



Chrome Ore Processor Optimizes Its Complex Production Process with Operations Optimization, powered by Proficy CSense

Company Background

This global enterprise processes chrome ore into sodium dichromate and chromic acid. Sodium dichromate is then shipped to another of its plant for use in the production of chrome tanning salts for the global leather tanning industry.

Challenges

With complex production processes, this chrome ore processor needed to ensure optimal control of its operations to meet quality, energy and throughput targets. Potential areas for optimization that were identified were base layer (PID) control as well as implementing Advanced Process Control (APC) on complex unit operations.

Process challenges included the need for better pH control, greater stability, and an opportunity to maximize throughput on the crystallizers. There were many manual processes that were heavily paper-based in an overall reactive environment.

Control loop management was a key area, where automation staff did not have enough visibility into loop problems to be proactive. They were reliant on the operators and production staff to surmise when operation parameters moved outside control limits and to let the automation team know if they thought it was controller-related.

It was also difficult and time consuming to get to root causes of control deviations. Issues with loops could include tuning, control-element sizing, plant design (such as process conditions changing faster than the controller could handle), manual operator issues, and large disturbances in the process.

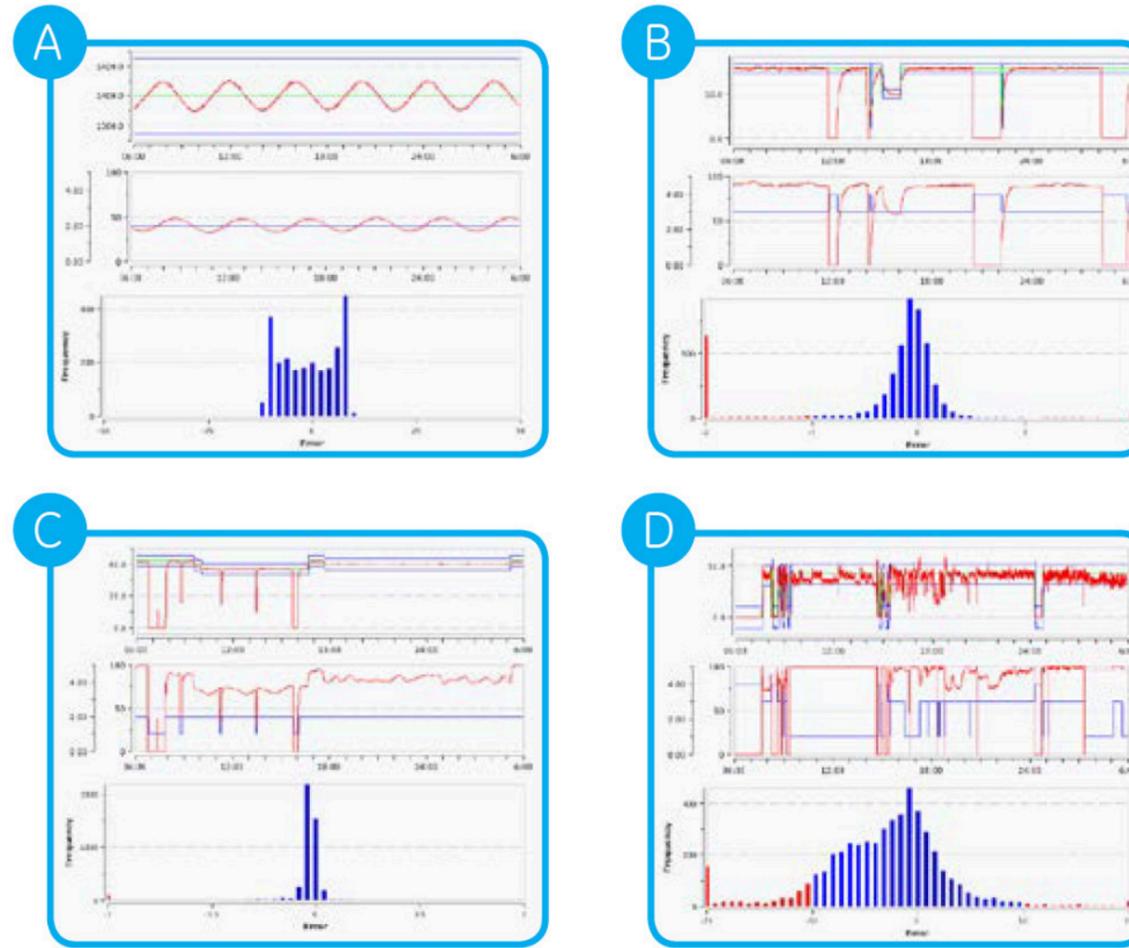
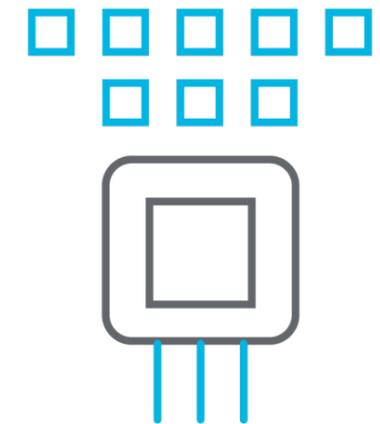


