

# See the Future

## Using predictive manufacturing to enhance lean six sigma

**CHALLENGE:** Reduce obsolete inventory and related costs

**PRODUCT SOLUTION:** SherTrack SNAPPS (Sense and Adapt Probabilistic Planning and Scheduling)

**COMPANY:** Basell USA

**FACILITIES:** Headquartered in The Netherlands with facilities around the globe

**OPERATION:** Producer of polypropylene, polyolefin catalysts, and polyethylene

### The challenge

Basell USA's obsolete inventory was accumulating at the rate of 1 million units annually. In fact, of the 184 million items produced every year, 1.8 percent of them eventually became part of the firm's aged inventory, defined as any unit of product becoming older than 120 days before its sale. Scheduling, forecasting, new product launches, and product terminations all contributed to the trend. Quality issues, technical problems, and isolated customer situations also played a role.

"A change in the amount of aged inventory created would require a systemic change in the ongoing business processes," says Larry Maynard, Basell USA global six sigma lead. "To change such a process in a controlled way requires the overall system or process to undergo a transformation."

### The solution

Using the lean six sigma define, measure, analyze, improve, and control (DMAIC) methodology, Basell USA leaders worked to establish process improvements that would measure and reduce the amount of the organization's aged inventory. Vital to any six sigma project, a multifunctional team was formed that included the project Black Belt, as well as representatives from the sales, customer service, and scheduling departments.

Using DMAIC to identify critical process inputs and customer requirements, group members

- created a value stream map so they could plot the process steps leading to the formation of aged inventory
- developed a measurement to track the rate of creation of aged inventory
- prioritized the most influential factors causing aged inventory
- implemented tools to improve and control the process.

During the define and measure phases, Basell USA employees discovered that demand factors—including forecast accuracy, new product launch information, and salesperson involvement—significantly influenced the amount of aged inventory created. Thus, discussions were held regarding lead time requirements, minimum production run sizes, production schedule flexibility, and the degree of reconciliation of inventory against new orders prior to production.

In the analyze phase, the team members attempted to correlate factors such as inventory age, forecast accuracy, quantity produced, and amount of product in stock relative to amount sold. From those details, a regression study was conducted, which determined the specific factors that were behind aged inventory. Findings suggested relationships could be mathematically modeled to predict or control the creation of aged inventory.

At this point, Basell USA managers discussed what would be the appropriate course of action based upon their findings. They chose to take a new approach to supply chain science via the SherTrack SNAPPS solution. This tool includes real-time sensing and shaping of demand; digital modeling; and discrete-event simu-

lation with design of experiments, sensitivity analyses, and predictive manufacturing.

The digital modeling capabilities supported mathematically modeling the variation in Basell USA customer orders, order lead times, production lot sizes, and inventory levels. This new technology also incorporated unique algorithms that integrated open-order data with short-range statistical forecasts of demand in order to ascertain customer demand patterns with probabilities.

### The results

During the live trial, Basell USA achieved positive results simultaneously and within just three months. Specifically, two production lines showed a 14 percent service level improvement; one line achieved a decrease in average daily inventory of 21 percent; years of simulation and digital modeling were run, producing an optimum roadmap for service and capacity throughput; and demonstrated capacity throughput was raised by more than 5 percent, with no increase in capital funding or equipment.

In addition, daily use of SherTrack SNAPPS helps Basell USA employees better manage customer orders, enabling short-term demand variation to be tracked and the production schedule continually adjusted and automatically generated.

Basell USA leaders report that SNAPPS has helped the firm achieve an optimum balance of service, inventory, and schedule complexity. In addition, they are impressed by its ability to predict the financial impact of change before they must commit funds, resources, and time. "[SherTrack] helped us link policy to execution," Maynard says. "The solution far exceeded our six sigma project's original objectives." 