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FAST FORWARD WITH ABB

RAILWAY INDUSTRY SPECIAL ISSUE 2009

Fast track technology

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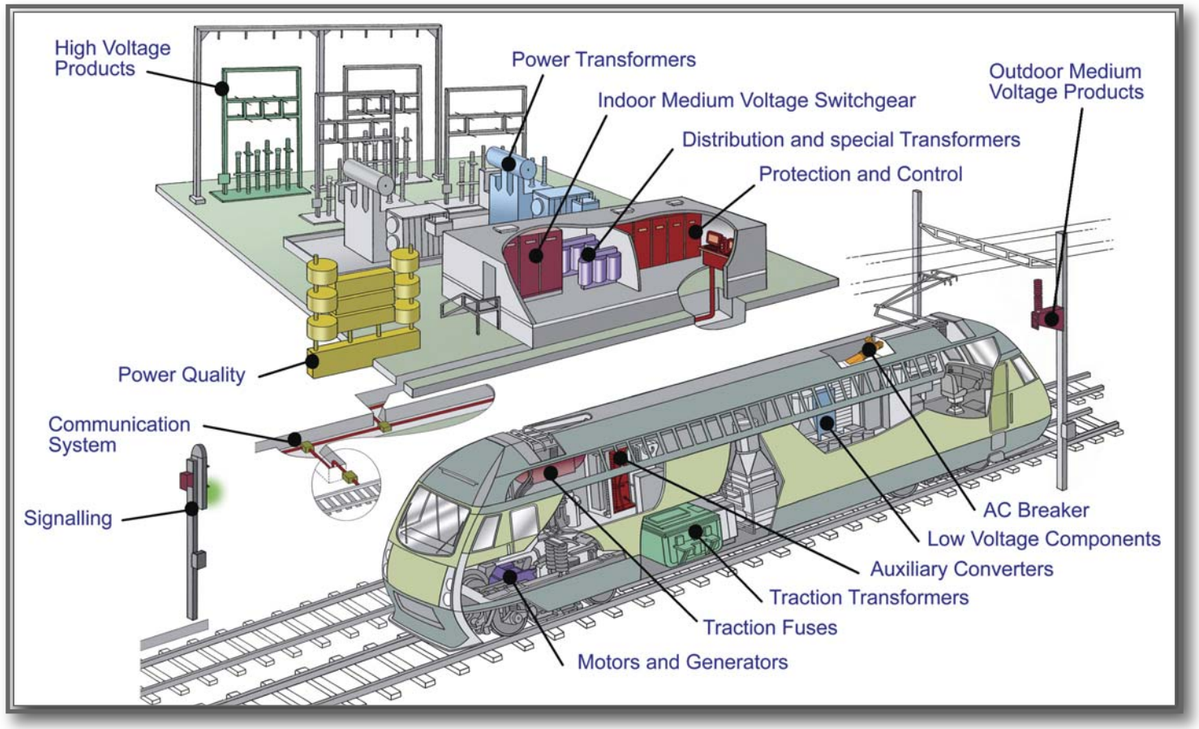
ABB

ABB rail industry services

ABB has a wealth of experience in the rail industry as a leading independent supplier of cutting-edge technology for infrastructure and rolling stock projects. We aim to keep the world moving by developing new approaches that help our customers to use energy effectively and efficiently, while also increasing industrial productivity in a sustainable way.

In this latest special rail issue of FastForward we focus on a wide spectrum of recent projects and new products that will be of particular interest for rail operators, contractors, partners and OEMs.



POWER TO THE LINE

- AC & DC power systems studies and Analysis
- Public frequency AC railway electrification substations
- Static frequency converter substations
- FACTS (Flexible AC Transmission Systems)
- Power supply for DC traction systems
- Secondary substations for auxiliary power supply
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- Traction transformers
- Power and control termination
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- MCBs
- Switches for signalling applications
- Slimline switch fuses for station upgrades
- Service

POWER IN THE VEHICLE

- Traction transformers
- Traction converters
- Low voltage components
- Motors and generators
- Semiconductors
- Surge arrestors
- Cabin equipment
- Power and communication connections
- Terminals and switches
- Contactors
- MCBs
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SIGNALLING

- Centralized traffic control
- Communications
- Electronic interlocking
- Wayside equipment

ROBOTICS

- Materials handling
- Welding
- Inspection

On the right lines

How well is the rail industry placed to weather the recession? Better than you might think, says International Railway Journal's ANDREW RODEN, in this personal view.

