



Winning with Lean in the Automotive Marketplace



A ROADMAP FOR SUPPLIERS

By **HARBOUR**
CONSULTING

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Foreword

Harbour and Associates has been chronicling the changes automotive manufacturers have been making to improve their operations for more than 20 years. Today, the pace of the automotive industry has never been faster. And there has never been a greater emphasis on lean manufacturing, continuous improvement and other activities that drive down costs and drive up quality and productivity.

In today's highly competitive marketplace, no company can afford to get left behind. Thus, every automotive manufacturer and supplier is working to eliminate waste and reduce cost, as well as improve their systems and products. Unfortunately, some companies have not been making the same strides as others. They have discovered they do not have the systems and processes in place to support their customers and be profitable in these highly competitive times.

Harbour is working with Microsoft to help automotive manufacturers – both OEMs and suppliers – recognize the factors and implement the systems and processes that will make your companies more competitive, and more valuable to your customers. At Harbour, our team visits dozens of automotive manufacturing operations each year to observe the systems and practices in place related to quality, lean manufacturing, continuous improvement, worker involvement, technology, level of product complexity, process design and layout. These visits help provide a better understanding of both a plant's results and a company's overall manufacturing strategy.

— Ron Harbour
President
Harbour and Associates, Inc.



I. State of the automotive industry

A highly competitive environment

Competition is greater than it has ever been in the automotive industry. And competition is becoming even more intense because every company is working hard to make their operations leaner and more efficient. In order not just to compete, but win in today's automotive marketplace:

- Best-in-class companies are decreasing their manufacturing costs across all product lines.
- Benchmarking performers are reducing cost even while increasing content and product complexity.
- Leading manufacturers are focused on quality, safety and throughput, which results in improved productivity and cost.
- Successful companies are building a foundation that creates an alignment between product, process and manufacturing.

Competition is just as fierce at all levels of the supply base. Suppliers are increasingly being called on to:

- Support their customers' global and local efforts.
- Increase their design responsibilities and get involved further upstream in a program development process.
- Provide significant upfront technical and engineering support, and ongoing production assistance.
- Help their customers gain competitive advantages in areas ranging from new products to new process technology to significant cost reductions.
- And have the agility and flexibility to quickly make design, scheduling, delivery and manufacturing changes.

Improved products

Customers in North America, Europe and throughout the world have an increasing number of choices of new pickup trucks, SUVs, large and small sedans, and so-called crossover vehicles. Many companies are accelerating the frequency of new vehicle introductions, as well as new features that will help win market share, attract customer interest and keep plants in production.

In today's highly competitive environment, customers clearly are looking for quality vehicles. And they also want all of the latest bells and whistles when determining their new vehicle purchase. While the public clearly is enamored with many of these new features, today's incentive-laden automotive climate also means buyers do not expect to pay more (if at all) to get these options in their vehicles.

Successful automakers understand what customers are willing to pay, then determine how to produce such a vehicle and still return a profit. The enhanced features providing automakers with a product differentiator often are being designed and produced by suppliers.

Cost pressures

Automakers are winning in the marketplace by providing high quality, highly reliable vehicles with all of the latest enhancements at a price customers are willing to pay. Companies that are creative, innovative and cost competitive are the ones that will win in the marketplace. That's why product and process design are such critical factors at the



The number of automotive suppliers has shrunk dramatically, from 30,000 in 1986 to about 5,000 at the end of 2003. Automakers are choosing to work only with suppliers they perceive to be the best at what they do; the rest are going away.

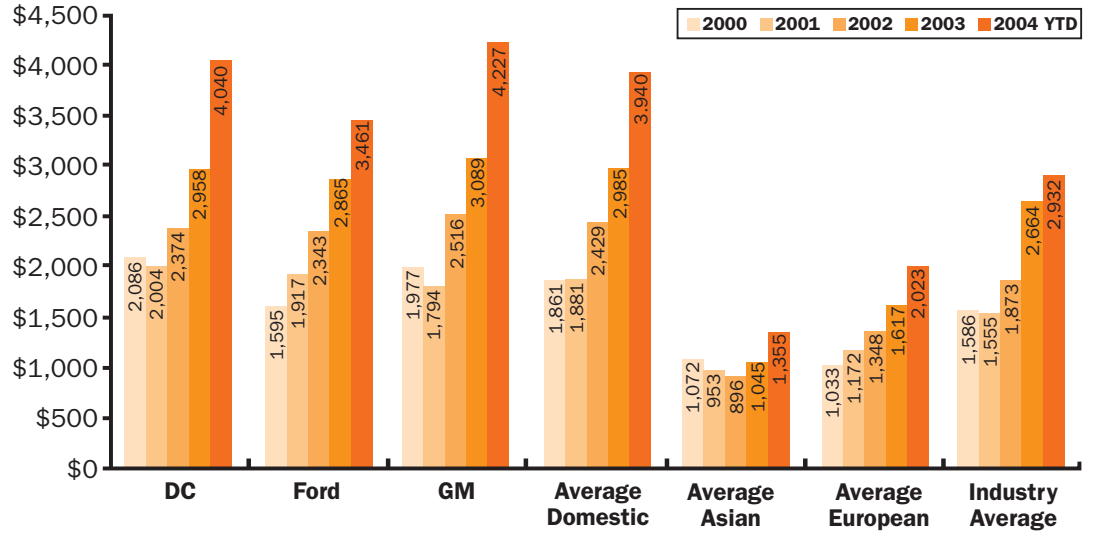


beginning phase of a new vehicle's life cycle.

