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## Optimizing Lean Product Development for Automotive Goods

While Lean is a familiar word for the manufacturing organizations of most manufacturers, it is a concept that is just beginning to make headway in product development circles. Organizations have found success 'Leaning out' manufacturing operations and supply chains, particularly in terms of cost reduction, but bringing Lean to engineering and design organizations is about removing redundancy and wasted effort from a product's critical path from concept to shipment. The concepts are more familiar for engineers in the engineering departments of automotive suppliers and OEMs, which are more likely than their peers in other sectors to report formal Lean product development programs. Automotive manufacturers that are not bringing Lean to product development are missing the considerable benefits realized by their competitors, while those with mature Lean programs have the opportunity to get the most from Lean with a little fine-tuning.

### Lean Product Development

First popularized by Toyota Motor Corporation, Lean principles originated in the automotive sector. As such, the progress of Lean in new product development among these manufacturers is slightly ahead of other sectors. Thirty-nine percent (39%) of automotive manufacturers report that they have pursued Lean product development programs for over a year, which can be compared to 33% of manufacturers in all sectors.

Of course, it's more than familiarity that's driving the relative maturity of Lean in the automotive sector. Aberdeen Group's May 2007 [Lean Product Development Benchmark Report](#) found that the major factors that make Lean attractive to the product development organizations of automotive industry are split relatively evenly between the top and bottom line (Table I).

**Table I: Top Pressures Driving Lean Product Development**

	<b>Automotive Goods</b>	<b>All Respondents</b>
Global markets / competition	45%	39%
Market demand for rapid product introduction	41%	37%
Limited product development budgets	40%	34%
Shorter product profitability windows	27%	21%

Source: Aberdeen Group, May 2007

### Sector Insight

Aberdeen's Sector Insights provide strategic perspective and analysis of primary research results by industry, market segment, or geography

### Sector Definition

For the purposes of this study, respondents who indicated that they operated within the automotive industry were isolated and aggregated for comparison against peer manufacturers across industries in Aberdeen Group's performance framework. Respondents are primarily tier one and tier two automotive suppliers, rather than OEMs.

The majority (76%) of these manufacturers are located in North America, with the remaining respondents split between Europe (20%), Asia (3%), and other areas of the world (1%).

The focus on schedules in addition to budgets highlights how Lean principles apply to product development in addition to manufacturing. In product development, Lean is often about streamlining repetitive and redundant processes as often as it is about decreasing budgets. While these pressures are similar to those of the product development organizations of other industries, they are even stronger for automotive suppliers. The automotive industry faces fierce global competition. This makes a program designed to improve the efficiency of processes in a way that allows an organization to get products to market faster while keeping costs down particularly compelling.

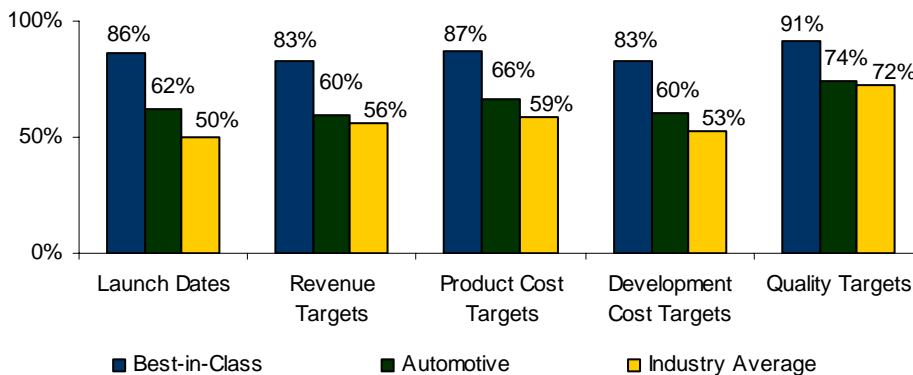
“Focusing and emphasis on Lean production and waste reduction starts right at the source in product design process. The benefits are increased reliability and durability while reducing costs and compressing the time of product development.”

