Defying wind and weather
HeavyDuty encoders in container gantry cranes ensure smooth cargo handling

Peru is one of the fastest-growing countries in Latin America. Callao as major seaport plays a prerequisite role in ever-growing cargo handling. HeavyDuty encoders are crucially involved when it comes to smooth loading and unloading of cargo from giant vessels.

Important transshipment point
Callao is the main seaport of Peru and a significant transit point for the fast-growing cargo traffic between Asia and South America. In 2010, it handled more than 1.3 mio TEU (Twenty-foot Equivalent Unit). The main share is held by the terminal DP World Callao „Muelle Sur“ with a capacity of 850,000 TEU. A water depth of 16 meters allows for landing and embarking of ships of the Post Panamax class with a maximum cargo capacity of 8,000 TEU.

Starting shot for terminal upgrade was in May 2010. Today, there are 6 STS cranes (Ship-To-Shore) with a maximum capacity of 28 TEU every hour and 18 RTG (Rubber Tired Gantry Cranes), all equipped with the HeavyDuty encoders by Baumer Hübner, the Baumer Group competence center for HeavyDuty applications. Deployed at spreader drives, crane trolleys and chassis they ensure reliable and trouble-free operation.

Maritime climate poses a challenge to all components
Harbor cranes are in action 24 hours a day and permanently exposed to corrosion by saltwater and salty air. Outstanding conditions call for outstanding products, so HeavyDuty encoders especially conceived for continuous operation, strong mechanical impacts and a corrosive ambiance are the products to choose when it comes to long-term proven reliability in cranes and port installations.

The cable-pull used for lifting and lowering the spreader is exposed to maximum stress and strain. The cable of a twin-spread er is expected to handle loads up to 65 t, and lifting and lowering speeds up to 100 m/s respectively 180 m/s are an every-day occurrence. So it is no wonder that every crane provides even two hoisting drives of 620 kW each and 95mm shaft manufactured by the company „Franz Wölfer Elektromaschinenfabrik“. One drive is intended as emergency drive with most demanding requirements on continuous performance. Planned maintenance is only twice a year, and the system is expected to run without any unexpected breakdown. Consequently, the encoders deployed must to be ultra-reliable to defy the very special application requirements.

High precision for reliable speed feedback
Precision is another decisive criterion, since the encoder has to provide absolutely dependable feedback of the spreader’s lifting and lowering speed. Here, optical encoders fully play to their strengths.

The incremental HeavyDuty encoder HOG 220 with through-hollow shaft will cope with all these challenges and fits any shaft diameter between 80 and 115 mm. The robust, thick-walled housing with special surface finish provides electric insulation, saltwater-resistant primary coating and a second top coat sealing. This way, the housing is compliant to category C4 of ISO 12944. Further, the anti-corrosion protection does not only include the housing but comprises the other components as well. Cable glands, connector outlets and screws also have to give proof of their saltwater resistance.

Bearing blocks withstand high loads
Thanks to its outstanding robustness, the encoder will also endure very high axial and radial loads. 450 N axial respectively 700 N radial are effortlessly mastered by the bearing blocks with particularly large bearings. Insulated against inductive shaft currents up to 0.7 kV, they are reliably protected from damage. Another design benefit is eased electrical connection by the proven terminal box rotatable through 180°. A protective lid and encapsulation will prevent the electronics from any damage by dust or condensation while the cover is opened for installation.
Directional stability calls for high precision

Directional stability of rubber tired gantry cranes (RTG) is another challenge that not every encoder is capable of. The crane installations in Callao provide four wheels at each side, the outer wheel is powered by an electric motor of 30 kW. True directional stability requires ultra-high encoder precision to ensure a perfect synchronization of the wheels opposite to each other.

Strong electromagnetic brakes attached to the motor even add on these demanding application environment. Every deceleration of gantry crane will cause a very strong shock impact on the encoder.

POG 10 with Euro Flange B10 in solid shaft design will easily cope with shocks. Large dual bearings at a maximum distance withstand shock impacts up to 200 g within 6ms. Housing and components are saltwater resistant in compliance with category C4. Electrical connection is either using the convenient rotatable terminal box or by heavy-duty connector with bajonet joint.

New product platform completing the encoder portfolio for gantry cranes

The latest development in the HeavyDuty portfolio is the HOG 86 platform for reliable position and speed feedback in harsh industry environments. The compact design and flexible installation capabilities make the encoder perfect for speed and position feedback at cranes or drive control tasks at lifting platforms.

The resilient aluminium housing with saltwater resistant top coat compliant to category C4 and ISO 12944 ensures long-term IP 66 protection – even at the shaft. Dual bearings provide a load capacity reserve up to 300 N radial respectively 200 N axial. There is no need to outline again that other components such as cable glands, outlets and screws are also saltwater proof.

The blind hollow shaft design is conceived for 12 or 16 mm shafts as well as cone shafts 1:10 mm with 17 mm diameter. The insulation will prevent the ball bearings from damage by inductive shaft currents up to 2.5 kV and provides particular dimensional stability capabilities when exposed to strong shocks and vibrations. The encoder is also available with optional longlife hybrid bearings.

Separate, encapsulated compartments prevent the sensing system and electronic components from dust, condensation or electrostatic discharges.

Integrated functionality monitoring

Condition monitoring for immediate error tracking to prevent damages is a prerequisite requirement of plant operators. The optionally integrated functionality monitoring feature EMS (Enhanced Monitoring System) will continuously supervise the encoder functionality to ensure reliable operation. Any error identified is signaled to the control via the alarm output. The multi-color LED integrated in the housing visualizes proper encoder supply, output driver operation and signal integrity. EMS is a valuable tool for error tracking to eliminate expensive system downtime.
Spreader drive with 2 x 620 kW. The HeavyDuty encoder is directly attached to the 95 mm shaft.

RTG wheel drive with the HeavyDuty encoder installed vertically below the protective cover.

HOG 86: convenient e-connection by terminal box rotatable through 180°.

One of the six STS crane installations at the container terminal DP World Callao „Muelle Sur“.

POG 10: especially shock-resistant HeavyDuty encoder with solid shaft and EURO flange B10.

Aerial photo of the container terminal DP World Callao „Muelle Sur“.

Photo credits: DP World Callao