

Water authority improves response times and reduces cost in waste sludge processing

RESULTS

- Elimination of overflow conditions
- Manual field control and supervision no longer necessary
- Reduced material costs
- Improved response times

APPLICATION

Dose control for gravity belt thickener

CUSTOMER

A Californian water authority's municipal de-activated sludge waste water treatment plant

CHALLENGE

A Californian water authority uses a gravity belt thickener (GBT) in one of the final steps in waste sludge processing. The GBT is designed to remove de-activated sludge or solids so that the water can be treated.

The GBT is a fast moving porous belt that sludge is pumped onto. As the sludge moves along the belt the water falls out, thus removing water from the solids. The solids are then sent to a press for drying and burned as a fuel or sent to a landfill for disposal. At this site the de-activated sludge is used as fertilizer in a nearby almond orchard.

Polymer is used to precipitate and thicken the solids for heavy sludge removal. Polymer is injected upstream and is allowed to mix before entering the GBT. The ideal set point is 4% solids. Polymer is the most expensive additive used at this site, it is estimated that it costs the authority approximately \$32K a year.

In the past the site had experienced many overflows due to poor solids control. Several instruments had been used without success. The problem was that these units did not provide immediate response to changing percentage solids, this is very important because of the speed of the belt and flow rate of the product.

SOLUTION

A Mobrey MSM433 sensor is mounted at the back end of the GBT. The 4" gap sensor is mounted directly over the belt. It is important to note that the sensor is measuring sludge in only 3 to 4 inches of depth. (See photos' overleaf). The mounting allows for easy inspection and access. Due to the flow rate the sensor requires minimal cleaning but when cleaning is required, the sensor is easily accessible. The MSM400 electronics are mounted on the adjacent handrail.



The MSM400 provides immediate response to changing percentage solids



Figure 1: Gravity belt thickener

Figure 2: Mobrey MSM433 sensor placed ¼" above gravity belt before it falls over the GBT edge.

Figure 3: Mobrey MSM400 controller and MSM433 mounting.



For more information:
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The 4-20 mA output from the MSM400 provides the feedback to the polymer dose control loop. The unit operates in auto and the customer has not experienced an overflow condition. Polymer usage has reduced as a result of the accurate dosing.

INSTALLATION NOTES

The MSM400 works by measuring the attenuation of the ultrasonic signal by the (signal loss) liquid containing suspended solids in the sensor gap minus the attenuation due to the liquid without the suspended solids.

The mass of suspended dry solids is the mass of a given volume of a sample, dried to a constant weight at 105°C, minus the mass of dissolved solids determined from a similar representative sample of the same volume.

The MSM400 controller is wall-mounted, IP65 (NEMA 4). It can be selected as intrinsically safe and may be connected to the sensor located in a hazardous area. The IS controller must be mounted in a safe area. The controller is HART compatible and features a 4 to 20 mA output, one control 5 AMP SPCO relay for de-sludge control and one 5 AMP SPCO relay for fault monitoring.

Sensor: The MSM433 sensor is all welded 316 SS construction, rated to IP68 (NEMA 6P). The sensor measures the attenuation of the liquid in the sensor gap.

The sensor should be mounted in a location to allow for the best possible reading. The location shown in the above pictures was chosen because it ensured that constant depth was maintained. The location also allows for the ideal dose pacing rate; the measuring point in this case is just before it falls over the edge thus giving a final look at percent solids before it goes to the press.

NOTE

Do not place the sensor on the belt. Allow for at least ¼" of free space above the belt. Contact with the belt will cause sensor wear and belt wear.

The customer is happy with the performance of the MSM400 and has not experienced an overflow condition since installation.



Figure 4: Controlling at a constant 4% solids. Note the uniform sludge thickening.

**Emerson Process Management
Rosemount Measurement Ltd.**
158 Edinburgh Avenue, Slough,
Berks UK SL1 4UE
Tel: +44 (0)1753 756600
Fax: +44 (0)1753 823589
www.mobrey.com

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