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Reliable leak-tightness despite suspended particles and fast response times as cost factors

## Sliding gate valves excel in aluminium rolling mill

**The application of emulsions is an important factor when hot-rolling aluminium. Accordingly, the control of the specifically required quantities of rolling emulsion is crucial. Sliding gate valves have well proven their reliability, especially in applications where the cooling medium is enriched with abrasive aluminium oxide particles and a high rate of response cycles is required.**

Hot-rolling of aluminium puts ultimate demands on the valve controlling the supply of the rolling emulsion. Novelis, a world leading manufacturer of rolled aluminium products and recycler of aluminium cans, uses in their plant in Sierre, Switzerland, an emulsion of 97% de-mineralised water and 3% oil. This rolling emulsion is recycled to support the safeguarding of resources, thus accumulating aluminium oxide particles in the process. The rolling emulsion is hence not only aggressive, but also abrasive. As the rolling plant requires the control of different flow rates for different product qualities, the requirements have been a challenge that many control valves could not meet in the past. Consequently, plant operators have had to cope with leakage caused by worn valve seats. Aluminium oxide particles found their way even into the frequently used PTFE seals, another cause for leakage.

The company which operates in 11 countries with a staff of approximately 12,500 and which generated revenue

of US\$9.8 billion in 2006, supplies technologically advanced rolled aluminium products to Asia, Europe and the Americas. The major part of the aluminium panels and foils goes to the automotive and transport industry, beverage and food packaging, and other industries such as the printing industry. A key factor for the company's success is the surface quality of the rolled aluminium products.

Recently sliding gate valves have taken control of the flow of the rolling emulsion. Since the cooling of rolled products is performed at two different flow rates, the following process requirements apply:

- $p_1 = 10 \text{ bar}$
- $p_2$  within the control range of 5 to 6 bar, hence:
- $\Delta p = 4 \text{ to } 5 \text{ bar}$
- $Q = 400 \text{ to } 800 \text{ l/min}$
- Opening time = 1 to 2 seconds
- Closing time = 3 to 5 seconds
- Cycling rate: 4 to 6 response cycles per minute

### Completely insensitive to suspended particles

The unique feature about the operating principle of a sliding gate valve is the two slotted plates sliding and sealing against each other, forming the central function unit. Sliding gate valves are consequently leak-tight without

using any metal valve seats. Thanks to the system design, the valve seats, traditionally a weak point of control devices, are eliminated completely. In addition, the central throttling unit, i.e. the slotted plates, is only subject to minimal wear. Sliding gate valves feature an exceptional leak-tightness even under highly demanding operating conditions, e.g. when controlling the emulsion application at Novelis, whilst providing a long service life thanks to their system design.

In addition to the long-term leak-tightness, the system design of the sliding gate valves provides another benefit "the short stroke of 8mm" which enhances sealing properties and economic, efficient service life: The maximum control lift of the sliding gate valve is only 8 mm. This short lift not only ensures short actuation travel and fast response times, but it also reduces the load on the packing and the actuation system. In a sliding gate valve, stress on both components is considerably lower, thus greatly reducing wear and significantly extending service life.

The leak-tightness owed to the system design in combination with the low stress on the actuation system result in ultimate long-term sealing properties. These sliding gate valves are an economically very efficient solution for a multitude of applications. Using different materials combined with any of the available actuation controllers, these valves can be used in the chemical, petrochemical, textile and pharmaceuticals industries, in steel mills and in many other areas of machine construction and plant engineering. Sliding gate valves are manufactured:

- in sizes DN 15 to DN 200
- for pressures up to PN 100 and
- for media temperatures between - 100 °C and + 530 °C

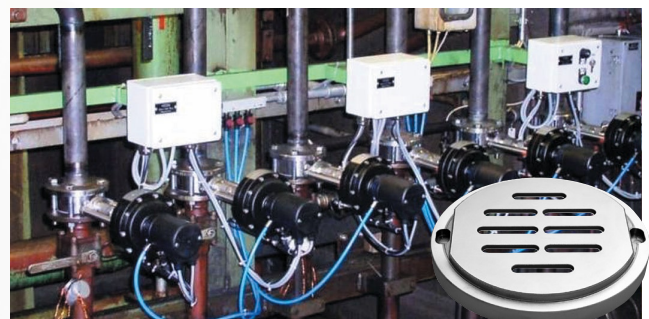
The sliding gate valves in service at Novelis are equipped with sealing plates made of stellite alloy STN2. These have proven to be the ideal choice for this specific application. The control valves with these sliding plates are almost wear-free, even under the prevailing process conditions. The spindle seal, another weak point of the ball valves used until recently, is now completely leak-tight, too. The comprehensive long-term leak-tightness of the valves is hence ensured. Also, the two ball valves required until recently to control the two flow rates were replaced by one single sliding gate valve. The easy control

of this sliding gate valve allows it to accurately adjust both required flow rates.

In addition, the sliding gate valves feature a high range of control flexibility and hence be adjusted to future process parameters. These control valves can easily be configured to control other flow rates by adjusting the actuation signals or by changing the Kv value. The adjustment of the Kv value only requires the function unit to be replaced by a unit to suit the revised conditions - which can be completed in minutes.

The sliding gate valves eliminated one source of leakage - enhancing the quality of the surfaces. To sum up, sliding gate valve offer the following benefits:

- higher robustness
- greater flexibility
- lower operating costs
- optimized operating reliability with optional valve function monitoring
- simple installation in the piping system
- significant improvement of cleanliness in the running process
- elimination of pressure deviations



*Sliding gate valves controlling the flow in an aluminium rolling plant: the aggressive and abrasive rolling emulsion is no problem for these valves which provide ultimate functional reliability by their two slotted plates sealing against each other. High-level leak-tightness despite suspended particles and a long service life create optimal conditions for economical production.*

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