These are odd times for the rail industry. On the face of it, the global recession should be hitting it very hard indeed - but while passenger and freight operators are unquestionably suffering (and are likely to suffer more), it seems the projects and supply sides of the industry aren't yet experiencing a major downturn.

Of course, railways have seen plenty of recessions over the past 200 years, and just as in the 1930s, they could become a beneficiary of government-backed efforts to retrieve the situation. The comparison with the 1930s for the wider economy is one which doom-mongering journalists have been making with apparent glee in recent months. In the case of the global rail industry, the comparison is actually a fair one to make, because then as now, rail projects could help drive the economic recovery. Back in the '30s, the government sponsored a series of major rail projects designed to keep people in work and boost the economy. If the economic comparisons with that era are appropriate, then don't bet against a huge Keynesian investment in infrastructure of all sorts.

The one thing which is certain about the recession is that it *will* end. Nobody knows with any certainty when that will be, but it will happen. Cutting spending plans on rail projects with a multi-decade lifespan now makes no logical sense: if there's a need for, say, enhanced capacity now, even if the recession obviates it for a while, that need will still be there in the future. Governments all around the world are starting to look at infrastructure projects in general and rail projects in particular as a way of boosting economies. The French are seriously talking about building *four* high-speed lines simultaneously (the most they've managed in the past is two); Deutsche Bahn has just placed a gigantic order for double-deck carriages; China continues its rail boom, and the USA is starting to seriously assess the role passenger rail could play in its future transport mix.

How does Britain fit into this picture? In terms of what you might call 'glamour' projects –high-speed lines –there's precious little, but looking at the existing network and the work planned for it reveals a much more positive image. After years of delay, the Thameslink project is kicking off in earnest, Crossrail looks like it's getting closer, and the unblocking of Reading should transform operations on the Great Western Main Line.

Although Bombardier's production lines at Derby are working at capacity, over the next few years, it is likely to be infrastructure which receives most investment. Two of Britain's most important railways – the Great Western and Midland Main Lines – are crying out for attention now the West Coast Main Line upgrade has been. The case for electrification on both looks good, and in the case of the Great Western route, there is a growing consensus that a workable case can even be made for extending the wires all the way down to Penzance – which shows how much attitudes have changed in just a couple of years towards electrification.

Inevitably, the railway will look towards government for funds, but there is a growing consensus among institutional investors that infrastructure projects (and by extension, companies involved in planning and building them) are worthy of serious investment too. One stockbroker I spoke to described rail as "a safe haven" because the longevity of infrastructure projects and rolling stock almost guarantees steady returns – particularly in public-private partnerships where governments share the risk with private companies.

The combined effect of all this is that there are big opportunities in the rail industry right now (so big, in fact, that squeezing all the major new contracts into International Railway Journal's news section is starting to become a real challenge!). An economic downturn doesn't defer the need for investment in the rail sector – though admittedly funding it might be an issue – and companies across the industry are reporting higher profits and bulging order books.

In Britain, we're awaiting announcements on the successor to the High Speed Train fleet, on electrification, and on a potential north-south high-speed line, to name but three decisions that could bring massive growth to the UK rail sector. Whether all of these will actually get the go-ahead is a slightly different question, but with oil prices likely to remain volatile for the foreseeable future, it would be foolhardy to ignore the case for further electrification.

One shouldn't blithely assume that everything is rosy: it isn't, as passenger and freight operators will confirm, and we could yet see a marked slowdown in government spending which hits rail projects hard. Nonetheless, at the time of writing, there's hard evidence to suggest that Britain's rail sector is well placed to weather the economic slowdown and to emerge from it with a railway in better shape than it has been for decades.

Total trackside power supply service

ABB has established an enviable track record in delivering trackside power to the line projects that ensure efficient and reliable traction power supply systems. This service covers everything from state-of-the-art switchgear to comprehensive turnkey solutions including planning, engineering, construction and maintenance of railway power supply systems for AC and DC applications.

ABB's trackside portfolio includes:

- Traction power supply products
- Traction substations for AC and DC
- Frequency conversion and power quality systems
- Network management systems

Jubilee Line – more power for more passengers

ABB is working on a fast-track, two-year contract to upgrade the DC traction power systems on the Jubilee Line, in readiness for more frequent services, especially as it will carry a large proportion of the traffic generated by the 2012 Olympics.

