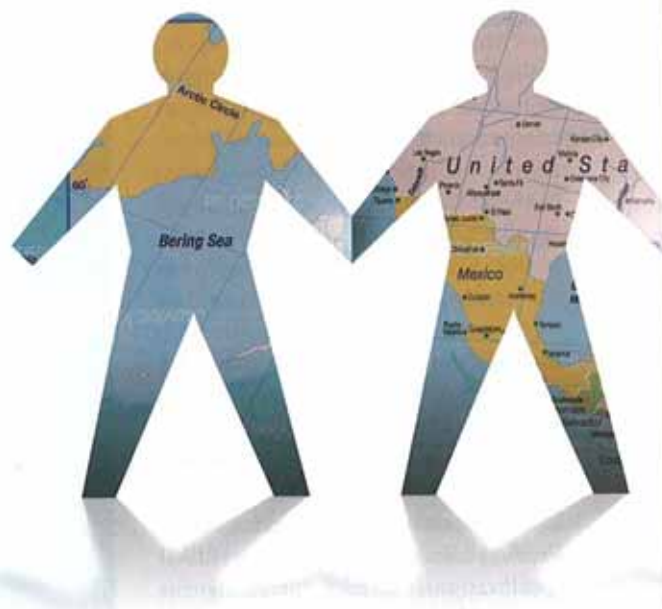


Operations Execution System

Taking automotive manufacturing to the next level



An OES is enhanced over MES as it synchronises production and logistics with ERP and plant automation systems, thereby providing a completely integrated system with real time visibility at all plants irrespective of their location.

Frederick L Thomas
 Industry Director, Automotive
 Apriso Corporation
 USA

Remember the advent of networked computers – and how stand-alone systems quickly became obsolete once workers could collaborate, share information and standardise through client/server technology?

The same quantum leap is occurring in automotive manufacturing as plant-specific Manufacturing Execution Systems (MES) are making way for the enterprise-wide Operations Execution System (OES). This transformation is happening for exactly the same reasons as it was in the case of the move to networked PCs – increased efficiencies, greater adaptability and standardisation of best practices.

MES on steroids

An OES is a much larger, more robust super-MES that links all aspects of operations, not just manufacturing. A traditional MES operates at the plant level, tracking the five main elements of

manufacturing: materials, equipment, labour, tooling, containers and fixtures, and specifications and data. Many so-called MES products do not meet even these limited criteria, and serve merely as product traceability systems.

The MES concept has problems once a company becomes international as engines may be manufactured in Japan, electronics in Mexico and assembling in Italy. Each plant typically has its own key performance indicators (KPIs), making it almost impossible to compare performance of facilities in a meaningful way. Similarly, an important process innovation developed at one plant cannot be easily imported to other plants as a best practice. ▶

