

The Road to Manufacturing Excellence : Are We There Yet?

Specialty chemicals manufacturer Rohm and Haas Co. has reinvigorated its Manufacturing Excellence initiative, to better compete in a tough chemical marketplace. Here's how the company did it.

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Global competition, maturing markets, over-capacity plants, increasing environmental pressure, and rising raw material prices continue to challenge chemical-industry profitability. Poorer returns, slower growth and lower margins have dimmed Wall Street's view of an industry prized for its performance in the last decades of the 20th century. However, within this environment, the Rohm and Haas Co., a premier specialty materials company headquartered in Philadelphia, PA, continues to be a high performer within the chemical industry.

The company derives its financial strength from focusing on how it performs in the eyes of five, key stakeholder groups (the "Five Voices"): the customer, the employee, the owner, the community, and the process. The pursuit of efficient and cost-effective work processes since the early '90s along with the achievement of supply-chain excellence have developed a strategic role for manufacturing in each of its businesses. A key link in each business' supply chain is the ability of manufacturing to deliver reliable and consistent performance. Manufacturing Excellence has been a key initiative to drive alignment, identify improvement opportunities, and leverage best-practice usage within each plant's "fence line." Manufacturing Excellence has been challenged as it adapts to the changing needs of each Rohm and Haas business. Its initial implementation was driven through a flexible application of implementing best practices to improve key manufacturing capabilities. Today, this initiative is being reformed to respond to the competitive pressures of the marketplace that require reduced manufacturing operating costs, improved productivity, and increased capacity with little capital support.

The company and Manufacturing Excellence

The Rohm and Haas Co., formed in 1907, is a specialty materials company with annual sales revenue of more than \$7 billion. Its 17,000 worldwide employees make chemicals that enhance the performance of paints and coatings, computers and electronic devices, household goods, adhesives, personal care products, and more. It is focused on delivering technically advanced products, as well as meeting fast-changing market requirements. It prides itself on respecting and understanding local customs and needs in the communities in which the company operates. The drive to achieve Manufacturing Excellence started in the early 1990s as certain Rohm and Haas manufacturing sites improved operating consistency. The company then deployed Supply Chain processes which placed a tougher set of requirements on manufacturing. Manufacturing needed to respond reliably and consistently to

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their business' sales and operating plans.

First, the focus was to change maintenance, production and engineering from the "fireman" mentality of reacting to equipment failure to working together to maintain assets. The company developed reliability as an important manufacturing competency. A cross-business effort then added four competencies to create the Manufacturing Excellence "POWER" model: Process Technology, Operating Excellence, Workforce Practices, Environmental-Health-Safety (EHS), and Reliability. These five competencies, each with its own set of best practices and support networks, represented the breadth of capabilities needed to enable manufacturing's role.

The expectation was set in 1999 for each business to assess its manufacturing sites and "flexibly" implement best practices. Since that adoption, most of the company's more than 100 manufacturing sites have assessed their performance in several of the five competencies. The majority of the assessments were performed "by invitation only" by the corporate support group. The implementation effort following the assessment was done by each plant.

A parallel initiative involved the deployment of the company's asset utilization metric which provided a financial driver for assessing reliability and operating excellence. The company reached consensus on a "bucket" model for all sites to track asset utilization. The model contains five "buckets" in which all downtime, no matter the cause, could be categorized with standard definitions. In addition, a tracking software was deployed across most businesses which provided consistent reporting.

Early results

Maintenance costs from 1993 to 1999 were reduced \$25 million (14%). Several "pockets of excellence" were developed in the Rohm and Haas plants around planning and scheduling, pump reliability and storeroom practices. Efforts to hire reliability engineers intensified, as did efforts to retrain existing maintenance resources in reliability principles.

Supply-chain performance steadily improved from 1999 to 2003. More than 40 assessments occurred in reliability, operating excellence, and process technology at various sites. Savings were achieved through operating excellence strategies. Late in 2000 and throughout 2002, however, the economy turned sharply down. Plants could not justify implementing best practices as pressures increased to reduce costs. Plant resources were further constrained as personnel became dedicated to the SAP ERP system roll-out. Many manufacturing sites went through restructuring periods and attention turned away from Manufacturing Excellence and toward cost reduction and survival. Both of these factors brought on the need to renew Manufacturing Excellence.

Challenges and renewal

Rohm and Haas' position in a value chain between petroleum-based, raw material suppliers and the consumer-product manufacturers, produces a "squeeze" on margins which pressures pricing. The challenge for Manufacturing Excellence was to

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adapt to these mounting pressures. Manufacturing needed a model that presented the "levers" that could impact change in response to the business climate. The model should meet today's challenges and future business climates. Process industries require similar models used in discrete manufacturing industries. In addition, a change was needed in the driving principle for the "power of implementing best practices" used to deploy Manufacturing Excellence since '99. The company turned to the use of a top-down driving metric.

