White Paper Series:

Lean Guiding Principles for the Supply Chain
Principle 4: Short Lead Time





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The Lean Advantage

The key to delivering long-term customer value and outstanding business performance, quarter after quarter, year after year, is to implement a lean culture. Lean practices improve quality and productivity by taking cost and waste out of all facets of an operation, from the procurement of raw materials to the shipment of finished goods. In a lean culture, every step in every process must add value for the customer. If it doesn't add value, you strive to eliminate it.

The roots of lean thinking go back to the manufacturing innovations of Henry Ford in the early 20th century. But lean manufacturing really got its start after World War II at Toyota Motor Company, which developed the Toyota Production System (TPS). (1) Much of the TPS is aimed at eliminating *muda*, or waste, which reduces quality and limits profitability. The Toyota team identified seven kinds of waste:

1. **Overproduction** – manufacturing items before they are required
2. **Waiting** – leaving goods in stasis before they are ready for the next process
3. **Transporting** – excessive movement and handling to get goods from one process to the next
4. **Inappropriate processing** – using equipment that is more sophisticated and expensive than needed
5. **Unnecessary inventory** – holding goods that are not flowing through any process
6. **Unnecessary or excess motion** – allowing bending, stretching, walking, etc. that is not strictly needed to do the job and can jeopardize workers' health and safety
7. **Defects** – allowing quality deficiencies that result in rework or scrap (2)

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Business that cultivate a lean culture report significant improvements in their operations.

Although lean thinking started in manufacturing plants, today companies use lean in their finance departments, customer service centers, supply chain operations, research and development organizations and many other areas. Lean thinking also has made an impact on the public and not-for-profit sectors.

Businesses that cultivate a lean culture report significant improvements in their operations. For example, by implementing lean principles at a manufacturing plant in Matamoros, Mexico, Kemet Corporation cut logistics costs by 20 percent, reduced crib inventory by 11 percent and reduced customer complaints from .49 parts per million in FY2005 to .32 parts per million in FY2007. It also increased productivity from 1.1 million pieces per person in FY2005 to 3.4 Million pieces per person in FY2007. (3)

ORGANIZATION	MEASURABLE RESULTS
Kemet Corporation	• Cut logistics costs by 20% • Reduced crib inventory by 11% • Increased productivity from 1.1 to 3.4 million pieces per person
Goodyear Tire	• OSHA incident rate 33% lower than national average • Perfect score on Process & Product Quality Audit • $5 million savings in direct ship warehouse • Zero landfill waste since 2008
Xerox Corporation	• Lean/Six Sigma since 2002 • 300% ROI

In the supply chain arena, a lean culture offers tremendous rewards, but pursuing a lean strategy also requires a significant commitment. Luckily, becoming lean doesn't mean you have to

re-engineer your operation. You can work with a logistics partner to make continuous, incremental gains in quality and efficiency. The right 3PL can jumpstart a company's transformation into a lean organization.

By working with a supply chain partner that has woven lean principles into its very fabric, you gain the benefits of lean culture without incurring the associated up-front costs. Your partner already has made the investments, hired the necessary talent and climbed the learning curve.

At Ryder Supply Chain Solutions, a division of Ryder System Inc., five lean guiding principles govern every activity the company conducts in its own and its customers' warehouses. They are:

1. **People Involvement:** Engaging every employee to root out waste, eliminate problems and make improvements
2. **Built-in Quality:** Striving to prevent mistakes before they happen, and engineering processes to make them "mistake proof"
3. **Standardization:** Documenting best practices and making sure that they are followed
4. **Short Lead Time:** Filling customer orders as promptly as possible
5. **Continuous Improvement:** Understanding that no matter how well a process works today, there is room to make it even better



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This white paper speaks to Short Lead Time. It is part of a series on the five lean guiding principles, written to provide insight on what it takes to develop a lean culture in a supply chain operation.

