg/L  
<sup>2)</sup> Legal standard 130mg/L, company's internal standard 52mg/L  
<sup>3)</sup> Legal standard 120mg/L, company's internal standard 48mg/L  
<sup>4)</sup> Legal standard 400mg/L, company's internal standard 160mg/L  
<sup>5)</sup> Legal standard 400mg/L, company's internal standard 160mg/L  
<sup>6)</sup> Legal standard 200mg/L, company's internal standard 80mg/L

Waste discharge and recycle	Korea	Total weight of waste	ton	21,179	27,179
		Recycled volume	ton	19,571	25,334
		Recycling rate	%	92	93
	Incheon	General waste	ton	18,453	23,932
		Specified waste	ton	1,861	2,321
		Recycling rate	%	94	94
	Gunsan	General waste	ton	647	743
		Specified waste	ton	218	183
		Recycling rate	%	55	71
	China	Total weight of waste <sup>1)</sup>	ton	2,161.8	3,469.5
		Recycled volume <sup>2)</sup>	ton	1,291.3	1,814.5
		Recycling rate	%	60	52

<sup>1)</sup> Hazardous and general waste  
<sup>2)</sup> Waste steel, waste wood

Safety

Occupational Safety and Health					
Classification		Unit	2016	2017	2018
Occupational accident rate	Korea	%	0.37	0.52	0.84
	China	%	0.22	0.10	0

\* Based on accidents requiring medical care covered by Industrial Accident Insurance

\* Based on accidents requiring medical care covered by Industrial Accident Insurance

LTIR <sup>3)</sup>				0.98
TRIR <sup>2)</sup>	Korea			2.46
LWSR <sup>3)</sup>				48.95

LTIR				0
TRIR	China			0
LWSR				0

\* Began to manage safety-related data based on LTIR, TRIR, and LWSR in 2018

<sup>1)</sup> LTIR (Lost Time Incidents Rate): Number of incidents involving more than one-day closure of workday per 100 workers, Total number of lost time cases/Total number of hours worked by employees \* 200,000

<sup>2)</sup> TRIR (Total Recordable Incidents Rate): Number of recordable incidents that require treatment for injuries or illness per 100 workers, Total number of injuries and illnesses/Total number of hours worked by employees \* 200,000

<sup>3)</sup> LWSR (Lost Workday Severity Rate): Number of lost work days experienced per 100 workers, Total number of lost work days/Total number of hours worked by employees \* 200,000

Win-win Growth

Support for Suppliers						
Classification		Unit	2016	2017	2018	
Financial support	Korea	Number of suppliers received financial support	No. of companies	45	42	62
		Amount of financial support <sup>1)</sup>	KRW billion	43.0	43.5	43.5
		Ratio of cash settlement cases	%	17.5	0.1	0.3
		Number of payments	Times	1 per month	1 per month	1 per month

<sup>1)</sup> Excluding indirect support

Technical development support	Korea	Support for developing technology	No. of cases	59	45	28
		Support for protecting technology	No. of cases	8	7	6

Education support	Korea	Training courses	No. of Course	17	11	14
		Staff at suppliers completed trainings	No. of persons	204	124	82
	China	Training hours	No. of hours	18	28	52

Competitiveness enhancement support	Korea	Number of operation days	man-day persons	179 persons	260 persons	196 persons
	China	Number of supports	man-day	156	286	357

\* Fair Trade Commission standard: 5 days=1 person (1 day=8 hours, Based on the application period of punctuality)

Part development capacity enhancement support	Korea	Provision of casting molds to strengthen suppliers' capacity of developing parts	No. of companies	104	74	99
			KRW billion	14.5	12.8	21.9
	China		No. of companies	-	77	77

\* Figures include multiple provision of casting molds to suppliers

EHS support	Korea	No. of companies	40	41	33
	China	No. of companies	-	3	0

<sup>1)</sup> As the business transfer of Machine Tools Business Group (BG) was completed in April 29, 2016, data on the EHS support by the Machine Tools BG is excluded.

Employees

Employment					
Classification		Unit	2016	2017	2018
Number of employees	Korea	No. of persons	2,550	2,602	2,720
	China	No. of persons	1,143	1,266	1,299
	Global	No. of persons	3,919	4,027	4,468

By job	Korea	Office	No. of persons	1,388	1,426	1,505
		Technical	No. of persons	1,162	1,176	1,215

By employment type	Korea	Non-regular <sup>1)</sup>	No. of persons	151	87	66
		Ratio of non-regular <sup>2)</sup>	%	5.9	3.3	2.4

Diversity	Korea	Disabled <sup>3)</sup>	No. of persons	35	28	32
		National merit recipient <sup>4)</sup>	No. of persons	75	82	90
		Elderly <sup>5)</sup>	No. of persons	174	219	224
		Male	No. of persons	2,394	2,408	2,479

		Female	No. of persons	156	194	241
		Office	No. of persons	569	550	561
		Technical	No. of persons	574	716	738