A cross-business manufacturing team renewed Manufacturing Excellence in June 2003. The team first developed a manufacturing model that identified nine attributes ("levers") that directly impact a site's manufacturing capabilities. These include EHS, quality, productivity, people, leadership and others. The extent to which each lever can be "pulled" to impact performance needed to be determined. Three positions were created peer, contender and leader that represented the level of competitive advantage each lever provided for its business. A "peer" site shows the start of positive trends, while a "contender" shows multi-year improvements, and a "leader" demonstrates long-term sustained competitive advantage (e.g. world-class). Each position for each lever is assigned both a detailed description and a value based on industry benchmarks.

A business case is needed for the movement of any lever based on the needs of the marketplace. For instance, flexibility is a lever that involves quick product changeovers and timing of new product introductions. Some of the company's new businesses should be leaders in this regard. For some of the established businesses with mature product lines, however, a contender position provides all the competitive advantage needed.

Rohn and Haas has also successfully improved productivity and the conversion of "hidden" capacity with our deployment of asset utilization as a strategic metric. We needed similar impact from a top-down driving metric for Manufacturing Excellence. The metric should identify costs associated with wasteful and "hidden" activities, and cover the performance of all the activities in a chemical processing facility. We selected the Cost of Poor Quality (COPQ) metric to meet these requirements. Since the 1950s, the Cost of Poor Quality (COPQ), also referred to as the Cost of Quality, has been involved in quality management in various industries. This metric represents more than just quality defects in final products. COPQ is defined as everything that a site would not have to do if everything were done right the first time. For the chemical industry, COPQ compares an ideal plant's operations (no offgrade, no yield loss, no equipment down time, etc.) to the current plant's operations. A cost gap can then be generated between these two operations. Although, the COPQ identifies an unattainable state like 100% asset utilization, its value can drive Manufacturing Excellence deployment.

Implementation

The renewed Manufacturing Excellence model, benchmarks, and metrics were deployed through five pilot Rohm and Haas plant sites. These sites are dealing with tight cost pressures within their perspectives business's marketplace. The agenda for each pilot involved the plant staff reaching consensus on their current and desired position across the nine "levers" in the model, determining the plant's value for each of the benchmarks, calculating their COPQ, and determining which tools

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and solutions to apply in Manufacturing Excellence to close the largest cost gaps. The major participants during the eight hour meeting were the plant manager, production, maintenance managers, and their plant accountant.

The pilot plants adapted the COPQ metric in the following way:

- Defined as a plant "fence line" metric, identifying hidden and wasteful activities within the plant fence line only

- Defined four cost "buckets": prevention (activities designed to prevent poor quality in products) appraisal (activities for measuring and auditing products to assure conformance to standards); internal failure (activities resulting from not doing the job right the first time during manufacturing); and external failure (activities that cause customers to return products resulting from a manufacturing error)

- Created a basis for the "ideal plant" composed of non-negotiable minimums of internal or external failure costs (e.g. 100% yield, 0% offgrade, and 0% equipment downtime)

- Used industry comparative benchmarks (e.g., 1.5 \$ maintenance / replacement asset value)

- Included only plant budget out-of-pocket savings.

Higher COPQ costs are prioritized and an evaluation is performed on the effectiveness of the current plant's existing improvement initiatives (e.g., training, problem-solving teams, root cause investigations). If the current initiatives need to be modified, proposals are made to use tools and solutions in Manufacturing Excellence to determine the cause and effect relationship (such as best practices, Six Sigma, external assessment, and others).

Renewal results

The renewal process has been enthusiastically embraced at the company. The most dramatic impact has been through the use of the COPQ metric. Overall, the metric has identified up to 15% of the site's budget to be an opportunity for reduction. Its self-prioritizing features have brought focus previously "clouded" by implementing a multitude of best practices. The largest manufacturing opportunity costs occur in quality control, maintenance, "first pass" inefficiencies and resulting activities. The results have driven businesses participating in the pilot to leverage gains in operational excellence to reduce quality-control costs, remediate activities that contribute to yield losses, and reduce maintenance costs after improvements in equipment reliability.

Early successes from the pilots indicate how the COPQ metric creates "pull" for Manufacturing Excellence best practices and how the original "POWER" concept still applies. The company's manufacturing leadership is currently reviewing the results and will decide how it will fit into the company's manufacturing vision and framework.

It's clear that the changing marketplace not only affects the way a company does business, but the initiatives that manufacturers use as tools for continuous improvement. The Rohm and Haas Co. has long demonstrated favorable financial performance compared to its peers and will continue to review the changing marketplace and structure the company's manufacturing direction accordingly.

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