

Bridging our technologies

Railway market

Edition 2011





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Your partner for system solutions

The HUBER+SUHNER Group is a leading international manufacturer of electrical and optical interconnectivity components and systems. Under one roof, we combine technological capabilities in the three core fields of Radio Frequency, Fiber Optics and Low Frequency.

As one of Europe's leading suppliers, HUBER+SUHNER offers a wide range of products which provide the platform to build modern rail vehicles.

New and innovative products based on our proven technologies supports you to fulfil the demanding requirements of the railway industry.



With all three technologies in the rail market

HUBER+SUHNER possesses a high level of competence in three major technologies: Radio Frequency, Low Frequency and Fiber Optics. For decades, they have been part of our strategic core business. This enables us, together with our customers, to create complete solutions tailored to the needs of their specific applications. The dynamic rail sector is one of the main beneficiaries of these powerful technological skills.

As a leading supplier of RADOX® traction cables, fiber optic and coaxial cables plus antenna systems, HUBER+SUHNER offers a broad product portfolio for equipping modern rail vehicles.

We are your partners when it comes to wiring locomotives, passenger coaches or underground railways or supplying the related connection solutions. Infrastructures combine the three core technologies of Radio Frequency, Fiber Optics and Low Frequency with products for wireless communications, signalling or communications through fiberoptic systems as well as rugged solutions for tunnels, outdoor applications and railway stations.

HUBER+SUHNER products are developed to satisfy the highest quality standards and to meet the special requirements of the Rail market. They offer passengers more safety and convenience and help to raise the attractiveness of public transport.

Low frequency

- Control and power cables, cable systems

High frequency

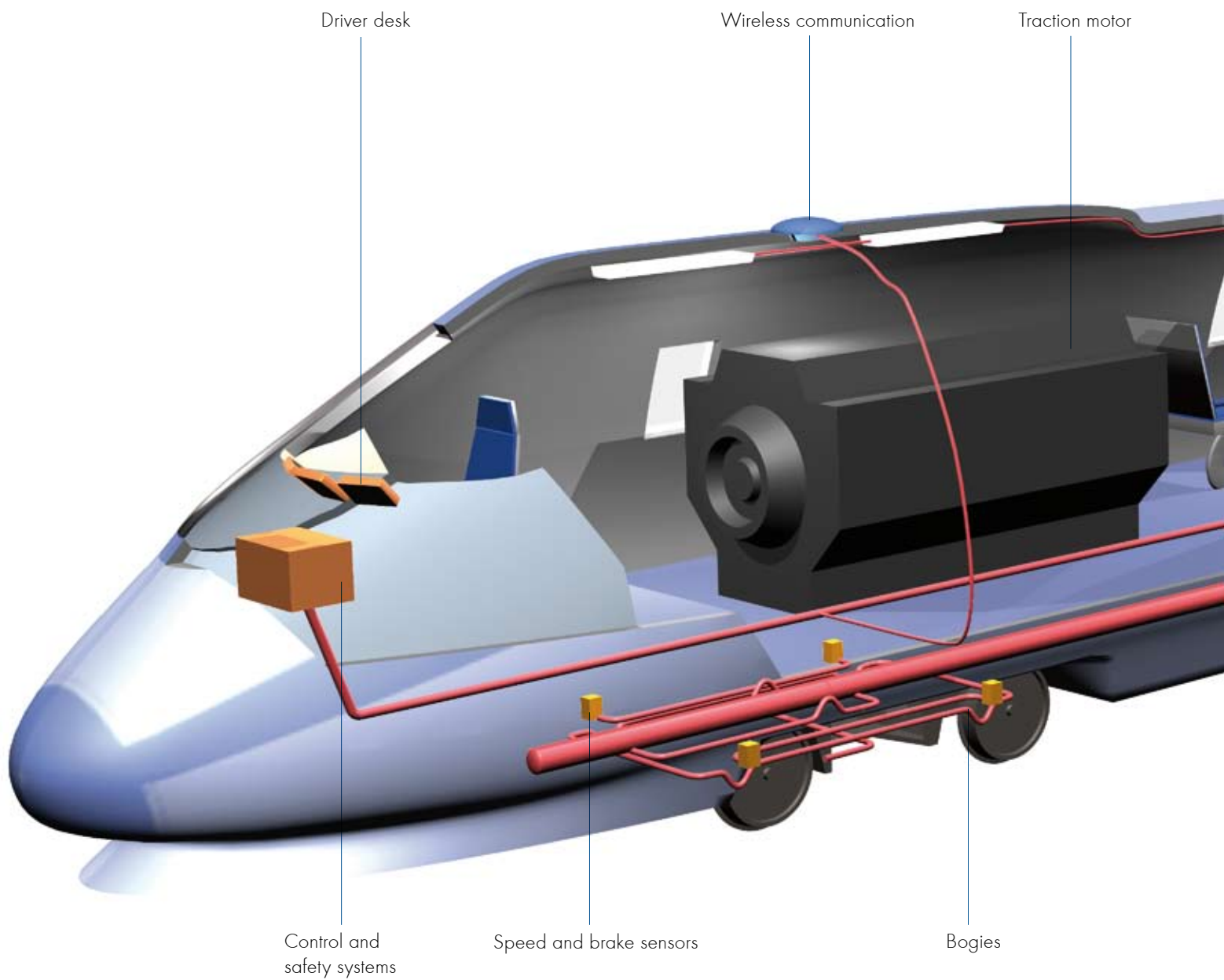
- Coaxial cables, coaxial connectors, cable assemblies, lightning protection components and antennas.

