SIEMENS

Background Information

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The Rhine-Ruhr express leads the way to attractive mobility

Siemens to deliver 82 trains and handle their maintenance for 32 years

The "Rhine-Ruhr Express" (RRX), one of the projects of the century, is good news for the millions of commuters in the most densely populated region in Europe. The first trains, with a top speed of 160 kilometers per hour, will enter service in the Rhine-Ruhr conurbation at the end of 2018. Step by step, a service interval of 15 minutes will be reached during rush hours. Siemens will not only supply the trains, but has also been contracted to maintain them for the next 32 years to ensure that the fleet is available every day.

Each day in the bustling urban environment of the Rhine and Ruhr region, millions of commuters are out and about – going to work or to school, to do some shopping or take a stroll around town, visiting friends and relations, or attending sports and cultural events. The infrastructure has great difficulty in coping with all these various needs for mobility. Kilometer-long traffic jams on the freeways, congested radial roads, city centers and multi-story car parks as well as overloaded train services above all during peak commute periods are everyday aggravations and hindrances for people living in the region. The Rhine-Ruhr express has been a long-cherished dream to bring a new quality of life to the metropolitan region. A dream is now due to become reality in the near future, with fast, comfortable trains running through the urban landscape at 15 minute intervals during peak travel times in a rail network running right across North Rhine-Westphalia, and extending up the Rhine to Koblenz and as far east as Kassel.

Transitional operation begins with timetable change at the end of 2018

The new RRX will be introduced step-by-step over the next ten years. When the new timetable takes effect in December 2018, the RRX will start its transitional

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operation on the following five lines currently served by regional express trains. The new services will be introduced at intervals of six months, which will create a network extending far beyond the heart of the metropolitan area in roughly one year:
RE 1: Aachen – Cologne – Düsseldorf – Duisburg – Essen – Dortmund – Hamm
RE 4: Dortmund – Wuppertal – Düsseldorf – Aachen
RE 5: Koblenz – Cologne – Düsseldorf – Duisburg – Wesel
RE 6: Cologne/Bonn Airport – Düsseldorf – Essen – Dortmund – Hamm – Bielefeld – Minden
RE 11: Düsseldorf – Essen – Dortmund – Hamm – Paderborn – Kassel

Upgrading the rail network for the RRX

The RRX rail network will have six lines when completed. Further substantial investments in the rail network are planned over the next few years to drive the RRX brand forward. The RRX could use the existing rail infrastructure as a traditional railway line, but capacity bottlenecks in a number of route sections and stations have so far prohibited the introduction of the quarter-hourly service planned for peak travel times and which is so desperately needed to meet the demand. The Federal Government, Deutsche Bahn (German Rail) – as the rail network operator – and the State of North Rhine-Westphalia have already agreed to the initial financing arrangements to eliminate the bottlenecks. Two of the most important projects were launched in the fall of 2014 with the start of the planning approval process. One involves upgrading one of the most heavily congested railway lines to four tracks in a section north of Cologne extending to Düsseldorf, the other concerns extensive reconstruction of Dortmund Central Station. On this occasion, Alexander Dobrindt, the Federal Minister of Transport and Digital Infrastructure, emphasized the importance of these projects: "The RRX will connect the metropolitan areas on the Rhine and Ruhr with fast, frequent and reliable services. In the first construction phase, we will be substantially increasing the capacity of the heavily used line between Cologne and Düsseldorf. That's good news for the thousands of commuters who use the line every day."

New division of responsibilities between ordering parties, manufacturer and railway operators

The ordering parties have decided to reallocate the roles played by the ordering parties, vehicle manufacturer and railway companies in the everyday operation of the RRX, in a way previously unknown in German rail transport. Siemens will not

only supply the new trains, but also carry out their maintenance. The company will maintain and service the fleet throughout the planned 32-year operating cycle, thereby ensuring over 99 percent availability of the vehicle pool for scheduled operation of the RRX. The trains will become the legal property of the ordering parties. The "NRW RRX Model" is a joint project of the following integrated rapid transit associations: Rhine-Ruhr (VRR), Rhineland (NVR), Westphalia-Lippe (NWL), Rhineland Palatinate North (SPNV-Nord), and North Hesse (NVV). Under the aegis of the VRR, the fleet will be leased to Abellio Rail NRW and National Express Rail. This is a marked departure from the previous traditional procedure in the German regional rail transportation market, whereby rail operators first bid for transport services, and then fulfill their contracts with vehicles they have procured themselves. The special-purpose associations placing the order are hoping that the new approach to regional passenger services in the Rhine-Ruhr metropolitan region will deliver consistently high-quality service on all the RRX lines throughout the entire lifetime of the trains. They are also expecting that the decision to choose a uniform vehicle concept, and thus a relatively large number of just one series of train, will significantly reduce lifecycle costs.

Many years of experience with lifecycle projects

For Siemens, the life-long service of its own vehicles is hardly a venture into unknown territory. Siemens technicians maintained the first electric trams to go into service in Berlin in 1881 throughout their service lives. In today's rail transport market, customers throughout the world prefer to order the vehicles and lifecycle maintenance from a single source. From the high-speed Velaro trains to the Desiro regional trains, Siemens is the service provider that not only supplies the trains but also ensures their availability in many countries nowadays. There are lifecycle contracts similar to the RRX model running in Great Britain, Russia and Spain for services totaling over 1,500 contract years. In the British Isles, Siemens currently services around 1,500 Desiro UK regional vehicles which were built in the Krefeld plant, and maintains a fleet availability of over 99 percent for the railway operators.

