



Express Rail Link Kuala Lumpur

Turnkey Project

SIEMENS

efficient rail solutions

The Turnkey Projekt Express Rail Link Kuala Lumpur

Malaysia on its way into the future

As always, time is money – a truism especially applicable to large-scale projects. Frequently, such projects involve an investment of millions and have to be executed and completed in a very short time - often without interruption in ongoing operations. Having brought more than 30 turnkey projects to a successful conclusion, Siemens Transportation Systems possesses vast experience and specialised project know-how in the field of turnkey rail systems. An example of how such advantages can be best put to use is the Express Rail Link in Kuala Lumpur, the capital of Malaysia.

Malaysia, located in South East Asia, is characterised by its multicultural population, consisting of Malays, Chinese, Indians and many other ethnic groups. Due to the rapid economic up-swing that the country is experiencing, it is well on the way to becoming one of the most modern nations in the region. The government is strongly supporting this development and is promoting numerous innovative projects, the best example of which is the "Cyberjaya centre of the multimedia super corridor", the Silicon Valley of Malaysia.

The city's most outstanding landmark is the famous "Petronas Towers", the highest office building in the world. Kuala Lumpur is likewise reaching for the sky in another respect: Kuala Lumpur International Airport, one of the world's most modern and largest airports.

Air Rail Intermodality

The main aim of the Express Rail Link system is to provide smooth, comfortable and safe transportation of passengers and their luggage from the city to the airport and vice versa. The complete check-in process is carried out at Kuala Lumpur's main railway station, thus enabling air and rail transport to be ideally combined. As an "airport in the city", the KLS terminal in the main railway station building provides all the necessary check-in and check-out facilities and also participates in the world-wide luggage handling system.

KLIA ekspres To the airport with the Express Rail Link

The new 57-kilometer city-airport connection was built by Siemens as a turnkey project and was completed before the agreed deadline. The Express Rail Link (ERL) carries passengers from K. L. Sentral, the main railway station, to Kuala Lumpur International Airport (KLIA) in just 28 minutes without any stops along the way. The KLIA express

operates at 15-minute intervals and a maximum speed of 160 km/h, while allowing passengers to enjoy the trip in highly modern, extremely quiet and air-conditioned trains.

KLIA transit Commuter Rail Service

The stations of Bandar Tasik Selatan, Putrajaya and Salak Tinggi of the CRS (Commuter Rail Service) system are on the same route between K. L. Sentral and KLIA. This system is embedded in the ERL system by means of a combined timetable. At Bandar Tasik Selatan station, passengers can use connections to the KTBM railways and STAR Railway Services. In Putrajaya, the new regional centre of Malaysia, a changeover to a monorail commuter system is to be provided sometime in the future.



Kuala Lumpur
Central Station

Bandar Tasik Selatan
Station

Putrajaya
Station

Salak Tinggi
Station

Kuala Lumpur
International Airport
Station



The Management of Mobility Siemens Transportation Systems is involved in Turnkey Projects worldwide



The Client ERLSB

The Express Rail Link Sdn. Bhd. (ERLSB) holds the concession to design, finance, construct, manage, operate and maintain the fast speed air-rail system between K. L. City Air Terminal (KL CAT) at KLS station and KLIA on BOT (Build-Operate-Transfer) basis. Shareholders of ERLSB are TH Technologies Sdn. Bhd. and YTL Corporation.

The Contractor SYZ

The contractor of this turnkey project was the consortium SYZ comprised Siemens and YTL under the leadership of Siemens. Siemens was responsible for the electrical / mechanical scope:

- Track Works
- Signalling/automatic train protection
- Telecommunications
- Overhead Catenary Line
- Traction power supply
- SCADA
- Rolling stock
- Depot / workshop
- E & M building services

