

Transform and Grow – Manufacturing Excellence in Specialty Chemicals

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The ubiquitous specialty chemicals industry looks bullish with access to diverse end markets, such as construction, automotive, electronics and agriculture. Valued at over USD 850 billion in 2015, Global Market Insights projects that the specialty chemicals industry will grow at 4.5% CAGR to reach USD 1,273 billion by 2024. Business drivers include increasing population, rising living standards and robust end market growth. Within the forecast timeframe, Asia Pacific is projected to witness the highest growth exceeding 6.5% CAGR as regional chemical producers compliment their commodity-heavy portfolios with higher-margin specialties. Not all is bullish, however. Competition is intensifying as more producers focus on specialties, compounded by increasing end market demands and tightening regulations. Producers seem rattled as they battle for differentiation in this environment, offering progressively more tailored products and services to secure customer loyalty. A key outcome of this fight for differentiation is steadily rising operational complexity.

Six levers of manufacturing excellence

Many producers are realizing that the status quo in manufacturing cannot support the increasing complexity of customer-intimate business models. Current manufacturing practices simply drive too much variability, provide too little visibility, and impose too much inflexibility for today's environment. A relentless focus on manufacturing excellence is required to succeed, one that drives transformation through technology-enabled best practices.

Lever #1: Improve Customer Outcomes

End-use product performance is the ultimate measure of success for specialty chemical producers, impacting both selling price and customer loyalty. A common problem for many is variability in product quality that drives inconsistent end-use product performance. Leading producers have demonstrated a number of best practices to reduce quality variability

and improve customer outcomes. Real-Time Quality Monitoring uses a combination of measured and inferred values to continuously calculate product quality KPIs. Golden Batch Profiling displays a real-time comparison of the current batch trajectory to that of a perfectly produced batch. Procedural and Recipe Control automates the step-by-step sequence from when an order is dispatched until the final product is complete. The results: producers improved quality by 10-20% via these best practices, enabled by manufacturing execution, advanced process control and asset performance management solutions from AspenTech.

Lever #2: Increase Customer Responsiveness

A high level of customer responsiveness is a powerful differentiator, elevating selling price and customer loyalty. Many producers face barriers to responsiveness, however, including variability in order fulfillment and the inability to commit to short notice orders. Model-Based Scheduling, a best practice for improving responsiveness, leverages models of manufacturing assets to automate the evaluation of all potential production scenarios over extended time horizons. Resource Sharing Optimization determines the optimal way to share interchangeable equipment and resources between production lines. Schedule Dispatch Automation provides real-time details of scheduled orders directly to operations staff. The results: producers improved on-time order fulfillment by 8-12% via these best practices, enabled by production scheduling and manufacturing execution solutions from AspenTech.

Lever #3: Improve Asset Effectiveness

How effectively assets are utilized impacts manufacturing performance, customer satisfaction and profitability. Producers commonly experience unplanned downtime and inconsistent utilization, however, which degrades asset effectiveness. A fundamental best practice for improving asset effectiveness, Real-Time KPI Monitoring, calculates and displays important effectiveness parameters. Reliability and Availability

Modeling evaluates the future effectiveness of an entire site based on the reliability and availability of its individual components. Predictive and Prescriptive Analytics forecasts impending equipment failures and provides corrective actions to avoid them. Model-Based Scheduling and Resource Sharing Optimization identify and remedy future utilization gaps. The results: producers improved overall equipment effectiveness and on-stream time by 2-4% via these best practices, enabled by asset performance management, manufacturing execution and production scheduling solutions from AspenTech.

Lever #4: Increase Production Throughput

Producers are under constant pressure to extract higher volumes from their existing plants. Frequent variability in batch and continuous production, however, limits production growth by preventing “best demonstrated” throughput from being consistently achieved. The best practice of Real-Time Process Monitoring uses a combination of measured and inferred values to track batch completion, minimizing batch cycle time. Golden Batch Profiling facilitates batch-to-batch consistency. Procedural and Recipe Control enables consistently executed start-ups, shut-downs and transitions. Advanced Process Control minimizes variability in continuous processes by holistically managing all of the complex, multivariable interactions that occur across an entire process unit. Predictive and Prescriptive Analytics identifies emerging process upsets that are invisible to operations staff. The results: producers increased production by 3-5% via these best practices, enabled by manufacturing execution, advanced process control and asset performance management solutions from AspenTech.

Lever #5: Reduce Operating Costs

Continuously reducing operating costs by managing its major elements – energy consumption, raw material efficiency and maintenance effectiveness – is vital to manufacturing improvement. A common problem for producers is that the performance of these major elements varies from day-to-day or batch-to-batch. The best practice of Procedural and Recipe Control enables raw materials and energy to be utilized more consistently. Real-Time Energy Monitoring provides continuous visibility of energy consumption to maximize efficiency. Batch KPI Reporting generates detailed cost performance attributes for a batch, facilitating continuous improvement. Advanced Process Control delivers increased yields and reduced energy consumption, while Predictive and Prescriptive Analytics reduces

maintenance costs. The results: producers reduced operating costs by 2-5% via these best practices, enabled by manufacturing execution, advanced process control and asset performance management solutions from AspenTech.

Lever #6: Achieve Sustainable Compliance

Documented procedural compliance is becoming a requirement in certain specialty segments. A common problem for producers is that compliance activities are time consuming and cumbersome, often delaying product shipment. The best practice of Electronic Batch Records automates capture of all production information associated with a batch, reconciling results against established procedures and specifications. Product Genealogy tracks a product across the entire manufacturing process, from raw materials to final packaged product. Procedural and Recipe Control, Golden Batch Profiling and Batch KPI Reporting also facilitate compliance by improving manufacturing consistency. The results: producers have reduced the burden of compliance and achieved faster product releases via these best practices, enabled by manufacturing execution solutions from AspenTech.

Specialty chemical producers are at a crossroads

Producers must transform manufacturing practices to mitigate the growing operational complexity of customer-intimate business models. The degree to which they embrace transformation will impact customer satisfaction, market share and profitability in an increasingly competitive specialty chemicals market. The six levers constitutes a roadmap for achieving manufacturing excellence goals and driving step-change improvements in manufacturing performance. Core to each of the six levers are demonstrated, technology-enabled best practices that can deliver measureable benefits in the form of improved product quality, more on-time orders, increased utilization, higher production, lower operating costs and streamlined compliance. Currently, leading producers, such as Dow Chemical, BASF, DuPont, INEOS, SABIC and Evonik, rely on solutions from AspenTech to improve manufacturing performance.

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