

Case story | VACON® NXP

Strong steel rails for high-speed trains



When trains travel at speeds of up to 300 km/h, the quality of the rails is of vital importance. Baogang has built a new production line in Baotou, Inner Mongolia, for high strength rails up to 100 meters long. In cooperation with its system integrator partner TRIED*, Vacon China Drives has supplied VACON® NXP common DC bus units with a total power exceeding 16 MW to Baogang's plant.

Baogang is one of the major steel manufacturers, with products including long rails for high-speed railways in China. Baogang is enhancing its competitiveness with a new finishing line and quenching** line to produce rails with a maximum

length of 100 meters and improved resistance to fatigue and wear. The new line has been designed to have an annual output of 400 000 tons.

Quenched rails are an ideal choice for high-speed and heavy-duty rail transportation, as their service life is two to three times longer than that of ordinary rails made of hot rolled steel. China has more than 10 000 kilometers of high-speed track, the longest high-speed rail network in the world. Significant savings and precise control

Utilizing the strong local competence and experience in metal industry applications, and in close cooperation with system integrator partner TRIED,

Vacon China Drives was able to supply what the end customer needed: a complete system drive solution.

Vacon's scope of supply included VACON® NXP common DC bus units: 173 inverter units and 9 active front end units (AFE) with a total power exceeding 16 MW. Thanks to the extensive power range of 0.55 kW to 2.2 MW, the VACON® NXP common DC bus products can fully meet the requirements of the wide variety of applications at the plant: roller and chain conveyors, traveling bogies, straightening rolls, pinch rolls and loading/unloading trolleys.

The VACON® NXP common DC bus modules are compact and easy to integrate. This significantly reduces the space needed for the enclosures and the time for installation, which gives savings for the customer. The enclosures were engineered and manufactured at Vacon's factory in Suzhou, China, resulting in a short lead time.

Baogang has very high requirements regarding control and reliability. All the VACON® common DC bus units are seamlessly connected to the plant automation system via Profibus-DP, so the status can be monitored and controlled at any operating point. Precise speed and torque control is essential when manufacturing top-class steel products, and this has been

achieved with the use of closed loop vector control. Full torque control is possible at any speed including zero speed.

A typical feature of metal processing lines is that the drives operate in two different modes, re-generating and motoring mode. Using the VACON® common DC bus drives, the regenerated power is shared among the motoring drives, optimizing power consumption from the grid. The regenerative VACON® active front-end (AFE) units can feed braking energy back to the grid, which gives significant energy savings.

Thanks to the AFE rectifier technology, harmonic distortion is low; THDi (total harmonic distortion) is kept below 5% throughout the system.

Stronger together

Engineering, installation and commissioning of the VACON® NXP common DC bus units at Baogang's new production line were handled by Vacon's system integrator partner TRIED, a major player in the Chinese automation engineering and metal industry. TRIED is also responsible for maintenance, providing lifetime support for the customer. This was the first joint project for the partners in the Chinese metal industry, and it laid a solid foundation for expanding cooperation in the future.

* TRIED: Tianjin Design & Research Institute of Electric Drive

** Quenching refers to the sudden immersion of a heated metal in cold water or oil. It is used to make the metal very hard.



Vacon China Drives has supplied VACON® NXP common DC bus units with a total power exceeding 16 MW to Baogang's plant in Inner Mongolia.

Cover photo: High-speed trains have an average speed of 200 km/h (124 mph). With over 10,000 km of high-speed track, China has the longest high-speed rail network in the world. The rails should be as long as possible since the joints between the rails are a source of weakness.

Photo by iStockphoto.com/chinaface, /winhorse

This case story was originally released before the merger of Vacon and Danfoss Power Electronics was fully completed on 15 May 2015. As a result, Vacon as a company brand no longer exists and contact persons mentioned in the story may have changed. Future case stories on VACON® products will be released on behalf of the new organization – Danfoss Drives – which is part of the Danfoss Group.