

## Basic Packing Techniques for the Shipment of 3-Dimensional Art Work

The packing of art objects for shipment is an important aspect of preventive care for both stable and unstable objects. The extent of handling involved in packing the artwork, crating the artwork, movement during travel, and then unpacking the artwork can cause physical and chemical damage.

The topic is an expansive one. The scope of this leaflet is limited to the common problems that the WACC Objects Conservation Laboratory observes most often, due to damage during shipment or improper packing methods and materials. A fairly simple and systematic approach to packing is offered for most basic packing and shipping needs. Unique and special situations are not addressed but should be consulted on an individual basis with professionals.

Some fine art shippers will offer packing and crating services in addition to shipping services. It is still important for the museum to oversee the shipper's method of packing and ensure that the artwork is not at risk. A shipper will need to know in advance if packing or crate manufacture is needed. The dimensions and weight of the artwork, as well as denoting its weak areas, is required information.

The bibliography included with this Technical Leaflet addresses the many aspects and considerations of packing and shipping artwork, whether for shipment to a conservation laboratory for treatment, to a storage area, lending to another institution, or for a multiple venue exhibit.

### Protection and Function

The extent of protection for the artwork must correspond with its level of stability, amount of handling needed, method of shipment, and number of destinations planned. To assess the risks, a checklist similar to the one below used *in advance of packing* the artwork can aid in providing the correct support and packing materials needed. Artwork must be examined thoroughly by a collections manager or possibly by a conservator before packing to confirm its stability during venue travel or to determine special packing needs. Because artwork shipped to the conservation center usually already has preservation issues, it is equally important to carefully pack and prevent further damage in transit before treatment.

- What is the reason for shipping? conservation treatment, loan, multiple venue, off-site storage, etc.
- Has a collections manager or conservator examined the piece?
- Is there available staff and materials for handling/packing? designate staff member(s) to handle/pack/crate artwork, courier to accompany travel and monitor unpacking, fine art shipper to crate
- What is the planned method of shipment? hand deliver by staff member, commercial transport by fine arts company (air-ride truck, cargo van) lift gate needed, crate pallet needed, air transport (water tight container needed), route and duration of

travel, security procured

- What method of packing is most appropriate? determined by above answers to method of shipment, budget restrictions, protection level needed for artwork, special requirements of artwork
- What are the appropriate packing materials? determined by surface of object, short-term or long-term shipping container needed
- Are there environmental or other special requirements during travel? does it need insulation against environmental changes, is destination prepared for special requirements (i.e. infestation or handling issues)
- Is the shipping container well labeled for handling, unpacking, and repacking?

### **Methods of Transport**

Label container for proper handling, regardless of mode of transportation, in large and bold letters so that a fine art shipper in a hurry will still take notice. Shipping of fine artwork using general public services, USPS, FedEx, or UPS, is not recommended as they lack climate control and do not provide safe handling by personnel or automated conveyer belts and sorters. Labeling these containers as “artwork” is also not recommended for reasons of security.

#### *Hand Delivery – maximum drop height 36 inches*

If the artwork is being transported by Museum personnel and not by a shipper, it should minimally be soft packed and contained in a box with proper cushioning. If the courier is traveling by car, the box should be secured in the vehicle against the forward bulkhead or seat using a strap and/or moving blanket(s) to prevent its shifting during travel. If the courier is traveling by domestic airplane, the box must be small enough to fit under the seat in front or in the adjacent seat after purchasing a separate ticket.

#### *Truck Delivery – maximum drop height approx. 40 inches, pallet drop height 6 inches*

An air-ride, air-conditioned truck is the preferred vehicle to prevent damage from excessive vibration and environmental fluctuation. The method of packing must reflect these two issues by using insulating packing materials and cushioning foam. Additional considerations include weight of artwork to be supported by the tailgate lift, securing the artwork to the sides of the truck, and whether a pallet jack is needed to load and unload. Check that the shippers have all the necessary equipment in the truck without being provided by the owner.

