



Corrugated Cardboard Pallet Pilot

Report to the Legislative Assembly

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Executive Summary

During the 2016 legislative session, Representative Parrish sponsored House Bill 4089, which would have required state contracting agencies to provide – in specifications for procurement and in public contracts – that contractors or suppliers must use corrugated cardboard pallets in transporting, distributing, storing, or otherwise transferring goods, and to require contractors and suppliers to have similar requirements in contracts with common carriers and other third parties.

The introduced version of the bill presented a number of challenges for state agencies. Given the Oregon Department of Corrections' (DOC) track record with implementing sustainability initiatives, the agency was approached and asked to participate in a pilot program outside of legislation. DOC agreed to participate in a pilot to determine what the implications would be to cost and operations; outline any challenges; and determine what would be a realistic goal for mandating the use of corrugated cardboard pallets.

DOC established a workgroup and developed a charter to determine the feasibility and probability of using corrugated cardboard pallets.

Workgroup members visited IKEA on a shipment day to gain a better understanding of their shipping processes and get a better look at their pallets, shelving, and equipment. During the visit, DOC learned of the benefits and challenges IKEA has faced during the transition to cardboard pallets. While IKEA has not completely converted to using cardboard pallets, it is their goal to be converted within the next five to ten years.

DOC also reached out to multiple cardboard pallet manufacturers to learn more about their pallets, make product comparisons, and determine feasibility for internal use. The agency identified one manufacturer with a product that could potentially work within DOC. To conduct a limited test phase, DOC ordered a small number of sample pallets from this vendor.

Through the test phase, DOC learned that, overall, the cardboard pallets tested did not work for the agency's transport and storage needs. In addition, cardboard pallets present a number of logistical and cost issues for the agency.

Cardboard Pallet Workgroup

Purpose

The purpose of the workgroup was to explore a pilot project that would enable DOC to work with vendors in utilizing corrugated pallets and study how it could impact agency procurement efforts and overall cost, as well as identify and outline any implementation and logistics challenges. Steps taken to research the project were done through:

- Conducting an internal analysis, including surveying institutions to further identify challenges and potential benefits, to determine what DOC would need to do to make this change;
- Visiting IKEA on a shipment day to look at pallets, shelving, and equipment;
- An attempt to make manufacturers product comparisons;
- Conducting a limited test phase for internal usage to determine the life of a pallet and if it will result in reducing the number of trucks on the road; and
- Identifying any additional challenges and/or benefits.

Workgroup Members

Name	Title
Elizabeth Craig, Project Sponsor	Communications Office Administrator
Steve Robbins, Project Sponsor	Chief Financial Officer
Dennis Wallace, Project Lead	Central Distribution Center Warehouse Manager
Barbara Cooney	Distribution Services Administrator
Marie Garcia	Legislative and Government Relations Manager
Dick Hawks	Procurement and Contracts Manager
Dustin Hoffman	Central Distribution Center Transportation Manager
Chad Naugle	Sustainability Coordinator

Project Updates

IKEA Visit

Members of the workgroup visited the IKEA store in Portland in August 2016. This visit was to learn how IKEA uses and transports corrugated cardboard pallets within their store and to other IKEA stores. Many issues surrounding the use of corrugated cardboard pallets became apparent, such as the limited lifespan of the pallets, the cost to purchase additional equipment, and the need to modify existing racking in all DOC warehouses.

The following are the key findings from DOC's visit to IKEA:

- IKEA's corrugated cardboard pallets are engineered by the manufacturer for each specific product IKEA ships. This is economically feasible based on the high world-wide volume that IKEA ships for each stock keeping unit (SKU). IKEA does not have low-volume, variably-sized freight.
- IKEA attaches metal rods or stabilizers to their racking systems on which the pallets rest. They are held in place on the warehouse racks with straps, which allow them to vary the distance of the stabilizers to accommodate the different sized pallets. IKEA sells much of their palletized product off the racks, so it minimizes the number of times the pallet must move in restocking.
- Pallets are required to be shrink wrapped, banded, or both to ensure stability.