~ R&D Director  
Automotive Equipment  
Manufacturer

## Aberdeen Analysis

How is Lean impacting the ability of these organizations to address these issues? To find the answer, Aberdeen's May 2007 [Lean Product Development](#) benchmark study surveyed participating companies regarding the percent of their products that meet key product development metrics. Aberdeen found that the relative maturity of Lean among automotive suppliers is reflected in the performance that these companies report, which is roughly on par with that of the Industry Average (Figure 1). In addition, these companies report that 46% of their time is spent on 'value-added' product development activities rather than on activities that they consider to be 'waste.'

**Figure 1: The Maturity Class Framework**



Source: Aberdeen Group, May 2007

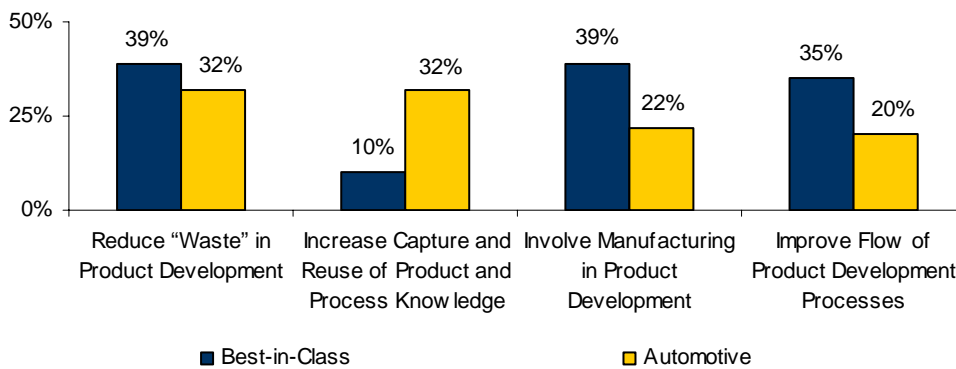
Automotive manufacturers report particularly strong performance regarding product launch dates, where they meet their targets on 12% more products than the Industry Average. They also report strong performance meeting both direct product and development costs. However, they remain on par with the Industry Average on revenue targets and quality targets, where they have the greatest opportunity to improve their business. While these companies have been successful at reducing the cost and improving the speed of their product development processes, they may be doing so at the expense of quality, and thus revenue.

The Best-in-Class, by contrast, meet all of these targets on an 83% or better average, with a lead of 15% or more over automotive companies in all of these areas. In addition, the Best-in-Class report that 69% of their product development time is devoted to value-added or productive design activities, 1.5-times that reported by automotive manufacturers.

### Lean Strategies of Automotive Suppliers

What are the Best-in-Class doing differently than automotive suppliers? At a general level, they have been pursuing Lean strategies for longer than automotive suppliers, with 65% of these companies have been pursuing a formal Lean program for longer than a year. In practical terms, what this means is more attention to improving process flow and improving coordination with the manufacturing organization (Figure 2).

**Figure 2: Top Four Lean Strategies of Automotive Suppliers**



Source: Aberdeen Group, May 2007

Both automotive suppliers and the Best-in-Class report a lot of attention around reducing 'waste' in product development. This is a top action for both, and is reported about as often by each group. The reduction of 'waste,' or non-value added activities, is a core principle of Lean, so its popularity isn't surprising. Interestingly, the second most commonly reported action of automotive suppliers, increasing the capture and reuse of product and process knowledge, is reported by these companies 3.2-times as often as the Best-in-Class. As will be seen in the sections to follow, the ability to access and reuse knowledge is a major component of these organizations' Lean programs. The prevalence of it on a strategic level, particularly so much more often than among the Best-in-Class, for whom knowledge management and Lean also go largely hand in hand, is surprising.

One explanation is the highly distributed nature of product development for these companies. The series of relationships between suppliers and OEMs means that there is a greater potential to create something new when an existing part may have worked. In this strategic focus on capturing and identifying designs for reuse can be a major element of a Lean development program, rather than a supporting characteristic.

