Powering the railways in the Middle East
Efficient and reliable solutions for sustainable mobility
Overview of ABB’s railway capability

ABB is a world leading independent supplier of innovative and reliable technologies to train manufacturers and railway operators. With a comprehensive offering for rolling stock and infrastructure as well as FACTS, network management solutions and SCADA systems, ABB also provides lifetime service support, including maintenance and retrofit.

A global approach with local presence
ABB’s presence in over 100 countries brings its expertise into close proximity with its customers. In the Middle East, ABB has major offices in all key countries in the region, employing nearly 5000 people with manufacturing and engineering centers in Egypt, Saudi Arabia and the UAE.

Turnkey infrastructure solution and propulsion package
ABB is able to construct and install complete, turnkey trackside power supply systems for rail networks, offering a wide variety of innovative and reliable products for every aspect of rail infrastructure. Onboard trains, ABB’s propulsion package includes the design, manufacture and supply of all the main traction components. This offers the best overall solution and optimisation in costs, reliability, weight, size and energy efficiency.

Efficient customer service around the globe
ABB has a global network of services for railway providing the possibility to get tailor made and lifecycle services for rolling stock and infrastructure. ABB’s broad range of services consists of spare parts, maintenance, upgrades and retrofit, on and off customer site. A customized bundle of services is available based on the customer’s operating needs, on demand when needed or in multi-year service level agreements.

Key deliverables
- Complete substations and turnkey AC and DC rail power systems, FACTS, network management and SCADA
- Onboard traction transformers
- Main and auxiliary converters, battery chargers
- Traction motors and generators
- High, medium and low voltage products and systems
- Semiconductors
- Turbo chargers for diesel locomotives
- Static frequency converters
- Traction rectifiers
- Trackside power and distribution transformers

A global approach with local presence
ABB offers a broad portfolio of solutions and services for rolling stock including traction transformers, converters, motors and many other components. ABB innovative technologies serve in different types of rail application, ranging from freight through high-speed to suburban railways, metros and tramways. ABB works worldwide with leading vehicle manufacturers and transport operators.

ABB specializes in the delivery of trackside traction power supply systems for both mainline and mass transit applications. Building upon decades of market and manufacturing experience ABB is able to construct and install complete power supply and control systems for rail networks, offering a wide variety of innovative and reliable products for every aspect of rail infrastructure.

- **Traction transformers**
  - For roof, under floor or machine room installations

- **Compact converters**
  - Traction converters with integrated auxiliary converters

- **Traction motors and generators**
  - For various electric and diesel-electric rail vehicles

- **Surge arresters**
  - For reliable protection against overvoltage of rolling stock & infrastructure in AC/DC systems

- **Semiconductors**
  - For reliable and efficient switching in propulsion and auxiliary converters

- **Low-voltage products and systems**
  - A wide range of LV products are available for onboard applications

- **Liquid-filled transformers**
  - Compact and low-weight power and distribution transformers for various applications

- **Dry-type transformers**
  - Vacuum cast coil dry-type transformers for a long lifetime and reliable performance

- **High-voltage switchgear**
  - In modular construction, for all voltage levels

- **Static frequency converters**
  - Ensure a reliable supply of 16.7 Hz to 25 Hz single phase current for railway networks

- **DC traction substation converters**
  - Traction rectifiers and inverters for DC traction supply

- **Bi-directional high-speed DC circuit breakers**
  - Suitable for EMUs, trams and metro applications

- **Traction substations**
  - Complete traction power supply systems for main line and mass transit applications

- **Low-voltage switchgear**
  - In modular construction, for reliable power distribution

- **Medium-voltage switchgear and breakers**
  - Indoor and outdoor circuit breakers, air and gas insulated switchgear

- **Medium-voltage modules**
  - Outdoor factory assembled frame for all electric railway single-/two-phase network

- **Turbochargers**
  - In compact construction, for diesel engines with an output of up to 3,200 kW

- **Low-voltage switchgear**
  - In modular construction, for reliable power distribution

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Power in the vehicle
Rolling stock traction solutions for optimized performance

High integrated traction packages for all rolling stock
ABB is a global player and one of the very few independent suppliers of traction packages. This unique positioning and strong local presence in all major rail markets helps ABB to provide optimum solutions for vehicle manufacturers and train operators.

