

Precipitator Vibrator Controls Upgrade

Background

The electrostatic precipitator in this case had 112 electric solenoid activated air vibrators and 8 transformer / rectifier (T/R) sets. The existing vendor supplied vibrator control panel had limitations in the setting of vibrator firing times (one time for all vibrators in one group) and in the frequency at which vibrators could be fired. In order to meet new performance guarantees by the vendor, a faster, more flexible control system would have to be implemented. In addition 56 new vibrators and 2 new T/R sets were included.

Previously, during the Recovery Boiler DCS installation project, KMH provided the engineering design for the installation of a DCS Interface Module to allow communication from the vibrator control panel and T/R controllers to the Foxboro DCS. KMH also implemented the DCS control and graphics configuration to allow the operators to control and monitor status of the vibrator control panel and T/R controllers.

Scope of Supply

KMH supplied a comprehensive detailed design package that included PLC hardware specifications, PLC wiring and cabinet drawings, PLC I/O card drawings, PLC programming, DCS control and graphics configuration, DCS/PLC gateway document revision, detailed logic drawings, cable tray layout drawings, cable layout drawings, cable and termination schedules and commissioning and startup services.

Summary

KMH was able to meet an aggressive project and shut down schedule including the PLC upgrade, and the complete commissioning of the PLC logic, DCS control configuration and graphic display interface prior to start-up. The entire project spanned 7 weeks. KMH was present when the precipitator started up and the upgrade was a success.

References

- Eric Boutin, Projects Leader, 807-475-2691

Design Approach

To get the required increase in performance the existing Recovery Process Siemens S7 PLC was chosen for control due to its speed and processing power. A new enclosure with a rack of I/O was added to the S7 PLC and the existing vibrator control panel was removed. New cables were installed from the PLC to junction boxes and from the junction boxes to the vibrator solenoids. Brad-Harrison connectors were installed on every vibrator solenoid for ease of removal.

The PLC logic for the vibrators' control was written to meet the criteria specified by the vendor which included the ability to set individual on times and single or dual firing mode for each vibrator. Total cycle time per group of vibrators and the enabling/disabling of the firing of a selected group is also settable. Four vibrator operational cycles are available to the operator. Cycle 1 and 2 are fixed using settings provided by the vendor and cycle 3 is adjustable by the operator. A fixed cleaning cycle (the fourth cycle) was also implemented in the PLC logic. The main precipitator DCS graphic, associated overlays and DCS control configuration were updated to reflect the enhanced capability the S7 PLC logic would provide including the additional 56 vibrators and 2 T/R sets.

