



Polymers Producer Uses Digital Process Analysis to Reduce Costs and Advance Sustainable Operations

20% Increase

in Catalyst Productivity

10% Reduction

in Off-Grade Material

\$609K USD/Year

in Avoided Loss Related to
Product Availability

CHALLENGE

Find the right balance between producing high-quality products and keeping production costs in line.

SOLUTION

Aspen ProMV[®] was deployed to automate process analysis and monitoring, and ultimately optimize operations.

BENEFITS

- Aspen ProMV's reactor temperature model profile improved process stability and resulted in a 10% reduction in off-grade products.
- The company realized significant cost savings by reducing catalyst use, energy consumption and maintenance costs, while improving product availability.



Overview

A Latin American company specializes in the production of raw materials for the plastics industry, including polypropylene, polyethylene and masterbatch. The manufacturer produces 100% recyclable, high-tech raw materials that reach over 20 countries around the world.

The company prides itself on its ability to meet customers' product specifications while keeping production costs in line. To continue meeting these goals successfully, the polymers producer wanted to achieve and maintain the optimal balance between product quality and production costs, keeping in mind the challenges of running a complex production process as well as the many outside factors that can impact operations. Process variables such as reactor temperature, pressure and residence time must be monitored, and raw materials continuously adjusted to achieve the desired quality variables like melt flow, isotacticity,

catalysts and percentage of monomers. Changes in one area can lead to adjustments needing to be made in other areas of production.

Improving Product Quality with Process Analysis and Machine Learning

After discovering quality variations between different product runs—or campaigns—the company chose AspenTech's industry-leading digital multivariate process analysis solution, Aspen ProMV, to analyze its reactor data. Aspen ProMV focused primarily on three areas: quality variation, reactor fouling and extruder energy consumption. Data was collected across multiple campaigns, with 412 hours of operation observed and data for 91 process variables collected.

Aspen ProMV's analysis of the data determined that keeping the reactor operating within a specified temperature range led to higher quality results. A Principal Component Analysis using this temperature profile confirmed that certain reactor temperatures would indeed improve process performance. The temperature profile was then modeled in Aspen ProMV, enabling real-time monitoring of the reactor's temperature and leading to a better understanding of how the different variables were contributing to any variations. Aspen ProMV would alert process operators if the process variance moved beyond set parameters, allowing them to quickly identify the cause and take preemptive steps to maintain the temperature profile. This knowledge gave the company confidence that its final product would meet quality expectations.

Using Aspen ProMV, the team created models that corresponded to desired and undesired product specifications. In addition, the system also sent warnings for process health, troubleshooting insights and production process optimization, which reduced troubleshooting time (and subsequently, time to corrective action).

Aspen ProMV's reactor temperature model profile has led to cost savings, improved process stability and a 10% reduction in off-grade products for customers. One key area of savings was in catalyst use, which can fluctuate during the production process. The manufacturer saw a 20% increase in catalyst productivity by using Aspen ProMV, enabling it to plan for and adjust the amount of catalyst needed to achieve optimal results.

Optimizing Processes and Reducing Reactor Fouling

The company's existing production process used two reactors. Fouling in the second reactor was causing a minimum of three shutdowns per year. The fouling was caused by a high level of cocatalyst needed to meet quality standards. Its team of engineers tried changing reactor conditions and using different catalyst/donor combinations with no success.

With Aspen ProMV, the team was able to analyze all the reactor's conditions, including cocatalyst flow. Aspen ProMV also identified quality requirements that enabled them to create optimal condition models to minimize cocatalyst flow and improve product quality.



Optimizing the Plant's Extrusion Process

Because the extruder is the plant's biggest energy consumer (although the amount of energy consumed varies with each campaign), the company anticipated that optimizing the extrusion process would lead to significant energy consumption savings and more consistent quality. Several extruder variables could be manipulated to optimize this process, and the organization had a vast amount of historical data available to model. Initial Aspen ProMV analysis indicated a 4% improvement roughly, and it is now in the early stages of deploying Aspen ProMV's models for further monitoring and adjustments.

Impressive Implementation Results

Since implementing Aspen ProMV, the company has seen outstanding results. These include:

- Reduced fouling thickness in its reactor
- Lowered cocatalyst use by approximately 50%
- No unexpected shutdowns
- Cut number of planned shutdowns needed from 3 to 1
- Saved \$19K USD/year in cleaning and maintenance costs
- Avoided \$609K USD/year in loss related to product availability





Summary

To date, Aspen ProMV has enabled the polymers producer to achieve several critical goals, including:

- Improved overall process efficiency, including reduced reactor fouling and extruder energy consumption
- Decreased quality variations across different runs with less off-spec, wasted product
- Automated monitoring of process variances and identified patterns in vast datasets

Aspen ProMV has played a vital role in optimizing its production process by analyzing a vast dataset that detailed the interaction between variables and their effect on operations. It realized significant cost savings by reducing catalyst use, lowering energy consumption, reducing maintenance costs and improving product availability.

The company continues to reap benefits from the Aspen ProMV implementation and plans to build on this success with AspenTech's support. Among other upcoming initiatives, it will continue investigating data, and creating and refining models to further optimize production processes.



About Aspen Technology

Aspen Technology, Inc. (NASDAQ: AZPN) is a global software leader helping industries at the forefront of the world's dual challenge meet the increasing demand for resources from a rapidly growing population in a profitable and sustainable manner. AspenTech solutions address complex environments where it is critical to optimize the asset design, operation and maintenance lifecycle. Through our unique combination of deep domain expertise and innovation, customers in capital-intensive industries can run their assets safer, greener, longer and faster to improve their operational excellence.

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