In today's world, cost is a considerable factor. With so many models and brands to choose from, automakers are finding themselves in a period of price deflation, as rebates and low-cost financing are nothing more than retail price reductions.

Companies that are succeeding in today's environment have figured out how to offset additional costs without impacting profitability. Suppliers that cannot help their customers reduce costs are likely to lose business.

North American Average Sales Incentives



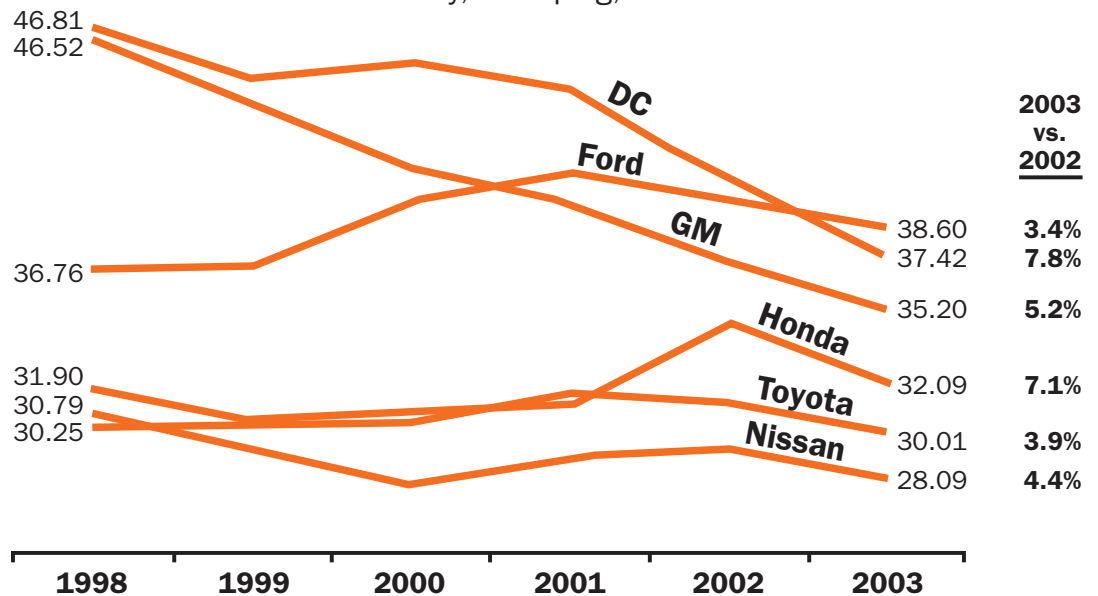
SOURCE: AUTODATA

Increased productivity

Why is productivity so important? Because productivity measures how effectively companies convert material and labor into a finished product. To succeed in today's environment, companies must improve their productivity to reduce variable cost.

The best manufacturers have considerable cost advantages over their competitors. They utilize lean, efficient, flexible systems and processes that enable them to produce high quality products faster and cheaper than the competition. Often, the savings generated are reinvested into unique, patented technologies and vehicle enhancements that provide customers with additional "perceived quality" and value. These enhancements often are the reasons why people buy a product, and spur sales and market share. Then a repeatable cycle ensues that benefits both customers and manufacturers.

North American History of Total Hours per Unit Assembly, Stamping, Powertrain



2003 vs. 2002

38.60 3.4%
37.42 7.8%
35.20 5.2%
32.09 7.1%
30.01 3.9%
28.09 4.4%

GM excludes medium duty. Honda, Nissan and Toyota data includes partial reporting of North American plants.



Global reach

These days, most automotive companies are designing their vehicles for a worldwide audience. The sharing of common platforms and architectures throughout North America, Europe and other continents better utilize available resources, avoid redundancies, improve product cadence, and allow for more implementation and reuse of company-wide systems, processes and components that improve operational efficiency.

Consequently, OEMs and suppliers are looking beyond North America to support their efforts – and not just in the area of manufacturing, either. An increasing amount of design, engineering and other work is moving to countries such as India, China, Malaysia and Eastern Europe, where overall costs are lower while technical competence is oftentimes equal.

Suppliers who can support OEM efforts in North America and Europe, Asia and South America, and help their customers become leaner and more efficient, have a better chance to grow their business as well.

II. What OEMs expect/want/need from their suppliers

Partners, not just suppliers

Suppliers are taking on more important roles in today's automotive industry. Manufacturers are concentrating on product planning, design, branding and marketing, and relying on suppliers to provide innovation and efficiencies for everything from new, enhanced products to IT applications. Suppliers are being asked to:

- Support automotive manufacturers globally.
- Identify areas for further cost reductions.
- Take a larger stake in investment costs and other risks.
- Provide greater engineering and technical support.
- Assist in the integration of systems throughout the supply chain.
- Assume greater responsibility for warranty cost.

