Turnkey Depots
for Maximum Availability of Rolling Stock

SIEMENS

Trains sometimes **need a time-out, too**

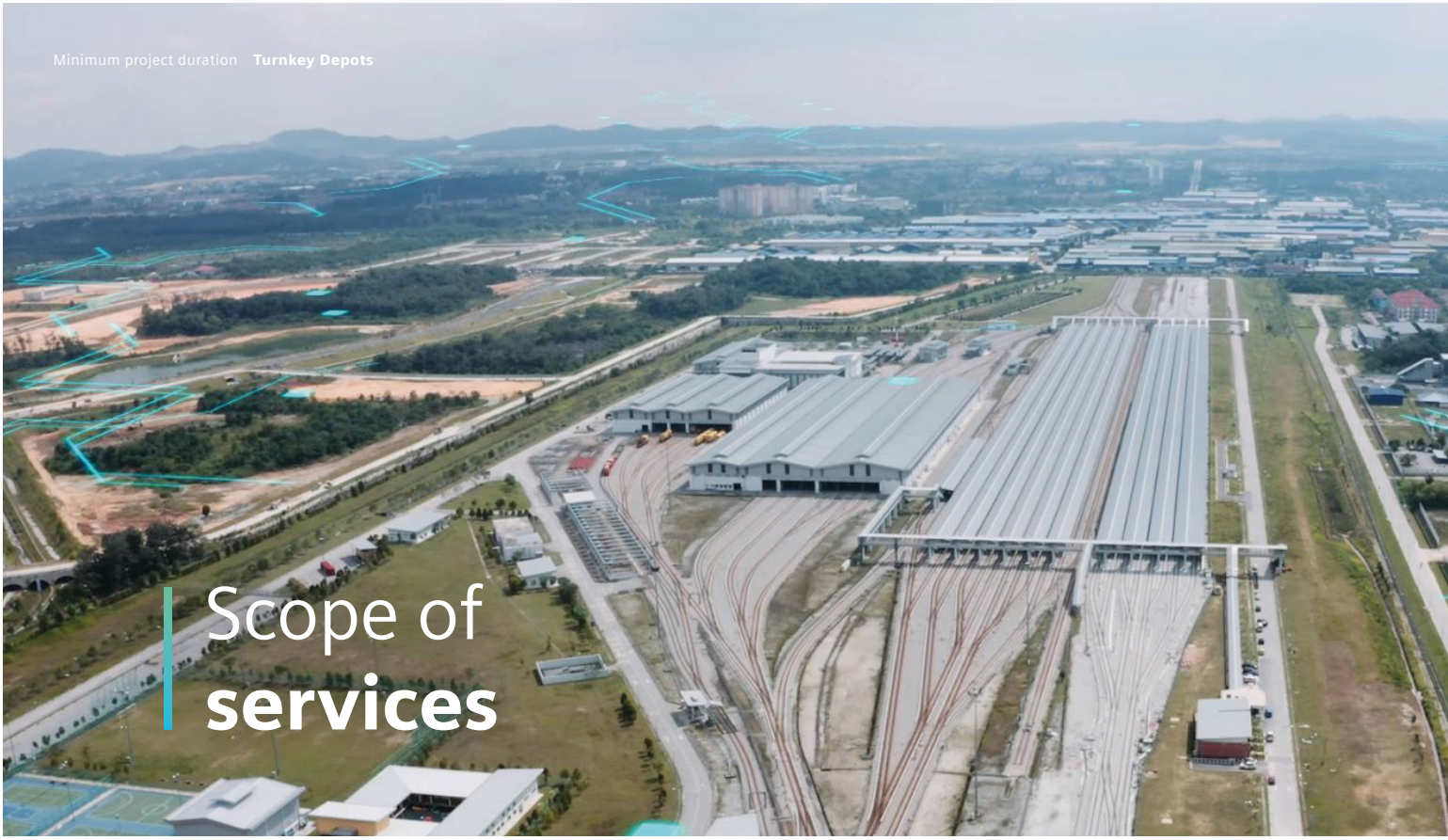
Trouble-free rail service is one of the most important preconditions for satisfying the growing demands for mobility – and prolonging the lifecycle of your assets. Modern rail depots are highly specialized inspection and maintenance facilities. To cope with the stringent requirements posed in actual practice, the optimal solution must be found for each rail system.

