

Best Practices in Lean Manufacturing

The Migration to a Lean Global Enterprise

WHITE PAPER

Cincom In-depth Analysis and Review



SIMPLIFICATION THROUGH INNOVATION®



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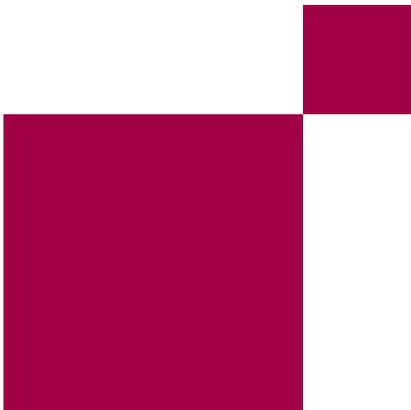
WHITE PAPER

Cincom In-depth Analysis and Review

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Executive Summary

Lean manufacturing's greatest benefits are from eliminating waste from the many processes manufacturers rely on to anticipate, respond to, fulfill, and serve customers, making it more possible for them to be more aligned to the unmet needs of their customers in the process.

The objectives of this white paper are to first provide insights into how manufacturers are tackling the task of transforming lean production lessons learned into lean enterprise strategies and instituting lasting change at the process level. This includes a discussion of the lessons learned and steps manufacturing companies are taking to overcome the challenges of making lean enterprise strategies last.

Second, this white paper provides a self-rating test to see how your company measures up. Included is a maturity model that shows specifically how your company measures up relative to others in manufacturing.

Finally, recommendations are made as to how manufacturers can attain lean transformation based on the collective insights gained from working with manufacturing customers to attain their lean manufacturing objectives. In addition, AMR Research's Demand-Driven Supply Chain (DDSN) Maturity Model applied to manufacturing lean production processes maturity.



Manufacturing Best Practices Starts with Lean

The following are the five primary elements to consider when implementing lean manufacturing, and they represent the variety of aspects needed to sustain a successful lean manufacturing implementation program.

1. **Manufacturing flow** - Addresses physical changes and design standards.
2. **Organization** - Identifies people's roles/functions, training in new ways of working, and communication.
3. **Process control** - Directed at monitoring, controlling, stabilizing, and pursuing ways to improve the process.
4. **Metrics** - Addresses visible, results-based performance measures, targeted improvement, and team rewards/recognition.
5. **Logistics** - Provides the definition for operating rules and mechanisms for planning and controlling the flow of material.

Clearly there is a need for intensive coordination and synchronization of these activities to attain lean objectives in any manufacturing organization.

Attaining best practices in lean manufacturing first begins with embracing a lean enterprise vision for the enterprise. In attaining this vision of a lean enterprise, manufacturers are pursuing higher levels of supply-chain visibility, greater levels of collaboration with customers, and increasingly greater levels of real-time integration of manufacturing flow, organization, process control, metrics and logistics throughout sourcing, pricing, manufacturing, and service systems. All of these advantages are combining to deliver higher product quality levels in the process. A lean enterprise is one that aligns itself to the goal of being as responsive and accurate as possible in all responses to customers and eliminating the many forms of waste, for both resources and time.

It's often said that lean manufacturing battles waste and concentrates on how to create a greater value by removing all barriers to accomplishing manufacturers' objectives.

There are seven types of waste in which lean manufacturing can assist in alleviating. Alleviating these will result in manufacturers being more efficient and centered on better serving their customers while attaining their goals in the process.

1. **Waste of overproducing** - Producing components that are neither intended for stock nor planned for sale immediately.
2. **Waste of waiting** - Refers to the idle time between operations.

3. **Waste of transport** - Moving material more than necessary.
4. **Waste of processing** - Doing more to the product than necessary and more than the customer is willing to pay for.
5. **Waste of inventory** - Excess of stock from raw materials to finished goods.
6. **Waste of motion** - Any motion that is not necessary to the completion of an operation.
7. **Waste of defects and spoilage** - Defective parts that are produced and need to be reworked.

