

Section VIII:

Storing and Shipping Your Product

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Process Overview

Shipping and warehouse activities include finished product inventory control and material handling operations. Material handling equipment such as forklifts, overhead conveyors, in-floor chain conveyors and increasingly, all types of automated equipment including: automated retrieval/automated storage (AR/AS) systems, Automated Guided Vehicles (AGV), very narrow aisle technology and deep bay push back racks are commonly used.

Packing operations typically includes the following:

- ! attaching hardware or inserting for customer attaching
- ! securing drawers for shipment to prevent damage
- ! general clean-up
- ! final inspection
- ! touch-up, if needed
- ! packing and labeling to provide the necessary protection to prevent damage during shipping

Potential Wastes: Solid and Hazardous

- ! paper
- ! wood packaging waste
- ! packing materials
- ! broken mirrors, glass
- ! damaged hardware

Waste Reduction Options/Case Studies/Checklists

Enhance Packaging Performance by Evaluating Damage History

Management of packaging material for furniture products can be a source of environmental concern due to the large volume of material used for protection of the furniture. However, inadequate packaging can result in furniture being damaged in transit and subsequently disposed in some cases, thereby creating a larger environmental problem than the packaging.

The focus here is to minimize the damaged furniture waste by improving packaging. Records should be collected of what goods are damaged. Evaluate these records periodically to determine sources of packaging problems. What caused the piece of furniture to be damaged? Would additional labeling aid in the situation? Would a different packaging approach provide protection from such incidents? Develop methods of improving packaging to eliminate or minimize these problems.

As an example, staples which have not been completely removed from a box before the furniture is removed, have been known to produce significant scratches on a new product (and in some case, on the customer, resulting in lawsuits). Changing to tape, banding or adhesives for box closure eliminates this source of damage.

Packaging systems can be improved by evaluating the sources of past furniture damage, and conducting performance tests on current and proposed packaging. Damage to a large piece of furniture has an environmental price as well as a financial price related to the wasted production of the piece and the ultimate disposal of the piece.

Enhance Packaging Performance by Evaluating Relative Humidity

Furniture pieces are typically sensitive to water damage, therefore, most packages must be carefully protected from exposure to water. When selecting packaging materials, ask suppliers how the materials ranked in standardized water resistance tests and choose materials which have sufficient water resistance and strength to properly protect the furniture being shipped.

Keep Relative Humidity Under Control

To keep your finished wood product in optimum condition, you may want to continue to monitor your final storage facility's relative humidity as is recommended for the wood during previous preparation and manufacturing steps. See Section IV.

Minimize Volume and Weight of Packaging Materials

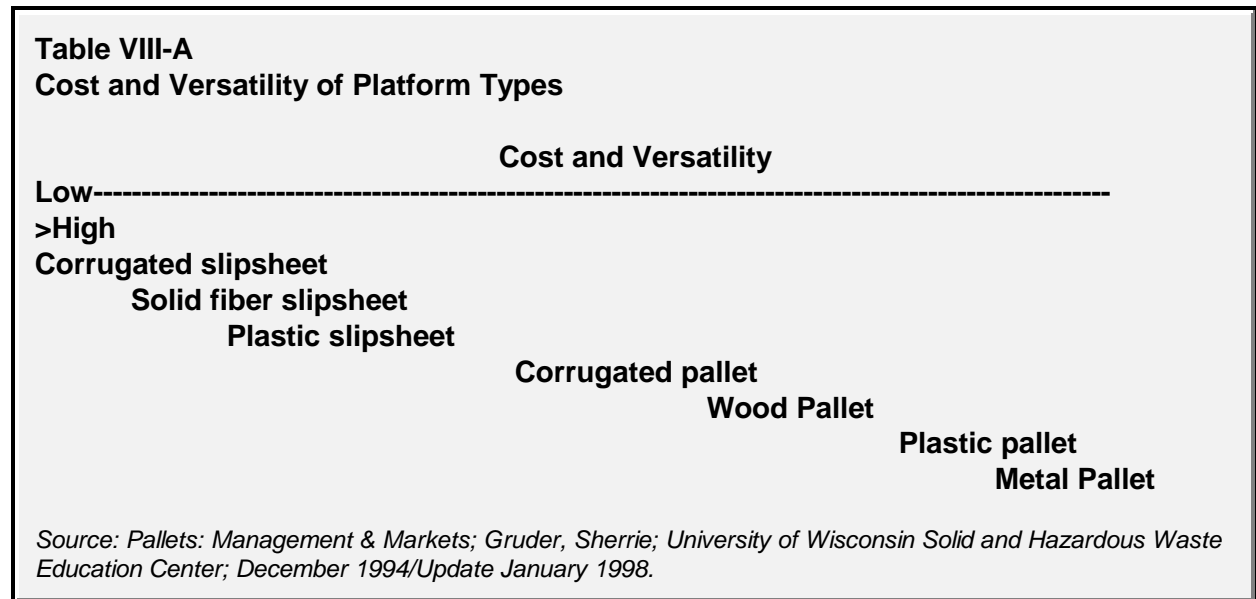
Although it is ultimately important to protect the product, it is also desirable to minimize the packaging required to the extent possible. Although "no packaging" is the ideal alternative, minimizing packaging is the second best alternative. By decreasing the packaging required, the manufacturer is saving in five ways:

- ! Less raw materials are required to produce the packaging
- ! Less labor may be required to package the material (in many cases)
- ! Less energy is needed to transport the package
- ! More efficient package size is achieved (decreasing cost of transport)
- ! Less waste handling at the shipping destination

Selection of packaging materials should include evaluation of the total energy and other environmental resources used to create the packaging, as well as the energy required to ship the package. Various materials are being developed for packaging which are lighter weight yet equally strong.

