



PAPER MILL BASIS WEIGHT VALVE

BACKGROUND: A REXA Electraulic™ Actuator was installed on a basis weight valve at a paper mill in the Northeast United States. An extensive benchmark test was performed to verify the REXA basis weight solution can meet or exceed the performance of the existing basis weight valve actuator. After eight months of run time, process data was collected to verify actuator performance.

KEY TO SUCCESS: Paper making is a complex process involving a variety of operations. From wood preparation, to pulping, to bleaching, to the paper machine, many variables can affect the finished product. In addition, the type of wood available and the type of paper being produced significantly affect each paper mill's operation.

The basis weight valve is the most critical component on the wet end of a paper machine producing fine paper. This valve modulates the flow of stock as it is mixed with white water on its way to the head box, as well as forming wire where the sheet begins to take shape. The basis weight of paper is calculated by the weight per a given unit area. Each paper machine is designed for a specific basis weight range and roll speed. Reliably producing quality paper requires precise control of the basis weight valve. Fluctuations in basis weight can result in uneven drying, a poor finished product and/or waste (materials, time and energy) and rejection of the whole roll. Controlling the basis weight valve to operate a paper machine for specific weight range requires a high-performing actuator. This actuator must be reliable, responsive and capable of making fine position changes without overshoot, while maintaining this performance level at a high duty cycle.



ELECTRAULIC™ ACTUATION

PROBLEM: There are a variety of well-established, decades-old products serving the pulp and paper industry. With technological advancement in control systems and measurement devices, there is opportunity to improve the final control element – the actuator. The paper mill’s basis weight valve/actuator assembly was a v-notch style ball valve actuated by an SKF 20HT electric actuator with an IC2000 step motor interface. The SKF model 20HT utilizes a ball screw design connected to a gear rack driving an output shaft. The electric actuator promises zero backlash across 90 degrees with a total of 5600 steps in resolution. Actuator movement is initiated by pulses of two separate 24VDC lines (increase and decrease signal). Speed is programmable within a range of 20-1120 seconds. The customer was concerned about overseas manufacturing and limited parts availability affecting the actuators’ long-term service life, despite its well-established presence in the industry.

SOLUTION: REXA supplied a X3R5000-90-B-P Rotary Actuator mounted to a new v-notch style ball valve as a replacement. The Electraulic™ Actuator’s self-contained hydraulics drive a rack and pinion cylinder. A precision-fit shaft adapter couples the actuator to the valve in conjunction with a spring-bias assembly, therefore ensuring zero backlash for precise valve positioning. The Electraulic™ Actuator rotates the ball valve at a speed of 30 seconds per 90 degrees utilizing a non-contacting digital position sensor. This sensor makes incremental position changes to a deadband of .021% of span. A pulse control signal, like the electric actuator replaced, is used to move the actuator to position



RESULT

The paper machine this actuator is installed on makes 16-70 grade weight paper at 2,200 feet per minute at a width of 180in in rolls of 55in. The REXA solution can control to 1% of target weight on the most difficult grade weight runs within the 2sigma range. Once installed, on a run of 19.80 grade weight paper, the REXA actuator controlled the wet basis weight to an average of 19.85 grade weight with the average 2sigma range being 0.168. This represents less than 1% of target basis weight (0.198). The improved position accuracy and precision of the REXA X3R5000-90-B-P Electraulic™ actuator has directly improved the paper machine’s ability to produce fine paper within the target basis weight range.

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