

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

Environmental Indicators	eROI™	Economic Results
Reduced annual heat exchanger cleaning by 80%	 ASSETS	Saved annual cleaning cost >\$600K

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:

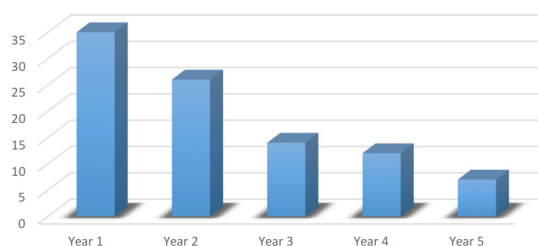
1. Upgraded to High Charged Polymer to eliminate mineral scaling issue.
2. Implemented plant wide backwashing program for all capable heat exchangers. Monthly backwash was scheduled for all exchangers, and some critical exchangers were backwashed weekly.
3. Changed operation on some units to reduce stress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

**Number of Cooling Water Heat Exchangers Cleaned Per Year**



**Total Savings Achieved (in thousands of US dollars)**



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 5<sup>th</sup> 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.

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