



KGID
2026
SEJONG

Digital Transformation in Railway : AI-Driven Safety & Maintenance Innovation

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Senior Manager

Overseas Business Dept. KORAIL

KORAIL, as the Mobility Company Leading the Railway Standards

I KORAIL, the Mobility Company Leading the Railway Standards (Dec. 2023)

➤ Innovating Digital Safety

"Establishing an AI-based integrated safety management system", "Maintenance with cutting-edge technologies", "Tightening RS design and component standards"

➤ Transforming to a Mobility Company

"Establishing KORAIL MaaS", "Smart station&digital service", "Innovating train service"

➤ Improving Financial Health

"Increasing the competitiveness of core businesses", "Business diversification", "Expanding presence overseas "

➤ IT, HR-Centered Corporate Culture

"Building a smart working environment", "Nurturing key talents & Securing cutting edge technologies "

New CEO appointed (Jul 2023)

Established digital management roadmap (Sep 2023)

KORAIL DT Strategy (Oct 2023)

KORAIL New Digital Management (Dec 2023)

➔ As of 2024, 85 strategic initiatives in digital underway

Digital 400PROJECT (Jan 2024)

1. Railway Safety and Health Management Policy

❖ Railroad Safety and Health Management Policy

- ❖ Under the principle that 'safety is the core value and top priority of railroad,' KORAIL internalize and practice a safety-first organization culture
- ❖ A systematic and proactive safety management system covering all stages of railway operations - *from rolling stock to facilities to train services*

Focusing on safety capabilities

- All employees regard safety as the top value and dedicate their organization capabilities to protecting the lives and safety of both employees and the public

Safety Capabilities

Risk Management

Systematization of risk management

- KORAIL has established an inspection and maintenance system for railway vehicles and facilities based on the significance of risk factors to prevent accidents and ensure they do not recur

Field-oriented safety management

- Responsibilities and authorities are clearly defined at each level, reinforcing field-oriented safety management

Safety Management

Railway Safety

Advancement of Railway Safety

- KORAIL continuously enhances its safety management system by integrating digital and smart technologies into the maintenance and operation of rail vehicles and facilities