ABB's role is to provide an extra 8MW of power for the Jubilee Line's 630V DC traction supply to support the additional demand created by the extra traffic. The project includes the design, supply, installation and commissioning of nine Transformers Rectifier Units (TRUs) (sometimes called Traction Converters) at four existing substations. The TRUs, each rated at 2.5 MW, will convert the 11kV and 22kV AC supplies from the London Underground network to the +420V/-210V DC power required by the trains. ABB is also carrying out civil engineering works at most of the sites.

Southern Region Power Upgrade

ABB in consortium with Mowlem Railways was one of four regional contractors appointed by Network Rail for the three-year Southern Region Power Upgrade programme to support the introduction of 2000 new carriages. The upgrade was vital because the sophisticated new trains draw around 23 per cent more power than the old rolling stock from the 750V traction power supply system.

Working in the 'Kent' Region, between 2003 and 2006, the ABB/Mowlem consortium carried out around £80 million of project work. This included the construction or upgrading of 27 substations and 17 feeders and installing around 100 panels of ABB ZX1.2 gas insulated MV switchgear and 25km of 33kV cable.

By November 2005 all the new trains were in service, with not one train introduction delayed due to a lack of power. Furthermore, an uncompromising approach to creating a safe working environment, with the emphasis on minimizing potential risk to site operatives, was reflected in a remarkable safety record. Network Rail's view on the overall Southern Region Power Upgrade project was - 'the project so successful that in the end nobody noticed it!'

Victoria Line Upgrade

The EDF Energy Powerlink PFI (Private Finance Initiative) consortium, in which ABB is a partner with EDF Energy and Balfour Beatty, is carrying out a multi-million pound contract to upgrade the power distribution network for London Underground's deep-level Victoria Line that will see 47 new larger, faster and more comfortable trains entering service between 2009 and 2013..

As part of the Victoria Line Upgrade, ABB is playing a key role in the design, manufacture, delivery, installation and commissioning of equipment for 10 upgraded substations including 11 kV and 22 kV ZX2 and Unigear medium voltage switchgear, SVC power quality equipment, distribution transformers and traction converter groups.

These projects will be delivered by a dedicated ABB team based in the consortium offices in London. This team has successfully delivered well over £75 million of work packages into the underground system over the past eight years and comprises design engineers, SCADA engineers, project managers, through to commercial/QS and administration staff.

Delhi Metro

ABB is carrying out a £50 million contract to provide electrical equipment to help Delhi Metro Rail Corporation Ltd almost triple the length of its commuter network by 2010. The expansion will help the rail network carry an estimated 1.1 million passengers per day in the Indian capital. ABB provided similar equipment to DMRC for the first phase of the metro's construction.

The project scope includes traction electrification of overhead lines, provision of auxiliary substations and a Supervisory Control And Data Acquisition (SCADA) system. ABB will also deliver products including switchgear and distribution equipment.

The project will add 100 km of track and 75 stations to Delhi's existing 65 km network with 59 stations. Using similar equipment to that supplied during the first phase of the metro's construction will help DMRC to save maintenance costs.

West Coast Main Line

A key aim of the West Coast Main Line (WCML) upgrade programme was to provide 125mph route capability for the new Virgin Pendolino tilting trains. ABB was been involved with the WCML from 1999 and carried out all the 400kV trackside power supply upgrade contracts for the northbound section.

A typical project was a £9 million contract to upgrade the existing substation at Rugeley Power Station in Staffordshire to provide two new 400/25kV WCML feeder connections.

This involved the installation of two ABB 400/26.25-0-26.25kV 40+40MVA SGTs (supergrid transformers) at the National Grid substation. Also included was the construction of a new 25kV compound and associated switchgear, and the provision of 25kV XLPE cables and associated fibre optic pilots.

High Speed 1

For High Speed 1 – formerly known as the Channel Tunnel Rail Link – ABB completed a four and a half year, turnkey contract for EDF Energy for the design, supply, installation and commissioning of the traction power distribution systems for Section 2 of this project.

The contract included eight specially adapted trackside substations to supply the continental European style 25-0-25 kV traction power for the catenary system. The main grid connection, at National Grid's Barking substation, is provided by an ABB 400/25-0-25kV transformer. This has been linked by an 1800m cable connection to Choats Road feeder substation, which also houses two 46MVAr ABB SVCs (Static Var Compensators).

