

TCS Helps Cummins Clean Up Its MES

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Keywords

Tata Consultancy Services, Cummins, MES, CPM

Summary

During the recent ARC World Industry Forum, Robert Borchelt, Ph.D., Director, Mfg. IT Systems & Industrial Controls, Corporate Manufacturing,

Manufacturers with a diverse product line like Cummins' need a modern MES to execute its production schedule and meet customer commitments. A common platform enables visibility with lower support costs.

Cummins, Inc., provided a presentation about the company's new MES application and the worldwide rollout with a global service provider. ARC Advisory Group also had the opportunity to interview Robert in depth on this program. Key findings include:

- Assembly of Cummins' diverse range of engines and its success with high inventory turns and earnings requires a modern manufacturing execution system (MES)
- A common platform and integration with corporate systems enabled improved management visibility and sharing of best practices
- Identifying an implementation partner with deep application knowledge and a global footprint is critical for successful rollout of a modern MES across a global manufacturing base

Diversity in Engine Manufacturing

Global engine manufacturer, Cummins Inc., has complementary business units that design, manufacture, distribute and service engines and related technologies. Headquartered in Columbus, Indiana, Cummins has customers in approximately 190 countries and territories with 6,500 dealer locations. In 2011, Cummins had \$18 billion in revenue, with engines comprising 55 percent of the total.



Cummins makes a huge range of engines starting at about 70 horsepower and up to 4,200 HP. Designs cover a variety of fuels including gasoline, diesel, natural gas, and LPG. Applications for the company's engines include off-and on-road use for agriculture, construction, marine, mining, power generation, rail, trucks, buses, motor homes, and many more.

MES Support Nightmare

Engines represent the core of Cummins and its success depends on manufacturing a wide variety of these products, on time, at low cost, and with high quality. To achieve high operational performance, most plants have an assembly management or manufacturing execution system. Each plant independently designed and implemented its solution and some had been in use for over 20 years. The variety of solutions and technologies resulted in a support nightmare and created a challenge to integrate with corporate systems.

"Our Engine business delivered record sales and profits."

"Warranty costs as a percent of sales in 2011 were the lowest in 15 years."

Tom Linebarger, Chairman and CEO,
Cummins Inc.
2011 Annual Report Chairman's Letter

MES Criticality

Several factors combine to make manufacturing Cummins' engines extraordinarily difficult from a production and materials management perspective.

Product Variety = Small Lot Sizes

The plants with a higher product mix make a wide range of engines with an average of one to two units per shop order. Cummins views a shop order as "high volume" with the units in the high single digits. The first plant chosen for the new MES has the highest product variation to prove feasibility for the other plants.

Six Sigma and Lean Programs = Low WIP inventory

Cummins has embraced Six Sigma and lean manufacturing techniques. Six Sigma provides practices and processes to help reduce variation and improve quality. The lean manufacturing practices focuses on reducing waste, including excessive inventory. Together, they significantly reduce work-in-process (WIP) inventory. The company's 2011 annual report shows that overall inventory turnover rates improved from 5.8 in 2010 to 6.3 in 2011; excellent results for this degree of product diversity.

Small Lots + Low Inventory = Rapid Changeover

Engine assembly occurs per customer order and the assembly lines are configured to accommodate the variety of models and options. The lines have many stations to allow for high production volume, with a typical cycle time of just 70 seconds. The lean manufacturing approach spreads the “larger” lot sizes (with units in the high single digits) throughout the day to avoid queues and keep inventory low. Thus, no two engines are the same in the assembly line sequence, and the line changes to another product every 70 seconds – a very rapid product changeover rate. Each operator has a display driven by the MES that shows the required assembly steps as the next engine in the line approaches.

Global Operations

Cummins serves a wide range of locations globally in both developed and developing economies. It serves these markets with products specifically designed for the locality and often built in the region. Cummins assembles engines in 15 plants in five US states and seven other countries. Plus, joint ventures have several additional plants. Including Cummins’ other businesses, the total number of plants potentially requiring MES solutions grows to about 80.



**Cummins QSX95 16-cylinder,
4,200 HP Engine**

Many of these plants have similar requirements since they use discrete assembly processes. However, with the variety of geographies, product volumes, and business practices, each plant has several unique needs.

Services Partner with Global Reach

Cummins had several issues converge for its existing MES applications. The company recognized that the wide variety of custom implementations in place in its many plants around the world represented an unsustainable situation. Managing diverse applications globally from the corporate manufacturing IT group introduces difficulties relative to distance, time zones, and technology variations. Also, attempting to integrate different MESs with corporate systems often results in a fragile solutions and additional hurdles for software upgrades. Simply outsourcing this IT support adds significant expense and does not solve the core technology issues.

Cummins needed a modern, adaptable MES platform and a strategic services partner that could support business transformation with a global rollout. Cummins selected Apriso's FlexNet as a platform and Tata Consultancy Services (TCS) as a services partner. According to Cummins, the benefits of working with TCS include:

- Global footprint that covers the engine plants for application implementation, custom configuration, and ongoing support
- Wide range of technical skills to match the various technologies and applications involved (Apriso, Oracle E-Business Suite, IBM Maximo, PLC and CNC communications, Oracle databases, networking, etc.)
- TCS' proven business process for code development, testing, and commissioning

Last Word

The combination of a modern MES and high-quality global support from TCS has proven successful for Cummins. The company implemented the MES solution in six plants in 2011, with ten more planned for 2012. The rollout will ramp up with the expectation that the company will ultimately upgrade 80 plants.

A "lesson learned" by Cummins includes active involvement in the careers of the contractors (within the service provider) so they stay and reduce turnover – particularly with extensive and long-term programs. Longer individual consultant engagement provides greater use of what they learned about the specific application. It takes three months on the job for someone to become fully knowledgeable and effective. Reducing turnover may also help facilitate company and partner team building-related social activities.

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