

In today's manufacturing world, every engineering decision must be made in a global environment consisting of different cultures, schedules, and even ways of conceptualizing information. Global engineering enables automakers to seize opportunities in emerging markets.

All the World's a Stage ... Are You a Player?

With their eyes on the exploding markets of Russia, China and India, the world's automakers are searching for ways to quickly produce vehicles that capture the hearts and imaginations of those regions' driving consumers. There is a sense of urgency to their efforts because early entries to these markets will gain a tremendous market share advantage.

Those who have observed the automobile industry over the years have seen dramatic improvements in the development cycle time for new models, down from four years in the early 1990s to about 18 months to 24 months on average today. However, automakers know that earning a position in the developing markets of the Far East will require an even more nimble response.

As part of their strategy for accomplishing this, the major automakers have adopted a platform approach in which about 40 percent of vehicle content remains the same across multiple vehicle variants. Toyota's Camry platform, for example, forms the basis for

a four-door sedan, a two-door coupe, a cross-over SUV and a minivan. A platform strategy lets automakers address opportunities more quickly because development can focus on the remaining 60 percent of the vehicle tailored to the target market.

Massive Operational Challenge

There are variations on the platform theme. Some companies, such as General Motors Corp. and Ford Motor Co., have multiple platforms of their own that they share among their multiple name plates around the world. Others like Nissan and Renault (and previously Daimler and Chrysler) form alliances in which they provide platforms to one another. Regardless of how it is implemented, the platform strategy poses significant business and technical challenges.

With distant engineering centers now involved in the creation of most new vehicles, it is impossible to co-locate everyone involved in a program. Once a mere vision, global engineering has

become a reality in the auto industry, with effort on a typical new vehicle happening somewhere in the world 24 hours a day. As a result, every engineer-

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—Dave Taylor

ing decision must be made in a global environment consisting of different cultures, schedules, and even ways of conceptualizing information. Every site needs up-to-the-minute vehicle data at all times. Taking full advantage of the platform concept to speed new vehicles to emerging markets is a massive operational challenge.

Automakers with the best chance of capturing marketshare in developing

By Dave Taylor

markets are adopting the following best practices for global engineering:

1. Data management 2.0. Global engineering complicates data management due to all of the different sites that need access to current vehicle data. Engineering work done in North America must be available in real time to locations in Asia and Europe throughout those locations' extended work days. The concept of transferring bulk data overnight is no longer valid. While increasing the flexibility of a car company's portfolio, the platform strategy also complicates data management by dramatically increasing the volume of data that must be managed. Data management for a single vehicle involves more than 15,000 components. Managing information for eight vehicle variants and all of the options they offer in the context of a platform increases the amount of data involved by an order of magnitude.

When you combine the data management requirements for global engineering with those posed by the platform development strategy, it becomes evident that automakers must execute data management at a new level. The leaders in this field are implementing global networks capable of flawlessly synchronizing tens of thousands of data elements securely and efficiently, effectively maintaining 100 percent data consistency between dozens of sites around the world.

2. Culturally appropriate data formats. Globalization is linking national economies and cultures in new ways, requiring automobile manufacturers to develop a global perspective among their workforce. The best way to ensure the target market's influence on a vehicle is to include engineers from that market on the development team. Global work teams are becoming commonplace, as engineers are being assigned to projects with international components.

In addition to making vehicle data accessible around the world, the leading automakers are going the extra mile to make that data as useful as possible to the recipients. That means that if users are from a culture that prefers to read up and down, they see data displayed that way rather than hori-

zontally. Where language differences may create ambiguity, snapshots or 3D models replace the textual BOM line. It may sound like a small thing, but having software that supports cultural differences can go a long way toward maximizing the efficiency of a global workforce.

