Complete rail solutions – the ticket to the future.

Integrated, reliable and sustainable rail systems.

Answers for mobility.
Mobility: the success factor of the urban age.

The dynamics of the global economy are determined by large conurbations. Global competition is becoming an issue of inter-city competition and, within this context, mobility is a decisive key to guaranteeing success. Transportation systems first and foremost decide on the attractiveness of a metropolis.

An urbanized global population. Migration into cities, high birth rates and increasing life expectancy combine to form a worldwide trend towards rising urbanization. Since 2007, over 50% of the world’s population has been living in urban agglomerations. This figure is set to rise to 70% by 2030. An enormous challenge for both the economy and the environment.

Transport routes as lifelines. Today, mobility is one of the key strategies for survival. On the one hand, because, in a functioning economy, both workforce and commodities have to be transported to where they are needed. And, on the other hand, because people measure their quality of life in terms of good mobility. Road traffic is coming to the limits of what is ecologically defensible – it needs to be supplemented by state-of-the-art rail traffic solutions.

Only sustainable solutions count. The attractiveness of a city starts with healthy living conditions. That is why it is vital to minimize traffic-induced pollution levels wherever possible. It is here that rail systems can make an important contribution.

The success triangle of mobility. Only attractive services are acceptable by would-be passengers. Only cost-effective solutions pay off in continuous operation. Only low-emission solutions ensure life quality in urban areas. As the leading international integrated rail solution provider, Siemens can give an answer to these complex challenges.

Pointing the way for tomorrow’s world. Unrestricted mobility is the greatest challenge for our society. Therefore, with its “Complete mobility” concept, Siemens creates networked, efficient and environmentally friendly transport and logistics solutions – for safe passenger and cargo traffic. Our portfolio ranges from solutions for rail and road traffic, rail vehicles through to airport logistics and postal automation. For the purpose of implementing complex integrated rail systems, Siemens supports customers with its complete rail solutions.
Rail systems with a built-in future.

The implementation of large-scale transport projects is not only a question of finance and what is technically feasible. In the mega-cities of the future, success particularly depends on optimum coordination and sophisticated networking.

Complex tasks call for complete solutions. A rail system operator has diverse interests: on-schedule completion, reliable operation, low-emission technology, low life-cycle costs, passenger safety, adaptability to the city’s dynamic growth. None of these tasks may be solved at the expense of another; all need the same level of attention.

Our definition of partnership. For us, a project is not completed until the customer is satisfied with the results. When it comes to procurement and the training of qualified staff too, we support our customers so that even the most complex systems run smoothly. Why not opt for an experienced partner at your side who both thinks holistically and acts specifically!

Only when a system is complete is it really ready for operation. Complete rail solutions stand for a holistic approach from the very beginning. Only an integrated overall solution with concentrated project responsibility will prove itself in practice in the long term. From the first feasibility study and operational hand-over through to after-sales service, project management is continuously involved. With distinct benefits for the operator.

Complete rail solutions cut costs. Fewer interfaces, precisely defined competences, streamlined time schedules and standardized organizational models ensure that projects are executed with minimum resources.

Complete rail solutions reduce the investment risk. Future operational practice is simulated true to reality in extensive preliminary analyses. This means that the system’s later profitability always remains at the focus of attention.

Complete rail solutions enhance operational reliability. Whatever has been planned in terms of integration is less susceptible to disruptions once it has been commissioned. System disruptions and communication failures are avoided from the very start.

With complete rail solutions into the 21st century

The execution of a rail system in terms of complete rail solutions optimally prepares the operator for the growing challenges of urbanization. Ultimately, the success balance is equivalent to:

- increased quality of life for people
- safety for operators
- environmental sustainability
Everything from a single source. All of one piece.

No company develops a holistic mobility concept over night. At Siemens, know-how and international strength have continuously grown over the last 160 years. With its complete rail solutions, Siemens ensures that integrated rail systems are implemented in a model way.