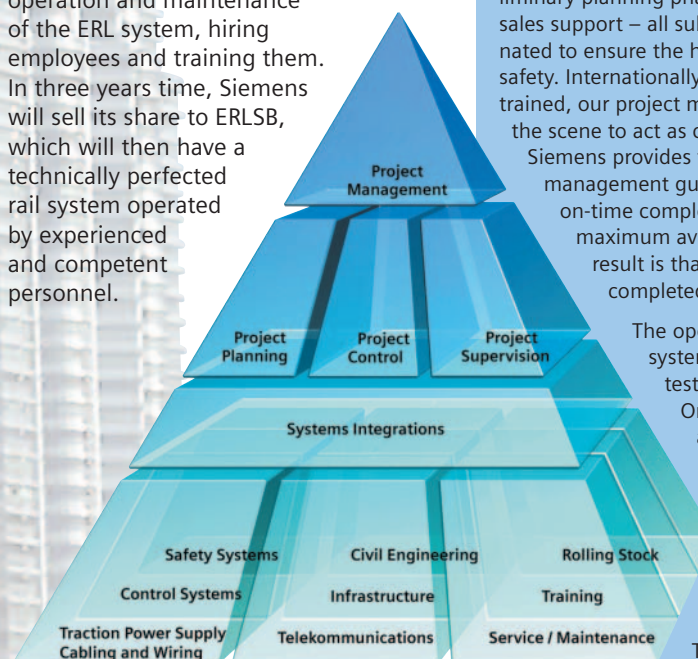
and YTL for the civil works construction and automatic fare collection.

Siemens and YTL have already proven their ability to successfully carry out large projects together, a fact demonstrated by the power station projects they have completed in Malaysia.

There were clear demarcation lines between the areas of responsibility within the consortium. Siemens' world-wide experience in building railway systems stands as a guarantee for a professionalism to the highest possible standard.

Maintenance and operations control Joint accumulation of know-how

ERL Maintenance Support Sdn. Bhd. (E-MAS) was established shortly after the project was started in 1999. Siemens owns 51 % of the company and ERLSB holds 49 %. E-MAS is responsible for operation and maintenance of the ERL system, hiring employees and training them. In three years time, Siemens will sell its share to ERLSB, which will then have a technically perfected rail system operated by experienced and competent personnel.



Turnkey competence from Siemens

Attractive, cost-effective and environmentally clean mobility solutions are needed today more than ever before. Making such transportation systems a reality is an extremely complex task, which is why they are often handled on a turnkey basis. Siemens meets this demand by offering not only technically innovative systems, but also immense competence in project management, system integration, project development and financing to ensure that operators the world over are supplied with safe, efficient and custom-made solutions that meet their transportation needs.

Highest quality and safety

When implementing turnkey projects, Siemens Transportation Systems is in the position to reduce interfaces, streamline timetables and therefore consistently cut costs. Cost-effective turnkey implementation starts immediately in the preliminary project phase, when it comes to choosing the right transportation system or taking advantage of cost-saving potentials offered by existing system structures.

Over the entire term of the project – from the preliminary planning phase to implementation to after-sales support – all subsystems are optimally coordinated to ensure the highest standard of quality and safety. Internationally experienced and superbly trained, our project management team is there on the scene to act as contact partner to the customer. Siemens provides transparent and efficient project management guaranteeing smooth progress and on-time completion of the work as well as maximum availability of the system. The result is that very often the project is completed ahead of schedule.

The operator takes over a turnkey system or sub-system that is tried, tested and fully operational.

On request, Siemens will even assume responsibility for the maintenance and technical operation of the system. Satisfied customers and over 30 successful turnkey projects worldwide testify to the quality of mobility solutions from Siemens Transportation Systems.



EXPRESS RAIL LIN

The Project

THE ERL-CRS SYSTEM

The ERL-CRS System

ERL – Direct Express Rail Link (ERL) service from Kuala Lumpur Sentral (KLS) at Brickfields to Kuala Lumpur International Airport (KLIA) at Sepang

CRS – A Commuter Rail Service (CRS) from KLS to KLIA, stopping at three intermediate stations located at Bandar Tasik Selatan, Putrajaya and Salak Tinggi.

