

Knorr-Bremse Rail Systems Italia

Digital Freight Train

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**Knorr-Bremse makes
mobility safe.
By rail and road. Every day.
Across the globe.**

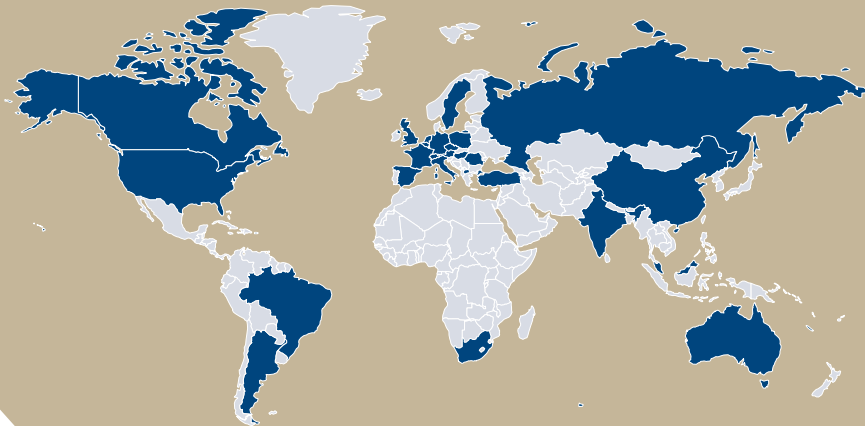
Rail Vehicle Systems



- Braking Systems
- Entrance Systems
- HVAC
- Power electronics
- Signalling systems / TCMS
- Sanitary Systems
- Traction
- RailServices

Commercial Vehicle Systems

- Braking systems
- Air supply systems
- Powertrain systems
- Steering
- Vehicle Dynamics



Knorr-Bremse is based in 30 countries/regions around the world at more than 100 locations,

REVENUE 2021

€ 6.71bn

EMPLOYEES 2021



30.544

R&D 2021

€ 431m

The digital freight train supported by the DAC will be a game changer

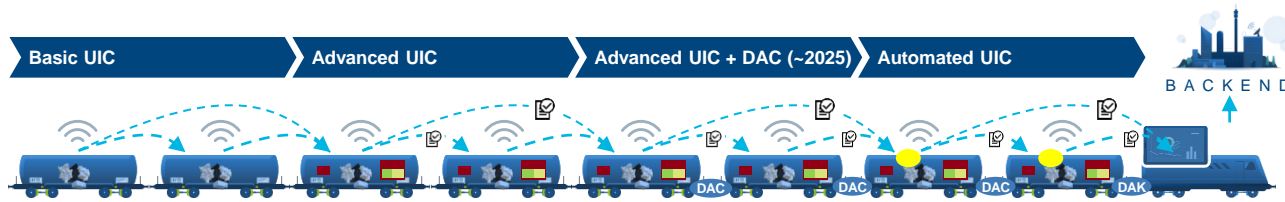
Intelligent Automation - Control and Monitoring

			
Train Preparation  faster processing	Train Operation  more transportation capacity dynamic infrastructure utilization	Shunting & Parking  faster processing	Maintenance Services  Sustain, Enhance, Accelerate
Automated <ul style="list-style-type: none">• Brake test• Train composition detection• Brake weight calculation Remote controlled <ul style="list-style-type: none">• Parking brake control• Brake settings Automated Coupling	Electro-pneumatic brake Monitoring <ul style="list-style-type: none">• Operational brake monitoring• Train integrity detection and monitoring Warnings and alerts <ul style="list-style-type: none">• driver alerts or warnings for critical operation conditions	Remote <ul style="list-style-type: none">• Decoupling (DAC5)• Parking brake control Shunting Assistant etc.	Condition (data) based maintenance Device management <ul style="list-style-type: none">• Over-the-air software update Asset management <ul style="list-style-type: none">• Identification and usage tracking

Freight Train Evolution – from Telematics to Freight Rail Automation

TODAY

from manual,
inefficient freight
train operation
limited application
number



FUTURE (2030)

...to fully
automatic freight
train operation
high application
number

KBs (future) product portfolio

standard UIC with 1st technical futures

- UIC-brake
- telematics / support functions

In-car power supply

intelligent freight wagon with safety relevant train functions

- ⊕ Automated Brake Tests and other SIL-functions
- ⊕ wireless communication

DAC enables further automatization through automatic coupling

- ⊕ Digital Automatic Coupler (DAC)
- ⊕ wired network comm.