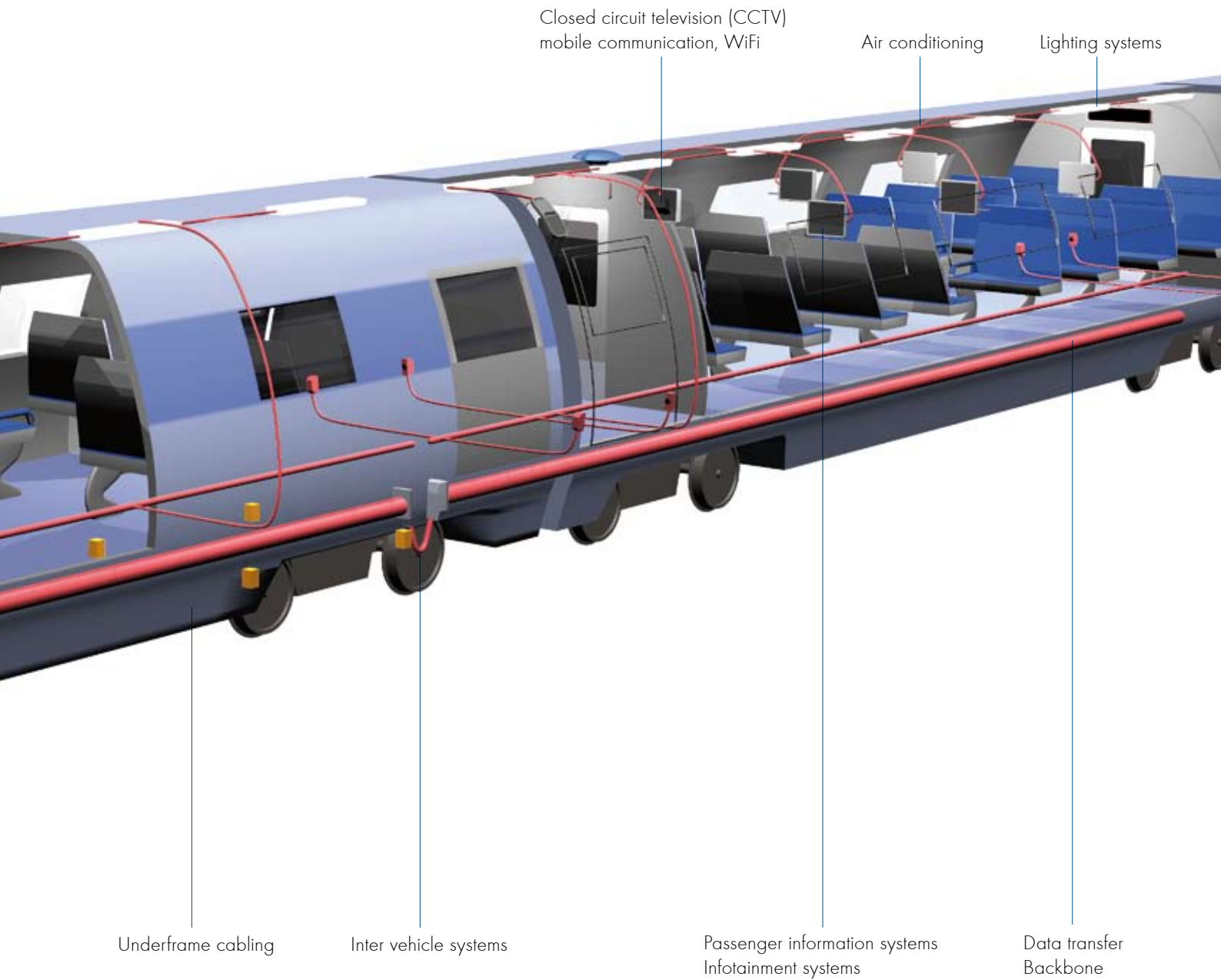
Fiber optic

- Fiberoptic connectors and cables, cable assemblies and customised optical distribution and cabling systems.

Rolling stock

HUBER+SUHNER supply products for use in:





Low frequency solutions

RADOX® Traction cables a name that is recognised by rolling stock manufacturers worldwide. It represents a product that combines quality, performance and technical excellence as required by today's modern Railway market. With the emphasis on safety, reliability and long service life we fulfil the needs of our customers and their customers, customers.

The proven RADOX® insulation system provides the highest safety requirements to protect people and equipment from damage in the case of fire. Using our core competences of material development and electron beam cross linking we are leaders in the field of thinwall insulations and sheathing materials, thus providing a range of high performance wires and cables that ensure weight and space issues can be overcome with the correct choice of cables. All products are low smoke, halogen free and meet the highest safety requirements as demanded by today's International standards for railway vehicles.

Field of use

- Traction motors
- Control panel wiring
- Brake systems
- Train safety systems
- Propulsion systems
- Inter vehicle jumper cables
- Ethernet backbone
- Passenger information systems
- Infotainment systems
- Closed circuit television (CCTV)
- On train monitoring and recording devices (OTMR)

Product portfolio

- RADOX® thin wall, low voltage and power cables
- RADOX® JUMPER cables
- RADOX® databus cables
- RADOX® FR cables



Customer benefit

- Provides highest safety and reliability
- Long service and design life
- Low maintenance costs
- Weight and space saving
- IRIS approved supplier



Radio frequency solution

