

Improved Petrochemical Process with HanPHI at PIC

Petrochemical Industries Company

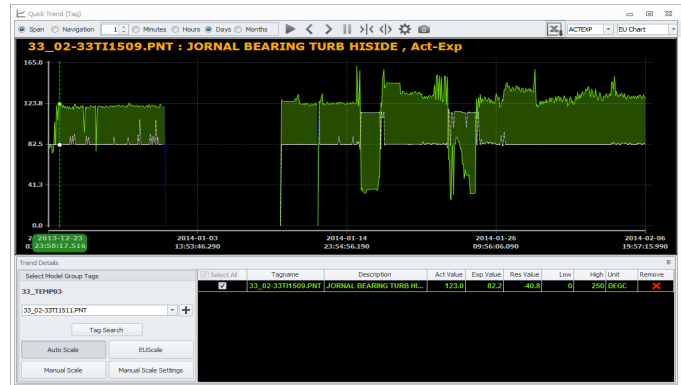
Petrochemical Industries Company (PIC), a subsidiary of the Kuwait Petroleum Corporation, manufactures and supplies petrochemical products throughout the globe. For over 50 years, PIC has been a petrochemical leader in Kuwait and the Middle East. Due to its location of its world-class manufacturing sites, PIC provides petrochemical products to the growing markets in Asia, Africa, and Eastern Europe.

In 2013, PIC installed HanPHI at the Shuaiba Al Ahmadi Refinery in unit #4 (ammonia and urea). The ammonia plant consists of methanation, ammonia synthesis, steam, H₂S removal, reforming, shift conversion, and CO₂ removal.

HanPHI Catches: Ammonia Synthesis

Bearing Temperature Increase

In December 2013 and January 2014, a bearing temperature suddenly increased to 118.5 °C when it normally is 80 °C. The site determined that the increase was a result of a steam leak from the turbine casing that heated the journal bearing and increased the bearing temperature.



HanPHI Catches: Steam System

Turbine Flow

On December 17, 2013, the 32_01-32FI0317.PNT flow tag suddenly dropped to 38.8 T/H and increased to 164.2 T/H after 23 minutes.

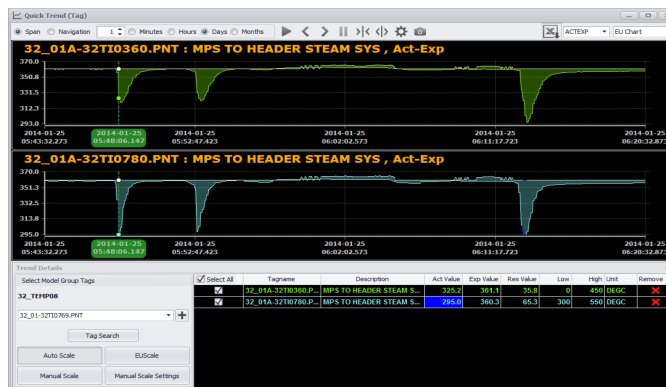
The site determined that the level in B-3223 increased and the 33-LIC-0316 level controller opened fully. The plant and compressors were normal, but the flow changes occurred because the turbine condensate pump P-3223 A/B vapor locked, or the flow was blocked in the water treatment plant.



MPS Temperature and Pressure

On January 25, 2014, 32_01A-32TI0360.PNT and 32_01A-32TI0780.PNT dropped 3 times. 32_01A-32TI0780.PNT had bad data 2 times.

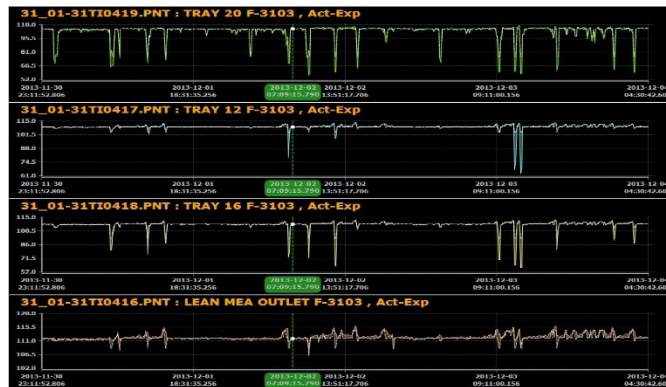
During this time, the MPS header pressure increased and the MPS station closed to keep the pressure normal. The site determined that the station quench valves TCV-350 and TCV-357 past badly and caused the decrease in the MPS temperatures.



HanPHI Catches: H₂S Removal Unit

Temperature Increase

In December 2013, the 31_01-31TI0416,17,18,19.PNT temperature dropped multiple times. The site determined that this was a result of flow variation to the reboiler E-3101 or foaming of the system.



Regenerator Changes

31_01-31LI0010.PNT and 31_F0011-31LIC0010.MEAS dropped to -0.2. This was a result of a disturbance in the H₂S removal system from internal leaks in the exchangers. These leaks forced an increase in heating and evaporation. After April 2014, the site repaired the leaks and the system returned to normal.



Condenser Pressure

In January 2014, the 31_P0012-31PIC0012.MEAS pressure increased. The site determined that the increase was from condensate or water in the H₂S header of the close of 31-PIC-0012.



HanPHI Catches: Reforming

Inlet Temperature Decrease

On December 24, 2013, the 32_01A-32TI0489.PNT temperature decreased, while 32_01A-32TI0490.PNT and 32_02-32TI0502.PNT dropped slightly.

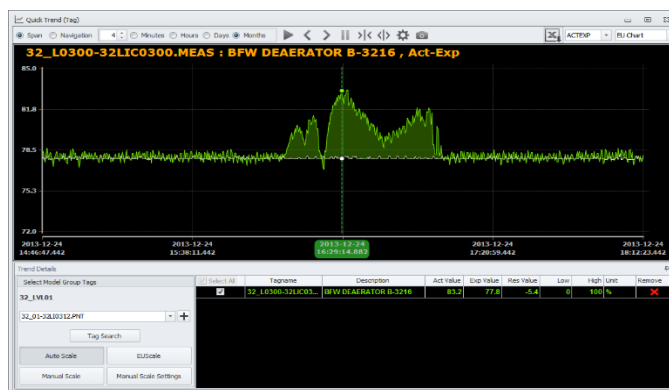
This was a result of an upset in the ammonia synthesis area that reduced the circulation flow rate from 560734 NM³/hr to 235788 NM³/hr. This decreased the outlet temperature of BFW OF E-3401 A/B from 303 °C to 232 °C. The temperature decrease affected E-32205, B-3206, and E-3208. which are connected on the shell side. This negatively affected the steam production of B-3206, so the site continued to monitor.



BFW Deaerator

On December 24, 2013, the BFW Deaerator 32_L0300-32LIC0300.MEAS level suddenly increased to a maximum of 83.2%.

The site determined there was a valve 32-LIC-300 problem. The valve was closed and reduced the flow of BFW at 32-FIC -0303 and caused the level to increase in B-3216.



HanPHI Catches: CO₂

Steam to Ejector Pressure

On January 27, 2014, the 32_P0092-32PIC0092.MEAS pressure spiked 3 times. It decreased to 0.1 and increased to 0.7, while its normal range is 0.3 to 0.5.

After investigation, the site found that there was rapid variation in the natural gas density that could reduce the latent heat and total steam amount in the process gas and reduce the evaporation in E-3210. This reduced the amount of steam that passed through the ejector of B-3220 and increased the pressure in B-3220.