**Leading edge in experience.**
Siemens provides complete support before, during and after commissioning of the transportation systems which are to be developed. A leading edge in experience with more than 40 turnkey projects worldwide is the best conceivable qualification to this effect.

Whether it is a question of mass transit, mainline services or airport links, the rail operator is provided with all major services from one and the same source:

- **Financing concepts**
Siemens supports customers in their search for a qualified financing partner and credit insurance company. Or the customer uses the offered option of a public-private partnership and profits from a clearly defined distribution of responsibility and risks.

- **Supply of technical systems**
Rail automation, rail electrification, locomotives, trams, metro systems, regional and high-speed trains, depots, and much, much more.

- **Project management**
Reliable time scheduling, a sophisticated organization, an active partner in the consortium – either as a member of the consortium or as consortium leader.

- **Commissioning and training**
From full-scale testing of all rolling stock and systems, e.g. at our Wegberg-Wildenrath test center, through to initial training of operating and maintenance staff.

- **System integration**
Complete synchronization of the different interfaces. Merging of all control and communication systems involved.

- **Maintenance**
Reliable system servicing also after commissioning. For some customers for many decades.
Complete rail solutions for

Mass transit
Sample project:
MST Lisbon, Portugal

Mainline systems
Sample project:
High-speed line, Beijing – Tianjin, China

Airport links
Sample project:
ARL Bangkok, Thailand
Growing cities result in a growing demand for sophisticated traffic solutions. New conurbations evolve and have to be interconnected intelligently. The requirements of users opting for fast convenient traffic solutions are to be harmonized to environmental requirements and the wish to preserve an intact townscape. This is where innovative solutions are called for with the aim of making rail the safe option for everyone and everything.

Resolution of increasing traffic levels. More than ever before, it is now a question of preventing conurbations and metropolises from collapsing under the sheer volume of traffic. State-of-the-art mass transit solutions are in demand. Rail is proving to be the fastest, safest, most environmentally friendly and most cost-effective approach to this objective – and as a convenient alternative to individual transport.

Lisbon – a city on the move. The city at the estuary of the Tejo has undergone considerable expansion over the last few decades. With the construction
of the “Ponte 25 de Abril” suspension bridge, large estates have been developed south of the city. To create a better link for these urban areas, Almada and Seixal were to be connected to Lisbon in the north by means of a mass transit system. During the planning phase, special attention was paid to a cost-effective, environmentally friendly solution and to harmonic integration of the system into Lisbon’s historic architecture.

**MST Lisbon, a modern high-capacity light rail system.**
13 km line length, 19 stations, 24 vehicles – Siemens executed this complete rail solution just in time within four years. The scope of work extended from project management, signaling and operations control systems, rail electrification and vehicles through to the complete depot. As consortium leader, Siemens set up the Metro Sul do Tejo (MST) network together with the Portuguese government as a public-private partnership. And since standstill is tantamount to a step backwards, another 20 km for connecting new towns are already at the drawing-board stage.

**Highlight: operation without overhead contact lines.**
With its unique architecture, Lisbon is one of Europe’s most beautiful cities. That is why, in passenger operation, MST Lisbon is designed as a system for operation with a “non-visible contact line”. The core element is the innovative Sitras® HES hybrid energy storage system developed by Siemens. This system consists of a mobile energy storage unit and a traction battery. Thanks to this technology, trams can run without overhead contact lines for a distance of up to 2,500 m. In passenger operation, this system demonstrates to other interested operators how an intact townscape can be preserved, energy costs reduced by up to 30% and up to 80 tons less CO₂ emission produced per vehicle.
Attractivity is trumps. Passengers wishing to switch from car to rail want to move faster and more conveniently. They wish to reach their destination in a shorter period of time – and as stress-free as possible. A high-speed system therefore has to surpass individual transport in terms of attractiveness in order to gain acceptance by potential passengers. In China, Siemens has pointed the way forward in this direction. In record time.

