

Doosan Robotics

Innovation in every motion,
revolutionizing the way we work

DOOSAN



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Chapter 01

Who we are

- 01. Doosan robotics at a glance
- 02. Structural change in labor market
- 03. Cobot optimized for targeting potential market
- 04. Most rapidly growing robotics company














Market 	Company Doosan Robotics	Business 						
<h3>18A-22A Robotics Market Growth</h3>  <p>Source: Markets & Markets (1) Collaborative robot</p>	<h3>Domestic & Global Market Share (2022)⁽¹⁾</h3> <table border="1"> <tr> <td>Domestic</td> <td>Global</td> <td>Global High Payload</td> </tr> <tr> <td>no. 1</td> <td>no. 4</td> <td>no. 1</td> </tr> </table> <p>Source: Markets & Markets (1) Global market share based on revenue, excluding China</p>	Domestic	Global	Global High Payload	no. 1	no. 4	no. 1	<h3>Overseas Revenue %⁽²⁾</h3> <p>63%</p> <p>(2) Based on accumulated revenue from 2019 to 1H23</p>
Domestic	Global	Global High Payload						
no. 1	no. 4	no. 1						
<h3>18A-22A Revenue Growth</h3>  <p>Source: Company data, Markets&Markets</p>	<h3># of Product Lineups</h3>  <p>Source: Markets&Markets</p>	<h3>% of Service Revenue</h3> 						

Main business areas



Expansion into solution packaged products and SW platform backed by best-in-class quality of Cobot

DR's business areas

Main Business Area Cobot 	Key Strategic Focus Solution 	Future Growth Driver Software 
 <p>Series E Higher accessibility to the F&B market with lower price</p>	 <p>Coffee Module Unmanned café solution</p>	 <p>Dart-Suite</p>
 <p>Series A A low payload⁽¹⁾ model of 5~9kg without torque sensor</p>	 <p>Palletizing Solution</p>	<p>Dart IDE Tool kit for developing robot apps</p>
 <p>Series M A premium model capable of precise work based on torque sensors</p>	<p>To be released</p>	<p>Dart Platform Primary platform where apps are downloaded and run</p>
 <p>Series H A high payload model of 20~25kg</p>	<p>To be released</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="812 1158 961 1327">  <p>Frying solution</p> </div> <div data-bbox="1038 1131 1144 1327">  <p>Ice-cream robot</p> </div> <div data-bbox="1195 1162 1366 1327">  <p>Welding solution</p> </div> </div>	<p>To be released</p> <p>Dart Store A store offering a variety of robot apps</p>

(1) Payload: The maximum weight that robot can lift and carry

Structural change in labor market

Working-age population is expected to decline rapidly mainly in developed countries while the avoidance of labor intensifies due to changed paradigm

Intensifying labor shortage

Falling labor force population



Drop in working-age population due to the aging and shrinking birth rate

Reduction in labor elasticity



Post COVID-19, needs for stable labor force has increased

High labor cost



Mounting burden of labor cost as average income level grows

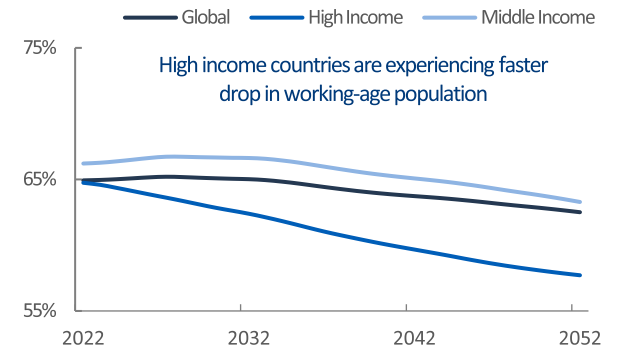
Desire for high quality of life



- Dangerous
- Difficult
- Dirty
- Repetitive

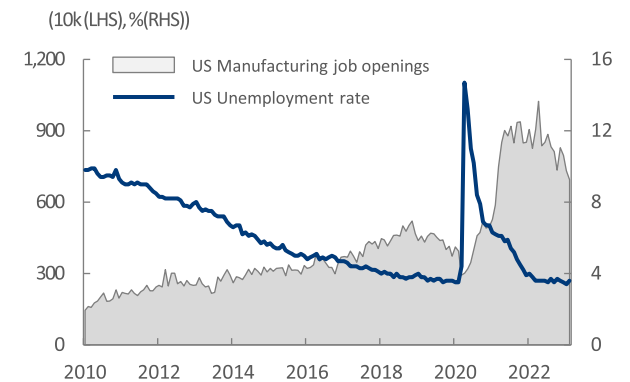
Increasing aversion to 3D / repetitive labor

Global working-age population forecast⁽¹⁾ (age between 15 ~ 64)



Source: World Population Prospects 2022 (UN), (1) Breakdown by income level, based on World Bank classification

U.S. Manufacturing job openings and unemployment rate trend




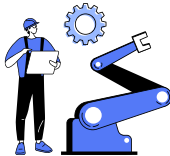
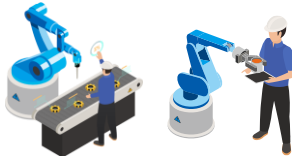

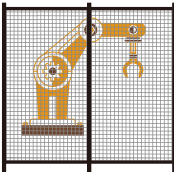
Source: U.S. Bureau of labor statistics

Cobot optimized for targeting potential market

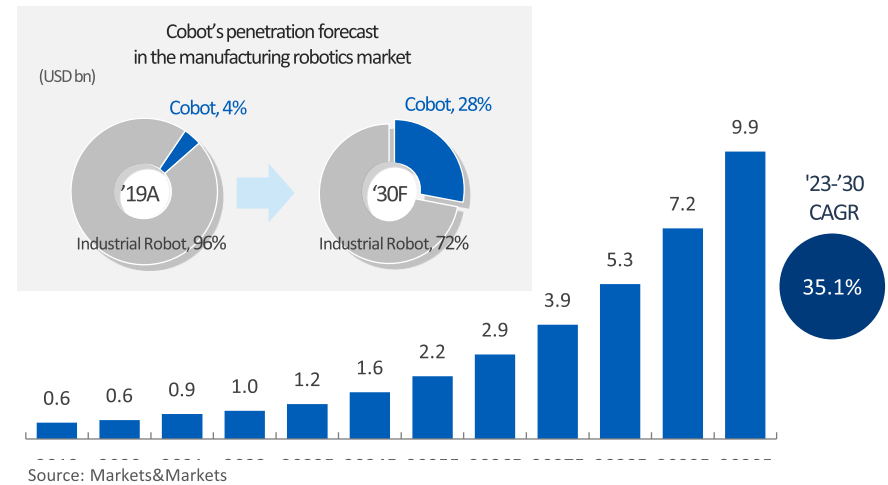


Robust growth of cobot market is expected with a replacement of human labor and Cobot is expected to vastly penetrate to wider markets including professional and personal service market

