

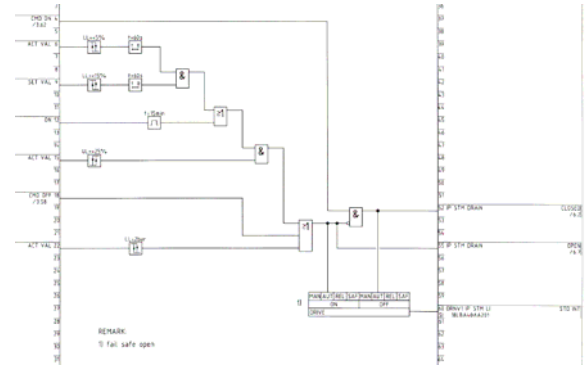


Control Loop Design & Analysis

Tetra Engineering delivers control-engineering expertise to assist plant operators in identifying and solving HRSG and boiler process control problems. This can involve either design reviews conducted prior to plant commissioning or performance reviews once in operation.

Design reviews encompass analysis of the plant design documentation P&ID's, control narratives, logic diagrams and operating procedures. Performance reviews incorporate analysis of historical operating data and in some cases a site visit to interview plant staff and perform a walkdown.

The focus is typically on key control factors that can have a significant effect on boiler performance or operating life:

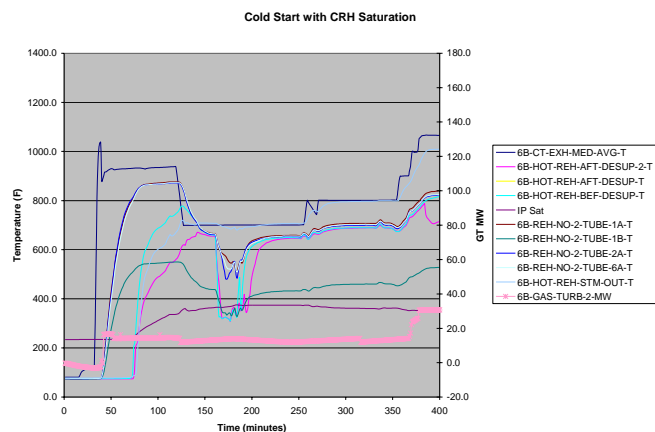
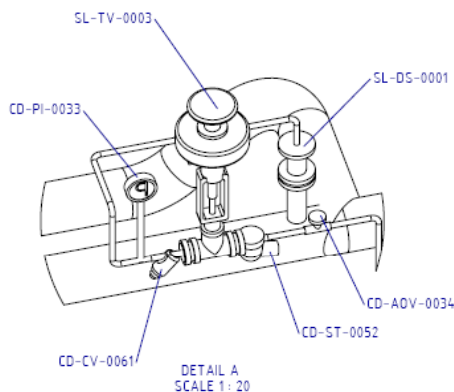


Drum and Header Temperature Ramp Rates During Startup and Shutdown
Desuperheater and Attemperator Spray
HP and Reheater Bypass Action

Drain Operation for Condensate Removal
Drum Level & Feedwater Control
Duct Burner Control Interaction

Supporting engineering analysis using FEA and boiler simulation software is available to investigate the impact of control loop changes. The design or performance review report provides detailed recommendations on improvements or modifications. These could include:

- changes to existing loop logic or setpoints to improve control performance,
- modifications to plant operating procedures for better integration of operator action with automated DCS control,
- alternative control strategies for reducing stress levels in pressure parts if plant moves from base load to two-shift cycling,
- changes to instrument location or specification to improve loop action.



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