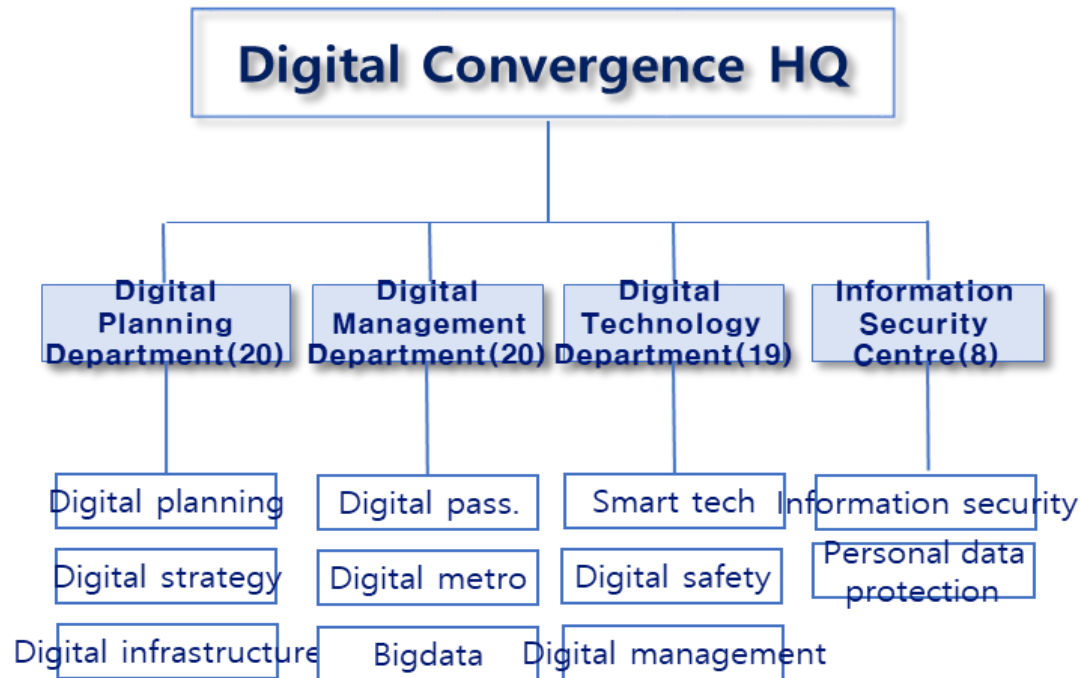


**Railway
safety**

2. Digital Departments

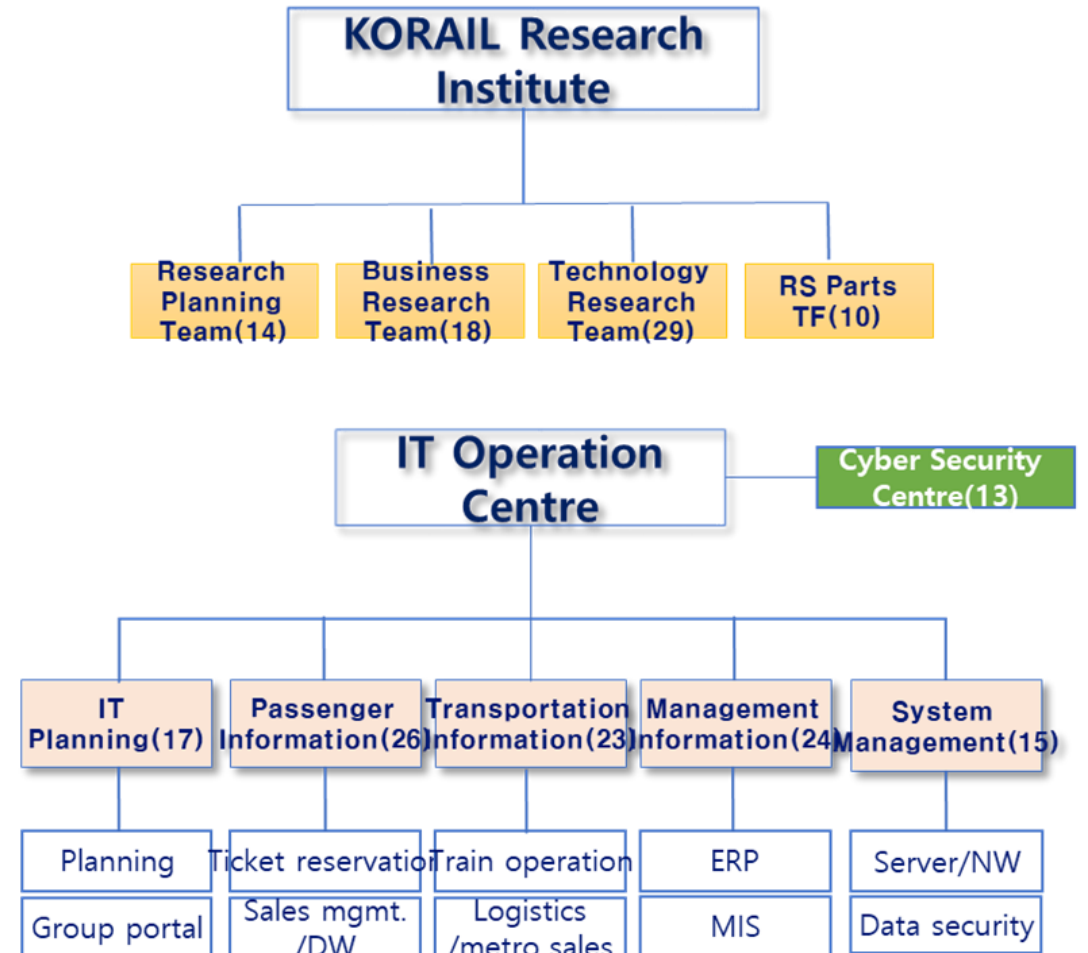
KORAIL HQs

CPO



243 KORAIL employees work for digitalization related affairs

Subordinate Departments

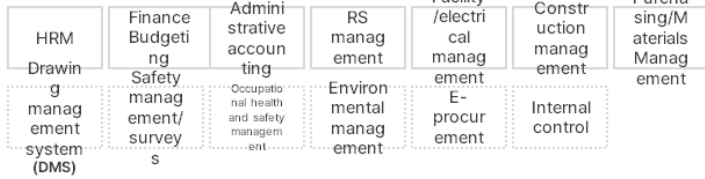


3-1. KORAIL's Information System

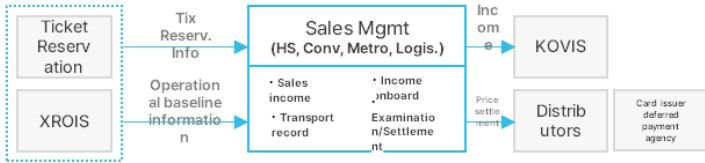
Big Data



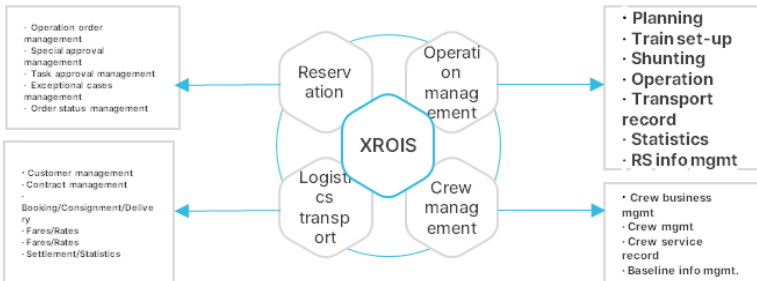
KOVIS (ERP system)



Sales Management System



Railway Operation System (XROIS)



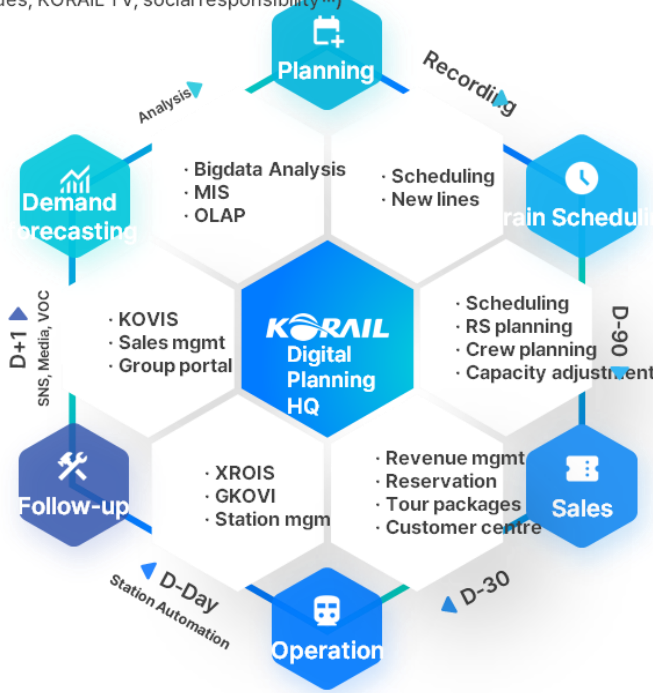
MOT Service

KORAIL Talk Self-ticketing rate using KORAIL Talk 47.2% in 2011 → 89.9% in 2023

KORAIL Metro Talk Service launched in September 2020 150,000 downloads in 2023

Management

Management Information Systems (MIS), Audit Information Systems, Internal Control Assessment System, E-procurement, Shared Growth of the Railways, Academic Administration Group Portal System (e-approval, intranet email, memo report, KORAIL bulletinboard, social media, VOC, affairs related to National Assembly and legal issues, KORAIL TV, social responsibility...)



