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CASE STUDY NOTES

DnA Drives and Automation

Arrol Crane Re-Drive, Freightliner, Garstang

Replacement drive system reduces downtime at freightliner terminal in Liverpool.

Freightliner have reduced downtime on their second Arrol Container Crane by replacing the existing outdated drive system with a new system provided by Drives and Automation Limited.

Freightliner are the largest freight hauler in the country with a huge fleet of rail stock operating from 5 major ports with local terminals and container storage throughout the country.

Freightliner had been operating the Arrol Crane at Garstang since the 1970s and maintaining and fault finding the existing D.C drive and relay based control system was causing major headaches. Drives and Automation Limited were awarded the contract for replacing the drive system which had to be completed within a set time scale to minimise crane downtime.

The existing drive system was housed within a small control room located at the top of the crane and access was very limited. A previous re-drive project on the 1st Arrol Crane had required the whole control room to be lowered to the floor. This increased the crane outage beyond acceptable time scales and could not be repeated.

DnA proposed a control system that utilised the existing panel shell that was in good order. New drive and PLC backplates were proposed along with new doors, hinges and panel instrumentation.

The new backplates were manufactured, wired and installed within a spare control panel that was shipped to the DnA panel workshop. The old control panel was identical to the second Arrol panel and had been obtained by Freightliner maintenance to provide spares. Utilising the existing control panel as a template provided an ideal solution as the backplates could be pre-wired and installed within the old cubicle at our workshop. Thus allowing the backplate system to be designed to a ship-split into manageable sections, allowing DnA to test the system off site and also provide a secure method of shipping back to site. With the knowledge that the backplates would fit the installation time onsite was reduced to less than a day.

The Freightliner engineers were familiar with Siemens PLC systems, therefore a S7 3/13 PLC system was proposed.

As safety was a major factor with lifting loads of upwards of 32 tonnes DnA proposed a Pilz Multi system to handle the emergency stop and safety interlocking.

As a system integrator for ABB Drives and as longevity of product was key DnA proposed a drive system based on the DCS800 D.C 4 quadrant converters.

Technical Details

- ABB DCS 800 DC Converters
- ABB Field controllers
- Siemens S7 3/13 PLC System
- Etop Exor20B HMI
- Pilz Multi Safety Relay System

The ABB DC drives are equipped with a MultiBloc program environment which allows complex control functions to be carried out within the drive. Brake Control and Torque Proving were key to control of the Main Hoist and software was developed for ensuring that control of the Hoist movement at all times.

Drives and Automation (DnA), based near Sheffield, provides a comprehensive system design and build or retrofit service for control systems, encompassing drives, PLC systems and complete projects working alongside machine builders.

Critical to the success of the project was planning. A comprehensive installation program was drawn up and plans made to operate on a shift basis to ensure the installation ran on time.

Work on-site inside the control room covered the removal of the existing drive equipment, installation of the new backplates, interconnection of the backplates and the provision of electrical installation services to interface to the existing crane wiring.

A door mounted HMI provided crane data including grab position, drive loadings and diagnostics.

In addition to the control room works, DnA provided new Profibus encoders on the Main Hoist motor and the Main Hoist drum. These specialist mechanical engineering works were handled by Broderick Projects who provided DnA with mechanical solution to couple up with the existing hoisting equipment.

Problem Solved

- Drive System Obsolete
- No Spares available
- Fault Finding very difficult
- Extended Downtime
- Expensive to Maintain

Solution

- New Control System
- New Drive Converters
- PLC Control
- HMI with Diagnostics
- Comprehensive Documentation

Benefits

- Crane Downtime Reduced
- Production Increased
- Easy to Maintain and Fault Find
- Documentation
- Easy to Support

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