

- Engineering the management of change.** Suppliers must deliver effectively and reliably on all fronts: speed, cost, quality, and innovation. As volume ramps up to a sales forecast of over 110 million vehicles in 2020, changes will only become more frequent and multi-faceted. Beyond collaboration with the OEM and all partners during the new product and model year change cycles, suppliers must help provide in-life changes and improvements. Suppliers are critical to production success and also to the connected lifecycle services that are allowing OEMs to preserve margin and loyalty.



Figure 1: Challenges for automotive OEMs and suppliers come from every angle—from product issues to production and supply chain.

These pressures pose a challenge. Typically, the automotive supply chain lacks visibility beyond standardized quality planning and materials

movement. To become both more innovative and more efficient, the automotive industry must extend “the management of engineering change” into “engineering the management of change” across all aspects of the business and supply chain. This engineered approach to managing change allows companies to succeed with the key competitive factors of speed, effective decision-making, cost, and process transparency.

Today’s technologies can support new and more integrated product change processes that extend far beyond the design and engineering offices. They can support both very structured processes and newer, web 2.0-style collaboration. Market leaders are moving as fast as they can—with add-on capabilities or new application implementations—to improve their change processes. Engineering new change processes will allow companies to keep up with the incredible speed of change in the industry and its products.

Accelerating change

Faster cycle times for new and improved vehicles not only keep customers satisfied, but can result in much higher profitability per vehicle. Pioneers in new categories, such as Toyota with the Prius hybrid, can often gain a brand recognition translating to brand loyalty that is difficult for competitors to shake. The pre-orders for the lower-priced 2010 Honda Insight were only 20,000 compared with 75,000 for the Prius.

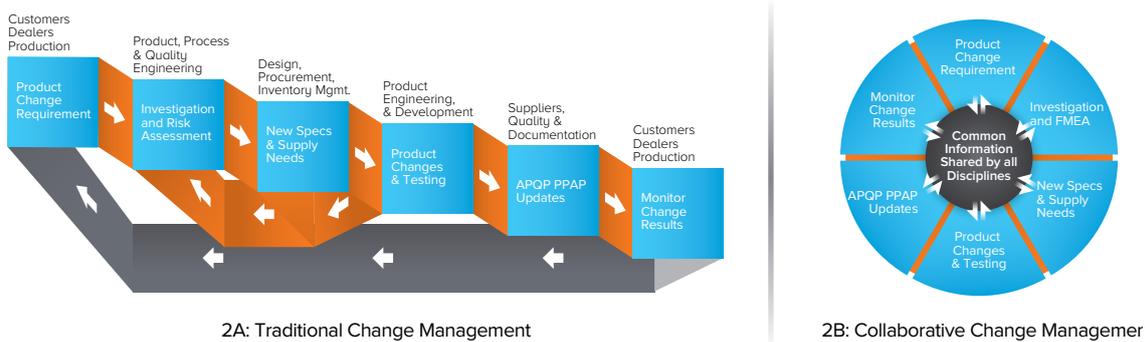


Figure 2: The traditional sequential approach to managing engineering change (2A) is inefficient. Sharing common information (2B) facilitates far more rapid and effective processes.

To optimize turnaround time for new, updated, or improved vehicles, assemblies, and parts, companies have effective communication and coordination across all disciplines and partners. The problem is that often separate departments manage changes through separate processes, not as a unified process. Common examples are the engineering change request (ECR) process in design, concession or corrective action processes in manufacturing, and warranty claims in customer service.

To support this increasingly dynamic environment, suppliers need to have:

- Highly responsive processes that can adapt to emerging needs, but incorporate critical controls to ensure quality and standards adherence
- Flexible collaboration mechanisms that allow customers and suppliers to engage quickly, easily, and effectively.
- The ability to manage and configure the mix of mechanical, electronic, software, and service elements, where appropriate

Process changes and technologies such as enterprise resource planning (ERP) and product lifecycle management (PLM) play important roles. While they are necessary factors in the change process, they are not sufficient. In fact, they must share information with each other and with external customers and suppliers. Enterprise applications must facilitate rapid addition of new suppliers at each tier. A fully collaborative change environment can reduce the time required to reach stable production and fulfill customer requirements by up to 50% (Figure 2).

Change for effective decision-making

OEMs and tier suppliers care about a wide variety of aspects of the product and the company from which they buy it, all of which contribute to their supplier preferences. These aspects are all facets of their overall perception and satisfaction (Figure 3). Typically, each department has a narrow view of these customer concerns, based on their day-to-day interactions. Disjointed business processes between departments and trading partners remain and hinder progress.

To make decisions that reflect these customer concerns as change processes ripple through the supply network, all disciplines and partners must participate in the same decision-making processes. And they must make decisions as quickly as possible, or risk spending time and resources on developing inappropriate solutions, inevitably leading to missed targets on key performance indicators (KPIs).