Metro Information Centre (KOTRIS)

Rail + (R+), Korail Metro Talk, Automatic Fare Collection facilities, Reporting on examination/statistics/settlement for metro sections operated by KORAIL

Video Ticket Reservation 1:1 ticketing guidance from remote agents 133 employees at Rail Help Centre

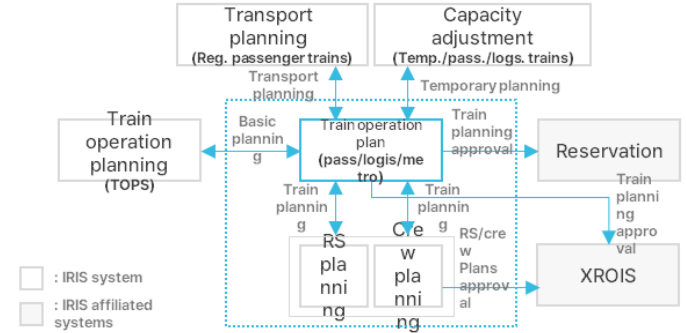
Kiosks (total of 1,866 units)

- WTIM: 472 units
- MTIT: 988 units

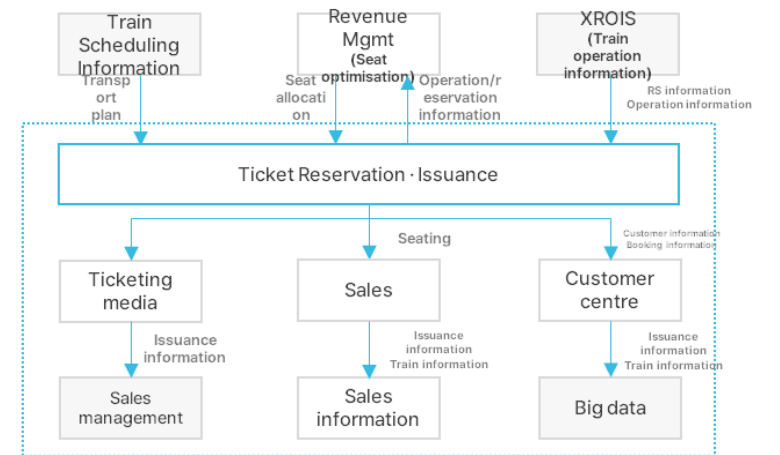
Ticket issuing tablets: 57 units
Kiosks: 349 units

Planning System (IRIS)

Train scheduling, rolling stock planning, crew management, transport capacity coordination