Maximum availability as the ultimate goal
High availability of the rolling stock is a prerequisite for the success of rail systems. Inspection, servicing, cleaning, and maintenance protects the assets and helps them withstand harsh operating conditions. No matter what type of maintenance is put in place (corrective, reactive, condition-based or predictive maintenance), the overall time for servicing trains becomes shorter and shorter. These time-outs therefore need to be optimally coordinated and executed with absolute reliability.

A proven solution from a single source
Our answer to this challenge: matching the knowledge about state-of-the-art maintenance with the competence to integrate various systems. The result: a depot system planned from a single source, enabling you to focus on your core business. A modular concept ensures high flexibility matched with shortest project execution, significantly reduced implementation time, providing you with full planning security. Proven solutions cater to a fully functional and sustainable solution from the start. Interfaces are streamlined with the help of a well-established civil works partner.

One depot, but many different interfaces
This is achieved by state-of-the-art depot rail solutions. The depot represents a demanding project within every transportation system, as it is based on various planning parameters and requires the coordination of many interfaces, such as signaling, electrification, communication, depot workshop equipment as well as buildings and civil works. An optimal layout and optimized depot operations concept allows for efficient service processes. Flexibility in capacity performance is given with regard to operation schedules, headways, maintenance intervals, and transportation services.

A home to all types of rolling stock and projects
From analysis and planning to outstanding project management and reliable services, with turnkey depots and workshops Siemens Mobility provides comprehensive support for rail operators and infrastructure owners. No matter whether you aim to build a new depot, expand or revamp an existing one; no matter whether you want a mass transit or mainline system, you can expect efficient planning, safe commissioning and support from start to finish.



Scope of **services**

Every depot is different, as it is based on the specific needs of the rail system and local requirements, such as the available land. The services for Siemens Mobility aim for faster execution with higher accuracy and confidence in the agreed schedule, price optimization, and high flexibility through a modular concept. Interface management is clarified for the main module and tailor-made based on onsite conditions. Thanks to the use of proven and standardized solutions project risks are minimized.

Design & layout incl. BIM

The functional layout of a depot is created after a comprehensive analysis of the operating data and maintenance plans for all system components. Based on a predefined equipment set, a modular approach for buildings, and keeping in mind an optimized number of train movements, we define the ideal layout. Additionally, the safety of maintenance staff needs to be observed and all safety and security measures in accordance with the relevant safety regulations also need to be implemented. With the help of Building Information Modeling (BIM) a digital representation of the depot is produced to enable first time right and less execution time at lower cost.

Project management

In order to bring the depot to life, coordination of all the work packages involved as well as customers and personnel responsible for maintenance and operation is needed. This ensures that all the contractually agreed goods and services are delivered on time, within budget and with quality.

Track work, signaling, communication and power supply system

As any other rail system, a depot needs the related track work for access and stabling, as well as safe signaling technology and a reliable power supply system. Here, we can source from decades of knowledge and experience by either inhouse expertise or reputable, highly reliable and competitive partners.

Depot & Workshop equipment

Various equipment is needed to provide a state-of the-art depot. This includes professional depot and workshop equipment, such as lifting equipment, a washing plant or automatic visual inspection system, special tools, spare parts as well as maintenance vehicles.

Civil works

Siemens Mobility is teaming up with very reputable and highly qualified civil construction companies based on a consortium agreement. You will interact with one team consisting of rail and depot equipment experts, as well as construction professionals. This team ensures seamless project execution. All potential risks arising from interfaces will be dealt with within this civil execution team.