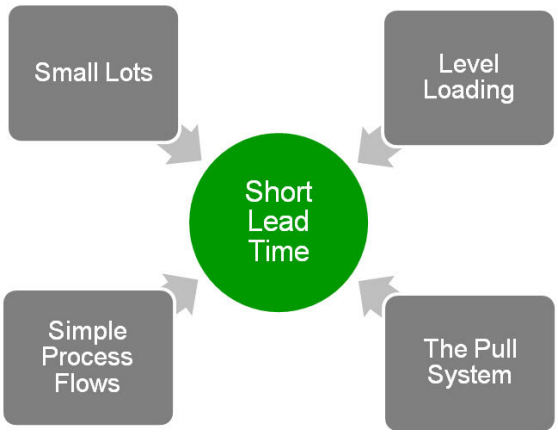
Short Lead Time: Keep it Moving

Lead time is the period that elapses from the moment a customer places an order until that customer receives the goods. The shorter that period, the leaner the supply chain. When lead time is short, companies don't tie up cash in safety stock or build extra days into production or distribution cycles. They rely on a steady flow of inventory to arrive exactly when it's needed and they can plan their business processes accordingly.

A lean organization designs its facilities to keep work flowing without impediment or waste.

A lean organization reduces lead time by streamlining its work as much as possible. It eliminates steps that don't add value for the customer, keeping in mind that minutes shaved off here and there eventually add up to significant savings. A lean organization designs its facilities to keep work flowing without impediment or waste.

Figure 1: Four Elements that facilitate Short Lead Time



Simple Process Flows

When water flows in a stream, it takes its time meandering around curves, tumbling over rocks and accumulating in pools. When water flows in a pipe, it rushes efficiently from point A to point B. Work in a lean facility flows like water in a pipe.

To achieve that efficient flow, a business must continually strive to take steps out of every process. Simple process flows start with facility design. One automotive manufacturer, for instance, uses the lean tool called Value Stream Mapping (VSM) to break a process down into its smallest steps, diagram the workflow and identify points of waste in order to improve the layout of its plant. (4)

The design of a warehouse should allow material to move from point to point with as little handling as possible. For example, fast moving product is stored on the floor, so pickers don't spend time retrieving it from slots on higher levels. That high-demand product is also positioned close to the loading docks, so workers only need to travel short distances to get it out the door.

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The concept of a simple process flow also guides the way product is stored on racks. Items that have a defined shelf life or a short market life are continually rotated to make sure that the oldest products are picked first. The concepts of First In, First Out (FIFO) and First Expiring, First Out (FEFO) guide the way the company positions and picks those items.

Requiring employees to perform their jobs according to documented standards also helps to simplify process flows in a facility. So does rewarding employees for good suggestions that remove steps from their work and celebrating small successes.

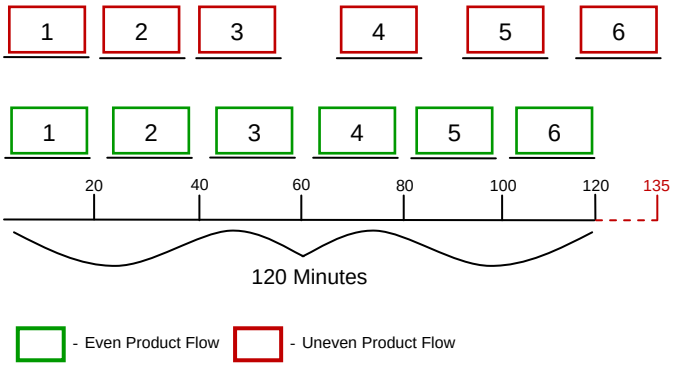
Small Lots

Breaking big jobs into smaller units helps employees to work more efficiently and get orders out the door faster. Consider an employee who is assigned a picking job that is expected to take two hours (equivalent of 120 minutes). The employee drives into the stacks and gets to work. The picking might move quickly for the first hour and then slow down as the employee's mind wanders. No one keeps track of the pace or quality of the work. The job ends up taking two hours and 15 minutes.

