

whitepaper

Lean Manufacturing Techniques

**Michael H. McGivern, Ph. D. and
Alex Stiber—Change Management Practice**

Lean manufacturing is a performance-based process used in manufacturing organizations to increase competitive advantage. The basics of lean manufacturing employ continuous improvement processes to focus on the elimination of waste or non-value added steps within an organization. The challenge to organizations utilizing lean manufacturing is to create a culture that will create and sustain long-term commitment from top management through the entire workforce. Lean manufacturing techniques are based on the application of five principles to guide management's actions toward success:

1. **Value:** The foundation for the value stream that defines what the customer is willing to pay for.
2. **The Value Stream:** The mapping and identifying of all the specific actions required to eliminate the non-value activities from design concept to customer usage.
3. **Flow:** The elimination of all process stoppages to make the value stream “flow” without interruptions.

4. **Pull:** The ability to streamline products and processes from concept through customer usage.
5. **Perfection:** The ability to advocate doing things right the first time through the application of continuous improvement efforts.

The Four Thrusts of Lean Manufacturing

Lean manufacturing organizations focus on four thrusts to support their lean manufacturing designs:

I. Solid leadership that:

- Communicates the vision.
- Facilitates and models the behaviors of lean manufacturing.
- Sets the standards for the organization.
- Assists the workforce in adapting to the change.
- Builds trust and inspires commitment.
- Coaches and develops the workforce.
- Constantly challenges the system.

II. Team-based cultures that:

- Use project-oriented, team-based structures that focus on empowerment concepts.
- Leverage knowledge by using highly skilled workers.
- Promote employee accountability and responsibility for work.
- Advocate the continual development of the workforce.

To learn more, call your local DDI office or contact:

The Americas..... 412.257.0600	Southeast Asia65.339.5255	France..... 33.1.41.96.86.86	United Kingdom..44.1628.810800
Toll-free Canada 800.668.7971	Australia61.2.9466.0300	Germany 49.2159.91680	E-mailinfo@ddiworld.com
Toll-free U.S..... 800.933.4463	Greater China852.2526.1188	New Zealand..... 64.9.377.6742	Webwww.ddiworld.com

- Value diversity.
- Believe that employee ownership of the final product is shared throughout the process.

III. Communication systems that:

- Advocate and develop processes to identify critical design issues as early in the process as possible.
- Encourage “on-the-spot” decision-making processes that use the fewest resources to resolve critical design issues.
- Promote knowledge sharing between hourly workers, management, and design personnel.
- Drive the behaviors of internal operations, as well as focus on the behaviors of suppliers and customers.
- Accept formal and informal communication behaviors.

IV. Simultaneous development and continuous improvement processes that:

- Design the product right the first time.
- Use continuous improvement processes to identify the non-value-added problems.
- Drive commitment to eliminating problems (controlling them is not enough).
- Advocate just-in-time material control systems.
- Promote constant improvement throughout the supply chain.
- Leverage the knowledge of the organization with the knowledge bases of suppliers and customers.
- Continually train and develop highly skilled workers.
- Use scoreboards or measurement systems to monitor progress.

Implementation

The First Six Months: Building Organizational Awareness

- Senior leaders clarify the business case for using lean manufacturing techniques.
- Senior leaders ensure that lean manufacturing techniques are consistent with the organization’s long-term vision.
- Management assesses the organization’s readiness to make the transition to lean manufacturing.
- Upper management defines the baseline measures of success.
- The organization defines a timetable consisting of communication, objectives, and scope of implementation.
- The vision of the redesigned organization strongly supports the linkage of business strategy to cultural strategy.
- The vision of the redesign includes the alignment of the organization’s communication, accountability, skills, processes, and systems.

Six Months to Year Two: Creating the New Organization

- Redesign the organization to use lean manufacturing techniques.
- Implement training and development processes to assist the transition.
- Help leaders and employees make the transition to their new roles.

Years Three through Four:

Aligning the Systems

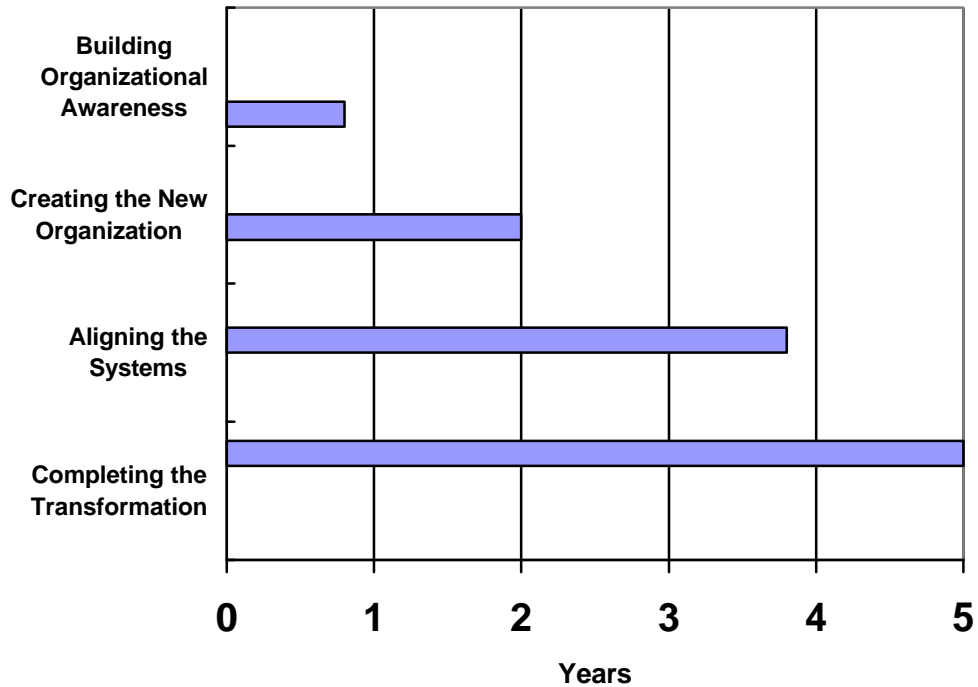
- Continuous improvement processes are driven from bottom-up versus top-down.
- All organizational support systems are in alignment.
- Ongoing measurement and process monitoring systems are ingrained in the new culture.
- The bottom line is meeting the favorable expectations identified in the business case from the first six months.

