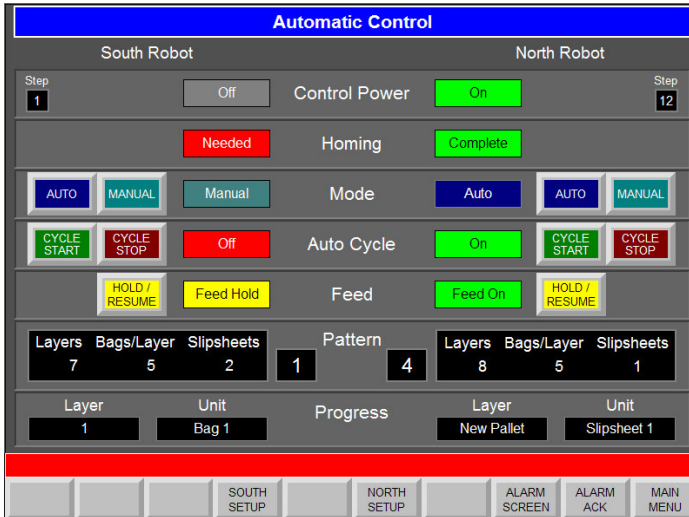


Control Masters Application Case Study

Palletizing Robot Controller Upgrade



Technologies

Machine and Motion Control
Brushless DC Drives

Services

PLC Integration
HMI Integration
Electrical Engineering
On-Site Control Panel Hardware Conversion

Project Description

The objective was to replace the aging and difficult to maintain automation controllers of the client's two 15-year old gantry-style palletizing robots with Modicon Quantum PLC-based controllers, and to replace their pushbutton/thumbwheel/L.E.D. display operator stations with a color touch-screen HMI.

The robots each have two horizontal axes, a vertical axis and a rotational axis. Each robot grasps and lifts 55-pound bags from a presentation conveyor and constructs layers of bags on a pallet in its work envelope. Depending upon the pattern selected, the robot may vacuum grasp cardboard slipsheets from a stack and place them on the pallet before placing bags. Completed pallets are conveyed from the palletizing area by a separate control system upon request from the robot controller. Each robot axis is driven by a brushless DC motor and drive. The existing motors and drives were retained, as were axis proximity sensors and gripping actuators.

For each robot, two Integrated Industrial Technologies (I²T) 2-Axis Motion Control Modules were specified, which reside in the Quantum IO housing. Control panel modification design and installation by Control Masters technicians involved the removal of the old motion controller and its IO boards, the installation of the new Modicon Quantum 434 PLC and motion control modules, and interfacing with the existing drives and encoder signals.

PLC ladder logic code was created from scratch and uses state machine techniques. Motion commands are initiated by the PLC using an I²T-supplied user-loadable instruction to execute motion commands and retrieve axis status. All pattern coordinates are stored in PLC memory. A single G.E. Fanuc QuickPanel View 12-inch color touchscreen HMI replaces the two operator stations. The HMI allows the operator to monitor and control each of the two robots, including monitoring its power-up sequence, initiating homing, selecting the pattern to run and initial layer and unit, starting and stopping automatic operation and jogging the axes individually in manual mode. HMI alarm messages replace cryptic alarm codes.

This upgrade has resulted in increased accuracy and throughput in the client's packaging operation, and has significantly reduced the maintenance burden from these machines. Their operators and technicians now have an intuitive and informative interface for setting up, running and troubleshooting the robots.