By maintaining an even pace and picking up speed only when appropriate, you use your energy efficiently and cut your overall running time.

Now consider what happens when you break that 120-minute job into smaller lots. The team leader asks the employee to bring a specific amount of product to the loading dock every 20 minutes and indicate on a white board each time a task is complete. Now the employee is responsible for meeting a goal three times in 60 minutes. The employee meets that goal six times and the job takes exactly 120 minutes—eliminating 15 minutes worth of waste.

Figure 2: Working with Small Lots



Another way to boost efficiency is to store product in smaller units that are easier to handle. Racks, bins and other containers are designed to eliminate ergonomic stress. Selecting the right-sized container reduces the work required to retrieve and move product. It also keeps items from shifting during transfer, protecting product from damage.

Level Loading

Anyone who has run a cross-country race understands the importance of pacing. If you give the race all your energy from the moment you start, you will eventually find yourself quickly running out of energy. By maintaining an even pace and picking up speed only when appropriate, you use your energy efficiently and cut your overall running time.

The same applies to work in a distribution center. When teams work faster than necessary, picked orders pile up waiting for

trucks to arrive, and inbound goods sit waiting for receivers to put them away. Then those fast-working teams grow tired and slow down. Soon, loaders and receivers find themselves standing idle as they wait for more product to handle. As various work cells fall out of synchronization, waste increases.

In a lean facility, managers plan the pace of the day's work to meet customer demand and clearly convey their expectations to employees. If the facility needs to expedite an order, workers might pick up the pace for a short time. If an unexpected event disrupts the schedule, an alarm notifies team leaders and managers, who have plans in place for getting the work back on target. Otherwise, workers maintain a steady pace, each team handing its completed work to the next team exactly as planned. Visual displays remind teams how well they are sticking to the schedule and meeting their goals.

The Pull System

When you push work through a warehouse, you store, pick and transport as much product as you *think* your customers will need. You make demand forecasts, based on historical experience, to determine how much product to stock and when to move it. If your estimates are correct, your facility runs smoothly. But if customers behave differently than they did in the past, it takes a while to respond to these changes. You might find yourself holding excess inventory, or inventory that has grown obsolete. You might experience bottlenecks and delays that keep you from meeting your service commitments. (5)

Under the pull system, a facility stores, picks and transports just enough inventory to fulfill actual customer orders. As product goes out the door, it's replaced, much as a delivery driver replaces the cans of soda that customers have consumed with exactly the same number and variety of cans. Customer consumption creates the signal that determines how much inventory to replenish.

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A facility that uses the pull system only invests in the inventory and storage it actually needs to meet demand. Because it replenishes items only as they're used, it keeps just enough products in stock at all times. As customers' needs change, the inventory mix changes. By matching inventory to demand, the distribution center is always able to deliver what customers need, and deliver it on time, without keeping excess buffer stock.

Conclusion

Implementing the principle of short lead time accomplishes a great deal more than simply creating a speedy operation. It ensures that a facility can respond to increases in customer demand without needing to ramp up resources. Short lead time helps a distribution center use its staff, its space and its inventory as efficiently as possible. By helping the facility eliminate waste and give customers precisely what they require, short lead time makes the job easier and ultimately strengthens the company's bottom line.

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MANAGEMENT TIPS:
ACHIEVING SHORT LEAD TIME

- Eliminate steps that don't add value
- Store product in units that are easy to handle
- Design your warehouse to allow material to move from point to point with as little handling as possible
- Use simple process flows to guide the way product is stored
- Break jobs into small lots that help employees work more efficiently
- Plan the pace of the day's work to meet customer demand and clearly convey expectations to employees
- Pick up speed only when appropriate
- Keep only enough product in stock to meet demand, replenish as it is used

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Appendix

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