

Bosch Rexroth

Powers Coal-Handling Equipment with Hydraulic Direct Drive



150 Hägglunds drives are in operation at the EECV port. Rexroth cylinders and power units can also be found on stacker/reclaimers and ship-unloaders, ranging from relatively small units for hinged lids to massive units holding the arms or jibs (all photos courtesy of Bosch Rexroth).

EECV in Rotterdam, the Netherlands, keeps on expanding and improving.

In 2013 their transshipment of coal increased and they installed a new bucket wheel reclaimer with a capacity of 3,500 tons per hour. They chose a direct-drive system from Bosch Rexroth for this big bucket wheel. The drive system consists of a Hägglunds MB 1600 motor and a DUE drive unit. It is the seventh bucket wheel reclaimer at EECV with Hägglunds direct-drive systems installed and has been in successful operation since February.

Versatility

Direct drives are suitable not only for the bucket wheel itself, but also for many of the main functions on a stacker/reclaimer. Their specific advantages and high torque capacity make them well suited for heavy-duty applications. At EECV, Hägglunds direct drives are also installed for slewing and long traveling on some of the stacker/reclaimers; on three of the four older stacker/reclaimers the slewing drives have been changed to direct drives, re-

placing the electric motor with brake, gearbox and open gear stage. Today, Hägglunds CB 840 motors with Bica brake successfully drive the pinions for slewing. The long travel drives on two of the bucket wheel reclaimers have been fitted with Hägglunds CA 50 motors.

Govert de Bruin, mechanical manager at EECV, said "These drive systems offer reliability and torque. They are low maintenance, have a long life span and we always receive excellent support."

Long-term performance

In 1987 EECV installed the first Hägglunds direct drive on two of their apron feeders in Rotterdam. Since then they have installed direct drives on the remaining apron feeders, their bucket wheels, slewing drives, long travel drives and conveyor head wagons. Today some 150 Hägglunds direct drives can be found at EECV. In addition to the Hägglunds drive systems, the stacker/reclaimers and unloaders

are also equipped with Rexroth cylinders and power units. The cylinders range from relatively small, suitable for hinged lids, to massive units that hold the arms or jibs.



The first direct drive – More than 140,000 trouble-free working hours

EECV was first introduced to the hydraulic direct drive concept in 1984. They had previously experienced problems with variable speed electromechanical drives, leading to high repair costs and unacceptable production losses. At that time, EECV was handling iron ore and considering other options; after considerable research, discussion and investigation, they decided to try an alternative technology. In 1987 EECV installed the first two Häggglunds MA 200 motors on the two apron feeders on one of the ship unloaders.

After one year of trouble-free operation, EECV was sufficiently pleased to order an additional four motors for the remaining apron feeders. Today, 26 years later, the first two motors have been running for more than 140,000 hours and are still working perfectly. Only the shaft seals and wear rings have needed to be replaced, but only twice. The apron feeders that were the source of so many headaches in the past now run so well that many people at EECV say they even forget the drives are there.

“Before using the hydraulic drives we had constant headaches. We tried several variable-speed solutions, but we were constantly plagued by unforeseen downtime and high maintenance

costs. Ever since we introduced the Häggglunds motors, things have been working perfectly,” de Bruin said.

The first bucket wheel drive—production increased by 15–20%

Performance of bucket wheel stacker/reclaimers is essential to EECV operations. When problems were encountered here, they chose to install the first hydraulic bucket wheel drive based on their positive experience with direct

drives on apron feeders. The solution was the prototype of the Häggglunds MB 1600 motor. The advantages of direct drive on bucket wheels

soon became apparent, with features such as variable speed that optimized material throughput, while overload protection and high starting torque reduced stall delays from the prior 90 seconds down to about 10 seconds. In addition, the highly reliable system features low weight that reduces the load on the slewing bearing, while its

3,500 tonnes per hour – that’s how much the latest bucket wheel reclaimer at EECV handles.





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excellent overload protection has significantly reduced both downtime and maintenance costs, which are even further reduced by soft, smooth starts.

The first hydraulic bucket wheel direct drive was commissioned in April 1991 and has now logged about 50,000 trouble-free hours. After 7,500 hours the motor was opened and inspected in the presence of EECV engineers. The results were impressive: everything was in perfect condition. In 1992 EECV ordered an additional three direct-drive systems for their remaining three stacker/reclaimers. The hydraulic bucket wheel drive has boosted production by a total of about 15-20 percent, depending on materials and circumstances, while simultaneously slashing maintenance costs. Over time, the slewing drive on the first three stacker/reclaimers was also replaced by direct drives.