Some special self-sticking stretchable film tapes are being used in the place of considerable quantities of shrink wrap for specific applications. These tapes are reducing the volume and weight of packaging materials used and are recyclable.

Wood is also often used in packaging, for instance placed under a piece of furniture to transport the piece around the manufacturing facility, and later to support that piece in the container. Heavy duty cardboard skids have been developed that can carry the furniture load, protect the furniture in transit and be recycled.



Wooden skids can be more expensive to purchase and are heavier than cardboard, adding to the fuel charge for shipping when loads weigh out before they cube out. However, cardboard skids can also be more susceptible to collapse during transit or when used in certain material handling environments, such as high humidity. There is not “one” perfect answer; it all depends on your specific packaging needs (see Table VIII-A).

Check out your options in recycling both wooden and cardboard (and sometimes plastic) by checking with your local recycler (see Table VIII-B). Professional associations such as the National Wooden Pallet & Containers Association¹ can also lead you to pallet experts.

An alternative to conventional plastic, paper and wood is the development of bioplastics: plastics created from fermentation of glucose by natural bacteria. The bioplastics can be processed and used in the same manner as other plastics, produced from a renewable resource (typically corn), and are biodegradable when exposed to aerobic

conditions and microbial activity (for example in a composting system). The cost of producing bioplastics is nearly 10 times the cost of producing conventional plastics.

**Table VIII-B
Environmental Scorecard for Pallet Materials**

Material	Wood	Metal	Plastic	Corrugated
Renewable Resources	Yes	No	No	Yes
Reuseable	Yes	Yes	Yes	No
Repairable	Yes	Yes, expensive	No	No
Recyclable	Yes	Yes	Sometimes	Yes

Source: National Wooden Pallet & Container Association; 1997.

The decision on whether to use paper, plastics or bioplastics is

complex and confusing and must be addressed on a case by case basis. The best advice is to use as little of whatever type of packaging is chosen and reuse or recycle as much as possible. Minimizing the overall weight of the package (as well as the volume) will also result in savings on energy resources needed to transport the package.

Benefit from Reusable Pallets and Containers

Environmental concerns about packaging have resulted in the development of reusable pallets and containers and the retrieval and recovery systems that go with them. Up to 87 percent of pallets returned for recycling are used to make more pallets²; the rest is used for landscaping mulch and fuel. Packaging ordinances have been passed in other countries which obligate manufacturers and suppliers to reclaim used pallets and containers and to either reuse them or to transmit them for recycling rather than sending them to conventional disposal facilities. Similar standards have been considered more recently in areas of the United States.

¹ While 91 percent of pallets used by manufacturers are wood, this particular association works with other material types as well. Web Site: <http://www.nwpc.com>

² Robert Bush, Virginia Tech Wood Science and Forest Products

When selecting packaging for furniture delivery, reuse and recycling goals established by state legislation should be considered. It is best when manufacturers develop pallets and containers which can be returned for reuse. Cardboard boxes can be effectively slit, collapsed and recycled. Bins can be filled at the retailer's facility then returned to the manufacturing plant when full. A credit or some other incentive can be associated with return of packaging materials to the manufacturer where reuse of these materials will result in an economic savings to the manufacturer. In many cases, reusable protective blankets are used to protect furniture in transit to the retailer or customer.

Some furniture companies are developing packaging bags which can be collapsed and mailed back to the manufacturer. In these cases, the customer may be provided with a large sturdy envelope or small box in which to put all the packaging material. The envelope or box could be pre-addressed to the manufacturer and have a return postage paid guarantee to encourage customers to use the system. The practicality of this approach must be determined on a case-by-case basis, but should be considered in packaging selection.

Improve Compatibility of Packaging Materials for Recycling

In many cases a reuse system may not work. Even where such a system is in place, the recyclability of packaging materials which are either damaged beyond continued use or escape the reuse circle should be considered. The two major types of recyclable packaging materials currently used in furniture packaging are plastic (polyethylene or other plastic) wrapping film and corrugated cardboard. Additionally, wood, metal and some foam products are used in the packaging process.

Consider recyclability of packaging material based on technical opportunities and practical options. It may be technically possible to recycle the material, but it is also necessary to have the collection systems in place for the retailer and the customer's use to get the materials to the right recycling facility. For some plastics, collection systems are not available in some towns, leaving plastics out of the recycling loop. In most areas, cardboard, glass, aluminum, steel and wood recycling collection systems are available.