Integration

System integration from a single source saves time and reduces risks: experts synchronize the various interfaces efficiently. They ensure unobstructed interaction between transit lots and all communication systems. Of course, all products and solutions fulfill the requirements for cyber security.

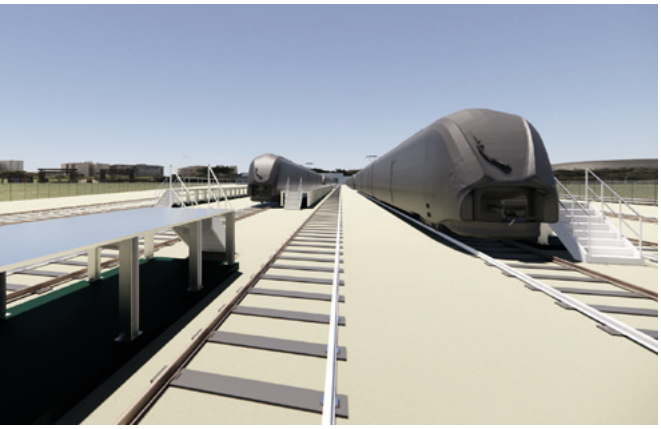
Interface & Requirements Management

The objective of the Interface Management procedures is to identify, describe, clarify, settle and control all interfaces between the project partners and their products or systems to ensure the functionality of the integrated system.

Due to the standardized approach, interfaces are already defined, details investigated and clarified and implementation solutions made available for the main model to shorten execution time. Of course, during the design of your project, these are customized based on the onsite conditions at hand. Additional interfaces based on location or additional requirements will be steered and controlled by a dedicated interface manager.

Tailor-made solutions

Minimizing the maintenance time of trains: depot solutions are implemented so that the rail operator gets maximum efficiency for all operational sequences.



Already in the layout, trimmed for maximum efficiency

Minimizing the maintenance time of trains: In each depot, a variety of tasks must be performed in perfect harmony in a confined space. The smooth interoperation of all those involved in the work process requires the shortest possible paths to permit efficient execution of the tasks at hand. This must all be taken into account early on when creating the layout of a depot. Materials and equipment must be available at all times.