train line power supply

final evolution step includes electro-pneumatic braking

- ⊕ EP-brake (direct/ indirect)
- ⊕ advanced DAC-functions

DIGITAL FREIGHT TRAIN combines 3 main streams:

- Digital Automatic Coupler (DAC) – Freight Link
- Freight Rail Automation System – Freight Control
- Digital Services

in a R&D program to support the evolution of rail freight in Europe

DAC makes rail freight fit for the future – it is safe for the staff, automates coupling and enables the digitalization of the freight train

Digital Automatic Coupler

data
pneumatic
power



Digital
Automatic Coupler
(DAC)

Automatic coupling

- ⚙️ mechanical
- 💨 pneumatic
- ⚡ Electrical / digital

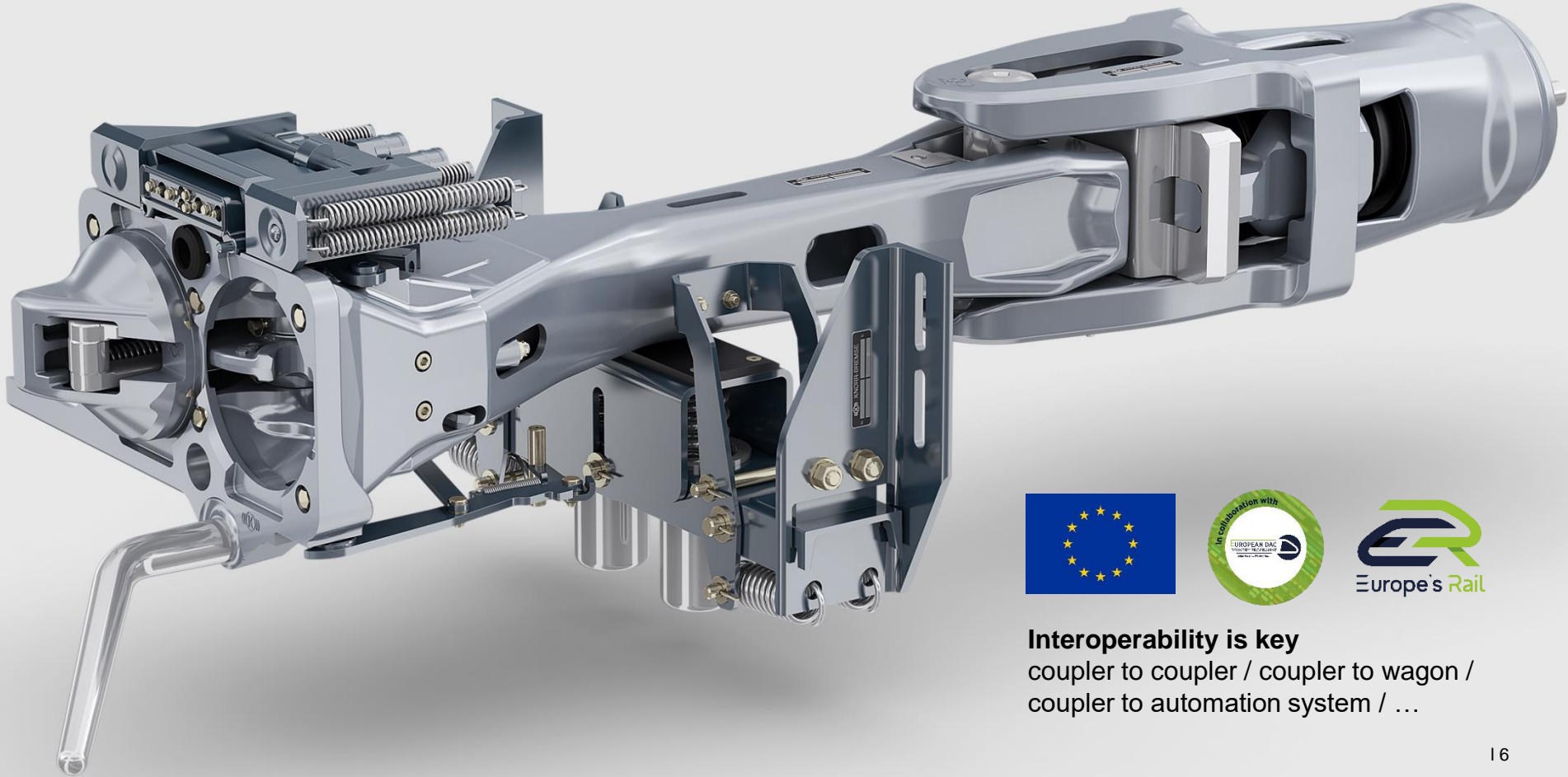
Type 4 – automatic coupling
Type 5 – automatic coupling & decoupling



Benefits

- ⌚ fast, efficient coupling
- ⚙️ Automatic coupling
- 🛡️ Safe operation
- ✅ Enabler for automation

Knorr-Bremse DAC “Freight Link”



Interoperability is key
coupler to coupler / coupler to wagon /
coupler to automation system / ...

