Stabilize steam system and prevent cascade trip events

SMARTPROCESS™ HEADER STEAM SOLUTION

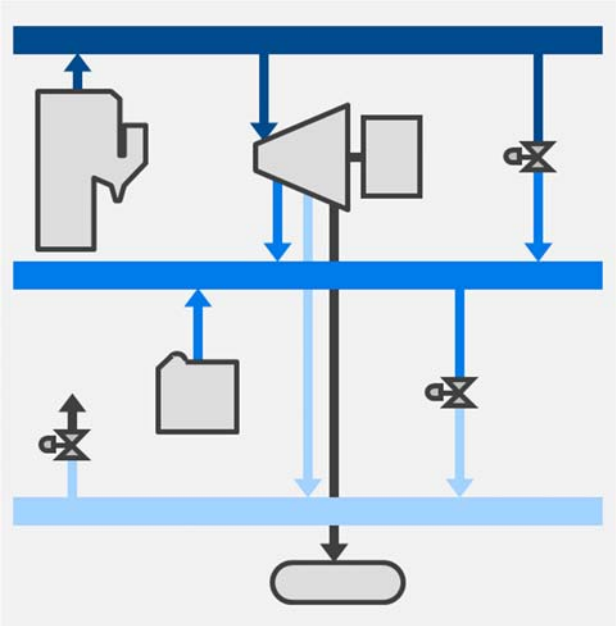
APPLICATION

Steam distribution equipment is a largely overlooked but vital part of many process plants and mills. The Steam Header System should be thought of as an operating unit similar to a boiler, HRSG, heater, furnace, or turbine. Along with the pipe runs themselves, the Steam Header System includes things that are used to manage header pressure. In a typical plant, mill, or refinery arrangement, boiler masters, turbine inlets and extractions, and pressure reducing valves (PRVs) are among the devices involved in header pressure control. Operations must coordinate steam generation and the steam control devices in order to produce and distribute steam at required pressures in a reliable and stable manner.

CHALLENGE

It is common for industrial sites to manage steam in headers at several different pressures. Generation of steam is typically done at higher pressures. Use of steam for processes and heating is generally at lower pressures.

Most typically, steam header pressures are managed by a single boiler, steam turbine, or PRV, and each of these control loops operates independently of the others. In this arrangement, for example, the high-pressure header control loop knows nothing of what is happening with the low-pressure controls.



While being satisfactory at times, the individual header control loop arrangement has significant limitations for handling upsets and optimizing cost. For example, during normal operation the steam system may balance using steam through a PRV rather than a steam turbine.

More importantly, however, individual control for steam header pressures limits response during upsets. When there is a large steam demand change, boiler trip, or other event, this will often ripple through the steam system and result in additional trips or even risk shutting down the entire steam system.

SOLUTION

Emerson has developed an automatic coordinated steam header control solution that overcomes the challenges normally encountered when attempting to manage steam distribution. The SmartProcess™ Header solution both improves steam system reliability and optimizes overall operating cost:

- In upset situations, all available components are used simultaneously within constraints to rebalance the steam system
- During normal operation, steam and utility processes are moved to optimum allowed settings for cost

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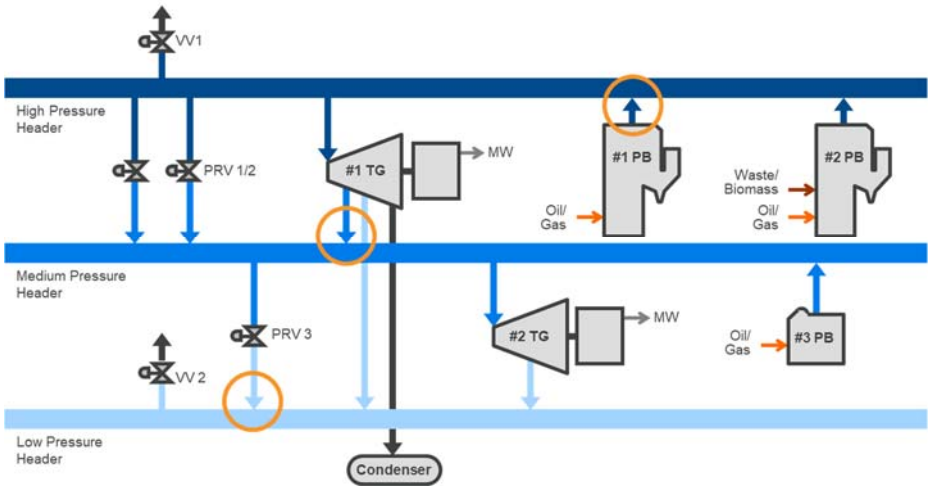
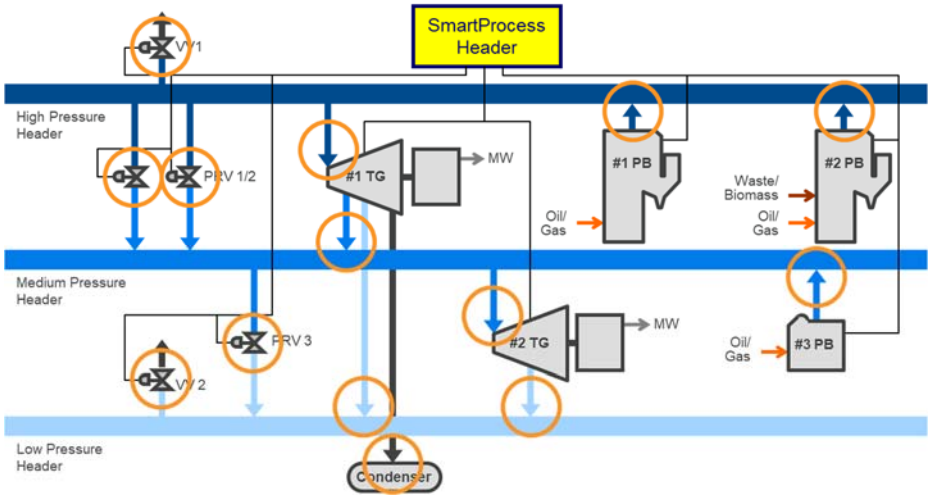
SMARTPROCESS™ HEADER STEAM SOLUTION

Traditional Steam System Control
Traditional header control with a single independent control loop for each header pressure control struggles to manage upsets and optimize cost at all times.





SmartProcess Header Control
Emerson's coordinated header control solution allows all steam system components to simultaneously manage the header system for improved stability, best response to upsets, and optimal cost.

The SmartProcess Header solution typically includes Model-Predictive Control (MPC), header demand logic, base control interface, and limit/constraint functionality. It is tailored to specific site situations. Constraints are based on physical equipment limits, calculated limits, and operator entered limits. Steam map limits are typically key constraints, such that steam turbine controls never become saturated.

Coordinated header control delivers a step change in steam system stability and minimizes the possibility of cascade trips after upsets, all while driving utility cost to its best outcome.

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