



## **Industrial Energy Product Description**

**Application:** Steam Header Control  
**Product:** SmartProcess® Header

### **Background**

Steam distribution equipment is mostly overlooked, but a vital part of many process plants and mills. In a power and utility department, the Steam Header system should be thought of as an operating unit in the same way that a boiler, HRSG, or turbine is. Along with the pipe runs themselves, the Steam Header system includes the devices that are used to control header pressure. In a typical plant, mill, or refinery arrangement, boiler masters, turbine intakes and exhausts, and pressure reducing stations (PRVs) are among the devices involved in header pressure control.

### **Issues**

Steam headers usually consist of long pipe runs connecting boilers, turbines, and multiple process areas. In many existing systems, there is no coordinated control link between the users of Btu (processes) and the Btu input devices (Recovery, Power and/or HRSG Boilers). Large, loosely coupled steam headers can be subject to localized header pressure changes and equalization delays. At times, an increase in energy demand is met by exchanging Btu of electrical generation for Btu of process steam.

Operations personnel have little indication of true process demand as the control devices monitor individual headers rather than the entire heat balance. Strictly on local header pressure control, a steam header system can then equalize at a state that is not optimal. A PRV may be open instead of a turbine increasing an extraction flow, for example. This means that the existing control arrangements often do not produce the most cost effective electrical/steam balance.

### **Specific Objectives**

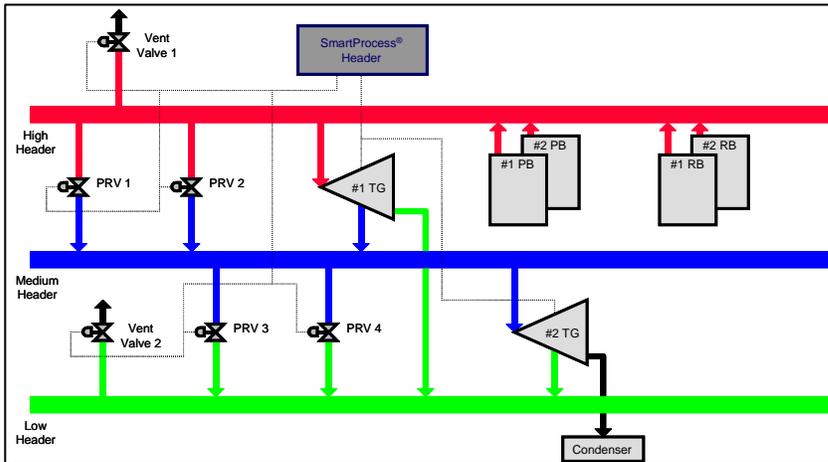
Best in class Coordinated Steam Header Control Systems provide the following performance functionality. Operation in this manner is the objective of Emerson's process control and optimization efforts:

- Minimize Header Pressure Disturbances
- Maximize Efficient Generation by Minimizing the Use of PRVs
- Allow Prioritization of Headers
- Eliminate Need for Operator Intervention During Upsets and Demand Swings

### **Emerson Solution**

Emerson optimizes Steam Header unit operation by incorporating all steam system unit equipment within the control scheme and implementing the Emerson SmartProcess® Header optimized control solution. The Emerson system maintains individual header pressures under normal load conditions with prioritization defined by the mill, and provides operations with an automated solution to upsets in any direction. Emerson also trains operating personnel to run the Powerhouse using the newly optimized control tools.

SmartProcess® Header provides full-automatic coordinated header pressure control, prioritization of headers as determined by operations, and economic optimization of the steam system.



SmartProcess® Header incorporates all header pressure control devices within the control strategy.

### SmartProcess® Header Solution

Emerson's SmartProcess® Header is a product used to automatically control and optimize the operation of a mill Steam Distribution System. SmartProcess® Header provides coordinated control of all steam headers, allows prioritization of the headers to be set by operations personnel, and optimizes steam distribution for least cost operation

SmartProcess® Header incorporates control techniques that improve on traditional methods of header pressure control. The system delivers a coordinated response to steam demand changes using all available control devices, provides a method of transferring Btu demand from the lower headers to the upper headers as well as from upper to lower, and has over/under pressure controllers that allow numerous upsets on various headers to be dealt with concurrently. SmartProcess® Header makes header pressure control efficient and automatic so that operations can deal with the causes of pressure upsets rather than their affects.

SmartProcess® Header functionality includes multiple modes to address normal changes in operation:

- Normal Operation
- Turbine Outage
- Turbine Trip
- Boiler Down
- Low Mill Steam Demand
- Peak Load Conditions
- Maximum Megawatt Generation

### Results and Guarantees

The bottom line is that SmartProcess® Header makes money for a process business. Emerson stands behind its offering by providing guarantees of steam header performance in many cases.

- Coordinated Header Control Case 1

Emerson implemented the SmartProcess® Header strategy at an industrial site with multiple steam headers, three boilers and two steam turbines. Operator intervention for header pressure control has been virtually eliminated and the mill is generating an additional 4-5 MW of electricity on average.

Typical payback from an investment in a SmartProcess® Boiler implementation is **6 to 9 Months**.