# How Choosing a Sliding Gate Valve Could Save Money in Steam Applications

## The unique design of the sliding gate seat technology is a hidden gem in the valve community that saves money in the long run.

Steam pressure control is frequently used to control temperature in large industrial drying, sterilizing, and curing operations. Steam temperature is directly related to its pressure, so precision steam pressure control will give consistent, accurate temperature control.

Sliding gate regulators and control valves have proven to be exceptional in steam pressure applications. The unique characteristics of the sliding gate technology provide several advantages over globe style valves in steam pressure control.

- Straight-thru flow path reduces turbulence and noise
- Self-cleaning design requires less maintenance
- Easy to rebuild, if required
- Larger sealing area results in longer service life

*Jordan sliding gate valve*

### What is a sliding gate valve?

The Jordan Valve sliding gate seat is designed for use with a wide range of liquid and gaseous media. The sliding gate technology results in higher accuracy, more efficient control, and lower maintenance costs. The unique valve seat design has multiple orifices, creating a straight through, non-turbulent fluid flow path.

The multiple orifice design allows multiple fluid flow streams, reducing energy and turbulence. The result is higher efficiency, longer service life, quieter operation and superior control, even in extreme conditions.

The Jordan Valve sliding gate technology is available in control valves, pressure regulators, back pressure regulators and temperature regulators.

## How does the sliding gate seat work?

The sliding gate seat is made up of a movable disc and stationary plate each with matching multiple orifices. When the valve is fully closed, the disc and plate are aligned such that the orifices are covered, creating a tight Class IV shutoff. As the valve opens, the slots are gradually uncovered and fluid flows straight through until the desired set point is reached. The disc modulates its position to allow process fluid to flow and maintain the set point.

This sliding gate seat set delivers levels of performance, reliability and accuracy that are hard to achieve in other designs.

*Sliding gate design*

## Why the Sliding Gate Technology Outperforms in Steam Service

Jordan sliding gate valves and regulators are designed for industrial use where long term operation and lower overall cost of ownership are important.

### Sliding gate valve lasts longer in steam applications

In a sliding gate design, the steam travels straight through the valve, minimizing turbulence and wear. Because steam flows through multiple orifices, the erosive exposure of steam is distributed across the surfaces of the valve seat.

Moreover, the Jordan Valve sliding gate seats have an advanced Jorcote coating which has demonstrated minimal wear for over one million cycles in high-pressure steam service.

In a globe style valve, the steam flows through one large orifice and changes direction three times leading to higher velocity and flow turbulence, causing more wear on the seat components.

- Longer valve seat life results in less maintenance and more uptime

### Sliding gate delivers more accurate regulation

The control element in a Jordan sliding gate valve or regulator is perpendicular to the process flow and has a short stroke length. This allows faster response and minimal droop.

The steam flow path is into the disk, minimizing valve chatter and improving stability at the low end of stroke. Because they respond quickly to input signals, Jordan sliding gate valves and regulators reach pressure and temperature set point quicker.

- Minimal droop and faster response results in steam savings

### Sliding gate valve operates with less energy

The stroke length of the sliding gate valve is a fraction of the stroke of a similarly sized globe valve. This not only results in faster reaction times, but the short operating path requires less force to operate. It also significantly reduces the stresses on the packing and the valve actuator.

- Save with reduced energy consumption

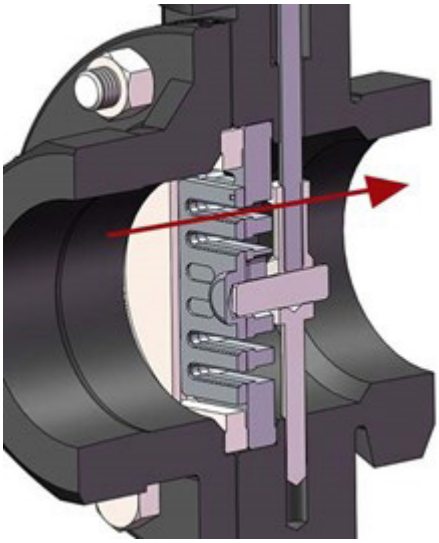
## Sliding gate design generates less noise

Compared to conventional globe and cage designs, the sliding gate seat generates between 5-10dB less noise. The sliding gate valve is quieter than other traditional valves for several reasons: the disc and plate remain in constant contact, eliminating the chatter; the straight-through flow passage minimizes turbulence, a significant cause of valve noise; and the multiple orifices in the plate and disc divide the flow into smaller flow streams, resulting in less noise.