Year Five:

Completing the Transformation

- The transformation to Lean Manufacturing Techniques is completed.
- Integration of Lean Manufacturing Techniques with suppliers begins.
- Ongoing continuous improvement and organizational development is a way of life.

Time Frame for Implementing Lean Manufacturing



Who Uses Lean Manufacturing?

Lean manufacturing processes are being used predominantly in the automotive industry. Toyota Motor Company, considered the leader in lean manufacturing techniques, started using the techniques during the 1950s and 1960s. They have since built their reputation as quality leaders and boast one of the fastest growing market shares in the automotive industry.

Manufacturers using lean manufacturing include:

Automotive Industry:

- Toyota Motor Company—*Toyota Production System*
- Ford Motor Company—*The Ford Production System*
- Chrysler—*Chrysler Operating System*
- Porsche—*The Porsche Improvement Process*
- General Motors—*NUMMI* joint venture with Toyota

Other Industries:

- Pratt & Whitney, United Technologies—Jet engine manufacturers
- Showa Manufacturing—Radiator and boiler manufacturers
- Lifescan, Inc. a subsidiary of Johnson & Johnson—Electronic Products
- Lantech Corporation—Packaging Machines (stretch wrapping products)
- Wiremold Company—Wire management systems (electronic transfer)

Results

Lantech Corporation ¹

- New product development time reduced from 3 to 4 years to 1 year
- Employee hours per machine reduced by 50 percent
- Defects per machine reduced from 8.0 to 0.8
- In-process and finished goods inventory values reduced from \$2.6 million to \$1.9 million
- Product delivery lead time reduced from 4 to 20 weeks to 1 to 4 weeks

Wiremold Company ¹

- Product development time-to-market reduced by 75 percent
- Receipt and fulfillment of order time reduced from more than one week to less than one day
- Amount of plant space needed reduced by 50 percent
- Time for raw material to shipping dock reduced from 4 to 6 weeks to 1 to 2 days
- Productivity up 160 percent over three years
- Sales per employee more than doubled from 1990 to 1995
- Number of suppliers reduced from 320 to 73
- Inventory turns increased from 3.4 to 15.0

Pratt & Whitney Aircraft ¹

- Operating results rebounded from losses of \$283 million in 1992 to profits of \$530 million in 1995, even though sales continued to sag
- Throughput time reduced from 10 days to 75 minutes

¹ Womack, J. P. & Jones, D. T. (1996). *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*. New York: Simon & Schuster.

Why do organizations want to use lean manufacturing techniques?

- To significantly improve overall productivity
- To increase market share
- To improve speed-to-market with new products
- To reduce manufacturing and engineering labor costs
- To eliminate non-value-added operations and processes

Lean manufacturing techniques focus on:

- Equipment reliability
- Balanced or level production
- Just-in-time material control techniques
- Stop-the-line to correct the problem and in-station process control
- Continuous improvement processes
- Statistical Process Control techniques for quality consistency
- Developing human systems to support the technical processes

How do you sustain lean manufacturing techniques?

- Create a solid business case
- Align systems and processes
- Share the vision
- Empower the workforce
- Ensure the use of proper measurement systems

Roadblocks to implementing lean manufacturing:

- Complacency; no reason to change
- Using lean manufacturing to facilitate downsizing efforts
- Role clarity issues from senior management

- Opposition from middle management
- Poorly defined measurement systems
- Short-term versus long-term thinking
- Inadequate union involvement
- Lack of commitment and ability to “just-do-it”

DDI Linkages

Linking DDI Technologies with Lean Manufacturing Techniques

DDI’s technology capabilities link well with the implementation and/or the support of lean manufacturing within organizations. DDI’s technologies can:

- Assess the organization’s readiness for change.
- Assist the organization in clarifying the business case.
- Help align the organization’s cultural strategy with the business strategy of lean manufacturing.
- Identify the competencies necessary to move to a lean manufacturing culture.
- Provide leadership development technology necessary to support lean manufacturing.
- Assist an organization in creating the culture necessary to support the lean manufacturing environment.
- Provide selection, assessment, and performance solutions necessary to sustain a lean manufacturing culture.
- Provide best practices in implementing and sustaining high-performance work teams.
- Develop training modules that promote lean manufacturing processes.

**Where to find out more about lean
manufacturing techniques:**

- Hines, P. (1994). *Creating World-Class Suppliers*. London: Pitman.
- Schonberger, R. J. (1996). *World Class Manufacturing: The Next Decade*. New York: Free Press.
- Womack, J. P. & Jones, D. T. (1996). *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*. New York: Simon & Schuster.
- Womack, J. P. , Jones, D. T. & Roos, D. (1990). *The Machine that Changed the World: The Story of Lean Production*. New York: Harper Collins Publishers.