By job	China	Office	No. of persons	569	550	561
		Technical	No. of persons	574	716	738

By employment type	China	Non-regular	No. of persons	17	62	41
		Ratio of non-regular	%	1.53	4.70	3.10

Diversity	China	Disabled	No. of persons	0	0	0
		Elderly	No. of persons	4	7	7
		Male	No. of persons	958	1,087	1,117
		Female	No. of persons	185	179	182

<sup>1)</sup> Contract workers (entrustment, technology entrustment, outside directors, advisory, outside appointment)

<sup>2)</sup> Non-regular/Total staff\*100

<sup>3)</sup> Based on MY HR; national disabled classification (levels 1-6)

<sup>4)</sup> Based on MY HR; national merit recipients (person with a merit number or someone approved)

<sup>5)</sup> Above the age of 55 (Based on total staff in Korea)

Appendix

Classification		Unit	2016	2017	2018
Annual employee turnover rate <sup>1)</sup>	Korea	%	2.90	1.92	1.29
Turnover rate by age <sup>2)</sup>	20s	%	1.70	3.65	2.26
	30s	%	5.00	2.33	1.59
	40s	%	1.90	1.72	0.93
	50 and above	%	0.00	0.18	0.35

<sup>1)</sup> Based on regular workers. Total number of turnovers in 2018 / Annual average number in Korea in 2018

<sup>2)</sup> Based on regular workers. Total number of turnovers in 2018 by age / Annual average number in Korea in 2018 by age

Classification		Unit	2016	2017	2018	
Number of employees on parental leave	Korea	Male <sup>1)</sup>	No. of persons	94	116	118
		Female <sup>2)</sup>	No. of persons	10	14	16
Number of employees eligible for childcare leave <sup>3)</sup>	Korea	Male	No. of persons	1,206	875	884
		Female	No. of persons	43	47	54

Number of employees on childcare leave <sup>4)</sup>	Korea	Male	No. of persons	4	14	14
		Female	No. of persons	12	11	10

Number of employees returning to work after childcare leave <sup>5)</sup>	Korea	Male	No. of persons	3	7	15
		Female	No. of persons	14	9	9

Continue to work rate for 12 months after childcare leave <sup>6)</sup>	Korea	Male	%	33	83	100
		Female	%	21	100	100

Number of employees on parental leave	China	Male	No. of persons	95	67	58
		Female	No. of persons	20	26	9

Return to work rate after parental leave	China	%	100	100	100
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<sup>1)</sup> Employees who began their paternity leave in 2018

<sup>2)</sup> Employees who began their maternity leave in 2018

<sup>3)</sup> Staff in Korea with children aged eight or under, or second graders in elementary school or below

<sup>4)</sup> Number of employees who began childcare leave in the base year

<sup>5)</sup> Number of employees who returned from childcare leave in the base year

<sup>6)</sup> (12 months after the return to work) Number of current employees in 2018 from among employees who returned in 2017 / Employees who returned in 2017\*100. Calculation for 2018 is based on figures as of April 2019

Labor Union					
Classification		Unit	2016	2017	2018
Union membership rate	Korea	%	71.2	78.5	93.4

\* Technical staff (1,090 with membership out of 1,167 in total as of 2018)

CSR Facts & Figures

Education					
Classification	Unit	2016	2017	2018	
Average annual training hours per person	Korea	No. of hours	57.5	47.9	31.7
Average training expenses per person		KRW 1,000	679	480	1,022
Average annual training hours per person	China	No. of hours	14	17.1	17.3
Average training expenses per person <sup>2)</sup>		KRW 1,000	221	290	289

<sup>1)</sup> There was a change in the per-capita annual average training time and training expense management standards starting in 2016

Per-capita annual average training time=(Total training time for office and technical personnel)/Total number of employees. Per-capita average training expenses=(Total training expenses for office and technical personnel)/Total number of employees

<sup>2)</sup> Korean won calculations are based on the average exchange rate of the year

Participation rate in education on human rights protection and sexual harassment prevention	Korea	%	88.8	96.7	96.0
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Community Involvement

Community Involvement Activities					
Classification		Unit	2016	2017	2018
Number of employees who participated in CCI activities	Korea	Including overlap person	587	978	1,046
		Excluding overlap person	332	374	385
	China	person	242	595	1,696
Total hours of CCI activities		No. of hours	2,527	5,247	4,422

Classification		Unit	2016	2017	2018	
CCI investment	Korea	CCI investment <sup>1)</sup>	KRW 100 million	26	68.5	77.3
		CCI investment per sales <sup>2)</sup>	%	0.12	0.26	0.25
	China	CCI investment <sup>3)</sup>	KRW 1,000	13,563	28,803	109,743

<sup>1)</sup> Used amount of donation

<sup>2)</sup> CCI investment/Sales of each year based on separate financial statements

<sup>3)</sup> Korean won calculations are based on the average exchange rate of the year

Classification	Unit	2016	2017	2018
Employee participation rate in the salary fraction donation campaign <sup>1)</sup>	%	80	75	75
Annual fund raised by the salary fraction donation campaign <sup>2)</sup>	KRW 1,000	78,321	60,514	61,052

<sup>1)</sup> Excluding staff sent to overseas worksites

<sup>2)</sup> Excluding the matching grant made by the company



# Independent Assurance Report

We were engaged by Doosan Infracore to provide limited assurance on the ‘2018 Doosan Infracore Integrated Report’ for the year ended December 31, 2018 (further ‘the Report’).