OPERATIONS EXECUTION SYSTEM



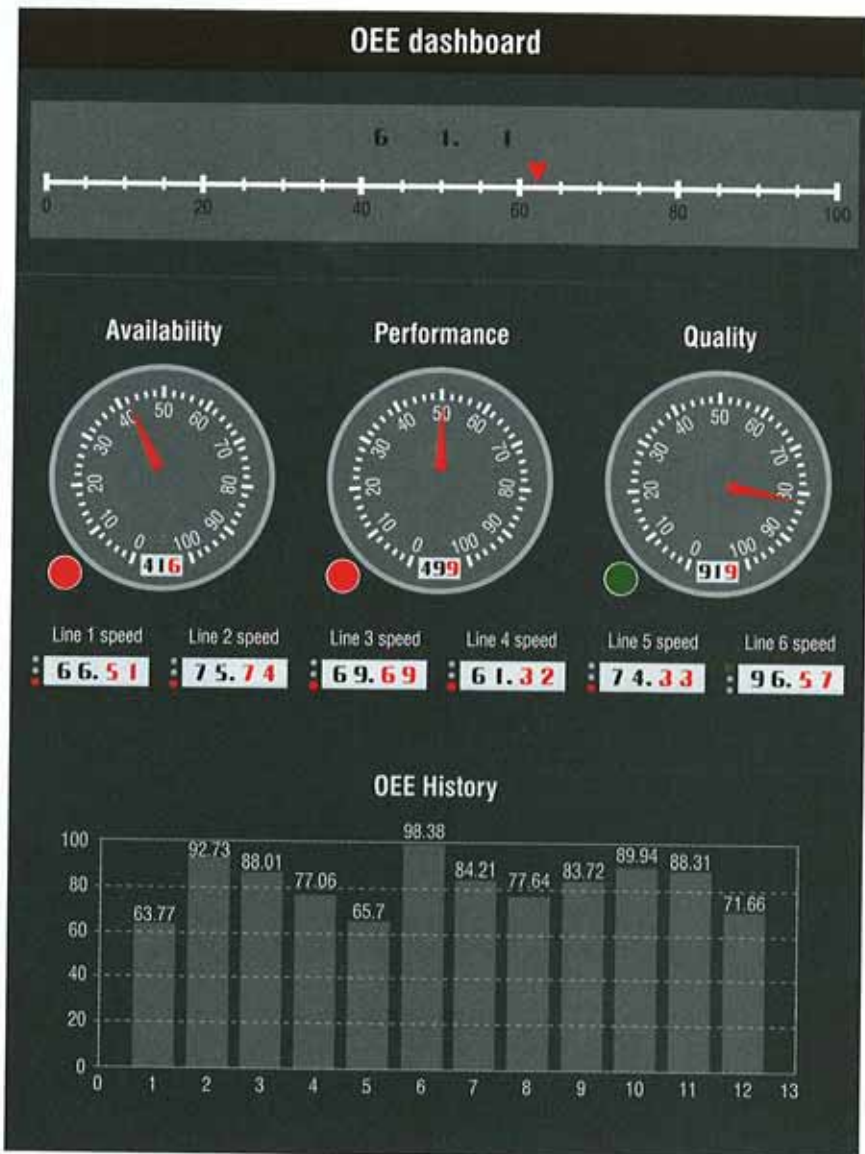
Figure 1

Other issues arise with portability. MES systems are often hard-coded to a specific plant equipment configuration. Rarely do other plants feature the same set up. Management is therefore forced to implement yet another stand-alone MES.

An OES, on the other hand, has the ability to synchronise manufacturing with your supply chain, both upwards to the Enterprise Resource Planning (ERP) system, and downwards to the automation layer. An OES can also provide the optional benefit of integrating product quality / tolerance execution results with Product Lifecycle Management (PLM) specifications, thereby increasing the speed with which product changes can be implemented. It does this at both headquarters and in the field. The result is a completely integrated system, providing real-time visibility at all levels of your enterprise, irrespective of the plant location, whether a plant is in Tijuana or Shanghai, facilitating multi-site rollouts.

Going global

The real push for OES technology comes from globalisation and its ever-increasing strategic challenges. A single-function MES just won't cut it these days, when manufacturers are facing relentless demands from customers, competitors and regulatory bodies.



Volvo CE values its OES

As a leader in the heavy equipment segment of the automotive industry, Volvo Construction Equipment (CE) recently discovered the importance of an OES, as part of its migration from being a multinational corporation to a globally integrated enterprise.

Reaching an "IT end-state" was the goal of Scott Park, CIO and senior VP of processes and systems. According to him,

“ Volvo CE needed an integrated supply chain. We need to be able to make any product at any location. We need to measure the effectiveness of methods used at different locations. Best practices can then be shared. ”

Volvo CE selected Apriso FlexNet as its enterprise OES, linking plant operations with the broader supply chain. Much as Volvo's ERP is a core application for business processes, the new OES serves as a core system for Volvo's various plants. The OES integrates seamlessly with SAP ERP, which Volvo did not want to change.

Apriso's FlexNet was implemented first in Changwon, South Korea, at Volvo CE's largest and most complex heavy equipment assembly facility. The system has automated production at component, fabrication and assembly plants. Among its many features are production order execution, material feed logistics, production monitoring, machine integration and quality control.

The system was designed with discrete modules, including material feeds, scheduling and manufacturing production. This permits easy replication so that the Korean model could be reused anywhere in the world, helping to achieve Park's vision of enterprise-wide best practices.

Take product complexity, for example. Customers want more models and variations than ever before. In the 1970s, automotive manufacturers offered about 140 different vehicles. This figure doubled by the 1990s, and is headed for doubling yet again in the next five years. Each product variation, of course, impacts manufacturing.