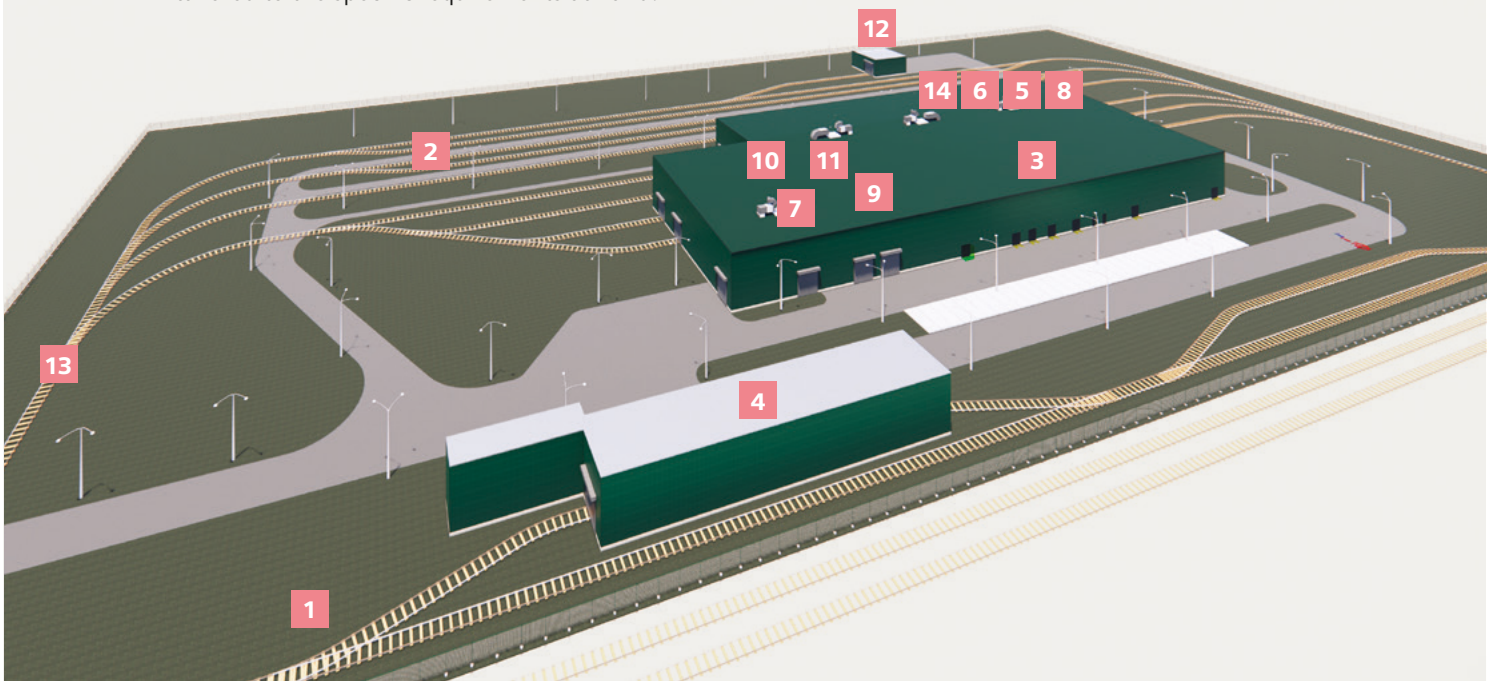
Only then can maintenance and repair tasks be performed reliably and on schedule. This is achieved through perfect arrangement of inspection tracks and the specialized workshop areas. Siemens Mobility has a profound knowledge of the underlying work processes and of course also supplies the necessary specialist tools, handling equipment, and maintenance documents

A virtual depot design at your fingertips

Siemens Mobility utilizes Building Information Modeling (BIM) for fully virtual planning of your depot facilities. This includes rail infrastructure, the depot equipment in alignment with needs for operations and maintenance and the related civil construction. All this data is combined in a fully virtual 3D model of the depot for full transparency at all times. This enables optimally coordinated work areas, as well as a completely transparent and therefore flexible and quickly adaptable design. Fully digital testing enables the most cost-efficient implementation and offers earlier training of staff.

The layout of an LRT depot

This model shows the layout of a Light Rail Train depot. For metros and mainline rail there are other layouts, tailored to the specific requirements at hand.