Freight Control – Key messages

*KB will offer train functions to the railway operators provided by the automation system: „**Freight Control**“*

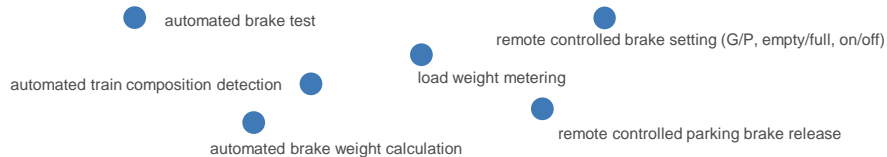
*Freight Control Automation System will be integrated by **digital services** for customers beside safety related train functions*

***Interoperability** of the vehicles in a train is **a must have** precondition*

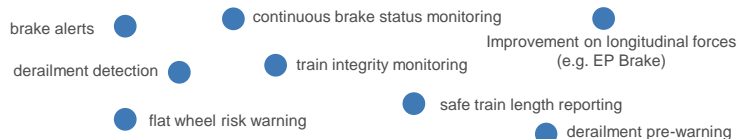
*The introduction of automation systems to freight wagons is combined with the central point of **train communication** and an onboard **power supply***

Automation Functions for Operations

Faster and automated Train Preparation



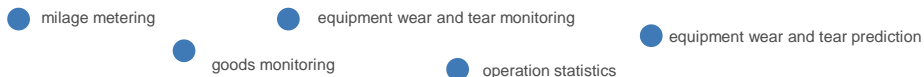
Improvement in reliable and safe Train Operation



