

Even Faster to Market: What's Next for the Vehicle Industry?

After rolling out new vehicles in two years or less, industry executives keep pushing the envelope. “How do I design, build and deliver new vehicles even faster? What new processes and tools will I need?”

Innovations in concurrent development processes, solids modeling, collaborative workflow, and part and assembly catalogs helped vehicle development teams get where they are today. Together, these tools eliminated barriers between design, engineering, quality assurance and manufacturing.

But these tools will only take you so far. Getting to market even faster requires that you re-think your management of people and equipment across the “engineering supply chain.” Today, you need the ability to effectively model, plan and optimize global resources throughout each stage of design, prototype and validation.

The new best practice for shrinking time-to-market is to apply the proven benefits of constraint-based factory planning to the massively complex development environments of vehicle design and engineering. The solution is available now. In fact, it's being deployed by the world's largest vehicle OEM. It's helping them eliminate bottlenecks by ensuring that their best people are consistently working on their most important projects.

This new best practice will impact you whether you're an OEM, a supplier, or a design or engineering firm. Are you ready?



A D E X A

The world's largest vehicle OEM has an 18-month head start in implementing the new best practice for accelerating time-to-market.

How will you respond?

Faster to Market: The New Best Practice

Ten years ago, no one believed vehicle industry executives could shrink time-to-market for new designs from 60 months to 18 to 24 months. How did it happen? Better management focus. Better concurrent engineering practices and standards for design, prototype and validation. Better collaboration and information hand-offs across development teams, both within and beyond the corporate four walls.

Better tools were part of the story, too. Specifically, we're talking about advances in solids modeling, computer-aided engineering systems, project management tools, product data management (PDM) software and Internet-enabled workflow applications. By managing the creation, propagation and storage of data, these tools ensured everyone spoke the same engineering language and worked on the same page. By leveraging shared intellectual capital (CAD drawings, product specifications, etc.), they dramatically compressed cycle times for development.

The question now is, what's next?

The new best practice for shrinking time-to-market is better management of people and equipment, not just data. This is no trivial undertaking. To get there, you need proven modeling, planning and optimization technology that ensures all of your development resources are working as efficiently and cost-effectively as possible, both individually and collectively.

The strength of this new best practice is the innovative application of the theory of constraints (TOC), the principle of lean manufacturing, and techniques of cost and profit optimization, just-in-time (JIT) scheduling, and yield management—mainstays of factory planning—to that other critical supply chain: the engineering supply chain. With the right modeling, planning and optimization software in place, you can effectively manage complex, distributed and finite resources throughout each stage of vehicle development. The payoff? You can be even faster to market.

Optimizing the Engineering Supply Chain

If you're a vehicle industry executive, you have good reason to believe your investments in solids modeling and engineering analysis software, as well as ongoing innovations in PDM and Internet-based workflow tools, will continue to pay off. But these tools alone won't shave six months or more from your development pipeline for new vehicles. Managing data and intellectual capital is one thing. Managing resources is another.

Your next quantum leap in accelerating time-to-market will come from software that eliminates bottlenecks throughout your product development pipeline. How? By modeling *people*, including drafters, artists, designers, engineers and QA personnel. By modeling *equipment*, including engineering workstations, molding and fabrication devices, and prototype and test machines. By planning the highly sequence-dependent activities of cross-organizational teams. By reacting intelligently to project delays and mishaps. By recommending time- and cost-efficient resolutions and workarounds. In so doing you optimize your extended engineering supply chain.

Think of the technology as project management software on steroids. Besides planning, scheduling and sequencing development processes, you can run powerful "what-if" analyses involving time, capacity, quality and costs. You also gain top-down visibility into the entire development process, including the activities of suppliers and subcontractors.

Your goal is to shave six months or more from your development pipeline.

Are you ready?

If You're An OEM Manufacturer...