Ticket Reservation · Issuance System

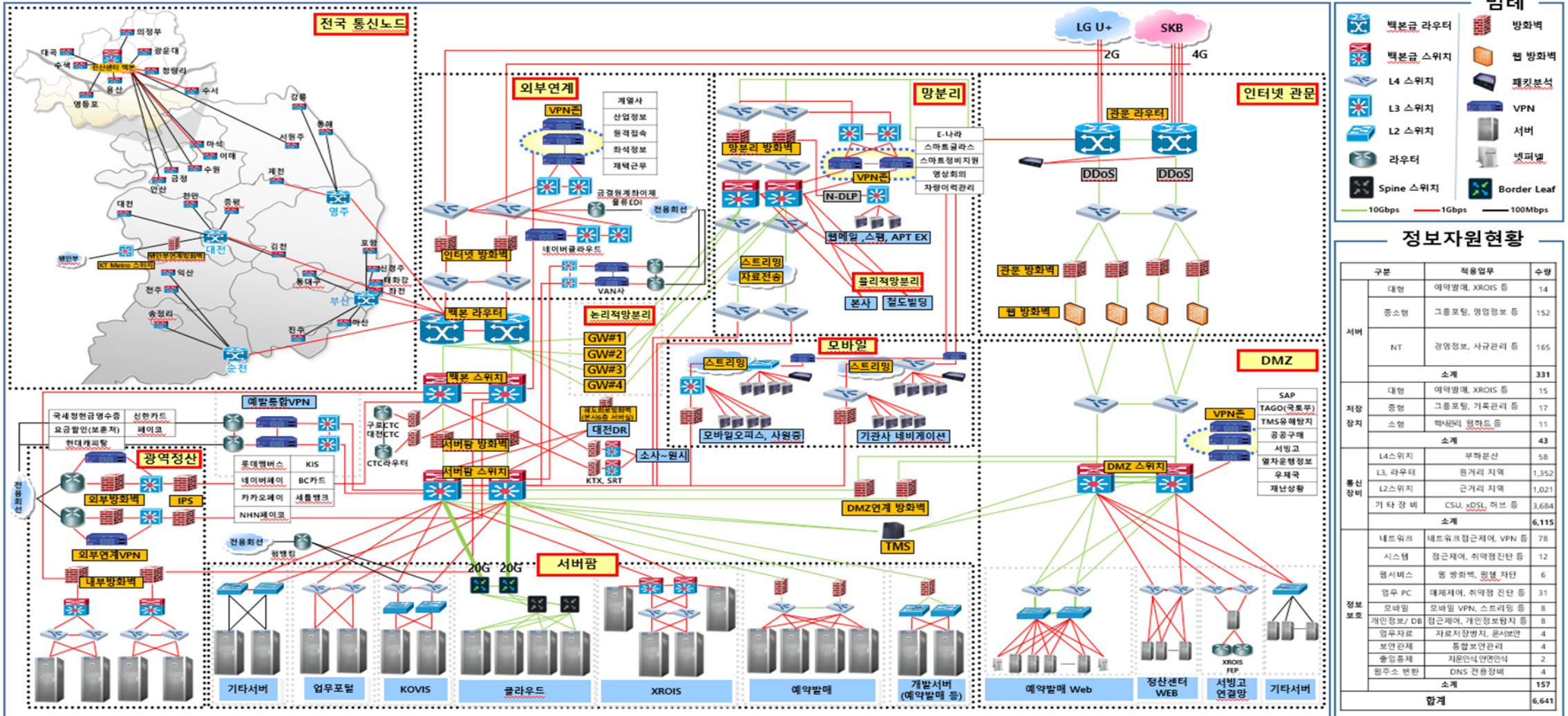


Support for In-House Work

Mobile Office As of April 2024 10k downloads

Drivers (1,882) for in-house works
Maintenance/shunting workers (1,612)
Mobile train crew records
Mobile ID

3-2. KORAIL's Information Management



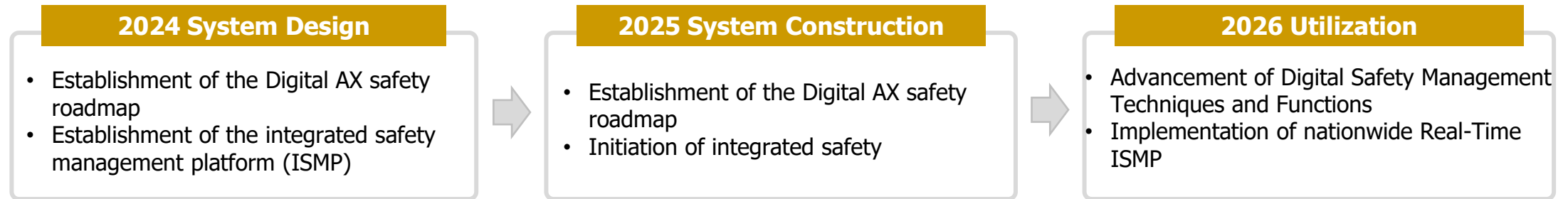
Main 1,806m² in Seoul

DR Centre 230m² in KORAIL HQ in Daejeon

4. AI-Integrated Safety Management Platform

❖ Top Three Global AI Leader Initiative – KORAIL’s new digital management vision

- Established a Digital AX Safety Roadmap and completed the design of an AI-based system and started in 2025
- Built an integrated safety system equipped with AI analytics functions, integrate and analyze data to predict train safety in real time
- Starting in 2026, the system will be expanded into a nationwide real-time integrated safety framework.



