

Nexans



**Cable expertise
to contribute to your railway network security**

High-performance trains need efficient infrastructure

Rail transportation is very dependent on the quality of the infrastructure that supports it, and that includes cables and cabling systems for telecommunications and energy. Modern high-speed trains demand cables with different characteristics in terms of bandwidth, safety, electromagnetic immunity and resistance. A definite trend is interoperability, which allows trains to move easily across borders and even continents. Here, too, cables must comply with the new consolidated ERTMS/ETCS standards which are progressively integrating GSM-R radio technologies for train control, while continuing to rely on older route control systems (relay interlocking) for safety and redundancy.

Indeed, safety has become a prime concern for the world's rail operators, and there is a demand not only for more reliable operating systems, but also for materials with improved fire-performance characteristics, especially in tunnels, stations and public


areas. Urban mass transit, subways, fully-automated metros, light rail suburban lines and trams are experiencing substantial growth, especially in Asia. Each rail mode has its own cable needs.

What railway operators expect of a cable manufacturer:

- Range of high-quality cables from one supplier
- Mastery of energy, data and radio-based technologies
- Installation for mainline, mass transit, tunnels, right-of-ways, etc.
- Enhanced fire performance for public and infrastructure safety
- Interoperability, open standards, and worldwide compliance
- Cable efficiency, compactness, lightness, and resistance
- Low costs, minimum maintenance, easy upgrades



Nexans helps you create the network you need for growth



Nexans produces a wide choice of power, signalling and telecommunications cables and components, specifically adapted to evolving rail infrastructures. In public areas and tunnels, virtually all of these cables are halogen-free, as well as flame-retardant, and thus assure low toxicity and minimal smoke to enhance survival, firefighting and emergency operations. For advanced telecommunications and train control, Nexans covers Wide Area Networks (main line); Metropolitan Area Networks for subways, light rail and intercity arrivals/departures; and station range outdoor cables for efficient rail management. Nexans provides trunk line and radio system optical fiber for multileveled analogue and digital railway applications (ERTMS/ETCS). Nexans also advises operators about evolving specifications and standards, and provides customized engineering, turnkey installation and maintenance anywhere in the world. We are engaged in ongoing R&D to keep all products competitive, compatible with modern standards and environmentally-friendly.

Nexans for safety, performance and comfort:

- All power, signalling and telecommunications cables and components for all infrastructure needs
- Advanced characteristics, EM immunity and high fire-performance
- European-based expertise for high-speed trains worldwide
- End-to-end turnkey systems for mainline and mass transit
- Complete train control cabling, from standard solutions to ERTMS/ETCS
- Custom engineering for country-specific challenges
- Innovative installation for trackside, tunnels and stations
- Open standards, interoperability and international delivery logistics
- Present along the value chain, from R&D and design to maintenance and training



Nexans' cable expertise...

POWER CABLES AND COMPONENTS

Power and feeder cables

Nexans manufactures low, medium, and high-voltage cables for both mainline and mass transit.



Special MV solutions include Ethylene

Propylene Rubber for flexibility, and special insulations that can withstand oil, heat, stress and extreme temperatures.

Nexans supplied the power cabling needs of two major German mass transit systems, in Berlin and Hamburg, and 1,000 km of special Long Stator Winding (LSW) cables for the new levitated Shanghai Transrapid system which uses MAGLEV technology to achieve speeds of up to 500 km/h.

Power accessories for medium and low voltage

Nexans produces medium-voltage accessories, such as



joints and terminations, plug-in connectors and

bushings, as well as low-voltage cabinets for aerial and underground applications.

For Italian Railways (FFSS), Nexans supplied low-voltage joints using polyepoxy resin. They are installed in their many power substations.

Connectivity for medium and high voltage

Nexans produces connectors to link insulated cables with



distribution and transmission equipment (transformers,

switches), as well as joints and terminations.

Nexans' Euromold has delivered MV and HV connectivity for high-speed trains running through France, Germany, Belgium and the Netherlands.

SIGNALLING CABLES

Signalling and control cables

Copper, multi-pair signalling and control cables are hybrid



energy/telecom cables providing low-voltage energy and

two-way telecommunications for field equipment.

For the main railway operators, Nexans has developed customized EM-immunity (high-reduction factor) cables, especially important for high-speed lines. Digicode signalling cables have been recently installed on the Daegu Subway line and Incheon International airport in Korea.

Axle counter cables

These cables connect trackside counting points



which determine train presence, direction of travel, length, number of wagons and integrity.

National Rail of the UK chose Nexans as a preferred supplier of axle counter cables which give clear advantages in terms of cable size and performance, especially watertightness. Nexans helped upgrade the signalling system for Korea's Bundang line by supplying new axle counter cables.