3. Global virtual analysis. Because it is no longer possible to have all the different parties involved in vehicle design

together at the same site, another best practice for global engineering is virtual collaboration. Here, too, the demands we're talking about go well beyond previous levels. For instance, it's no longer enough to have a conference call with people looking at the same image on their computers. Across the board, automakers must expand this capability to permit virtual analyses at the platform level.



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All the World's a Stage

What would this look like? Consider the team making the suspension for a new car. At a minimum, those engineers must be able to see how their components fit within other subsystems. This means inserting their digital assemblies into the digital assembly models of other groups — models that may or may not be in the same data format. After building a virtual model from these disparate CAD files, they must be able to manipulate the model — to look for interferences, for example — as they move their and others' assemblies through a range of motion.

Expanding this concept to the platform level, remember that the suspension is likely to be electronically controlled so that it can provide the appropriate ride on multiple vehicles (a stiffer ride on an SUV versus a smoother ride on a coupe). This requires virtual analysis of the design's performance, which is a step beyond checking it for form and fit. In this example, the suspension design team would need to simulate shock absorber performance at the different stiffness settings, most likely electronically controlled and under various road conditions — all this using multiple sources of geometric data coming from all over the world.

As automakers' challenges continue

Seamless Collaboration Key to AIAG Standardization Efforts

Globalization of the automotive industry is in full swing, and the most important factor to the success of a truly globalized supply chain is seamless collaboration, both up and down stream. "This can only happen if the whole world is using the same systems and formats to design, engineer, test, and manufacture products, as well as sharing product and business information," says Akram Yunas, AIAG program manager. "And that's only going to happen in a perfect world."

To achieve interoperability, Yunas says the industry is relying heavily on open standards to permit such collaborations. The International Standards Organization (ISO) and AIAG are playing a key role in developing and implementing automotive-focused data exchange standards. ISO's AP 214 and AP 238, which AIAG helped develop and continues to support, are good examples of standards that are making disparate CAD and PDM systems interoperable.

"AIAG has accomplished a great deal by developing guidelines and standards in the digital engineering visualization field (DEV)," adds Yunas. "DEV is the technology that allows sharing of design information/CAD on lightweight systems, irrespective of what proprietary systems were used to make the original CAD drawings. This allows global sharing of design information, a 3-D annotated model, up and down a supply chain on a PC-based platform."

For more information on AIAG's activities and initiatives in DEV and interoperability in general, contact Akram Yunas at ayunas@aiag.org.

to grow, the technology of leading suppliers is growing to address them. By supporting the demands of global engineering in the auto industry, it is the supplier's responsibility to ensure that customers in all industries are

prepared to seize the opportunities of expanding markets. ➤

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COMMENTARY

It's the Process

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tracked, effective tools and techniques employed and compliance to accepted standards. This evaluation needs to be done on all alternatives prior to selecting a strategic path.

U.S.-based operations have been nipped and tuned at every level with the constant drive to reduce cost. We have burdened ourselves with multiple niche, process improvement initiatives that have not been tied together for synergies. These "buzz word" acronyms work well in the niche, but are not tied into the overall system for true integration. We are working harder in the United States, but not working smarter by integrating these tools and techniques

into one operational system.

We need to take a total look at U.S. manufacturing from an operational perspective, combining the niche tools and techniques into one simplified system

"Assumptions are easy to make, but are littered with surprises which always cost money."

that makes us efficient, effective and compliant with industry standards. A simplified system with company-wide usage leads to consistency in operations and quality compliance. This drives costs down, making U.S. companies competitive and leaders in a global economy. This system or process is the

differentiating factor for companies to separate themselves as the best choice in a global market.

This is hard work, but it pays off in the long term by ensuring consistent profits and value in the market. Therefore, process is king and must be constantly upgraded and continuously improved to keep the company viable for the future. Executives need to make fact-based decisions, and understanding facts takes time and hard work. Assumptions are easy to make, but are littered with surprises which always cost money. *Do the work*; choosing the correct strategy will have enormous long-term impact on your employees and our U.S. economy. ➤

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