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Boosting Power Plant Performance Through Guided Wave Radar Technology

THE ECLIPSE MODEL 706

MAGNETROL LEVEL MATTERS AMETEK LEVEL MEASUREMENT SOLUTIONS

Overview

In coal and gas-fired power generation, precise liquid level measurement is essential for optimizing efficiency, minimizing downtime, and maintaining operational safety.

Some key customers had been experiencing inconsistent level measurements across a variety of applications, including steam drums, oxygen generators, shaft seal heaters, condensers, and oil collection tanks.

Traditionally, these facilities relied on differential pressure (DP) transmitters, capacitive level transmitters, and multi-point electric contact level gauges to monitor liquid levels. However, these legacy systems often faced reliability challenges, particularly during start-up and shutdown phases.

Challenge

As the power sector shifts toward ultra-supercritical coal-fired units (660–1000 MW) and J-type gas turbines, the demand for high-accuracy, real-time level measurement has become critical. However, customers encountered several major obstacles:

- **Reliability During Load Fluctuations:** DP transmitters and similar technologies delivered unstable readings during load increases / decreases.
- **Frequent Maintenance and Troubleshooting:** Traditional systems required frequent recalibration, particularly in high-pressure environments.
- **Operational Inefficiencies:** Inaccurate level measurements reduced thermal efficiency, driving up fuel consumption and operational costs.
- **Safety Concerns:** Inadequate level control posed heightened risks in high-temperature environments, especially in steam drums operating at temperatures up to +608 °C (+1126 °F) and pressures reaching 15 MPa (2175 psi).

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Application Details

Before switching to Guided Wave Radar (GWR), power plants relied on older technologies – each with critical drawbacks:

- **DP Transmitters:** Struggled with unstable readings during rapid temperature and pressure shifts at start-up and shutdown.
- **RF Capacitance Transmitters:** Delivered inconsistent performance in extreme heat.
- **Multi-Point Contact Gauges:** Couldn't provide the resolution or real-time accuracy needed for modern, dynamic processes.

These limitations left operators facing unreliable data, higher maintenance costs, and reduced efficiency – making the move to GWR an essential step toward safer, more accurate, and more cost-effective operations.

Solution

We implemented Guided Wave Radar (GWR) technology as a modern alternative to traditional differential pressure (DP) transmitters, affording:

- **Consistent, Real-Time Accuracy:** Unaffected by temperature or pressure variations, ensuring stable readings during all operating phases.
- **Low Maintenance Needs:** With no moving parts, GWR requires no recalibration and significantly less servicing.
- **Seamless Integration:** Fully compatible with single and double chamber configurations, enabling quick retrofitting into existing plant designs.
- **Remote Monitoring & Diagnostics:** Designed for hard-to-reach installations, reducing on-site troubleshooting and downtime.

Results & Benefits

The upgrade to GWR technology delivered measurable operational improvements:

- **Reduced Measurement Fluctuations** for reliable liquid level control even under dynamic load conditions.
- **Lower Maintenance Costs** thanks to the elimination of frequent recalibrations.
- **Improved Thermal Efficiency** by optimizing fuel consumption in coal and gas-fired plants.
- **Enhanced Operational Safety** through real-time integration with the Distributed Control System (DCS), enabling faster decision-making.

Eclipse 706 GWR Probe Options

Business Impact

- **Extended Equipment Lifespan** and reduced capital spending on replacements.
- **Ongoing Maintenance Savings** due to high durability and built-in self-diagnostics.
- **Greater Efficiency** with maximized power output and minimized fuel use, improving overall profitability.

Conclusion

Replacing the DP transmitters greatly improved stability, and the ability to withstand temperature and pressure variations makes Guided Wave Radar (GWR) the superior choice for steam drum applications. Its seamless integration into existing plant configurations ensured a smooth transition with minimal operational disruption. With real-time monitoring and reduced maintenance requirements, operators gained improved control over thermal efficiency and safety.

Contact us today to learn how GWR technology can enhance your plant's efficiency, reliability, and overall performance.

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