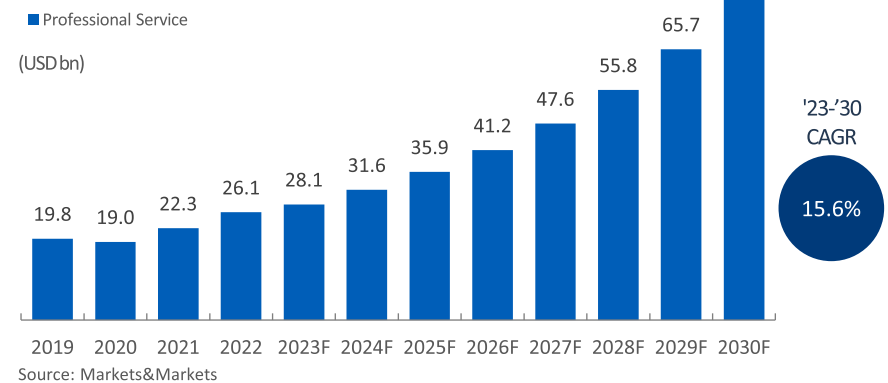
Why Cobot?

	Feature	Industrial	Professional Service	Personal Service
Cobots 	<ul style="list-style-type: none"> Safety Light weight Easy control 	 Interaction with human / Low initial cost	High Expandability  Combination with mobility and vision / Diverse applications	
Industrial Robots 	<ul style="list-style-type: none"> High Danger Fence needed Heavy weight 		Low expandability due to inability to interact with human	

Cobot market outlook



Service robot market outlook (1)



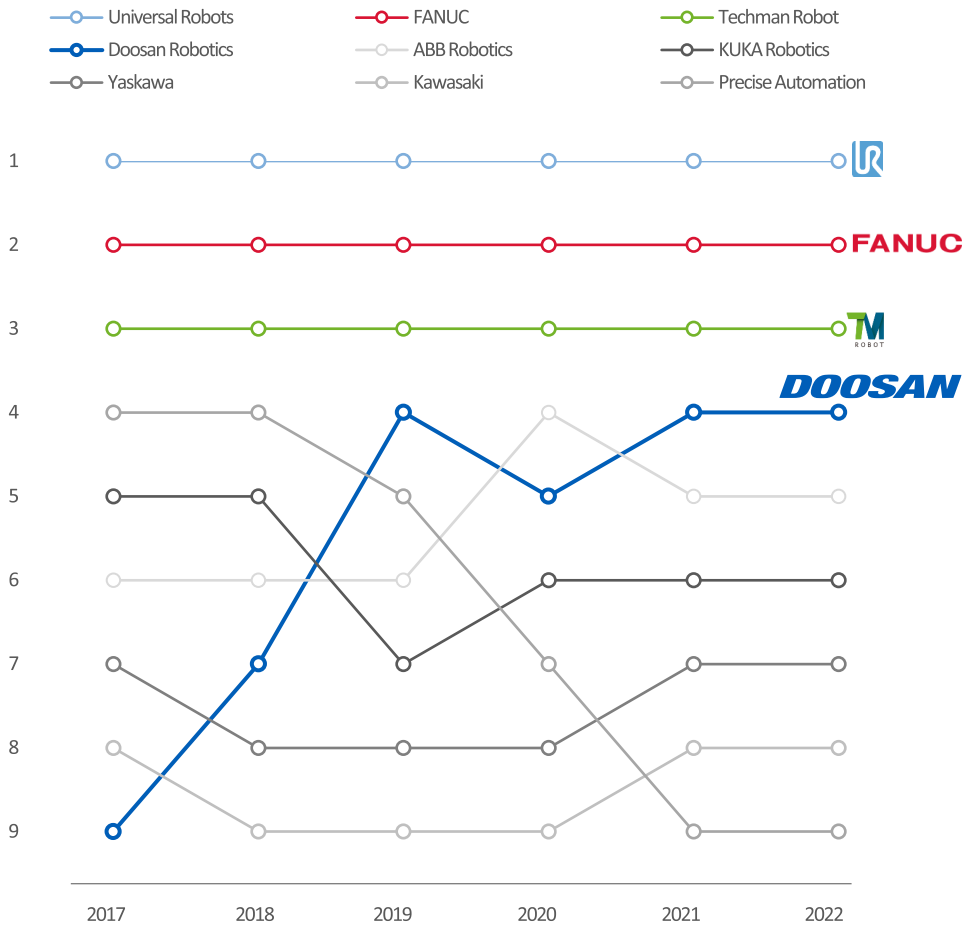
(1) Professional service robots are robots used for commercial purposes, and do not include personnel robots (i.e. robot vacuum cleaners, drones, etc.) used by individuals for non-commercial purposes.

Most rapidly growing global leading robotics company



Fastest growth among the global leading robotics peers since its product launch in 2018

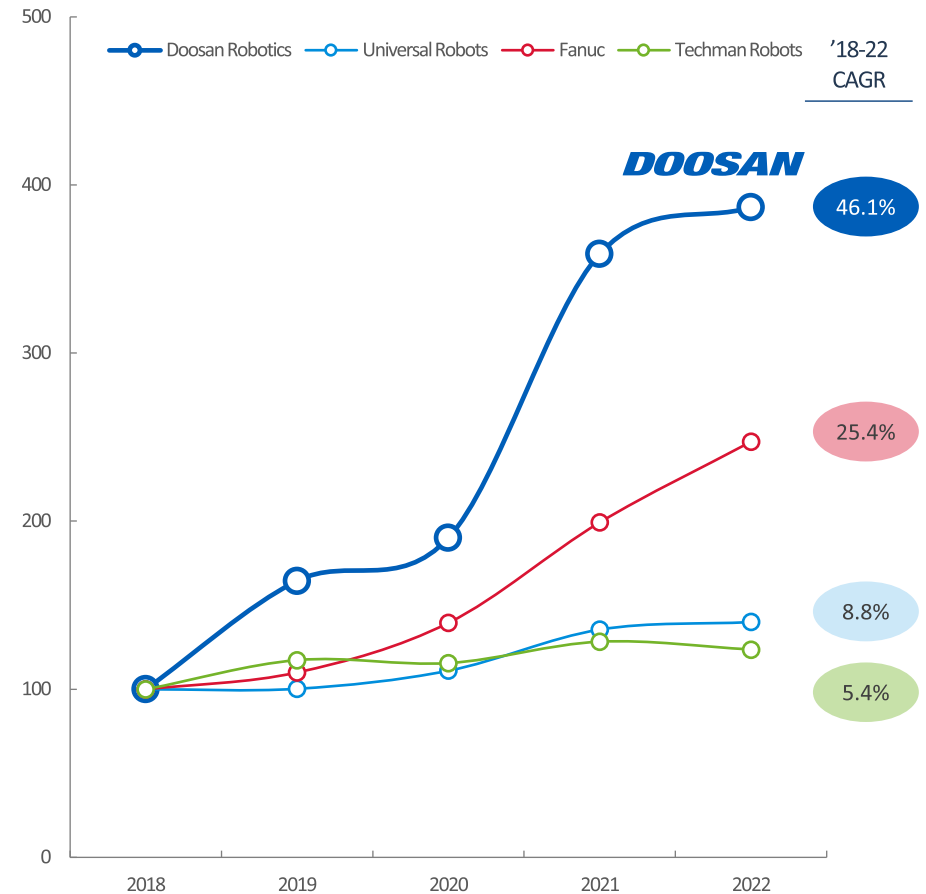
Cobot market share ranking (excl. China market)