Route Length	approx. 57 km
Train Type	ET 425 M
Number of Train sets	12 4-car train sets with fully air-conditioned (ERL 8 sets & CRS 4 sets); One 4-car train set consists of a motor car, a trailer car, a trailer car with pantograph and a motor car with luggage compartment (ERL-System only).
System Capacity	156 seats per ERL 4-car train set with no standees, including 4-flip up seats to provide space for handicapped passengers; and 144 seats per CRS 4-car train set, and allowance for 396 standing passengers under regular operating conditions
Principle Dimension of Train set	
Overall length	68.7 m
Overall Width	2.84 m
Overall height	4.16 m (Height of pantograph (down) above rail level (unladen))
Max. Operation Speed	160 km/h
Track Configuration	Ballasted Track with concrete sleepers and overhead line (25 kV, 50 Hz), Track Gauge 1,435 mm, Rail Profile UIC 54, bi-directional working system.
Siemens' Scope of Delivery	Traction Power Supply, Overhead Contact Line, SCADA, Rolling Stock (12 Train sets), Telecommunication, Signalling, Workshop, Building Services, Trackwork, Project Management

System Capacity

The system capacity is based on:

- 156 seats per ERL 4-car trainset with no standees, including 4 flip-up seats to provide space for handicapped passengers; and
- 144 seats per CRS 4-car trainset, and allowance for 396 standing passengers under regular operating conditions.

In specifying the above, the ERL-CRS System as designed is capable of simultaneously handling 8-car ERL trains at a frequency of 10 minutes and 8-car CRS trains at a frequency of 20 minutes in both directions throughout the hours of operation. Actually, 4-car trains with a headway of 15 minutes for the ERL and a headway of 30 minutes for the CRS are in operation.

Safety and Reliability

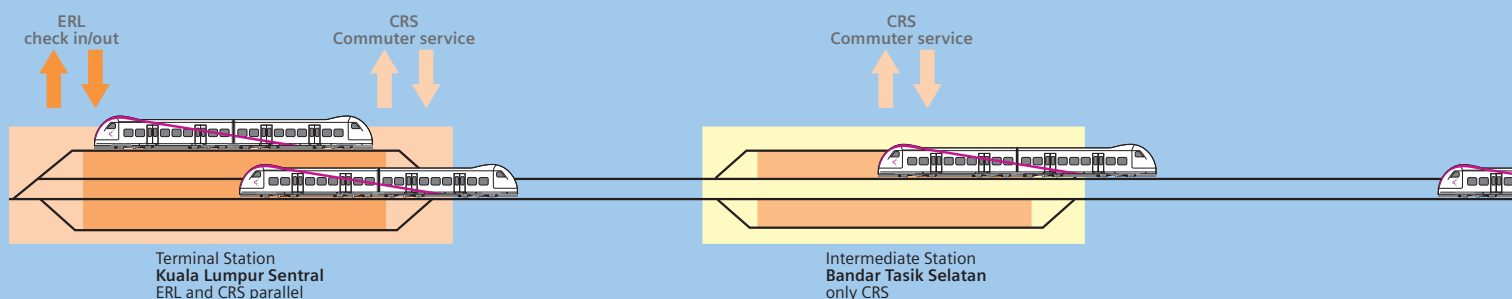
Appropriate system design, construction methods and standards and equipment selection are used in order to achieve safe, reliable, efficient and punctual services. The safety of passengers and workers on the ERL-CRS System is the prime requirement at all times.

High reliability is ensured from all sub-systems of the ERL-CRS System to deliver consistent and high standards of customer service and to minimise maintenance costs.





K K U A L A L U M P U R



Track Configuration

The track alignment considers an operational line speed of 160 km/h. The equipment used for construction and the locally trained personnel are capable of providing Malaysia and the region with modern track works.

The track is designed with standard gauge 1435 mm. The running rail and turnouts are continuously welded both in running line and sidings either by the flash-butt or alumino-thermic methods. Pre-stressed monobloc concrete sleepers are used for plain line ballasted track, slab track is used in KLIA ERL station.

Track and turnout components have a design life consistent with international practice.

Design speed is 160km/h for mainline, 25 km/h for depot track. Clearances comply with the UIC G2 static gauge and kinematic envelope.



Signalling System

The supplied signalling system has already acquired experience in the Asian regions: Vietnam, Thailand, Malaysia. The modern and well-proven technology ensures a safe and efficient operation of the system.

The signalling system provided is designed to maximize comfort and speed without compromising safety, ensuring at all times that no dangerous or undesirable incident will occur. It ensures that the trains cannot exceed the safe instantaneous speed anywhere on the running lines. The system permits only safe selection of routes at crossovers and junctions. Real-time information is provided to the operations staff to permit flexible and efficient control from within the Operations Control Centre (OCC). Clear, unambiguous instructions are provided to drivers.

