Rail automation solutions for mainline and regional railways

Rail automation systems and components from Siemens at a glance

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Efficient, sustainable and future-oriented railways – with the world market leader in rail automation

“Complete mobility” is Siemens’ response to the challenges of growing global population and urbanization, climate change and the consumption of resources.

That is why Siemens is creating integrated mobility solutions – for safe, economical and environmentally friendly rail transportation.

An efficient mainline infrastructure creates the basis for mobility without frontiers and for the further economic development of regions and countries.

**Maximum safety for more efficiency**
Rail control and automation systems must be fail-safe through to the highest safety integrity level (SIL 4) of the current CENELEC standards.

Signaling and safety components and systems are the decisive interfaces between vehicles, lines and networks. Ranging from components such as axle counters through to complex networked systems such as operations control centers, all systems have to function trouble-free under all conditions.

A high level of reliability and optimum availability, fault-free installation and maintenance, rapid project execution, and the perfect synchronization of all components in all operating conditions – that is railway engineering which makes a good system into an efficient Siemens system.

**Trendsetting innovations for our customers’ competitive edge**
As a pioneer in the field of railway engineering with 160 years of experience, Siemens repeatedly comes up with innovations. From development of the first electromechanical interlocking in 1894 through to the Trainguard interoperable train control system for ETCS – Siemens’ components and systems are one of the elements determining railway history and recurrently prove themselves as a major success factor for railway operators.

**Green mobility for a clean environment**
Climate change, the world’s growing population and increasing urbanization require high-capacity, environmentally friendly transportation solutions. Siemens has set itself the task of creating “green” solutions for rail automation, using resources efficiently and sustainably improving the quality of life. We are continuously perfecting these solutions in terms of their energy efficiency and efficient use of resources.

In this way, rail services can be designed to be attractive so that many people will opt in favor of this environmentally friendly form of transportation.
For this purpose, our environmental portfolio covers a large number of outstanding products which make a direct demonstrable contribution to environmental protection:

- Intelligent control systems from Siemens ensure, for example, reduced energy consumption yet at the same time increased line capacity and improved punctuality. This stabilizes the overall timetable, reduces noise and wear and increases convenience for passengers.

- The time-optimized initiation of grade crossings decreases the “barriers lowered” time. Thanks to a reduced road traffic waiting time, CO₂ emission levels can be considerably cut.

- Rail automation components along the tracks additionally boost energy efficiency: with its LED signals and cableless solar-powered radio-operated approach indicators, Siemens enables low energy consumption and low installation costs.

This is the solution provided by our “green” rail automation for safe railway operations – both today and in the future.

**Optimal conditions**

All our products comply with all railway-typical approval standards, the decisive aspects of reliability, availability, maintainability and safety (RAMS) and quality (certification in line with DIN ISO 9001).

Throughout the world, our solutions are tried and tested on:
- high-speed and mainline railways
- regional railways
- private railways

**Construction and straightforward upgrading of existing systems**

For these different applications, Siemens offers products and systems which are precisely tailored to customer requirements, such as cost-effectiveness and shorter headways. We can supply our customers with all components and systems required for successful railway operations.

However, the high level of standardization, e.g. for ETCS, and the modular design of product families and systems also ensure compatibility with the products of other manufacturers, interoperability, investment security and straightforward upgrading of existing installations. And this is to remain so in future.

Specialists in development and production and at the Test Centers and the ETCS Competence Center in Berlin are working towards this objective. Another milestone in the field of development and customer orientation has been set by the Rail Automation Academy, a center of competence for rail automation, which imposes new standards in the training and vocational education of personnel and customer training.
From proven through to innovative – solutions for maximum rail efficiency

**Operations control systems**

With operations control systems from Siemens, electronic interlockings and any relay interlockings can be controlled and monitored via remote control. In addition, our operations control systems feature a large number of automation functions.

- BPS 901 operations control system
- Vicos OC 100 operations control system
- Vicos OC 501 operations control system
- Iltis operations control system

**Electronic interlockings**

Electronic interlockings monitor and control logic and safety-related facilities in line with the dependencies between signals, points and vehicles. As the world’s only manufacturer, Siemens supplies containerized electronic interlockings which are completely pre-assembled at the Brunswick plant and tested at our system test centers.

- Simis D electronic interlocking
- Simis IS electronic interlocking
- Sicas S7 electronic interlocking
- Simis W electronic interlocking

**Service and diagnostic systems**

- Vicos S&D

**Dispatching systems**

- Falko

**Axle counter sensor**

- Euroloop

**Radio-operated approach indicator**

**Train radio (GSM-R)**

**Grade-crossing protection system**

**Radio block center (RBC)**

**Axle counting evaluator**

**ETCS on-board unit**
Train control systems
Train control systems support the driver with a large number of automatic functions. The system continuously monitors all vehicle movements in a fail-safe manner. Furthermore, operational information can also be transmitted.