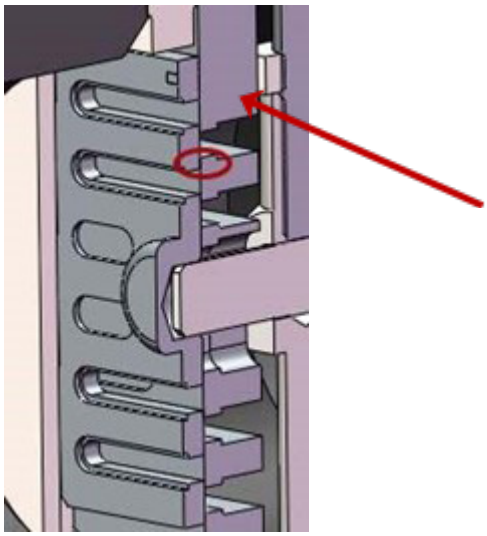
- No need to pay for “low-noise trim”

## Jordan valve overlapping seat design creates tight shut-off

The disc and plate are designed with a slight overlap of the openings to provide an ANSI Class IV shut-off rating. Each orifice is engineered with a 1/32” overlap creating an area of closure versus a line of closure as seen in globe valves.



*Open sliding gate allows straight through flow*



*Closed sliding gate has 1/32” overlap for shut-off*

This seat overlap in the Jordan sliding gate technology is an important design advantage. If the leading edge of the valve seat were to damage due to steam erosion or wire draw, the affected area would be concealed in the overlap. This overlap prevents leaking when the sliding gate closes and ensures full shut-off.

- Area of closure design has better long term shut-off. Class IV Shut off

# Case Study: Dryer Temperature Control for Electrode Coating

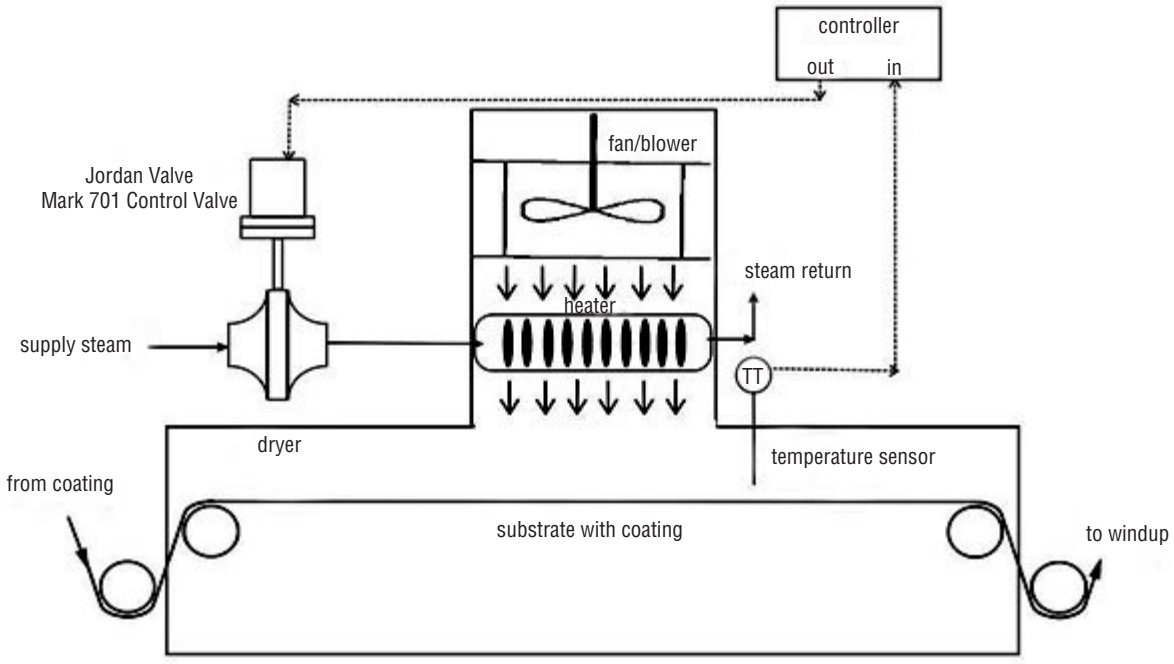
## Why Drying Temperature is Important in Lithium-Ion Battery Production