Source: Markets & Markets

Major cobot makers' revenue growth trends

(2018 Revenue = 100)



Source: Company data, Markets & Markets



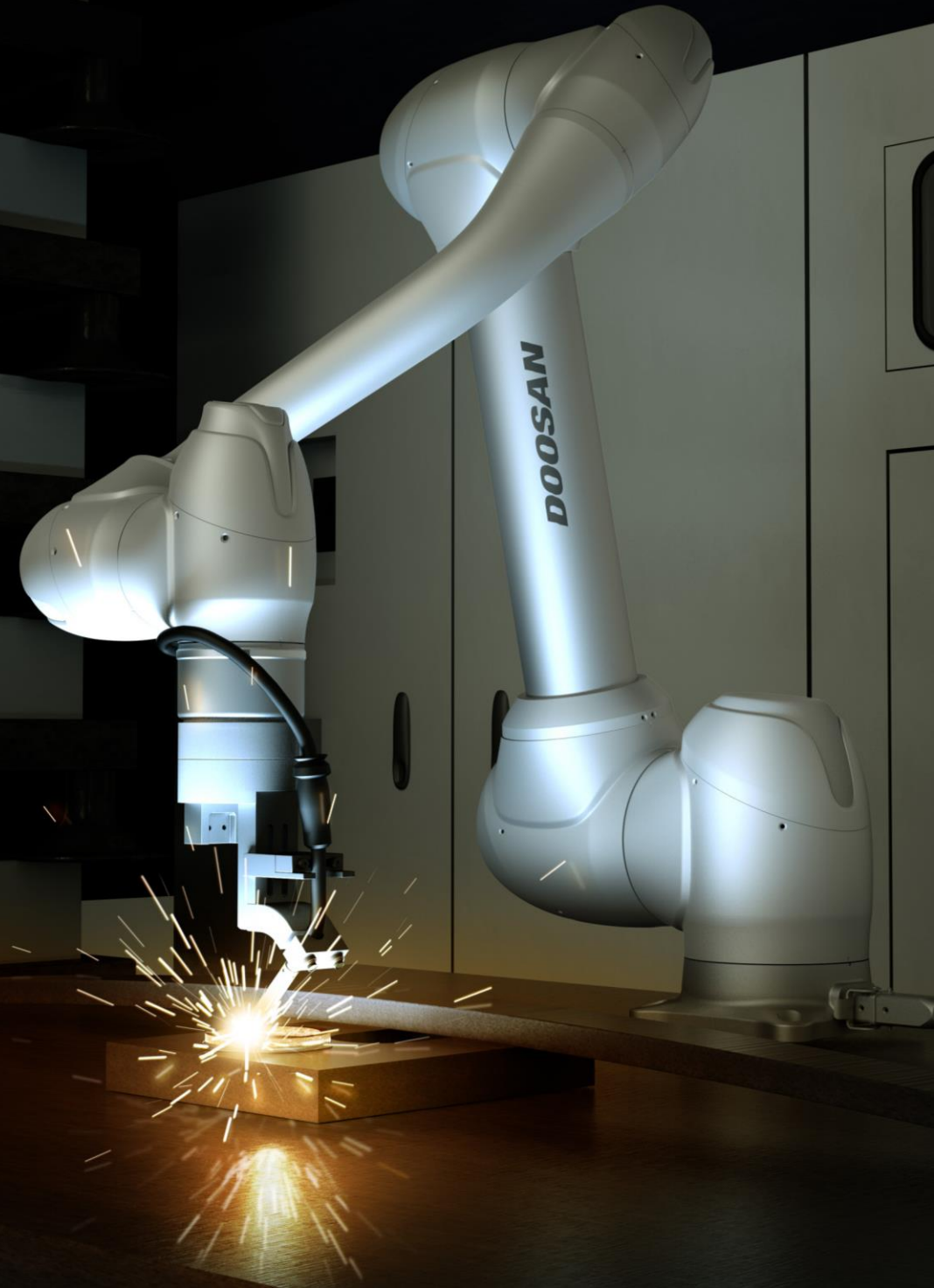
Chapter 02

What Makes us Special?

01. Leading Technology

02. Global Presence

03. New Application



DR is the leader of safety qualification

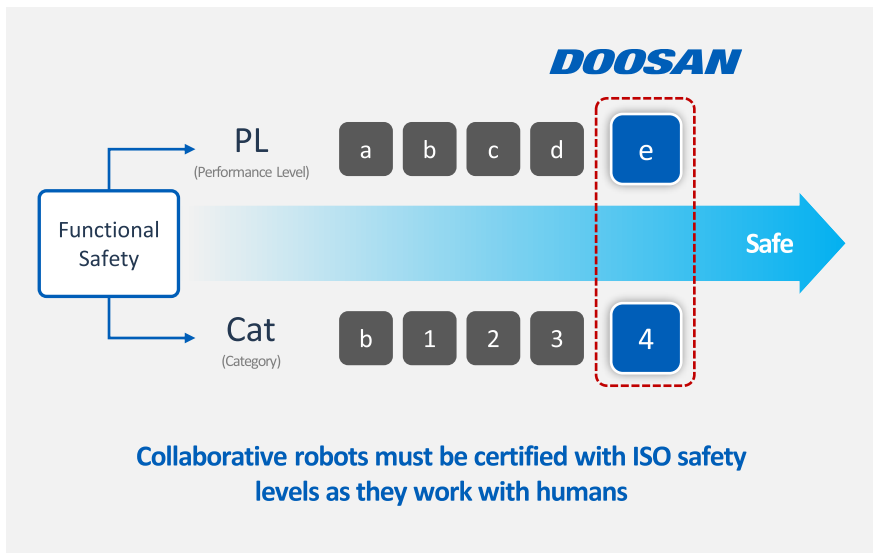


DR is certified with the highest safety rating among leading global cobot manufacturers

