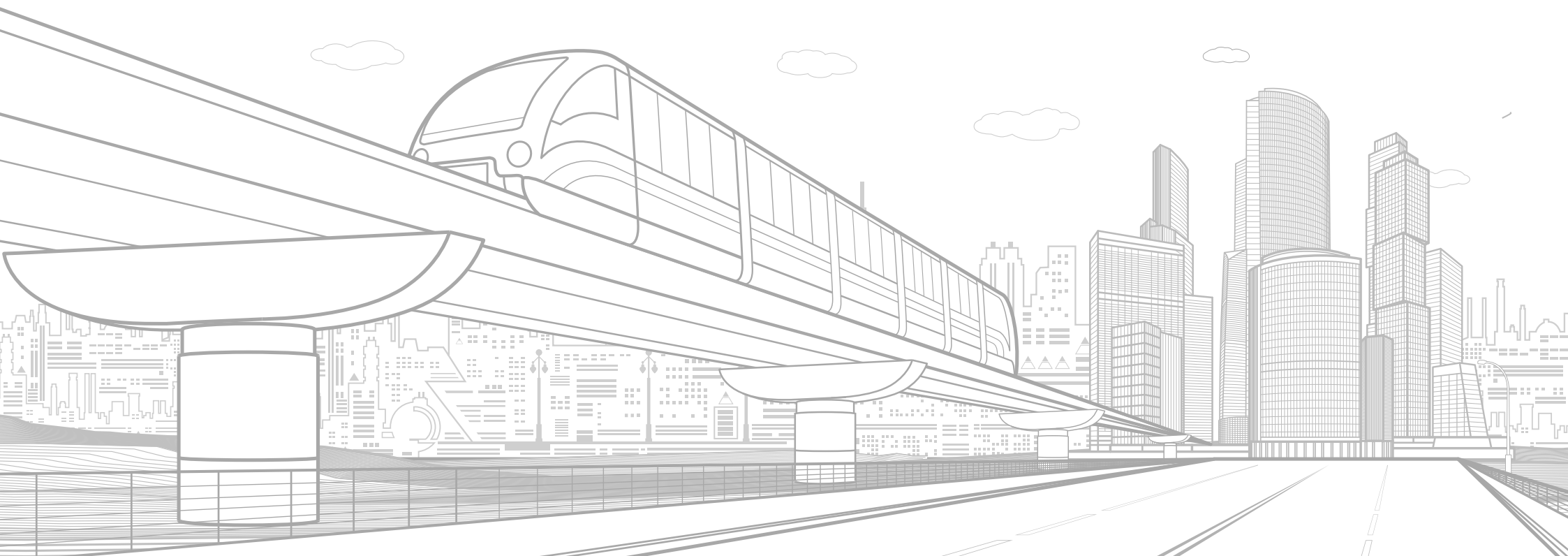
WOOJIN
Industrial Systems Co., Ltd.

TECHNICAL INNOVATION

FOR YOUR SAFETY AND EASY LIFE



INTRODUCTION

TECHNICAL INNOVATION
FOR YOUR SAFETY AND EASY LIFE

Woojin Industrial Systems, as a leader of the ecofriendly greengrowth era, is committed to delivering safe and comfortable newtransit systems.

With a strong sense of responsibility that regards every single rail passenger as a valued customer, we do our utmost to supply safer and more comfortable rail transit systems for the happy lives and dreams of everyone. A company that challenges itself and strives for safety and comfort—Woojin Industrial Systems will faithfully protect your happiness and your future.

CONTENTS

MESSAGE FROM CEO

A company that thinks one step ahead and one step deeper.
A solid company that customers can trust even more—this is our promise.

Woojin Industrial Systems — A Global Leader in Eco-Friendly Rail Mobility

Taking its first step in 1974 with the challenge of localizing core electrical components for rolling stock, Woojin Industrial Systems Co., Ltd. has grown over the past half-century into a total rail mobility solutions company, driving the advancement of Korea's railway industry through accumulated technical expertise and R&D capability.

Woojin Industrial Systems is widely recognized for its outstanding quality and technology in manufacturing advanced rail vehicles, including light rail transit (LRT), subways, and hydrogen trains. Furthermore, by successfully expanding into eco-friendly electric/hydrogen buses—centered on our flagship brand 'APOLLO'—and smart autonomous public transit platforms, we are ushering in a new era of future mobility that encompasses both rail and public transportation.

Rooted in our core rolling stock electrical component technology, Woojin Industrial Systems continues to achieve sustainable technological innovation, creating a safer and more punctual transportation environment for all.

Moving forward, Woojin Industrial Systems promises to lead the advance of rail technology and dedicate deeper thought to every solution, becoming the most reliable partner for our clients and passengers, as well as a global leader in rail mobility.

Thank you.

Woojin Industrial Systems CEO
Kim, Jung-hyun

HISTORY

A specialist in rolling stock and newtransit systems pursuing trust and innovation—customer satisfaction through the latest technology and the finest service, Woojin Industrial Systems leads the way!

Founded in 1974, the year the subway was introduced to Korea, Woojin Industrial Systems has grown alongside the advancement of the domestic rolling stock industry as a specialized manufacturer, expanding into both domestic and global markets where Woojin's outstanding technology is widely recognized.

WOOJIN Industrial Systems Co., Ltd.

1970s	1974	Established Woojin Industrial Systems Co., Ltd.
1990s	1992	Established Woojin Electric Machinery Co., Ltd.
	1993	Produced auxiliary power supply systems (GTO/PRT type) and propulsion control systems(GTO type)
	2001	Produced propulsion control systems (IGBT type)
2000s	1999-2005	Developed the Korean standard light rail transit system (two cars per train set)
	2005	Obtained the New Excellent Technology certification (NET mark)
		Awarded light rail transit and related materials and equipment for Busan Subway Line No. 4 (Bansong Line)
	2009	Received Silver Tower Order of Industrial Service Merit as an honorable small enterprise
2010s	2010	Completed the production of smart monorail development rolling stock (two cars per train set)
		Received the Ministry of Knowledge Economy award
	2011	Busan Subway Line No. 4 opened
	2012	Selected for the Enterprise of the World Class 300 project (Ministry of Knowledge Economy)
		Awarded DEMU rolling stock for Medan, Indonesia
	2013	Manufactured rolling stock for Daegu Metro Monorail Line No. 3
	2014	Awarded rolling stock for Daegu Metro Monorail Line No. 3
		Awarded Airport Transit (AT) rolling stock for Incheon International Airport
	2016	Awarded Airport People Mover (APMS) for SIA of Indonesia
		Awarded operation of Seoul LRT Ui Sinseol Line
		Completed the development of a mid-size low-floor electric bus
		Awarded electric bus for Seoul Science Center
	2017	Awarded LRV for Gwangju Metro Line No. 2
		Awarded bi-modal tram for Cheongra International City
		Developed Apollo 900 mid-size low-floor electric bus
	2018	Awarded LRV for Seoul Sillim Line
		Awarded rolling stock for Daegu Metro Line No. 2
		Awarded operation of LRT Uijeongbu (Woojin Metro)
	2019	Awarded rolling stock for Seoul Metro Line No. 5 and No. 7
		Awarded the electric multiple unit (EMU) for Line 8 (Byeollae Line)
		Completed construction of Jeungpyeong factory of Woojin Industrial Systems
2020s	2020	Seoul LRT Wirye–Sinsa Line (selected as a preferred bidder in the rolling stock category)
		Awarded AT rolling stock for Incheon International Airport
		Awarded 160 cars of new EMU for Line No. 1 and Ilsan Line (Korail)
		Awarded 330 cars of new EMU for Line No. 1 (Korail)
		Developed Apollo 750 mid-size low-floor electric bus
	2021	Awarded 200 cars of new EMU for Busan Line No. 1 (Busan Transportation Corporation)
		Awarded sightseeing trains for Wonju City
		Completed construction of Train Test Center (TTC) of Woojin Industrial Systems
		Awarded rolling stock for Wirye Tram of Seoul (9 trains, 45 modules)
		Selected as a preferred bidder in the rolling stock category for a privately financed infrastructure Project for Seoul LRT Seobu Line
		Developed Apollo 900 wireless charging mid-size low-floor electric bus
		Developed Apollo 2000 Korean articulated tram of 2 double-doors
	2022	Awarded new EMU (260 cars) for Line No.4
		Awarded 18 train cars for automated guideway transit (AGT) from Busan Transportation Corporation
		Developed Apollo 900 autonomous mid-size low-floor electric bus
		Developed Apollo 1200 large high-floor electric bus
	2023	Awarded 72 cars of new EMU for Busan Line No.1 (Busan Transportation Corporation)
	2024	Completed Gimcheon factory
		Awarded LA METRO A650 Vehicle Modification Project
		Completed Godeok Building
		Awarded 168 cars of new EMU for Busan Line No.2 (Busan Transportation Corporation)
		Awarded 108 cars of new EMU for Korail (Seoul Metro Line no.1, Shinbundang Line, Donghae Line)
	2025	Awarded 220 cars of new EMU for Seoul Metro Line no.1, Line No.4, Line No.8)

VISION & MISSION

Ecofriendly transit and power systems
A world-class leader

Relentless technical innovation for a safe and convenient human life

By providing new technologies in ecofriendly transit and creative power systems, we will achieve KRW 1 trillion in revenue, enhance quality of life, and contribute to society.

ORGANIZATION

Woojin Industrial Systems secures worldclass technological and price competitiveness and, to supply the finest products, invests generously in strengthening core capabilities through specialization in rolling stock, developing talent, and funding R&D at its research centers.

A rapidly changing business environment and customer needs—
our challenge and effort will continue relentlessly!

QUALITY ASSURANCE, R&D

The energy that drives Woojin Industrial Systems is customer satisfaction and trust!

Woojin Industrial Systems has adopted a rigorous, systematic quality management system to supply the finest products. It has obtained not only the international quality management system certifications ISO 9001 and KSA 9001, but also the international environmental management system certifications ISO 14001 and KSA 14001, which verify product environmental performance, as well as IRIS (ISO/TS 22163), the rail-industryspecific quality management certification, growing into a company trusted for both product quality and environmental performance. Through thorough aftersales support, we also do our utmost to ensure customer satisfaction across the various A/S processes that may arise during product use. We give our very best effort.