"We completely reviewed our new product development process to apply Lean principles, enhancing teamwork both within the design department and across the entire organization. We were lucky (or able) enough to demonstrate some time and cost savings due to the initiative, and that prompted our top management to give higher commitment to re-engineering product development. Our company was able to score its shortest lead time ever for the design and development of a new product and reduce development costs by 16% on a yearly basis. Some problems are still to be addressed and solved; the work to do is not finished."

~ Product Development and Planning Manager  
Automotive Manufacturer

The area where automotive suppliers may be missing considerable opportunity is by failing to involve manufacturing in product development. The Best-in-Class are nearly twice as likely as these companies to make this part of their Lean product development programs. Lean product development processes can make little difference if manufacturing organizations can't produce the product. For automotive companies, involving manufacturing in product development can mean avoiding fixing problems when designs can't be manufactured on the shop floor. The delays and scrap caused when these organizations have to find fixes that could have been resolved by earlier collaboration can negate the benefits a Lean product development organization can provide. Additionally, by involving manufacturing in product development, the Best-in-Class also allow these organizations to complete manufacturing planning processes soon as well, further improving efficiency.

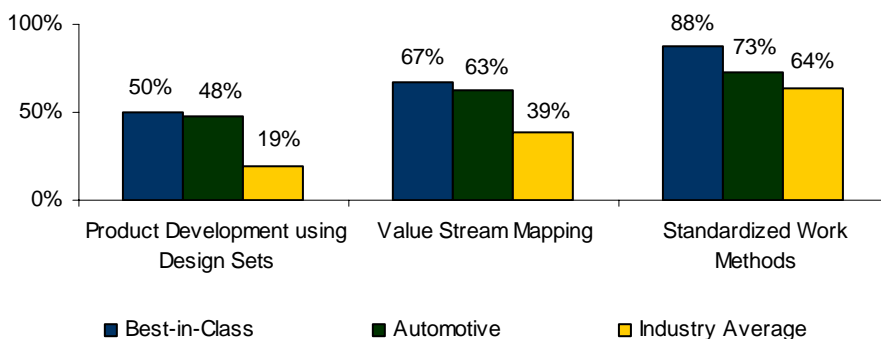
### Optimizing Lean Product Development

Having taken many of the initial steps, leveraging Lean to improve performance, is not necessarily a daunting prospect for automotive organizations. Aberdeen found that many of these manufacturers already exhibit many of the same capabilities of the Best-in-Class. In fact, their adoption of these capabilities frequently eclipses that of the Industry Average. There are, however, a number of key areas where these companies are missing critical opportunities to expand on their Lean product development programs.

#### Streamline Processes: Getting up to Speed

Automotive suppliers have taken great strides towards streamlining product development processes. On a strategic level, improving process flow is not a high priority for many of these companies, but that may be because they have already taken many of these actions. In fact, automotive supplier report adoption of Lean process capabilities at near Best-in-Class levels (Figure 3).

**Figure 3: Process Capabilities of the Best-in-Class**



Source: Aberdeen Group, May 2007

The high level of adoption of these capabilities may reflect the maturity of Lean in automotive manufacturers. Automotive companies report both the use of design sets and value stream mapping on par with the Best-in-Class. Automotive companies just beginning their Lean product development programs would be best served by following in the path blazed by their peers and the Best-in-Class.

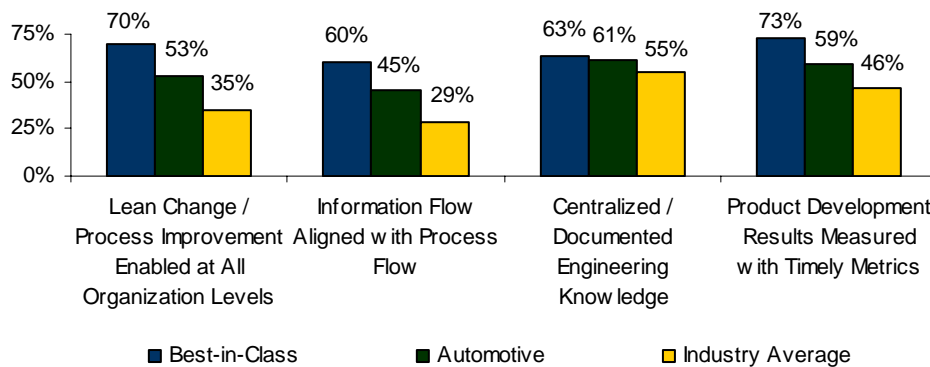
In fact, both are hallmarks of Lean process. Value stream mapping is often an initial step of Lean, by which the steps of a process are scrutinized for inefficiencies and wasted effort. Activities that do not contribute to achieving customer value are redefined or removed in order to streamline the overall product development process. Once inefficiency is removed, the next step is often to standardize these processes across an organization. This is a step where automotive manufacturers fall further behind the Best-in-Class, representing a potential opportunity for many of these manufacturers to improve the efficacy of their Lean product development programs as a result.

