

Improve Lifetime Cost Savings by \$31,800 per Power Plant by Using Guided Wave Radar

RESULTS

- Lifetime cost savings total \$31,800 per power plant
- Installation integrity was enhanced by eliminating multiple components
- Maintenance is eliminated by the use of Guided Wave Radar
- Save \$3961 per unit

APPLICATION

Bubbler System Replacement in Cooling Tower Basins, Blow-Down Sumps and Waste Water Sumps

APPLICATION CHARACTERISTIC

Bubbler systems are top-down level measurement devices. They use a constant air source to create a back pressure to the transmitter that is proportional to the level. If the measured liquids contain mud, fiber particles, or other debris, they tend to plug lines and create an artificially high pressure, resulting in erroneous level readings.

CUSTOMER

Fluor®, an Engineering and Construction Company

CHALLENGE

Fluor® is an Engineering and Construction Company that has built many standard design, turnkey, lump sum power plants in the United States. During a project's engineering and design, both Fluor® and their clients place an emphasis on reduction of overall cost without affecting the integrity and functionality of the plant design.

One area that was ripe for improvement was level measurement using bubbler systems. Bubbler systems consist of differential pressure transmitter, pressure regulator, an indicating rotameter, various tubing and fittings, and a constant source of instrument air. These systems have a long proven history of use in many plants and are an accepted way to provide top-down level measurements in low pressure applications.

With the many components involved, a bubbler system can be costly to install. While the most costly item is the transmitter, the other system components and lines for instrument can easily double the basic hardware cost. In addition, over the life of the system, consideration needs to be given towards the supply of instrument air and general maintenance to



The return on investment and the total cost of ownership was improved with an estimated lifetime savings of over \$31,800 per plant.



Guided Wave Radar Installed

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keep the bubbler line clear and open. In many of these applications the pipe goes through water which has mud, fibers and other plant debris which can cause the pipe to plug. Plugged pipes can cause false level readings which can have significant consequences.

In one installation in a power plant, a bubbler was used in a fire water storage pond containing a mixture of mud and carpet fiber sediment. The bubbler pipe was often caked in mud and carpet fibers. This plugged the end of the tube and caused erroneous level measurements.

In another case, a cooling water sump basin caused a shutdown of a steam turbine and eventually tripped the entire plant. The cause of the shutdown was traced back to a faulty connection to the supply air tubing in the bubbler system. Back pressure caused it to blow off and send the transmitter output to zero.

SOLUTION

In keeping their desire to reduce overall cost without compromising the integrity and functionality of the plant design, the engineers at Flour® decided to evaluate alternatives to bubbler systems. A proposal was made during the P&ID review on a new power plant project to reduce the initial investment and material costs of using a bubbler system.

The overall cost to install a Rosemount GWR was 64% of the bubbler's installed cost.



The Rosemount 3300 GWR installation only requires the loop connection and process mounting.



In addition to the necessary control loop connections and process mounting, a bubbler system also includes an air supply with filter regulator, tubing and fittings to the transmitter, a rotometer for regulation of the air supply and a mounting support for the transmitter.

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In addition to the necessary control loop connections and the process mounting, a bubbler system installation also includes an air supply system with a filter regulator, tubing and fittings to the transmitter, a rotameter for the regulation of the air supply and a mounting support for the transmitter. In contrast the Rosemount Guided Wave Radar (GWR) only requires the loop connection and process mounting. When considering the elimination of the extra pieces and the labor to install them, the total cost of the GWR was determined to be 64% of the total cost of the bubbler system. Based on a total cost of ownership analysis, a decision was made to try a guided wave radar level transmitter.

Once installed, the GWR is able to make direct level measurement with a minimal amount of configuration support. No adjustments are needed for an air supply, no continual maintenance is needed to keep the lines clear. In operating the bubbler system it was found it was estimated to be about \$US 106 per year of instrument air. Many of the power plants designed by Flour® typically have 8 units consuming \$848 per year in instrument air. Over a 20 year plant life this totals \$17,000.

The applications using these level instruments are often installed in areas that have little instrumentation, so the instrument air lines are more difficult to route to bubbler air system.

By switching to the Rosemount 3300, Flour® was able to fulfill their goal of reducing overall costs to the plant without affecting the integrity and functionality of the plant design. The return on investment and total cost of ownership was improved with an estimated lifetime savings of over \$31,800 for the 8 units typically found in a power plant.

TABLE 1. Per Unit Lifetime Cost Savings

	Savings
Installation Savings Per Unit	\$1,841
20 Year Supply of Air for Each Unit	\$2,120
Total Per Savings Unit	\$3,961

RESOURCES

Rosemount 3300

<http://www.emersonprocess.com/rosemount/products/level/m3300.html>

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