

Lean Packaging:

*Using Plastic Reusable Packaging
to Support Your Lean Operation*

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Executive Overview

Today, more than 33% of US companies recognize the need for a lean philosophy to gain optimization in their operations and entire supply chain. Very simply...the lean philosophy emphasizes total system efficiency, continual improvement and value-added activity, to reduce costs. ¹

This can be achieved in three ways:

- The aggressive elimination of waste
- Improved productive flow of material/product
- Highly optimized inventory management

According to the March 2001 issue of Modern Materials Handling, "Businesses succeed or fail based on their supply chain performance, therefore, the scope of lean thinking must encompass every aspect of every job within a company, including factory operations, engineering, project management, transportation and finance." ²

And this includes packaging. According to Ford Motor Company, plastic reusable packaging drives lean production by facilitating the tremendous benefits. It opens the door to better scheduling, smaller batches and inventories, faster response to schedule changes and smaller, more frequent deliveries leading to the success of their "Synchronous Material Flow." It facilitates improved layouts and processes and provides a cleaner, safer, more ergonomic workplace. The net effect drives costs down. ³

The concepts behind lean production are not industry-specific. Whether shipping plastic bottles to a soft drink bottler for filling; trim parts to an automotive manufacturer; electronic components to a computer manufacturer or consumer goods to the mass retailer, plastic reusable packaging will help move product faster, better, safer and more cost effectively.

While lean production seems is prevalent in the automotive industry, plenty of other leading industries have adopted lean philosophies, including: beverage, electronics, aerospace and pharmaceutical.

In this paper we will address how companies, regardless of industry, can use a global plastic reusable packaging program to achieve lean production throughout their supply chain for total cost reduction.

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History of Lean

The term “lean production” was coined in 1990 by James Womack and Daniel Roos in their landmark book, “The Machine That Changed the World”. The philosophy behind it was born more than four decades ago.

After World War II, Japan’s industrial sector was devastated. The Toyoda family decided to extend the capacity of their automatic loom company to produce automobiles. After visiting automotive plants in the United States, they realized they lacked the infrastructure to compete head-to-head with the established US companies. They also realized that the vulnerability existing in US companies was that mass production worked best when only one model was manufactured (with no modifications) and there were no hiccups in upstream production.

Taiichi Ohno, one of Toyota's executives, realized that to compete with mass production manufacturers, Toyota would have to produce small quantities of automobiles with high variety. In 1956, Taiichi Ohno visited the United States and discovered the answer. But he didn't find it at an automobile plant - he found it at the grocery store! Japan did not yet have many grocery stores and Taiichi Ohno was quite impressed with how customers chose what they wanted, when they wanted, and in the quantity they wanted. He knew he had to make that type of efficiency a reality in his automobile plant.

After much experimentation, Taiichi Ohno developed the Toyota Production System (TPS). The premise behind TPS is that small-lot production can be achieved if waste is eliminated and continuous flow facilitated. Over the years, TPS has evolved and today is commonly called “lean production.”⁴

Supply Chain Improvements are Vital to Lean Production

To develop, manufacture and distribute a product in a lean environment means involving the entire supply chain. True, a company can still benefit from implementing a lean program in its facility, even if its suppliers don't. Those benefits, however, will only be marginal.¹

According to a 2002 Deloitte and Touche survey, over 90% of executives spend time on supply chain management.

To achieve maximum benefit, the collective and cumulative impact across the entire supply chain must be considered. Doing so will help identify

Lean Packaging:

