Case Study

DuBois Technical Experts Offer Robust Solutions for Heat Exchanger Scale and Corrosion Concerns

OPPORTUNITY:

The customer manufactures a variety of farm and ranch equipment. In this process, they utilize DuBois product GF Phos 427 to clean and treat their steel prior to painting. The first stage of their three-stage spray washer is heated by a small plate and frame heat exchanger. Maintaining the proper temperature is important for cleaning and iron phosphate formation, which ensures paint adhesion and maximum corrosion resistance. Because of the large volume of steel processed relative to the small size of their process tank, the exchanger often became fouled and nonfunctional in a week or less of operation. If the heat exchanger was cleaned without dumping Stage 1, it would almost immediately plug, and the temperature would drop. The process of cleaning the heat exchanger required disassembling the unit and cleaning each plate individually with a wire brush on a drill; a project that occupied 8 to 10 hours. In addition to the labor involved, the cleaning process damaged gaskets, requiring replacement. The DuBois technical team and the customer began working together to identify a solution that did not entail taking apart and manually cleaning the heat exchanger. The overall goal was to minimize washer downtime, reduce maintenance cost, increase bath life to minimize chemical usage, and maintain operating temperature, all of which would ultimately improve quality.

THE DUBOIS SOLUTION:

The DuBois technical field team collected samples of the heat exchanger scale and sent them to the DuBois Laboratory in Sharonville, Ohio to identify its composition. In addition to the typical scale present, the lab found that the majority of the scale was comprised of synthetic fiber from the workers' gloves. Upon the DuBois team's recommendation, the workers switched to a non-fiber glove for handling the parts. This removed the fibers and slowed the scaling of the heat exchanger. This was a significant improvement, but the team still sought a solution for the phosphate and hard water scale.

The heat exchanger is made of stainless steel but contains Nitrile (Buta-N) gaskets. DuBois GF Acid Clean 88, a citric acid-based cleaner, is compatible with Nitrile gaskets. With the proper product selection in place, DuBois teamed with the customer's engineers to design a simple system to isolate the heat exchanger and recirculate a 10% solution of GF Acid Clean 88. The process circulates the acid for approximately 4 hours during the weekend when they are not running production. The customer can easily clean the heat exchanger without damage by switching to a chemical descaler.

KEY BENEFITS:

This solution fully eliminated the multiple sources of damage to the heat exchanger. By removing the need for regular dumps and cleanups, the customer saw much greater downtime requirements and **$10,000 annual savings**, $6000 in washer maintenance labor savings, and $4000 in chemical savings. This process also allowed the customer to maintain a much more consistent operating temperature in their cleaning and pretreatment operations, improving part quality.

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