### Context and Scope

Our engagement was designed to provide limited assurance on whether the Report is presented fairly, in all material respects, in accordance with the Sustainability Reporting Standards of the Global Reporting Initiative (GRI). We do not provide any assurance on the achievability of the objectives, targets and expectations of Doosan Infracore.

The scope of our engagement conforms to the KPMG Sustainability Assurance Manual™ (KSAM™), including the aspect of “materiality”. With regards to financial data, our procedures were limited to verifying that they were correctly derived from audited financial statements. To obtain a thorough understanding of Doosan Infracore’s financial results and position, the audited financial statements produced on 29 March 2019 should be referred to.

### Responsibilities

As stated in the ‘Reporting Principles and Standard,’ Doosan Infracore is responsible for all content within the Report in respect of the GRI Sustainability Reporting Standards. It is the responsibility of Doosan Infracore’s management to establish and maintain appropriate performance management and internal control systems from which the reported sustainability information is derived.

Our responsibility is to perform a limited assurance engagement and to express a conclusion based on the work performed.

### Independence

In conducting our engagement, we have complied with the requirements of the International Federation of Accountants (IFAC) *Code of Ethics for Professional Accountants*, issued by the International Ethics Standards Board for Accountants. We do not engage in any and all activities that may influence our independence from Doosan Infracore. KPMG has systems and processes in place to monitor compliance with the Code, and to prevent conflicts regarding independence.

### Assurance Standards

We conducted our engagement based on the International Standard on Assurance Engagements (ISAE) 3000 *Assurance Engagements other than Audits or Reviews of Historical Financial Information*, issued by the International Auditing and Assurance Standards Board, and also AA1000AS. The standards require that we comply with applicable ethical requirements, including independence requirements, and that we plan and perform the engagement to obtain limited assurance about whether the Report is free from material misstatement.

### Limitations

A limited assurance engagement is substantially less in scope than a reasonable assurance engagement, and consequently does not enable us to obtain assurance on all significant matters that we may become aware of in a reasonable assurance engagement. Accordingly, we do not express a reasonable assurance conclusion.

This report has been prepared solely for Doosan Infracore in accordance with the terms of our engagement. We do not accept or assume responsibility to anyone other than Doosan Infracore for our work, or for the conclusions we have reached in the assurance report.

### Main Assurance Procedures

Our engagement was designed to provide limited assurance on whether the Report is presented fairly, in all material respects, in accordance with the reporting criteria. Procedures performed to obtain a limited level of assurance on a sustainability report consists of making inquiries, primarily of persons responsible for the preparation of information presented in the integrated report, and applying analytical and other evidence gathering procedures, as appropriate. These procedures included the following:

- Confirmation on whether the financial information presented in the Report was correctly derived from Doosan Infracore’s audited financial statements
- Inquiries to gain an understanding of Doosan Infracore’s processes for determining the material issues for key stakeholder groups
- Interviews with relevant staff at corporate and business unit levels responsible for providing the information in the Report
- Visit to Doosan Infracore’s offices in Doosan Tower
- Comparing the information presented in the Report to determine whether it is in line with our overall knowledge of, and experience with, Doosan Infracore’s performance on corporate social responsibility

### Opinion

#### • Stakeholder Inclusiveness

- Doosan Infracore operates communication channels with key stakeholders such as shareholders/investors, customers/dealers, employees, suppliers, local communities (environment/NGOs), local/central government and media.
- We are not aware of any key stakeholder group that has been excluded from dialogue in the Report.

#### • Sustainability Context

- Doosan Infracore has established a process to incorporate CSR in management’s decision-making and the business management plans of relevant teams, thereby securing continuity.
- We confirmed that Doosan Infracore recognizes general business management and social responsibility management comprehensively and applies such understanding within the Report.

#### • Materiality

- Doosan Infracore conducts a materiality test in determining material issues.
- We are not aware of any material aspects concerning its sustainability performance which have been excluded from the Report.

#### • Completeness

- Doosan Infracore applies reporting scope, boundary and temporal criteria.
- In terms of criteria mentioned above, we confirm that the Report is suitable for stakeholders to assess social responsibility performance.

Based on the procedures performed, as described above, nothing has come to our attention to indicate that the Report is not presented fairly, in all material respects, in accordance with the reporting criteria.

May 2019  
KPMG Samjong Accounting Corp.  
CEO Kim, Kyo Tai







