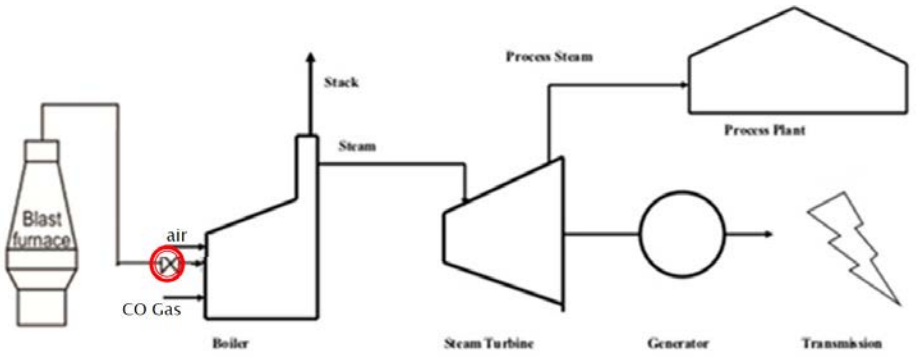
METALS

STEEL MILL BLAST FURNACE **GAS PRESSURE CONTROL**

BACKGROUND: Steel making is an energy intensive process. At a tier one integrated steel mill in Jamshedpur, India, the mill energy consumption required for steel production is met with power generation produced at the power houses on site. The primary fuel sources used are by-product gases from the blast furnaces and coke ovens. Blast Furnace Gas (BFG) is the key fuel source used at the combustion boiler to generate steam. The steam is used in various plant processing and is used by the steam generator to produce electrical power. There are three power houses, each with five to seven boilers. BFG feed has two issues, the incoming flow rate is variable, and it's calorific energy constant is low and also fluctuates.



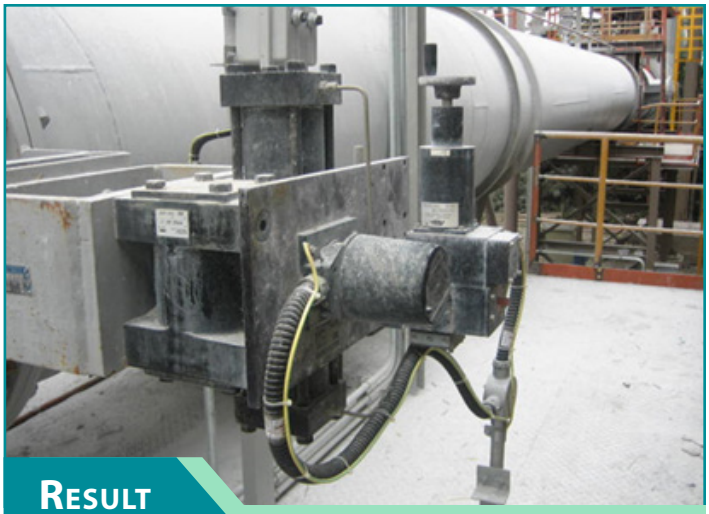
KEY TO SUCCESS in producing high quality steam is to have minimal process variation of incoming BFG entering the boiler. Tightly controlled pressure and gas flow rates can enable efficient combustion and boiler product steam pressure. T his will in turn lead to steam with stable pressure, which is critical for efficient turbine operation and advances the plant to be utilized by product gases to produce steam and energy.

ELECTRAULIC™ ACTUATION

Problem: A large integrated steel mill in Jamshedpur, India, produces 9.7 MTPA of crude steel. At the production facility, a variety of finishing mills were using pneumatic actuators (as do many other mills) to actuate large butterfly valves to control BFG fuel gas entering boilers. After monitoring the exit steam pressure and turbine operational performance, the power house operations team found the results to be increasingly disappointing. A large part of the problem was traced to the inability of the pneumatic actuators to reliably control the valve to position. Unfortunately, even with the use of smart positioners, the pneumatic actuators lacked precision due to the compressibility of air.

Solution: Greater process control is a hallmark of REXA's Electraulic™ Actuators, which provide more precise and accurate performance than pneumatic and traditional hydraulic technologies. At the steel mill in India, the pneumatically operated 69 inch butterfly valve had a pressure variation of +/-25 MMWC, causing the operators to manually take some boilers offline and operate the turbine at a higher speed. The customer sought a solution to this problem and ultimately selected REXA's X2R Rotary Actuator to replace the old pneumatic model. The REXA Actuator's hydraulic pressure is generated through an internal positive displacement gear pump, driven by a servo motor, with no limitations on starts, stops, or reverse cycles. This self-contained Electraulic™ system locks the cylinder in place when no movement is required, minimizing wear-and-tear on moving components and eliminating unnecessary power consumptions.

REXA Electraulic™ Actuators have been engineered for use of constant modulating duty cycle and precise positioning independent of load variation. REXA's technology provides the precise modulating control required by using cylinders rated for 2,000,000 full strokes or 20,000,000 dither cycles. REXA's sophisticated electronics allow complex diagnostics and partial stroking to enhance the operation and service life of the gate. Software designed specifically for REXA Actuators allow the user to calibrate and customize the actuator's operation. The actuation package supports both HART (Highway Addressable Remote Transducer) and Foundation Fieldbus control system protocols.



Result

As a result of the design, features and performance of the REXA Actuators, problems with boiler feed pressure variation are essentially eliminated, resulting in a more efficient boiler efficiency and increased power generation. Based on the company's proprietary, self-contained Electraulic™ Technology, which combines the simplicity of electric operation and the power of hydraulics, the REXA Rotary Actuator dramatically improved boiler feed BFG pressure variation from +/-25 MMWC to +/-6MMWC. Similarly, the REXA Actuator's high stiffness and exact positioning resulted in stable steam generation. Once the remaining three boilers are upgraded with REXA's Electraulic™ Technology, the turbine will produce an additional 1 MW of power, helping the steel plant achieve it's vision of becoming energy self-sufficient.

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