Overcoming the Barriers to Becoming a Lean Enterprise

The greatest challenges to any manufacturer in implementing a lean manufacturing strategy is attacking those processes that cause one of the seven types of waste first, and second, creating a more synchronized manufacturing strategy. When one considers the work completed by AMR Research, Gartner, and the research completed by MIT's Center for Transportation and Logistics, it becomes clear that the same barriers to change are more process- than customer-centric and require a change in how manufacturing is perceived— not as a cost but as a means of better serving customers. From the accumulated work of the sources mentioned, here are the major barriers to manufacturers being able to transform themselves into a lean enterprise:

- **Need for greater levels of ownership at the C-level to force change to existing processes.** What is consistent across industry advisory firms is the fact that all three rank the lack of urgency and lack of support for lean initiatives at the C-level as the major reason why so many companies fail to become lean enterprises. As the self-scoring survey in this paper will show, the lack of support and vision at the top of an organization actually encourages more siloed-based approaches to managing lean initiatives at the lower levels of the organization.
- **A company will become what it focuses on more.** For those manufacturers that are attaining lean enterprise-level performance, the cultures of their companies have become incredibly focused on metrics, and in fact, the organizations themselves have become so metrically driven that the culture itself embraces the concept of measuring performance and improvement.
- **Lean positioned for cost-cutting versus customer-driven change.** This is also a critical mistake many manufacturers make, and often becomes the main focus these companies continue to pursue, as opportunities to better integrate their strategies with customers, suppliers, buyers, and service organizations present themselves.

Evolution of the Lean Enterprise

Manufacturers have continually struggled to gain the advantages of lean manufacturing, starting first with manufacturing processes at the shop-floor level and progressing to a vision of implementing an entire lean enterprise. What's become essential in the pursuit of the lean enterprise in the creation of strategies for driving waste of all types (time, logistics, costs) out of the enterprise. The table below shows the specific lean production processes and accompanying system change initiatives.

Table 1: Characteristics of a Lean Production System

	Lean Production Process	System Change Initiative
Focus	Production line (tasks, activities, and cells)	Single organization (departments, processes, suppliers, and customers)
Practices	Cellular manufacturing, quality circles, supplier relationship management, pull production, reengineering setups.	TQM, JIT, Six Sigma, and process re-engineering
Performance Measurement Systems	Takt time, on time delivery, first-time-through, safety performance, production rate Visibility – Real-time reporting and the use of analytics to track the entire value chains' performance, casual relationships (production tasks and activities), use of single version of the truth and single information reporting	Quality, delivery, process time, cost, flexibility, customer satisfaction; balanced set of strategic metrics (financial and non-financial); new methods of cost accounting (ABC, target costing); top-down communication; internal versus external focus (benchmarking and self-assessment); process management and measures (value delivery)



The table below illustrates the many differences in focus, practices, metrics, and performance measurement systems. The shift required in manufacturing companies to achieve this level of performance needs to start with the recommendations at the end of this paper and continually build upon insights gained from the survey contained within this paper.

Table 2: Comparing Lean Production and Lean Enterprise Characteristics

	Lean Production Process	System Change Initiative	The Lean Enterprise
Focus	Production line (tasks, activities, and cells)	Single organization (departments, processes, suppliers, and customers)	Extended enterprise (value streams and all stakeholders)
Practices	Cellular manufacturing, quality circles, supplier relationship management, pull production, re-engineering setups	TQM, JIT, Six Sigma, and process re-engineering	Seamless information flow, integrated product and process capability and maturation, identify and optimize enterprise flow, maintain stability in changing environment, align and involve all stakeholders to achieve lean vision, relationship based on mutual trust and commitment across the extended enterprise, make decisions at the lowest levels, optimize capability and utilization of people, focus on external and internal environment, nurture a learning environment
Metrics	Takt time, on-time delivery, first-time-through, safety performance, production rate	Quality, delivery, process time, cost, flexibility, customer satisfaction	Stakeholder value (effectiveness), overall efficiency, system availability, system-level flexibility
Performance Measurement Systems	Visibility – real-time reporting, casual relationships (production tasks and activities), use of single version of the truth and single information	Balanced set of strategic metrics (financial and non-financial), new methods of cost accounting (ABC, target costing), top-down communication, process management and measures (value delivery)	Stakeholder value measures, uniform set of measures, casual relationships between measures across all levels

How Does Your Company Rate?