- Pilot construction of integrated safety (Dec. 2024)
- Expansion and application of the onboard inspection system for commercial trains (Dedicated team newly established , 12 personnel)
- [2023] Operation of 1 ITX train
- [2024] Additional installation on 3 EMU trainsets (Seoul Metropolitan Railroad section)

Continued expansion of remote equipment



5. AI-Data Based Preventive Maintenance System

❖ Smart & Preventive Safety Management System

- Predicts potential risks before accidents occur and enables proactive responses
- Rail temperature system, catenary tension prediction system, weather information system



Temperature Prediction system

D-2

Inspect sprinkler systems by predicting temperature changes

D-Day

Operate automatic sprinkler systems



Automatic sprinkler system



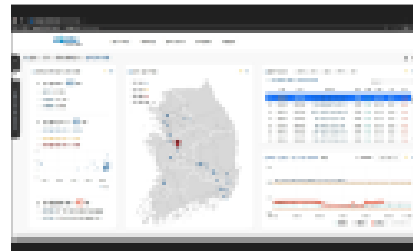
Catenary tension Prediction system

D-2

Use IoT sensors to predict catenary sag and conduct preemptive maintenance

D-Day

Real-time



Catenary tension prediction system



Catenary tension Prediction system

D-2

Predict landslides & tree fall risks from typhoons & heavy rain; perform preemptive maintenance

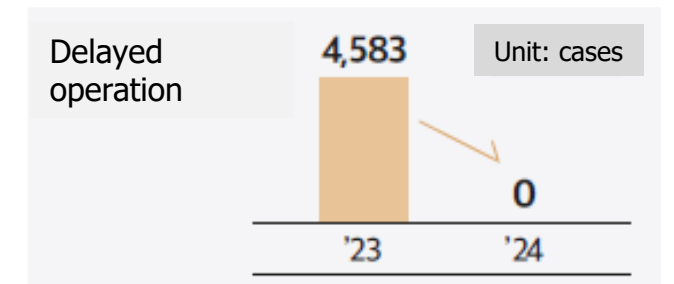
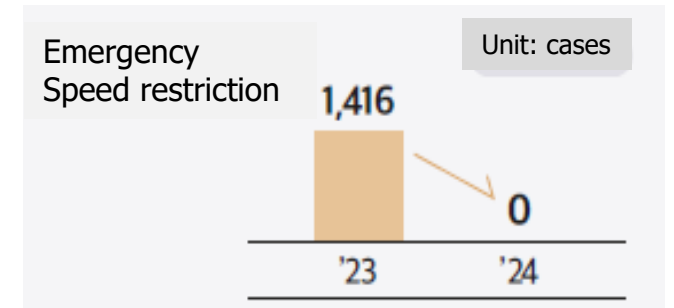
D-Day