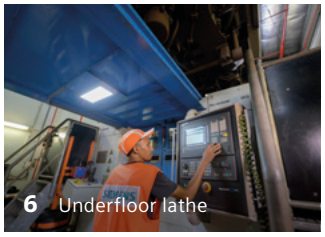

1 Depot access


2 Stabling

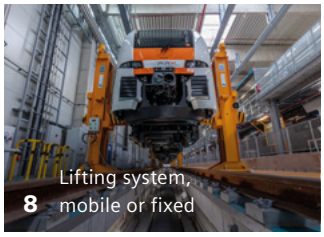

3 Service buildings for inspection, sanding, and interior cleaning


4 Exterior washing plant


5 Central workshop area for inspection and maintenance


6 Underfloor lathe


7 Specialist workshops

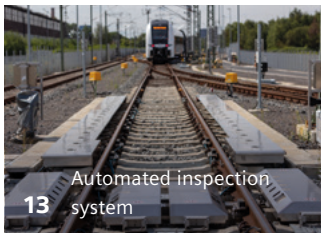

8 Lifting system, mobile or fixed

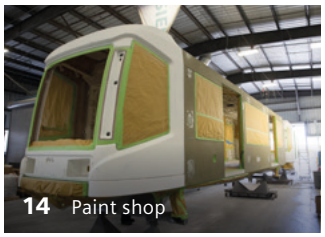

9 Spare parts storage


10 Testing

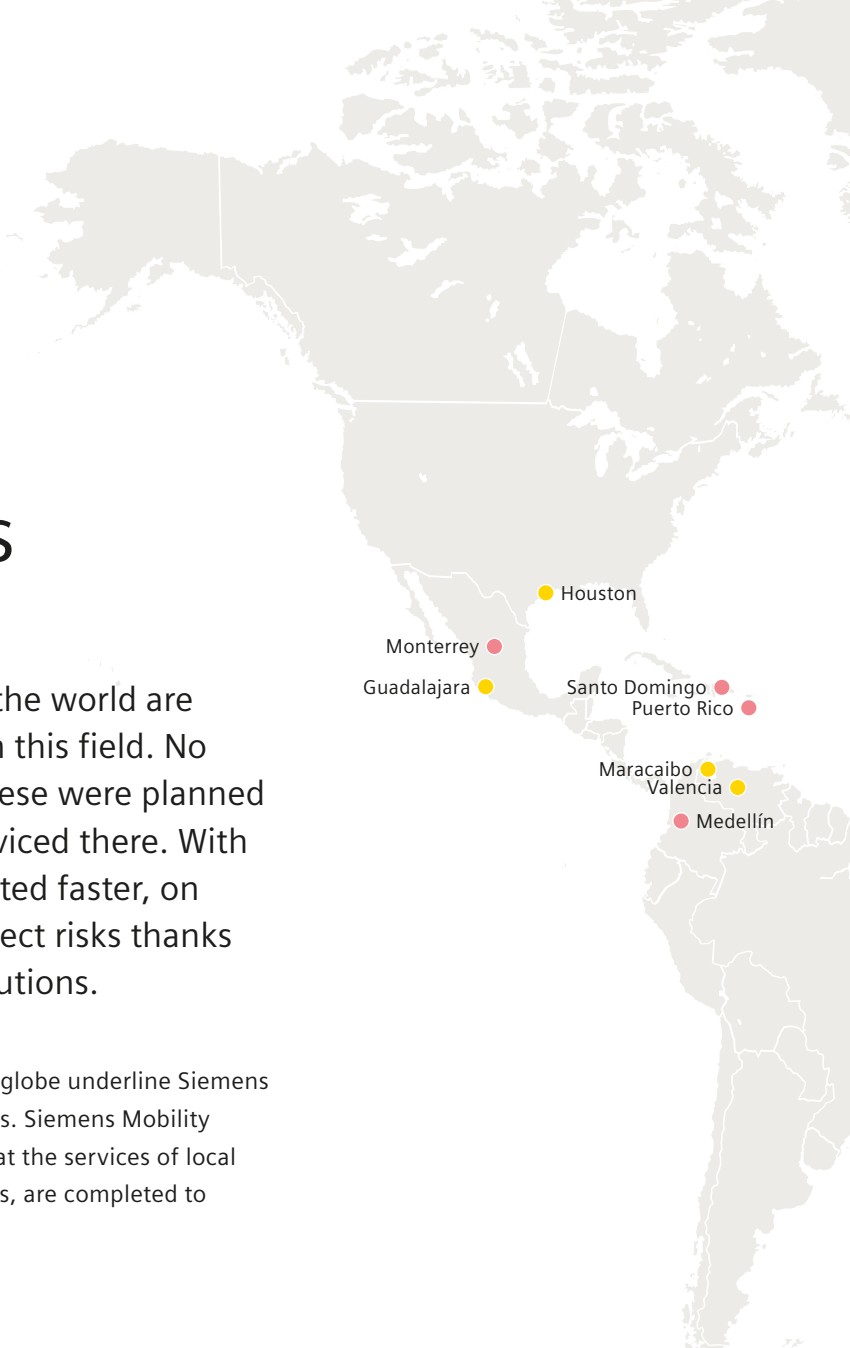

11 Wheelset press (not LRT systems)


12 Infrastructure workshop with service vehicle


13 Automated inspection system


14 Paint shop

International knowhow for local solutions



More than 50 successful projects all over the world are proof of Siemens Mobility's track record in this field. No matter what type of rolling stock, all of these were planned for maximum availability of the trains serviced there. With a turnkey approach, depots are implemented faster, on time and within budget and with less project risks thanks to the use of proven and standardized solutions.