Best-class safety certificates

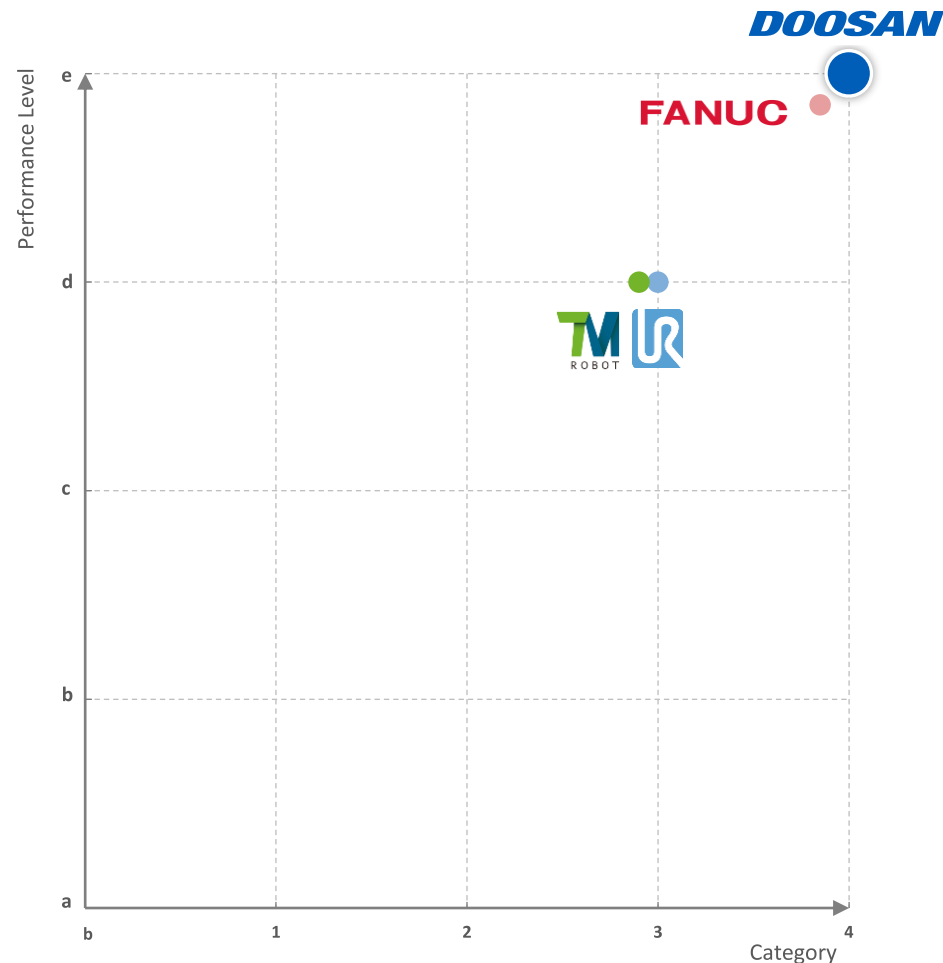


ISO certification overview



Source: Company data

Major cobot makers' certification status⁽¹⁾



Source: Company data
(1) Based on highest safety rating

DR is specialized in offering products with a high degree of precision





Best-in-class precision capability with top-notch software and control technology backed by 6 torque sensors⁽¹⁾

Adoption of torque sensors



Differences in operation

	 Torque sensors	 Current control
Mechanism	Directly measure the torque generated from robotics motion	Indirectly measure torque with the current value input to a motor
Operating Feature	Measure the direction of an object to enable robots to perform diverse motions	Cannot measure the direction of an object, instead perform only predetermined motions
Pros	<ul style="list-style-type: none"> Capable of doing unstructured motions such as fitting an object into a specified form Precise force control for delicate and safe motion 	Affordable Price

Torque sensor's control methods



Force Control

Generates motion until the set force and reaction force are in equilibrium



Compliance Control

Reaches equilibrium at a target point, generating reaction force when displacement occurs at the equilibrium point



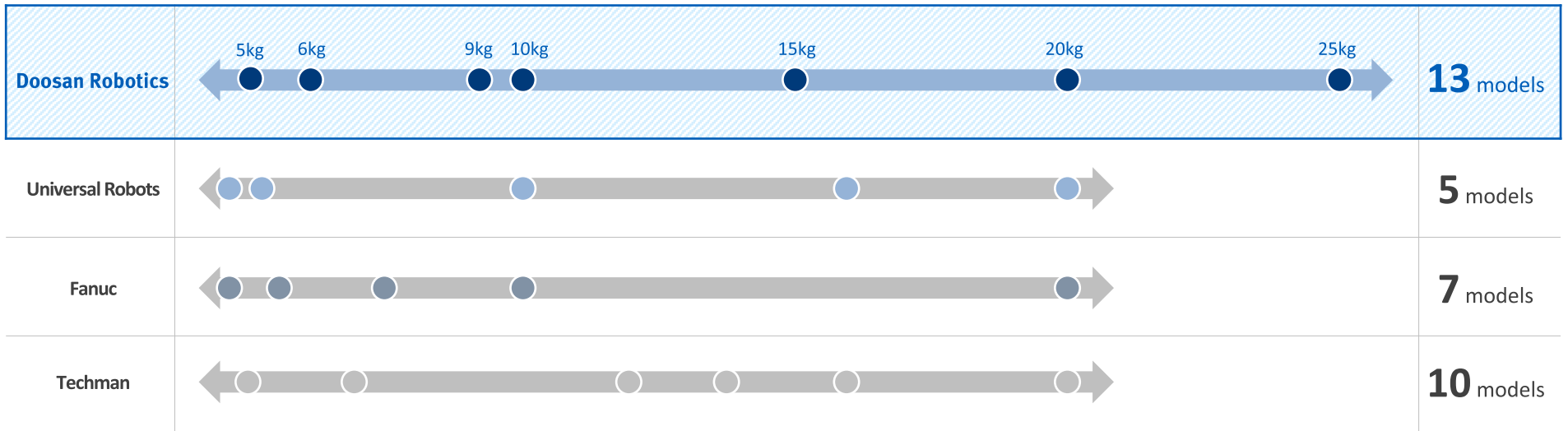
Source: Company data
 (1) Limited to a few models

