Mine utilizes electric actuator with embedded PID control to automatically fill remote water tank

RESULTS

- Remote water tank reduced traffic and transport cost
- Automatic filling ensured water availability
- Solution avoided running over a mile of control wiring
- Controls are independent and fail-safe

The mining company has reported the tank filling solution has worked perfectly since its installation. The tank remains full and water truck traffic has eased considerably.

APPLICATION

Automatic level fill control for remote tank application.

CUSTOMER

Large copper mine in southern Arizona.

CHALLENGE

The mine uses large water trucks for dust control on the roads throughout the pit. A recent mine extension created a large area that lacked a water filling station, forcing the water trucks to travel long distances to refill.

An existing tank was available and repurposed to create a water truck refill station in the area of the mine extension. A water pipe was run to the tank, and the mine planned to use a pump driven by a variable frequency drive (VFD) to fill the tank and maintain the desired level. However, the tank was located over a mile from the pump, and the undulating landscape made wireless communications impossible (Figure 1). The mine needed a reliable and fail-safe means to start and stop the pump as necessary to maintain the tank level without running over a mile of conduit and wiring to facilitate control.

Figure 1: The remote location and difficult terrain surrounding the new water tank eliminated wireless as a communication solution and made routing of control cables cost prohibitive.

BETTIS™

For more information:
www.emerson.com/en-us/automation/bettis

EMERSON™

SOLUTION

The mine operator engaged Caltrol, their local Emerson Impact Partner, to evaluate the problem. Their solution included the following equipment:

- A VFD was installed on the water pump, with the pump speed setpoint determined by the water pipeline pressure.
- A fail-closed Bettis™ RTS actuator (Figure 2) mounted on a Keystone K-LOK® isolation valve was installed on the water tank's fill line. The RTS actuator was connected to a local level transmitter monitoring tank level.

The RTS actuator utilized its embedded PID control functionality to control tank level. A stroke profile was programmed to open the valve as the level got low and close the valve as the tank became full. The VFD was programmed to start and ramp up pump speed when the pipe pressure was low, and to ramp down and stop the pump when the pipe pressure got high.

When the RTS actuator opened the valve, the water pipe header pressure would fall, starting the VFD and initiating the water pumping operation. When the tank was full, the RTS-actuated valve would close, blocking the header and raising the water pipe pressure. The VFD would sense the rising pressure and stop the pump, which remained off until the tank valve opened again.

This elegant solution kept the water tank full and avoided continuously running the pump, yet it required no control wiring to coordinate between the tank and pump, which are located a mile away from each other. The Bettis RTS actuator is fail-safe, avoiding overfilling the tank on control or power failure, the pressure-controlled VFD avoided pump damage from deadheading, and the control system only ran the pump as necessary, reducing energy costs.

Figure 2: The Bettis RTS low power, all electric actuator can be ordered with a fail-safe spring and mounted on quarter turn or linear valves. The intelligent controller provides embedded PID and programmable stroke functionality.

North & South America

19200 Northwest Freeway
Houston TX 77065
USA
T +1 281 477 4100

Asia Pacific

No. 9 Gul Road
#01-02 Singapore 629361
T +65 6777 8211

No. 1 Lai Yuan Road
Wuqing Development Area
Tianjin 301700
P. R. China
T +86 22 8212 3300

Europe

Holland Fasor 6
Székesfehérvár 8000
Hungary
T +36 22 53 09 50

Strada Biffi 165
29017 Fiorenzuola d'Arda (PC)
Italy
T +39 0523 944 411

BETTIS™

For more information:
www.emerson.com/en-us/automation/bettis

EMERSON™