



Application Profile

Molten Sulphur applications, while they do not come up every day, are worth discussing because of the problem solving opportunity that they represent. And frankly, some of the things we can learn from pumping molten sulphur may be applied to other, similar applications.

Most customers who pump molten sulphur have experienced the "yellow heap". This is the tell-tale sign of leaking packing or a mechanical seal which has failed in molten sulphur service. Or perhaps they remember putting a pipe wrench on the pump shaft to try and break it loose after the sulphur has hardened inside the pump. This happens when the sulphur is allowed to cool during shut-down. Less frequently, customers complain about using over-sized centrifugals and expensive control valves required to handle the typically low flows required for molten sulphur. These complaints come less frequently, not because the customer likes using over-sized pumps and control valves for low flows, it's just that many of them don't know there's an alternative.

Most commonly, molten sulphur is burned to produce either Sulfuric Acid (H_2SO_4) or Sulphur Dioxide (SO_2) for a variety of industries, most notably, corn sweeteners, fertilizer and pulp and paper. In the case of pulp and paper, the opportunities are limited to "sulphite" mills, which are in decline because of environmental issues but still offer a significant opportunity. In all cases, the molten sulphur must be kept at about 300F; too cool and it solidifies, too hot and it burns. The molten sulphur is fed through a nozzle, atomized and burned (700F for sulfuric acid and 1800F for sulphur dioxide).

In order to control the burn rate (and thus the sulfuric acid or sulphur dioxide produced) the rate of flow of the molten sulphur must be controlled. Historically, this was done by either controlling the level of molten sulphur in a standpipe and using the head pressure to vary the flow or using a recirculation loop and a control valve. In either case, the pump of choice was an over-sized ANSI centrifugal pump. Sulphur temperature was maintained with steam heated jackets on the pumps.

More recently, the major producers of molten sulphur burners i.e. Stebbins Engineering and Manufacturing in Watertown, NY, began using variable speed ECO pumps. As positive displacement pumps these ECO pumps were much more suited to the low flow, high pressure requirements and can be very effectively controlled with either DC or AC drives. A typical molten sulphur pump would be a G6-ACE(or C)-KKG(or R). A jacket or other method must be used to keep the sulphur molten. High temperature options such as metallic bearing lock pins can be used and bearing flush ports will make it easier to service the pump. Keeping the sulphur molten in the stuffing box is critical. If your customer is having problems in this respect, let us know as we have solutions we can offer. An approach we are anxious to put in service is a mag drive. A magnetically coupled pump should make an excellent molten sulphur pump, providing that the sulphur in the magnet area is kept molten as well. Our standard jacket does not cover this area. Two methods for keeping the sulphur molten are; heat tracing of the magnet area or, in GMH8 and larger units, introduction of steam between primary and secondary containment cans.

Add molten sulphur to your list of applications to look for when visiting your customers. It's broad use might surprise you. If your customer has an older system in place with over-sized ANSI centrifugals, there is a better way!