This greater reliance on suppliers is changing – or will change in the future – the relationship between OEMs and their supply base. Suppliers are now responsible for greater investment and validation of a vehicle. OEMs and suppliers must work closer together, recognize and understand each other's needs, and create a foundation of trust that will result in their mutual benefit. OEMs risk losing of some of their best suppliers whenever the two sides are working against each other.

The best automotive manufacturers treat suppliers as partners in search of the same formula for success: simple, low-cost solutions with an appropriate level of profitability for everyone. They involve their supplier partners early in the concept phase. They share best practices, and cost improvements. And they work together to develop lean systems and processes and components.

Best suppliers, in turn, know their customers and can respond to their specific needs. They are focused on developing strong long-term relationships rather than short-term gains. These suppliers are likely to be the biggest winners in automotive marketplace.



Offshore Location Attractiveness Index

1. India
2. China
3. Malaysia
4. Czech Republic
5. Singapore

SOURCE: A.T. KEARNEY



The quality of OEM-supplier relationships is one of the most significant competitive differentiators in today's automotive world.

Innovative applications/opportunities that reduce total cost

Automotive manufacturers are improving their sales, market share, customer satisfaction and profit per vehicle by offering unique, low-cost products that create a "must have" demand from customers without adding to overall costs. How is an automaker gaining this cost advantage? More often than not, suppliers are responsible for these enhancements/improvements through the introduction of unique systems, patented technologies and innovative manufacturing solutions.

Some suppliers are being asked to take on a larger portion of the value stream of the total automotive process, so it's only natural that automakers are looking to their suppliers to help them become leaner, more efficient and lower their overall costs. Technology has had a great impact on the way automakers communicate and collaborate internally, and with suppliers. Technology applications and lean enterprise solutions produce productivity and throughput improvements in areas such as research and design, testing, scheduling and manufacturing. There are ways to share information between OEMs and suppliers, and ways to help manufacturers spread best practices among their operations. There are business processes that can dictate how technology is deployed, as well as ways to leverage everything from people to supplies.

Technology innovations, new applications and improvements of existing systems and processes all can help automotive manufacturers improve operations and lower total costs. To become strategic partners with their customers, suppliers must be able to, and must be ready to:

- Develop value propositions that maximize long-term utilization.
- Integrate themselves early into the development process.
- Share financial risks.
- Offer reliable, flexible and reusable systems that meet compressed lead times and minimize capital investment.
- Integrate themselves within their customer's operational systems via information exchanges and EDI systems.

The integration of lean systems and processes throughout the enterprise is a key enabler to a successful OEM-supplier partnership, and must cascade through every tier of the supply base. The most effective relationships are established early in the product development process, where significant focus can be put on collaborative design and cost reduction. This speeds the overall process and reduces late, costly engineering changes and launch times.



In 2003, General Motors spent \$3.5 million on off-shore manufacturing engineering work; in 2004, GM expects to shift \$48 million to lower cost locations.



III. The benefits of a good OEM/supplier relationship

Healthy financial partners/improved bottom lines

All of the OEMs are pressuring suppliers to lower costs. But the best relationships are formed when both partners gain financially when improvements are made. A collaborative approach is an effective way to identify applications / opportunities that will lower overall total costs of both suppliers and OEMs. OEMs that have the best relationships with their suppliers invest in this partnership, often by providing lean training and support to their supply base.

Several surveys of automotive suppliers in recent years have given highest marks to Japanese manufacturers such as Toyota, Honda and Nissan – companies that tend to have greater partnership relationships with their suppliers. The lowest marks, on the other hand, generally have gone to General Motors, Ford and Chrysler – companies that are known for demanding price cuts from their suppliers.

Improvements in quality/cost across value stream

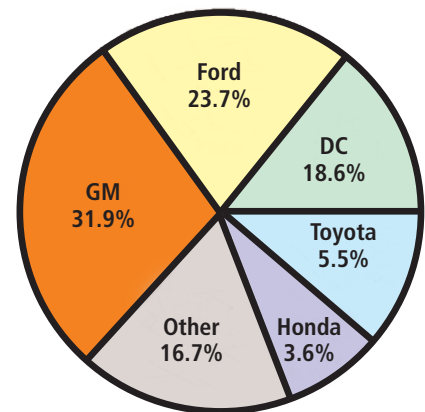
Suppliers are finding ways to help OEMs differentiate themselves, and not just with new products. The greatest advancements are those that can be applied across the value stream. There are opportunities in areas such as reusability, scalability, and common systems and processes. There are ways suppliers can help reduce lead time reductions and improve just-in-time deliveries and build sequence. All of these elements make up a lean, flexible operating system.

Best-in-class automotive manufacturers are focusing efforts to improve quality, cost and productivity in areas such as:

- Lean product design (lower cost, easier to build).
- Lean process and equipment design.
- Lean manufacturing.
- Lower capital investment.