ABB placed a key emphasis on project management and communication throughout the project to ensure a seamless interface between the customer and ABB's procurement, civil engineering and installation teams. The contract achieved a remarkable health and safety record, clocking up well over 250,000 hours without a LTI (lost time incident).

Featured product – ZX1.5-R

ABB's new ZX1.5-R primary medium voltage GIS (gas insulated switchgear) solution has been developed to meet the specific needs of railway applications. Its design is evolved from the ZX1 three-phase switchgear that is well established in industrial and utility installations and inherits the key features of this well proven SF^ insulated platform.

ZX1.5-R is ideally suited for 2 x 27.5 kV electrified networks on high speed lines, and can also be offered for 1 x 27.5 kV networks if required.

Total protection and control

ABB offers a complete range of products for protecting, controlling and monitoring the entire railway power system including:

- SCADA (Supervisory Control and Data Acquisition) systems
- Protection and control relays
- FACTS (Flexible AC Transmission Systems)
- Power quality equipment

5,000th MicroSCADA takes control of the Delhi Metro

ABB celebrated a significant milestone in its long history of supplying network control and substation automation systems when the 5000th MicroSCADA licence was sold in May 2007 for Phase II of the Delhi Metro, which used the same technology when Phase 1 construction began in 2000.

The MicroSCADA system interconnects all stations on the Delhi Metro and ties the main receiving and traction substations to a central control centre and a back-up control centre. The installations monitor the rail system's field equipment and networks, warning operators of potential faults and giving them time to avoid major repairs and service interruptions, thus enhancing performance while helping to keep costs down.

"Since the first line started up in 2002, there's been no problem," says Delhi Metro's Director (Electrical), Satish Kumar. "ABB has been a strong and reliable partner to us. It is most important for us that the work should be finished on time, come what may and ABB is geared up for that."

The goal is to cover the whole of Delhi with a world-class metro network by the year 2021, presenting an alternative to roads where on average five people die each day and 13 are injured. Presently, Delhi Metro operates three lines using 65 kilometres of track and 59 stations, and its air-conditioned coaches carry more than 500,000 people each day. Phase II will add 70 kilometres of track and 75 stations by 2010, serving an estimated 1.1 million passengers each day.

Weaving a power control web for the Underground

One of ABB's main roles in the EDF Energy Powerlink PFI (Private Finance Initiative) consortium, in which ABB is a partner with EDF Energy and Balfour Beatty, has been the design, installation and commissioning of a new integrated, high performance, SCADA SPIDER system for the London Underground (LU). This provides overall control of the power distribution network for four out of seven LU regions (Eastern, Western, Victoria and Metropolitan) as well as the primary 22kV distribution network. It replaces six previous SCADA systems.

The SPIDER SCADA system is fully integrated with LU's communications system. Control of the network is centralised in two replicated command centres (main and emergency), with dual application servers interconnected by a high-speed fibre-optic communications link.

RTUs (remote terminal units) provide the local interface with the power network equipment (transformers, switchgear, SVCs and so on), and they are linked into the SCADA system by copper lines converging on six data concentrators. One of the key technical challenges in the project was in developing the protocol conversion software that enabled the legacy RTUs to communicate with the new SCADA system.

Since commissioning was completed in 2006, the SPIDER system has proved its capability to ensure a high level of power availability to meet LU's stringent operating targets. In particular, greater visibility of the power system enables any issue to be flagged and identified, so that early action can be taken to prevent it escalating into a fault.

Power quality for the West Coast Main Line

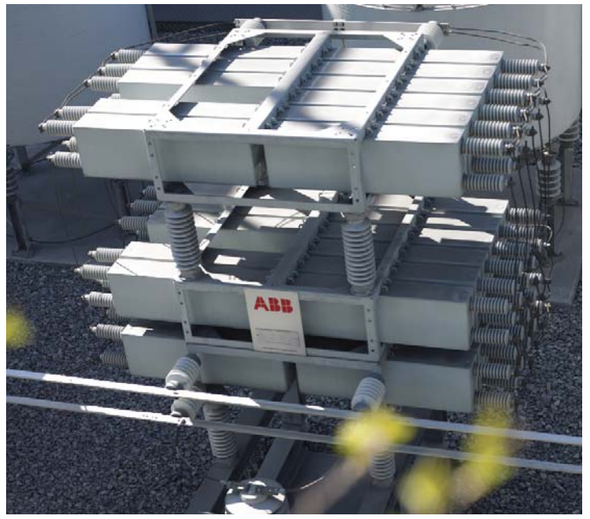
Special trackside high voltage resistor/capacitor damping systems developed by ABB for Network Rail are helping mitigate the effects of high frequency currents associated with the new generation IGBT (Insulated Gate Bipolar Transistor) traction control systems employed on the new 125 mph trains now running on the West Coast Main Line.