Wireless communication systems are an integral part of any high-performance, modern transport system. They include train control and train radio systems (GSM-R or TETRA), satellite navigation (GPS), mobile communications (GSM, UMTS) and internet on the train (WiFi). HUBER+SUHNER supplies antennas which cover all communication standards between 380 MHz and 6 GHz. As a solution provider, we supply all the necessary radio frequency components:

- RF cables and connectors in the form of customised cable assemblies
- Vehicle antennas (roof-top/in-vehicle/inter-vehicle) for trains and tramways
- Radio frequency filters, lightning protection components and surge protection elements, DC blocks

Our application engineers will assist you in selecting the optimal RF components and matching them to your specific application.

Field of use

- Safety-related applications (GSM-R, TETRA)
- Mobile radio communications (GSM, UMTS, LTE)
- Satellite navigation (GPS, Galileo, Glonass)
- Data communications (WiFi 2.4/5.6 GHz and WiMAX)
- Wireless inter-vehicle communications

Product portfolio

- Carefully matched RF products in the frequency range 0 – 6 GHz
- Extremely rugged products, especially designed for Rail applications
- Fulfilment of railway standards and requirements



Customer benefit

- Single-source supply of all important RF components
- Technical support in product selection and application
- Advice on and assistance in the optimal positioning of antennas



Fiber optic solutions

A wide variety of services and systems needed and offered on modern rail vehicles require the transmission of continuously growing data rates. Fiberoptic solutions are applied to cover this need on a sustainable basis. Beside their immunity to electromagnetic fields, fiberoptic systems offer the additional crucial benefits of having a low weight and a compact size. Fiberoptics are the ideal choice for building a consistent high-performance network on rail vehicles.

The solutions offered by HUBER+SUHNER ensure continuous data transmission under adverse environmental conditions in fixed as well as mobile applications. These products, which are tailored to customers' specific needs, are manufactured to international railway industry standards.