Suppliers are taking on greater responsibility for making these improvements happen. The sharing of quality, warranty and recall costs is now common between OEMs and suppliers. Most automotive manufacturers have programs intended to reward suppliers for cost reduction ideas. It makes sense that suppliers focus on implementing and utilizing systems, processes and tools that will improve their own quality and cost performance, which then will benefit OEMs as well. The result of these initiatives is increased customer satisfaction, higher sales and greater profit.

Percentage of U.S. Car and Light Truck Warranty Claims in 2003



SOURCE: WALL STREET JOURNAL, JANUARY 6, 2004

Do better OEM-supplier relationships help reduce costs? Consider this: According to Warranty Week, General Motors expected to spend approximately \$537, Ford \$541 and DaimlerChrysler \$628 on per vehicle warranty claims in 2003. Toyota and Honda, two companies that rank as having the best relationships with suppliers, were expected to spend \$233 and \$216, respectively. U.S. car and light truck warranty claims in 2003 were expected to total \$7.9 billion.

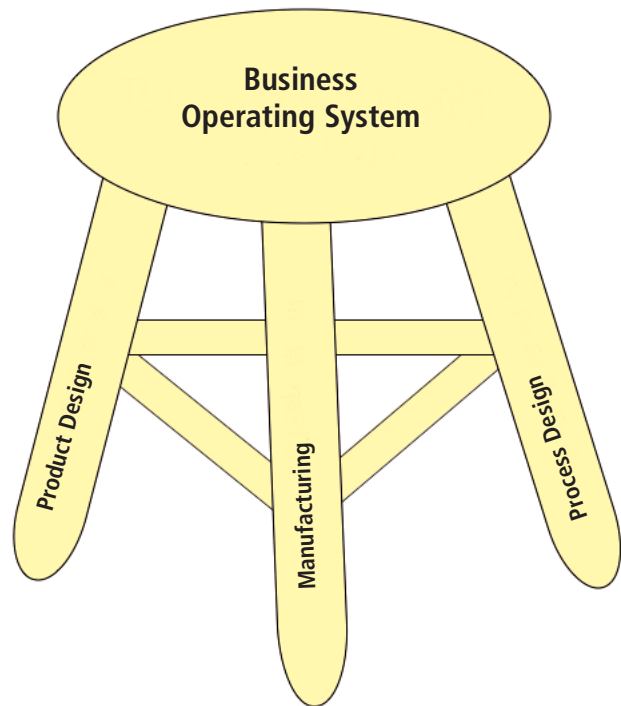


Competitive advantages

The best suppliers are designing and engineering low-cost systems and products that ensure a sustainable competitive advantage in the marketplace. These savings, in turn, can be shared between suppliers and the OEMs, and used to add more customer features to vehicles, to improve company bottom lines and to help develop even lower cost, higher efficiency systems, processes and features. A lean enterprise system with a fanatical focus on continuous improvement is key to developing and implementing higher quality, lower cost systems, processes and featured enhancements.

A lean business operating system is analogous to a three-legged stool. One leg is manufacturing, or the systems and processes in place at the plants. The other two legs are product design and process design, both of which take place in the program development stage. Best-in-class operations understand the interrelationship and the influence of the impact factors on the other legs and utilize cross-functional teams that work together to optimize total cost issues.

In the world of competitive automotive manufacturing, all three legs are integral, and must be given equal consideration. It is the responsibility – make that a requirement – of suppliers to help OEMs design, engineer, manufacture and deliver leaner, better, lower cost and simpler products and processes.



IMPACT FACTORS

Product Design	Manufacturing	Process Design
Design complexity	Plant volume/mix	Level of automation
Option content	Lean implantation	Build sequence
Build combinations	Sourcing strategy	Assembly methods
Build variation	Int. / Ext. quality	Workstation design
Attachment scheme	Absenteeism	Tooling design
Design band-aids	Labor agreements	Ergonomic issues
Packaging design	Shift pattern	Equipment design
Comp. sourcing	Relief pattern	Launch process
Build sequence	Contracted services	Part sequencing
Material type	Material logistics	Part presentation



IV. What is Lean

Getting lean – and helping your customers get lean – has never been more critical to the automotive industry. Lean is a journey not only worth taking, it's a trip companies must take if they hope to compete in today's marketplace.

In addition to improving their own systems and processes, OEMs are asking suppliers to help their efforts to get leaner and more flexible. For example:

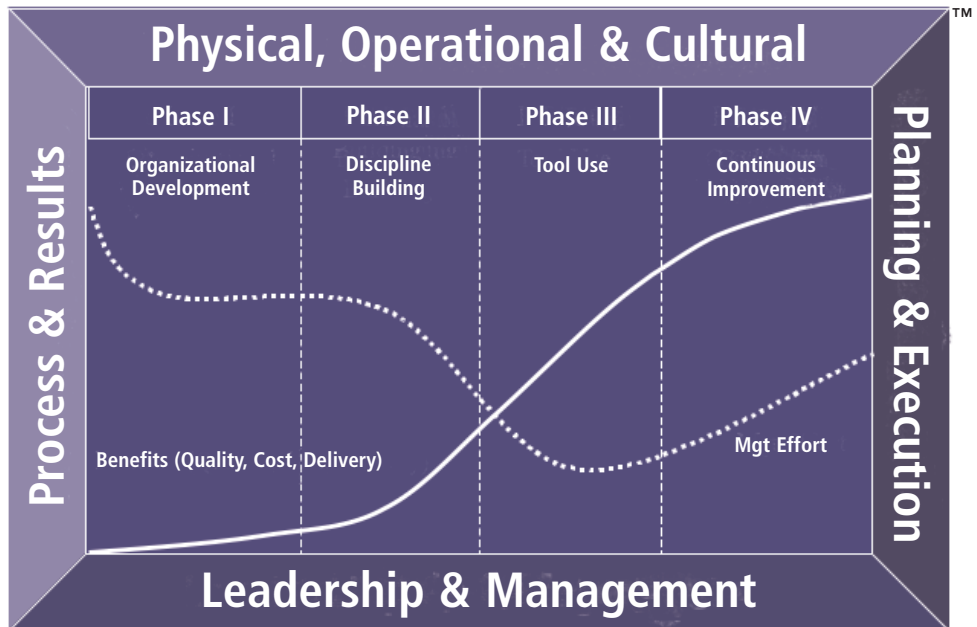
- How can suppliers help take investment and production costs out of their assembly systems, while at the same time increasing manufacturing flexibility? That's what new manufacturing systems are providing Honda and Toyota.
- What can suppliers do to help stamping operations improve average die changeover times, a key stamping operating indicator? Stamping requires a huge financial investment, and automakers are constantly seeking ways to get the most out of their equipment, labor and raw materials.
- And what can suppliers do to speed the introduction of new engines and transmissions? Powertrain launch activities are the slowest in the industry, and every day that engine and transmission plants are not running at high capacity is a financial drain on a company's bottom line.

Lean systems and processes provide the solution to all of the above competitive challenges. But to make the transformation to a lean operation in today's highly competitive automotive marketplace, companies must be willing to take all of the necessary steps that will bring about real change. They must create a process that will bring improvements and, at the same time, will ensure that improvement can be sustained in the future. Harbour calls this process the four phases of lean implementation.

Phase I – Organizational Development

Most companies – and not just automotive manufacturers – have spent untold dollars trying to get lean. Many of these same companies are going to expend even greater amounts of their precious dollars because initial attempts at lean manufacturing did not produce the results they expected – or needed. After their first attempts at lean fail, businesses go back to their drawing boards, look at their operations in the same traditional ways and try to come up with a couple of new “lean tools” – such as Six Sigma – they can force on their operations. Then, when their efforts again prove mostly fruitless, the cycle starts anew.

Unfortunately, not many companies understand the true concepts of lean manufacturing. Most tend to focus on results, and not the processes that will get them to lean. While their focus may produce some short-term results, improvement does not continue – and sometimes even goes backward – because there is nothing to sustain the momentum. Without a real understanding of lean, these companies' efforts to successfully implement lean are destined to fail – no matter how much money or resources they invest.

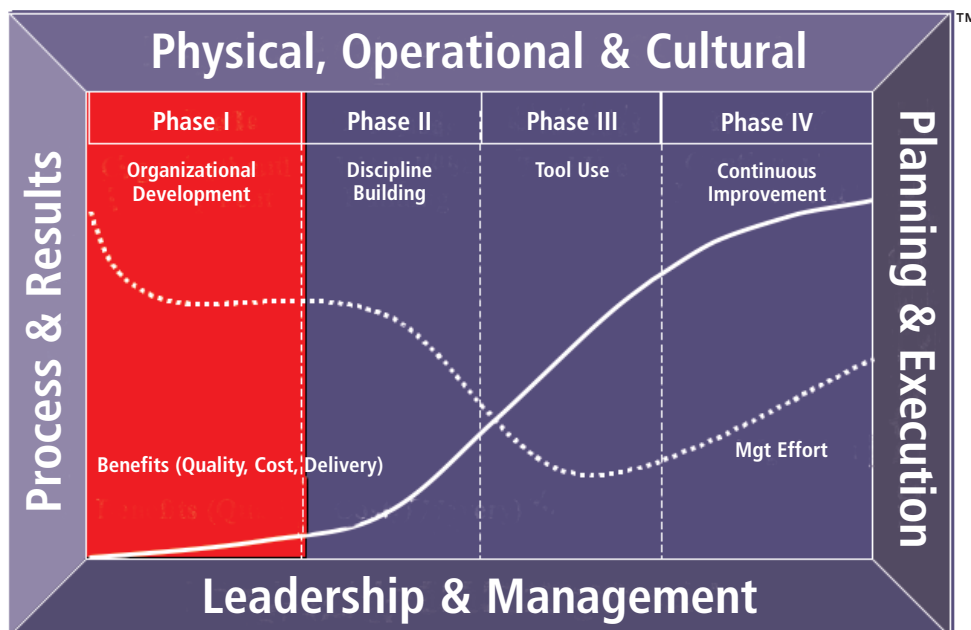




Organizational Development, or Phase 1, is the most critical element of Harbour and Associates' four-phase lean implementation process. In almost all of Harbour's studies and work with manufacturers, companies were unsuccessful in their implementation of lean practices because they failed to develop or skipped this critical first phase. Too often company leaders had no first-hand knowledge of what changes were needed to produce a truly lean environment. In the quest for instant results, leaders would move straight to the implementation of tools such as just-in-time production error-proofing or Kaizen events, then couldn't understand why these tools failed to produce the desired results. They also never viewed the transformation process beyond the shop floor.