Without damping, the IGBTs could give rise to unacceptable high voltage, high frequency inductive interference on the AC lines which could damage the 25kV power supply network and interfere with signalling systems. A total of 107 systems have been installed along all of the West Coast Main Line's 641 route miles from Glasgow Central to London Euston.

SVC Light balances the load for SNCF trains

Evron substation, in the Mayenne Department of France, which converts the three phase 90kV supply from the local EdF grid to the single phase 25kV supply for RFF's overhead catenary system, is the first rail application to use ABB's SVC Light technology as a load balancer and active filter.

SVC Light is one of a group of technologies commonly referred to as FACTS (Flexible AC Transmission Systems) that are used to increase the flexibility, stability and capacity of HV transmission networks by making better use of existing infrastructure. In the Evron application, the SVC light helps to maintain power quality within acceptable levels against the electrical disturbances created by high speed SNCF trains. In particular, it



balances the unsymmetrical railway load as well as mitigating voltage and load fluctuations and harmonics.

Without SVC Light, RFF would have had to find an alternative means of supply by connecting to the nearest 225kV EdF infeed. This would have involved a much higher capital investment and longer project timescale, as well as making a significant impact on the local environment.

Featured product – RED615 protection relay

With native support for the rapidly advancing IEC 61850 standard and packed with the latest protection technology, ABB's new RED615 offers the ideal solution for two-end phase-segregated line differential protection. Benefiting from seamless peer-to-peer communication over a dedicated fibre-optic link, two interconnected RED615s form an absolutely selective unit protection scheme. Unit protection and the smart grid enabled

RED615s are key constituents of the intelligent and autonomous power systems of tomorrow.

All onboard

ABB is a leading supplier to most rolling stock manufacturers throughout the world based on a broad portfolio of equipment and services including:

- Traction transformers
- Main and auxiliary converters
- Traction motors
- Low voltage components – circuit breakers, contactors, connecting devices, sensors, relays, push buttons, limit switches
- Semiconductors
- Surge arrestors
- Turbo chargers
- Other components
- Complete traction packages

Record breaking performance

When a modified Alstom TGV set a new world rail speed record of 574.8 km/h (356 mph) in France in April 2007 it was a state-of-the-art ABB traction transformer that provided the traction power.

The record-breaking run was on SNCF's TGV east line, a 300 km stretch of new high-speed track which has significantly reduced travel time between Paris and destinations in Germany, Luxemburg and Switzerland. Its aim was to test the performance and reliability of new rail and train infrastructure and material under extreme conditions, as part of the development of Alstom's new AGV high-speed TGV trains, which are capable of reaching a commercial speed of 360 km/h

The modified test trainset included two power cars, three TGV double-decker carriages and two AGV motorized bogies (rail chassis with wheels). It developed an output of 19.6 MW compared with the 9.3 MW of a conventional TGV train.

The innovative AGV traction chain, located in the middle car and feeding four permanent magnet traction motors mounted onto the adjacent boogies, was fitted with an ABB traction transformer which was developed, designed and manufactured by ABB Sécheron Ltd. This transformer features reduced size and weight allowing it to be mounted underfloor. It is also a multi-system unit that can operate anywhere in Europe, at any voltage.

Major orders for Stadler Rail

In January 2009 ABB secured orders worth around £40 million from Swiss train manufacturer Stadler Rail for traction and onboard power equipment. The equipment will be installed in 50 double-decker trains serving the busy commuter network in and around the Swiss city of Zurich. ABB will also provide specialized electrical equipment for Stadler Rail's trains on routes between Switzerland and Italy.

ABB's scope of supply includes specially designed traction converters with integrated onboard power supplies as well as traction transformers and battery chargers. Compact, lightweight ABB traction products convert electricity from overhead power lines to the voltage levels needed by a train's motors and a host of auxiliary power systems (lighting, heating, ventilation, automatic doors, etc.).

