Case Study: CH-1983

NALCO CHAMPION HEAT OPTIMIZED MAINTENANCE COST AND IMPROVED RELIABILITY FOR PLANT

INTRODUCTION
Cooling water heat exchanger performance can have significant impacts to the overall throughput, safety, and reliability of an operating unit as well as the total maintenance budget. Often, the cooling water heat exchangers are not monitored as closely as other critical equipment in the field due to lack of readily available data. Planning for turnarounds and predicting heat exchanger maintenance such as cleanings or retubing can be a difficult exercise when there is not ample performance data.

BACKGROUND
A North America petrochemical plant routinely cleaned a large number of cooling water exchangers each year as part of their normal maintenance practice. The cleanings were performed in the spring in preparation for higher production rates and increased cooling water supply temperatures in the summer. The goal of the operations team is to continuously run the production safely throughout the year. However, there were no metrics or performance data available to make precise heat exchanger performance evaluation. Thus, the heat exchangers were selected based on production schedule and process need. The maintenance planning group reviewed the cleaning list, but without sufficient data to determine whether an exchanger needed to be cleaned, numerous exchangers were cleaned unnecessarily. The maintenance costs started to add up as each cleaning was roughly US$25K per cleaning.

SOLUTION
Nalco Champion started working closely with the customer’s operations team on implementing Nalco Champion HEAT, a digitally enabled heat exchanger monitoring program. The

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<th>Environmental Indicators</th>
<th>eROI</th>
<th>Economic Results</th>
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<td>Reduced annual heat exchanger cleaning by 80%</td>
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<td>Saved annual cleaning cost &gt;$600K</td>
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Nalco Champion reports Environmental Return on Investment (eROI) values to customers to account for contributions in delivering both environmental performance and financial payback.
goal was to optimize total cost of operation. A dedicated
team of technicians and engineering consultants conducted
a comprehensive cooling system audit on site. Holistic MOC
data and inspection reports were collected and processed
in HEAT’s digital platform, which then provided guidance on
exchanger operations and cleanings, turnaround planning and
water chemistry.

Through previous turnaround inspection, the team found
that 95% of heat exchanger issues were due to chip scale.
Proving that certain heat exchangers did suffer from low water
velocity and high skin temperature. Nalco Champion also had
a comprehensive cooling system review with the customer’s
operations team. Based on the findings, the following
rectifying action were taken:

1. Upgraded to High Charged Polymer to eliminate
mineral scaling issue.
2. Implemented plant wide backwashing program for
all capable heat exchangers. Monthly backwash
was scheduled for all exchangers, and some critical
exchangers were backwashed weekly.
3. Changed operation on some units to reduce stress or
eliminate throttling of the inlet cooling water.

Afterwards, the customer and the Nalco Champion team
agreed to keep the Nalco Champion heat exchanger
monitoring program, HEAT, as a routine service. The cooling
water temperatures (in and out) of each heat exchanger were
recorded every month. If the temperature data indicated a
decrease in performance, a full heat exchanger survey was
conducted. Timely rectifying happened as needed, allowing the
team to proactively improve heat exchanger reliability.

RESULTS
The customer reliability department kept historical maintenance
records for 67 exchangers. More than half of them were slated
to be cleaned each year as a preventative measure, regardless if
they were clean. After Nalco Champion HEAT was implemented,
comprehensive performance data was provided to make data
driven decisions on which heat exchangers should be cleaned.

As a result of the upgraded High Charge Polymer and
improved heat exchanger monitoring, Nalco Champion
was able to remove unnecessary cleanings from the Spring
Cleaning list. By the 5th year of implementing HEAT, the
cleaning costs had been reduced by 80%. (The $600,000
only represents the physical cleaning cost savings)

CONCLUSION
HEAT is a proven advanced platform for heat exchanger
reliability management. With regular monitoring of key heat
exchangers, HEAT provides guidance on water chemistry
optimization and turnaround planning activities such as
online cleaning and retubing of exchangers. Nalco Champion
partnered with the petrochemical plant to drive a safe and
sustainable heat exchanger monitoring program to optimize
maintenance costs and improve reliability.