

Paper Machine Siemens PLC Upgrade

Background

The No. 2 FPM Paper Machine PLC was a Siemens S5-150U PLC with local rack and ET100U distributed I/O. The PLC was at its I/O and program capacity and as a result would not handle the additional Shoe Press controls being installed as part of the No. 2 FPM Optimization Project. After considering the age of the system (the S5-150U is a discontinued product line) and recent failures that had been experienced, it was determined to proceed with upgrading the PLC, either in phases or in whole, with a Siemens S7 PLC system. The No. 2 FPM Optimization Project shutdown timeline did not support an entire machine control system upgrade, thus a phased PLC upgrade approach was selected.

In addition to upgrading the PLC, significant logic revisions were required to accommodate new operating strategies for the Shoe Press. KMH was responsible for auditing all of the existing strategies for the Former and the Press and, in consultation with the Metso Start-up Engineer and Mill Operations, complete major logic revisions to; Pick-up Automatics, 1ST, 2ND and 4TH Press Loading, Tail Threading, Former and Press Drive Warm-up/Crawl and Run Interlocks and Break Automatics. The logic revisions also resulted in the requirement to update all of the DCS Interlocking and FIFO displays previously built by KMH for the Former and Press. To supplement the DCS Graphics, PanelMate OIT's were also added to the Press console to provide interlocking screens and to display Press Loading set points in the field.

Design Approach

Two options were explored for upgrading the PLC. One was to upgrade the PLC and PLC I/O racks in their present cabinet locations. The other was to install the new S7 PLC and I/O racks in new centralized enclosures in the MCC room and run multi conductor cables to the existing PLC, local I/O and remote I/O rack locations. The decision was made to proceed with centralized I/O. The installation of the centralized enclosures would be complete in whole prior to the shutdown. On the shutdown existing I/O wiring from terminal blocks to the I/O cards in existing cabinets would be removed and the new multi-conductors would be re-terminated in their place. The existing S5 I/O structure would be retained and would not get decommissioned until such time as it was completely obsolete. The benefits to centralized I/O were:

- Hard wiring points back to other S5 I/O racks for a phased installation was not required
- PLC hardware would be located in a controlled environment
- Pre-shutdown commissioning of system communications and I/O wiring to remote termination points
- Shorter shutdown requirements

Scope of Supply

KMH supplied a comprehensive detailed design package including all hardware specifications, drawings, cable schedules, construction specifications as well as S5/S7 PLC programming and Foxboro DCS graphics and control configuration. As the No. 2 FPM Optimization Project expanded KMH also completed the detailed installation design and programming for a new 4TH Press Tail Threading Roll and for 4TH Press Felt Squaring. We were also responsible for programming and commissioning of the new Rope Less Tail Threading system for the 1ST and 2ND Unorun sections and revisions to Break Automatics. KMH acted as construction supervisors for all of the above and we were responsible for commissioning and start-up of systems. KMH provided 24 hour support during and after start-up.

Summary

KMH met an aggressive project and shut down schedule. The PLC Upgrade including the re-programming of Former and Press logic was an overwhelming success. A number of new strategies were implemented to improve wet end operations driven both by the Metso Start-up Engineer's and the Operation Superintendent's quest to make the Fine Paper Machine "Best in Class".

References

- Scott Beckett, Paper Machines Production Manager, Weyerhaeuser, Dryden
- Dave Pentney, Senior Electrical Project Engineer, Weyerhaeuser, Dryden
- Paul Goodall, Start-up Engineer, Metso