Key advantages and customer’s benefits are:
- one single interface to the supplier
- total energy efficiency
- low life-cycle cost
- optimized dimensioning of components
- fast commissioning and homologation

Full service portfolio for rail customers
A typical customer’s installed base may have been built up over a period of 40 years or more, and will reflect the different prevailing technologies during that period. ABB has hence developed a service portfolio to help customers face this challenge. Thanks to its vast knowledge base, ABB can provide service for rolling stock regardless of type or age. Work performed can range from routine diagnosis and maintenance to retrofitting, re-engineering and overhauls.

As a long term partner, ABB has a proven track record of service packages with railway customers in which ABB commits to improve the equipment performance and reduce the operating life cycle costs.

Power to the line
Infrastructure solutions for more capacity and power stability

Turnkey railway infrastructure solutions
ABB offers a comprehensive range of AC traction substations for both 16.7 Hz and 50 Hz applications comprising single- or two-phase feeder substations and switching posts, autotransformer stations and substation automation (local control and protection). For DC traction substations, ABB is also an experienced partner taking care of system integration such as rectifier substations up to 3000 V DC.

Network management and SCADA systems
SCADA (supervisory control and data acquisition) automation systems enable remote monitoring, control and operation of traction power as well as data acquisition for traction substations. ABB SCADA system is the customer’s choice for mainline and urban transport systems worldwide, due to its proven reliability and flexibility.

FACTS solutions for improved power quality
Trains taking power from the grid must be able to rely on the supply to be stable. Similarly, power quality in the grid must not be impaired, despite harmonic generation and unbalance between the phases of the load. Time as well as money can be saved by implementing FACTS (flexible AC transmission system) in existing systems rather than investing in new transmission or sub-transmission lines, and/or building new substations and feeding points.

Adequate power quality can also be achieved with in-feed at lower voltages as it may be sufficient to feed a railway system at 132 kV rather than at 220 kV or even 400 kV, which enables a lower investment cost and in shorter time. FACTS for railways comprises SVC, SVC Light® and Dynamic Energy Storage.

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Thanks to unrivaled experience gained in many landmark rail projects around the world, ABB has the ideal combination of design skills and manufacturing facilities to deliver the optimum solution for a wide variety of railway electrification systems.

**Dubai Metro, Dubai, UAE**
- Dubai Metro’s current route length of 70km and 47 stations is the world’s longest fully automated line. ABB’s deliverables for the entire network power supply included:
  - Design, engineering, and supply of Substation Control and Monitoring Systems (SCMS) for three 132/33kV GIS switchgear substations for the 750V DC TSS and ASS
  - A/Au-K Power Distribution and motor control panels for all metro station electrical loads (HVAC, Lighting)

**Glattalbahn, a Modern Light Rail System, Zurich, Switzerland**
- Glattal, the public transport authority (VBG) has built a new light rail system. The 12.7km line will serve 150,000 local residents and 120,000 workers in the Glattal area. ABB’s project scope covers:
  - General contractor for the electrification covering the design, supply, installation and commissioning of 8 DC traction substations feeding the system with 630 V and power distribution for 23 passenger stations

**King Saud University Rapid Transit System, Riyadh, Saudi Arabia**
- The campus of the newly built King Saud Bin Abdulaziz University for Health Sciences in Riyadh stretches over an area of five square kilometers. The rapid transit project will create an emissions-free transport zone within the university grounds. ABB’s project scope covers:
  - The design, engineering, installation, testing and commissioning of DC traction substations
  - SCADA control and monitoring system

**Delhi Metro Rail Corporation (DMRC), New Delhi, India**
- DMRC urban rail network spans approximately 200km and 142 stations. ABB is delivering for the 25kV AC traction system and station electrics:
  - Turnkey OHE including 220/33/25kV receiving and traction substations, and electrical power distribution for stations
  - SCADA system interconnecting all stations and linking the main receiving and traction substations to the central and backup control centers

**High Speed 1 (HS 1), UK**
- HS1 upgraded its 109km route on the English side of the channel, from Folkestone to London, to enable travel speeds of up to 300kmph. ABB’s deliverables for the 2x25kV AC traction system included:
  - Turnkey design, supply, installation and commissioning of three 400/33/25kV feeder substations and 2x25 kV autotransformer stations
  - 6 x 1-phase Static VAR Compensator, 40 MVAr
  - 1 x 3-phase Load Balancer, 170 MVAr

**Gautrain Rapid Rail Link, South Africa**
- The 80km Gautrain Rapid Rail Link bring high-speed commuter communications to Gauteng province. ABB’s deliverables for the design, installation and commissioning of the 25 kV turnkey traction power supply system include:
  - 1 x 88/2x25 kV feeder substation
  - 5 x 2x25kV autotransformer substations based on pre-fabricated outdoor modules
  - SCADA system