On-site inspections of high risk areas



Weather information prediction

Train delays due to heat waves and torrential rain in 2024



2026년 4월 20일 17:00 발표 ▶ □ (통합) 내

기상 관측 Weather Observation

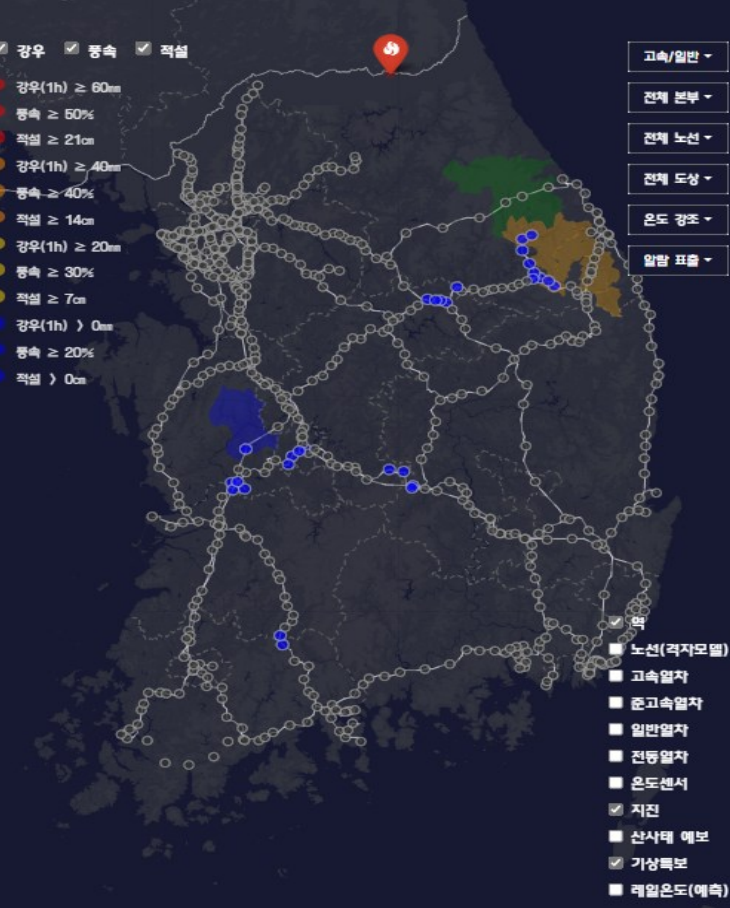
강수/풍속 기준 : 17:09 / 적설 기준 : 17:00

강우 개소	강우 개소	적설 개소	강풍 개소
0	0	0	0

시간당강우 연속강우 적설 강풍

- 강우 ≥ 60mm
- 강우 ≥ 40mm
- 강우 ≥ 20mm
- 강우 > 0mm
- 강우 = 0mm
- 연속강우 ≥ 400mm
- 연속강우 ≥ 300mm
- 연속강우 ≥ 200mm
- 연속강우 ≥ 100mm
- 연속강우 < 100mm
- 적설 ≥ 21cm
- 적설 ≥ 14cm
- 적설 ≥ 7cm
- 적설 > 0cm
- 적설 = 0cm
- 강풍 ≥ 50%
- 강풍 ≥ 40%
- 강풍 ≥ 30%
- 강풍 ≥ 20%
- 강풍 < 20%

- 강우 풍속 적설
- 강우(1h) ≥ 60mm
- 풍속 ≥ 50%
- 적설 ≥ 21cm
- 강우(1h) ≥ 40mm
- 풍속 ≥ 40%
- 적설 ≥ 14cm
- 강우(1h) ≥ 20mm
- 풍속 ≥ 30%
- 적설 ≥ 7cm
- 강우(1h) > 0mm
- 풍속 ≥ 20%
- 적설 > 0cm



- 고속/일반
- 전체 본부
- 전체 노선
- 전체 도상
- 온도 강조
- 알람 표시

통제 대상 열차 Train Subject To Control

통제구간 설정

Excel 전체 고속 준고속 일반

Search:

열차번호	운행일자	노선	차량	구분	계획시간	진입역명
- 통제구간 진입 예정 열차가 없습니다.						

기상특보 Weather Warning

특보 발표기준 통보문 발표/해제 지역

특보 발표 현황 Search:

종류	구분	노선	역	지역
강풍	주의보	강릉선	진부	강원동부산지
강풍	주의보	강릉선	대관령	강원동부산지
강풍	주의보	강릉선	남강릉	강원동부산지
강풍	주의보	정선선	아우라지	강원남부산지
강풍	주의보	영동선	신기	강원남부산지
강풍	주의보	태백선	고안	강원남부산지