These latest orders continue a highly productive strategic alliance between ABB and Stadler Rail begun in 2002. In 2008, ABB won orders from Stadler Rail to supply power electronics traction equipment for trains used in Finland, Germany, Hungary, Italy, Poland and Switzerland.

Powering the world's fastest sleeper trains

ABB is supplying 240 high performance traction transformers to Bombardier Transportation to power 60 electric multiple unit (EMU) trainsets for China's high-speed passenger network that links the country's major cities with high-speed rail connections.

Traction transformers are the single most expensive outsourced item of equipment on an electric locomotive. They are a key component in enabling trains to perform efficiently, comfortably and economically at very high speeds.

Each of the 430 metre trainsets – almost half a kilometre in length - will consist of 16 cars, powered by four high-performance ABB traction transformers. They will be mounted under the floor, as this lowers the train's centre of gravity, increasing passenger comfort when the train is travelling at high speeds.

Forty of the trainsets will be designed for overnight service and fitted with sleeping berth interiors. Capable of speeds of up to 200 km/h they will be the fastest EMU sleeper cars in the world.

Motoring ahead for London Underground

ABB is supplying the AC traction motors for 191 new S Stock trains currently under construction by Bombardier Transportation for London Underground's sub-surface District, Circle, Metropolitan and Hammersmith & City Lines.

Traction motors typically power the drive wheels and are usually fitted on each driven axle.

The motors are based on Bombardier's design and are integrated into the propulsion and control system manufactured in Sweden.

In addition to the traction motors, ABB is also supplying low voltage equipment for the S Stock trains including 23,000 connection systems. Bombardier is building the completed trains in its Derby plant in England.

The new vehicles will feature air-conditioning and inter-connecting gangways which will allow passengers to walk through the entire length of the train. The standard, modular design will help to optimize maintenance regimes. The first new trains are expected to arrive on the Metropolitan Line by 2010 and, together with new signalling, the extended fleet will improve journey times as well as adding over 40 per cent overall passenger carrying capacity on the sub-surface lines.

One route one train

Bombardier's AGC XBiBi is the world's first universal train that can run without stopping on all three power supply alternatives: diesel, AC and DC power – a breakthrough made possible by a unique ABB technology – the roof mounted traction transformer.

Previously the traction transformer (which powers the train with AC power) and the diesel engine were mutually exclusive because they occupied the same position in the train. ABB solved the impasse by developing a traction transformer that could be installed on the roof of the train, freeing up space inside for the diesel engine.

Crucially, the roof-mounted traction transformer has no impact on the speed, acceleration, performance or seating capacity of the train itself.

The AGC XBiBi was developed for SNCF whose network in 21 regions across France uses all three power alternatives. Of SNCF's

29,500 km of track, 15,800 km are not electrified, 5,800 km are electrified at 1.5 kV DC and 7,900 km at 25 kV AC.

A route like Marseille to Geneva via Grenoble, for instance, is part diesel, part AC and part DC, which means that prior to the AGC XBiBi passengers had to change trains whenever the regional power system switched from, say, diesel to AC. With the AGC XBiBi, a single train can now run the entire route, regardless of power system.

The AGC XBiBi is based on Bombardier's AGC family of trains, a versatile platform that consists of diesel, diesel/AC and AC/DC variants. Bombardier is currently delivering 612 AGC trains to SNCF. ABB is supplying the traction motors for all 612 trains, the generators for the diesel variants, and the traction transformers for the AC trains.

Featured product – ACTrac Vacuum Circuit Breaker

ABB's new ACTrac medium voltage (MV) vacuum circuit breaker is designed specifically to ensure the safety of electric drives on rolling stock. The roof mounted single pole ACTrac is suitable for both 25kV/50Hz and 15kV/16.7Hz applications.

An important feature of the ACTrac's modular, maintenance free design is an innovative weight and cost-optimized magnet drive mechanism ('single coil actuator'). Its main function is to protect transformers, converters and al other electrical components in the traction train from damaging over currents, such as short circuits.

Platforms for success

ABB provides a wide variety of products and services for rail depot, passenger station and factory site applications including:

- LV & MV systems (switchgear, drives and motors)
- Robots
- Power supplies
- Power network maintenance and service support
- Crane engineering and maintenance
- Soldering

East Midlands Control Centre

ABB LV products help ensure the smooth running of Network Rail's new East Midlands Control Centre (EMCC) in Derby - a key element in providing control of train services in the East Midlands. Since construction began in November 2006, £15m has been invested in turning a derelict, brownfield site into a modern facility, which will eventually control the signalling and operations for the entire East Midlands rail network. This will result in an improved service to rail users.