You're continuing to outsource product development work to suppliers. To manage resources effectively, you need better planning visibility and execution across your extended engineering supply chain. You need the ability to:

1. Compile gross requirements for your multiple vehicle development programs.
2. Explode these requirements into bill-of-resource (BOR) specifications and communicate them to internal organizations and suppliers.
3. Gather feedback on what can be feasibly done —when and by whom—based on multiple sourcing scenarios.
4. Optimize the plan based on the constraints of your extended engineering supply chain.
5. Monitor progress, re-planning as circumstances and priorities change.

***Faster-to-market
requires better
management of
product
development
resources.***

Beyond Data Management

Without question, computers have revolutionized new vehicle development. In the 1960s and 1970s, OEMs pioneered computer-aided design (CAD) systems to model new vehicles based on mathematical data. The 1980s saw widespread adoption of CAD technology and its siblings, computer-aided manufacturing (CAM) and computer-aided engineering (CAE), to leverage that math data. These breakthroughs led to exponential reductions in vehicle development times.

In the 1990s, things really began to pay off. The standardization on one CAD system per OEM and the evolution of math data from wire frame to surface to solid models brought tremendous benefits.

That's the history. The question now is where do we go from here?

Some say the next frontier is collaborative workflow through the Internet. These systems began as product data management systems in the late 80s. PDM systems were essential to manage the explosion of computer-generated data spawned by their CAD/CAM/CAE cousins. In the 90s, PDM systems morphed into workflow, supporting vehicle development process models and enabling the rapid transmission of Engineering Change Notices (ECNs) and math data.

Others say the use of Internet-based catalogs for parts and assemblies is the new best practice. On the surface, the concept makes sense—companies are always attracted to innovations that promise to save time and money. In theory, recycling existing component specifications eliminates the need for additional design, fabrication and validation steps. But in the real world of vehicle development, most manufacturers would hesitate to reuse a five-year-old seat design (or electrical subsystem) in a new model. In short, the concept of catalogs oversimplifies the complexities of vehicle design and engineering.

Mastering Resource Management

Collaborative workflow and catalog applications are powerful stuff and will, no doubt, continue to improve. But will these tools alone, even with the Internet, get us to the 12-month vehicle? The answer is no, for two reasons.

First, without a comprehensive model of all of the resources involved in product development, as well as their associated constraints, collaboration and workflow have limited utility. Effective resource modeling must include, for example, your engineering workstations, the machines you use for prototyping and testing, your CAD designers, your engineering analysts, and your QA people. To complicate matters, these resources are distributed across multiple locations, are used both serially and in parallel, and frequently involve suppliers and contract workers.

Second, you need the ability to quickly generate a constrained plan based on your resource model and driven by strategic and tactical objectives defined at the management level. This plan must account for all of the relevant development tasks, cross-dependencies and sequence dependencies associated with vehicle development. You need the ability to explode out and track exact planning requirements, then communicate these requirements to everyone on a need-to-know basis. Finally, you need to be able to re-plan, then re-sequence, on the fly as circumstances and priorities change.

The underlying assumption, borrowed from lessons learned from the factory floor, is that the planning process is always incremental and exception driven, never static. Constraints change, as do priorities. Translated into the real-world terms of vehicle design and engineering, you need software that quickly generates time-optimal and cost-optimal schedules based on “material,” “capacity,” and other constraints, as well as factors and priorities such as due dates, lead and wait times, sequence dependencies, skill levels, and project completion commitments.

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The stakes are higher now. Better planning tools are needed.

Limitations of Current Tools

How do OEMs and suppliers ensure that their best people are consistently working on their most important projects? How do senior executives evaluate the impact of major new programs, minor facelifts or schedule delays in their pipelines for new products?

Today's project management tools have changed little from their origins in the 70s and 80s. Large planning staffs struggle with unwieldy and proprietary software tools or make do with PC applications. Resource-oriented collaboration across the engineering supply chain is missing. Visibility is limited, consequences are hidden, and "what-if" analysis requires heroic efforts.