The other area where automotive companies approach the Best-in-Class is in the application of design sets to product development. This is an approach that breaks a design into a series of functional 'modules' with standardized interfaces that buffer each area from dramatic changes that may be made to others. This enables engineers to explore a wide variety of new options in parallel with minimal impact to one another. It makes a lot of sense for an automotive company to adopt this approach as they can have a basic platform to base new designs on, but then interchange components to create new models. The Best-in-Class are 2.6-times as likely as the Industry Average to adopt this approach, effectively enabling innovation without introducing risk.

### ***Supporting Lean Development***

Again, automotive manufacturers are well ahead of the curve when it comes to empowering the organization to execute on Lean programs. They don't, however, quite approach the Best-in-Class as often as when it comes to streamlining processes (Figure 4).

**Figure 4: Support Capabilities of the Best-in-Class**



Source: Aberdeen Group, May 2007

Given their strategic focus on capturing and reusing knowledge, the most important capability for automotive manufacturers might be the centralization of engineering knowledge. Central access is a critical step to removing waste from product development for these manufacturers. It is a supporting capability for most industries, but a central location that is accessible by all design stakeholders can be a critical aspect of Lean for automotive suppliers. It improves an organization's ability to reuse designs and can significantly improve the efficiency of product development processes.

There are, however, two important steps that the Best-in-Class have taken, but automotive manufacturers largely have not: enabling Lean process improvement at all organizational levels and aligning information flow with process flow. Specifically, the Best-in-Class are 32% more likely than automotive manufacturers to authorize individual process owners to make the changes required to 'Lean out' those processes. By doing so, the Best-in-Class recognize that those performing a task are often the ones who best understand it, and thus have the best insight to improve it. By placing Lean responsibility in the hands of the engineering staff, the Best-in-Class also increase employee buy-in, which can improve the efficacy of a Lean program as they are more likely to embrace new processes when they feel they have a voice in the definition of the process.

However, a more critical step may be aligning information flow with process flow. Automotive manufacturers have invested the effort to transform their processes, but without adapting the flow of information through their organization to match it, they are creating roadblocks for themselves. The Best-in-Class are 33% more likely than automotive manufacturers to align information flow to process flow. Ensuring that individuals at all steps of the process have the right information to do their jobs without waiting, excessive searching, or rework of data has the potential to reduce development time and improve overall product development efficiency.

Finally, automotive manufacturers have the opportunity to improve by measuring the progress of their Lean programs through the application of

formal metrics. The Best-in-Class are 23% more likely than automotive manufacturers to drive continuing improvements by measuring the success of Lean programs with formal and timely metrics. While this isn't a core aspect of Lean, continuous improvement is. Tracking progress allows these organizations to recognize what's working and what areas they need to continue to find the means to continue to improve and profit from their Lean initiative.

### **The Role of Technology**

The Best-in-Class are also taking advantage of technology tools as part of their Lean programs. The solutions they are using range from digital manufacturing tools, Product Data Management (PDM), as well as portfolio management and workflow or business process management (Table 2).