Balise cables

Nexans advanced balise cables are flexible, resistant and have electromagnetic



immunity for HF communications for an escalating and eventually

fully radio-based GSM-R traffic management system.

Nexans won a contract from GE Transportation Rail for balise cables used in upgrading Italy's rail network to meet ERTMS requirements. For Bombardier, it also won a contract to provide balise cables for the Korean National Railroads' ATP project (1,720 km).

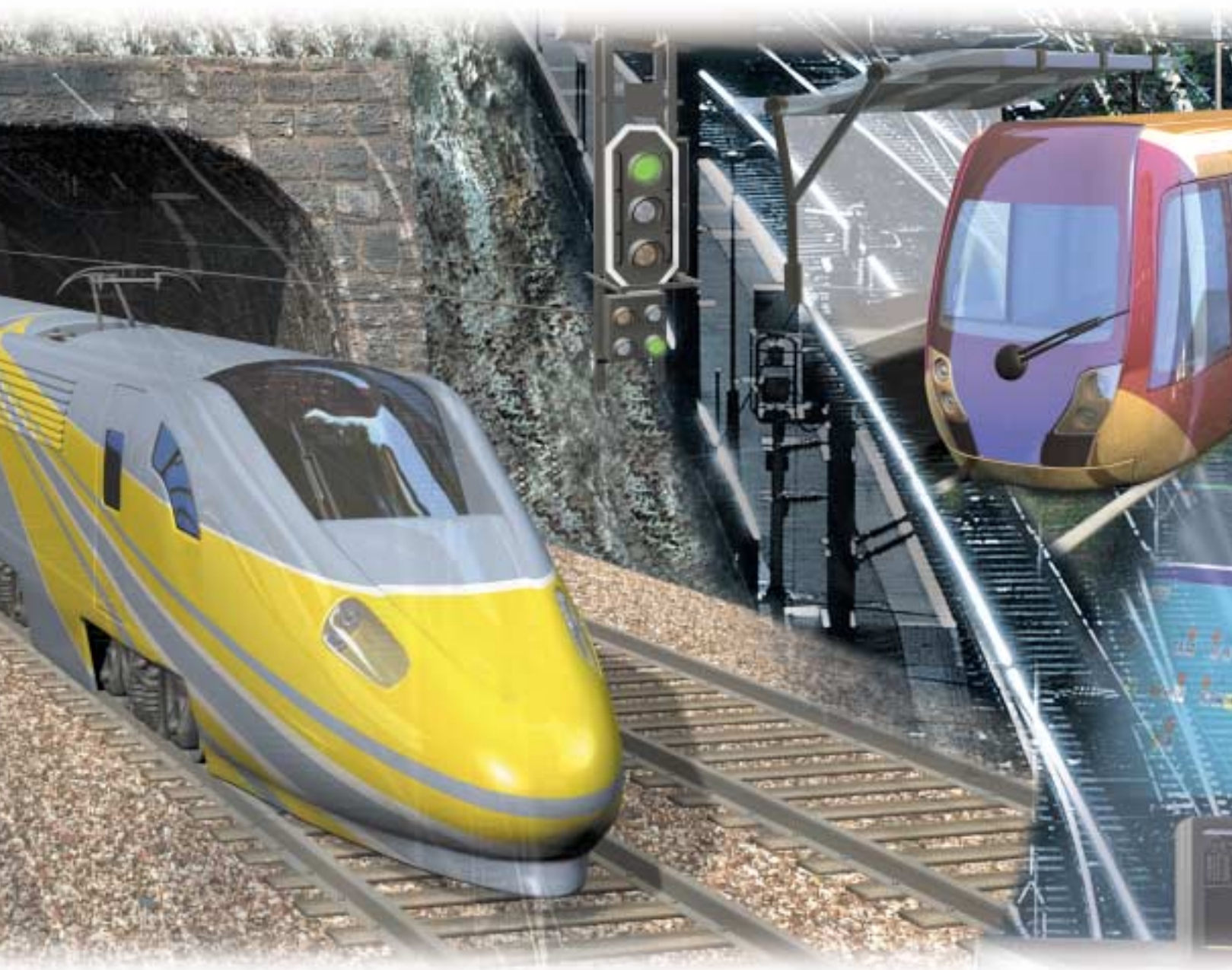
DUO track cable

Figure-8 duplex copper/fiber cable, which is securely clamped right on the tracks,



is used to provide routing information with communications and control functions for regional railway lines, including ETCS capability. Fast and easy to install, it saves 30-40% of installation time and achieves overall ownership cost savings of over 50%.