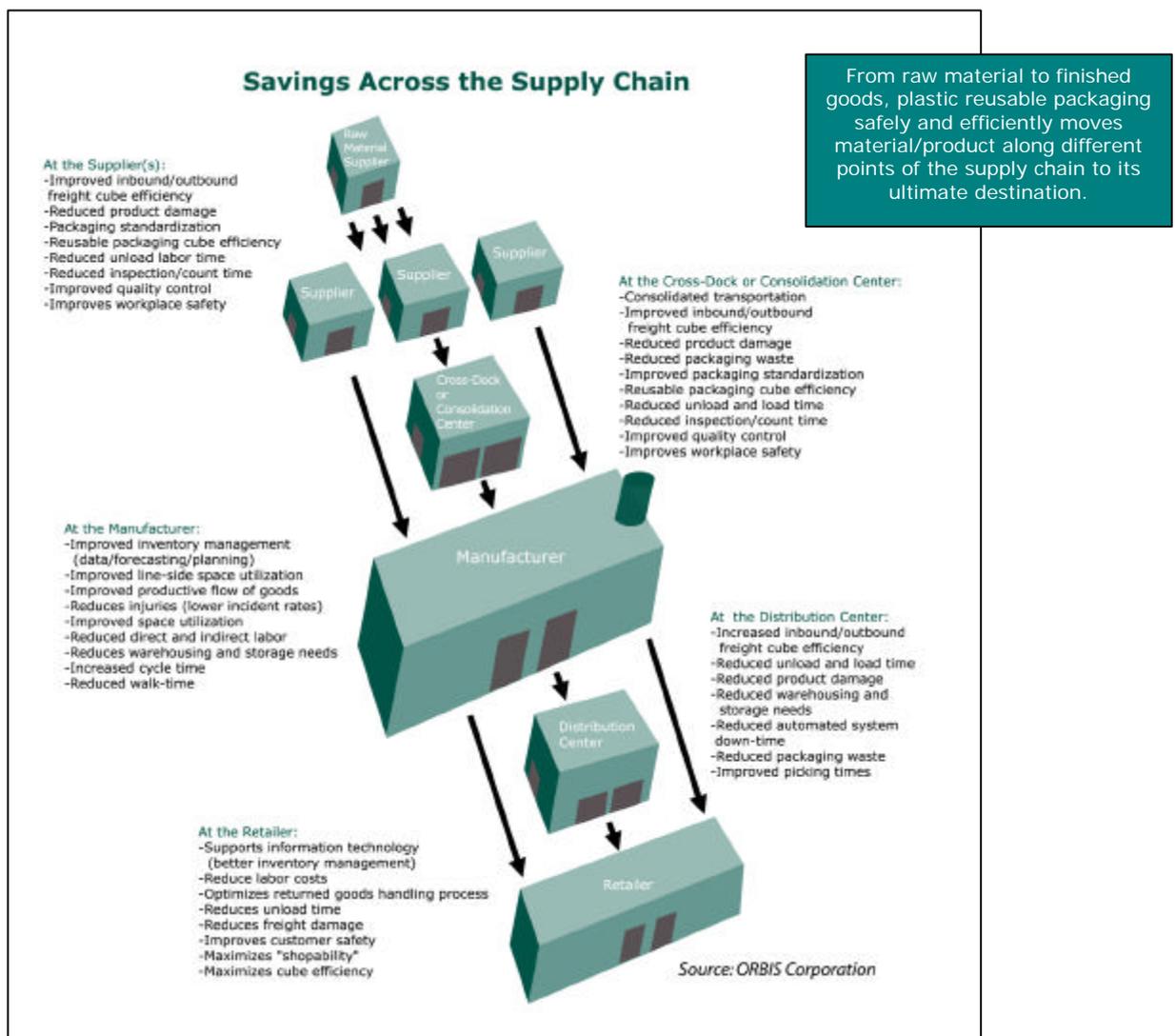
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opportunities for savings and efficiencies that may not be considered during simple site-specific or department-specific improvements. Companies must analyze their entire supply chain to identify waste and non-value added activities, then implement process and cultural change gain financial and operational benefits.

And this includes packaging.

Plastic Reusable Packaging Optimizes the Supply Chain to Support the Lean Production

Essential to supply chain performance is improving the effectiveness of materials management, or the flow of product that begins with the design and purchase of the product/material and continues with the work-in-process, warehousing, shipping and distribution activities required to output it in its finished state. ⁵



Plastic reusable packaging improves the flow of product all along the supply chain, to reduce costs. World-class companies like Ford, John Deere, Harley-Davidson, Tyson, Wal-Mart, Amcor and Coca-Cola have already recognized the value of reusable packaging in moving their product faster, better, safer and more cost-effectively.

“Reusable packaging fits into a lean environment perfectly. The packaging is designed to fit into your specific manufacturing and logistics system. When properly managed, it can be done with minimal inventory and cost. You cannot be lean without embracing reusable packaging – the packaging decision and use process can guide the total lean implementation.”⁶

A study by Michigan State University (MSU) found that actual savings from reusable packaging, in terms of cash flow, exceeded forecasts for four automotive manufacturers with medium-to-high usage of reusable containers. One company saved \$10.9 million a year over a four-year period after a \$16.3 million investment in reusable packaging, including a 35% reduction in truckloads sent to landfills. Another firm estimated its savings from reusable packaging at \$2.3 million.⁷