**Table 2: Technology Enablers Supporting Lean**

	<b>Best-in-Class</b>	<b>Automotive</b>	<b>Industry Average</b>
Digital Manufacturing (DM) / manufacturing process planning	53%	50%	23%
Product Data Management (PDM)	67%	66%	48%
Advanced search technologies	53%	31%	23%
Product portfolio management	72%	58%	51%
Workflow / Business Process Management (BPM)	57%	36%	38%

Source: Aberdeen Group, May 2007

Digital manufacturing solutions help support concurrent development, through the use manufacturing process planning solutions to plan, develop, and reuse manufacturing processes plus catch potential design problems that could cause problems during the manufacturing process. In this way, they improve the efficiency of design processes, enhance the manufacturability of designs, and allow manufacturing planning processes to begin earlier thus avoiding errors and rework which can lengthen time to market and as well as add cost.

The adoption of PDM among automotive companies is near that of the Best-in-Class, which is not surprising given the strategic attention to capturing and reusing design knowledge that plays a major role in their Lean programs. However, they fail to take advantage of advanced search technology to sort through this information as consistently. Advanced search technologies that search by parameters or part characteristics reduce the time wasted looking for information or struggling with the limitations of less sophisticated searches. The Best-in-Class are 70% more likely than automotive companies to leverage these tools which can help take further advantage of design reuse strategies.

Finally, the Best-in-Class are more likely to make two additional investments that help enable them to streamline product development processes. On one hand, these companies are 58% more likely than automotive manufacturers to take advantage of workflow and business process management solutions, effectively automating the processes that they have streamlined. They are more likely than automotive manufacturers to leverage Product Portfolio Management (PPM) solutions. These tools allow the Best-in-Class to apply Lean to product development from a planning perspective. PPM tools are used to target resources and efforts on products that are best aligned to changing market needs such as a greater demand for more fuel efficient vehicles, effectively 'Leaning out' the portfolio to allow these organizations to focus on projects that will provide the greatest value by meeting the demands of the market.

## Recommendations

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Lean is a well established program in the product development departments of automotive suppliers and manufacturers. However, this does not mean that these organizations have arrived at the full value that Lean has to offer. In fact, it is somewhat surprising that given their familiarity with Lean and rather robust set of Lean product development capabilities, automotive manufacturers indicate performance that is roughly on par with the Industry Average in most areas. For many of these companies, the next steps are to find ways to better leverage the tools and capabilities they have adopted in a coordinated way:

- **Empower Lean decision makers at all levels of the organization.** Often the individual with the best insight into how to improve a process is the one who performs it. The Best-in-Class take advantage of the experience of their staff and enable the engineers who are responsible for a process to determine how it can be best improved. Additionally, by locating ownership of Lean programs at all levels of the product development organization, the Best-in-Class stimulate greater enthusiasm for Lean.
- **Involve manufacturing in the product development process.** This is an area where automotive companies have considerable opportunity for improvement. The Best-in-Class are 77% more likely than these companies to involve the manufacturing organization in product development as part of a specific Lean initiative. The use of digital manufacturing tools currently reported among automotive manufacturers helps to streamline the handoffs between engineering and manufacturing as well as head off incompatibilities between designs and manufacturing environments. What's lacking is priority at a strategic level that will enable automotive suppliers and manufacturers to make it a programmatic part of a Lean initiative to standardize and repeat more effectively.
- **Maximize the efficiency of design reuse.** The Lean product development initiatives of automotive manufacturers stand out from

their competitors most conspicuously in their focus on enabling the capture of knowledge and reuse of design knowledge. This strategy addresses a particular need of the design environment within the automotive sector and enables these companies to avoid wasting time creating something new when an existing design will work, freeing designers to focus on value-added product development tasks. In order to accomplish this, automotive manufacturers have centralized product knowledge and leverage product data management solutions to do so effectively. Advanced tools that search product data in a more sophisticated manner will allow these companies to continue to improve on these initiatives, and thus promote even more efficient use of time by their engineers. Currently, the Best-in-Class are 70% more likely than automotive companies to leverage advanced search technology, despite their relative lack of focus on reuse within their Lean programs.

For more information on this or other research topics, please visit [www.aberdeen.com](http://www.aberdeen.com).

### Related Research

[The Engineering Executive's Strategic Agenda](#); June 2008

[The Lean Product Development Benchmark Report](#); May 2007

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