Diverse product portfolio



DR has the largest product portfolio with various payloads and work ranges

Product portfolio of major cobot makers⁽¹⁾



Source: Markets&Markets

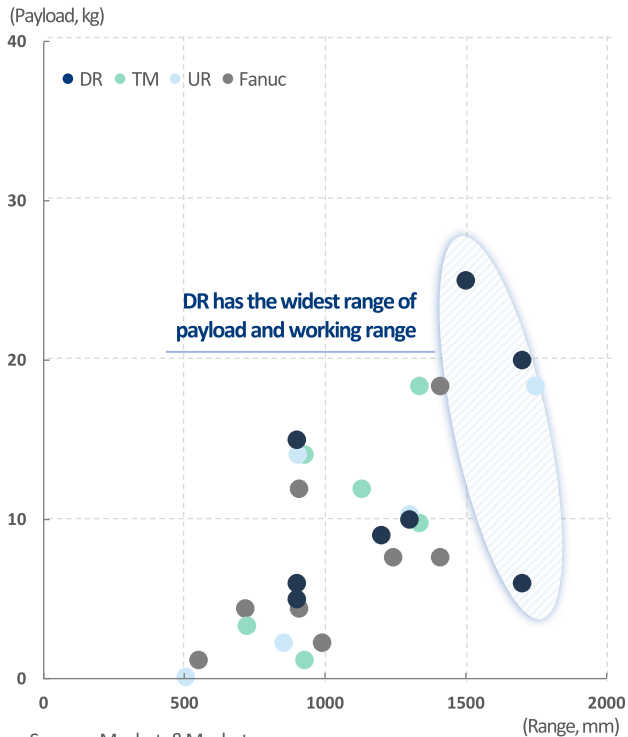
(1) Based on Markets&Markets research data excluding models that weights more than 100kg

Pioneering high payload markets



Pioneering the new markets with high payload and wide work range

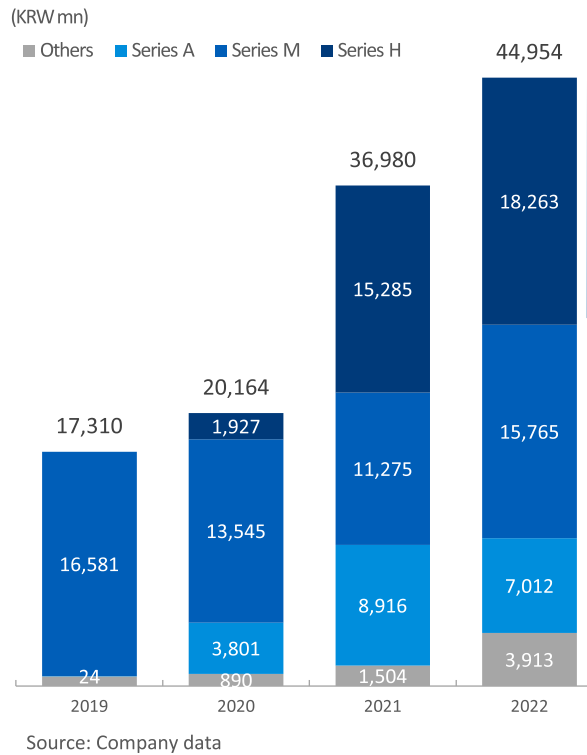
Payload and work range landscape of major cobot makers⁽¹⁾



A wide range of product lineups and coverages enables diverse market applications and customizations

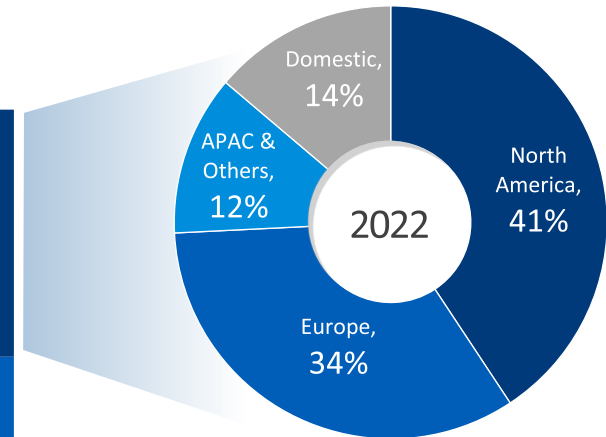
(1) Based on Markets&Markets research data excluding models that weights more than 100kg
 (2) Markets&Markets

DR's revenue breakdown by series

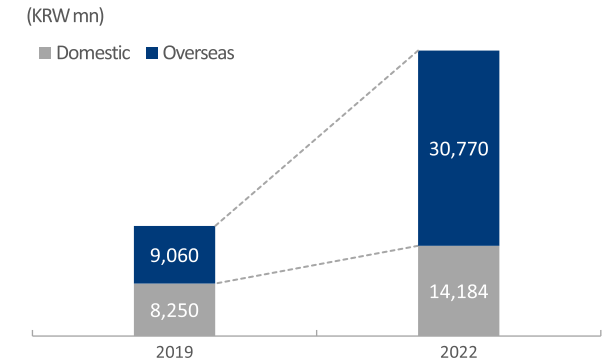


Strong dominance in 20kg+ Payload Cobot market with a market share of 72.0% in 2022⁽²⁾

Series H revenue breakdown by region



Comparison of overseas revenue before and after launch of H Series

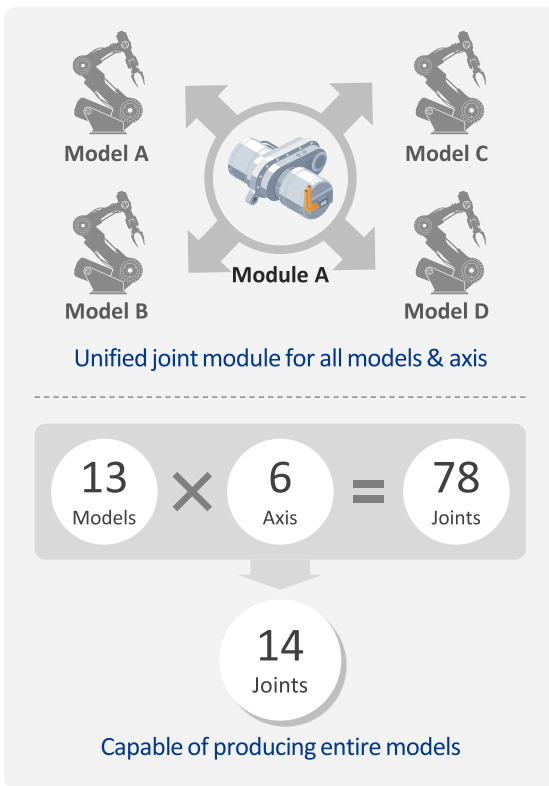


Establishment of a mass production system



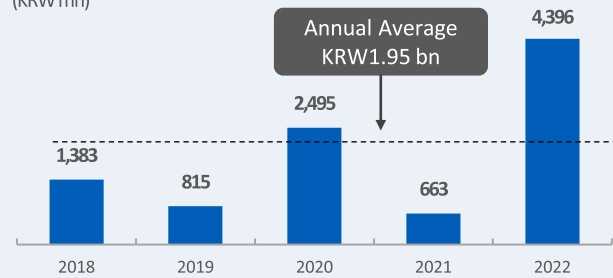
Unified Joint module manufacturing offers enhanced cost structure and an opportunity to expand capacity without large-scale CAPEX

