Pulling power

by Fitzwilliam Scott

Robust and economical rail loading is the name of the game for efficient port logistics and other heavy-duty industrial operations. The shunting system should be as flexible as possible but also operational 24/7. In the Finnish Port of Pori, rail operators have lately started relying on a shunting robot from Vollert to move freight trains. These power pack machines capable of pulling train loads between 300 and 7,000 tonnes from the German manufacturer – remote-controlled, cable-connected, diesel-electric or battery-powered – have been in use worldwide for decades, including in other Baltic countries: Estonia and Latvia.

In Pori, ferrous sulphate is stored and loaded in bulk in a weather-protected manner. For handling by a wheel loader, the freight trains move into a loading hall and are later made available for further transportation outside. This task has recently been taken over by a shunting solution from Vollert: the Tandem DER 150 robot. A Stage V diesel-electric drive, which powers the four electric motors on the machine's four axles, provides the thrust. The DER 150 has a total weight of 100 tonnes on the rails; its tensile load of 150kN allows the reliable pulling of up to 2,000t at a speed of half a meter per second.

Pori's shunting robot is controlled remotely, enabling the wheel loader driver to operate across the entire freight train on a 500-m-long track. Besides the actual driving control, the wagon roofs can also be opened and closed hydraulically. The shunting robot's coupling system is also compatible with both Eastern and Central European systems. Vollert ensures reliable transmission of the control data in and outside the track system through several repeaters along the 500-m-long radio link. For optimum control of the transmission and reception power, the system automatically switches between the stations.

Strong, connected, weatherproof

The technology is also proving its worth at Bogatyr, the largest opencast coal mine in Kazakhstan. Here, five Tandem DER 300 shunting robots from Vollert accelerate and automate rail loading. The Wi-Fi-controlled shunting machines, each with a tractive force of 300 knots, move trains with a length of around one kilometre and a total weight of up to 6,900t.

For data transmission and control, Vollert used Siemens components to set up a Wi-Fi route along the 1.3 km-long shunting network. Eleven access points with directional antennas connected via fiber optics reliably transmit the data signals from the control system to the machines and vice versa. In addition, thanks to the Wi-Fi control system, the robots can operate freely on all tracks. This enables the rolling use of the five shunting robots on the four tracks and guarantees fail-safe operation around the clock.

Remote maintenance access also enables remote control of the shunting robots and therefore fast and direct support from the Vollert service team in Germany at any time. All the robots' performance data, such as operating hours and consumption, can be evaluated over longer periods on a dashboard.

Bogatyr plans to increase its yearly production capacity from 32 to 40 million tonnes using the automated conveyor technology. An automatic coal wagon loading system has been installed for this purpose: two trains, each with around 70 wagons, can be loaded in parallel in just three to four hours. The staff controls the shunting robot from the loading facility. When the process starts, the coal is transported into the empty wagons of the freight train while the shunting machines continue to move. The mainline locomotive then takes over the train again for transportation to the customer while the shunting robot starts its journey to handle the next one.

Each of the five shunting machines consists of a six-axle tandem version with a control trolley and motor trolley and a drive power of 180kW. A CAT power generator, tailored to the specific requirements on site, provides the drive power. Temperatures from -30 to +30°C, plus daily temperature fluctuations of +/-30°C, require tried and tested, robust technology. With heated components, a diesel


VDM VLEX


Bogatyr Robot Pro-Tandem DER 300


Photos: Vollert; Bogatyr Robot Pro-Tandem DER 300


Pori Robot Tandem DER 150


Pori Robot Tandem DER 150

tank integrated into the frame, automatic couplings and a sanding system, Vollert ensures smooth operation even under these harsh climatic conditions.

Making Riga dust-free

In Latvia, coal-handling facilities in the Port of Riga are also gearing up with modern technology. The terminal operator SIA STREK relies on a Vollert shunting robot. The handling process was reorganized into a closed loading hall in 2018 to get rid of the dusty coal loading process in the centre of the Latvian capital. Every three to five minutes, three wagons are completely turned and emptied into an underground bunker without polluting the environment. SIA STREK noticed Vollert's flexible shunting solution because of its many years of positive experience at the Tallinn coal loading terminal in neighbouring Estonia. Unlike conventional shunting locomotives of this size, STREK's robot allows the cab driver to see both the surroundings in front of and behind the vehicle. This means that the driver does not have to get out and shift cabs when changing direction. This is made possible by an exceptionally narrow drive unit, which ensures a clear view of the track area (a particularly low access height also facilitates convenient access to the cab). Here, too, steering is conveniently carried out through the control panel, by radio, or from inside the vehicle.

Eco-friendly robots

Dust and soot avoidance are not the only issues when taking care of coal. Emissions of the drive machines themselves in loading terminals, ports, and industrial plants are also increasingly coming into focus, not least due to increasing international noise and exhaust regulations. In-plant transportation in particular poses special requirements with regard to diesel exhaust protection rules. Vollert has therefore long been offering fully-electric versions of its shunting robots – with identical performance values. In addition to battery-powered versions, these also include cable-connected machines for continuous outdoor and indoor use.

The VLEX road-rail robot is a special version of the emission-free range. In one-person operation, this radio-controlled all-round vehicle switches quickly and easily from track to road and back again, and, despite its compact design, enables shunting operations of up to 600t. Its inventive vehicle geometry, with articulated steering and four individually controlled wheel hub motors, makes it extremely manoeuvrable and economical. An oscillating axle ensures that all four wheels remain in continuous contact with the ground and rails so that potholes, height differences in the track, or minor obstacles can be overcome with no loss of traction. And thanks to its emission-free electric drive, the hardy solution earns its spurs both in rough railroad operations on sidings and in enclosed storage and production areas. The VLEX shunting solution has been put to use at the South Korean metro in Seoul, for shunting tank and freight wagons at Lanxess and Rheinkalk in Germany, and at a plant of the Swiss rail vehicle manufacturer Stadler. ■