In Lithium Ion Battery (LIB) manufacturing processes, a thin film of viscous electrode slurry is coated onto a web of metal substrate moving continuously from the coater into a drying chamber. The drying chamber must maintain a tight temperature set point as the web passes through in order for the electrode slurry to adhere to the metal substrate. Equally as important, the temperature must be maintained so the conductive properties of the electrode are consistent and of high quality. The electrodes are key to the functioning of the LIB.

## How Jordan Sliding Gate Control Valves Improved Dryer Temperatures

During the electrode drying process, there can be mass transfer in solid, liquid and vapor phases creating a dynamic thermal environment leading to a difficult temperature control scenario. One customer came to Jordan Valve with a dryer temperature fluctuation of +/- 6 °C (10.5 °F) and was looking for tighter temperature control. They were using steam to control dryer temperature and their existing control valves were not providing the responsiveness and reliability they needed.

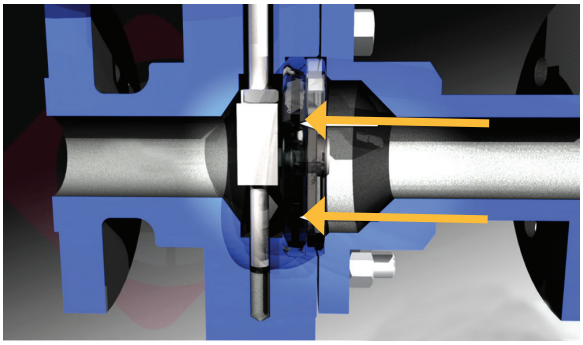
A Mark 701 high flow sliding gate valve was chosen for this application and installed in a few locations to test. A simplified schematic of coater drying system is shown in the schematic below with a Jordan valve controlling the steam supply to the dryer.



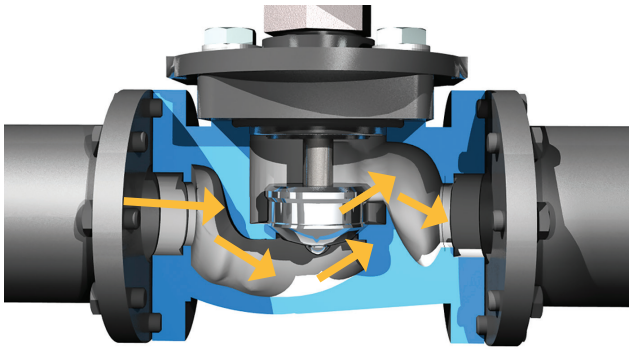

*Schematic of a coating process using Jordan Mark 701 to control steam supply to the dryer*

## Key Attributes of Jordan Mark 701 Valve Led to Application Success

The sliding gate valve design is superior in steam applications because its straight-through flow pattern and short stroke make it more responsive. The sliding gate valve opens and closes quickly when temperature starts to drift from the set point. See the diagrams below showing the straight-through flow pattern in the Jordan Valve compared to the circuitous flow through a globe valve.



*Straight-through pattern of the sliding gate valve*



*compared to flow through a globe valve*

Other benefits of the Jordan sliding gate valve design are reduced chatter, longer life, less maintenance, and smaller size. Below is a photo of the Jordan Valve Mark 701 installed at the customer site.

*Photo of sliding gate valve in customer installation*

During the initial trial, the customer found that the dryer section with the Jordan Valve provided tighter temperature control at +/- 2 °C (3.5 °F), a 66% decrease in variation! After all the older valves were replaced by Jordan Valve Mark 701 control valves, the customer reported several other benefits:

1. Tighter temperature control for better product quality
2. Ability to increase the line speed for higher throughput / cost savings
3. Easy maintenance
4. No more packing leaks