Modularized production system

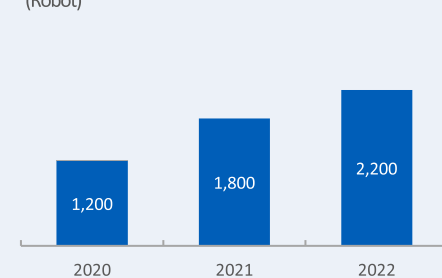


Simplified manufacturing process Ready for mass production without large-scale CAPEX through production of unified joint module

CAPEX trend (excl. intangible asset)
(KRW mn)

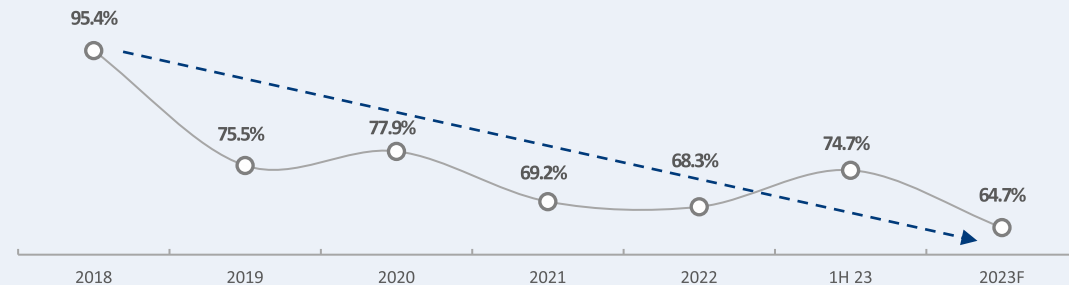


Annual capacity
(Robot)



Enhanced raw material composition Secured economies of scale and unit-cost reduction via streamlining raw materials and unified joint module design

CoGs % to sales

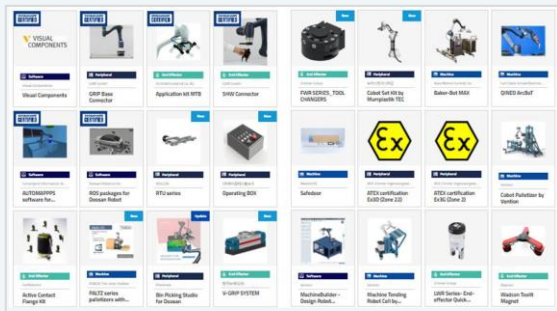


Outstanding user convenience



DR offers easy-to-use working environment to all customers (SI & end-users) with user-friendly SW platform and UI/UX

1. Easy Connecting



Doosan Mate

Provides SW environment for easy connection between various tools(EOAT⁽¹⁾) such as Gripper

2. Easy Teaching



Cockpit Function

Able to directly pre-set simple motions without any complex programming

3. Easy Programming



Task Editor, Dart-Studio, etc.

Easy programming that does not require professional knowledge through functions such as Drag & Drop of pre-programmed application

Source: Company data

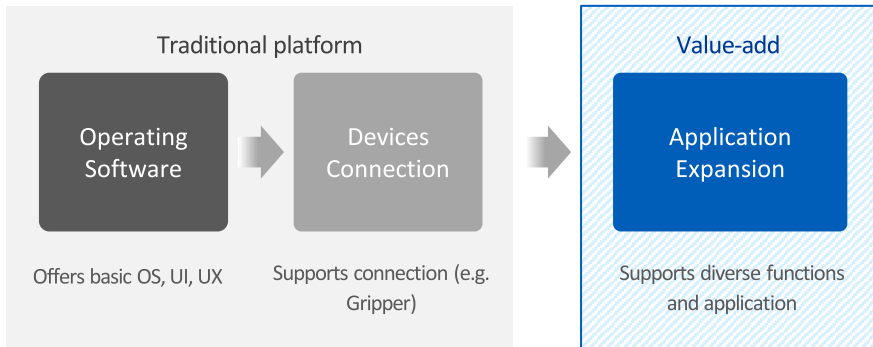
(1) End of Arm Tooling: An accessory that attaches to the end of a robot that allows the robot to perform a specific action, such as grabbing an object or tightening a screw



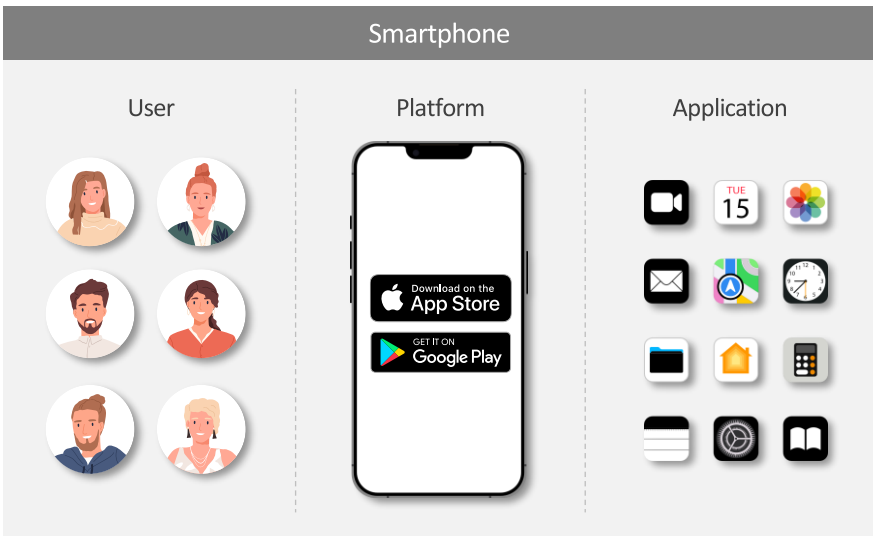
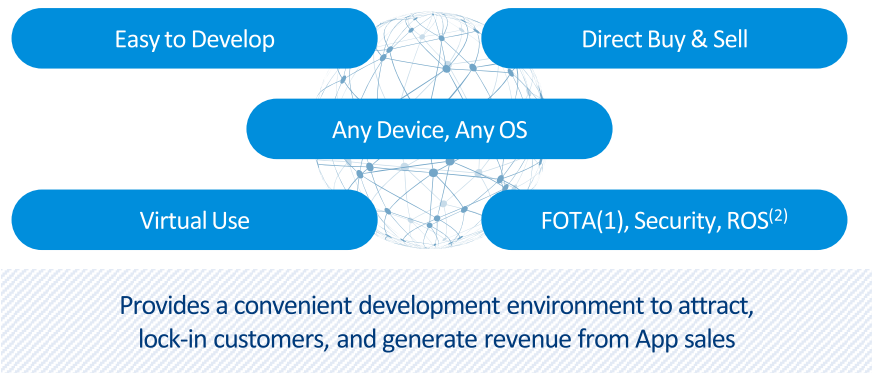
Establishment of a software platform

Dart-Suite is an integrated platform for all developers, creators, and users, providing a similar working environment to those of smartphone

What is Dart-Suite?



