Precise steam pressure control at Apollo Tyres

Schubert & Salzer sliding gate valves solve a tricky production problem

An application report by Rowan Blomquist and Peter Stein

Apollo Tyres South Africa's Durban plant had been experiencing steam flow control issues on the steam feed into the bladders on their truck tyre presses during the shaping sequence of the tyre curing process.

The problem was that while they required rapid bladder inflation, any resultant pressure above the desired set point caused defective tyres to be moulded. The steam supply pressure was 17 Bar and the maximum allowable downstream pressure was 0.5 Bar. The bleed off from the bladder was controlled by a fixed orifice.

The current system of multiple globe type control valves was cumbersome and did not present the desired functional accuracy.

This application was an ideal opportunity for the Schubert & Salzer sliding gate system. The heart of the sliding gate valve consists of two slotted discs and a fixed sealing plate that is housed perpendicular to the flow direction, and which has a fixed number of transverse slots. A rotationally fixed disc with an identical arrangement of slots is moved vertically over the fixed disc. This has the effect of changing the flow cross section. The differential pressure holds the two discs together and with the self lapping function, forms a seal. This design achieves leakages of less than 0,0001% of the valve K_{vs} value.

The key to success in this application lay with the high speed accuracy of the valve. The Schubert & Salzer sliding gate is able to achieve this accuracy through its design. The fact that the discs operate perpendicular to the flow path mean that differential pressure has minimal effect on actuation requirements and the result is a very small actuator, which is able to respond quickly to any step changes. Another feature is the exceptionally short stroke (less than 8 mm) as well as the precise digital positioner.

After extensive sizing calculations, the first valves were installed and the 15 mm model 8043 with integrated digital positioner was used. Due to the high flow rates of the valves, a highly reduced K_{vs} was required. From the outset it was clear that the new valves were far superior to the predecessors. Automation engineer Ashraff Sheik confirms, "The new valves respond far quicker in response to set point changes and have improved the press efficiencies."

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