Comprehension is a critical element of lean. But understanding is even more vital, and it only comes by learning, and then putting lean into practice. Both must take place in Phase I, when companies – and, in particular, company leaders – come together to develop the vision, goals and metrics that support a total commitment to the principles of lean manufacturing. More than simply developing a vision, mission statement or values, these leaders must align all levels of the organization in their support of lean. This includes development of a strong business plan, a robust policy deployment process, a set of metrics and well-defined roles and responsibilities. All of these elements create a system that will drive behavior and performance that support a lean environment. Most importantly, leaders must openly communicate what their organization is to become, how their organization intends to get there, and what each person's role is in the transformation process.

Lean manufacturing demands strong cultural and behavioral transformation at each level of the organization. And it all begins with leaders who recognize that changes need to be made, and who are willing to take whatever time is necessary to first understand, and then lead all of the work that must take place in order for lean to be successful. A high level of management and leadership effort is required during Phase I, with minimal impact to the bottom line. Positive results will never occur without leaders who are “champions for change” – from top executives to line personnel at each manufacturing operation. In short, company leaders must practice what they preach.

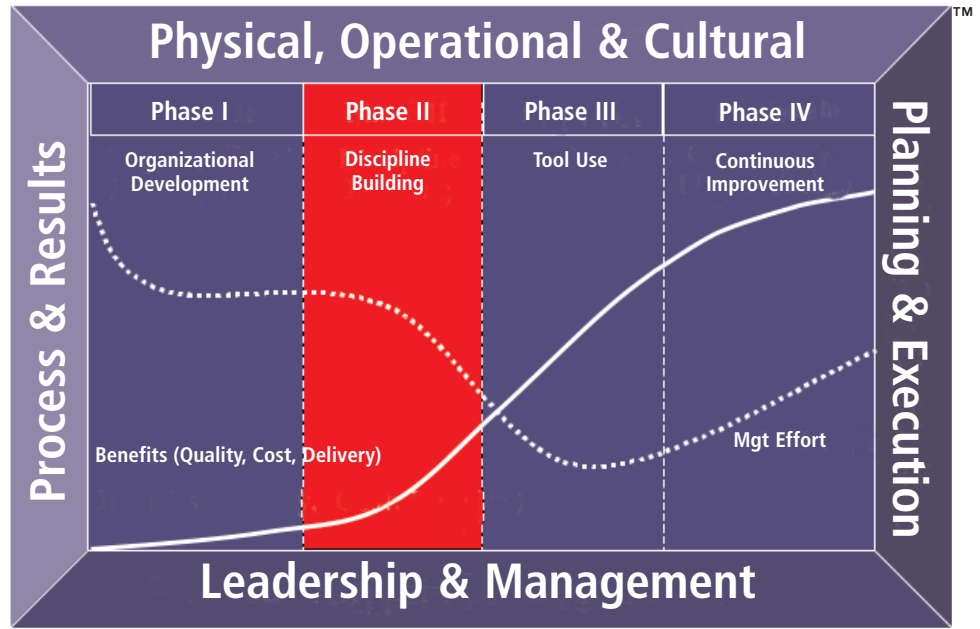


Phase I: The foundation is established for management, cultural and behavioral transformation.



Phase II – Discipline Building

Discipline Building is the biggest challenge an organization must overcome on the road to lean. Here, a new way of management becomes paramount as company leaders persuade middle managers and hourly workers that change is necessary in the way they do their work and the methods they use to measure their performance. Convincing anyone of the need for change is difficult because it means asking people to step outside their comfort zone and their old ways of doing things. Change is possible at any operation. But it takes a disciplined approach that focuses not on results, but on the development and adherence to standards and processes that eventually will produce the desired results.



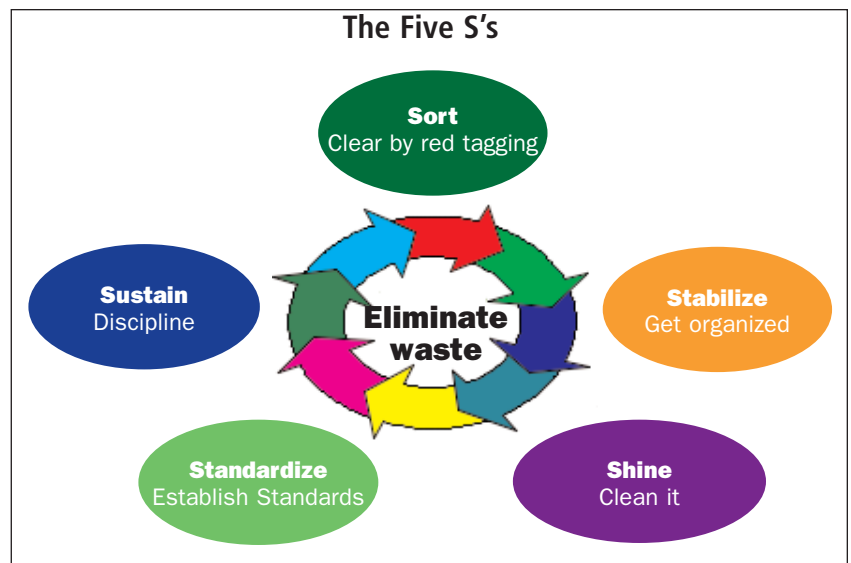
Phase II: The shop floor transformation begins and sustainable quality improvements start to be realized.