Plastic reusable packaging products are used to move, store and distribute product within a single operation or entire supply chain. From raw material to finished goods, plastic reusable packaging safely and efficiently moves material/product along different points of the supply chain and ultimately to its destination. It is ideal for multiple trip applications in a closed-loop environment or well-managed supply chain. It can also be used effectively in a managed open-loop system, with reverse logistics in place to return empty containers or pallets for re-use or replenishment. Products include:

- Hand-held containers, bins, boxes or totes
- Pallets, slip sheets, top frames and top caps
- Divider sheets
- Bulk containers, bins, boxes or totes
- Protective interior dunnage (custom)
- Storage containers and metal systems
- Custom designed and engineered packaging

Plastic reusable packaging is integrated in a single operation or entire supply chain to take the place of single-use corrugated shipping and

storage boxes and limited-use wood pallets. Users experience a rapid return on their packaging investment...many times in 6-18 months or less.

By design, plastic reusable packaging products offer durable, rigid construction; contoured surfaces; easy-to-grasp handles; high levels of recyclability and vast identification options. These dimensionally consistent containers and pallets are easy to handle and interface effortlessly with all types of high-speed automated equipment. In fact, some products are specially designed to be "hands-free" and solely handled by robots or conveyors. Plastic packaging has no nails or loose corrugated flaps to halt a high-speed system. And, in high-volume industries, hundreds of thousands of dollars are lost when an automated system is stopped.

They are available in standardized sizes, so parts and materials can be packed/loaded to optimize the packaging, resulting in more product being manufactured and shipped in a shorter time.

How Does Plastic Reusable Packaging Add Value to Lean Production?

Ford Motor Company considers reusable packaging a catalyst to a lean material process. ⁸ Lean production is accelerated with plastic reusable packaging. Packaging drives lean production in three ways:

- The aggressive elimination of waste
- Improved productive flow of material/product
- Highly optimized inventory management

Reusable packaging eliminates waste

One of the best ways to grow a business--outside of increasing sales -- is to increase efficiencies by **eliminating waste**, which represents between 55% and 95% of the manufacturing process. ¹

Plastic reusable packaging has been implemented at leading companies like General Motors and Ford to reduce waste. Fewer SKUs of packaging are needed with standardized plastic reusable containers and pallets, requiring less ordering and set-up time and virtually no container disposal cost. The receipt and inspection of

deliveries is faster and easier with standardized packages and consistent unit sizes. Corresponding indirect labor and equipment costs are driven from the system.

"Any time you're storing or reworking a product, or sending its design back to be reviewed, for example, you're not creating value for that product. If you can get the product designed, manufactured and sustained without taking these steps, the customer can have the product faster, with higher quality and at a lower cost." states James Womak, president of the Lean Institute and co-author of the book, "The Machine That Changed The World".

The lean philosophy eliminates waste in the form of unnecessary materials, work processes, labor steps, handling and shipping. Waste can be also be identified in:

- Overproduction
- Unnecessary inventory
- Rejects/defective product
- Motion/walk time
- Processing
- Re-work or scrap
- Time
- Transportation
- Packaging waste
- Sorting/counting
- Testing ⁵

"Unfortunately, real waste lurks in forms that do not look like waste. Only through careful observation and goal orientation can waste be identified. We must always keep in mind that the greatest waste is the waste we don't see," according to Dr. Shigeo Shingo, the Japanese industrial engineer who distinguished himself as one of the world's leading experts in improving manufacturing processes.

At Ford Motor Company, they estimate that if an operator makes 1,500 parts per day and small-lot packaging saves

three feet of walking distance for each part, this would equate to 54 hours per year, or 1.35 man-weeks. ³

A more obvious source of waste is the costly disposal of used corrugated and wood packaging, in terms of fees and non-value added labor incurred for set-up and/or break-down. The long service life of plastic reusable packaging allows it to be used over and over again, in place of one-time use corrugated boxes and wood pallets.

In one example, by establishing a reusable container and pallet program with its suppliers, General Motors reduced its disposal costs by \$12 million between 1987 and 1992. Additionally, they experienced reduced solid waste and product damage during shipping. ⁶

And, according to Jack Ader, of Ford Motor Company. "At our Windsor, Ontario plant, the use of 100% reusable containers for all production parts has eliminated the generation of 11 pounds of expendable waste per engine produced or 30,000 pounds per day." ⁹

The March 2001 issue of *Modern Materials Handling* cited that by recycling and reusing packing material and packaging containers, companies are seeing lower cost, less delivery waste and less parts handling each year.

Reusable Packaging Improves Product Flow

The contoured, lightweight design of standardized reusable packaging allows product to travel safely and efficiently to its destination and back to **improve the productive flow of product/material** within a single operation and entire supply chain.

