Nidec
All for dreams

Case study

Goliath Gantry Crane
Newport News, VA

Project Summary

Project: Electrical power and control system for a new 315-metric ton crane
Location: Newport News, VA
Client: Kocks and Huntington Ingalls-Newport News Shipbuilding
Application: Refueling and complex overhauls of nuclear aircraft carriers -RCOH

Nidec's Role

Provide a complete turnkey solution to Kocks for the entire electrical power and control package of the 315-metric ton crane

Scope of Suppy

- High voltage switch gear
- AC common bus system drives
- 17 Regular PLCs
- 1 Safety PLC
- 6 HMIs
- 20 Encoders
- 4 Remote I/O stations
- Complete operator's chair control
- MCC (Motor Control Center)
- Air conditioning system
- LED lighting system
- Fire alarm control system
- Cable reel for 10 KV system
- Intercom communication system

The challenge:

The new gantry crane at Huntington Ingalls-Newport News Shipbuilding has a capacity of 315 metric tons and is approximately 260 feet tall and 400 feet wide. It is used to lift highly formidable loads; primarily to support the complex overhaul of nuclear aircraft carriers – RCOH. The electrical power and control systems of this crane were designed with redundancy to ensure safe movement and handling of load at all times.

The challenge of this project was to synchronize the operation of the crane while maintaining a very tight skew tolerance. If one side of the crane were to get ahead of the other by more than a few inches the crane could go off rail and badly strain the girders.

Part of the complexity of the project was the coordination of the many components. The crane includes 3 main hoists, 2 trolleys, and the gantry. The 3 hoists themselves represent 11 possible operating combinations. It is critical that hoist, trolley and gantry motions are tightly coordinated and that there is redundancy in all systems.

Nidec was selected to meet this challenge because the company has a successful track record at this facility for complex electrical power and electrical control design on these types of cranes.

Our solution:

Nidec Industrial Solutions partnered with the crane manufacturer (Kocks) and the end user (Huntington Ingalls) to provide a complete turnkey solution that matches the specific requirements of the end user. The scope of the project included the entire electrical power and control package on the 315-metric ton crane. Nidec also achieved the goal of synchronous operation and multiple tiers of redundancy.

Nidec has a 15-year development relationship with Huntington Ingalls and we worked with their teams to develop the system required for operation of this crane. For instance, Nidec worked with Huntington Ingalls to design the control system so that the crane operator can customize what the joy sticks control. By using the touchscreen, the operator can make the joysticks run any of the hoists or run any combination of hoists together.

In addition, the touchscreens show every electrical event as it happens in real time. If any anomaly is detected, the system will be shut down. The Safety PLC monitors the 17 main PLC commands and crane movements.

Nidec built many layers of redundancy into the entire I/O system, the power system, and the drives to produce a more reliable crane. Nidec also provided a data historian for the crane's operations that can track alarms for multiple years.

The HMI System can display real time trending of analog data for all relevant functions and store it in historical trending for a period of 30 days. This allows analog data to be viewed at a later date.

Results:

Load testing was successful. The crane runs at a higher speed than the previous crane and performs very accurate synchronized operations. The redundancy in drive systems enhances the reliability of the crane. Nidec custom software, specially designed for Huntington Ingalls, allows the operator to control the load very accurately and move it safely at all times.

Electrical Houses, Cabinets, Motors and Operator Chair ready for shipment