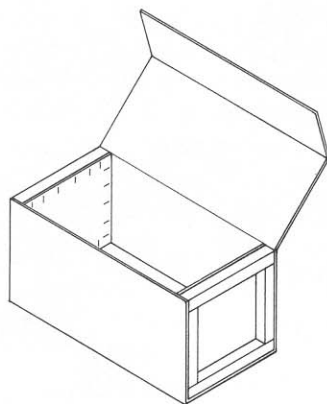




CCI Notes

1/4

Making Triwall Containers



Introduction

Shipping containers are the first line of defence against shipping hazards. An appropriate container and an effective cushioning system work together as a system for preventing physical damage to fragile objects during shipment.

Wooden containers continue to be a popular choice for many museum shipments. They are strong, and can be fabricated to high performance standards by museum preparators with readily available materials and power tools.

The strength and durability requirements of a shipping container depend on the nature of the contents to be shipped and the hazards that are likely to be encountered in a particular distribution system. As an extreme example, marine shipment of heavy items requires very durable containers to resist compressive forces resulting from the high stacking heights in ship cargo holds, and to resist damage during handling by equipment such as grab hooks and slings. On the other hand, source-to-destination transport of relatively light items by museum staff or qualified art handlers places

much lower demands on a shipping container.

In certain situations, especially those involving transport by museum staff and art handlers, it may be possible to reduce crating costs by seeking alternatives to conventional wooden cases. An example of such an alternative is the triwall container developed by the Department of Canadian Heritage, Parks Canada, Heritage Presentation and Public Education Branch, Collections Management Unit. The container is inexpensive, easy to build and surprisingly strong, and it can be quickly fabricated without the use of power tools. The assembly and fabrication procedures developed by the Collections Management staff of Parks Canada have been reproduced here to expand the range of crating options available to museum staff.

Materials and Tools

- 16 mm (5/8") thick triwall cardboard sheet
- 8 pieces of 50 mm x 50 mm (2" x 2") cedar, cut to required lengths
- fibre-reinforced Kraft paper tape
- white resin glue

- 25 mm long (1") staples or 25 mm long (1") #8 wood screws and washers
- 1 m to 2 m long (4' to 6') crimping block (described in text)
- 19 mm or 25 mm wide (3/4" or 1") self-adhesive Velcro tape
- 75 mm long (3") box nails
- utility knife
- measuring tape
- straightedge
- rubber mallet (heavy weight)
- screwdrivers or an electric or pneumatic staple gun (depending on construction method)

Assembly Instructions

1. Determine the inside dimensions of your container.

2. Cut 2 pieces of triwall material to the required inside height (A) and inside depth (B) (Figure 1). These pieces will form the container end cap panels.

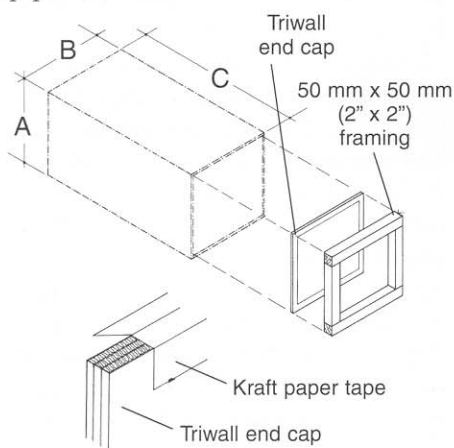


Figure 1.

3. Tape all edges of the two panels with reinforced Kraft paper tape to strengthen the open corrugated edges and to seal them against moisture and insects.

4. Two frames, made from 50 mm x 50 mm (2" x 2") cedar, will be used to secure the end cap panels and to provide structural reinforcement for the container. Assemble the cedar frames using white resin glue and 75 mm long (3") box nails. Attach the assembled frames to each end cap with white glue and reinforce

with 25 mm long (1") staples using a pneumatic or electric stapler. For maximum strength, the staples should be set at a slight angle to span several corrugations. **Note:** If a power stapler is not available, use 25 mm long (1") #8 wood screws with 12 mm (1/2") washers.

5. To determine the width of triwall material required for the container, add the thickness of the two end cap panels, including the cedar frames, to the desired internal width to arrive at the outside width (C).