To secure technological competitiveness ahead of changing customer needs and the technology environment, Woojin Industrial Systems established a technology research institute and assembled new talent in the rolling stock field, carrying out active R&D for localization and product development, thereby leading a new paradigm in the rolling stock industry.

NO	Project name	Period	Supervisor
1	Developed power conversion system for propulsion control	Dec 2012 - Dec 2014	KORAIL
2	Built automatic inspection system	Dec 2011 - Dec 2014	Eco Master
3	Developed high-speed rolling stock and electronic units	Dec 2011 - Mar 2015	KIMM
4	Developed propulsion and power system	Dec 2011 - Mar 2015	KRRI
5	Developed urban railway rolling stock permanent magnetic traction motor	Oct 2012 - Oct 2015	Hanyang University
6	Developed bi-modality tram commercialization technology	Jun 2014 - Jun 2016	Woojin Industrial Systems Co., Ltd.
7	Developed main power conversion system using module-type IGBT	Dec 2013 - Oct 2017	Woojin Industrial Systems Co., Ltd.
8	Developed DC/DC high-efficiency/ subminiature converter technology	Dec 2013 - May 2017	Woojin Industrial Systems Co., Ltd.
9	Developed high-speed railway peak power reduction technology	Dec 2012 - May 2017	Woojin Industrial Systems Co., Ltd.
10	Developed DC 4,000 V-grade electromagnetic contactor for rolling stock	Jun 2014 - May 2017	Woojin M&E
11	Designed and produced core component for bogie system running on steep gradient track	Dec 2013 - Dec 2018	KRRI
12	Developed main power converter for electric locomotive(Korail Class 8200) and composite controller device commercialization technology	Apr 2016 - Sep 2019	Woojin Industrial Systems Co., Ltd.
13	Developed and conducted research on standardization for emergency broadcast and lighting modules in urban rail transit	Oct 2017 - May 2020	Woojin Industrial Systems Co., Ltd.
14	Developed wireless-powered light rail transit technology	July 2015 - May 2020	KRRI
15	Developed hydrogen fuel cell-powered hybrid rolling stock operation technology	Apr 2018 - Dec 2022	Woojin Industrial Systems Co., Ltd.
16	Research on the verification of safe operation requirements between K-AGT train cars for unmanned operation of Sillim Line and KRTCS train control system	Sep 2018 - Feb 2021	Woojin Industrial Systems Co., Ltd.

MAIN PRODUCT **01**

METRO


Our technology running through the city—
Woojin Industrial Systems is writing a new
chapter in Korean railways.

MAIN PRODUCT_01 / METRO / Seoul Metro Lines 5 · 7 · 8 (Byeollae Line)


Line 5


Line 7


Line 8 (Byeollae Line)

Key Specifications

Category	Item	Details
Vehicle Dimensions	Carbody length	19,855mm(Tc), 19,500mm(M, T)
	Vehicle(roof) height	3,600mm(from top of rail)
	Vehicle width	3,120mm
Performance Specifications	Max. design speed	100 km/h or higher
	Max. operating peed	80 km/h (90 km/h on some sections) or higher
	Acceleration	3.0km/h/s
	Deceleration	3.5 km/h/s (service), 4.5 km/h/s (emergency)
	Speed control	Acceleration/deceleration control by VVVF inverter (loadweighing)
	Braking method	Regenerative braking combined with electropneumatic braking (loadweighing)
New Technology Applied	Traction motor	Permanent Magnet Synchronous Motor (PMSM) applied
	Auxiliary power supply	Resonant inverter (SIV) applied
	Air supply unit	Oil-free air compressor applied
	EMU data analysis System integration	• SMART realtime integrated information system • EMU faultanalysis program • Other servers, etc. (LTER network integration)

01 A cabend surface and curvature crafted like finely made, clean ceramic, expressing softness within the vehicle's robustness

02 Modern edge lines and gently curved surfaces combined through restrained sculptural techniques form the vehicle's exterior design concept

03 NorthernEuropean simplicity with naturefriendly design elements and minimal color matching create a more spacious, open, ecofriendly interior for subway passengers

NewTechnology Application Status

Safety	Crash safety performance improvement	In a vehicle collision, impact is absorbed in two stages to secure passenger safety
	Real-time fault-information transmission	When a fault occurs, the situation is shared in real time among the driver, control staff, and inspectors
	Emergency broadcast & lighting	When an emergency occurs, the driver can move through the vehicle to evacuate and control passengers
Customer Service	Congestion display function	EMU passengers can intuitively grasp congestion levels
	Sign-language display function	Enables hearingimpaired passengers to quickly recognize and respond to emergencies and other unusual situations
	Air-quality improvement unit	Air-quality improvement effect
Energy Efficiency Improvement	Permanent-magnet synchronous motor	Energy savings and noise reduction
	Zero-speed control technology applied	Reduced fine dust and power consumption
	Resonant SIV applied	Minimized winding size and weight

New EMU: selected for 2020 Good Design (GD), BF certification obtained


우수산업디자인상품선정증

kidp 한국디자인진흥원 원장 윤주현


인 증 서

제 3029 호

Barrier Free

지역(사업명) : 서울교통공사 5,7호선 신조건등차 336칸(우진산전)
소 재 지 : 서울특별시 성동구 천호대로 346
인 증 기 간 : 2021년 03월 04일 ~ 2026년 03월 03일

위 교통수단은 「장애를 없는 생활환경 인증에 관한 규칙」 제8조 제1항에 따라 장애를 없는 생활환경 (최우수 등급)으로 인증되었기에 인증서를 발급합니다.

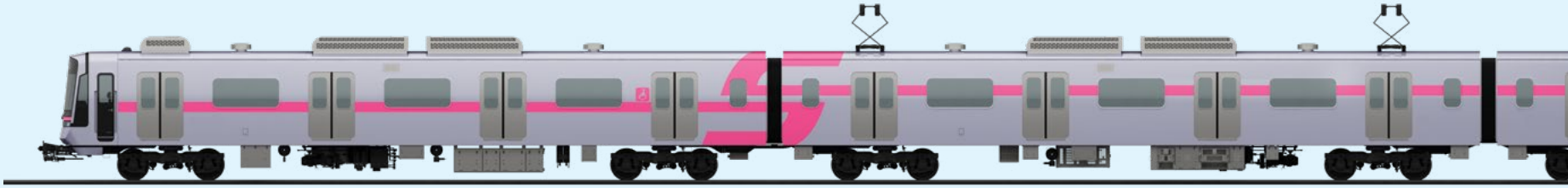
2021 년 03 월 04 일

한국장애인개발원장

- Korea's first urban rail EMU design selected as an Excellent Design
- An exterior expressing speed and strength, reflecting diverse ergonomic elements

BF (Barrier Free) certification

A system in which an authoritative body evaluates and certifies whether planning, design, construction, and management ensure that children, the elderly, people with disabilities, and pregnant women—as well as those with temporary impairments—can access, use, and move through individual facilities and areas without inconvenience



MAIN PRODUCT_01 / METRO / KORAIL Line 1 · Ilsan Line

Line 1

Ilsan Line

Key Specifications

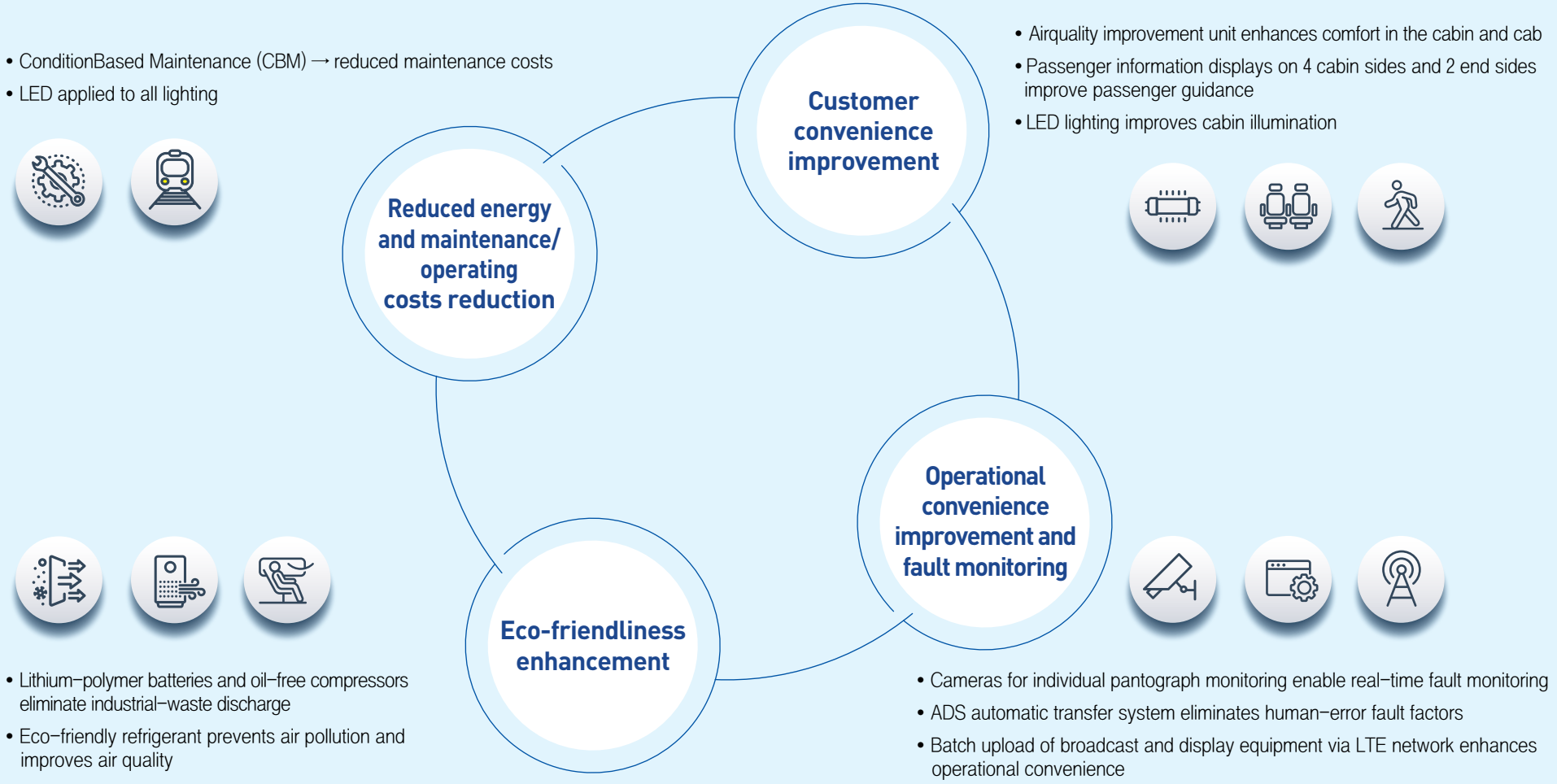
Category	Item	Details
Vehicle Dimensions	Trainset length	200.7m(10 cars per trainset)
	Carbody length	19,950mm(Tc), 19,500mm(M, T)
	Vehicle(roof) height	3,750mm
	Vehicle width	3,120mm
Performance Specifications	Max. design speed	120 km/h(Line 1), 100 km/h(Ilsan Line)
	Max. operating speed	110 km/h(Line 1), 90 km/h(Ilsan Line)
	Acceleration	3.0 km/h/s or higher(from stop to 35 km/h)
	Deceleration	3.5 km/h/s(service), 4.5 km/h/s(emergency)
	Speed control	Acceleration/deceleration control by VVVF inverter
	Braking method	Regenerative braking combined with digital electrocommand electronically computed air braking (loadweighing)
Other Details	ConditionBased Maintenance (CBM) system implemented	
	ADS automatic transfer device applied	
	ATS(Line 1), ATC(Ilsan Line) applied	

