

Pallet Management and Waste Reduction

FACTSHEET

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The National Wooden Pallet and Container Association states, "Pallets move the world." Pallets, particularly wooden pallets, are the basic units used to transport goods throughout the country. More than 600 million pallets were manufactured in the United States in 1998. Approximately 90 percent of those manufactured were wooden pallets while the remaining 10 percent were manufactured from corrugated, metal, or plastic.

During the past two decades both timber prices and landfill fees have increased and have compelled businesses to modify the way pallets are managed. This fact sheet examines how businesses can evaluate and improve their pallet management system and reduce associated waste.

Assess Pallet Use

Examine the current use of pallets; track pallet use from first arrival to disposal. Note pallet sizes used (48" x 40," 40" x 40," etc), types used (block, stringer, two-way, four-way), and number of pallets purchased, shipped in, shipped out, returned, and disposed. Calculate costs incurred from pallet purchase, maintenance, retrieval, and disposal. After gathering this information, examine the options presented in this fact sheet for reducing the number of pallets that your company must manage.

Investigate Pallet Waste Reduction Options

- Have suppliers take back their pallets
- Pick up shipped pallets from customers
- Use high-quality pallets
- Design a pallet-less system
- Use plastic, composite, or metal pallets in a closed loop system
- Use corrugated paperboard pallets

Suppliers take back pallets

Require suppliers to take back pallets from previous shipments. Consider charging a disposal fee for those pallets not taken back.

Drivers pick up pallets

Require drivers to pick up pallets from previous shipments or pallets comparable to the ones your company uses. This will save the cost of buying new pallets and promote reuse. If finding pallets at the time of pick up is a problem, then implement a fee system. This system would charge

the customer a fee for each pallet that is not provided for return to your facility. A disadvantage to this method includes driver time spent finding comparable pallets and loading them.

Use High-Quality Pallets

High-quality pallets are easier to repair and more likely to be repaired and reused again and again. The cost per trip of higher quality pallets tends to be lower than cheap pallets because high-quality pallets can withstand more trips before repair is needed. Companies that use higher quality rebuildable pallets also can save as much as \$3 to \$4 per pallet by repairing them in-house.

Design a Pallet-less System

Pallet-less systems include the use of slip-sheets, reusable containers, recyclable top and bottom cardboard covers, rolling carts, and other material handling systems. These products are usually tailored to the company's specific needs and are often reusable, recyclable, and easy to clean.

Slip-sheets

Slip-sheets are flat sheets, 1/32" to 1/16" thick, and manufactured from corrugated, solid fiber, or plastic (usually polypropylene or high density polyethylene). Each sheet has one to four "tabs" that run the length of the sheet and are bent upwards for grabbing by push/pull attachments. They may be custom designed with alterable features including thickness, size, number of tabs, and coatings for tensile strength, slip resistance, and moisture resistance. Slip-sheets are best used in a warehouse/distribution center.

The following table compares general characteristics between the three different slip-sheet materials.

Material	Load Capacity *	Cost*	Recycling Notes	Moisture Resistance
Corrugated	500 lbs. or less	\$0.50 - \$0.60	Recycle with corrugated unless contaminated	Do not use around moisture
Solid Fiber	1,000 - 2,000 lbs.	\$1.00	Can be repulped by paper mills	Can withstand low moisture
Plastic	2,500 or less	\$2.50	Recycle with proper plastics market – may generate as much as \$0.21 revenues each	Moisture resistant

- ② Load capacity indicates the weight the tab can withstand when grabbed and moved via the push/pull attachment.
- ② Costs vary depending upon quantity ordered, thickness, size and coatings added.

Slip-Sheet Advantages over Pallets:

- Lighter and less bulky. Slip-sheets weigh around two pounds compared to 50 pounds for a standard 48" x 40" wooden pallet.
- Increase storage space. 50-100 slip-sheets can be stored in the same space as one pallet.
- Lower employee injury. Stress/strain and injury from manually handling pallets is prevented.
- Inexpensive enough for one-time use. Avoids the manpower of keeping track of pallets through exchanges.
- Decreases product damage. Broken pallet boards, protruding nails and splinters can damage products.
- Recyclable. Corrugated, solid fiber, and plastic sheets are recyclable with corresponding OCC, paper and plastic markets.



Disadvantages of Slip-sheets

- Large start-up cost. Push/pull forklift attachments generally range \$5,000 -\$6,000 each.
- Need customer participation. Customers must have push/pull attachments to move goods on slip-sheets
- Water and moisture can weaken corrugated and solid fiber sheets leading to load damage.
- Slip-sheets must be placed on rackable pallets, or a steel wire support system must be installed in racks.
- Requires specialized training of forklift drivers to ensure proper handling.