Recent major safety recalls highlight the need for rapid root cause and impact analysis. Although many problems and even recalls are relatively minor, Toyota's recall in 2010 cost it an estimated 70 to 80 billion yen (roughly \$770 to \$880 million). As new technologies and customer-driven product configuration take root, OEMs and suppliers must build a knowledge base around emerging trends and common issues.

The rise of software as a critical component also presents significant opportunities for suppliers in both vehicle performance and customer lifestyle. Performance monitoring can help drive service-related revenues. Lifestyle technology helps build brand allegiance and offers opportunities to tie into applications and on-demand services currently pervading the mobile device market.

Managing changes in these contexts requires access to fully integrated product, supply chain, and service information. This access relies on having an overall program view of product changes and the process controls in place to reallocate tasks and resources appropriately.

Leaders are developing appropriate information flows to feed cross-disciplinary analytics. These systems empower teams to make sound decisions. The benefits include faster throughput of changes, fewer recurring problems, and improved customer evaluation scores.

The cost of change

Cost continues to be a primary driver for automotive suppliers, and emerging market pressures reinforce that. KPIs with tight targets are in place for cost reduction efforts in manufacturing, inventory, logistics, and sourcing. Yet few companies know the total cost of product changes.

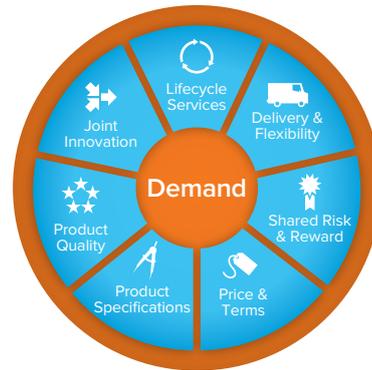


Figure 3: Customer demand means not only item quantities at specific times, but all characteristics supporting the relationship and satisfying OEM needs. The result: A holistic customer perception and preference.

Up to 80% of product cost is built in during the design and engineering development stages of the lifecycle (Figure 4). Some studies suggest that 60% is built in during the initial investigation and architecting of suitable solutions¹. One of the main hidden costs is the cost of poor quality. Failures, rework, returns, and warranty issues result in direct material and contract costs as well as damaging the company's reputation with customers. Of course, all of these also waste valuable time and resources.

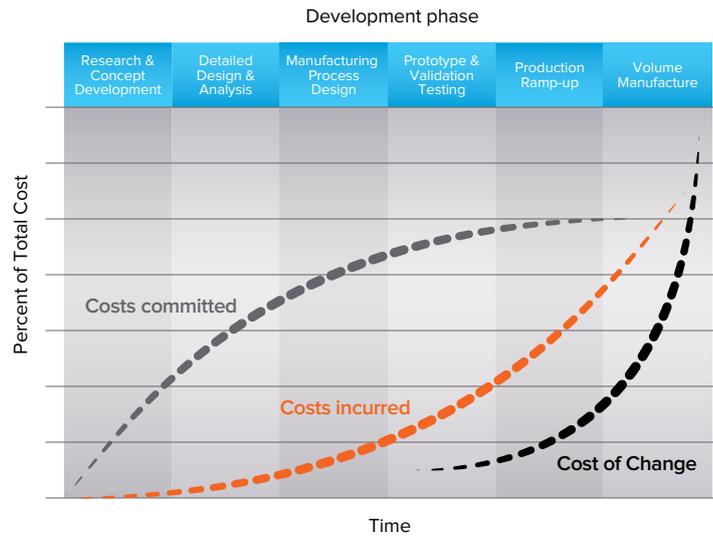


Figure 4: Product costs are largely locked down during initial investigation and design and engineering.

Controlling quality and costs as the product changes may seem daunting. However, material costs are only a fraction of the story. Decisions must also result in streamlined supply, logistics, production, and warranty processes. To weigh all of these factors, the team needs to analyze a wide variety of information that is typically owned and controlled by separate groups in a shared application such as ERP or PLM.

An Aberdeen report² shows that companies running best-in-class change processes are more than twice as likely to hit their targets for quality and product cost. Companies achieving best-in-class change processes are more than twice as likely as others to have PLM. PLM supports every stage of the product lifecycle, as shown in Figure 5. However, companies ideally need PLM integrated with enterprise applications, trading partner collaboration that reaches well beyond EDI, and powerful multi-source analytics.

Concept	Development	Production	Mid-life	Retirement
Setting up the Bill of Material	Producing sales material	Proving regulations compliance	Handling recalls efficiently	Capturing organizational learning
Visualizing possible configuration	Setting quality standards	Producing technical manuals	Launching derivative models	Enabling parts carry over to new models
Building virtual concepts	Defining manufacturing processes	Feeding ERP, MES, SCM, CRM	Incorporating new features	Maintaining adequate parts stocks
	Incorporating supplier systems	Defining vehicle configuration	Setting up new factories	Closing down production
	Rapid prototyping		Setting up new suppliers	

Figure 5: PLM supports every stage of the product lifecycle.