ExteriorDesign

- A flat, wide front window emphasizes a dynamic vehicle design
- Precise, sharp detailing reflects Seoul's progressive urban culture

Interior Design

- Passenger flow optimized for convenient boarding and alighting
- Separating multipurpose spaces keeps passengers who use them apart from those who do not, preventing secondary safety incidents



- ConditionBased Maintenance (CBM) → reduced maintenance costs
- LED applied to all lighting

- Airquality improvement unit enhances comfort in the cabin and cab
- Passenger information displays on 4 cabin sides and 2 end sides improve passenger guidance
- LED lighting improves cabin illumination

- Lithium–polymer batteries and oil–free compressors eliminate industrial–waste discharge
- Eco–friendly refrigerant prevents air pollution and improves air quality
- Airquality improvement unit enhances air quality

- Cameras for individual pantograph monitoring enable real–time fault monitoring
- ADS automatic transfer system eliminates human–error fault factors
- Batch upload of broadcast and display equipment via LTE network enhances operational convenience

MAIN PRODUCT_01 / METRO / Busan Metro Line 1

Vehicle Specifications

Category	Item	Details
Vehicle Dimensions	Trainset length	144.8m(8 cars per trainset)
	Carbody length	18,400mm(Tc), 18,000mm(M, T)
	Vehicle(roof) height	3,670mm
	Vehicle width	2,750mm
Performance Specifications	Max. design speed	100km/h
	Max. operating speed	80km/h
	Acceleration	3.0km/h/s or higher(from stop to 35km/h or higher)
	Deceleration	3.5km/h/s(service), 4.5km/h/s(emergency)
	Speed control	Acceleration/deceleration control by VVVF inverter
	Braking method	Regenerative braking combined with electrocommand air braking

Vehicle Exterior

- A modern redesign that retains the existing vehicle design
- Clean cabend surfaces with an edge connecting to the lower skirt express a linear, crisp layout, and circular lighting

Vehicle Interior

- Finely tuned blue tones blend with light gray to bring a bright, vivid color atmosphere to a calm interior

Cabdedicated airconditioning unit

- A cabdedicated airconditioning unit was applied to improve the cab environment, supplying cooled and fresh air into the cab through a separatecab cooling duct

Zerospeed electric braking unit Applied

- The propulsion control unit's regenerative braking is controlled to maximize regeneration, maintaining regeneration down to zero speed, and applies air braking just before stopping to minimize airbrake use
- Zerospeed control of regenerative braking is expected to reduce brake friction material,lower power consumption, and improve maintainability and cost savings

Mobilephone wireless charging unit Applied

- A wireless charging facility for mobile phones is installed in the cabins of the lead and tail cars, allowing passengers to charge their phones while traveling, providing charging convenience for passengers

Electronic route information display

The electronic route information display shows, via an LCD (37"), the data input from the setting unit—the route map, current train position and direction, transferstation information, and promotional video

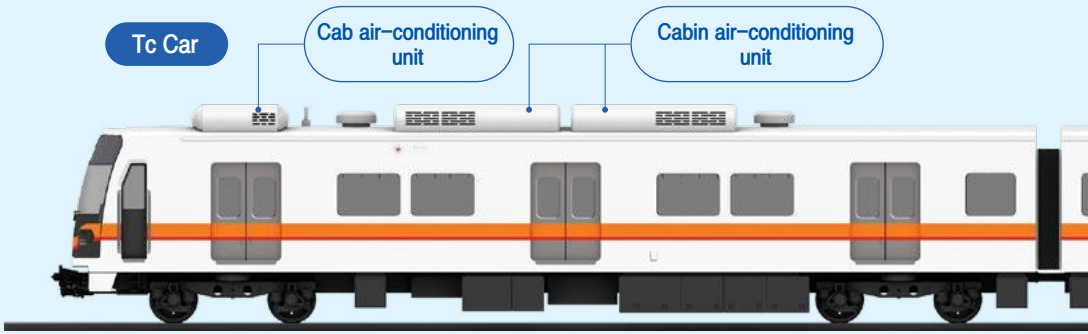
New electronic route information display

Vehicle information provision and destinationstation flashing (single line)

Destination and transferstation guidance screens Advertising video display

Cab–dedicated air–conditioning unit

A cab–dedicated air–conditioning unit was applied to improve the cab environment, supplying cooled an fresh air into the cab through a separate cab cooling duct.



MAIN PRODUCT_01 / METRO / Busan Metro Line 2

Vehicle Specifications

Category	Item	Details
Vehicle Dimensions	Trainset length	109.4m(6 cars per trainset)
	Carbody length	18,000mm(Tc), 17,500mm(M, T)
	Vehicle(roof) height	3,670mm
	Vehicle width	2,750mm
Performance Specifications	Max. design speed	100km/h
	Max. operating speed	80km/h
	Acceleration	3.0km/h/s or higher(from stop to 35km/h or higher)
	Deceleration	3.5km/h/s(service), 4.5km/h/s(emergency)
	Speed control	Acceleration/deceleration control by VVVF inverter
	Braking method	Regenerative braking combined with electrocommand air braking

Vehicle Exterior

- Pocket sliding doors provide greater noise insulation than outside sliding doors

Vehicle Interior

- Seat width expanded from 450mm to 480mm, resolving discomfort such as bumping into the person in the next seat
- Ergonomic design widens the lumbar round of the seatback and applies anti-slip treatment

Permanent-magnet synchronous motor (PMSM) Applied

- Reduced power consumption in powering; increased regenerative braking power
- Increased electric braking force during braking reduces air-brake usage
- Maintenance cost savings

Zero-speed electric braking unit Applied

- Using electric braking down to a stop improves ride comfort and reduces energy consumption
- Reduced wheel friction noise from constant deceleration and air braking at stops
- Reduced brakepad wear lowers fine dust and maintenance costs

Train-operation information wireless transmission system Applied

- Vehicle fault information and vehicle status information are transmitted through the LTER modem installed in the TCMS
- Transmitted via the LTER network to the datacollection system, enabling easy retrieval and maintenance response at the control center

LTE-R train radio equipment applied

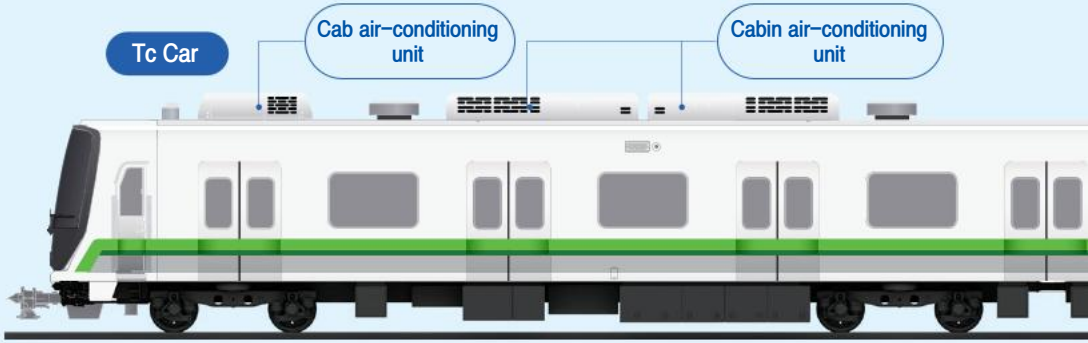
Delivering train radio equipment that meets the functions and performance required by future advanced LTE-R projects—including interoperability with the national disaster-broadcast network—improving scalability and compatibility over legacy train radio

Key improvements

- 3GPP Rel.12 support (VoLTE/McPTT support)
- Twodigit QCI support (high survivability support)
- Support for new EPC integration on Lines 1 – 4 and stable support for new services
  - Enhanced compatibility through reflecting the latest standards
  - Secured scalability through high specifications

Cab-dedicated air-conditioning unit

A cab-dedicated air-conditioning unit was applied to improve the cab environment, supplying cooled an fresh air into the cab through a separate cab cooling duct.