In the Discipline Building phase, managers are likely to be the first ones asked to make changes in what they do, what they measure, and what they look at. For example, implementation of standardized work means doing a job the exact same way every time. Managers not only must accept these new procedures, they must become the leaders of change. Their willingness to embrace and drive the process and their desire to achieve results can stabilize an operation. They must lead by example, and establish the standard for which the organization measures itself. This is the step that places entire organizations on the path to a lean environment. Discipline to the process is the driving force that builds and sustains a lasting structure.

Phase III – Tool use

Total productive maintenance. In-station process controls. 5S. Error-proofing. Quick changeovers. Kanban. Andon. Just-in-time manufacturing. Most people consider these to be some of the essential tools of lean manufacturing. For example, Kanban is a method for assuring the correct parts are available at the right time and in the quantity needed. Kanban eliminates waste through improved control of production schedules, material usage and inventory levels.

Kanban and all of these tools improve operations – but only when they are implemented and executed properly by a company that has established a cultural and organizational structure to support them. All of these elements come into use in Phase III, the stage where company leaders begin to understand the vast resources they have available, and how they can be

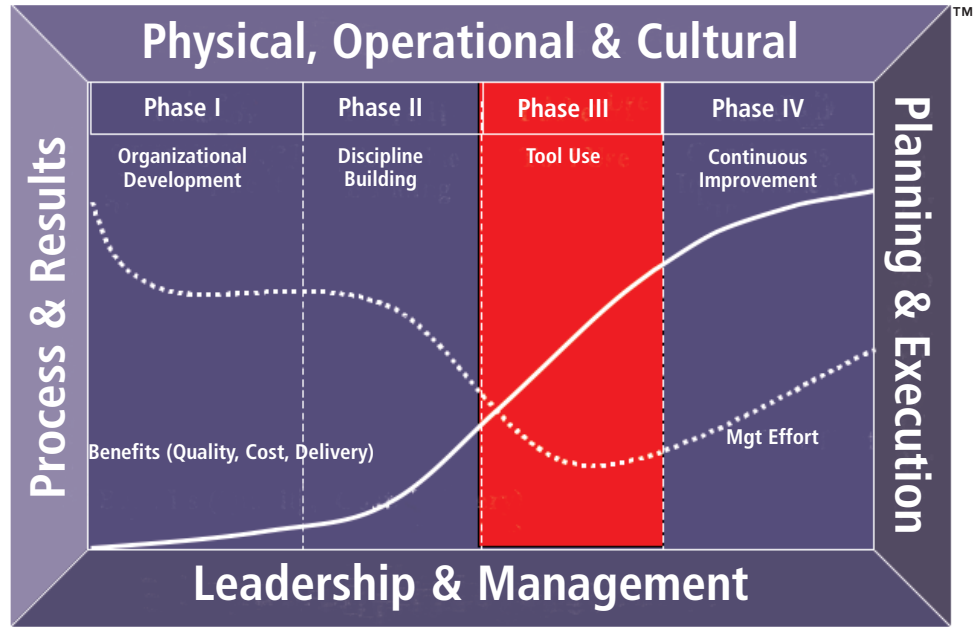


All of these elements come into use in Phase III, the stage where company leaders begin to understand the vast resources they have available, and how they can be



effectively applied to best support their companies' objectives.

There are a dozen or more tools available for use in this phase. And knowing which ones to use, how to use them properly, and when to use them make up some of the biggest challenges in this phase. For example, 5S is one of the most popular lean tools being implemented today. Almost everyone thinks of 5S as a process that addresses physical elements, such as taping in waste on the factory floor. But 5S goes well beyond that. When utilized correctly, the principles of 5S can be applied to any business process.