Figure 1:

Examples of control loop problems - Tuning (A), Plant (B), Operator (C) and Process (D).



Not only was it difficult to control operations within set parameter; it was challenging to optimize operations, keeping values as close to the control limits as possible.

The interdependency of variables made goals such as energy optimization and process optimization challenging.

The company sought a solution that would form part of a continuous improvement cycle so that the control system would never be static but would rather contribute towards incremental process improvements. It wanted an innovative way to help run its operations smarter, faster and better with less manual interaction—optimizing its production and profitability for utmost competitiveness.

The GE Solution

The global enterprise turned to GE Digital's Proficy CSense - an analytics and optimization software solution that could provide the company with the Advanced Process Control and PID loop performance monitoring capabilities it was looking for in order to provide visibility into developing process issues and push productivity to new levels.

The solution provides insight into process and control problems and allows staff to identify what has changed and why, leading to better decision making. It also closes the loop through its APC solutions, controlling multi-variable processes.

Control Loop Management supports continuous improvement

When a control loop is inefficient, the Proficy CSense solution enables rapid and effective responsiveness. The solution provides daily summaries and reports so staff can quickly identify an issue and investigate changes to minimize deviations outside set parameters.

In addition, the Proficy CSense solution helps:

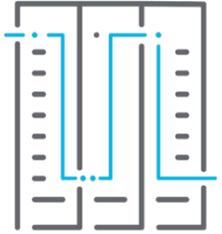
- Maintenance engineers identify design problems
 - Chemical engineers identify production and design problems
 - Improve energy savings because of the accurate measurement and control of gas, steam and electricity
 - Drive higher quality in the final product
 - Maintain environmental controls within specification
 - Improve production throughput
-



“GE’s solution allowed us to tune all our control loops to an acceptable level and empowers process personnel to identify plant problems on a daily basis.”

— Operations Manager
Chrome Ore Processor





Advanced Process Control leads to increased throughput and quality

Before implementation of Proficy CSense, most programmers of controllers in a process unit and process operators were not able to focus on the plant's goals of optimizing quality and maximizing profitability. Instead, they were absorbed in the vertical application of their expertise.

With the new solution, Advanced Process Control enables all the controllers on a process unit to work together to achieve the larger process objective. It can trigger improvements before products are out of specification, which allows for a proactive approach.

There is also more information available, as the solution enables on-line mass, component and energy balances. It's also possible to monitor the conditions of a process using state-based functions, and cyclic processes can now be modeled based on the state of the cycle. In addition, manipulated variables can now be controlled based on all of this information, which was previously not possible.

The crystallization units at the plant were the perfect candidates for Advanced Process Control. Multiple feed streams and varying moisture and sodium content made these processes difficult to operate optimally with reactive control strategies. Sodium content of the product often was outside of the allowed specification limits, leading to wasteful rework of the product.

The Operations Manager explains, "Since implementing Proficy CSense, sodium content has consistently been within specification, leading to minimal rework. Using GE's solution, we've increased capacity by 30-40%."

