

CRI Catalyst & Pavilion Technologies

Partnership Creates CATSCAN®, Real-time Catalyst Performance Monitoring Software

CRI Catalyst Company is part of CRI International, the global catalyst technology company of the Royal Dutch / Shell Group. CRI Catalyst operates research laboratories, development facilities, manufacturing plants, and business units throughout the world dedicated to providing a broad customer base with the most effective and cost-efficient catalysts, technologies, and expertise. Specific areas of focus include hydrogenation, oxidation, dehydrogenation, and environmental catalysts and systems.

Benefits of CATSCAN to CRI Catalyst Company

- > Further differentiates their catalyst and technical services offering with unique, value-added software
- > Aligns CRI and customer goals of maximizing catalyst life, and minimizing operating costs per ton of styrene produced
- > Provides a daily reminder of the benefits CRI delivers to their customers
- > CRI customers achieve more accurate forecasting of catalyst life with more robust modeling techniques
- > Increases the CRI technical services team customer response time and diagnostic ability by reducing data-handling time and improving the performance trend analysis

The Challenge

Analyzing a reactor's performance is a time-consuming and elaborate process that involves difficult sampling techniques and costly laboratory analysis. "Most reactor performance analysis today is based on limited, periodic processes that have been in use for decades," says Jim Wambaugh, director of CRI Catalyst's styrene business unit. "This traditional method creates 'blind spots' for managers who are trying to make the best decisions they can, but without timely insight into what's happening at any point in time and the impact of a decision on the catalyst."

Operators must also find ways to maximize the life of the catalyst, one of the most critical raw materials in the production process.

CRI Catalyst prides itself on facilitating creative solutions to the most difficult customer problems. Long-time CRI customer Sterling Chemicals saw an opportunity to enhance the performance of CRI's catalysts by using a real-time performance monitoring solution. Sterling had used software solutions, developed by Pavilion Technologies, since 1993 to monitor emissions and other key production indicators in real-time. CRI Catalyst Company felt a similar solution would not only help its customers maximize the life of their catalysts, but it would also further differentiate the company as a high-value solution provider in the styrene market.

The Solution

CRI Catalyst joined forces with Pavilion Technologies to create the CATSCAN® catalyst performance modeling system. CATSCAN combines CRI Catalyst's deep

product expertise with Pavilion's deep process expertise, building on Pavilion's patented advanced predictive modeling technology to improve operational performance, enhance catalyst life, and reduce production costs for styrene manufacturers.

CATSCAN is a PC-based online performance monitoring system that uses proprietary models of catalyst performance, real-time reactor information, and periodic lab results to continuously monitor and predict catalyst performance and life. The system monitors and analyzes all key operating variables, providing instant feedback on catalyst performance and predictions of catalyst life.

CATSCAN's conversion calculation engine allows users to simulate the conversion outcome based upon different input conditions. With CATSCAN, operators can monitor catalyst activity, selectivity, and conversion, as well as run different "what-if" scenarios to determine the optimal operating conditions to achieve a given production target.

"CATSCAN gives styrene manufacturers a real-time, predictive performance dashboard," says John Walker, Business Manager for Styrene Catalyst Technology for CRI. "The results are better decisions, faster response and, ultimately, improved performance."

CRI Catalyst first investigated the possibility of developing such technology in-house but decided against it. "The time and cost necessary to develop the product paled in comparison to what we could deliver by working with Pavilion," says Wambaugh. Pavilion was already familiar with the styrene production process through their



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Business Director, Styrene
Business Unit
CRI Catalyst Company

work with Sterling Chemicals. In addition, Pavilion's unparalleled modeling expertise, analytics software engine, and software development core competency made them a preferred partner. "As it turned out, the combination of catalyst knowledge and modeling software development, allowed both parties to bring their expertise together to create a product that neither company could have produced alone."

CRI Catalyst includes CATSCAN as a standard part of its technical performance package and estimates that it can save companies as much as \$500,000 to \$700,000 per year in reduced operating costs and improved catalyst life.

Running the Numbers

Sterling Chemicals, a long-time Pavilion and CRI customer, acted as a key development partner for CATSCAN, using the software solution to monitor and model two reactors at its styrene facility in Texas City, Texas.

"CATSCAN has been a key performance-management tool for our company since installation," said Dennis Yieh, process control technologist at Sterling Chemicals. "It helps us improve operating decisions and better understand the impact of key variables on catalyst performance."

Although Sterling Chemicals had an in-house reactor-modeling tool and well-established performance analysis processes, CATSCAN delivered enhanced results by using more accurate catalyst models tied to real-time production data.

"Reactor performance analysis used to be a costly, periodic process that only represented a snapshot in time," said Yieh. "With CATSCAN, we can now see how well the reactor is performing every minute in real time. Performance problems are spotted much sooner, and decisions to change to

new operating conditions can be made faster and with a higher degree of confidence and certainty. It is as if the performance of the catalyst is watched over by a CRI catalyst specialist around the clock."

Scanning Customer Feedback

CRI Catalyst customers are excited about CATSCAN; in fact, one of the world's largest styrene manufacturers switched catalysts to take advantage of the company's value-added services, including the CATSCAN solution.

Wambaugh agrees that the customer reaction to CATSCAN has been very positive. "Having good data in a timely fashion allows the customer's team and our team to help the customer run their catalyst to its maximum potential."

"This product requires a customer to look honestly at their plant and know that they could improve their operations," he says. "Initially some customers think they already have the capabilities of CATSCAN in-house; however, when they investigate the product further they realize they don't have the robust simulation and catalyst prediction tools. The overwhelming response is 'We want it.'"

Wambaugh says that partnering with Pavilion helps CRI Catalyst improve efficiency and increase customer satisfaction. "We were spending 80% of our company's technical service time manipulating data and 20% of the time analyzing it. With CATSCAN we are able to flip-flop those numbers. This allows us to spend time applying our expertise more effectively. The customer benefit is in the quality of the discussions we have and the ability to provide valuable feedback faster. The time is not spent gathering data and trying to understand it, it is spent improving our customers' performance."

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