Automated Wagon Shunting and Parking Activities

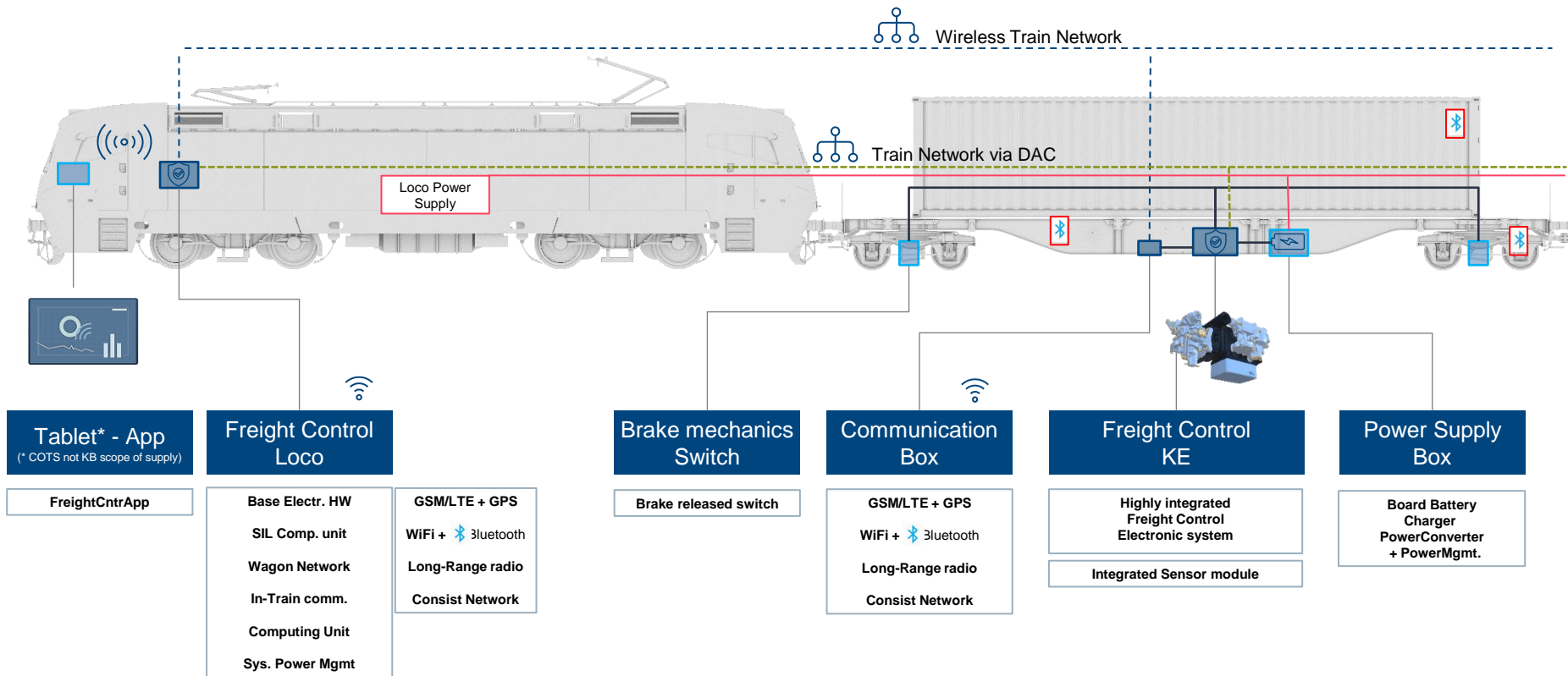


Functions for Maintenance (CBM) / Logistics Telematic / Digital Services



Freight Control – Freight Rail Automation System

Advanced Asset + Device Mgmt.
Data Collection
Digital Services

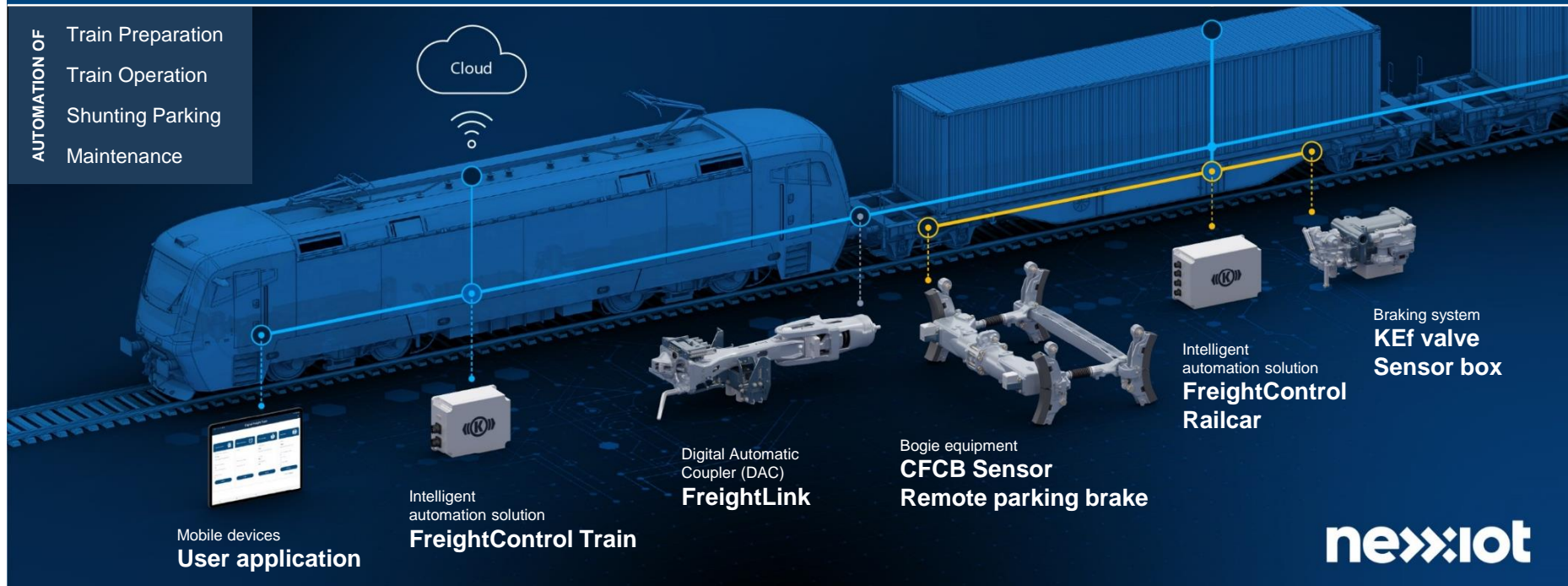


“KB Digital Freight Train” provides the needed technology for the automation of all critical processes from train preparation to parking & maintenance

Knorr-Bremse Digital Interoperable Freight Train Eco-System - Technology

AUTOMATION OF

Train Preparation
Train Operation
Shunting Parking
Maintenance



nexx:iot

Grazie per l'attenzione!

Thank you for your attention!

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