Frequent part deliveries and standardized package sizes improve the flow of product and reduce the need for extra storage or warehouse space. Tom Reynolds, operations manager for Donnelly Automotive Systems, states, " An efficient flow of materials is essential to a sound lean program. Currently, the company uses a kanban system to

coordinate the flow of inventory from the supply chain into its facilities. In the future, manufacturers will use web-based communication to coordinate with suppliers.”¹

In the 1990s, DaimlerChrysler sought to reduce inventory and packaging costs with reusable packaging. Their “small-lot containerization” program yielded significant cost savings and improved their supply chain efficiency, in just a few short months. At their Belvidere, IL assembly plant, they experienced:

- 60% reduction in assembly line inventory
- 270 ft. reduction in line-side
- An annual reduction of 27% in parts handling
- Addition of 1,700 sq ft of storage area¹⁰

In another example, a major truck manufacturer was able to reallocate 20,000 square feet of production space by storing only a one-day supply of parts line-side, rather than the larger quantity containers that previously came standard from its suppliers. The company provided suppliers with “right-sized” reusable containers designed to hold a half-day supply of each component.

Reusable Packaging Optimizes Inventory Management

One of the fundamental concepts of a lean philosophy is to source, build and move only what is needed...when it is needed.⁶ Shipping in smaller quantities, on a more frequent basis, and delivering parts closer to the time of usage reduces the number of days of parts inventory and therefore limits the days that inventory is nonproductive. Combining supplier pick-ups or customer deliveries into small, daily truck routes (milk runs) also reduces dollars tied up in inventory. Standardized plastic containers and pallets will securely stack higher than expendable boxes and nest or collapse to take up less floor space, making inventory management and material handling easier.

Companies are changing the ways manage their supply chains. Direct interaction with supply chain partners can enable a company to reduce total inventory levels..."⁵

In the Ohio State University Supply Chain Management Research Groups' 2003 Survey of Career Patterns in Logistics 14% of logistics professionals cite lean manufacturing as one of the most important strategies they use to reduce the level of inventory investment in the entire supply chain.¹¹

Supported by suppliers who deliver parts just-in-time, Canada's CAMI Automotive cut inventory up to 40% with the use of plastic reusable packaging and related process improvements.¹²

In another example, with the cost of doing business continuing to go up, Ford Motor company identified parts and material inventories as an opportunity to generate savings. A series of precisely scheduled milk and sweep runs were designed for each shift of operation, based on the analysis of time and place requirements for parts, load capacities and supplier locations. Small quantities of parts, enough for a few hours, are picked up from suppliers within specific windows several times a day and delivered to Ford, again, within specific 15-minute window times. In some cases the parts are first sent to their Sequencing Center (managed by TNT Logistics), so the right color floor mat, for example, reaches the line in time for placement in the right color vehicle. The benefits of reduced inventory management time, material handling and warehousing space accrue to Ford.¹³

And, in another example, after a major truck manufacturer implemented reusable packaging, they increased their inventory turns from 30 to 55 per year and reduced on-hand inventory from 8 to 3.2 days!

Collaboration is the KEY to Getting Started with Reusable Packaging

How much time is spent on packaging? According to the Ohio State University Supply Chain Management Research Groups' 2003 Survey of Career Patterns in Logistics, logistics professionals have a 60% degree of authority over packaging, but spend just 5% of their time on it. ¹¹

According to John Anderson of Ford Motor Company. "Packaging cannot be considered as an end in its own right. It exists as part of the material system (supply chain) and must be engineered with that in mind." ⁸

A well-planned plastic reusable packaging program requires expertise and an in-depth understanding of the specific operation, the entire supply chain and the marketplace trends that face the company. Careful collaboration with an experienced reusable packaging provider will ease integration.

1. **ANALYZE** The process should begin with a careful analysis of the entire operation and supply chain to identify the product/material flow, the packaging application (work-in-process, storage, distribution, etc.) and packaging objectives (protection, improved transportation efficiencies, etc.)
2. Before a reusable packaging decision can be made, it is important to demonstrate and **PROVE** how the packaging and related support services translate into measurable efficiencies. The potential return on investment can be calculated. Metrics like time, cost reductions, safety, cleanliness and warehouse utilization are documented for benchmarking.
3. Next is **DESIGN**...After discovering the specific needs of the entire operation, a comprehensive reusable packaging program is planned. The objective is to optimize the supply chain whenever and wherever possible. To validate the solution, a pilot packaging program is conducted.
4. **IMPLEMENT** Once the reusable packaging program is planned, the specific packaging is delivered and seamlessly integrated into the system. Leading packaging partners oversee the entire implementation to ensure long-term system success. (i.e.

automated equipment interface, worker acceptance, proper handling, etc.)