MAIN PRODUCT_01 / METRO / Seoul Metro Line 4

Key Specifications

Category	Item	Details
Vehicle Dimensions	Trainset length	201.2m(10 cars per trainset)
	Carbody length	20,580mm(Tc), 20,000mm(M,T)
	Vehicle(roof) height	3,750mm
	Vehicle width	3,120mm
Performance Specifications	Max. design speed	100km/h or higher
	Specifications	80km/h or higher
	Acceleration	3.0km/h/s
	Deceleration	3.5km/h/s(service), 4.5km/h/s(emergency)
	Speed control	Acceleration/deceleration control by VVVF inverter (loadweighing)
	Braking method	Regenerative braking combined speed control, electrocommand air braking (loadweighing)
New Technology Applied	Traction motor	Permanent Magnet Synchronous Motor (PMSM) applied
	Air supply unit	Oil-free air compressor applied
	EMU data analysis System integration	• EMU fault-analysis program • Other servers, etc. (LTER network integration) • CBM (ConditionBased Maintenance) implemented: predictive maintenance realized

Vehicle Features

Axlebox heatdetection sensor applied

- The CBM system detects axlebearing temperature and vibration in real time via the TCMS, reducing labor input and costs

Integrated SMART switchboard Applied

- A smart switchboard for CBM (ConditionBased Maintenance) enables realtime monitoring of internal component status, storage and transmission of internalcomponent event DATA, and componentsize reduction through relay modularization. Integrating general and HVAC switchboards and revising harness wiring shortens maintenance time

Pantograph monitoring camera Applied

- A pantographmonitoring camera detects abnormal pantograph up/down movement and provides abnormality alerts, enabling predictive pantograph maintenance and reducing labor input and costs

Line-flow fan Reduction-gear motor applied

- Replacing the worm gear inside the gearbox—the reciprocating device of the line-flow fan—with a reduction-gear motor improves maintenance (noise reduction, shorter replacement time, cost savings)

CBM (Condition-Based Maintenance) implemented

- CBM (Condition-Based Maintenance) enables real-time monitoring of vehicle and component status; monitoring data is transmitted to a ground server for analysis and diagnosis, providing condition-based information before a vehicle fault occurs

Operating Conditions

Category	Item	Details
Track Conditions	Track gauge	1,435mm
	Max. axle load	16ton
	Max. gradient	35‰(main line), 45‰(siding)
	Platform height	1,135mm
	Curve radius	Main line: 140m, siding: 100m
Load Conditions	Passenger load	62kg/person
	Max. passenger load	20ton/car or higher(performance basis)
		30ton/car or higher(strength basis)

MAIN PRODUCT_01 / METRO / KORAIL Conventional Lines (Gyeongbu · Suin–Bundang · Donghae)

Gyeongbu Line

Suin–Bundang Line

Donghae Line

Key Specifications

Item		Specification
Max. design speed		120km/h
Max. operating speed		110km/h
Acceleration (to 35 km/h)		3.0km/h/s or higher (10car trainset basis, constant up to 20 ton/car load)
Deceleration	Service braking	3.5km/h/s±15%
	Emergency braking	4.5km/h/s±15%
Jerk limit		0.8m/s^3 or less
Axle load		16ton or less
Passenger weight		Average passenger weight on board is 70 kg/person
Speed–control method		Speed control by variable voltage variable frequency (VVVF) inverter
Braking method		Regenerative braking combined with electrocommand air braking (with loadweighing device)

Trainset Configuration

Gyeongbu Line	Tc – M – M′ – T – T’ – M – M’ – Tc (8cars / 4M4T)
Suin · Bundang Line	Tc – M – M′ – M1 – M’ – Tc (6cars / 4M2T)
Donghae Line	Tc – M′ – M′ – Tc (4cars / 2M2T)

Vehicle Features

Air-conditioning unit

- Applying BLDC motors to the condenser and evaporator motors r educes power consumption through airflow control.
- Applying an inverter-start compressor reduces power consumption through compressor-motor speed control.

T-Car BED Performance Control

- The Tcar braking ECU issues the regenerative braking demand (BED), and the paired car (Mc) applies regenerative braking to minimize friction braking.

DAS driver advisory system

- A system that raises operating efficiency and improves driving convenience during train operation, providing the driver with optimal driving conditions and contributing to energy savings, ontime operation, and safety.

Self-cooled main transformer

- A naturalcooling method with sufficient capacity to cool the heat generated in the maintransformer windings and core.

Next-generation maincircuit system and main power converter

- Individual control eliminates the need for wheeldiameter compensation, enabling optimal slip/slide control.
- Sensorless speed control reduces maintenance.
- Harmonic current can be reduced, lowering losses.

Traction motor (PMSM) and zerospeed regenerative braking

- High efficiency: no field current to the rotor & no rotor copper loss.
- Fully enclosed structure: no radiator or cooling fins · noise reduction.
- Reduced maintenance: fully enclosed structure eliminates the need to clean the internal stator and rotor [PMSM structure]

Operating Conditions

Category	Details
Coupled-face distance	21,085mm(Tc-Car) / 20,000mm(M-Car, T-Car)
Carbody length	20,225mm(Tc-Car) / 19,500mm(M-Car, T-Car)
Bogie center distance	13,800mm
Max. carbody width	3,120mm
Roof height	3,750mm
Folded pantograph height	4,500m(from top of rail)
Cabin floor height	1,150m(from top of rail)
Coupler height	880±10mm(from top of rail)
Wheel diameter	860mm(new), 780mm(worn)

KORAIL Gyeongbu Line

KORAIL Suin · Bundang Line

KORAIL Donghae Line

MAIN PRODUCT_01 / Hydrogen Fuel Cell Train

Specifications & Performance

Item	Specification
Basic trainset	2 cars(Mc1, Mc2) per trainset
Trainset dimensions	Length 49.7 / Width 3.15 / Height 4.5[m]
Tare and passenger load/trainset	118[ton] / 10[ton]
Seating capacity/trainset	101 seats
Electrical system	Hydrogen fuel cell + battery
Hydrogen tank/trainset	700Bar, 201.6kg
Fuel cell/trainset	750Vdc, 480kW
Battery/trainset	750Vdc, 1.5MW
Control method	VVVF-IGBT 1C4M individual control
Starting acceleration	2.0[km/h/s]
Service/design speed	150/165[km/h]
Deceleration	3.0(service), 4.0(emergency) [km/h/s]
Number of motors/trainset	8 induction motors / 2 cars
Traction motor spec	130kW(continuous) / 166kW(peak, powering) / 229kW(peak, regenerative)

Vehicle Features

Hydrogen fuelcell power system applied

- The roof of each car carries a hydrogen fuelcell power system comprising three 80 kW fuelcell stacks; multiple cells are stacked in series, and current is generated through the catalyst layer, gas diffusion layer, and external circuit.

Hydrogen fuel system applied

- The roof of each car carries a module of fourteen 179 L hydrogen storage vessels; components used in the hydrogen fuel system are products certified by the Korea Gas Safety Corporation.
- A charging port for hydrogen refueling is installed beneath the vehicle; hydrogen is charged to the roof tank module through piping at the vehicle end.

Propulsion battery applied

- Beneath each car are five battery packs and a BDU that oversees the packs.
- In normal operation it supplies power for vehicle propulsion together with the hydrogen fuelcell power system; in an emergency (fuelcell failure) it is designed to provide enough power capacity to move the vehicle to a charging station.

Operating Conditions

Category	Item		Item
Track Conditions	Track gauge		1,435mm
	Max. axle load		16ton
	Max. gradient		35‰
	Platform height	High platform	1,150mm(ballasted track)
		Low platform	500mm(ballasted track)
Load Conditions	Passenger load		10ton/trainset
	Full load		128ton/trainset

MAIN PRODUCT_01 / METRO / Incheon Metro Line 2

Specifications & Performance

Vehicle/wheel type		Light rail/steel wheel	Third rail, bottomcontact method
Carbody length		16,350mm	per car
Coupled-face length		17,200mm	per car
Width/height		2,650mm / 3,600mm	from running surface(top of rail)
Cabin floor height		915mm	from running surface(top of rail)
Max. Speed	Performance	90km/h	
	Operating	80km/h	
Acceleration		3,96km/h/s	
Deceleration	Service	3,96km/h/s	
	Emergency	4,68km/h/s	
Tare weight		64ton/trainset	
Full-load weight		90ton/trainset	
Operation method		Automatic operation	
Nominal voltage		DC 750V	
Contac-tline method		Third rail (bottom-contact method)	

Vehicle Features

- Fully automatic driverless steel-wheel light rail
- Fire-suppression system for early extinguishing in case of fire
- Excellent cabin vibration reduction through the use of resilient wheels
- Excellent acceleration/deceleration and steepgradient (60‰) performance

MAIN PRODUCT **02**

Rubber Tire AGT / APM

MAIN PRODUCT_02 / K-AGT FEATURES

Features and advantages of rubber-tired light-rail vehicles

Driverless automatic operation

- Ensures safety and punctuality
- Reduced operating staff lowers operating costs

Complete prevention of derailment risk

- Left and right guide rails guide from both sides
- Ensures safety

Vehicle weight reduction

- Reduced civilworks costs
- Excellent vehicle load-distribution performance
- Improved energy efficiency
- Efficient vehicle size suited to transport demand

Rubber-tired method applied

- Low vibration, low noise (75dB or less)
- Excellent curve-running capability (30m)
- Powerful gradientclimbing capability (58%)
- Applicable in complex urban areas

Overhead line for light rail

Rigid Power Real for Light Real Transit

- **Type** : third rail(sidecontact method)
- **Supply voltage** : DC 750V, DC 1500V
- **Material** : aluminum + stainless steel / aluminum + harddrawn copper contact wire

K-AGT bogie

Rubbe-rtired bogie	
• Bogie type	Single-axle bogie
• Running wheel	Nitrogen-filled rubber tire
• Tire type	Safety-wheel pneumatic tire
• Guide & switch wheels	Hard urethane tire
• Basic braking method	Disk type
• Suspension	Primary rubber tire, secondary air spring
• Guidance method	Guide-wheel side-guidance forced-steering method

MAIN PRODUCT_02 / AGT / Busan Metro Line 4

- Embodies the image of the maritime city of Busan, realizing the shape of "the sea, a yacht's sail, and waves"
- A streamlined, advanced design using curvedglass cabend

- Integrated large windows secure passengers' field of view
- Curved stanchion poles secure convenience
- Separate seats increase passenger independence, and maximized gangway connections secure interior space
- Multipurpose spaces for wheelchairs, strollers, etc. secure mobility convenience for the transportvulnerable

Specifications & Performance

Trainset	2 to 6 cars possible
Vehicle Dimensions (per car)	Length: 9,140mm Height: 3,500mm Width: 2,400mm
Vehicle Weight (per car)	Tare: 12 tons or less Full: 18 tons
Passenger capacity	97(full)
Power supply method	DC 750V, third rail
Operation method	Fully unattended operation
Key Performance	Max. speed : 80km/h(design) Acceleration : 3.5km/h/s Service deceleration : 3.5km/h/s Emergency deceleration : 4.5km/h/s
Track Conditions	Track gauge : 1,700mm Max. gradient : 58% Min. curve radius : 40m
Noise	75dB or less(including curved sections)