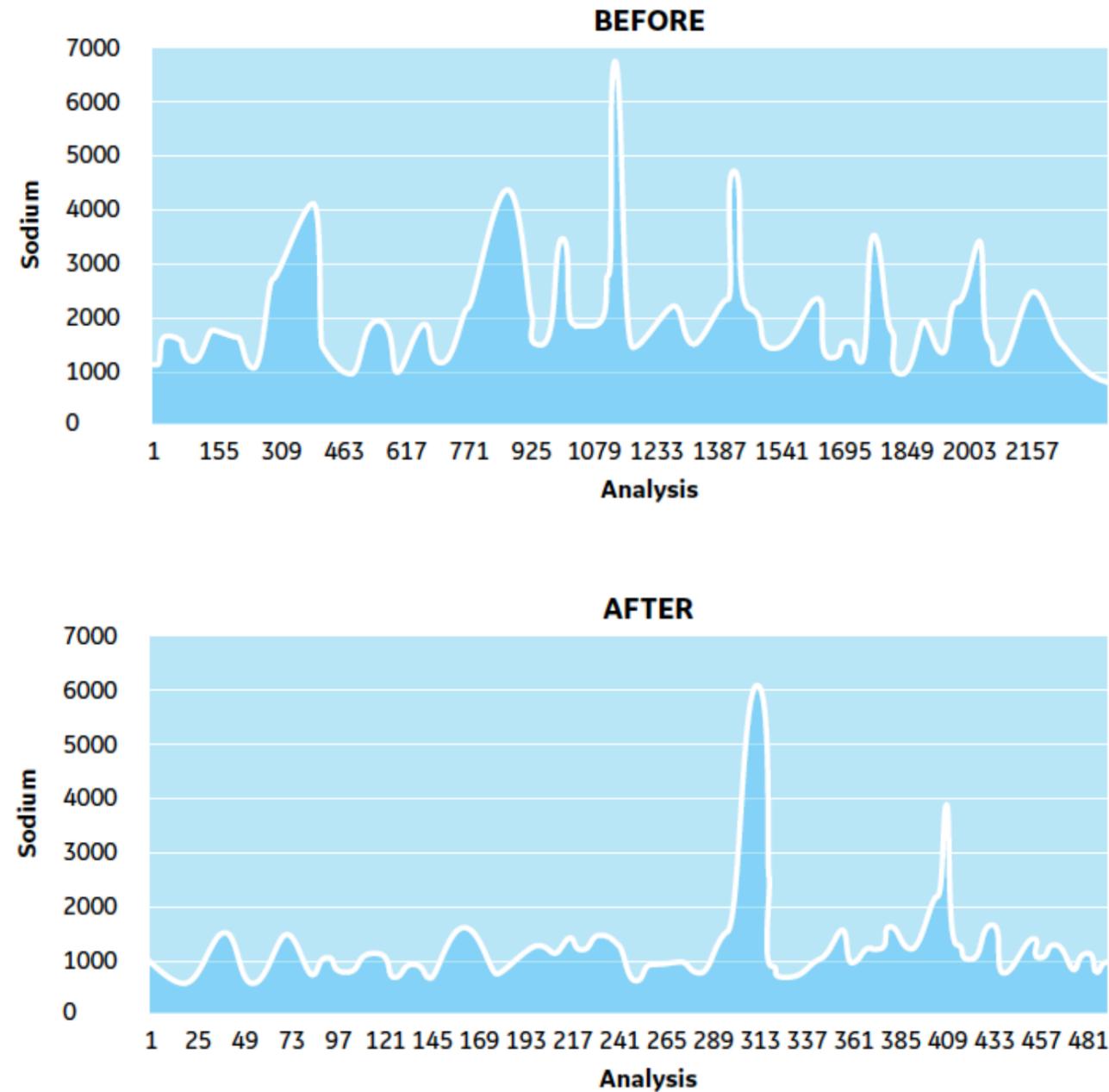


Figure 2:

Sodium left on crystals after crystallisation before and after the implementation of Advanced Control (target 1000 ppm). This resulted in much less product rework due to sodium content, and the plant availability increased significantly.



“I recommend GE's solution, as without it, we would see a lower overall standard of control as well as various control problems. We're now able to leverage innovation to optimize our operations and stay competitive.”

— **Operations Manager**
Chrome Ore Processor



Results



30-40% increased operational capacity



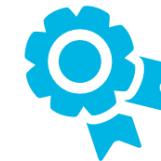
Optimized processes and plant availability



Better, faster responsiveness to issues



Increased product quality and reduced rework



Improved energy efficiency

The benefits of GE's digital solution have led the company to meet its objectives of process optimization and profitability. The solution helps the company make timely and informed decisions, and it minimizes process variability for improved, sustainable production performance.

Looking ahead, the company plans to train its engineers to uncover additional opportunities in other areas of its plant to leverage Advanced Process Control and monitoring for a competitive edge.



About GE

GE (NYSE: GE) is the world's Digital Industrial Company, transforming industry with software-defined machines and solutions that are connected, responsive and predictive. GE is organized around a global exchange of knowledge, the "GE Store," through which each business shares and accesses the same technology, markets, structure and intellect. Each invention further fuels innovation and application across our industrial sectors. With people, services, technology and scale, GE delivers better outcomes for customers by speaking the language of industry.

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