

# Refinery Saves Over \$700,000 from Hydrogen and Hydrocarbon Loss Utilizing Emerson™ Smart Wireless

## RESULTS

- Saved \$500,000 in lost hydrogen from leaking vent valves and PRVs
- Saved \$200,000 in lost hydrocarbons from leaking flare valves
- Improved health and safety by eliminating manual readings

## APPLICATION

Monitoring of flare control valves for leaks on hydrogen and hydrocarbon services, and monitoring re-closure of PRVs after pop-up

## CHALLENGE

One of the largest petroleum refineries in the world is equipped to refine various types of crude oil (sour crude, sweet crude, or a mixture of both) and manufacture various grades of fuel from motor gasoline to Aviation Turbine Fuel (ATF).

Due to wear and tear, automatic control valves on vents were not closing completely in the Hydrogen Manufacturing units, and hydrogen was venting to the flare system. Eight valves in each refinery were experiencing leakage, and each event cost \$1800 per ton of hydrogen vented.

The plant was having the same problem with leaks on nearly 30 flare control valves on various hydrocarbons in the Crude Unit, the Fluid Catalytic Cracking (FCC) Unit, the Hydrocracker, the Sulfuric Acid Alkylation Unit, and the Catalytic Reformer. The result was valuable hydrocarbons going to flare instead of remaining in the production stream.

Another area of loss was with poorly seating PRVs in the hydrogen manufacturing unit. To ensure safety, these valves pop up in the event of overpressure. Unfortunately, they did not sit back down tightly and, over time, led to a significant hydrogen loss. This problem was found on five PRVs in the domestic refinery and 17 in the newer export refinery.

In the past, hand held acoustic leak detection equipment was used to manually test flare valves and PRVs. This was periodic, and a significant loss of hydrogen and hydrocarbons resulted between tests. Also, since these flare valves and PRVs are at difficult-to-reach process locations, manual monitoring was a major HSE issue.



*The alarms and health indications from the continuous online acoustic monitoring network enables our refineries to initiate corrective actions when leakage occurs, saving over \$500,000 in hydrogen.*

The refinery wanted to test the new Emerson Wireless Acoustic Transmitters for viability of a continuous, online monitoring system that could catch leaks early, minimize hydrogen and hydrocarbon production losses, and improve safety for maintenance.

*The plant has improved revenue by more than \$700,000.*

### SOLUTION

Ninety-four Emerson Wireless Acoustic transmitters and two Wireless Gateways were installed in the domestic and export refineries, with one Gateway and 47 transmitters in each refinery. Twenty-six acoustic transmitters were installed upstream of the vent and flare valves in the hydrogen unit, the FCC, the Hydrocracker, the Sulfuric Acid Alkylation Unit, and the Catalytic Reformer. Five transmitters were installed upstream of PRVs in the hydrogen unit in the domestic refinery and seventeen in the export refinery.

Each wireless Gateway brings the measurements into a host DCS, where trending is done on the acoustics to continuously monitor the valves. Alarms based on the acoustic signatures at each valve have been programmed in the DCS to alert operators when a valve begins to leak, or when a PRV fails to seat properly. Remote viewing has also been provided for the Plant Manager.

The alarms and health indications from the continuous online acoustic monitoring network enabled the refinery to initiate corrective actions when leakage occurred, saving over \$500,000 in hydrogen. They have also saved over \$200,000 in hydrocarbon losses. In total, the plant has improved revenue by more than \$700,000, and is now looking at online acoustic monitoring for some of the 40,000 steam traps in their refineries.

The refinery has improved the health and safety of its workers, an important accomplishment for this refinery.

### RESOURCES

#### Emerson Process Management Refining Industry

[www2.emersonprocess.com/en-US/industries/refining/Pages/index.aspx](http://www2.emersonprocess.com/en-US/industries/refining/Pages/index.aspx)

#### Emerson Smart Wireless Gateways

[www2.emersonprocess.com/en-us/brands/rosemount/wireless/wireless-gateways/pages/index.aspx](http://www2.emersonprocess.com/en-us/brands/rosemount/wireless/wireless-gateways/pages/index.aspx)

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