Mark 701 Sliding Gate Control Valves give Tighter Temperature Control and Faster Throughput

Steam pressure control is frequently used to control temperature in large industrial drying operations. Steam temperature is directly related to pressure, so precision pressure control will give consistent temperature control. Coating and drying materials on a continuously moving web can be a complex operation and requires precise and consistent temperature control.

Better Steam Pressure Control Improves Drying for Coating Process

Case Study: Dryer Temperature Control for Electrode Coating

Why Drying Temperature is Important in Lithium Ion Battery Production

At the start of the Lithium Ion Battery (LIB) manufacturing process, is the electrode coating process. 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 setpoint 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.

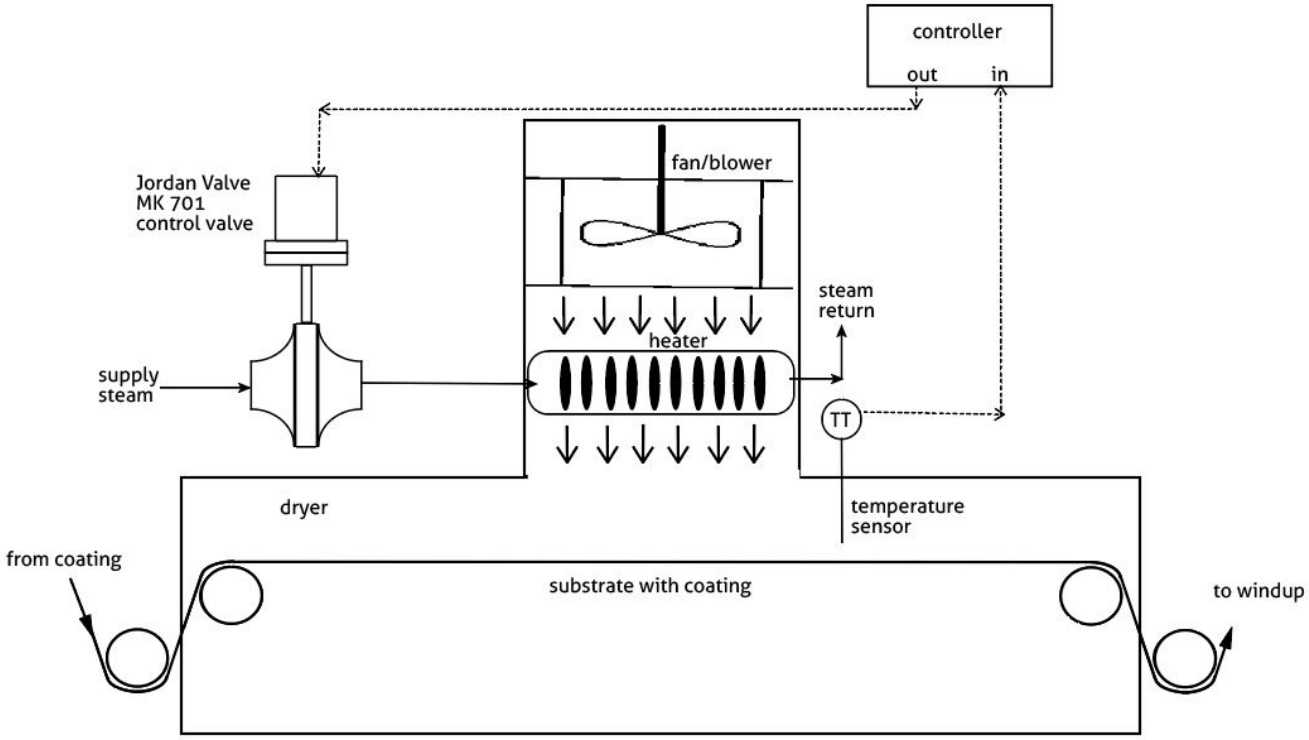
A lithium Ion Battery contains a positive and a negative electrode, each with an electrode coating. Typically, the positive electrode of the LIB has an aluminum substrate, and the negative electrode has a copper substrate. The electrodes are key to the functioning of the LIB, so the coating quality is extremely important for battery performance and reliability. As such, dryer temperature must be precise and tightly controlled.

How Mark 701 Sliding Gate Control Valves Improved Dryer Temperatures in Electrode Coating

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 DegC 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.

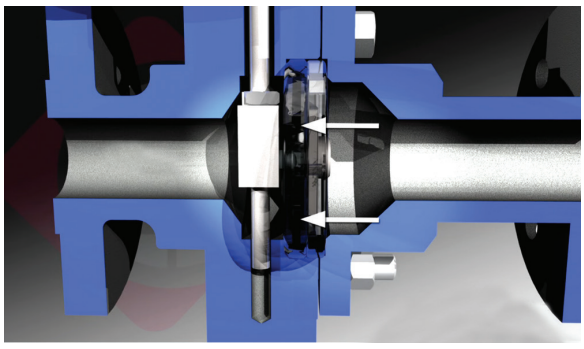
A **Mark 701** high flow sliding gate valve was chosen for this application and installed in a few locations to test. The **sliding gate valve design** is superior in steam applications because its straight-through flow pattern and short stroke make it more responsive. The sliding gate valve opens and closes quickly when temperature starts to drift from the setpoint.

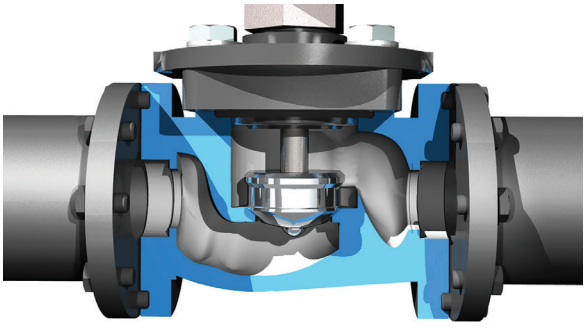
A simplified schematic of coater drying system is shown in the schematic below with a Jordan valve controlling the steam supply to the dryer.



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

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 flow pattern of the Jordan sliding gate valve (left) compared to flow through a globe valve (right).

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 valves installed at the customer site.

Why the Jordan Sliding Gate Valve was A Superior Solution to Dryer Temperature Control

During the initial trial, the customer found that the dryer section with the Jordan Valve provided tighter temperature control at +/- 2 Deg C. After all the older valves were replaced by Jordan Valve Mark 701 control valves, the customer reported several benefits:

1. Tighter temperature control for better product quality
2. Ability to increase the line speed for higher throughput / cost savings
3. Jordan Valve delivered the Mark 701 valve with **short Lead-times**
4. The service from the local Jordan Valve representative was excellent
5. Easy maintenance. Customer has not had any maintenance issues since installation in 2018.

The customer also reported that they had experienced packing leaks with their previous “globe style” valve which they are not seeing in the Jordan sliding gate valve due to the shorter stroke. For more information about the Jordan Valve sliding gate either in a steam application or in any other application please contact our sales representative.