Following the choice of the primary packaging material, it is necessary to evaluate the method of closure. It is important that the materials used to tape or seal the package do not interfere with the recycling of the major packaging material in question.

Laminated and coated papers are not as amenable to recycling because it is difficult to get the materials into solution and the laminates and wax-coats contribute to the problems with "stickies" (globules of tacky material which may result in sticking of paper and possible flaws in the final paper). Some types of labels and closure materials are not amenable to recycling. Any tape adhesives and hot melt adhesives which pass through the cleaning process and stay in the slurry will turn into "stickies". The presence of stickies is a significant concern in quality control for recycling paper.

According the US Forestry Service (Klungness), the three major problem sources with "stickies" in the OCC recycling process are wax-coated corrugated cardboard, hot-melt adhesives and pressure sensitive labels where the adhesive is not designed to stay with the backing during the recycle process.

Tapes and labels which are designed to meet two specific criteria are preferable for use on packaging materials to be recycled. These criteria are:

- 1) the adhesive must stay with the backing when placed in a water slurry, and
- 2) the backing must remain intact during the recycling process so it can be easily removed with devices normally employed in the process.

In a study conducted by the Forest Service, pressure sensitive plastic tape designed to meet these requirements was found to not interfere with recycling and to not impact the quality of the paper product.

Generally, staples are not considered a technical problem for the recycling process. However, in some areas of the country, staples create a problem for recycling collection operations that do not handle stapled boxes. The justification given is that workers have a high rate of injury (cuts and scratches) from handling the stapled boxes. The health and safety aspects are a problem to the recycling companies so they often establish policies stating that they simply will not handle stapled boxes.

Recycle Other Wastes Produced in Packaging, Shipping and Warehouse

Recyclers are available for paper (paper, cardboard), wood (pallets, frames, skids), metals (hardware, fasteners), and glass. If the materials cannot be reused within the facility, check to see if it can be reused or recycled externally. Keep dedicated containers in work areas as receptacles for each type of material. Also, if you use starch peanuts for packing, note that they are often biodegradable.

Shelby Williams Industries Inc. Case Study

Corrugated cardboard from cartons received with raw materials in addition to the dunnage wrapped around pallets of product cartons created large amounts of scrap for Shelby Williams Industries. Historically, the scrap was picked up by recycler. However, it was suggested that this material was appropriate for use as carton inserts and furniture edge protectors, which Shelby Williams was purchasing by the thousands each week.

In 1992, a small, in house department was established to re-cut the scrap cardboard into inserts. Machines were designed and developed by Shelby Williams employees to die cut and crease edge protectors and other inserts. Even though the project was successful, the remaining odd shaped scrap that remained after cutting was not acceptable by recyclers, and many smaller boxes did not convert to the insert sizes required. Shelby Williams had no boiler where scrap might be used as fuel.

To resolve this problem, Shelby Williams made arrangements with a local recycler to take all their scrap cardboard for no cost. The recycler then uses Shelby Williams "homemade" cutting and creasing machines to make all the inserts that Shelby Williams needs at no charge, or for only a few cents each to cover labor costs.

The net result is a reduction of the cost of inserts from an average of 22 cents each to about 3 cents each. Applied over 3000 to 5000 inserts per week, significant savings were realized. Also, most of the cardboard is re-used rather than recycled which prevents additional energy usage associated with recycling.

Web Links

Packaging Association Links <http://www.napco.com/packaginglinks.html>

Here are links to over 50 associations relating to packaging of manufacturing items, including ASTM, Institute of Packaging Professionals, etc.

National Wooden Pallet & Containers Association <http://www.nwpca.com>

An association that can lead you to pallet experts and help you meet your recycling needs.

Checklist: Storing and Shipping Wood Products

Here's a checklist of items to help keep product damage to a minimum while increasing your profits. It is important to view the overall picture in order to give an account of the full shipping and packaging costs incurred by your company. Minimizing the overall weight and volume of the package will result in energy saving resources needed to transport the package.

Storing the Product

- ___ Evaluate the weight of your product and the load it can take if other items are stacked on top of it.
- ___ Is the relative humidity similar to that in the rest of your plant? Will wood products expand/contract beyond desired levels?

Assessing the Packaging

Much can be learned from assessing past damages from shipping. In doing so, check out current packaging uses as well to determine best cost saving practices:

- ___ Type of pallet (wood, metal, corrugated, plastic; evaluate: reuse, repair, recycle capabilities)
- ___ Packing material (paper, polystyrene, bioplastics [typically corn based and biodegradable])
- ___ Closure material (staples, banding-metal/plastic, adhesives)
- ___ Skid containment (shrink wrap; self-sticking stretchable film tapes)
- ___ Is there a different way to package item to prevent damage?
- ___ Would additional labeling aid in the situation?
- ___ Can weight be added to the top of your packaged product (label appropriately)?
- ___ Was there water damage that could have been avoided?
- ___ What is the relative humidity of your warehouse? shipping trucks? Does it affect your finished product?
- ___ Do you have too much or too little packaging?