



## | North-South-Line Project

The Kingdom of Saudi Arabia is the largest economy among Arab countries and possesses the greatest oil reserves in the world. In addition to recovery of crude oil, major growth stimulus is being provided in Saudi Arabia by the numerous infrastructure and industrial projects being executed by the government. One of these key undertakings is the Saudi Landbridge Project, which will provide a 115-km rail connection between Dammam and Jubail, as well as lengthening the Dammam-Riyadh rail line by extending it 950 km to the port city of Jeddah. This will create an ultra-modern rail network for freight and passenger trains throughout the country, from the Red Sea to the Persian Gulf. At the same time, the government plans to expand rail passenger capacity: for example, by the 444-km line between Mecca and Medina. By 2025, it is planned to have an annual capacity of 9.2 million persons: almost twice the present number.

RAIL.ONE succeeded in entering the Arabian market in late 2007, with a contract for delivery of main-track and turnout sleepers for project sections CTW 100 to 300 for the North-South-Line Project, a 2,400-km line from the mining areas in the northwest of the country to Dammam. Production of the required 850,000 main-track sleepers, as well as more than 63,000 linear metres of turnout sleepers, will take place in the plant built for this project in Hail, approx. 700 km north of Riyadh, in collaboration with Bureau 15 of Chinese Railways Construction Corporation (CRCC).

### Requirements placed on the track

The track was designed for freight trains with axle loads of 32.4 metric tonnes, at maximum speeds of 110 km/h. At the same time, it will handle passenger trains with axle loads of 30 tonnes for speeds as high

as 160 km/h. For reasons of uniformity, the customer specified that all sleepers have a length of 2.5 m and a base width of 280 mm for the entire 4 project sections. RAIL.ONE was responsible for exact design dimensioning of the sleepers, in which particular importance was placed on coordination with the requirements arising from the designated production processes.

### Sleeper design

Type HHS 32.5/5 sleepers more than satisfy all requirements placed by the customer in Saudi Arabia: resulting not only from their massive concrete body, but also by pre-tensioning greater than that called for in standard European sleepers. In addition, the concrete mix formulation has been adapted – with full adherence to in-company RAIL.ONE quality parameters – such that only local materials can be used.

### Data and facts

Length of the line section:	approx. 500 km	
Top speed:	110 km/h	160 km/h
Axle load in metric tonnes:	32.4	31.0
Type of concrete sleeper:	HHS 32.5/5	
Scope of delivery:	850,000 main-track sleepers 78,000 linear metres of turnout sleepers	

### Regulatory authorization

Regulatory authorization was provided for the type HHS 32.5/5 concrete sleepers, on the basis of pre-production samples tested at Munich Technical University. The sleepers in these tests fulfilled all criteria of the tender-solicitation specifications, which are strictly derived from AREMA standards. Final official authorisation was awarded after commissioning of the production plant in Saudi Arabia. For final authorization, sleepers from series production were successfully tested in accordance with the same criteria at Munich Technical University.

### The production process

Production of the main-track sleepers is according to the so-called carousel process, in the production plant in Hail constructed especially for North-South Line. In this process, high-strength concrete is filled into mobile forms, and then stored for curing in insulated chambers under exactly controlled climatic conditions. In addition, the temperature of the raw materials for the concrete is monitored and corrected with suitable cooling processes as required. These measures are necessary to prevent any early damage to the concrete as a result of high temperatures or from great temperature fluctuations during curing.

The process is further characterised by great flexibility with respect to the required production quantities. Production can be effectively regulated according to construction progress during the project and the resulting demand for the sleepers.

The HHS 32.5/5 therefore offers the following to the customer:

- ▶ Extremely long life cycles with low maintenance expense
- ▶ Full performance characteristics, even under conditions of rugged operational requirements
- ▶ Cost-effective optimisation of the track, together with maintenance of technical durability and safety
- ▶ Minimum risk from extreme climatic conditions
- ▶ Optimal utilisation of local resources
- ▶ Maximum flexibility with respect to fluctuations in demand for the product



- Saudi Landbridge Project
- Mecca-Medina rail line
- North-South-Line Project
- Existing lines

### The HHS 32.5/5 concrete sleeper

Length:	2500 mm
Width:	265 mm
Height:	240 mm
Type of fastenings:	Pandrol
Weight without fastenings:	approx. 333 kg