#### *Air Transport*

This mode of transport has special regulations, especially for international travel. The Conservation Center does not receive many air delivered works of art and therefore this topic is not addressed in this leaflet. Air transport is addressed in more detail in the bibliographic sources listed at the end of this leaflet.

### **Choosing a Shipping Container**

Generally, it is recommended having an inner box and an outer box, also known as a double-case design, for soft-packed and crated containers. This system will consistently encourage good physical and environmental protection for the artwork. Physical damage can include punctures and dents occurring to the exterior box. Environmental protection is created with a more insulated climate.

The inner box should be a tight package so that the object enclosed is as evenly

supported as possible. Not all objects have a balanced load, and that can cause an increase in peak shock because support material does not compress equally. Multiple objects within the same box must be partitioned and cushioned separately.

The container must be labeled with proper handling and unpacking instructions such as “pull here” or “this end up” or which screws should be removed first to facilitate uncrating.

*Soft packing* describes a method and container without a hard shell. It leaves the object more vulnerable, but can be very appropriate for artwork that does not risk damage due its own weight or intricate construction, i.e. moveable parts. It is recommended only when the work is transported by vehicle and the experience of the handlers and shippers is known (hand courier). The benefits of this method include using light-weight materials and reduced packing time. Commercially available shipping containers are an option of this method.

*Open crates or slat crates* have a wooden framework, often with paperboard facing. This method of crating offers more protection than the minimal soft packed paperboard container, although not as much as an enclosed hard shell crate. The facing material gives insulation against environmental fluctuation, rain or snow, shallow punctures and abrasions, and allows a surface for labeling. It is necessary to have it pallet ready if the artwork is heavy or oversized. This method does not allow for inner and outer box system of packing (the most protective).

*Hard shell crates* have a facing made from plywood (most commonly) or metal. This type of container is used for larger, heavier, and more fragile artwork or for artwork that must travel by air or to multiple venues. It can be well insulated and made water tight. Hard shell crates may be more appropriate for crating outdoor sculpture or other large objects. Ideally, you want versatile support and container methods. Sometimes an object’s permanent storage box can be used as an internal shipping container.

### **Artwork Fragility and Cushioning**

A very good detailed description about static loading is given in Dennis Piechota’s article “Packing Anthropological Collections for Transit.” Though it uses anthropological collections as the example, the concepts discussed apply to all artwork and his section on the “Fragility Factor” is discussed below.

Can the cushioning foam absorb *vibration*? Vibrational damage in transit can include abrasion of surfaces (loss of pigment and fibers) or cracking and denting of substrates. The frequency of jet engine vibration is a range of 100-200 hertz, while a truck ranges from 2-70 hertz. That is why polyurethane foam is still considered useful, because no other foam has its property of absorbing vibration.

Should the artwork be packed to withstand the drop height from the back of a truck or a forklift? If G is the force of its own weight on impact, then 25 Gs = 25 times the weight of the artwork. This is acceptable as long as that measurement remains less than the supposed fragility of the object, which is an arbitrary factor. Therefore, in practical terms, the cushioning materials should be dense enough to withstand the G-force (force of gravity of the weight of the object). For example, a two-inch foam plank of one lb./in. cu. density will not help a heavy object that travels a three-inch deflection or compression into that foam.

So how can you know all that? Experience. Calculations. There are studies, but to make it even easier “PadCAD” software is available from the Canadian Conservation Institute, at this link: <http://www.cci-icc.gc.ca/crc/tools-ouils/index-eng.aspx>

### **Packing Guidelines**

A list of recommended packing materials is given at the end of this leaflet. Detailed schematics of packing and crating are given in the P.A.C.I.N. publications, below. Some general considerations are as follows:

Double wall corrugated cardboard boxes are preferred over single wall for more puncture resistance and strength.

Friable or rough surfaces that can easily snag and flake may be better wrapped with smooth spun bond polyester sheeting, like Tyvek. Plastic wrap is not recommended due to the build up of electrostatic forces that can pull friable paint or fibers from the substrate.