Field of use

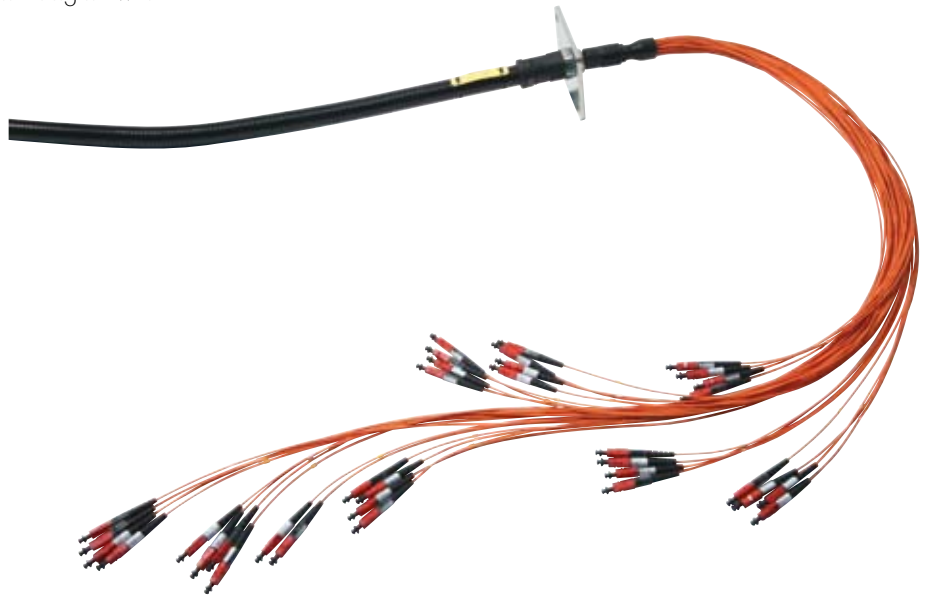
- Backbone cabling on rolling stock (incl. FO - Jumper)
- Video surveillance and control systems
- Monitoring and control of traction converters
- Infotainment
- Passenger information system
- On-train internet and mobile communication services

Product portfolio

- Coach harnesses and assemblies
- Intercoach Jumpers
- Connector solutions for harsh environment
- RADOX® FO cables with enhanced fire behaviour
- Fiber Management Systems

Customer benefit

- Fully tested customised harness solutions
- Inhouse million cycles testing facility
- Onboard Gigabit Ethernet network free from electromagnetic interferences
- Combined expertise in Fiber Optic and Rolling-Stock applications
- Global production and application engineering network
- Co-design



Cable system solutions

The HUBER+SUHNER cable systems develop solutions focused on specific customer needs, which are designed to ensure safety and functionality. Time and again, our uncompromising integral approach is confirmed by the team's competence in project management, system engineering, prototyping and volume production. This applies to national and international projects alike.

All Rail segments- underground and tramways, locomotives, urban and high-speed trains - have access to the extensive, group-wide expertise of HUBER+SUHNER.

As our partner and customer, you will benefit from:

- Our unique global production and distribution network
- Our unmatched product competence in the fields of Low Frequency- Radio Frequency - Fiberoptics
- Our global project management capability

Field of use

- Complete coach and wagon cabling systems for air conditioning, lighting, passenger information systems
- Cable harnesses for control and safety systems
- Cable harnesses for drive and motor cabling
- Cable systems for bogies
- Inter-vehicle cabling based on system cable and conduit solution

Service portfolio

- | | |
|----------------------|---|
| • Development | The HUBER+SUHNER cable system technology staff develop new solutions, partnering with customers. |
| • Project management | Technical and commercial project responsibility lies with the respective country sales company and thus allows fast action without any linguistic or geographical barriers. |
| • Prototyping | Process assurance and process fine-tuning during the prototyping phase ensure successful volume production. |
| • Volume supplies | Volume production according to ISO and IRIS standards (E. 2009) guarantees the most rigorous and reproducible quality standard. |