Small but powerful

The small, compact Hägglunds CA motors with MDA brakes were soon also found to be suitable for the long travel drives that move the large ship unloaders along the rails. Between 2001 and 2010, direct drives were installed on the long travel drives of the ship unloaders, providing benefits such as simplicity, automatic load-sharing and reduced system complexity. In all,

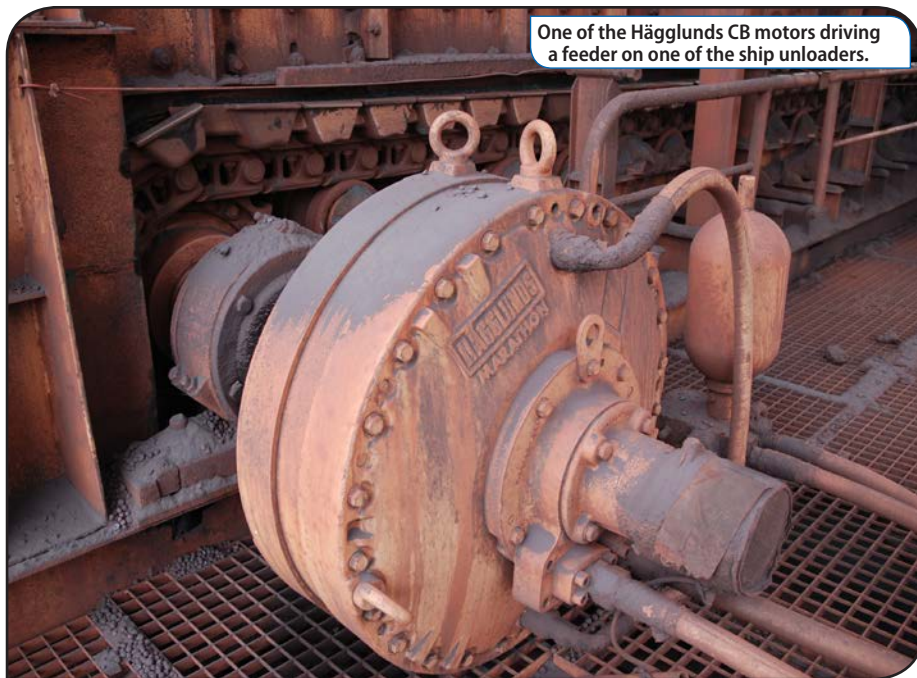
54 direct drives, 18 on each unloader, were installed on the long travel drives, providing a compact and clean solution around the wheels, fewer components in the contaminated area, and convenient cleaning using water jets. Maintenance also improved and could be concentrated to a single sheltered convenient location.

Going into coal

In 2005 EECV expanded operations to encompass coal transshipment. Two new stacker/reclaimers and a barge loader were ordered for this purpose. Hägglunds direct drive systems were fitted on the bucket wheel of the stacker/reclaimers, as well as on the long travel drives. The barge loader was fitted with twelve Hägglunds CA motors and Bica brakes. In 2008 coal operations were further expanded with a new ship unloader, a grab-type portal crane with a 65-ton hoisting capacity. This time around, Hägglunds direct drives were specified for the long traveling wheels, the feeders below the bunker and their head wagons. The long travel drives were equipped with 18 CA 100 motors with MDA 14 brakes, one on each side of a double wheel set. This clean, compact solution results in excellent load-sharing, as well as smooth starting and stopping. Two Hägglunds CB 280s with built-in crossover valve



EECV's Mechanical Manager Govert de Bruin and Bosch Rexroth's Hans Langerak have met with each other many times since long-term cooperation between Hägglunds Drives, now Bosch Rexroth, and EECV began in 1983. In the background is one of the first bucket wheels at EECV with Hägglunds direct drives installed.



One of the Högglunds CB motors driving a feeder on one of the ship unloaders.

and speed encoder are installed on the feeders, providing advantages such as excellent starting torque and performance, overload protection, and convenient maintenance. Two CA 70s were also installed on the head wagons. Drive units and the rest of the system were engineered, produced and delivered by Bosch Rexroth in a collaborative effort involving their German and Chinese facilities.

Experienced service

The drive systems and motors at EECV are handled and maintained by an enthusiastic small team of hydraulic engineers. The teams were previously managed by de Bruin, who is currently mechanical manager at the site. When asked to give his opinion about Bosch Rexroth's direct drives he does not hesitate: "I've known Högglunds for a long time. Högglunds

stands for torque, longevity, reliability, low maintenance costs and excellent service and support."

New direct drive brings new possibilities

The latest addition to Rexroth's wide range of products is the Högglunds CBM motor, released in late 2012, yet another direct drive that is advantageous for many heavy-duty applica-

tions. The new motor opens up new possibilities. The CBM not only handles heavier workloads, but also occupies less space and places less weight on the driveshaft. This allows customer machines, and in some cases the facilities that house them, to be smaller, lighter and simpler.

The motor's reduced installation requirements, combined with improved productivity, can translate into lower overall investment and higher long-term revenue; added to this are the unique operating advantages of a hydraulic direct drive: full torque from zero speed, protection from shock loads, overload protection and four-quadrant operation. **PTE**

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