The Speed to Succeed
Leaner, more responsive and quality-driven automotive operations with a manufacturing execution system.
The Automaker’s Dilemma

Global automakers produced more than 80 million light vehicles for the first time in 2012 and are expected to exceed 100 million by 2019. This bright future presents new opportunities for higher sales, particularly in emerging markets. Automakers with their sights set on success also must navigate a number of unique challenges.

- The transition from single-vehicle to multi-vehicle production facilities that rely on flexible manufacturing has streamlined production and cut costs per car but introduced greater complexity into the production line.

- Global automakers are rolling hundreds of new cars off the production line every minute to meet the ever-growing worldwide demand. This need to maintain high production rates has put a premium on maximizing productivity and uptime.

- Automakers must evolve product designs and production processes to deliver the new vehicle styles and technologies that will satisfy changing consumer demands.

- U.S. fuel-efficiency standards will increase to 54.5 mpg by 2025, and even higher targets are expected in Japan and the European Union. Automakers must be able to deliver better-performing vehicles while continuing to reduce production costs.

- China overtook the U.S. in 2009 as the largest car market in the world and has annually produced more vehicles than the U.S. ever since. Manufacturers seeking to retain their foothold in existing markets and make headway in new ones will be expected to provide high-quality vehicles.

“Emerging markets’ share of global sales will rise from 50 percent in 2012 to 60 percent by 2020, while their share of global profits is also set to rise by 10 percentage points.”

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Switch to Top Gear

Manufacturing execution system (MES) software can help you keep pace with an increasingly complex and fast-moving automotive industry, and better align your complex manufacturing operations to market needs. An MES uses three key functionalities to accomplish this:

**Operations Management:** An MES can help you better coordinate the full spectrum of production operations for both build-to-stock and build-to-order manufacturing. This includes synchronizing production activities; improving work-instruction delivery to plant personnel in increasingly complex flexible-manufacturing operations; and better managing the flow of materials from warehouses and suppliers.

**Integration Gateway:** An MES also enables integration between plant-floor and business networks. This is the key to bridging historically separate information technology (IT) and operations technology (OT) systems to create what’s known as The Connected Enterprise – a unified network architecture that connects the people, processes and technologies across your entire organization.

**Information Management:** Automating data collection in an MES can replace costly, time-consuming and potentially mistake-prone manual data collection. Data can be displayed in dashboards and as KPIs for better decision making and consistent performance measurement. Production data can also be used for regulatory compliance and warranties, while genealogy and traceability can help limit the scope of recalls and shorten containment response times.

An analysis of 76 vehicle models shows that prices have been almost flat in real terms since 1998, while more and more features and improvements have been added due to competition, customer demands and regulation. The net effect has been a decline in profit per vehicle.”

1 The road to 2020 and beyond, McKinsey & Company, August 2013
More Efficient Production

Flexible manufacturing enables you to produce a wider range of vehicles and provide more choices for customers from a single production site. It also adds greater complexities and introduces more opportunities for errors or delays. An MES can help you master this greater complexity with more efficient control and automation of your operations:

Order-management functionality can help match the requirements for assembly and subassembly processes, providing real-time coordination for everything from an order’s initiation to its final packaging.

Performance measures can give operators and plant managers more detailed insights into site, line, machine and cell/area performance. This information can help plant personnel better understand where downtime is occurring, pinpoint the root causes of efficiencies, and make better decisions to optimize assets and improve productivity.

Error proofing can transform your bill of materials, work instructions and procedures into enforceable work instructions that guide operators through each production process. Amid a constant influx of changing requirements, parts and processes for new orders, this helps ensure products are built to their defined specifications, which in turn can improve throughput and reduce costs.

Enterprise data can also be shared across your organization. The data can be contextualized into information relevant to each person’s role, allowing a broader range of stakeholders to support continuous-improvement efforts.

“By 2017, Ford will increase its global flexible manufacturing to produce on average four different models at each plant around the world to allow for greater adaptability based on varying customer demand.”

1 New Goals for Advanced, Flexible Manufacturing, Ford, October 2013
Better Material Coordination

In fast-moving automotive production operations, you can’t afford to have vehicles sitting and waiting for the right materials. An MES can coordinate all material-management activities and provide real-time inventory visibility to help keep your lines moving.

An MES can also replace the need to manually manage inventory and material transactions. Instead, the system can use Kanban and just-in-time material-replenishment triggers to detect when an inventory is low. It then automatically sends a request to a supplier, while also sending a purchase order to accounting.