All the operations services are centrally controlled by a Traffic Management System (TMS), which has its input/output devices in the OCC at the depot. The Passenger Information Display System (PIDS) is controlled by the TMS and provides at platforms and concourse levels information about approaching trains to the passengers.

Accurate instructions are provided to drivers by means of signals. The drivers control the trains under guidance and control of the Automatic Train Protection (ATP) system.



Telecommunications

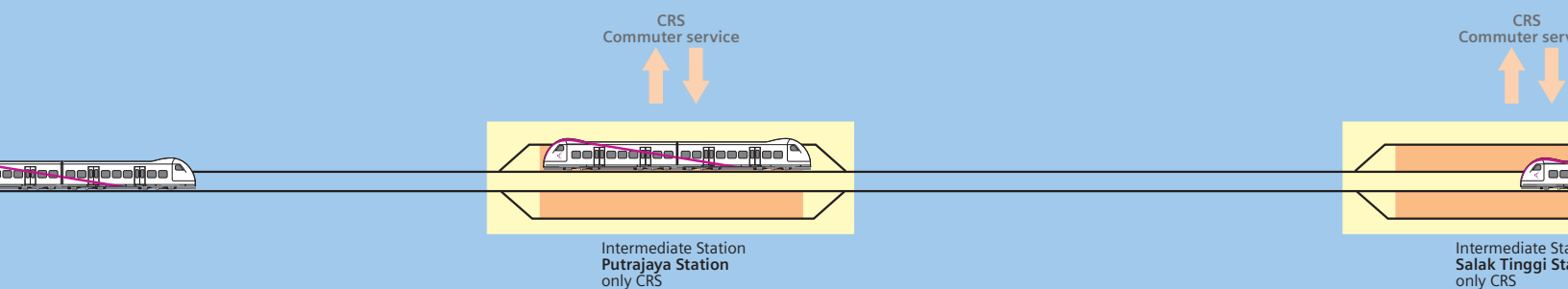
The telecommunication system supplied by Siemens provides all necessary communication facilities to ensure reliable and redundant submission of data via an optical fibre cable transmission system. A complex CCTV system for the surveillance of the stations during operation, as well as the PA system are centrally controlled from Operations Control Centre (OCC).

The independent telephone system provides lines for both digital and analogue systems to the required number of operational and non-operational areas. It is interconnected to PTT.

The world-wide first commissioned radio system according to TETRA standard provides state-of-the-art technology. The central radio facility is provided within the OCC.

The clock system ensures that the entire railway system is provided with the correct time. Siemens provides a clock system for all passenger stations, within the depot area and for technical systems. The system consists of a master clock, synchronised by a GPS receiver in the Operations Control Centre, and slave clocks.





Overhead Contact Line

The railway line is equipped with an Overhead Contact Line System (OCS) of 25 kV which is designed for operational speeds up to 160 km/h to transfer the electrical power to the trains.

This OCS complies perfectly with local requirements, especially with high humidity, related corrosion influences and the incidence of thunderstorms. The OCS has been optimised to operate with the lowest possible contact forces between overhead contact wire and pantograph, thus providing optimum conditions to limit dynamics in operation with full speed.

Traction Power Supply

The railway line is electrified with traction power from one substation which is located approximately in the middle of the line between KLS and KLIA. To ensure high supply reliability, the substation is connected via two feeders to the 132 kV transmission system of the Malaysian power supply company TNB.

The substation provides the traction power supply, which is realised as a 25 kV 50 Hz system with return conductor. The 25 kV feeds the complete overhead contact line system. Both the 132 kV and the 25 kV switchgears are of the gas-insulated indoor type. Remote control of the substation is implemented from the Operation and Control Centre (OCC) in Salak Tinggi as the substation is normally unmanned.

SCADA

The supplied SCADA system was based on the experience with solutions for other major international railway projects in Asia (e.g. Guangzhou and Shanghai / PR China; Taipei / Taiwan).

The SCADA system provides a means of control, status indication and alarms for the traction power supply components and infrastructure installations at all remote outstations. This provides a clear overview of the complete ERL-CRS network status.

Process computer and process coupling form the heart of the control system. The configuration employs redundancy for the Operations Control Centre such that the non-availability of major component parts, such as process computer and process coupling due to maintenance or fault, has no adverse effect on system performance.

