



PROJECT REPORT

PR1598/87

HiTRAN[®] Thermal Systems Technology

DESIGNS OUT WAX CRYSTALLISATION FOULING IN A NEW AIR COOLER FOR BP OIL, WITH 50% SURFACE AREA REDUCTION

PLANT

Refinery, Grangemouth, Scotland

SERVICE

Heavy wax Distillate Cooler

EXCHANGER

New Design - Air Cooled Heat Exchanger (2 Bundles in Parallel)



PROBLEM

With a pour point at 45°C (113°F), and operating Reynolds Numbers between 2000-2500, cooling the distillate in plain-internal, finned-external tube design, would fail to maintain wall temperatures above pour point at a winter ambient air design of -12°C (10.4°F), even with air temperature control louvres. The consequent crystallisation of heavy components forming wax deposits at the tube wall would progressively block non-preferential flow tubes, leading to unacceptably short service life at design performance.

Typical conventional design practice incorporating steam coils below the bundles to either, maintain tube wall temperature above the pour point or, provide winterisation to melt wax deposits once they had formed, would limit performance and adversely affect product quality.

SOLUTION

HiTRAN Matrix Elements reduce fluid residence time by continuously removing and replacing boundary layer fluid, and in combination with their enhanced tubeside performance, produces a higher film temperature along the tube wall, eliminating wax crystallisation. Resulting increases in temperature driving force and overall heat transfer rate led to a 50% reduction in required surface area. Waxing was prevented in extreme winter conditions without the use of steam coils or the need for a complex, expensive air recirculation system.

BENEFIT

Smaller exchanger with fouling eliminated. Reduced plot area, fan power, capital and running costs. Consistent performance and increased run times.

INSTALLATION

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