Effective resource management calls for new business processes supported by new planning technology. This technology must efficiently model each process, identify and resolve constraints, and provide support for multiple scenarios. These tools exist today in manufacturing environments as Advanced Planning and Scheduling (APS) systems.

If You're a Vehicle Supplier...

You have multiple customers, often with conflicting requirements. You also have limited resources for design and engineering. How do you effectively meet customer demands while maximizing profits, minimizing costs, and using your people and equipment to best advantage? Today, you need the ability to:

1. Consolidate multiple customer demands and create a consensus forecast for gross resource consumption.
2. Constrain the forecast by calculating the most feasible, cost-optimal and profit-optimal use of your people and equipment, as well as which tasks to outsource.
3. Communicate the constrained forecast back to your customers. ("This is what I can do, and when, based on your requirements.")
4. Communicate relevant requirements to your design and engineering teams, as well as your own suppliers.

Lessons Learned from the Factory Floor

The value of APS in complex manufacturing is undisputed. APS complements less sophisticated enterprise resource planning (ERP) and materials resource planning (MRP) systems by efficiently solving complex problems involving the constraints of both capacity and materials. The benefits are unprecedented gains in productivity and efficiency, including better bottleneck utilization, greater overall throughput, lower inventory costs and shorter manufacturing cycle times.

APS systems enable manufacturers to model and solve their most challenging planning, scheduling and sequencing problems associated with production, assembly and distribution. Key capabilities include:

- Simultaneous consideration of factors such as materials, available resources, quality issues, customer requirements and supplier capacities.
- A robust modeling environment that incorporates constraints, configurable business rules and goals into the planning process.
- Powerful algorithms that quickly optimize the trade-offs between and among objectives such as minimizing cost, maximizing profitability and maximizing customer responsiveness.
- Use of memory-resident processing and database technology to ensure real-time plan and schedule creation and regeneration.
- The continuous monitoring of plans versus actuals as well as the score-carding of key performance indicators (KPIs) for on-time delivery, quality, costs and other business metrics.
- The integration of real-time decision support with predictive cost and profit analysis, enabling executives and senior managers to plan effectively based on considerations of “what if” and “what’s best.”

The application of factory APS is the new best practice for vehicle design and engineering.

Adexa's Product Development Planner eliminates costs and inefficiencies throughout each stage of vehicle development.

Revolutionizing New Vehicle Development

The application of APS technology to new vehicle development is the next frontier. Partnering with Adexa, one vehicle OEM has been implementing this best practice for the past year and a half. This OEM is adding powerful capabilities for constraint-based resource management to its math data and workflow toolset.

The solution is called Product Development Planner. By incorporating powerful, proprietary solver algorithms into its planning and optimization engine, Adexa's Product Development Planner is the first solution of its kind that enables executives and senior managers to manage their design and engineering resources based on the same planning principles that prevail on the factory floor.

Product Development Planner is a key component of iCollaboration, Adexa's integrated suite of supply chain management and e-business tools. Product Development Planner accelerates time-to-market for new vehicle designs by optimizing all phases of pre-manufacturing, including design, prototype and validation. With Product Development Planner, OEMs and suppliers can eliminate unnecessary costs and inefficiencies throughout each stage of vehicle development.

It's also fully Internet ready. The Product Development Planner engine functions simultaneously as a centralized "brain" and a distributed "nervous system" within a corporate-wide portal or private exchange community that links design, engineering, manufacturing, sales, and marketing teams across divisions and companies. Through its powerful aggregation and de-aggregation logic, Product Development Planner optimizes product development processes both locally and globally, rationalizing planning discrepancies and consistently respecting constraints throughout your extended community of users.

