

Crane drive in for the long haul

A regenerative drive and AC motor package that replaced an aging slip ring motor on a crane has brought a multitude of benefit and is expected to maintain its near-continuous operation for many years to come.

"This is a hard working crane drive system," says drives engineer George Newton of Newton Tesla who commissioned the drive. "It is part of a 24x7 production process, so has to be reliable day in and day out. Repeatability is also critical, as it operating cycle runs up to 45,000 times a year."

In fact the crane and its Mitsubishi Electric FR-A741 drive is delivering 25 ton loads of steel feedstock to a furnace five or six times an hour, over a quarter of a million tons a year.

The basic reason for installing the new drive system was that the original slip ring motor was nearing the end of its life, creating an opportunity to upgrade the entire operation, improving energy efficiency, operational control, reliability and longevity.

"The crane is manually controlled by a driver, and with the old slip ring set up speed and torque control was achieved by varying the load through a resistor bank," explains George. "It was a fairly rudimentary level of control and the crane drivers had to work hard to keep everything operating smoothly. The new drive, in contrast, gives precision control making the operation safer and smoother."

The drive also removes the direct-on-line starting of the motor, which prevents voltage spikes and other mains-borne disturbances as well as mechanical shock loads.

The Mitsubishi FR-A700 drive range is designed for demanding applications like cranes and lifting gear, high-bay warehousing, extruders, centrifuges and winding machines. Usually used in open-loop configuration, powerful on-board processors continuously calculate and re-calculate the optimum magnetic flux for the moment, whatever the operating conditions. This leads to performance levels previously the domain of closed-loop vector drives or DC systems.

The drive's advanced autotuning function allowed George to obtain all the necessary specifications from the motor in less than a minute – he did not even have to run the motor – and complete commissioning in comfortable less than a day. Its self-diagnostics mean unexpected down time is reduced to an absolute minimum, with no problems reported at all during the drives first six months of operation.

The FR-A741 drive is particularly well suited for tasks involving frequent cyclical acceleration and deceleration and in all applications where braking resistors are normally used. The combination of the integrated AC reactor and no need for an external braking unit eliminate a large amount of additional wiring. These inverters need up to 60 percent less main circuit wiring and occupy up to 40 percent less space than conventional solutions, depending on the output capacity.