KOREA Automated Guideway Transit

Korea's standard rubber-tired light rail

MAIN PRODUCT_02 / AGT / Gwangju Metro Line 2

Specifications & Performance

Vehicle configuration		2 cars per trainset
Vehicle System		Rubbe-tired type Fully unattended operation system
Track Conditions	Track gauge	1,700mm
	Max. axle load	9 ton
	Max. gradient	52°/₀₀ or higher
	Min. curve radius	Main line R=50m, siding R=40m
	Contact-line voltage	DC 750V
	Power supply method	Third rail
Load Conditions	Tare weight	11.7 ton/car or less
	Full-load weight	18 ton/car or less
Max. design speed		80km/h
Max. operating speed		70km/h

Acceleration	3.5km/h/s
Deceleration	Service braking 3.5km/h/s, Emergency braking 4.5km/h/s
Speed-control method	Acceleration/deceleration control by regenerative-braking-combined VVVF inverter control
Braking method	Regenerative braking combined with electrocommand air braking
Cabin noise standard	75dB(A) Leq (5sec, Fast Mode)or less
Vehicle length	9,960mm/car
Vehicle width	2,400mm/car
Vehicle height	3,500mm(from running surface)/car
Bogie center distance	5,800mm/car

Vehicle Features

- A free movement space where areas are clearly defined and users feel cared for
- Both sides of the ceiling center finished in bright blue to convey a sense of speed and spatial comfort
- Seats are bench-type but distinguished so each can be recognized individually

MAIN PRODUCT_02 / AGT / Sillim Line

Specification & Performance

Max. design speed		70km/h or higher
Max. operating speed		60km/h or higher
Deceleration	Service braking	3.5km/h/s or higher
	Emergency braking	4.5km/h/s or higher
Track		1,700mm (distance between runningwheel centers)
Guid-erail spacing		2,900mm (distance between guide rails)
Max. axle load		9ton
Max. gradient		Rubber-tired type, fully unattended
Min. curve radius		Main line 80m / siding 30m
Platform edge height		1,095mm (from running surface)
Contac-tline nominal voltage		DC 750V
Power supply method		Third rail

Vehicle Features

- 3-car trainset configuration improves passenger transport capacity
- Rubber-tired system reduces noise and vibration
- Korean-type wireless-communication-based train control system enhances safety
- Driverless operation system increases stability and reduces operating costs

MAIN PRODUCT_02 / AGT / Yangsan Line

Key Specifications

Category	Item	Details
Load Conditions	Passenger load	62kg/person
	Max. passenger load	Performance basis 6ton/car
Vehicle Dimensions	Trainset length	19,280mm (2 cars per trainset)
	Carbody length	9,140mm (coupledface 9,640mm)
	Vehicle height	3,500mm
	Vehicle width	2,400mm
Performance Specifications	Max. design speed	70km/h
	Max. operating speed	60km/h
	Acceleration	3.5km/h/s or higher(from stop to 30km/h)
	Deceleration	3.5km/h/s(service), 4.5km/h/s(emergency)
	Speed control	Acceleration/deceleration control by VVVF inverter
	Braking method	Regenerative braking combined with electrocommand air braking (loadweighing)

Vehicle Features

Windowdimming device and air-quality improvement unit installed

- Window-dimming devices installed to prevent invasion of privacy in densely residential areas during main-line operation
- Air-quality improvement unit installed to reduce fine dust in the cabin



- Magic glass applied for windowdimming
- Windows opacified on specific sections
- Airflow: 300 m³/h (2 units installed per car)
- Duallayer filter, flameretardant grade per technical standard

Pantograph (+)(−) integrated structure

- Increased number of pantographs per car improves currentsharing rate
- Distributed current sharing improves collector-shoe life

- (+)(−) integrated, 4 sets installed per 2 cars

Cabin doors double-leaf pocket type Applied

- Changed from singleleaf outsidesliding to doubleleaf pocket type
- Improved blocking of external noise and secured durability

- Structural airtightness gives noise advantages
- Unity with the doubleleaf PSD type

Operating Conditions

Category	Item	Details
Track Conditions	Track gauge	1,700mm
	Max. axle load	9ton
	Max. gradient	58‰(main line max. 50‰)
	Platform height	1,080mm
	Min. curve radius	Main line: 40m, siding: 30m

MAIN PRODUCT_02 / AGT / Busan Sasang – Hadan Line

Key Specifications

Category	Item	Details
Load Conditions	Passenger load	62kg/person
	Max. passenger load	6ton/car
Vehicle Dimensions	Trainset length	28,920mm(3 cars per trainset)
	Carbody length	9,140mm(coupledface 9,640 mm)
	Vehicle(roof) height	3,500mm
	Vehicle width	2,400mm
Performance Specifications	Max. design speed	70km/h
	Max. operating speed	60km/h
	Acceleration	3.5km/h/s or higher(from stop to 30km/h)
	Deceleration	3.5km/h/s(service), 4.5km/h/s(emergency)
	Speed control	Acceleration/deceleration control by VVVF inverter
	Braking method	Regenerative braking combined with electrocommand air braking (loadweighing)

Vehicle Features

AL carbody applied

- Main framing designed as a doubleskin structure for excellent impact absorption and a lightweight, highstrength design.
- Design satisfying structuralsafety assessment and crashworthiness standards.

Improved bogie running stability

- Rotationcontrol springs improved to bidirectional to enhance bogie curverunning stability.
- Added a device that absorbs vibration from the guide rail and guide wheels.

Cabin doors double-leaf pocket type Applied

- Changed from singleleaf outside-sliding to double-leaf pocket type.
- Improved blocking of external noise and secured durability.

Air-conditioning duct improved structure

- Changed from direct injection at the cabin ends to a duct structure for uniform distribution throughout the cabin.
- Resolved passenger discomfort from direct injection and secured cooling efficiency.

Pantograph (+)(-) integrated structure applied

- Increased number of pantographs per car improves current-sharing rate.
- Distributed current sharing improves collectorshoe life.

Vehicle underframe improved noise blocking

- Applied a semipermanent levelingcompound structure with excellent maintainability to the cabin-floor upper structure.
- Added expansion foam and soundabsorbing material to the underframe to suppress the ingress of underframe noise and vibration into the cabin.

Operating Conditions

Category	Item	Details
Track Conditions	Track gauge	1,700mm
	Max. axle load	9ton
	Max. gradient	56‰(main line)
	Platform height	1,080mm
	Min. curve radius	Main line: 40m, siding: 40m

MAIN PRODUCT_02 / APM / Incheon International Airport IAT

Specifications & Performance

Trainset configuration	1 car per trainset (multipleunit operation possible)	Operation method	ATP/ATO driverless operation
Vehicle Dimensions	Length: 11,200mm Height: 3,725mm Width: 2,760mm	Key Performance	Max. design speed: 80km/h Acceleration: 3.5km/h/s Service deceleration: 3.5km/h/s Emergency deceleration: 4.7km/h/s
Vehicle Weight	Tare: 17.5tons or less Full: 28.4tons	Track Conditions	Track gauge: 1,850mm Max. gradient: 60% Min. curve radius: 30m
Passenger capacity	88	Braking method	Regenerative and air braking
Power supply method	DC 750V, third rail	Cabin noise	80dB or less

Vehicle Features

- Wide doors enable rapid boarding and alighting of passengers
- Flexible trainset configuration according to transport demand (singlecar operation possible)
- Expanded standing space for highcapacity boarding of passengers on shortdistance sections
- TRIP STOP device installed for vehicle safety
- Increased number of installed LCDs to deliver diverse information to passengers

MAIN PRODUCT_02 / APM / Soekarno-Hatta International Airport Skytrain

Specifications & Performance

Trainset configuration	2 cars per trainset (multipleunit operation possible)	Operation method	ATP/ATO driverless operation
Vehicle Dimensions	Length: 11,200mm Height: 3,975mm Width: 2,690mm	Key Performance	Max. design speed: 80km/h Acceleration: 3.6km/h/s Service deceleration: 3.6km/h/s Emergency deceleration: 4.5km/h/s
Vehicle Weight	Tare: 17tons Full: 27.85tons	Track Conditions	Track gauge 1,850mm Max. gradient 60‰ Min. curve radius 30m
Passenger capacity	88	Power supply method	DC 750V third rail
Braking method	Regenerative and air braking		

Vehicle Features

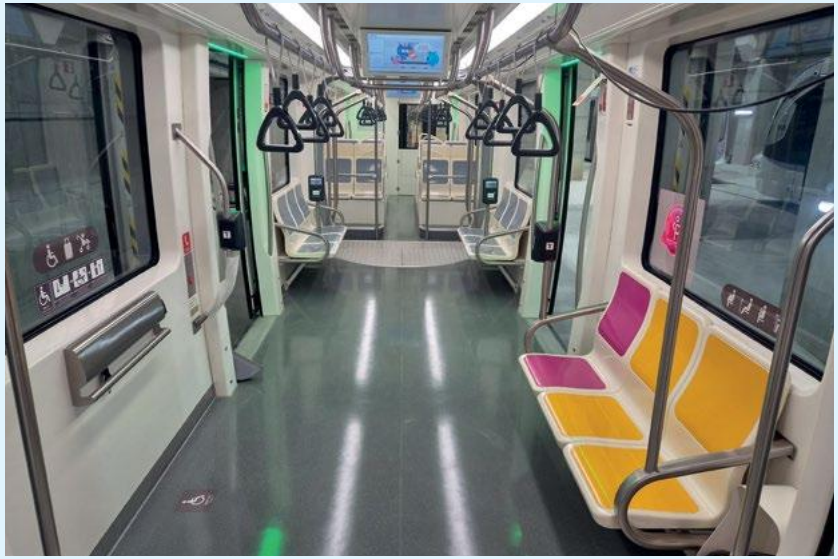
- Flexible multiple-unit operation according to transport demand
- Real-time transmission of vehicle status and information to the control room
- Provides manned-operation convenience on a driverlessoperation basis
- Buffer systems mounted on the guidance device to reduce vibration and noise
- Meets the international standard ASCE 21