Based on the collective work completed at the Massachusetts Institute of Technology (MIT) Center for Transportation and Logistics relating to manufacturers and the theoretical frameworks developed by the MIT Lean Aerospace Initiative, the following benchmarking framework has been created. The 18 life-cycle processes measured in this benchmarking include the following:

Business Acquisition and Program Management

- Leverage lean capability for business growth
- Optimize the capability and utilization of assets
- Provide capability to manage risk, cost, schedule, and performance
- Resource and empower program development efforts

Requirements Definition

- Establish a requirements definition process to optimize life-cycle value
- Utilize data from the extended enterprise to optimize future requirement definitions

Develop Product and Process

- Incorporate customer value into design of products and processes
- Incorporate downstream stakeholder values into products and processes
- Integrate product and process development

Supply Chain Management

- Define and develop supplier network
- Optimize network-wide performance
- Foster innovation and knowledge-sharing throughout the supplier network

Produce Product

- Utilize production knowledge and capabilities competitive advantage
- Establish and maintain a lean production system

Distribute and Service Product

- Align sales and marketing to production
- Distribute product in lean fashion
- Enhance value of delivered products and services to customers and the enterprise
- Provide post delivery service, support, and sustainability

In creating a questionnaire from these 18 factors, it's critical to take into account the maturity levels of each attribute as it relates to the performance of an entire organization. It is not enough to simply look at a binary, either/or condition for each factor. It is rather the level of maturity on each of these 18 attributes that determines a company's potential for attaining best practices in the lean enterprise. Using a four-point scale applied to each of these factors yields a self-scoring questionnaire that is shown in the following table. Giving just one answer for each of the 18 factors, calculate your company's score for lean enterprise performance.