Numerous integrated package depot solutions around the globe underline Siemens Mobility's expertise in the field of complete depot solutions. Siemens Mobility assumes the bundled overall responsibility and ensures that the services of local companies, with special regard for the cultural peculiarities, are completed to schedule and in high quality.

Light Rail Edinburgh, Great Britain
May 2014
As a member of a consortium led by the engineering and service company Bilfinger Berger, Siemens Mobility received an order from the City of Edinburgh Council to build a 14-kilometer tram line as a turnkey project. The scope also included the depot workshop equipment.

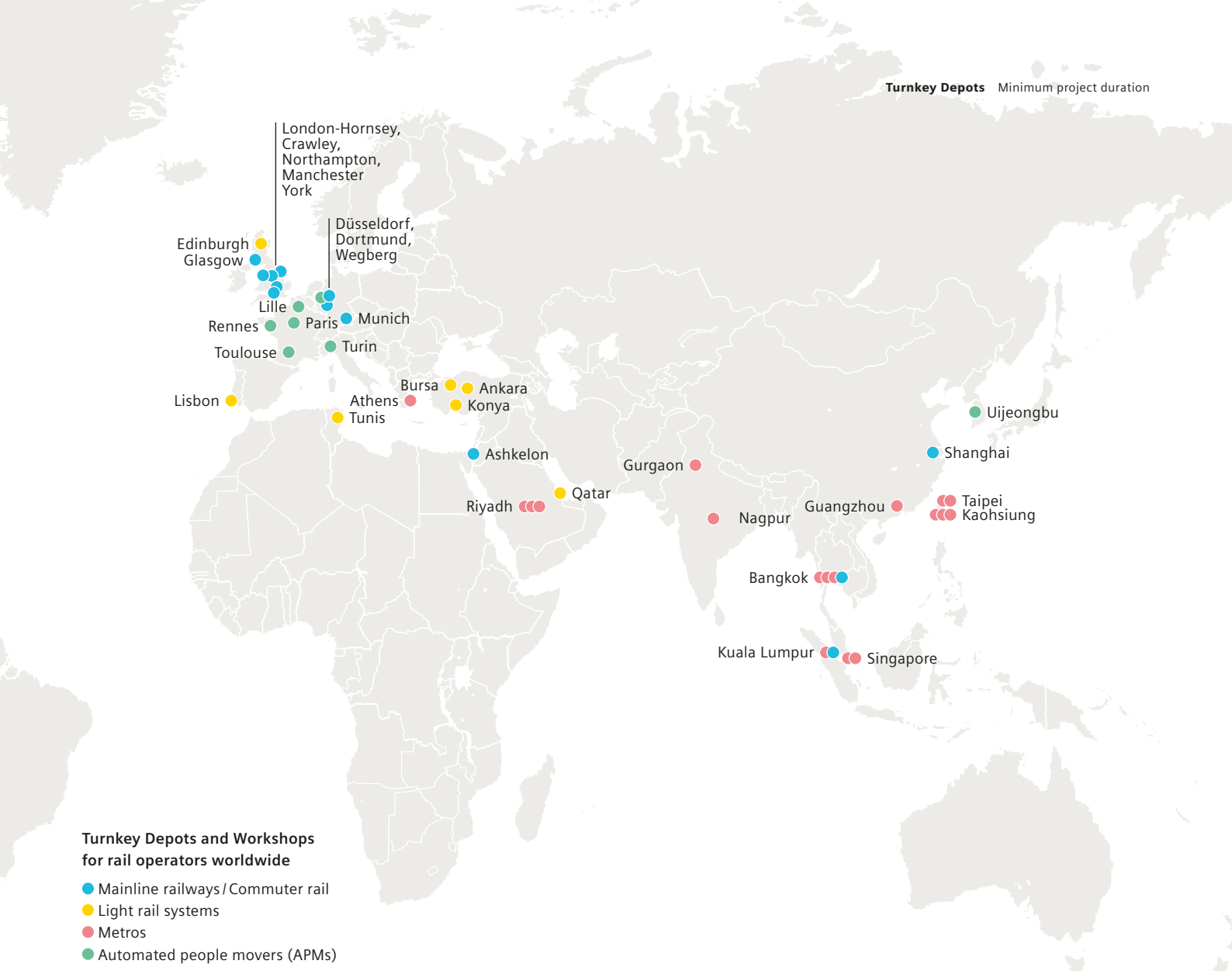
Highlights: maintenance of non-Siemens rolling stock, depot commissioned 18 months before passenger operations