- IKEA uses each corrugated cardboard pallet once, and then recycles it. IKEA believes multiple uses would cause cardboard pallets to break down due to damage caused by various actions during movement by forklifts or pallet jacks.
- The main damage to IKEA’s cardboard pallets occurs in transit to the pallet foot or the block on which the pallet top rests. IKEA purchases replacement blocks for damaged ones to allow continued use of pallets. This prevents having to restack product onto an undamaged pallet during transit.
 - This works for IKEA, because their logistics network is predicated on few pallet moves across minimal shipping docks. This compares to DOC’s complexity that involves multiple pallet moves, and storage of product on the pallet that is constantly moved as product is used.
- IKEA pallets hold up to 2,300 pounds.
- IKEA does not move food items on cardboard pallets.
- IKEA does not transport product in refrigerated trucks.

Product Comparisons

As part of the workgroup’s efforts, DOC staff reached out to 10 manufacturers¹ to learn more about their corrugated cardboard pallets and make comparisons among products. Upon learning of DOC’s freight characteristics, these manufacturers either did not return DOC calls after multiple attempts, or identified concerns that precluded them from being viable options:

- Corrugated cardboard pallet availability was an issue.
- Durability when being used to store product in a refrigerator or freezer for any extended period of time was a concern. The temperature has an impact on the adhesives used, and refrigeration results in condensation – a concern with a corrugated cardboard structure.
- Some corrugated cardboard pallets also contain recycled plastic, which complicates pallet disposal.
- If a vendor could only offer a “firm core” corrugated cardboard pallet, which can hold up to 1,000 pounds, it was not an option. The majority of DOC pallet loads weigh more than 1,500 pounds.

One vendor had corrugated cardboard pallets that would be suitable for a test phase – The Corrugated Pallets Company out of Toronto, Ontario. DOC purchased a small quantity of pallets for a test phase.

Limited Test Phase

DOC completed a test phase for internal use to determine the lifespan of a corrugated cardboard pallet and whether it would result in reducing the number of trucks on the road. The limited test phase included the following steps:

1. Purchasing a limited quantity of corrugated cardboard pallets from The Corrugated Pallets Company.
2. Restacking product from the wood pallets on which it was received onto the corrugated cardboard pallets. DOC tested the shipment of a variety of products, including cleaning supplies, inmate clothing, dry food, and refrigerated/freezer foods. Distribution Services

¹ Corrupal (Quebec); CorTek Inc. (North Carolina); DDN Industries, Inc. (Illinois); Elsons International (Ohio); Erdie Industries (Ohio); GL Packaging products, Inc. (Illinois); Green Light Pallet (Oregon); Ox Box (Illinois); Sonoco (South Carolina); The Corrugated Pallets Company (Toronto).

- staff monitored the durability and stability of the corrugated cardboard pallets while being restacked and staged in the various areas of the CDC Warehouse.
3. Loading product onto DOC trucks for delivery to the Snake River Correctional Institution (SRCI) warehouse in Ontario, Oregon. The DOC driver inspected the truckload several times during transport to monitor durability and stability.
 4. Unloading and inspecting the pallets (and product) when it arrived at SRCI.

Internal Analysis

DOC conducted an internal analysis to identify potential benefits and challenges of using corrugated cardboard pallets. A summary of findings is as follows.

Benefits

- From a Sustainable Materials Management (SMM) standpoint, there are some benefits to switching to corrugated cardboard pallets. SMM looks at the entire life cycle of a product from resources to make, transport, use, and dispose of the product.
- Using corrugated cardboard pallets could reduce DOC's carbon footprint, based on the fact that cardboard pallets are typically manufactured from recycled product.
- Corrugated cardboard pallets provide less impact on habitat, based on the reduced need to harvest trees for replacement.
- DOC has not found significant study in this area to reference, but using corrugated cardboard pallets may result in fewer warehouse injuries due to the ease of lifting them and the lack of puncture injuries from splinters and sharp edges.
 - Cardboard pallets are 65-75 percent lighter than wooden pallets, making them easier to handle and less costly to transport when trailers or sea containers are "fully cubed."²
 - Cardboard pallets are 100 percent splinter, nail, and mold-free, which helps improve health and safety.