MAIN PRODUCT **03**

TRAM


남위례

MAIN PRODUCT_03 / TRAM / Wirye Line Tram



Vehicle Specifications

Item		Specification
Vehicle type		Battery-mounted catenaryfree lowfloor tram
Trainset		5 modules per trainset
Battery capacity		178kWh/trainset
Max. vehicle speed		Design 70km/h, operating 50km/h
Acceleration		1.2m/s²
Deceleration		Service 1.2m/s², emergency 2.7m/s²
Min. turning radius		25m
Max. gradient		60‰
Passenger capacity		161(rated), 260(full)
Dimensions	Overall length (5module basis)	34,000mm
	Width/height	2,650mm / 3,600mm (from rail surface)
	Interior floor height	350mm (from rail surface, at doorway)
Weight	Tare (5module basis)	50tons
	Full load (5module basis)	67.4tons

Vehicle Features

- A streamlined classic style for a refined, stable image
- A design in harmony with nature and the surrounding environment
- Purple applied, carrying the spirit of Baekje
- Comfortable, cool bluetoned seats applied

Tram Features

- One tram trainset offers high transport capacity able to replace 174 cars, using roads and resources efficiently
- LTO batteries enable catenaryfree route operation, maintaining clean cityscapes—an ecofriendly transit mode well suited to new towns
- The low-floor tram is advantageous for boarding by the elderly and people with disabilities, and integration with road and rail systems secures punctuality

Wirye Line Tram

- 100% lowfloor independent-wheel bogies applied
- High-performance, high-efficiency batteries used
- Energy reduction through minimized power conversion
- A modern design suited to the urban environment

MAIN PRODUCT **04**

DEMU

Diesel-Electric Multiple Unit

MAIN PRODUCT_04 / DEMU

Specifications & Performance

Trainset configuration	4 cars per trainset	Braking method	Regenerative and air braking
Vehicle Dimensions	Length: 20,000mm Height: 4,020mm Width: 3,180mm	Key Performance	Max. design speed: 100km/h Acceleration: 1.22km/h/s Service deceleration: 2.88km/h/s Emergency deceleration: 3.6km/h/s
Vehicle Weight	Tare: 43tons or less Full: 51tons or less	Track Conditions	Track gauge: 1,067mm
Passenger capacity	83 to 139	Power supply	Onboard diesel-engine generation

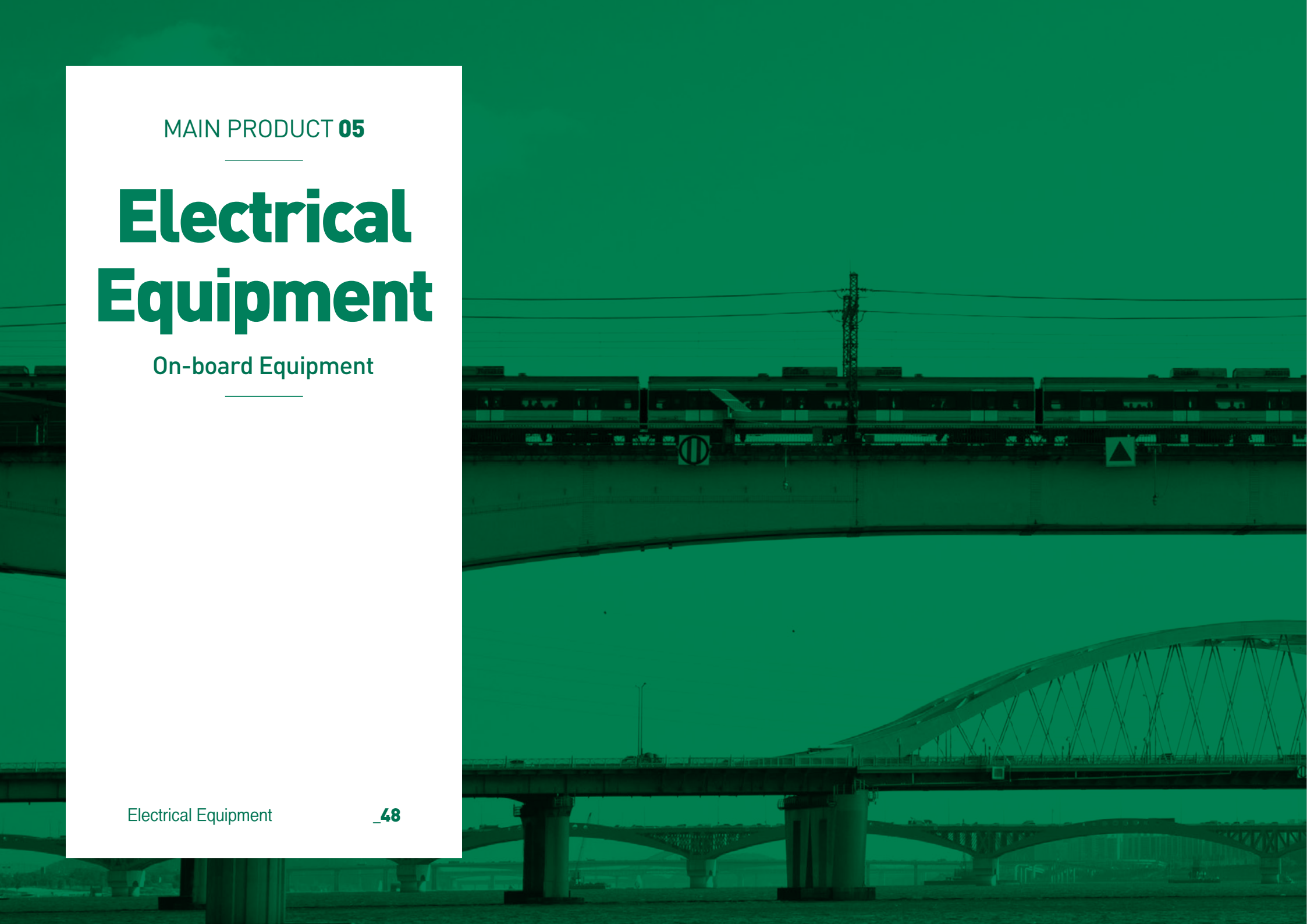
Vehicle Features

- Self power supply via the onboard engine and generator
- An economical, eco-friendly system requiring no catenary or substation facilities
- Lower placement of diesel engine and generator equipment improves interior-space utilization
- Combines the advantages of EMU vehicle systems and diesel vehicle systems
- A train monitoring system secures inspection convenience and reduces maintenance costs

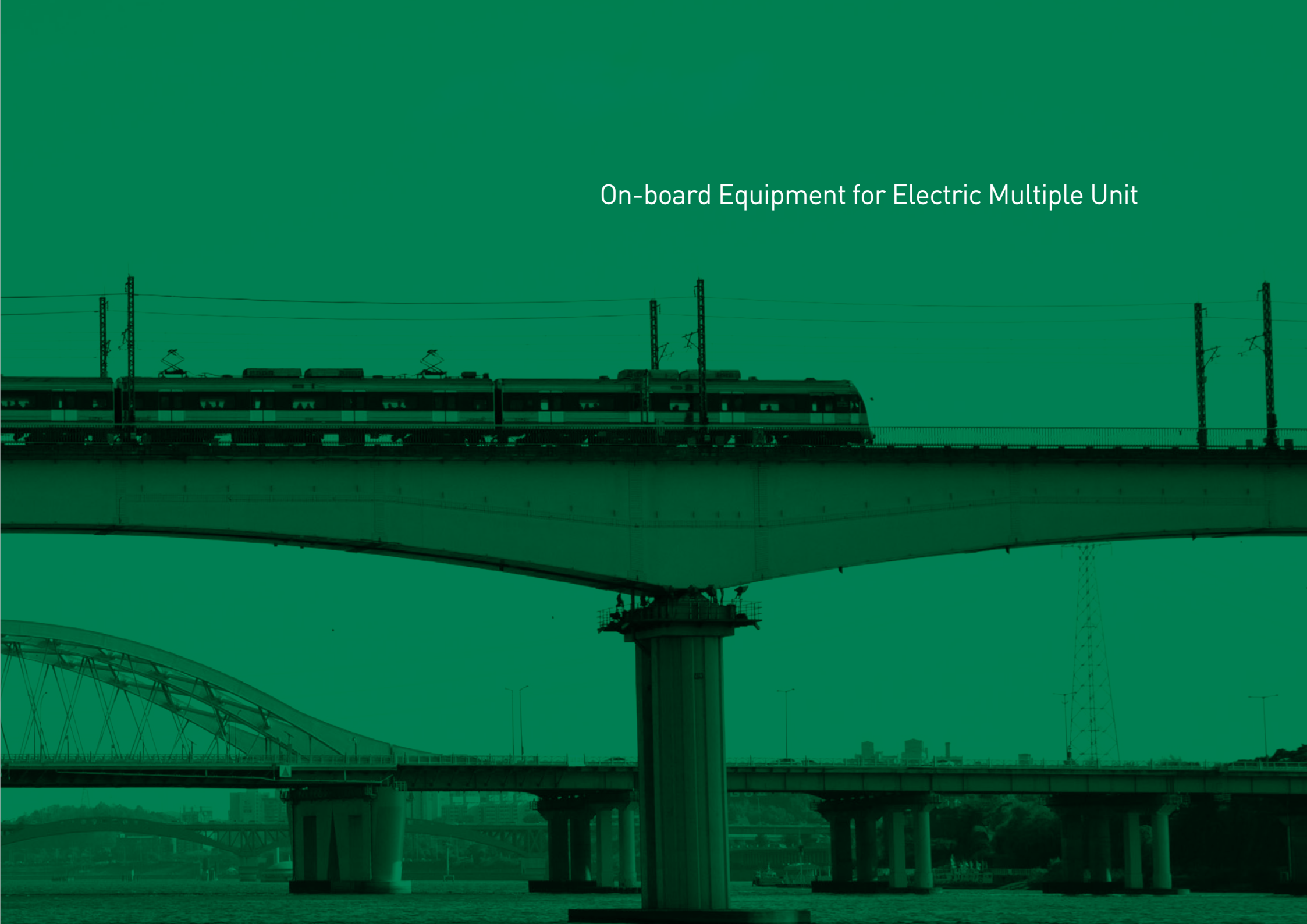
MAIN PRODUCT **05**

Electrical Equipment

On-board Equipment



On-board Equipment for Electric Multiple Unit



MAIN PRODUCT_05 / ELECTRICAL EQUIPMENT

Propulsion Control System

The propulsion control unit controls vehicle propulsion and regenerative braking. Woojin Industrial Systems has independently developed a highly reliable, compact system and manufactures and supplies it for light rail, subway, trunkline, electric locomotive, and highspeed rolling stock.