Dart-Suite Pros



(1) FOTA(Firmware Over-The-Air): Updating Software remotely (First to developed and implemented in the robot industry)
 (2) ROS: Robot Operating System

Proven track record



DR is a trusted partner for a well-diversified group of blue-chip customers across major industries

DR's Global Customers

<p>Automotive</p>	
<p>Electronics</p>	
<p>Industrials</p>	
<p>Consumer Goods</p>	

Source: Company data

Expansion through global partnerships



Signed MOU with global leaders from various industries to jointly develop and exclusively supply robot solutions

Global IT Company A

AI-Based
Robot Control
Solution



Rockwell Automation

Exclusive supply of
collaborative robots
in smart factories



SAMSUNG C&T

Joint development of
collaborative construction
robot solution



Global Battery Manufacturer B

Joint development of
automatic EV charging
solution



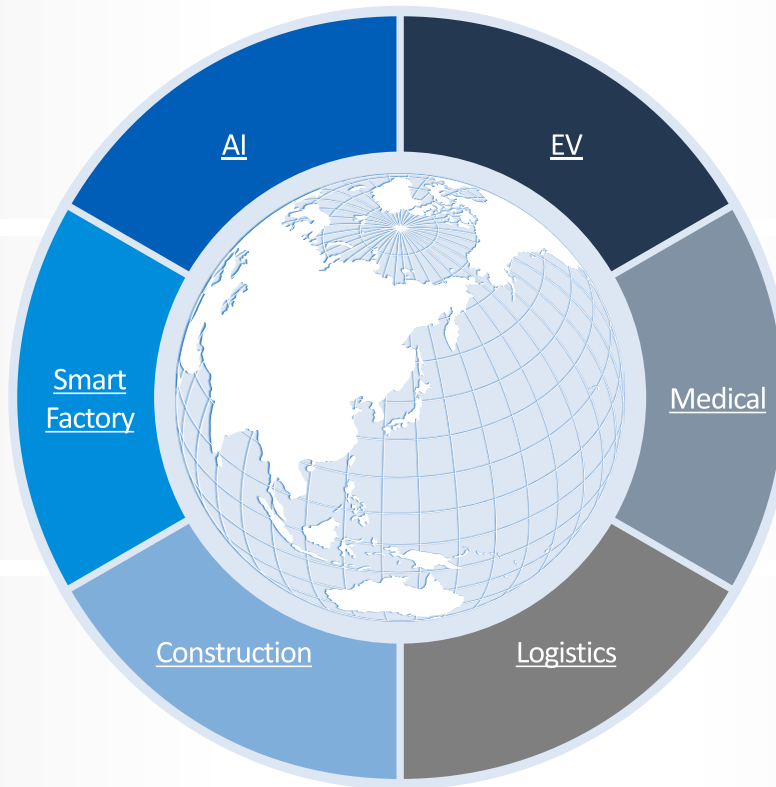
세브란스병원 SEVERANCE HOSPITAL

Joint development of
medical solutions



Cobot Lift

Joint-development of lift-
applied luggage solution





Diversified application backed by accumulated know-hows

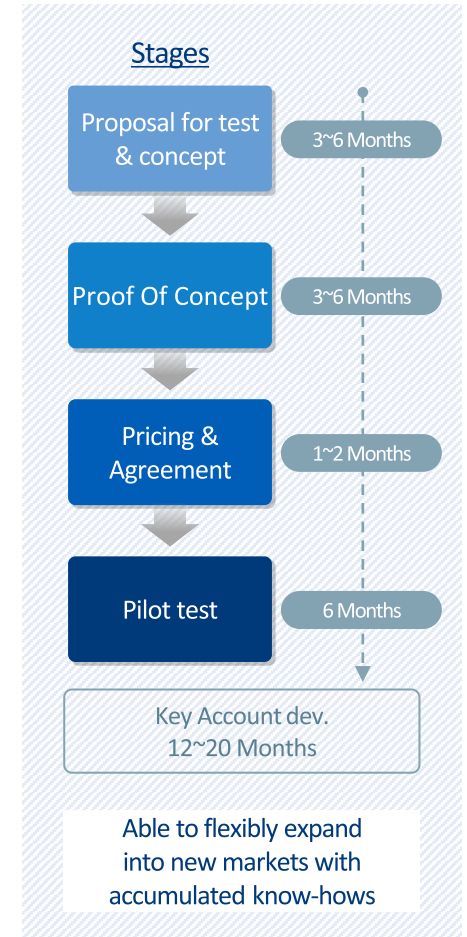


Able to flexibly expand into new markets and applications with accumulated know-hows with each Key Account, which takes 12 to 20 months of development/testing

Key Account's use cases

Industrials	Automotive	Consumer Staples	Food Service
<p>Schiphol Airport, Netherlands</p> <p>Baggage Handling</p>  <ul style="list-style-type: none"> Picks up a baggage from the transport conveyor with a cobot and automatically loads it into a cart 	<p>Global Top Automobile OEM</p> <p>Assembly</p>  <ul style="list-style-type: none"> Rear wheel shock absorber assembly 	<p>Coffee Manufacturer C</p> <p>Palletizing</p>  <ul style="list-style-type: none"> Product palletizing Sets speed limit tailoring to the human worker 	<p>Chicken Franchise G</p> <p>Fryer</p>  <ul style="list-style-type: none"> Automated chicken fry
<p>Safety equipment manufacturer A</p> <p>Assembly</p>  <ul style="list-style-type: none"> Collaboration with human workers to screw parts and settle them on the conveyor 	<p>Automobile part maker B</p> <p>Gluing</p>  <ul style="list-style-type: none"> Mat gluing for automotive moldings 	<p>Beverage Manufacturer D</p> <p>Palletizing</p>  <ul style="list-style-type: none"> Product pack palletizing 	<p>Restaurant franchise F</p> <p>Noodle Cook</p>  <ul style="list-style-type: none"> Automated noodle making

Key Account Development





Chapter 03

Our Way Forward

01. Revenue growth drivers
02. Pioneering AI-based advanced B2B market
03. Doosan Robotics' growth roadmap
04. Financial statements