Challenges

- Through the test phase, DOC found that the loaded pallets began to rip apart when moved to staging areas. Upon being staged for a period of time, some pallets then crumbled as they were picked up to be loaded onto the truck. The pallets did not hold their structure in-transit and were not capable of being used to store product at the destination location because of their condition after shipping. See the Appendix for more information.
- DOC currently uses 873 different line items in its Central Distribution Center (CDC) warehouse in Salem. Conventional warehouse racking cannot accommodate corrugated cardboard pallets. Over 300,000 square feet of racking would need to be reconfigured at CDC, and 82,500 square feet of racking at DOC satellite warehouses located at Two Rivers Correctional Institution (Umatilla), Deer Ridge Correctional Institution (Madras), and Snake River Correctional Institution (SRCI). The cost has not been determined.
- DOC would be required to carry additional replacement blocks to address damaged corrugated cardboard pallets during transit. This could slow delivery time to each of DOC's 14 institutions.

² Fully cubed, or filled to 100% capacity of usable space, is most frequently attained when shipping lightweight units of consistent size (the model used by IKEA). Refrigerated trailers, primarily what DOC uses, rarely reach volume capacity because weight must be kept within legal limits – and heavy freight reaches weight capacity before volume capacity.

- The weight of dry goods or food used by DOC would be too heavy for cardboard pallets. Food weight can exceed 4,000 pounds on one pallet, which DOC's current warehouse racks and pallets are able to sustain.
- Corrugated cardboard pallets come in different sizes and shapes. In the case of IKEA, they can mandate all one style for a worldwide closed-loop shipping network. DOC does not have the capability, so could be receiving a wide variation of pallets from various shippers. DOC electric and manual pallet jack fork attachments would need to be purchased to accommodate different sized corrugated cardboard pallets. DOC uses approximately 30-35 electric and manual pallet jacks statewide in its four warehouses that would require refitting or replacement.

Vendor Concerns

- DOC notified vendors from whom the agency orders food, clothing, and cleaning supplies of the possibility of requiring their product to be delivered only on corrugated cardboard pallets. The resounding response from vendors was that, if cardboard pallets were to become a requirement, the additional cost would be passed along to DOC in either freight or product pricing. This would likely increase the daily cost for DOC to feed and clothe adults in custody, and to keep facilities clean and sanitary.
- Cardboard pallets are typically not used for shipping heavy and irregular sized food products. The food product vendors DOC contacted were not able to provide a cost estimate of the additional cost to deliver their product on corrugated cardboard pallets, and some stated that they may be unable to provide this service.
- If food vendors were unable to deliver on corrugated cardboard pallets, DOC warehouses would have to receive product on a regular wood pallet and shift the product to a corrugated cardboard pallet, which would add time in handling the product.

Direct and Indirect Financial Impact

It should be noted that, while corrugated cardboard pallets provide some sustainable benefits, there also may be adverse impacts to DOC if the agency were to decrease or halt its use of wood pallets. For example, DOC receives Other Funds revenue for recycling the wood pallets it currently uses, which is a primary driver of revenue for the CDC Central Recycle Center. This revenue from recycling wood helps offset the cost to recycle other commodities, such as fabrics, shoes, fluorescent bulbs/ballasts, and e-waste. In addition, CDC coordinates a vocational program for adults in custody whereby they use broken pallets to make furniture.

Appendix



Palletized milk crates.



Palletized milk crates that have been shrink wrapped. The corner of the pallet began to rip away from the sides of the pallet when staff attempted to move it to the staging area.



Cardboard pallet loaded with 50 cases of beef patties, each weighing 40 pounds; staff were not able to move the pallet because it crumbled.



This pallet of frozen chicken (pictured before transit), along with a pallet of frozen eggs, was able to be loaded successfully and shipped to the eastside of the state. However, once it arrived at Snake River Correctional Institution (Ontario), the pallet didn't maintain its form and staff had to re-palletize the product onto wooden pallets.