An MES can synchronize the flow of materials in parallel with vehicles as they progress through the assembly line. This helps ensure continued material availability for each planned production sequence and reduces the likelihood of production gaps.

Real-time visibility into inventory levels within an MES enables operators to track materials and provide input at each decision point to help rein in material consumption.
React Faster to Market Changes

From a desire for more fuel-efficient vehicles that can fluctuate with the price of oil to a continued desire for new and improved technologies, consumer demands can be difficult to predict. An MES can help ensure your operations are agile and responsive enough to adjust to those demands.

Responsive Operations

ERP system connectivity can help ensure your operations quickly respond to new orders. Order information and build data can be immediately obtained from your business system and seamlessly converted into detailed build sheets for each shop. Plant managers and business leaders can also track order statuses and other information using real-time work in progress (WIP) updates.

Agile Production

Shops can use MES information to look ahead at production sequences, allowing them to retrieve the corresponding parts or tools in advance of each order. The system also eliminates the need for each shop to handle its own documentation. Instead, it can automate the collection of millions of data points and share that data across the enterprise as actionable information that is contextualized to each worker’s unique role.

Speed New Deployments

Rather than developing and deploying new applications at each station – which can often involve writing the same code for multiple applications – an MES can include automotive library suites that save engineering time and costs. These configurable and scalable library suites are designed for common automotive applications and can help ensure faster deployments.

“A full-line manufacturer is akin to Baskin-Robbins with its 31 flavors. They have to be very good at things that appear to be diametrically opposed.”

- Reilly Brennan, executive director, Revs, Stanford University
Improve Quality Management

Quality can never be compromised. Your reputation – and your business – is built on it. Yet higher volumes, more frequent vehicle refreshes, and the need to offer customers more options for fuel efficiency and vehicle technologies make quality more difficult to maintain in an increasingly complex manufacturing environment.

An MES can help you manage key quality characteristics throughout your operations to help deliver consistently high-quality vehicles and comply with industry standards.

Built-to-Spec Quality
In addition to helping improve production efficiency, an MES error-proofing application can also use enforceable work instructions to help ensure workers build vehicle assemblies and subassemblies to specification. This can help maximize first-pass quality and reduce scrap resulting from nonconforming vehicles.

Defect Management
If an error should occur on the production line, hold-and-quarantine capabilities available within an MES can help you manage affected vehicles. This supports ISO 9001 and TS16949 automotive quality initiatives, and can ultimately prevent defective and potentially dangerous vehicles from reaching your customers.

Information Coordination
Real-time connectivity to automation systems allows you to capture process results, defects and attributes. Collected information can support key requirements, such as visual defect tracking, statistical process control and root-cause analysis. This information can be shared across business and plant-floor systems as part of regular KPI reporting.

Genealogy and Traceability
An MES that offers genealogy and track-and-trace capabilities can give you new insights into the processes, production events and quality information for specific units or assemblies. These applications can provide forward and backward traceability to identify upstream or downstream quality issues, as well as provide real-time product location and as-built data to help limit the scope of recalls.

“Vehicle recalls in the U.S. surpassed the 60 million mark for the first time in a single year in 2014, double the previous annual record of 30.8 million set in 2004.”

[1] Auto Recalls This Year May Surpass Record 2014, NHTSA Chief Says, Bloomberg, Jan. 6, 2015
You Have Arrived at Your Destination

The auto industry is only going to become more competitive as automakers compete to serve emerging markets while also trying to maintain costs as consumer and regulatory demands continue to evolve.

At the same time, the ongoing march toward greater connectivity – within your organization, to your suppliers and dealerships, and even out to the vehicles you to deliver to customers – will require that you are able to collect the valuable data resulting from those connections and effectively act on it within your production operations.

An MES is the foundation on which this can all occur. To learn more about how an MES can make your automotive operations more efficient, responsive and quality driven, contact a Rockwell Automation sales representative or visit:

www.rockwellsoftware.com/automotive


In China and India alone, 680 million Gen Y consumers plan to buy a car within five years.¹

“If a user opts to share data with Ford, we get the analytics that show how our customers are using plug-in vehicles, like how far they’re driving on a charge and how often the vehicle is being charged. That data has been tremendously powerful in shaping our next-generation product.”²

- Michael Tinskey, Global Director, Vehicle Electrification and Infrastructure, Ford Motor Co.

¹2014 Global Automotive Consumer Study: The Changing nature of mobility, Deloitte, June 2014
²Green-Lighting Ford’s ‘Clean’ Technologies, Automotive Engineering, June 2015