Real World, Real Results, Real Time

The devil is in the details. Modeling, prototyping and validating a new vehicle design entails dozens of subassemblies and hundreds of unique parts, all of which have complex engineering cross-dependencies. Some design and engineering work can proceed in parallel; other tasks must be executed in sequence. These complexities must be modeled and factored into monthly, weekly and daily planning buckets.

To complicate matters, today's vehicle product development teams are severely capacity-constrained. In many cases, the same person or machine may be assigned to multiple design projects, each with different scheduling milestones and sequence dependencies. And today's global development teams have different areas of expertise and work at multiple locations, including contractor facilities.

Product Development Planner was designed for these complexities—from the ground up and inside out. Its power lies in its ability to model highly distributed engineering supply chains—including people of different skill grades, project availabilities, and even pay scales. It then quickly generates an optimized plan delineating tasks and project milestones.

The complexities of vehicle development are real. Product Development Planner solves these complexities in real time.

If You're a Design or Engineering Firm...

Your resource capacity is variable, driven by fluctuations in demand from different customers, each with different requirements. As you bid on and win new vehicle development programs, you're constantly spinning up resources—then ramping them down as projects come to a close. You also feel the squeeze from competitors and larger players. To protect your market position, you need to be on the leading edge in adopting technology that lets you:

1. Accurately forecast demand from OEMs and suppliers.
2. Calculate the most profit-optimal mix of development resources to meet gross requirements.
3. Communicate precisely what you can deliver—when and how—in your bid proposals and request-for-quotation (RFQ) responses.
4. Plan, schedule and sequence the operations of your people and equipment in monthly, weekly and daily increments.
5. Synchronize your resource utilization—including your use of contract employees, leased facilities and rented equipment—to the ramp-up and phase-out stages of each project.
6. Offer “engineering supply chain management” as a value-added (and potentially high-margin) service to customers.

The Adexa solution strengthens your in-place engineering and e-business programs.

Integrating People, Processes and Tools

Using Product Development Planner, stakeholders benefit not only from a state-of-the-art optimization engine for planning, scheduling and sequencing design and engineering activities, but also from a closed-loop system that supports:

- A dedicated exchange community for collaborative product development involving strategic organizations, suppliers, and contractors.
- Consensus forecasting on gross and component-level resource requirements for design, engineering, prototyping and testing.
- Available -to-promise (ATP) and capable -to-promise (CTP) calculations (what development tasks can be done, when, and by whom).
- “What-if” analyses of time, cost, quality and other issues that impact product development projects.
- Real-time alerts, exception signals, early-warning notifications and graphical reports, triggered by intelligent business agents, which inform stakeholders of current status, including completed milestones and project glitches.
- Integration across heterogeneous systems, including engineering and project management applications.

This last item, integration, is critical given the disparities among legacy systems used by organizations and companies. Product Development Planner leverages the value of all in-place engineering business systems for personnel, project management, financials, and work order management. Its “single data model” architecture provides a common touch point of integration for transferring data between and among these applications. It also supports “any-to-any” translation between and among various B2B message formats and protocols, including EDI and all flavors of XML. The bottom line is rapid, scalable and low-risk integration across platforms.

How to Get Started

The vehicle industry continues to re-invent itself by innovating new practices to cut time and cost out of product development while improving quality and innovation. Real progress has been made thanks to better processes and tools that improve the accuracy and flow of information.

Now the bar has been raised again. The next imperative for vehicle companies is better management of resources across the extended engineering supply chain. Adexa has pioneered this new best practice in partnership with the world's leading vehicle OEM. We've leveraged our expertise in your industry to develop a solution, available now, which gets you even faster to market, minimizes costs and maximizes quality.

As an industry leader, you cannot afford to be a late adopter of this new best practice. Nor can you afford to ignore the technology that supports it. For more information on Product Development Planner and Adexa's other tools for accelerating time-to-market, call us at 888-300-7692 or log on to adexa.com.

What steps are you taking to be even faster to market?

Adexa delivers a breakthrough solution you can implement today.