ABB equipment installed at the EMCC includes LV control gear and power breakers as well as power box enclosures incorporating S800 high performance MCBs (miniature circuit breakers).

Robotics lend a hand

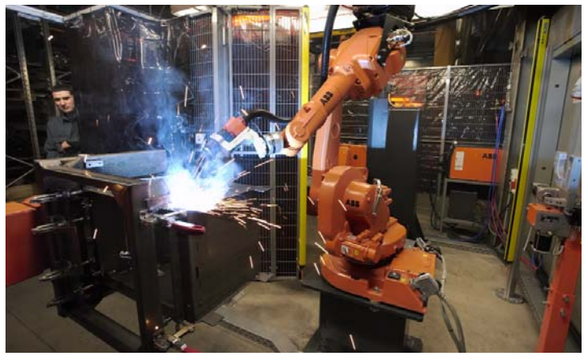


ABB robots are used in a broad spectrum of railway applications such as:

- surface treatment
- machine tending
- materials handling
- composites construction for fibre placement
- assembly (drilling, riveting, welding)
- quality control and inspection

ABB is a world leader in robot design and production and supports the rail and transportation sectors worldwide.

KNX takes control at St Pancras International

A KNX intelligent installation system incorporating a number of ABBs i-bus KNX components is monitoring essential building services and providing lighting control at St Pancras International, the new London terminus for Eurostar trains.

Having decided against a traditional BMS (Building Management System) due to cost and functionality considerations, the contractor opted for the simple, yet proven KNX technology which is now accepted as the world's first open standard for the control of all types of intelligent buildings.

The KNX installation, by the system integrator Andromeda Telematics, features a simple central LCD control panel which allows the station management to view the performance of important building services and control lighting for all platforms and concourses via a simple low voltage two wire system.

Ventilation fans, air conditioning cassettes, condensing units, extraction fans, Motor Control Panels, UPS, Sump Pumps and Lift alarms are all monitored for common alarms by the KNX system with audible alarms with acknowledge response. Escalator points and lift alarms are also monitored from the same central scheme. The system can be extended for daylight linking with the photocells commanding the lighting actuators. The same actuators have manual over-ride via the LCD mini-control panel.

All the right messages

ABB has built on its expertise in power and automation systems to develop high quality signalling systems that ensure flexible and efficient operations on modern railway networks.

Turnkey solutions include the new Centralized Traffic Control system ABB RailManager and new Electronic Interlocking System, ABB RailLock. ABB also works with partners and third party suppliers on wayside equipment projects including:

- Signals
- Points
- Automatic train control/protection
- Cabling

ABB RailManager for the Norwegian Railway Administration

The Norwegian Railway Administration selected ABB Rail Manager as the remote control solution for its new Centralized Traffic and Power Control Centre in Trondheim, which controls one third of Norway's rail network. In addition, ABB delivered the remote power control centre and 67 remote terminal units (RTUs) for overhead contact line switches.

The Centre, which opened in May 2006, provides remote control of railways operating in central and northern Norway. It also has the capacity to include routes that are currently not remote controlled.

ABBs' turn-key delivery covered a system for the remote control of 68 railway signalling plants, including design, programming, testing, installation, commissioning, documentation and staff training. The installation is based on standard components. All major functions have been backed up to satisfy the high availability requirement of 99.98 percent set by The Norwegian Railway Administration.

The railway response time is less than two seconds from command to on screen response.

The traffic management system is designed to provide automatic railway traffic flow, which is based on timetables and interacts with other information and support sub-systems such as public information and power for overhead lines.

ABB RailLock for the Norlandsbanen

ABB RailLock is an Electronic Interlocking System to control single stations, block stations, whole lines (single- or double track) and marshalling yards.

