Buckman

WATER TECHNOLOGIES

CASE HISTORY

Sulphuric acid reduction in the evaporators at a Midwestern ethanol plant in the USA with Bulab® 8031

Background

Sulphuric acid was added to the lower thin stillage. The control of pH this way was needed to prevent loss of heat transfer, due to scale buildup, in the evaporators. While the buildup usage of acid had never been a major concern for the customer, the availability of sulphuric acid at the time had driven acid cost to where it had become a significant operating expense.

Action

Buckman's anti-scale product Bulab 8031 was fed to the evaporators into the thin stillage ahead of the first evaporator. The feed rate of the product was controlled at the recommended dosage of 10 ppm as allowed under FDA regulations. The product was fed proportional to the flow of the thin stillage using a simple, programmable metering pump controlled via the output signal from the existing process flow meter.

Figure 1. Evaporator tube appearance prior to hydro-blasting after treatment with Buckman anti-scale.

Results

When the anti-scale was used at the recommended feed rate, total plant acid usage was reduced by as much as 45%.

Benefits

ROI:

The plant used 90 tons of acid per annum prior to the Buckman program. The acid is bought at a price of $0.40/kg. In addition to acid savings, additional benefits have been observed by the plant in the 18 months of using the Buckman program:

- In the six month period between shutdowns, cleaning requirements for Evaporator One had been eliminated compared to monthly CIP's needed previously.
- The elimination of Evaporator One cleanings avoided the reprocessing cost for 3.8 m^3 of 200-proof at a cost of $210/$m^3$ per clean. It also assisted the plant in saving steam.
- A reduction in cleaning requirements was observed in the other evaporators; a total of 10 CIP's were eliminated per year. Acid wash frequency was reduced resulting in a savings of 6.8 tons of sulphamic acid a year.
- During hydroblasting at shutdown, cleaning was much easier due to both the nature and volume reduction of deposit present. Inspection results showed a significant reduction in plugged tubes. When present, deposits were now more easily cleaned by standard CIP procedures.

Production gains: 1.8–3.8 m^3 of 200-proof X cost X number of switches

Chemical savings: 6.8 X cost of sulphamic acid

Labour/time savings: reduced cleaning time X labour costs

ROE:

- Energy savings — overall heat transfer performance has been improved which provides additional flexibility to optimize water balance and backset usage.
- Environmental savings — while DDG sulphur levels have never been an issue at this plant, a reduction in sulphur content was observed.
- Water and energy savings — reduction in cleaning requirements of the evaporators; a total of 10 CIP's were eliminated per year.

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