A bottleneck overcome in the time schedule. More than 25 million people currently live in the Beijing and Tianjin conurbation. The existing highway and railway line were incapable of coping with the demands involved. The collapsing transport network had to be relieved. Siemens was contracted with the job of linking both cities by a high-speed line. A demanding project which had to be executed under considerable time pressure. A period of only 27 months from contract conclusion through to commissioning was available with zero time allowance. The deadline was August 1, 2008, the official opening date of the Olympic Games.

A complete rail solution of the superlative category. Siemens assumed responsibility for the entire scope of project management. Thanks to exact detailed planning, nothing was left to chance. System integration by Siemens ensured that all activities were reliably coordinated. Siemens’ own components were perfectly dovetailed to Chinese signaling systems and telecommunications as well as solutions for the overhead contact line and rail electrification. In this way, the level of work involved in coordination for the customer remained positively low. Punctually in time for the beginning of Mainline solutions – successful along the entire line.

Today’s life is being determined by an increasing speed. Each hour and each minute count in economy, in society, and above all in traffic. Increasingly larger distances have to be covered in a shorter and shorter period of time. Siemens has gained an outstanding reputation worldwide in the realization of complete high-speed rail systems.
the 2008 Olympic Games, the Velaro CN high-speed train with a capacity for carrying 601 passengers went to the starting line. On this 115 km line, it achieves a speed of max. 330 km/h.

So that the impossible becomes possible.
Complex, time-critical projects with a high-level risk have to be managed with a particularly high degree of reliability. Siemens has taken on the complete scope of services from project management, system integration, signaling, telecommunications and overhead contact line through to traction power supply.
Trains instead of buses in Bangkok. Suvarnabhumi is Bangkok’s major airport which was opened in 2006. Until then, buses in particular had been used as airport feeders. The Airport Rail Link (ARL) implemented by Siemens links Suvarnabhumi Airport to the railway station at the heart of Bangkok. The construction of a rail link in an expanding megacity proved to be an enormous challenge. Prior to construction of the ARL, Siemens had already built the 23 km Skytrain line (1999) and the first metro line (2004) in Bangkok.

Compact solution for boom cities. The ARL Bangkok is a high-speed, envi-

Top airport link – business card for urban quality.

It is only a modern, high-capacity airport that makes a city a genuine metropolis. Such an airport has to offer passengers a high level of convenience. Convenience and rapid accessibility are two of the imperative standards which are expected of a modern airport today.
ronmentally friendly, highly convenient means of transport. 93% of the line’s total length of 28 km is elevated, whereas only the last section in the vicinity of the airport runs through a tunnel. This meant that the project could be executed without entailing any major impact on the existing townscape. While passengers travel at high level above the Thai capital, life in the city’s streets continues as usual.

The future can start today. Like many other megacities in Asia, Bangkok suffers from escalating road traffic levels. Continuously increasing CO₂ emission levels and congestion paralyzing the flow of traffic are daily features, impairing people’s health and sense of well-being. As many as one in seven of Bangkok’s inhabitants complains about respiratory problems. The ARL creates perceptible relief. Instead of sweating away in traffic jams, the ARL’s passengers can relax in fully air-conditioned open-plan carriages.

Everything from a single source. Within the consortium, Siemens assumed responsibility for the entire scope of project management, system integration, supply of signaling and control systems, telecommunications, rail electrification, equipment of the depot and service center, track construction, baggage management, check-in systems and rolling stock.

Safety has pride of place. In major projects, it is vital to have the time required, the costs involved and all activities under control at all times. That is why, in the ARL project, particular attention was paid to professional execution of the project within each phase. Reliability analyses, e.g. FMEA (Failure Mode and Effects Analysis), which for Siemens is part of optimum project management, contributed to additional safety.
The information in this document contains general descriptions of technical possibilities which may not always be provided. The desired features therefore need to be determined individually by contractual agreement.