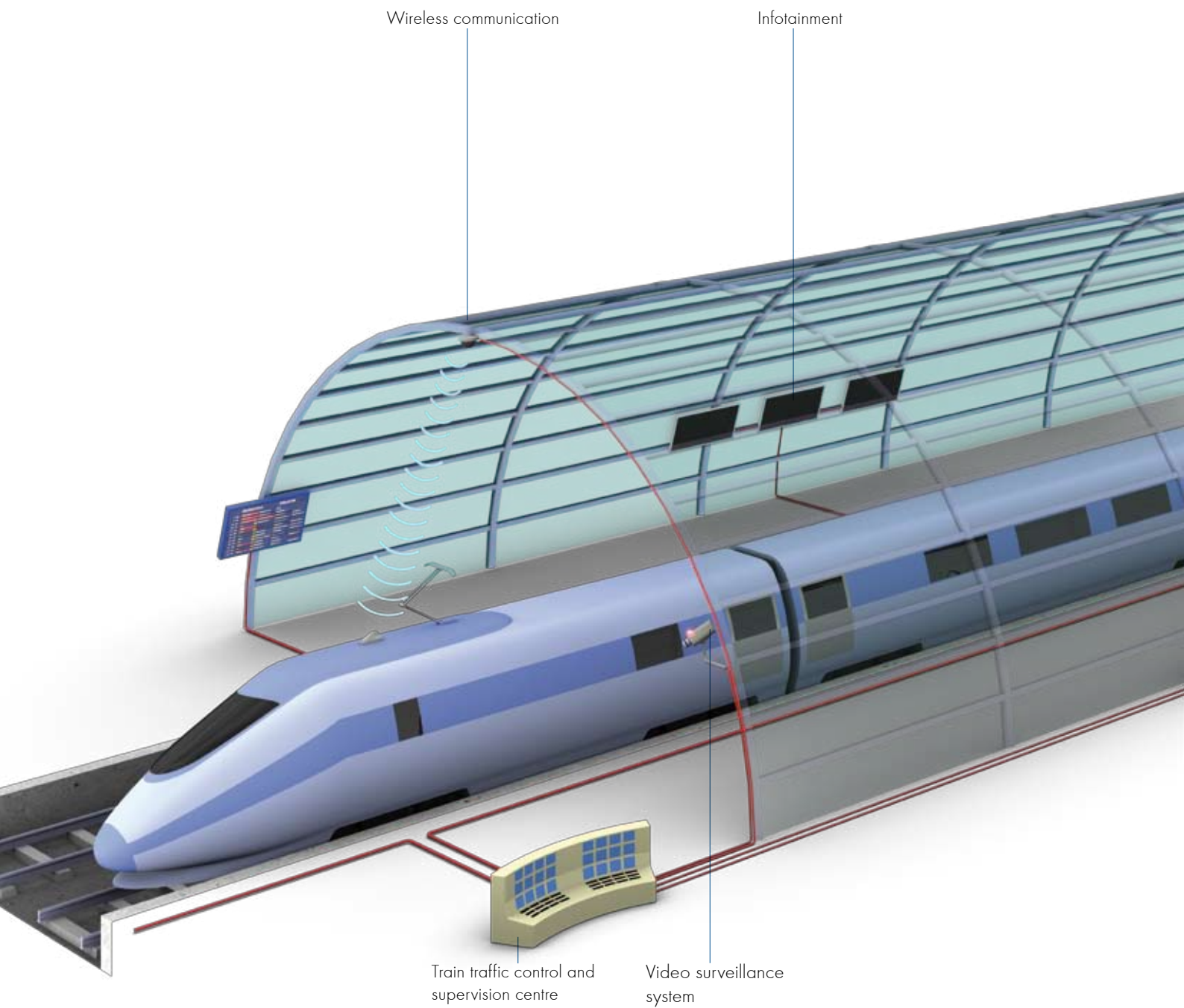
Customer benefit

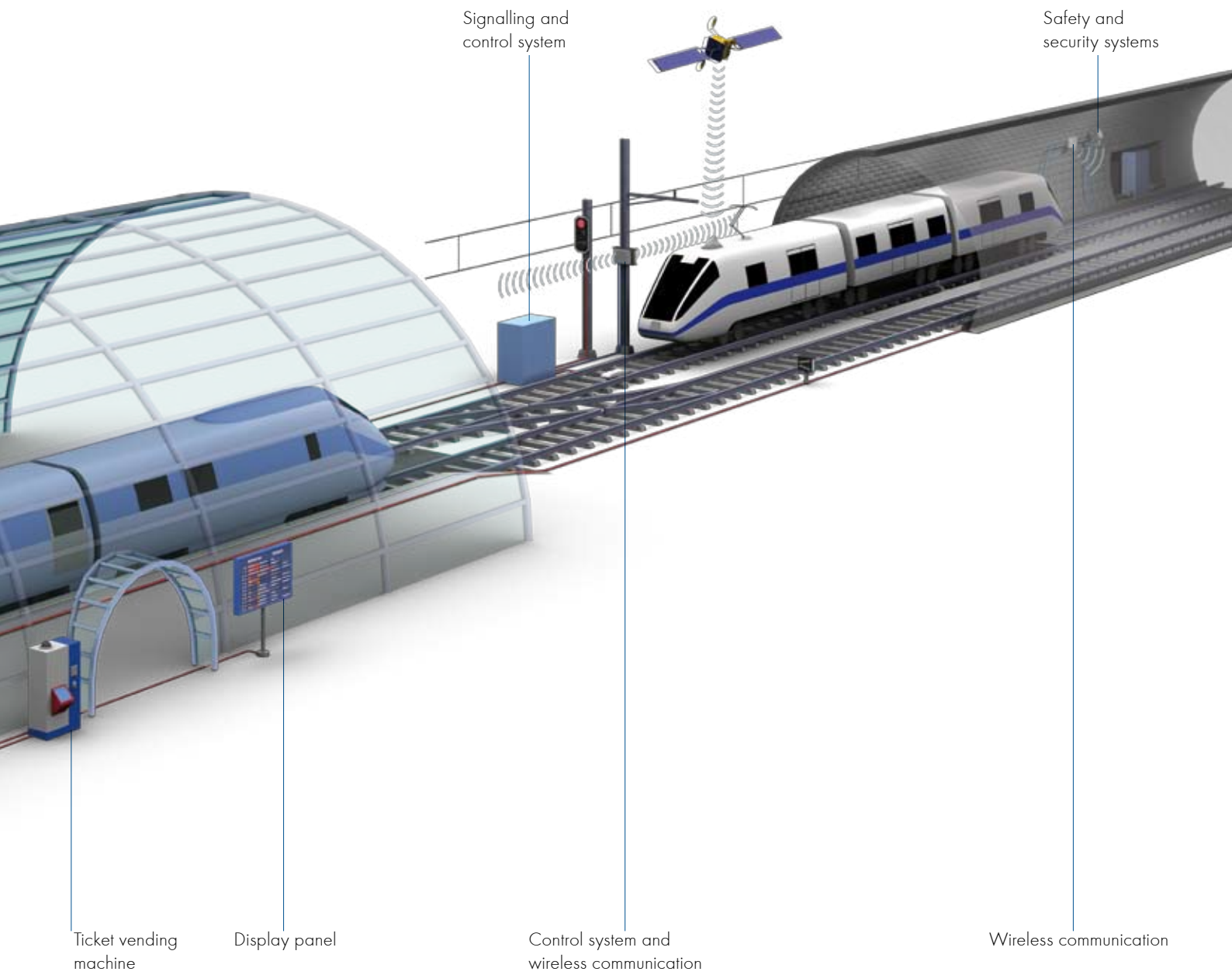
- Tested and optimised solutions
- Cost-effective prefabricated solutions
- Low project risks
- Just in time deliveries
- Global production and distribution network
- Perfectly matched HUBER+SUHNER products



Infrastructure

HUBER+SUHNER supply products for use in:





Radio frequency solutions

Wireless communication systems along railway lines allow applications involving high data rates and high uptime. Whether high-speed on-board internet, surveillance systems such as CCTV or the exchange of data in depots: HUBER+SUHNER will always contribute the most advanced technology available.

- RF cables and connectors in the frequency range 0 - 6 GHz as customised cable assemblies
- Antennas for tunnel/depot and outdoor applications
- Filters, lightning protection components and surge protection elements, DC blocks

Our application engineers will assist you in selecting the optimal RF components and matching them to your specific application.