Product Overview

AConly Propulsion Control Unit

- Applicable vehicle: AC/DC dualmode EMU
- Input voltage: AC 840V ~ AC 1500V / DC 1500V
- Unit capacity: 750kVA ~ 1264kVA or higher
- Control method: PWM control, vector control

DC-power Urban Rail Propulsion Control Unit

- Applicable vehicle: DC-only urban rail EMU
- Input voltage: DC 1500V
- Unit capacity: 470kVA ~ 1100kVA or highr
- Control method: PWM control, vector control

DC-power Light Rail Propulsion Control Unit

- Applicable vehicle: DC-only lightrail EMU
- Input voltage: DC 750V
- Unit capacity: 250kVA ~ 500kVA or higher
- Control method: PWM control, vector control

Propulsion Control Unit for Electric Locomotive / KTX

- Applicable vehicle: electric locomotive, KTX
- Input voltage: AC 1,230V / AC 1,800V
- Unit capacity: 1,600kVA or higher / 2,260kVA
- Control method: PWM control, vector control / phase control,currenttype inverter control

Auxiliary Power Supply System

The auxiliary power supply supplies power to the air conditioning, lighting, compressor, and other equipment requiring vehicle auxiliary power. Woojin Industrial Systems has independently developed a highly reliable, compact and lightweight system, and designs, manufactures, and supplies it for light rail, subway, trunkline, electric locomotive, and highspeed rolling stock.

Product Overview

AC-power Auxiliary Power Supply

- Applicable vehicle: AC/DC dualmode EMU
- Input voltage: AC 1500V ~ AC 1600V / DC 1500V
- Unit capacity: 190kVA ~ 250kVA or higher
- Control method: PWM control

DC-power Urban Rail Auxiliary Power Supply

- Applicable vehicle: DC-only urban rail EMU
- Input voltage: DC 1500V
- Unit capacity: 140kVA ~ 250kVA
- Control method: PWM control

DC-power Light Rail Auxiliary Power Supply

- Applicable vehicle: DC-only lightrail EMU
- Input voltage: DC 750V
- Unit capacity: 50kVA ~ 70kVA
- Control method: PWM control

Resonant Auxiliary Power Supply

- Applicable vehicle: DC-only urban rail EMU
- Input voltage: DC 1500V
- Unit capacity: 200kVA
- Control method: PWM control

TCMS(Train Control and Monitoring System)

The train control and monitoring system displays information needed for vehicle operation in real time and stores control, test, and fault information for the vehicle's subsystems. Woojin Industrial Systems supplies the TCMS in addition to complete vehicles and electrical equipment, providing a onestop solution.

Product Overview

TC

TC(Train Computer)

- The TC comprises LIU1 and LIU2
- LIU1 and LIU2 have identical H/W and identical S/W
- LIU1 and LIU2 are configured with separate powersupply uni
- LIU2 provides a backup function by checking the status of LIU1, forming a redundant structure
- Each LIU comprises MCPU (1ea), ECM (1ea), DIM (3ea), AUX (2ea), AVR (1ea)

Supply voltage	DC 100V
Digital input	128 CH
Digital output	28 CH
Communication port RS485	8 CH
Main communication	Ethernet Network
Power consumption	110W

CC

CC(Car Computer)

- The CC receives data from the TC via highspeed communication and controls and monitors the train status of each car
- The CC comprises ECM (1ea), DIM (2ea), AUX (2ea), AVR (1ea)

Supply voltage	DC 100V
Digital input	64 CH
Digital output	14 CH
Communication port RS485	4 CH
Main communication	Ethernet Network
Power consumption	40W

DU

DU(Dixplay Unit)

- Displays information collected and organized by the TC
- Displays relevant information on screen when a fault occurs
- Touchscreen applied in consideration of ease of use for operators and inspectors
- 12.1inch TFT color LCD large screen with a clear viewing angle applied

Supply voltage	DC 100V
Display size	21.1 inch
Resolution	800 × 600
Input method	Touchscreen
Power consumption	25W

Communication System

A system that performs trainoperation announcements—station information, notices, advertisements, and more—for passenger safety and convenience. Woojin Industrial Systems has successfully entered the U.S. market, with a delivery record to SEPTA, DENVER, and others.

Central controller

Monitor speaker

Emergency intercom

Setting un

Output amplifier

Side controller

LED display

MAIN PRODUCT **06**

Rolling Stock Refurbishment

Refurbishment / Upgrade

ROLLING STOCK REFURBISHMENT/UPGRADE

Rolling Stock Refurbishment/Upgrade

Building on top-tier technology, Woojin Industrial Systems provides customized vehicle-refurbishment solutions and, by applying smart systems of forwardlooking change and ecofriendly technology, builds safer, future-ready vehicles.

Vehicle performance upgrade

Through customized vehicle refurbishment, we provide performance enhancement, strengthened safety, and facilityupgrade services

Life extension

Through customized parts supply, we restore vehicle performance and refurbish vehicles to extend their service life

Customized service

Vehicles can be upgraded and refurbished to meet diverse customer requirements, including enhancements tailored to specific operational needs

Track record

- U.S. LA METRO A650 HRV Refurbishment project
- Seattle public address system and auxiliary power supply upgrade project
- Philippines LRT2 project and many others

MAIN PRODUCT_06 / Rolling Stock Refurbishment / LA METRO A650

Key Specifications

Item		Details
Basic trainset		2 cars per trainset (up to 6 cars coupled)
Vehicle Dimensions	Length	22,860mm
	Height	3,644mm
	Width	3,200 mm
Vehicle Weight	Tare	Trainset length
	Full load	Trainset length
Passenger capacity		181/car
Braking method	Service	Dynamic braking priority, friction-braking-assisted blending
	Dynamic	Regenerative braking, rheostatic braking
	Emergency	Friction braking
Key Performance	Max. design speed	121km/h (75mph)
	Max. operating speed	113km/h (70mph)
	Acceleration	1.34m/s² (0~32km/h range)
	Deceleration	1.34m/s² ±5%(service), 최소 1.34 m/s² or higher (emergency)
Track Conditins	Track gauge	1,435mm(standard gauge)
Power Supply Method	Method	Third rail, over-running
	Nominal voltage	750VDC

Refurbishment Features

State-of-the-art modernization of core systems

- Introducing the latest propulsion inverter and friction-brake control unit (ECU) greatly improves drive performance and braking reliability. A new Ethernet-based monitoring & diagnostic system (MDS) records fault data in real time and maximizes maintenance efficiency.

Innovation in passenger convenience and service quality

- Full HVAC replacement creates a comfortable interior. All cabin lighting is replaced with high-efficiency LED, and an automated announcement system (AAS) plus front, side, and interior LED destination displays are newly installed to provide accurate operating information.

Operation & maintenance (O&M) optimization

- An ergonomically improved new manual controller enhances driveroperation convenience.
- New inter-car cables and connectors with waterproof sealing fundamentally prevent pin-corrosion defects.

Secured safety and system integration

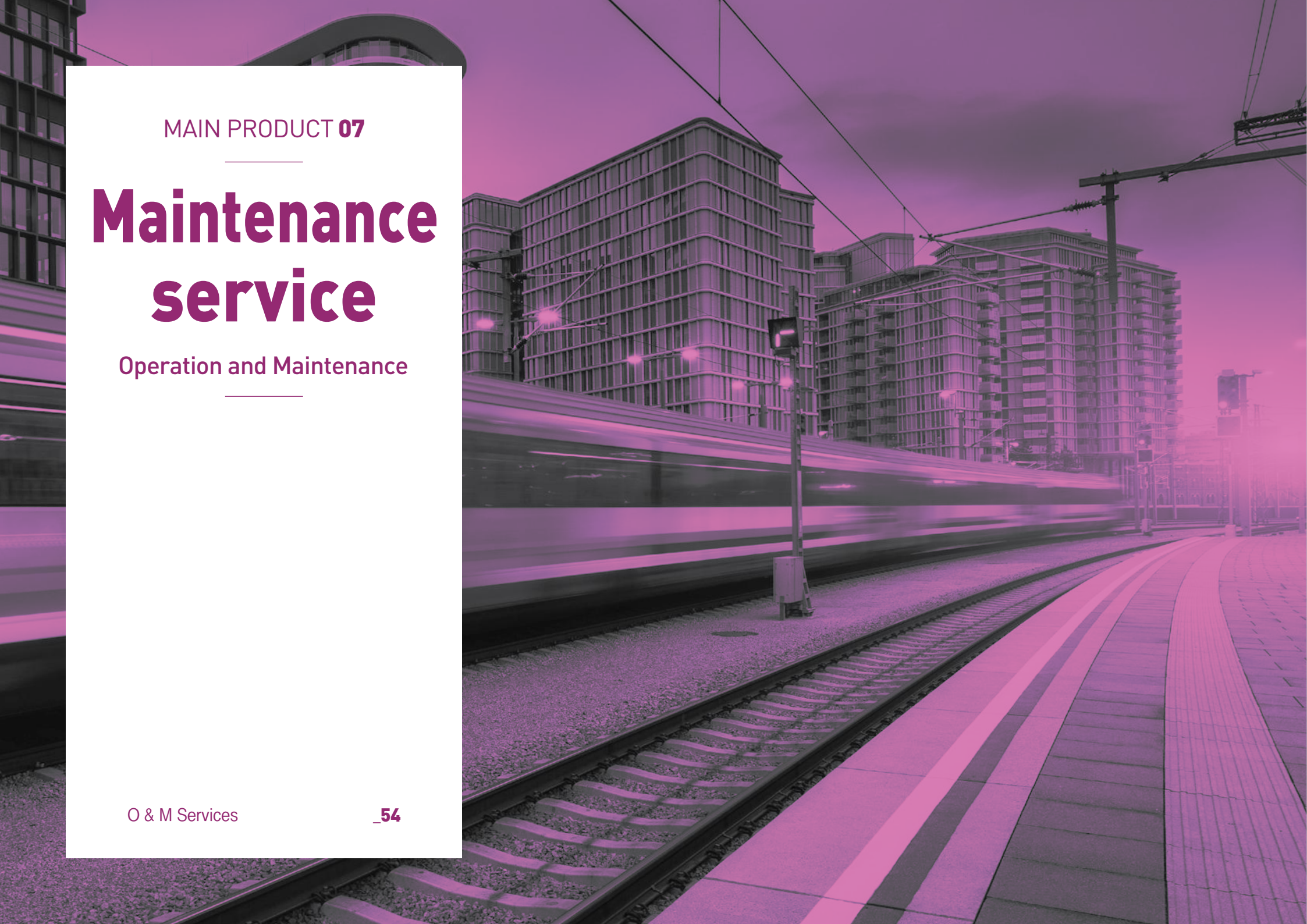
- Precise bogieframe inspection (MPI) and repair, plus full new replacement of major parts such as air springs and shock absorbers, secure structural safety and ride comfort.
- Optimized ATC/TWC interfacing and a target of achieving a systemwide mean miles between failures (MMBF) of 100,000 miles or more.