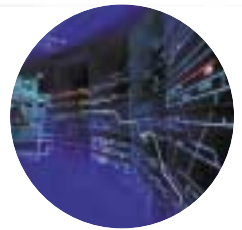
139 km of DUO cable was installed by Deutsche Bahn on 130 km of the Odenwaldbahn line. Nexans not only worked closely with DB, but also with system integrators, Siemens and Alcatel, to achieve a truly integrated turnkey solution.



**POWER CABLES
AND COMPONENTS**



SIGNALLING CABLES



**COMMUNICATIONS CABLES
AND COMPONENTS**

...contributes to your railway network security

COMMUNICATIONS CABLES AND COMPONENTS

Optical fiber cables

To serve complex signalling and telecommunications for train control, Nexans has developed WANs (trunk line), MANs and LANs based on optical fiber, and is also an expert in GSM-R technology. To meet the security concerns of tunnels and urban metro systems, Nexans produces both metal-armored and all-dielectric optical fiber cables, offering electromagnetic immunity.



Lisbon's inter-modal Gare do Oriente uses a Nexans LAN to manage 8 railway lines, a subway and surface mass transit. An all-dielectric cable containing 216 fibers was qualified for the London underground. Compact and cost-efficient optical fiber micro-cables are increasingly being installed in dense subway networks.

Station range cables

For the final mile, especially in city transport systems, Nexans offers both copper and hybrid copper/optical fiber cables for xDSL transmission, which can be incorporated in a LAN or access network.



Nexans has also developed a universal cable which uses copper and a special filling mass, which means that it can be installed underground, and extended safely into buildings.

Fiber access routing technology

Nexans' splicing modules and jointing sleeves optimize fiber routing, thus guaranteeing network integrity. They are easily implemented as an end-to-end solution in distribution frames, splicing closures and access points.



Nexans provided special jointing sleeves for the optical fiber links of Deutsche Bahn AG for a part of the high-speed Cologne-Brussels line. This advanced technology is used for both single circuit and single fiber management.

ODFs and closures

Our modular Optical Distribution Frames provide a complete architecture for main exchange nodes or point-of-presence applications.



Splice protection closures are used along the line or at access points to the local loop.

Splicing closures come in a range of splice protection boxes, and can be installed in manholes underground or fixed to poles for aerial cables.

Radiating cables

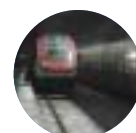
These perforated coaxial cables act like antennas in twisting or confined environments, like tunnels, where conventional antennas cannot operate. They are extremely important for ERTMS/ETCS radio-based technologies.




Nexans provided integral cabling for the 35-mile long Lötschberg railway tunnel in Switzerland, which will be the longest in continental Europe. Along with energy and optical fiber links, radiating cables will assure full GSM-R operability.

LIST fire-detection system

Nexans furnishes a complete linear fire-detection system for difficult environments (like tunnels) providing early warning and no false alarms. It is easy-to-install, zone programmable, and immune to electromagnetic interference. The system includes sensor and communication cable, control units, connection boxes, accessories and software.



This system was installed in Lerida, Spain, in a 1.5 km train tunnel for both regular and high-speed train traffic. Using multiple sensors, the system can pinpoint fires accurately, and requires neither maintenance nor calibration.



NEXANS... service and support all along the line

Global expertise

The fact that we master all cabling technologies means that we are able to efficiently upgrade old infrastructures and install new ones. Since railways and urban transit systems are faced with enormous cost pressures, Nexans has developed innovative turnkey products, which include system engineering, project management and maintenance.

Local presence

With our European experience and knowledge of international standards, we can act anywhere on the globe, even on major transnational products, often providing our customers with local manufacturing capability and fast delivery. Key products have been fully qualified for southeast Asia (including China's CCC).

Technical leadership

Familiar with traditional and new train technologies, like high-speed lines, radio-based train control, and maglev power systems, Nexans has continued to innovate on all levels.

It takes an application-engineering approach to find customized solutions for tunnels, urban and mainline networks, and stations, always with fire safety in mind.



Global expert in cables and cabling systems

Nexans is the worldwide leader in the cable industry. The Group brings an extensive range of advanced copper and optical fiber cable solutions to the infrastructure, industry and building markets. Nexans cables and cabling systems can be found in every area of people's lives, from telecommunications and energy networks, to aerospace, automotive, railways, building, petrochemical, medical applications, etc. With an industrial presence in 29 countries and commercial activities worldwide, Nexans employs 20,000 people and had sales in 2005 of 5.4 billion euros. Nexans is listed on the Paris stock exchange.

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