CASE STUDY

Ethylene Producer Regains Lost Throughput with PrimAct™

eROI℠ by Ecolab

BACKGROUND

An ethylene producer that processes naptha in the Asia Pacific region experienced a throughput limitation caused by upper section fouling in their primary fractionator. The fouling in this fractionator required an increase in tower overhead temperature to maintain the same distillation efficiency. Based on tower scans, the plant also suspected that the pan oil, or PGO draw tray, was leaking and limiting the PGO draw rate. When the overhead temperature reached the upper limit of 130°C, the plant was forced to decrease throughput.

As shown in Figure 1, this ethylene producer attempted to correct the problem with a competitive treatment chemistry. However, the chemistry did not allow them to achieve their targeted plant load of 190 MT/hr without exceeding the overhead temperature limit of 130°C.

SOLUTION

The Nalco Water solution was to implement a PrimAct program consisting of an antipolymerant and dispersant. The PrimAct antipolymerant was introduced at a dosage rate of 12-15 ppm based on reflux rate. The PrimAct dispersant was introduced slowly, and ramped up from 0-12 ppm during the initial weeks of the trial.

RESULTS

As the dosages approached targeted levels, overhead temperature decreased from above 125° to 115°C, allowing the plant to begin increasing its load to reach the 190 MT/ hr targeted level. Figure 2 chronicles the program for its first 18 months.

By the end of the first 12 months of evaluation, the plant was able to demonstrate targeted plant load at a lower overhead temperature than with the competitive chemistry. The PGO draw rate was also restored to targeted levels. Performance improvement was demonstrated with analytical data. Polystyrene levels in the PGO and the pyrolysis fuel oil (PFO) increased initially as the dispersant reached the target dosage of 12 ppm. The increase in polystyrene levels along with the decrease in overhead temperature proved that the dispersant was allowing foulant material to gradually move out of the upper section of the tower. After a few weeks, the polystyrene content decreased by 40-60% as the tower operated more efficiently, (See Figure 3).

ANNUAL SAVINGS

PRODUCTIVITY

Increased plant throughput by

30%

VALUE DELIVERED

Annual TCO Savings of

$800,000 ANNUALLY

The reduction in polystyrene content in the PGO and PFO translated into more than $800,000 in annual TCO savings for the customer, as pygas was not downgraded to polymer in the PFO. This savings was in addition to the TCO savings gained by the elimination of 15-30 MT/hr throughput limitations. Since the plant turnaround, the primary fractionator (GF) load target has increased to 220 MT/hr, and the Nalco Water PrimAct program has allowed the tower to maintain the overhead temperature at or below 130°C, (See Figure 4).

When compared to the previous run using the competitive treatment chemistry, the Nalco Water PrimAct program has allowed the tower to operate at 30% more capacity with the same distillation efficiency.

NALCO Water
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AP ETHYLENE PLANT PRIMARY FRACTIONATOR PLANT LOAD VS OVERHEAD TEMPERATURE (COMPETITIVE TREATMENT)

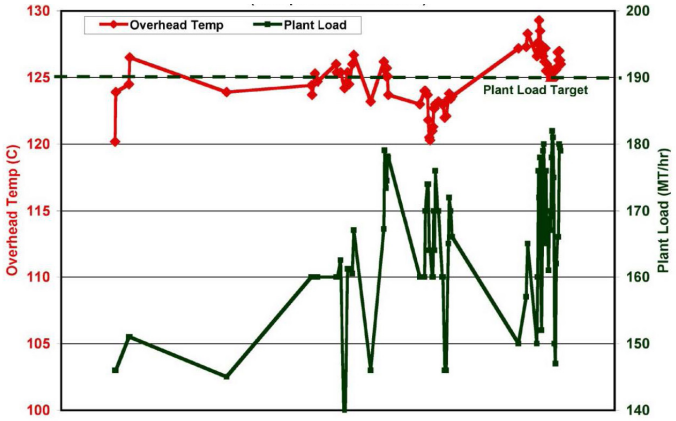

FIGURE 1: COMPETITIVE TREATMENT CHEMISTRY DID NOT ALLOW ETHYLENE PRODUCER TO ACHIEVE TARGETED PLANT LOAD OF 190 MT/HR WITHOUT EXCEEDING THE OEVERHEAD TEMPERATURE OF 130°