Refurbishment Scope

Key System	Refurbishment Scope
Coupler	Replacement of semi-permanent inter-car cables (waterproof sealing, connector relocation)
Operator's Cab	New replacement of the manual controller
HVAC	Full system replacement (latest equipment)
Lighting	Fluorescent → LED replacement
Propulsion	Replacement of propulsion and dynamic-braking control units, traction-motor overhaul, braking-resistor inspection
Bogie	Bogie-frame inspection/repair, replacement of aged parts
Friction Brake	Braking control unit replacement (cylinders, shoes, compressor, tanks, and piping reused)
Communications	Full replacement of PA equipment (including automated announcements), LED destination display replacement, new interior electronic signage
ATC / TWC	Integrated interfacing of ATP, ATO, and TWC equipment

Before

After



MAIN PRODUCT **07**

Maintenance service

Operation and Maintenance

OPERATION AND MAINTENANCE

O & M Services

Building on our rolling stock and electrical equipment manufacturing technology and experience, we provide the highest level of maintenance service across diverse fields including vehicle maintenance, control, and passenger service.

Integrated operation control center

Supports efficient operation through realtime monitoring of train operation, systems, and facilities, and provides safe operation through rapid response when incidents occur

Vehicle and facility maintenance

Provides continuous maintenance management to optimize the performance, safety, and service life of vehicles, electrical equipment, and facilities over the long term

Customer tailored service

Provides customer service such as tailored information, lostandfound handling, and passenger complaints, and creates a clean, safe station environment

Track record

- Woojin Metro Co., Ltd.
  (Vehicle: Bombardier VAL)
- Woojin Metro Yangsan Co., Ltd.
  (Vehicle: Woojin Yangsan Line LRT)
- UiSinseol Light Rail Operation Co., Ltd.
  (Vehicle: Hyundai Rotem steelwheel LRT)

ECO-FRIENDLY GREEN GROWTH

We will be a company that respects humanity and puts the environment first!

We will be a company that respects humanity and puts the environment first!

The environment is our precious asset

Woojin Industrial Systems has established an environmental management policy and steadily pursues environmental and safety-improvement activities for its products, processes, workplaces, and local communities, fulfilling its role and responsibility as a green company to build a society that puts the environment first and respects humanity.

HUMAN RESOURCES DEVELOPMENT

Within an open space, daring talent
creates new history!

Only knowledge and human resources that challenge the shifting paradigm and flexibly respond to a changing environment can lead this era!

For the protagonists of today and tomorrow, Woojin Industrial Systems leads in knowledge management—from building a knowledgesharing infrastructure and securing outstanding research talent, to practical industry-academia collaboration, overseas training for globalization, and cultivating knowledge technicians, workers, and multi-skilled personnel. This is because we know well that our future rests in the hands of talent that dreams and dares.

CERTIFICATES & AWARDS

Woojin Industrial Systems will supply you with the finest, latest products!

Through rigorous quality management and new-technology development, Woojin Industrial Systems has grown into a world-class rolling stock manufacturer, competing confidently with leading companies in domestic and global markets. For the safety and comfortable travel of every single rail passenger, we will be a company that thinks one step ahead and one step deeper—a company customers can trust and rely on.

Awards

Oct. 1985	Awarded Bronze Tower for 22nd Savings Day	President
Nov. 1985	Awarded Order of Import Substitution Merit on the 22nd Trade Day	Minister of Commerce and Industry
Nov. 1987	Awarded Stone Pagoda Order of Merit on the 24th Trade Day	President
Nov. 1993	Received Prime Minister's Award of Merit on the 30th Trade Day	Prime Minister
Dec. 1994	Awarded Grand Prize of Chungcheongbuk-do Small Businessmen Award	Governor of Chungcheongbuk-do Province
Nov. 1996	Received 5 Million Dollar Export Tower Award on the 33rd Trade Day	President
July 1998	Selected as venture company	Head of Chungcheongbuk-do Small and Medium Business Administration
Jan. 1999	Selected as Company with Technological Competitiveness	Head of Small and Medium Business Administration
Mar. 1999	Selected as promising small business	Head of Small and Medium Business Administration
Sep. 1999	Awarded Iron Tower Order of Industrial Service Merit for 100th anniversary of railway	President
June 2000	Selected as Top Venture Company	Governor of Chungcheongbuk-do
Nov. 2001	Selected as Leading Company in Parts/Materials Export	Ministry of Trade, Industry and Energy
Sep. 2005	Selected as technological innovation-type small business	Head of Small and Medium Business Administration
Mar. 2006	Received award certificate on the 38th Taxpayers Day	Prime Minister
May 2009	Received Silver Tower Order of Industrial Service Merit as an honorable small enterprise	President
Feb. 2010	Received National Green Tech Award (energy storage system)	Minister of Knowledge Economy
June 2010	Received award certificate (for land and maritime research and development results)	Minister of Land, Transport and Maritime Affairs
Nov. 2011	Awarded 10 Million Dollar Export Tower on Trade Day	President
May 2012	Selected as World Class 300	Minister of Knowledge Economy
July 2013	Received award certificate (for commercialization of land and transport research and development results)	Minister of Land, Transport and Maritime Affairs
Nov. 2014	Awarded 30 Million Dollar Export Tower	President
Mar. 2019	Received Honest Taxpayer award certificate	Minister of Economy and Finance
Nov. 2021	Selected as Time-honored Business	Ministry of SMEs and Startups
Mar. 2025	Meritorious Service on Commerce and Industry Day	Presidential Citation

Certifications

Quality certification

- KS mark: Power type fixedwinding resistor
- ISO 9001 certification
- EM mark: Power converter
- Platform screen door quality certification
- ISO 14001 certification
- ISO 45001 certification

Technological certification

- **New Technology (NeT) certification**
  - 2006: Korean standard rubber tire light rail transit vehicle system technology
  - 2009: Electric railroad braking energy storage system
- **Patent**
  - Control Device for the Operation of EMU and its Method
  - 3-Phase Vacuum Contactor
  - Remote Operated Circuit of Tracked Vehicle and others
- **Utility model**
  - Rheostatic braking resistor for electric locomotives
  - Fixed contact section of the AC/DC changeover switch for EMUs, and 23 others

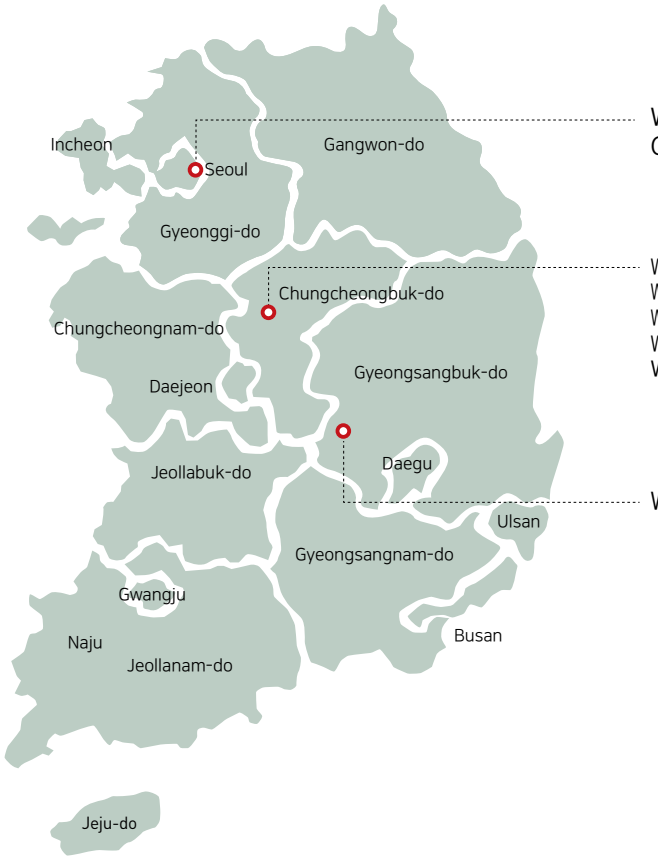
Patent

Time-honored business Certification

New Technology Certification

WOOJIN NETWORK

Practicing a more convenient and safe new transit for the future—our technology, Woojin Industrial Systems!



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Godeok Headquarters

Woojin Industrial Systems Head Office (Goesan)
Woojin Industrial Systems Jeungpyeong Plant (Jeungpyeong)
Woojin Industrial Systems Rolling Stock Test Center (Jeungpyeong)
Woojin Industrial Systems Ochang Plant (Cheongju)
Woojin Precision & Electric

Woojin Industrial Systems Gimcheon Plant

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Woojin Industrial Systems leads the world of new transit.

A safe and comfortable subway, rail as a dependable partner for enjoyable journeys, and new transit that takes you right to your doorstep—all made possible by the products of Woojin Industrial Systems. A company that challenges and strives for the safety and comfort of passengers, a solid company trusted by customers—Woojin Industrial Systems will build the more comfortable newtransit world of the 21st century.

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