1 David M. Anderson, Design for Manufacturability & Concurrent Engineering, CIM Press, 2006.
 2 Aberdeen Group, Engineering Change Management 2.0: Better Business Decisions from Intelligent Change Management, September 2007.

Change process transparency and resilience

The demand for change comes from many sources and in many forms, but making changes is always a team activity. However, it's a tall order for the change process to be both cost-effective and speedy in a rapidly changing and complex environment.

Frequent change is becoming an urgent need. As people around the globe engage to discuss specific aspects of the vehicles in their lives using the Internet and social media, they will expect to see the impact of their suggestions.

Companies must now extend transparency and integrate the array of processes that control the product across the entire lifecycle and the supply base for a vehicle. Consistent processes for product change requires new capabilities in both the organization and the technologies that support it. Important capabilities include:



Figure 6: Three business interaction types: a community trend, a joint view on how to address an issue, and the transaction between buyer and supplier.

- Each participant needs a specific view. This view must match their involvement in any specific change for any specific product, yet deliver the full context of all disciplines and trading partners.
- Analysis must be dynamic to drive effective decisions about what the transactions should be. Transactional, collaborative, and social media approaches interact to drive effective change action, as shown in Figure 6.
- Change processes will have multiple levels of control. Some process parts require formal, fixed gates to support quality and standards audits, whereas other process parts operate more effectively through less formal collaborative approaches.
- Each change process must be managed as a project to ensure that nothing is missed and that escalation occurs when issues are not resolved on the original workflow path.

- Improving the process for product change requires a comprehensive means of capturing process metrics and providing timely analytics that drive effective action.

Once change processes are transparent and resilient, companies can apply continuous improvement not only to the product, but to all supporting processes, as well. This will put the company in an excellent position to see new opportunities and proactively address issues before they become problems.

Getting on the road to success

The new face of competitiveness, much like today's automotive products, requires the highest degree of efficiency and innovation. As the pace accelerates and complexity of change grows, each company must craft processes to ensure complete visibility, effective collaboration, and unprecedented control across all disciplines and with all trading partners on both the buying and supplying sides. Even the most successful automotive industry competitors are not at that level today.

Leaders are moving in the right direction at a high speed. Yet most companies cannot and will not want to undertake the journey overnight. There is no silver bullet or single approach that is right for all companies in the industry, partly because of differences in organizational issues, process maturity, and installed IT applications.

Regardless of the company's current state, every automotive company can take practical steps now. There are some process concepts and accompanying software to add to current ERP and PLM platforms. The company can:

- Gain a better understanding of how product changes impact cost, inventory, production schedules, cycle time, and quality with analysis across disciplines, partners, and the product lifecycle.
- Treat each product change as a project. Project management software facilitates coherence with workflow, escalation, and resource views to improve efficiency and ensure timely change resolution.
- Connect the disciplines and data to generate knowledge. Ideally, all individuals and applications involved can dynamically update a unified knowledge base. From this platform, a company can drive multidiscipline business intelligence, enterprise search, and mobile applications in a role-based context.
- Broadcast and monitor application activity to ensure completely engineered and instant change notifications. Social media-style enterprise capabilities allow an individual to broadcast and monitor demands, exceptions, and knowledge on any device.
- Reach out to your network and gain better visibility. Today's portals not only allow electronic data interchange and advanced product quality planning capabilities, but they are active dashboards that show inventory as it moves. A portal can also empower collaboration on purchase orders and exceptions and deliver automated supplier performance ratings. Layering this type of portal on top of PLM and ERP can also empower dynamic collaboration between trading partners to keep cash flowing and performance on track.

Urgency for automotive suppliers to get on this transformative path is enormous, as highlighted in a recent MIT study:

“The ground has shifted, however, and enterprises no longer compete based on process management and continuous improvement. They must instead create dynamic long-term capabilities, establish inter-organizational networks fostering learning, knowledge-creation and innovation, and evolve adaptive and reconfigurable network architectures to thrive under varying external environmental conditions characterized by increasing complexity, high-velocity change and uncertainty”.³

Change management is a multi-disciplinary practice that every company can and must improve. As leaders drive down this road, they will be in position to capture new opportunity and optimize their position in the automotive supply chain. Take the first step now—even if it's a small one.

Consider Infor

There are solutions for change management proven to be effective in the automotive industry. Whether you're keeping pace with accelerating change, factoring change into effective decisions, managing change costs, or gaining visibility into the change management process, you can leverage today's solutions to meet these challenges. To learn more, contact Infor™ today or visit us at www.infor.com or at www.infor.com/industries/automotive/.

³ Kirkor Bozdogan, Towards An Integration Of The Lean Enterprise System, Total Quality Management, Six Sigma And Related Enterprise Process Improvement Methods, Center for Technology, Policy and Industrial Development, Massachusetts Institute of Technology, 2010.



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