Reusable containers

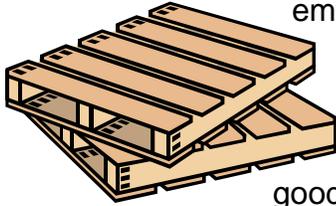
Reusable containers, usually manufactured from plastic, corrugated, solid fiber, or metal, have many appealing features. The strength, durability, and cleanliness of reusable containers are dependent upon the material used. Containers can be ordered to fit your needs, including size, shape, color, partitions, and reusable cushioning systems. They offer features such as being stackable, nestable and collapsible for return.

Rolling carts usually made from heavy duty plastic or metal can be tailored to fit odd shaped producers with considerably less protective packaging. Rolling carts tend to save labor and reduce labor injury claims, as they are much easier to work with than pallets. Savings on labor, injuries and protective packaging often can pay for these carts in one year.

Closed Loop System

Pallets made from plastic, metal or composite materials are a long-lasting alternative to wooden pallets. All three materials are durable, reusable, easy to clean, and recyclable. Despite higher initial costs, these pallets save money in the long run. According to the Purdue University AGVS Research Group, the average life of these pallets is 100 trips,

where one trip is defined as five handlings. These pallets usually meet both USDA and FDA standards for pharmaceutical, chemical, grocery and food processing operations as they can be sanitized and steam cleaned. They also exhibit low breakage rates and work well with automated material handling systems. Product damage is lowered, and employee safety is increased when using these pallets because they have no nails, staples or broken boards.



Plastic, composite, and metal pallets are best used in a closed loop or slave system where shipping is restricted to moving goods within or between specified plants and facilities. Closed loop systems operate best under one or more of the following conditions: short distance shipments, frequent deliveries to the same customer, delivery to a limited number of customers and/ or delivering with company owned vehicles.

Plastic Pallets are created in three general forms. Plastic lumber pallets resemble the wooden pallet with the exception that the boards are made from extruded plastic. Structural foam and thermoformed pallets are distinctive in their style as they are one solid piece of plastic. These pallets have no nails, screws, or staples, thus reducing product damage and employee injuries. They often offer a grooved deck, a raised lip on the outer edges, and hollow feet that provide nesting of pallets to save storage space. Plastic pallet manufacturers are still trying to create a truly rackable structural foam or thermoformed pallet. Heat and weight have proven a detriment to these types of pallets because they bend under open racking conditions.

Composite pallets, as their name states, are made of two or more distinct materials. Some are made from a combination of plastics while others are extrusions of sawdust, wood shavings and recycled plastics. Composite pallets are fairly new to the pallet industry. They have high loading capacities and racking ability like wooden pallets, but are easily cleaned like plastic pallets.

Metal pallets generally are made of aluminum or stainless steel. They are most often used as slave pallets, which do not leave a facility. Metal pallets are the strongest and most durable pallets on the market. They usually are heavier than their wooden counterparts and have a much higher initial cost. Metal pallets are most often used in a manufacturing setting where a pallet is needed to withhold heavy racking weights, high temperatures, the rigors of conveyor systems, and cleanliness standards set by the FDA and USDA.

Corrugated Paperboard Pallets

Four percent of manufactured pallets are made from corrugated paper or pressed wood composites. Reasons for using corrugated pallets include light weight, ease of disposal (cardboard recycling), and strength. Some corrugated pallets boast static load capacities as heavy as 30,000 pounds (at 70° F and 50 percent relative humidity). Corrugated pallets are also able to meet the special dimensions and disposal needs for shipping goods to Europe. Some European customers request corrugated pallets because they can be recycled with corrugated boxes. For those interested in completing

the loop and buying recycled, corrugated pallets are typically manufactured from recycled paper.

There are drawbacks to corrugated pallets. First of all, they can be expensive, about \$5 to \$7 each, and are usually intended for one-way use. Corrugated pallets are not as durable as wooden, plastic or metal pallets, and products often must be stacked in specified ways for the pallet to hold the load. Furthermore, exposure to moisture will damage corrugated pallets possibly causing pallet failure.

Investigate Pallet Management Systems



- Standardize - use one type of pallet, preferably 48" x 40"
- Repair broken pallets
- Recycle pallets
- Use a third party management system to lease pallets and repair
- Donate pallets
- Exchange pallets

Pallet Standardization

Standardizing pallet sizes promotes reuse and recycling. Work with vendors to supply incoming materials on pallets your company can use to ship out its final products. A change in pallet size may require modifications to racking, storage facilities, or product orientation, but the savings may be well worth it. Using one standard size will reduce pallet inventory needed and labor needed for sorting different pallet sizes. The Grocery Manufacturers Association (GMA) style, 4-way, 48" x 40" pallet is the unofficial standard size of the pallet industry. Because of its popularity, pallet recyclers may pay as much as \$2 for each used GMA pallet.

Repair Pallets

Adding new nails, metal brackets or replacing a broken board, can often repair broken pallets. Dedicated pallet handlers can be trained to provide minor or major repairs to broken pallets for a fraction of the cost of buying new ones. If getting into the pallet repair business does not appeal to you, then contact a local pallet repairer.