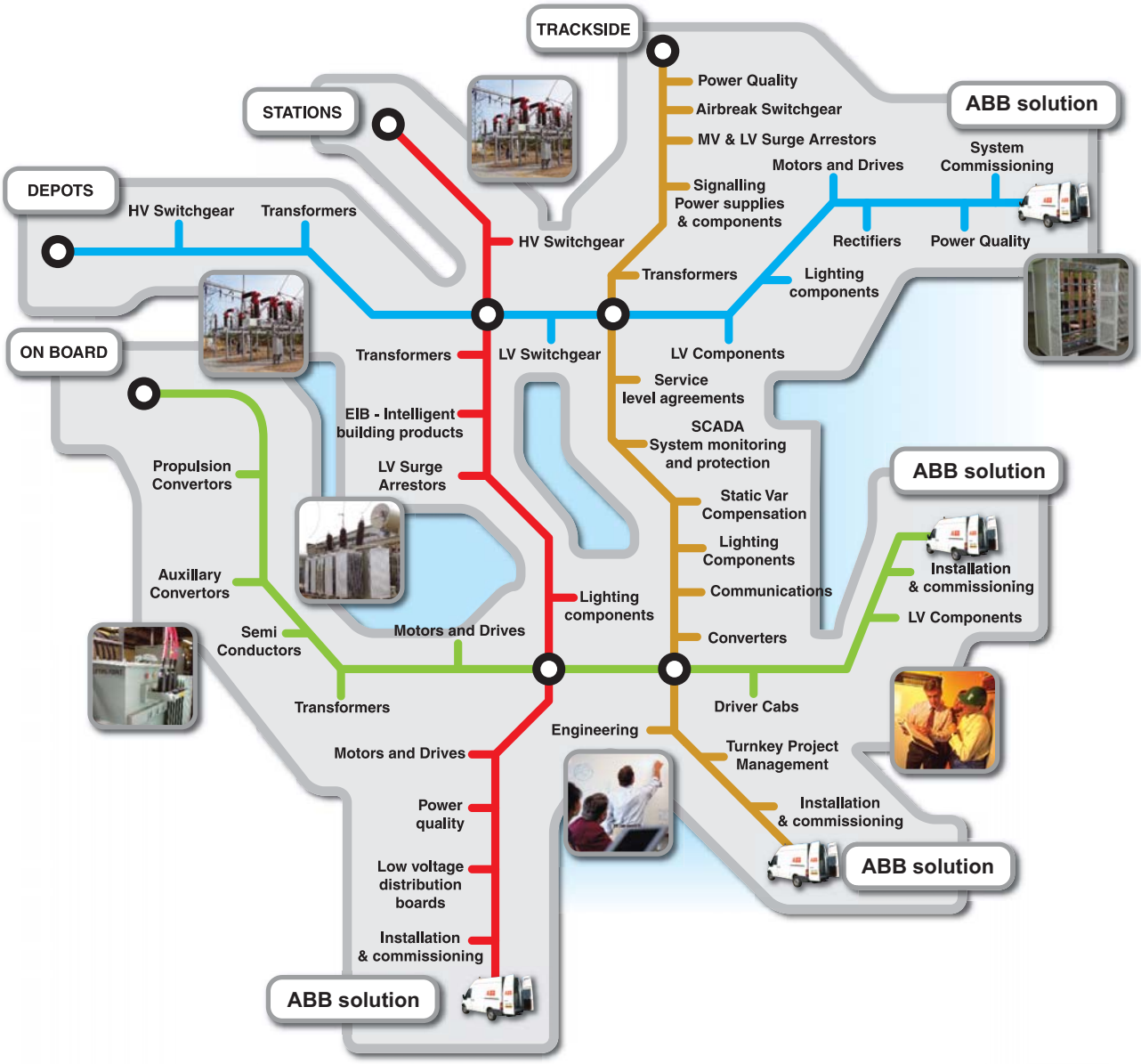
It's based on ABB standard industrial PLCs that fulfil SIL 4 according to Cenelec norms EN 50126, EN 50128 and EN 50129. Signal lights, points etc. are controlled by 2 AC800M independent PLCs. Commands and indications are handled by 1 AC800M via a local manoeuvre system, via ABB RailManager or other Centralized Traffic Control.

The wayside equipment is controlled by a special I/O-card, DO822, with relays approved by TÜV. Current transformers measure the current intensity in the signal lamps. Alarms and events are continuously logged to the hard disk of a standard PC.

It is possible to deliver software that includes play back to reconstruct the real situation in any time period.

A recent major installation is for the Norlandsbanen - the longest railway line in Norway and the only one crossing the Arctic Circle. ABB has upgraded 11 old railway interlocking systems on the route between Mosjøen and Bodø to provide remote control from the Trondheim traffic control centre.

ABB's well connected



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