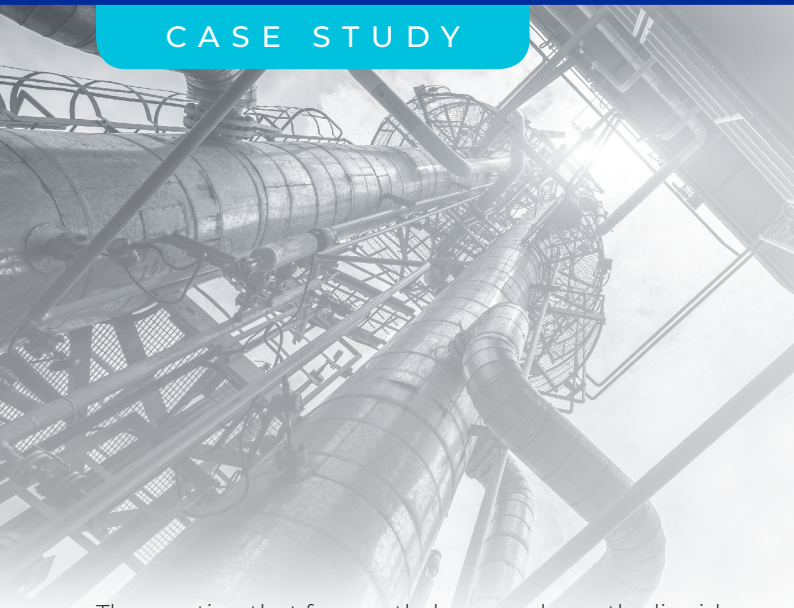


Pall PhaseSep® EL Liquid/Liquid Coalescers Improve Ethylene Plant Output



PICSPLEPT2EN

CASE STUDY



Background

Ethylene is one of the most important petrochemical intermediates and is a feedstock for various end products like food packaging/containers, bottles, films, pipes, antifreeze, etc.

The ethylene production process is a complex multi-stage process. The two primary feedstocks are naphtha and natural gas (ethane, propane, butane, etc.). The first step is to take the feedstocks and 'crack' them into ethylene and other various by-products by subjecting them to high temperatures (300 to 900 °C/ 572 to 1652 °F) in the absence of oxygen, a process known as pyrolysis.

The reaction that forms ethylene produces the liquid hydrocarbon by-product called pyrolysis gasoline (py-gas). After the ethylene cracker, heavy oil may be present from carryover into the quench water along with the py-gas. To re-use part of the quench water for steam production, it must be processed to remove hydrocarbon contaminants, including py-gas. Failure to do so will cause fouling of heat exchangers and boilers, lead to poor separation in stripping units, and increase energy consumption.

Solution

Following site investigation and fluid analysis, Pall PhaseSep EL Liquid/Liquid coalescers were recommended and installed on the quench water system, downstream of the decanter. To maximize the functional performance of these coalescers in both service life and separation efficiency, the PhaseSep EL coalescers were protected by coarse (50 µm absolute rated) and then fine (10µm absolute rated) Pall Ultipleat® High Flow particulate filters.

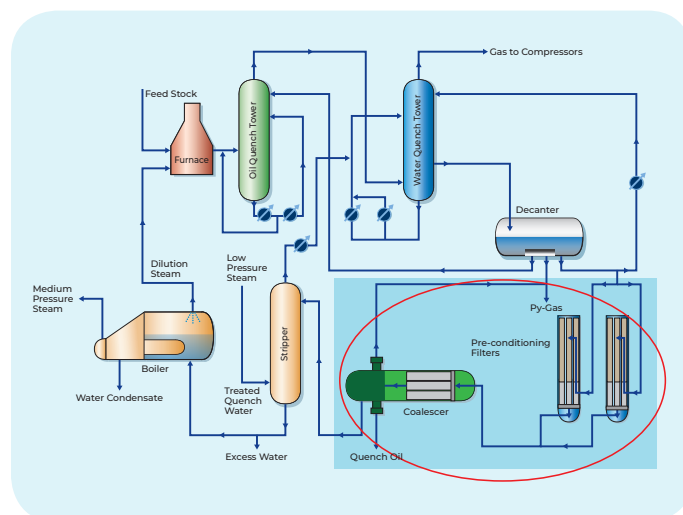
Table 1-1: Furnace Reactions

| Primary Reactions | | Secondary Reactions | |
|---------------------|------------|---------------------|-------------------------|
| Feedstock/ steam | → Ethylene | → | C ₄ products |
| | Propylene | | C ₅ products |
| | Acetylene | | C ₆ products |
| | Hydrogen | | Aromatics |
| | Methane | | C ₇ products |
| | Etc. | | Heavier products |

Problem

A major Petrochemical company in the Middle East operating a 140 m³/hr Dilution Steam system wanted to upgrade its filtration and separation solutions due to the currently installed coalescer filters experiencing low separation performance and compatibility issues with the processed fluid.

Process engineers reported fouling issues on the stripper and steam generator heat exchangers due to high hydrocarbon content in the process quench water. They were also dealing with recurrent unstable operating conditions and frequent, unpredictable maintenance operations on heat exchangers and reboilers, impacting the overall performance of the ethylene processing plant.



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Conclusion

By upgrading its quench water system with Pall PhaseSep® EL advanced coalescer technology, the customer has dramatically improved the uptime of its ethylene processing lines. The quench water now exhibits an oil concentration of < 20 ppmw throughout the full service life of the coalescer filters.

Effective removal efficiency of pyrolysis gasoline (py-gas) from the quench water has returned the dilution steam system under control. Significantly less fouling issues have been reported on the heat exchangers and boilers and no fouling issues have been observed on the stripper, providing a real benefit in terms of process efficiency, maintenance costs and energy consumption.



*PhaseSep EL Liquid/
Liquid Coalescers
available in 20 and 40
inch lengths.*



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