Pallet Recycling

Pallet repair and pallet recycling are two words that are often incorrectly interchanged. Companies who repair pallets are usually labeled pallet recyclers although their main goal is to repair and rebuild pallets. Pallet repair is the restoration of broken pallets to working condition. If pallets are not suitable for reuse or repair, then they can be recycled. Recycling usually entails grinding the pallets to wood fiber for use as landscape mulch, playground cushion/bedding, animal bedding, compost, soil amendment, or biomass fuel. Many companies that offer pallet repair services are also capable of pallet recycling. If the pallets you are looking to unload in an environmentally

friendly way are not suitable for repair, then you should look for biomass recyclers that accept all types of wood for their wood fiber.

Third Party Management

The development of third-party pallet management companies and networks of individual pallet companies provides an efficient way for companies to manage their pallets. Third party management companies combine pallet manufacturers with pallet repair and recycling companies to provide complete pallet management. Third party companies either manage a user's existing pool of pallets or rent pallets to the user on a per trip basis. The management company tracks pallets throughout their usage and retrieves them for reuse or refurbishing. Third party systems often use higher quality pallets, increasing the trips per pallet an average of 20 to 40 times compared to five times when managed by the user. This style of pallet management reduces lumber used to make new pallets, promotes reuse and repair, reduces pallet waste via recycling, and saves the pallet user money and time.



Exchange Pallets

One way to handle excess pallets is through exchanges between businesses. These arrangements can be made by the businesses themselves or facilitated by local government recycling coordinators and groups such as the Chamber of Commerce. Another good exchange possibility is finding a sister facility that can exchange pallets with your plant. The resulting agreement to exchange pallets keeps used pallets out of the solid waste stream and reduces costs for new materials. Exchanges work especially well when participating businesses do not require top quality pallets.

Donate Pallets

Industries can give wooden pallets away to facilities that chip pallets for use as fuel, mulch, compost, or animal bedding if the pallets are not treated or contaminated with hazardous or toxic residuals. Also, several county solid waste management facilities and some private facilities have the ability to grind and process pallets to remove nails and fasteners.



Companies with small numbers of pallets can give away clean scrap pallets to employees for building projects and firewood. During the winter, scrap pallets can be donated to the public to fuel fireplaces and wood stoves. A small classified ad in the local paper can generate considerable demand.

Comparison of Wooden Pallets and Alternatives

PALLET MATERIAL	NUMBER OF TRIPS	REPAIR-ABLE	RECYCLED CONTENT	BASE WEIGHT (LBS.)	DYNAMIC LOAD CAPACITY (LBS.)	UNIT COST	DISPOSAL OPTIONS	DISADVANTAGES	ADVANTAGES
WOOD	2-15 before repair	Yes	No	55-112	2,500	\$3.50-\$10	Recycle Compost Fuel Source Remanufacture Mulch	Product damage and lowered employee safety because of splinters, loose boards and nails	Wood is the standard pallet material; third party management can reduce costs and increase reuse
PRESSED WOOD FIBER	2-4	No	Yes	30-42	1,000-2,500 (uniform load)	\$5-\$7	Recycle Compost Fuel Source	Not very resistant to water or contamination, loads need to be uniform across pallet face	Slightly lighter than wood; round corners make ideal for stretch wrapping; nestable which means less storage space
CORRUGATED FIBERBOARD	1	No	Yes	7-12	1,700-4,000 (uniform load)	\$5-\$7	Recycle Compost Fuel Source	Not resistant to water or contamination, easily damaged, loads must be uniform across pallet	Easily recycled with OCC waste; some are nestable; light weight, no nails, no splinters – safer for employees
PLASTIC	250	No	Yes	35-75	1,500-4,000	\$20-\$80	Recycle	Usually used in closed-loop system, fair to high unit costs, poor reparability; potential fire hazard	Easy to clean; some are nestable; no splinters or nails – safer for employees; low cost per trip
METAL	15 year life	Yes	Yes	32-100	5,000	\$40-\$350	Recycle	Usually used as a captive pallet or in a closed loop system, very high unit costs	Meet FDA and USDA standards; strongest and longest life pallet; no fire hazard
SLIPSHEET (PLASTIC, CORRUGATED, FIBER)	1	No	Yes	2	Corrugated – 500 Solid fiber – 2,000 Plastic – 2,500	\$0.60-\$2.50	Recycle	High start-up costs; push/pull attachments are required on shipping and receiving ends	Lightweight, no nails or splinters – increased employee safety; less storage space; no need for tracking – cheap enough for one time use
COMPOSITE	100-150	Yes	Yes	55-75	5,000	\$22-\$70	Company buy back for recycling	Usually used in closed-loop system, fair to high unit cost, still fairly new in market so little performance data is known	Typically stronger than wood or plastic; sanitary; washable; some are fire retardant and self-extinguishing; water resistant