레일온도센서 Rail Temp

레일 ● 지진 ● 산사태 ● 태풍 ● 산불

전체 정상 점검 55°C 이상

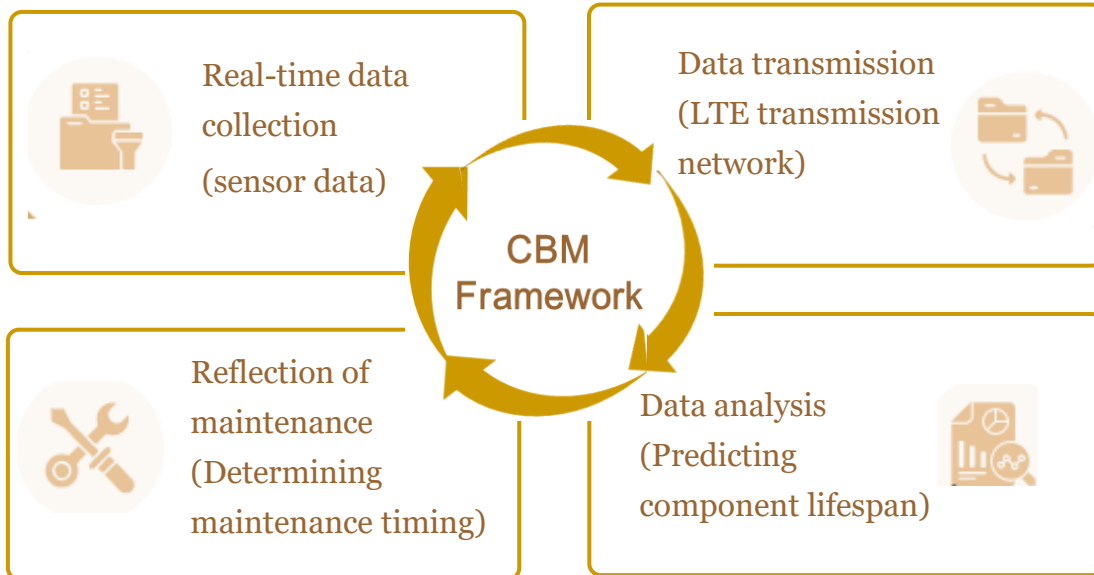
Search:

#	상세	본부	노선	설치위치	계열
338	●●●	부산경남	동해선	승정-가장(아) 28,800km	32,8°C
125	●●●	서부	경부선	구포-가산리 상2선 13,400km(살수)	30,7°C
110	●●●	서울	경의선	월릉-리우 상선 40,200km(살수)	30,4°C
187	●●●	강원	영동선	북오-옥계(단) 155,300km	30,3°C
336	●●●	부산경남	동해선	고대-동해 하선 8,700km(살수)	29,8°C
109	●●●	서울	경의선	운정-금릉 상선 32,200km	28,5°C
324	●●●	부산경남	경부선	부산진구내(상) 441,000km	28,4°C
82	●●●	부산경남	경부고속선	부산역역점(상) 418,000km	28,0°C

6. Digital Transformation & Smart Maintenance

❖ CBM Framework

- Established a Condition-Based Maintenance (CBM) platform to drive innovation in rolling stock maintenance and management
- To collect real-time data from onboard sensors and to transmit and analyze the data over a dedicated communication network to predict failures in advance
- To improve the efficiency and safety of train operations



❖ Smart Maintenance Equipment

- To improve the speed and accuracy of rolling stock maintenance
- Video-based remote technical support is available at distant sites
- Used for maintenance training and incident analysis
- Significantly improving work efficiency by minimizing errors and omissions associated with handwritten records

< Smart glasses >



Background

- Delayed technical support during anomalies
- Difficulty in understanding on-site situations and communication

Utilization

- Intermediate-station technical support and emergency measures
- Produce worker-perspective training videos

< Maintenance log application >

Work Details

Component fastening status	Normal
Coupler connection and quantity status	Normal
Wear pin condition check	Normal

Background

- Maintenance results in notes, then system entry
- Input errors and limited checklist use

Utilization

- Completion of the tablet and mobile input application



Ai
ARTIFICIAL INTELLIGENCE

ROBOT ASSISTANTS

MACHINE LEARNING



High Speed Digital Transformation

We will lead the future of the global railway.

BIG DATA

CLOUD COMPUTING

DEEP LEARNING

CYBER SECURITY

CHATBOT