

Case Study – Assembly Machine Controls

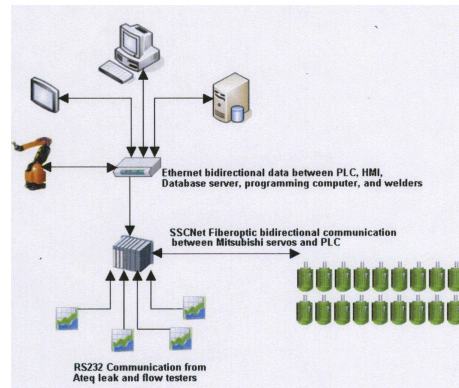
This is an assembly and leak and flow check machine control system upgrade project. The machine is a rotary dial unit with concentric part tracks, feeding and assembling of bodies, valves and caps on the main dial and a nut feeding, assembling and unloading of parts on a smaller dial. The machine was shipped to TEC for a complete electrical overhaul. TEC converted all older technology actuators, networks, sensors and the operator interface screens to modern and much improved versions.

The challenges with retrofitting the machine

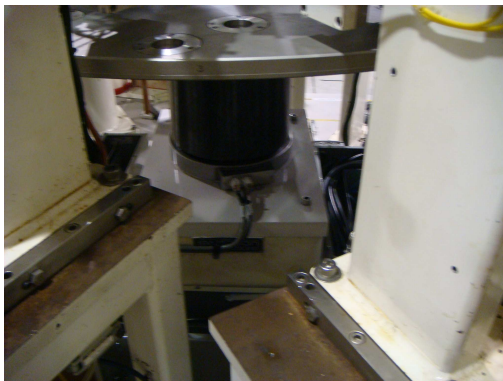
- The timetable was short as this is a production machine
- Several changes were managed at once including some light mechanical changes to the table drives
- Adding newer controls to an existing machine requires an experienced group to watch for and manage new discoveries as the machine is disassembled; something in which TEC is very well versed



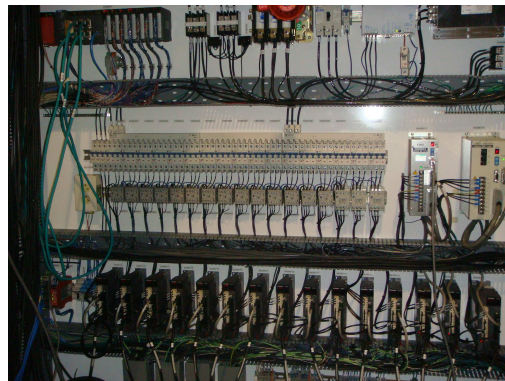
The machine at TEC



The control system architecture



The new main table drive



The new controls near the final stages



System Requirements

- Upgrade all servo drives, sensors, main PLC and operator interface system and networks and control enclosures – we used Mitsubishi for the servo drives and Keyence for the sensors
- Upgrade the main table drive and the nut assembly and part exit smaller table drive – we used CKD for the table indexer drives
- Upgrade the bowl feeder controls
- Replace the leak and flow testers with new ATEQ units
- Reuse the main machine base, bowl feeders

Description of the Solution

TEC chose the Mitsubishi Q Series Platform with appropriate motion control cards and I/O interface cards for the application. The PLC communicates to the Mitsubishi servos via SSCNet for parameter changes and part change over.

There are fourteen (14) 200 watt servos and one (1) 750 watt servo drives on the machine to perform the assembling and leak and flow checking steps.

The HMI operator interface is a Dynics Industrial PC running Indusoft and Mitsubishi's MX OPC Server. This allows Ethernet communication to the PLC for fast data display and acquisition. Ethernet was also the chosen network for the connection between the production databases to add data to the existing SQL Server database. RealVNC is also loaded onto the HMI for welder control and monitoring.

The data from the leak and flow checkers was delivered back to the system via RS232 connections.

We replaced the electromechanical table drives with direct drive servos. Adapters for the new drive motors and mechanical assembly and dial in of the machine were performed during the retrofit project.



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