- Trainguard 100 for ETCS Level 1 and ETCS Level 1 Limited Supervision
- Trainguard 200 for ETCS Level 2
- Trainguard Basic Indusi

Proven systems
- LZB continuous automatic train control system
- Zub intermittent automatic train control system

Components and subsystems
Siemens provides the full range of components from point operating systems through to LED signals from one and the same source. In top-tested quality, designed and built for fault-free installation, maximum availability and simple maintenance.

Signals
- Compact signals
- LED signal light units
- Fiber-optic indicators

Point operating systems
- S 700 K point machine
- ITS 700 point machine in hollow sleeper
- Bsg.antr.9 point machine
- Switchguard ELP 319 end position detector
- Siwes decentralized point controller
- Sidis W compact point diagnostic system
- CKA pawl lock

Track vacancy detection systems
- Clearguard ACM 100 axle counting system
- FTG S remote-fed audio-frequency track circuit

Grade-crossing protection systems
- Simis LC grade-crossing protection system
- Sim 6|13 barrier drive
- Radio-operated approach indicators
Internationally recognized competence in implementation for sustainable solutions

To project success with both consistency and reliability
Siemens handles projects from A to Z. From the installation of new point machines through to complete infrastructure solutions – our competence in implementation which has been demonstrated in many projects is at the focal point of our business.

One of our highlight projects has been equipping Frankfurt Main Station. With 1,200 train arrivals and departures and 350,000 passengers a day, Frankfurt Main Station is one of the busiest stations in Europe. Siemens has commissioned the state-of-the-art interlocking and outdoor equipment on schedule without interrupting services. Offering maximum availability, the Beijing–Tianjin project was completed in time for the 2008 Olympic Games in China. The trains run at three-minute intervals. With this project, system standards have been created for China’s high-speed railway network.

In the case of the Dammam–Riyadh project, Siemens has installed the first ETCS application in the Arab world which is of decisive significance for the planning and expansion of the railway infrastructure in Saudi Arabia. This project has demonstrated that our technology is capable of coping with extreme environmental conditions.

We successfully complete each project throughout the world. From planning, configuration and implementation through to the handling of official acceptance, we have proved ourselves as a reliable and competent partner for customers.

Systems put through their paces
Rapid project execution is unthinkable without automatic test sequences and simulation. For each project, Siemens installs a complete test facility with original hardware at its test centers. The outdoor equipment is simulated. Automatic test sequences are used to put the systems through their paces under original conditions. This means that commissioning periods can be shortened.

Efficient installation strategies
Pre-assembled containerized interlockings, signal installation by means of helicopters and experience gained in connection with a large number of installation projects without interrupting operations all ensure that products and systems are commissioned both fast and safely. This, in turn, guarantees reliable planning on the part of the customer and enhances the attractiveness of railway operations.

Customized servicing and maintenance
Successful railway operations are based on absolute safety and availability. In order to provide undisrupted railway operations, Siemens offers customer-tailored servicing packages.

From inspection, on-site and remote preventive maintenance of installations, delivery of spare parts, corrective maintenance, testing and diagnostics through to training, our logistic concepts warrant maximum system availability. Another positive feature: Rail Mall, our innovative online shop for spare parts.

Sustainable product strategy
One of the typical features of rail systems and components is their long life cycles. This aspect is a key factor in defining the sustainability of our product strategy.

Siemens guarantees functional integrity for a minimum period of 20 years. One example: we have bought up most of the 286 series processors on the world market in order to ensure that no problems are encountered in stocking spare parts for the first computer generation of electronic interlockings dating back to the 1980’s.
Siemens is world market leader in rail automation with more than 200 customers in 45 countries.

Beijing–Tianjin high-speed line, China
- First ETCS-equipped line in China
- First line in China for a speed of up to 350 km/h

Amsterdam–Rotterdam high-speed line (HSL-Zuid), Netherlands
- First cross-border ETCS Level 2 project with cab signaling

High-speed lines in Spain
- High-speed trains, equipped with Siemens ETCS on-board units, demonstrate interoperability with the lineside equipment of different manufacturers

Cologne–Rhine/Main high-speed line, Germany
- From Frankfurt to Cologne in only 59 minutes
- Equipment of one of Europe’s largest stations without interrupting operations

Dammam–Riyadh mainline network, Saudi Arabia
- First ETCS line in Saudi Arabia
- 449 km line for passenger operations (ETCS and GSM-R)
- 556 km line for cargo operations (GSM-R)

Mainline network in Belgium
- Framework agreement for 5,700 signals for the market launch of ETCS Level 1 for the entire Belgian rail network

Bratislava-Rača–Nové Mesto nad Vahom–Trenčín line, Slovak Republic
- First ETCS-equipped line in the Slovak republic for a line speed of 160 km/h
- Siemens signaling and safety system including Iltis control center at Trnava for fully automatic operation and monitoring of railway operations

Harz–Weser regional network, Germany
- Innovative Simis D interlocking
- Equipment of the 500 km line network

Orex Line, South Africa
- World’s second-longest coal line
- 861 km line running through different climate zones
The information in this document contains general descriptions of the technical options available, which do not always have to be present in individual cases. The required features should therefore be specified in each individual case at the time of closing the contract.