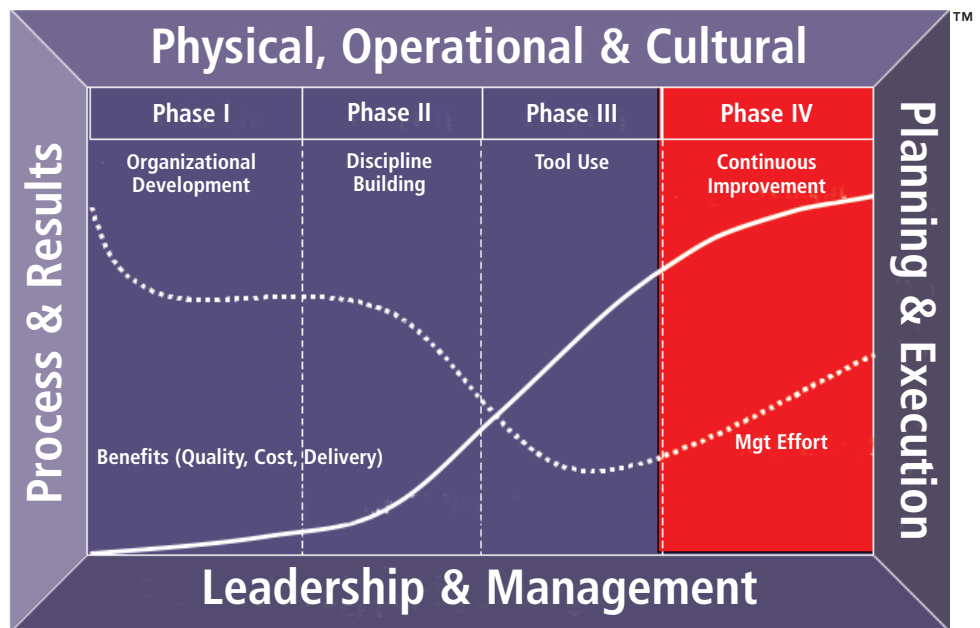


Phase III: Quality improvements are further accelerated while improvements are also realized in inventory, productivity and cost.

Jumping ahead to Phase III before an operation is ready is the biggest mistake companies make in their attempts to get lean. Successful companies that build a strong foundation in Phase I and Phase II will reach Phase III ready to apply the tools that will support their objectives. They will understand which tools are appropriate for their operation, and know how to apply them to improve their processes. This is where the payback of a successful lean transformation begins to be realized.

Phase IV – Continuous improvement

The final phase does not signal the end of the cycle, but the beginning of a self-sustaining all-encompassing way of life for companies that have attained this level in their efforts to get lean. Getting to this phase will take years because it requires a maturity of the lean process. In the final stage, leaders not only will have an understanding of which tools are appropriate for their operations, they will have applied them and seen the resulting improvement in their systems and processes.



Phase IV: Activities expand through the whole workforce including product development, sales, marketing and distribution, and the supply base.

Entire organizations will see the benefits of a lean business system, and will be actively involved as continuous activities expand to product development, sales, marketing and distribution. Organizations will become highly



flexible and will effectively and efficiently respond to changes in the marketplace. Operations will see the elimination of waste and efficiency improvements achieved at all levels of the organization. Production levels will be better balanced, and quality will be higher because of improved systems, standardized work, and a more skilled and flexible workforce.

Complacency is the biggest challenge in the Continuous Improvement process. It can't be allowed to happen, because companies that are not moving forward will fall further behind benchmark leaders, and will be passed by competitors that are committed to taking lean to the next level. Organization leaders and workers cannot be content with the improvements that have resulted from their initial efforts at lean. Armed with the tools and knowledge they have gained, they must realize that lean manufacturing is not a destination, but a never-ending journey.

Companies must become fanatic about improving a little bit every day, and challenging the current systems and processes that result in waste.

V. The key elements of a lean organization

There is no quick fix to getting lean. And successfully implementing a lean system takes time. How long it takes will depend on the commitment of the people – from the top down – and the method of implementation. To have a successful lean operation, a company must be willing to take all of the necessary steps that will bring about real change. A process must be created that will bring improvements and ensure that progress can be sustained in the future.

Companies that make lean an everyday part of their lives have a sustained focus on:

- Leadership commitment, support and actions that drive cultural change throughout an organization.
- Robust policy deployment process with a set of performance metrics that drives correct behaviors.
- An alignment of product, process and manufacturing.
- A well-defined set of roles and responsibilities that promote lean behavior.
- Selective application of lean tools that address safety, quality and throughput issues.
- Coaching and training programs that create a flexible workforce.
- Developing and implementing common/standard operations and processes through all functional areas.
- Designing products and manufacturing processes that have a common bill of design and process.
- Using flexible, scalable and reusable systems.
- Developing a workforce with a continuous improvement mindset.

Every automotive company is working to improve its manufacturing systems and processes, to get leaner and more cost efficient. But somehow, the best companies manage to stay ahead of the pack because every time the competition gets closer, these benchmark performers take themselves to a new level. What is it that sets these best-in-class performers apart from the rest? And how does your company stack up to the best-in-class performers?



Toyota is generally recognized as one of the worldwide leaders in lean, and the Toyota Production System continues to set the industry benchmark for automotive manufacturing. Toyota has taken 25 years to develop its processes to where it is today.



About Harbour Consulting

Harbour Consulting is a manufacturing and management consulting firm focused on improving the overall competitiveness of manufacturing companies. The Harbour team is dedicated to helping companies develop and sustain a competitive advantage by implementing proven quality and productivity techniques. The company continues to study and service automotive manufacturing organizations throughout the world, and has expanded its scope to assist firms in such industries as pharmaceuticals, electrical components, caskets, furniture and paper products. In addition, Harbour Consulting publishes *The Harbour Report*, the annual study of automotive manufacturing performance.

More information about Harbour Consulting can be found at www.harbourinc.com

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