

Automatic Tank Gauging System

Case Study: Integrating N2920 FTT for Higher Accuracy

Bayway Refinery - New Jersey

The Bayway Refinery, located on the New York Harbor in Linden, New Jersey, processes mainly light, low-sulfur crude oil. Crude oil is supplied to the refinery by tanker from Canada and West Africa, and U.S.-advantaged crude is supplied through a combination of rail and marine transport.

A new rail offloading facility began operations in August 2014. With a capacity of 75,000 BPD, this offloading facility, owned by Phillips 66 Partners, makes the receipt of additional advantaged crude by railcar possible. The refinery produces a high percentage of transportation fuels and petrochemical feedstocks, residual fuel oil and home heating oil. The facility distributes refined products to East Coast customers by barge, truck, pipeline and railcar.

Bayway's refining units include fluid catalytic cracking, hydrodesulfurization units, a naphtha reformer, an alkylation unit and other processing equipment. Bayway also has a 775 MMLb/Y polypropylene plant.

SITUATION

Phillips 66, like many others in the industry over the past couple of years, was trying reduce costs due to the drop in oil prices while also needing to make critical investments across the organization. The Bayway Refinery, a large refinery based Linden, NJ, had over 100 tanks running on a Honeywell system and was evaluating new tank gauging

hardware. The refinery needed better measurement of its inventory, including real-time product movement across their typically large distributed tank farm. The refinery's engineering team also had a mandate to find the most cost effective solution to provide this level of measurement that would also help improve efficiencies across every aspect of the refinery's ongoing operational and maintenance processes.

The team also sought to reduce in-the-field-risk by automating and transmitting comprehensive tank conditions back to the site operations center and load racks in real-time. They considered swapping out existing measurement equipment with radar-based systems offering data transmission capabilities. To fully evaluate this option, the team calculated the corresponding installation man-hours needed, infrastructure upgrades, and CapEx requirements.

Considering the level of effort, significant cost, and extended ROI timeline needed to swap equipment, the engineering team decided to seek out a more practical, time and cost efficient option. It was important to find a solution that would meet the necessary accuracy requirements and support current staff levels.

Automatic Tank Gauging System

Integrating N2920 FTT for Higher Accuracy

SOLUTION

The Bayway Refinery engineering team met with Varec to learn more about its radar gauges, and in that discussion, Varec suggested an alternative solution. Varec's Model N2920 Float and Tape Transmitter (FTT), which had the Honeywell Enraf Bi-Phase Mark field protocol, could serve as a "bolt on" component to the refinery's current tank gauges. The plug and play solution enabled Phillips 66 to eliminate the cost of replacing the extensive number of installed tank gauging equipment, which in many cases included Varec's reliable N2500 Automatic Tank Gauge. Adding the N2920 FTT's could be done at a fraction of the cost. In addition to the transmitter's flexible communications protocols, its HART and digital inputs and outputs integration capabilities made the N2920 FTT the ideal choice for meeting API 2350 — the industry standard for overfill prevention.

RESULTS

Aside from the near seven figure savings by installing the N2920 FTT over replacing their current tank gauges with radar gauges, there were other immediate benefits. For instance, by seamlessly communicating via the Honeywell Enraf Bi-Phase Mark field and other industry standard protocols, the N2920 FTT includes its own DC power supply, enabling direct wiring of RTD', eliminating the need to use a separate thermocouple and transmitter at the tank.

By automating the tank gauging system Phillips 66 achieved a more accurate and reliable measurement system. They also improved their security by adding optional high, high-high, low and low-low levels alarms to the N2920 FTTs.

N2920 FTT SPECIFICATIONS AND OPTIONS

- The N2920 FTT Float & Tape Transmitter (FTT) transmits level via field communications protocols: Modbus, BiPhase Mark, etc.
- Accuracy $\pm 1/16"$ (1.58 mm)
- Repeatability $\pm 1/16"$ (1.58 mm)
- Two or four optional limit switches
- Approved to cFMus, ATEX and IECEx standards for use in hazardous areas
- Analog inputs and/or outputs
- HART Master for up to four smart devices
- Two digital inputs or four digital inputs with four dry contact outputs



► The N2920 Float & Tape Transmitter (FTT) provides data from the tank side to the control room for use in inventory management applications. It accurately converts mechanical level measurement from the connected tank gauge, integrates temperature and HART devices, and provides digital inputs and digital outputs for the indication of alarms or drive relays.



► The N2500 Automatic Tank Gauge (ATG) is a mechanically operated, float and tape instrument designed to provide continuous liquid level measurement in bulk storage applications. Since 1928, over 800,000 units have been sold worldwide, making the N2500 ATG the industry standard for float and tape gauges.



► With the combination of a N2500 ATG and the N2920 FTT, Varec customers have the ability to integrate float and tape level measurement with several other level technologies in one system. The N2920 FTT can accept up to 4 independent HART devices, such as Radar, Servo, Hydrostatic, Temperature, etc.