Each of these myriad products is becoming more multifaceted. Consider mechatronics, the integration of mechanical, electronic and software technologies in the automotive industry. AMR Research estimates that nearly 40 per cent of new innovation in vehicles is directly related to mechatronic-based items like anti-lock braking, collision detection and blind-spot detection systems. While these innovations provide great value and differentiation opportunities for automakers, they also add new levels of complexity to manufacturing and distribution.

Simultaneously, auto manufacturers sprint to meet ever-shorter cycle times. Electronics manufacturers now measure product line success in terms of weeks, not months. Auto OEMs have followed suit, reducing vehicle development cycle times by more than half in the last decade.

The increasing pressure to reduce cycle times and bring products to market faster can potentially have an impact on quality, if not managed appropriately. ▶



Quality issues must be avoided at all times. In 2006, Ford shut down seven plants in two countries for a day and a half due to faulty transmission parts, at an estimated loss of US\$ 27 million. Chrysler suffered a similar problem in 2007 with faulty V8 engine parts.

Situations like these leave auto manufacturers in a quandary. In a 2006 survey, 32 per cent of top US manufacturers blamed either late entry to market or missing demand for the failure of products. Even more concerning is the fact that product quality was cited by another 30 per cent.

Wider footprint with OES

An OES addresses complexity, timely launch and product quality issues. It delivers plant-level functionality across the manufacturing enterprise

their last legs, and the data they silo is practically useless to you at headquarters. You're no longer competing with the plants across town, but with very aggressive contenders on other continents. Here's how an OES could transform your dilemma.

First, you would create a functional blueprint based on various plants' inputs. Plant managers create a "wish list" of desired features for a new OES. Usually, about 80 per cent of these requirements fall into standard processes—things everybody wants and needs. The remaining 20 per cent will be features that are plant-specific, tailored to their unique culture, processes or machinery.

The OES is then designed, driven by best-practice manufacturing processes gleaned from your facilities. This is a great opportunity for recognising star performers, as

more complicated than ever before. Operations are increasingly distributed and far-flung around the world. Automotive manufacturers scramble to meet faster innovation and introduction cycle times. Customers demand perfection when it comes to quality while expecting all this to be accomplished at a lower cost.

An operations execution system may not be a total cure-all, but it is certainly a big step in the right direction. As many of the most successful global manufacturers are discovering, an OES streamlines production and improves efficiency. It stitches together a patchwork quilt of diverse plants into one cohesive whole. It can typically be implemented at a pilot site in seven to nine months. Best of all, it quickly pays for itself in enhanced competitive positioning, improved profitability and lower overall training costs due to standardised processes at multiple locations.

Operations Execution System streamlines production and improves efficiency, and stitches together a patchwork quilt of diverse plants into one cohesive whole.

into supply chain network. Within a single plant, the OES can manage production, quality, warehouse, maintenance, and time and labour. More importantly, it then will be capable of managing global processes, performance and production throughout the enterprise.

Let's take an example of a Tier 1 automotive supplier, with multiple divisions, product lines and manufacturing models, and with operations in 97 countries around the world, an outsourced supply chain, 350 different vendors, and at least a hundred variations on 15 main product options.

You've always had disparate manufacturing systems, which once worked well but are now driving up costs. Many of your legacy applications are on

managers become trusted advisors during the design process, helping their colleagues to improve company-wide performance. Adopting OES forces standardisation with all plants. Using consistent KPIs help create meaningful, real-time visibility into all operations.

Right rigging for perfect storm

Current market conditions are much like a perfect storm. Higher product variability makes manufacturing

Time to move beyond MES?

Ask whether these indicators ring true:

- Our "global enterprise" is really just a lot of individual plants cobbled together
- We have no best practices for maximising plant performance
- We have no uniform metrics for comparing plants against themselves or competitors
- We lack real-time data on our enterprise or supply chains
- Customers are complaining about quality or delivery time
- We're not nimble enough to adapt quickly to constantly changing customer requirements
- Our ERP system constricts our ability to adapt or change processes. ■

AUTHOR



Frederick Thomas, Automotive Industry Director for Apriso Corporation, has over 25 years of global automotive experience, spanning automotive OEMs, suppliers and enterprise software providers. He is a frequent speaker at industry forums and conferences. Several articles on the subject of MES and the need for flexible, adaptive manufacturing by global enterprises are there on his name.