AP ETHYLENE PLANT PRIMARY FRACTIONATOR PLANT LOAD VS OVERHEAD TEMPERATURE

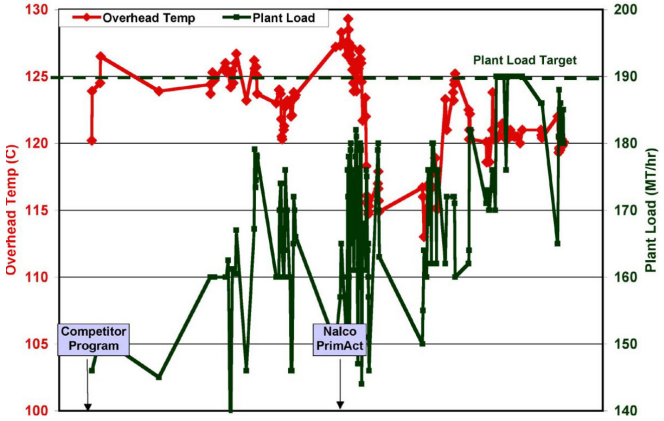

FIGURE 2: NALCO WATER PRIMACT PROGRAM ALLOWS ETHYLENE PRODUCER TO ACHIEVE TARGETED PLANT LOAD

AP ETHYLENE PLANT PRIMARY FRACTIONATOR POLYSTYRENE LEVELS IN PGO & PFO (NALCO WATER PRIMACT PROGRAM

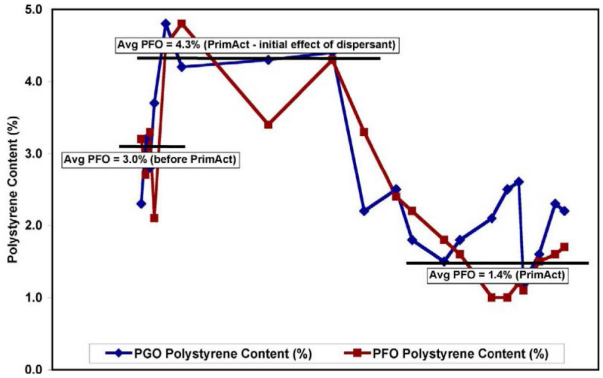

FIGURE 3: POLYSTYRENE LEVELS DECREASE WITH NALCO WATER PRIMACT

AP ETHYLENE PLANT PRIMARY FRACTIONATOR POLYSTYRENE LEVELS IN PGO & PFO (NALCO WATER PRIMACT PROGRAM

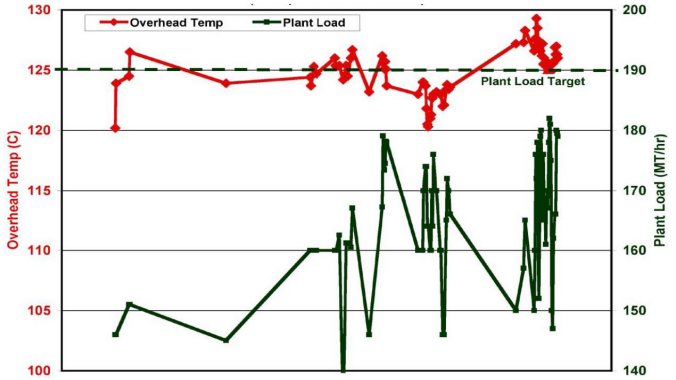

FIGURE 4: CURRENT THROUGHPUT EXCEEDS PREVIOUS LEVELS WITH NALCO WATER PRIMACT

CONCLUSION

Nalco Water PrimAct allowed this ethylene producer to not only achieve, but substantially exceed their target plant capacity. Where the primary fractionator had been the bottleneck in the plant, due to the high overhead temperature limit, Nalco Water PrimAct safely mitigated the fouling with a combined antipolymerant and dispersant program. As a result of this treatment program the plant was able to run more efficiently and even increased the total plant load target by 16%.

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