If the artwork is placed into dense polyethylene (PE) foam cutouts, an interleaving material next to its surface may be necessary to prevent scratching and abrasion. This can be in the form of soft sheeting or cross-linked PE foam sheets. The *CCI Technical Bulletin 14*, by Carl Schlichting, describes examples of using these materials.

Polyurethane foams have good compression and are recommended as a good cushioning material in the double-box system. However, they degrade easily and should not be in contact with the surface of artwork. Carbon impregnated black polyurethane foam is the most stable type and is recommended. The added carbon particles in the foam absorb degradation products and slows the breakdown reaction.

Total encapsulation with bubble wrap is the least acceptable amount of support for a 3-D object. There is no specific rule, but only consider using it on an object weighing five lbs. or less, 12 cu. in. or less. With objects of this size, one can double-up layers of large bubble wrap and hand carry to the destination.

### **Examples of Packing**



PE foam cutouts and bottom pull-out tray lined with cross-linked PE foam sheet; clear polyester sheeting wrap and double-wall corrugated box



Interior of hard shell crate with PE foam partitions to secure inner boxes



Collared cut-outs of PE foam lined with cross-linked PE foam sheet in half-inch foam core box



Hard shell crate with removable bottom tray and PE foam blocks attached to inner walls. Screws for uncrating are clearly marked in order of importance

### **The Condensed Rules of Packing 3-D Objects**

- Simpler is better
- Make sure object can be easily removed from packing system and, if necessary, re-packed in the same manner
- Label, label, label
- Colored tape is more visible on clear packing materials than clear tape
- Minimal tape
- Interleaving tissue between object and plastic packing materials
- Bubble side of bubble wrap away from object
- Support object as evenly as possible, especially around weak areas, immobilize moving parts
- Box within a box provides more protection from shock, puncture, and environmental changes
- Do not let the most fragile side of an object be the load bearing side
- Objects that stand on fragile feet may travel more safely when inverted (furniture)
- If object must be packed with storage or exhibit mount (i.e. headdress, saddle, globe, etc.), it must be secured to the mount and the mount must be secured to the inner shipping box.
- Do not use loose packing materials (foam peanuts or shredded paper)
- Do not use Styrofoam
- Do not use expansion foam in vessels or profiles with undercuts
- Do not assume anything
- Build as if this could become its permanent housing (it often does)

**Preferred Packing Materials**

Acid-free/lignin-free paper products: wrapping tissue, mat board, and corrugated board

Fome-Cor® (acid-free version is paper-lined, polystyrene, foam-filled board)

Interleaving Papers: Neutral Glassine, Renaissance® Paper (unbuffered, for photos, leather and other protein-based material), Permalife® Paper

**Foams**

polyethylene in various densities

Backer rods (Sonofoam® polyethylene foam rods)

Ethafoam® (polyethylene foam, plank density: 220)

Volara® polyethylene foam (type 2A)

Plastazote® PO53

Zotefoam®

Microfoam® for wrapping

**Polyurethane**

Unifoam® (carbon impregnated)

standard or convoluted

**Plastic sheeting and soft wrapping materials**

Coroplast®, Cor-X™ (polyethylene/polypropylene corrugated board)

Polyester sheeting (Mylar®, Dartek®)

Spun-bond polyethylene (Nomex®, Tyvek®)

Polyethylene sheeting (high density (less plasticizer) vs. low density without anti-static films and perfumes)

Bubblewrap (inert gas filled)

**Other Materials**

Buffering Materials for microclimates: Art Sorb™ Beads and Sheets, Arten Gel®, Silica Gel, Saturated Salts

cotton muslin (unbleached, undyed, and laundered)

**Fasteners/Adhesives**

Hot-melt glues/adhesives to bond foam supports (3M #3764 and #3792, Bostik thermogrip #6363)

Velcro®

plastic packing tape

nylon or metal rivets

**Exterior Grade plywood and Medium Density Overlaid Plywood**

(lower urea and formaldehyde content) can be sealed with aluminized plastic

Medex®

Aluminized plastic films (for making flexible pouches or lining unstable hard materials)

Marvalseal®

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