Such success does not simply "happen overnight." Right from the moment they start designing the vehicles, engineers have to take the servicing during future operations into account, and develop appropriate maintenance schedules. This ranges from the installation of diagnostic sensors for monitoring vehicle components, to arranging the components so they are easy to maintain and quick to replace, to designing

maintenance and servicing facilities precisely tailored to the particular type of train. A continual flow of data from train operations also aids the further technical development of the vehicles, since weak points can be identified and technological advances speeded up.

State-of-the-art maintenance workshop being built in Dortmund

With the RRX, Siemens is creating and safeguarding high-quality jobs in North Rhine-Westphalia. The front and end cars of the trains will be built in the Siemens plant in Krefeld. All the trains will make their first trial and certification runs on the Siemens test circuit in Wegberg-Wildenrath, near the Dutch border. Siemens will construct a state-of-the art maintenance workshop in Dortmund-Eving specifically for this order, which will create 100 new skilled jobs for round-the-clock shifts. The cornerstone for the workshop was laid early in March, 2017.

The heart of the maintenance workshop will be a large vehicle hall. According to current plans, it will be able to service four four-car trains simultaneously. There will also be other special facilities at the site, including an outdoor train washing facility, an underfloor wheel lathe, and sidings for up to ten trains. Each multiple-unit train will undergo a detailed, mandatory "fitness program" based on the number of kilometers it has traveled. The annual distances traveled will be astonishing. Each train will become a "kilometer millionaire" in just three years. Modern data communication will provide a continuous dialog between the trains and their service facility. This will provide the basis for early warning messages indicating impending technical faults, so that, as far as possible, they can be rectified within the scope of predictive maintenance before an actual breakdown occurs. Ideally, minor maintenance and service jobs can be performed during the nightly breaks in operation. However, to ensure that longer servicing work does not lead to service cancellations, RRX will have a number of multiple units in reserve to ensure a constant vehicle availability of over 99 percent at all times.

The Desiro HC – a new development based on the proven Desiro platform

The RRX trains will be based on Siemens' successful Desiro model. The Siemens Krefeld plant has built more than 2,000 units of this classic model since the turn of the millennium. Each version has been tailored to its particular operational area and requirements. They range from the Russian "Lastotschka" designed for extremely cold winter temperatures, to the trains destined for the tropical climates of Malaysia

and Thailand. There are also Desiro trains running in Great Britain as well as in Germany, such as on the Middle Rhine Railway (Mittelrheinbahn) operated by Transregio, and in Belgium, Switzerland and, soon, in Austria as well. Based on all this experience, the Desiro HC has been developed as a combination of single and double-deck cars, which will run for the first time on the RRX.

In and out quickly, with no steps

The trains will enter service in the white, gray, black and orange color scheme of the RRX brand. Even at first glance, the silhouette and configuration of the new express trains convey a sensation of a new lease of life for NRW mass transit services. Each multiple unit consists of four cars. The first and last, as end car and driving trailer, have just one passenger deck, whereas the two middle cars are double-deckers. This combination is advantageous from the point of view of both passengers and operator. The two single-deck end cars allow barrier-free access to most of the seats for the needs of passengers with restricted mobility or for passengers with bicycles. Another factor is decisive for the operator: Single-deckers are substantially lighter than double-deckers, and the weight saved reduces the power consumption. Within a train length of just 105 meters, the double-decker intermediate cars give each train a capacity for 400 seats and provide spacious legroom. When the RRX begins operation, automatic couplers will combine two units for double running to form an eight-car express with more than 800 seats.

Extra wide double doors enable quick boarding and alighting, even under crowded conditions. An initial passenger absorption space of more than six square meters behind the doors ensures freedom of movement and fast passenger circulation. Directly adjacent are the multi-purpose zones, with enough parking space on each train for 18 bicycles, baby carriages or wheelchairs. For first class passengers, there are 36 leather-covered seats, fitted with folding tables and reading lights.
A timelessly elegant ambience in the distinctive RRX design can be enjoyed by all passengers. Wide lines of sight and large windows give a pleasant impression of spaciousness. Further features of the high-quality equipment of the RRX fleet include the advanced technology, from the energy-efficient air conditioning to the information systems, including WLAN and socket outlets throughout the train, CCTV and non-slip floors. All contribute toward encouraging people to leave their cars at home and travel by train instead.

High acceleration keeps pace with modern rail traffic

The vehicle design was determined by the requirement to ensure sustainable, efficient operation. The crucial factors are an energy-saving, lightweight construction, detailed aerodynamics, a driver assistance system for look-ahead braking and acceleration, power management to use the energy recovered by the electrodynamic brakes, and intelligent air-conditioning and lighting equipment. The drive train of the RRX has an efficiency of over 90 percent. One of its outstanding features is fast acceleration to its top speed of 160 km/h. This is a plus point on the extremely busy lines along the Rhine and Ruhr, where the trains have to keep pace with all the other rail traffic, and it sometimes comes down to a matter of seconds to get through the network bottlenecks on schedule. The air-sprung bogies are another special feature of the trains. They not only provide passenger comfort, but also make the RRX a "whispering train" spectacular to see, but moving quietly. It will hardly be heard in the hectic Rhine-Ruhr metropolitan region.

You can find the **press release**, **press photos and other material** on this topic at: www.siemens.com/press/RRX

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