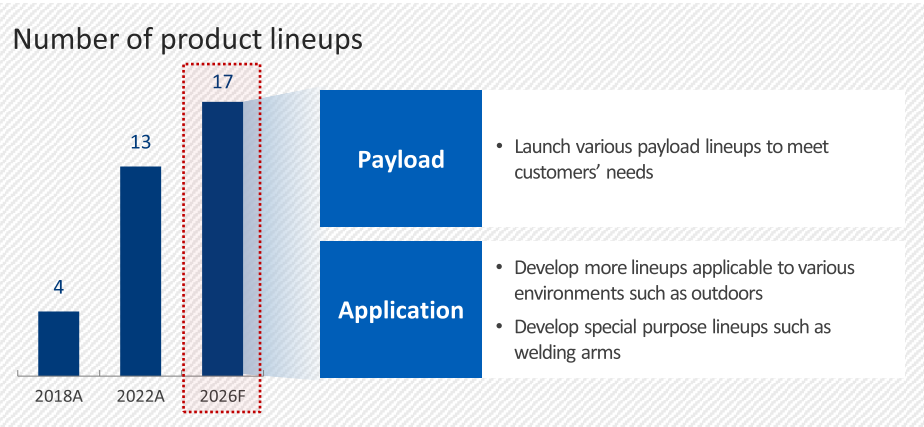


Revenue growth driver

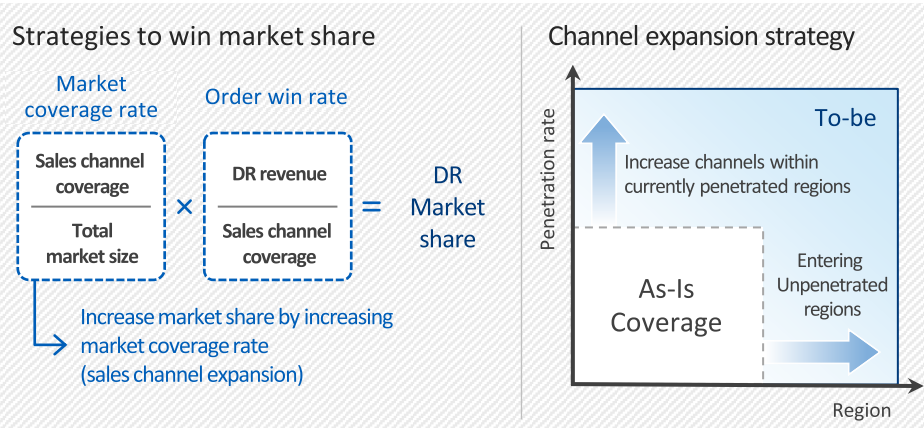


Capable of robust revenue growth through the expansion of product lineups, sales channel, sales of solution

Driver 1: Product lineups expansion



Driver 2: Sales channel expansion



Source: Company data

Driver 3: Solution sales expansion

Short-term sales strategy

1. Palletizing



- Develop and sell automated palletizing solutions that enable logistics automation
- Establish partnership with domestic top-tier B2B logistics company to expand coverage to partners customers

2. Fryer



- Automated chicken frying solution with integrated robot arm
- Establish partnership with domestic top-tier chicken franchisor to increase penetration into franchise stores
- Planned partnership with a global restaurant franchisor

3. Coffee



- Automated coffee brewing and barista collaboration solutions
- MOU with top-tier Korean coffee franchisor for installation in new stores and store renewals

Future plans

EV charging solution, Medical(surgical robot) solution, AMR⁽¹⁾ solution, etc.

Leveraging AI Vision, MoMa to spearhead advanced B2B market



Pioneering advanced B2B markets through AI Vision & MoMa, and providing application SW and technology through Dart-Suite platform

Tech

MoMa

Manipulator

+

Mobile

Mobile Manipulator (MoMa)

Unlocking complex applications by
AMR/arm integration

Harvesting

Outdoor cleaning

Machine tending

Expanding all-in-one MoMa robotics & commercializing integrated controller

Vision AI

Algorithms to recognize structured/unstructured objects

Enter unstructured vision markets with accurate detection capability

Foods Pick&Place

Unstructured objects sorting (i.e. clothes)

Commercialization of advanced AI tailored to robotics vision SW + HW

Platform

Recurring revenue from Dart-Suite

Store

Sale of developed App. & SW

Tech (AMR, Vision)

Proven Arm, AMR, Vision product offering

Dart-Suite

SDK (IDE)

Collecting app download fees and SDK usage fees

Platform (MW)

Collecting subscription fees from users utilizing third-party robotic platform

Expanding MoMa/Vision Integrated solution business

Based on stable growth of B2B market, DR can enter B2C market preemptively



Preoccupy B2B robotics market in a short period → Pioneering advanced robotics market, leveraging AI and MoMa → Expand to B2C robotics



Consolidated Income Statement

Unit: KRWmn

	FY2020	FY2021	FY2022	1H2023
	K-IFRS, Audited	K-IFRS, Audited	K-IFRS, Audited	K-IFRS, Reviewed
Revenue	20,164	36,980	44,954	23,652
Cost of Goods Sold	15,714	25,598	30,710	17,659
Gross Profit	4,450	11,382	14,244	5,993
SG&A Expense	18,305	18,467	27,472	15,926
Operating Loss	(13,855)	(7,085)	(13,228)	(9,932)
Financial Income	144	247	819	466
Financial Expense	635	582	1,027	932
Other Non-op. Income	87	40	981	1,071
Other Non-op. Expense	194	38	93	5
EBIT	(14,453)	(7,417)	(12,548)	(9,333)
Tax expense	-	-	-	-
Net Loss	(14,453)	(7,417)	(12,548)	(9,333)

Source: Company data

Consolidated Balance Sheet

Unit: KRWmn

	FY2020	FY2021	FY2022	1H2023
	K-IFRS, Audited	K-IFRS, Audited	K-IFRS, Audited	K-IFRS, Reviewed
Current Asset	12,005	19,662	38,837	37,109
Cash & Cash Equivalent	2,621	4,390	7,430	6,750
Accounts Receivables	3,385	8,558	10,644	12,498
Inventory	5,323	5,615	13,391	14,542
Other Current Asset	676	1,099	7,372	3,319
Non-current Asset	10,327	9,783	23,782	28,672
PP&E	8,095	7,754	15,973	19,910
Other Non-current Asset	2,232	2,029	7,809	8,762
Total Asset	22,332	29,445	62,619	65,781
Current Liabilities	11,207	11,809	14,738	26,204
Accounts Payable	3,217	5,036	3,875	5,361
Short-term debts	3,000	-	-	9,943
Other Current Liabilities	4,990	6,773	10,863	10,900
Non-current Liabilities	1,986	2,135	5,116	7,152
Lease Liabilities	1,708	1,544	3,418	4,321
Other Non-current Liabilities	278	591	1,698	2,831
Total Liabilities	13,193	13,944	19,854	33,356
Common Equity	20,700	22,100	24,310	24,310
Total Equity	9,139	15,502	42,765	32,424

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