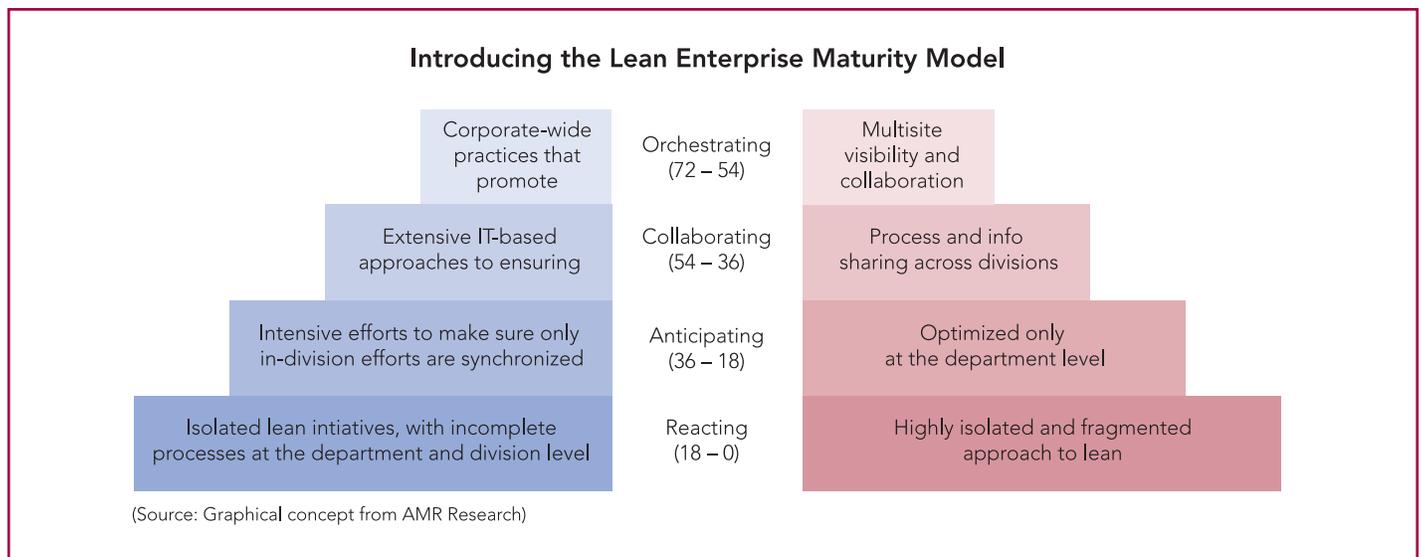


	Manually Done If at All (1)	Only within Departments (2)	Cross-Department Collaboration (3)	Corporate-wide Collaboration (4)
Business Acquisition and Program Management				
Leverage lean capability for business growth				
Optimize the capability and utilization of assets				
Provide capability to manage risk, cost, schedule, and performance				
Resource and empower program development efforts				
Requirements Definition				
Establish a requirements definition process to optimize life-cycle value				
Utilize data from the extended enterprise to optimize future requirement definitions				
Develop Product and Process				
Incorporate customer value into design of products and processes				
Incorporate downstream stakeholder values into products and processes				
Integrate product and process development				
Supply Chain Management				
Define and develop supplier network				
Optimize network-wide performance				
Foster innovation and knowledge-sharing throughout the supplier network				
Produce Product				
Utilize production knowledge and capabilities competitive advantage				
Establish and maintain a lean production system				
Distribute and Service Product				
Align sales and marketing to production				
Distribute product in lean fashion				
Enhance value of delivered products and services to customers and the enterprise				
Provide post delivery service, support, and sustainability				
TOTALS:				

After having scored your organization on its lean initiatives, use the following table to define where your organization is on the Lean Enterprise Maturity Model:

Score	Level in the Lean Enterprise Maturity Model
72 – 54	Orchestrating – Where an organization has a very high level of cross-department and division collaboration and often has a corporate-wide edict that forces lean enterprise principles deep into the organization.
54 – 36	Collaborating – A series of process- and IT-based infrastructures exist to ensure cross-department and cross-divisional collaboration.
36 – 18	Anticipating level – Marked with in-division collaboration only.
18 – 0	Isolated approach to lean – heavily influenced by silos.

The following graphical representation of the Lean Enterprise Maturity Model illustrates how each level of maturity varies by Process Maturity and Information Maturity. This graphical concept of a maturity model was originally proposed by AMR Research in the definition of Demand-Driven Supply Networks (DDSN) maturity levels, and has direct applicability to lean enterprises' levels of lean manufacturing maturity.



Recommendations for Driving Lean Transformation

In the studies referenced and the experiences Cincom has had in implementing lean manufacturing strategies for manufacturers, the following key recommendations emerge:

Greater system-level integration with downstream stakeholder values and greater visibility into customer demands. Relating back to the discussion at the beginning of this paper, how the highest-performing manufacturers are able to eliminate several types of waste while concentrating on delivering exceptional value to their customers is a key success factor in attaining lean manufacturing strategies. Using the 18-attribute lean manufacturing framework to evaluate your organization is a great place to start diagnosing areas of relative strength and weakness of performance.

Delivering greater process standardization and greater cross-functional communication eliminates wasted time, duplicated processes, and lost opportunities to better serve customers. In several of the case studies that MIT and others have cited as examples of best practices in lean enterprises, the senior management teams worked to tear down the silos between departments by actively encouraging and rewarding cross-department and cross-division collaboration. The greater the level of integration between functions and processes, the greater the reduction of waste in over-processing, waiting, transport, processing, and inventory carrying costs, in addition to defects and spoilage.

Integrate and reward lean initiatives success and include it in both strategic planning and production systems planning. The companies gaining the greatest competitive advantage through their efforts to become lean enterprises have started first with smaller projects and then progressed to enterprise-wide ones once the payoff has become clear.

Integration of environmental protection, compliance, health and safety systems corporate wide. Clearly the need for mitigating the significant costs of compliance as they relate to the use and disposal of chemicals and raw materials used in the production of complex products are many manufacturers' most critical concern. This speaks to the need for a comprehensive strategy surrounding Enterprise Compliance and Quality Management (ECQM).

Allow the customer to have a seat at the development table. MIT found that the highest-performing lean enterprises re-define their product development processes to support the inclusion of customers in the actual development environment. This has increased customer satisfaction, reduced the number of reworked orders, and also led to the development of cross-functional teams that attacked the processes that got in the way of allowing divisions to be more responsive to customers.



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