Field of use

- Applications involving high data rates and/or high uptime requirements (e.g. high-speed internet access, CCTV) in the depot or along the track
- Data communications (WiFi 2.4/5.6 GHz and WiMAX)

Product portfolio

- Carefully matched RF products in the frequency range 2.4 - 6 GHz
- Compact antenna products, different connector and mounting variants available
- Fulfilment of railway standards and requirements



Customer benefit

- Single-source supply of all important RF components
- Technical support in product selection and application
- Assistance in optimal positioning of antennas



Fiber optic solutions

Train control and safety systems are indispensable elements of any railway infrastructure. They enable high rail traffic to be directed through the railway network in a controlled and safe way. The networking of diverse sensors and signals along the line and of display panels and ticket vending machines within stations is an important factor in ensuring smooth and safe railway operation.

The HUBER+SUHNER fiber optics components and systems satisfy the high requirements of track side applications with a wide range of high-grade products and services for such adverse conditions.

Many years of experience in development and production of cables, connectors and assembled cable systems, guarantee optimized solution for your benefit.

Field of use

- Control and monitoring of signals and sensors along the track
- Cabling of train traffic control networks
- Integration of ticket vending machines and time table displays
- Control and surveillance systems in tunnels and stations
- Integration of radio base stations for train control systems and mobile communication
- Communication networks MAN, WAN along the tracks

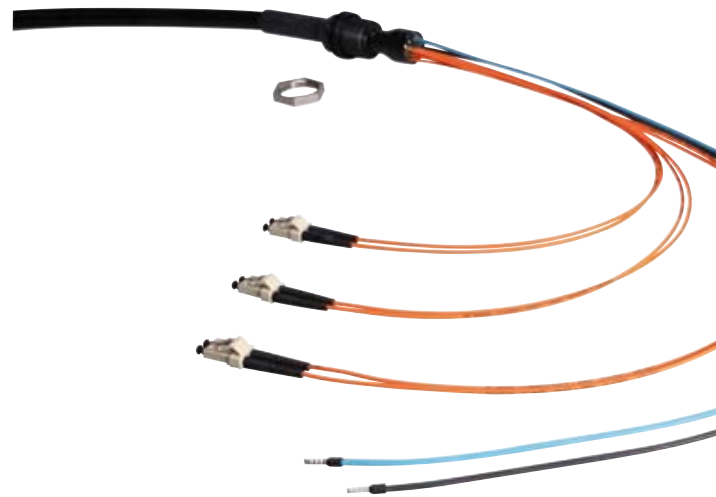
Product portfolio

- Compact, sealed connectors (IP68) for outdoor use
- Variety of cables for outdoor, tunnel or in-building installations
- Engineered cable assemblies for permanent or temporary installations
- Hybrid FO/Cu cables and assemblies
- Fiber management systems for central offices and outside plants



Customer benefit

- Integrated cabling solution from one source
- Technical consulting and support on Fiber optic technology
- Reduced installation time with hybrid solutions
- Fast and reliable delivery performance



Engineering services – to support our technologies

Our years of experience in the field of Rail enable us to offer our customers individualised solution packages which – in addition to the selection of the most suitable products – also includes the related services.

We are proud of the smooth collaboration with our customers, with whose assistance we continuously further develop our products. Our services are designed to make it easier for our customers to apply our components.

Design support

- Creation of customised solutions by our applications engineers (by suitable combination of our components)
- Determination and definition of customer-specific products
- Exchange of CAD data for ensuring optimal design-in of our components in our customers' systems
- Investigation of special effects in the application of our products
- Environmental tests in our in-house test facilities

Project development

- Project management
- Materials planning, creation of component kits
- Assistance during installation

Training

- Local on-site product training courses by our specialists
- Individual workshops



Bridging our technologies. Wherever you are.

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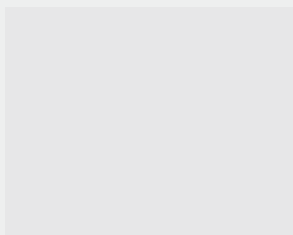
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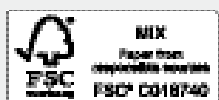
HUBER+SUHNER is certified according to
ISO 9001, ISO 14001, ISO/TS 16949 and IRIS.

WAIVER

It is exclusively in written agreements that we provide our customers with warrants and representations as to the technical specifications and/or the fitness for any particular purpose. The facts and figures contained herein are carefully compiled to the best of our knowledge, but they are intended for general informational purposes only.



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