5. It doesn't end there. Supply chain systems are dynamic and the packaging programs that support them must **EVOLVE** with them. New product launches, quality improvements, changing production process and new labor practices may require new and more innovative packaging. Experienced packaging providers will continually re-evaluate for future opportunities for optimization.

What are the Challenges?

Stakeholder Acceptance and Endorsement

Although it's possible to physically implement reusable packaging in as little as five days, true success depends on stakeholders across the supply chain embracing the benefits. The biggest pitfall is lack of acceptance from people who are affected by the change. Packaging is one of the few areas that impact almost every function in an organization. All of the people who touch the part or package should be represented and educated as part of implementation. Experienced packaging providers are available to provide on-site support to help plan and facilitate a smooth and most cost-efficient transition.

In most organizations, accomplishing this would involve several months of planning, training and testing to ensure that all the players embrace the new processes and work effectively with the new system.

Initial investment

The initial investment in plastic reusable packaging is different than the simple purchase of traditional packaging like corrugated boxes and wood pallets. A cost analysis conducted for one major tier one automotive supplier cited that with a \$448,000 initial investment, they would experience a return on their investment in just 4-5 months. Additionally, they would reduce line-side space requirements by 44% and eliminate 280 tons of waste!

Check Printers, of Nashville, Tenn., realized that the one-time use corrugated boxes could be replaced by reusable plastic containers with a long service life. In fact, when initially implementing 7,000 plastic containers in their operation, financial payback occurred within just 9 months, with a Return on Investment of over 430%, over a 5 year service life.

If the initial investment is a concern, companies may be able to achieve immediate, significant savings by leasing or pooling their packaging. Leasing enables the usage of reusable packaging without an up-front investment. Operating leases are available in 36- or 48-month terms. Companies can achieve all the benefits of reusable packaging without adding debt, assets or capital expenditures to their balance sheet.

Overcoming the Challenges

Begin with a pilot program

Depending on your organization, it often is beneficial to start your reusable packaging roll-out with a pilot program, then learn from it, adjust the process and take the next step. By choosing to begin with a specific supplier, production line or delivery route, the organization can adjust operations gradually while still seizing the cost-savings opportunity. Moving step by step gives employees a chance to adapt to the new process, and see visible signs of success that builds momentum and preserves morale.

Involve Suppliers and Share the Savings

Multiple players in the supply chain are affected by a change to reusable packaging. To achieve a smooth transition, it is important that suppliers understand how the change benefits them. It's only reasonable to allow suppliers some economic benefit if they are expected to convert to reusable packaging, and the best way to come to agreement is to share an honest perspective of why the change makes financial sense. Freight and handling charges, reverse logistics, container management and

tracking are among the issues that should be addressed with suppliers.

Manage Packaging for Long-Term Benefit

Once they implement reusable packaging and reap the immediate benefits, some organizations can become complacent about following the procedures that sustain long-term value from their packaging investment. Collaborating with an experienced reusable packaging provider will ensure long-term success. Leading providers will continue to evaluate your system for additional benefits. For example, they can provide services to track the use of reusable packaging in the operation to ensure that the system is providing the right amount of packaging to the right supplier or customer locations, at the right time. Or they can coordinate washing or sorting services, oversee any equipment changes and address other issues necessary to manage the program.

Plan Ahead

Don't wait until the last minute to consider the packaging portion of the supply chain equation. It's important to start planning the packaging and pursuing potential supply chain impact as soon as a change is anticipated. Be sure to allow time to test prototypes of the containers in the supply chain, and to work with and adjust various areas of the plant to facilitate the flow of goods. In order to maximize the line-side use of a hand-held reusable tote, for example, be sure to consider material handling needs, such as leaving enough space for containers to be delivered to the line by the appropriate equipment. If line-side space is configured too tightly, it can interrupt the movement of goods to the line. And, plastic containers and pallets should be tested to ensure they interface with high-speed automated equipment, to ensure ease of use.

In Conclusion: Packaging for Lean Production

When the entire supply chain is considered, a carefully conceived, well-planned reusable packaging program will eliminate waste, optimize

inventory management and improve the flow of product...making lean production possible and profitable.

And, with a rapid return on investment (ROI) in just 6-12 short months, the packaging program will continue to perform and yield cost savings for many years.

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