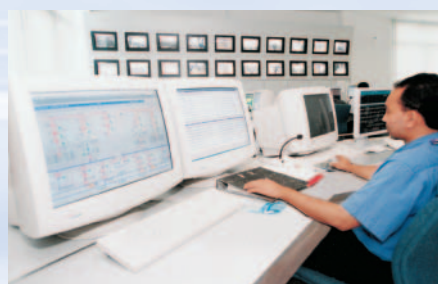
Sufficient workstations are provided to allow the employer to effectively control, operate and maintain the traction power supply and infrastructure equipment. The system has the capability for expansion in the future.

Rolling Stock

The Desiro ET vehicle supplied by Siemens is based on the proven ET 425. It was modified in respect of climatic requirements, higher speed and attractive design. Furthermore, the special requirements of the air-rail intermodality were taken into account in the design of the train interior.

An interior ambience with specified levels of seating and baggage accommodation is provided for the ERL train fleet. The separate baggage compartment to safely transport the required containers is provided to comply with the air-rail intermodality concept.

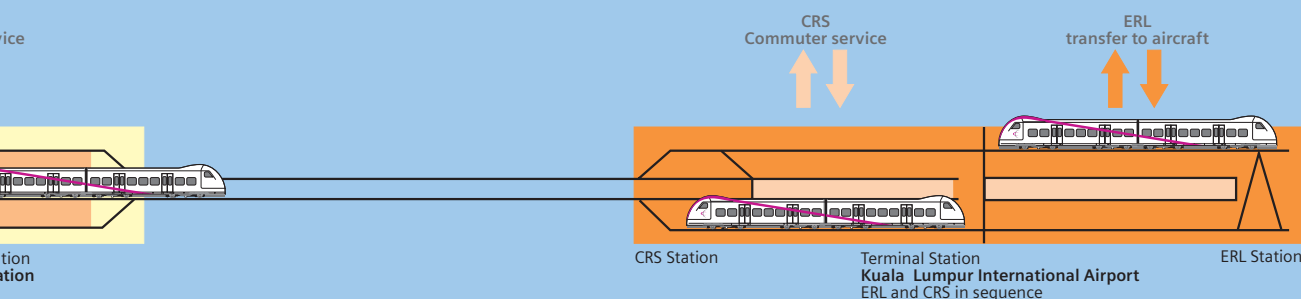
An interior ambience with specified levels of seating and standing is provided to meet the passenger loading for the CRS train fleet complete with a pleasing internal and external appearance.





ice

tion
tion



Depot: Buildings, Workshop and Facilities

Routine servicing, maintenance, repairs, overhauls and refurbishment works can be effectively carried out generally under covered areas, at the specified intervals, or as needed, both for the ERL-CRS System train fleets and for the support locomotives and service vehicles. All specified subsidiary workshops, machine tools, benches, stores, calibration equipment, gauges, hand tools and minor equipment etc. are provided.

All the necessary major items of processing machinery and handling equipment are determined and provided e.g. jacks for lifting a complete an Desiro ET train-set, underfloor wheel lathe and cranes.

Station Design

KLIA station is integrated into the airport complex. The station's design copes harmonically with the requirements in functionality to serve as an active interface between train and plane.

The other stations combine a well-developed functionality with the impression of modern Malaysian architecture.

Automatic Fare Collection System Ticketing

An Automatic Fare Collection (AFC) system was installed which includes programming, and controlling of paper tickets. The access to the platforms is controlled by automatic gates.

Building Services E & M, Lighting and Others

Appropriate equipment is installed to protect public, staff, equipment and installations in compliance with local fire prevention regulations and relevant National Fire Protection Agency (NFPA) regulations.

Lifts and escalators are provided at Kuala Lumpur Sentral, Bandar Tasik Selatan and Salak Tinggi stations.



Siemens AG
Transportation Systems
Turnkey Systems
P. O. Box 91 02 20
D-12414 Berlin, Germany
Phone (++49) 30-3 86-50
Fax (++49) 30-3 86-5 10 50

www.siemens.com/ts/turnkey

Printed in Germany
PPG071 170059 PA02032.0
Order No. A19100-V400-B558-V1-7600

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.