Depot scope of work: designed and equipped for preventive and corrective maintenance

Number of trains: 27 low-floor trams (length of train: 43 meters)

Stabling tracks in depot: 8

Workshop tracks in depot: 4



Metro Klang Valley, Kuala Lumpur
December 2016

Siemens Mobility, in a consortium with Hisniaga Sdn Bhd, was tasked by MMC – Gamuda KVMRT to execute a turnkey project for Klang Valley Mass Rapid Transit for two depots to maintain the Siemens Mobility Inspiro metro trains, which operate on a 51-kilometer-long track.

Highlights: supply of maintenance vehicles with ultramodern measurement facilities for track geometry and track conditions, Siemens Mobility trained 30 local young technicians and engineers for the tasks in the depots

Depot scope of work: designed and equipped for preventive and corrective maintenance; work trains provided by Siemens Mobility were used during construction of Klang Valley metro line

Number of trains: 58 driverless four-car Inspiro metro trains (length of train: 90 meters)

Stabling tracks in depot: 12 (depot Sungai Buloh), 6 (depot Kajang)

Workshop tracks in depot: 7 (4 light maintenance and 3 heavy maintenance in Sungai Buloh depot), 2 (light maintenance in Kajang depot)

Thameslink Commuter Rail, Great Britain
May 2014

To facilitate long-term maintenance of commuter trains for the greater London area, Siemens Mobility designed, constructed and commissioned two depots for the Department for Transport (DfT) and Govia Thameslink Railway Limited: at Three Bridges and Hornsey depot. Three Bridges is located next to the main tracks to enable all necessary requirements to be met on the limited property which was available.

Highlights: state-of-the-art tools such as an automatic inspection facility to predict when key train components need to be maintained or replaced. Siemens Financial Services developed a finance and leasing structure that meant that no initial capex investment was needed by the customer

Depot scope of work: designed and equipped for predictive maintenance, automatic inspection facility for condition-based maintenance, in-cab simulator for theoretical and practical driver training

Number of trains: 115 Class 700 Desiro City Siemens Mobility commuter trains (length of trains: 8-car train: 162 meters, 12-car trains: 242 meters)

Stabling tracks in depot: 11 (12 at Hornsey depot)

Workshop tracks in depot: 5 (3 at Hornsey depot)

Factors for **sustainable success**

Turnkey depot solutions of integrated functional plant and machinery within a minimum project duration

Execution

by companies with many years of experience in turnkey construction

General Planning

done by your supplier for the realization of your project

Planning

and implementation from a single source, including depot workshop equipment

Planning reliability

with regard to time and cost framework

In-depth experience

with BIM and using the method in the rail environment

System integration

and assumption of the associated risks

Get in touch with Siemens Mobility to find out more.

Published by
Siemens Mobility GmbH

Otto-Hahn-Ring 6
81739 Munich, Germany

For more information, please contact
E–mail: contact.mobility@siemens.com

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