6. To determine the length of triwall material necessary to cover the entire container (Figure 2), use the following calculation:

Important: Before cutting the triwall material, ensure that the corrugations will run across the width of the container (Figure 2). This orientation enables the material to be properly folded to form the corners.

$(2 \times A) + (2 \times B) + (\text{the desired flap length}) + (\text{a } 50 \text{ mm (2\"})$

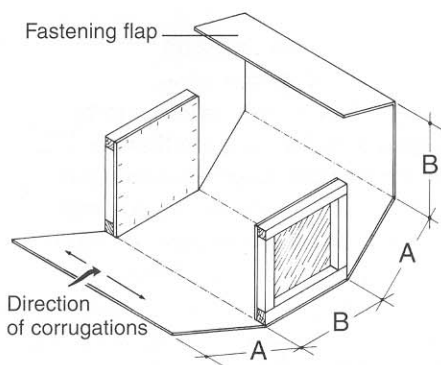


Figure 2.

Note: The fastening flap should be at least 2/3 of the internal height (A) of the container.

7. Use Kraft paper tape to seal all edges of the triwall material in the same manner described for the end caps.

8. Choose the desired location for the container opening. From one side

of this opening, begin to attach the triwall material onto the cedar end cap frames using glue and 25 mm (1") staples (Figure 3).

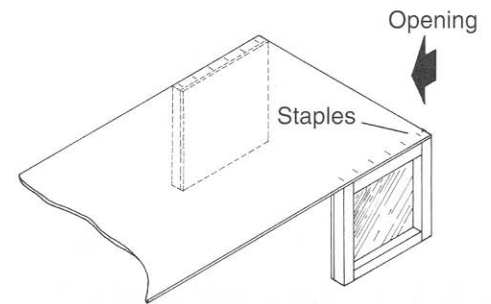


Figure 3.

9. After the triwall material has been attached to one side of the container, it is necessary to fold the material 90°. To produce a crisp and straight fold, a crimping block must be used. A crimping block can be made from a 1 m to 2 m (4' to 6') piece of 25 mm x 75 mm (1" x 3" nominal) hardwood (preferably birch or maple), shaped with a pointed edge as illustrated in Figure 4.

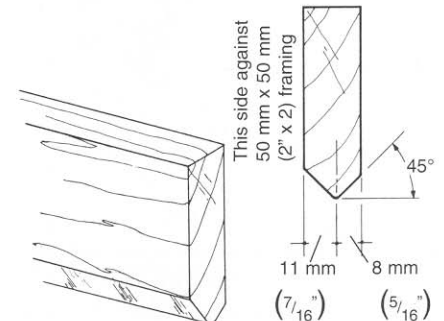


Figure 4.

10. To fold the triwall material, invert the partly assembled container such that the triwall is flat on the floor or workstation. Align the pointed edge of the crimping block over the area to be crimped by placing the edge of the crimping block against the cedar frame as illustrated in Figure 5. With the crimping block in position, strike it with a heavy rubber mallet, moving from one end to the other. This procedure indents the triwall and allows it to bend easily and precisely around the cedar end cap frames.

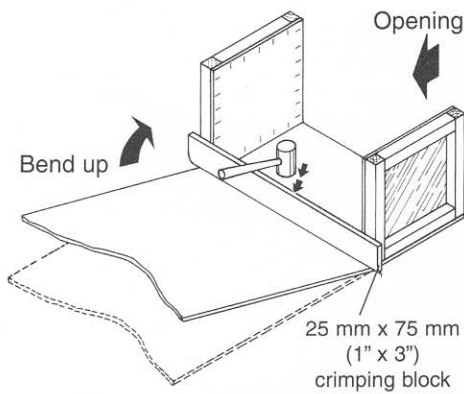


Figure 5.

11. Continue to assemble the container by securing the triwall to the next two sides of the cedar frames with glue and staples as described above, crimping at each corner. **Note:** Be sure to identify which sides of the triwall material will form the lid and fastening flap and remember that these sections are not stapled or screwed to the end cap frames.

12. To secure the lid and fastening flap during transport, a length of 19 mm or 25 mm wide (3/4" or 1") self-adhesive Velcro is used. Apply the hook part of the Velcro tape to the inside face of the fastening flap and the loop part of the tape to the main body of the container (Figure 6). The tape should run the entire width of the fastening flap. For added strength and an improved seal, Velcro may also be used along the top side of the end cap frame.

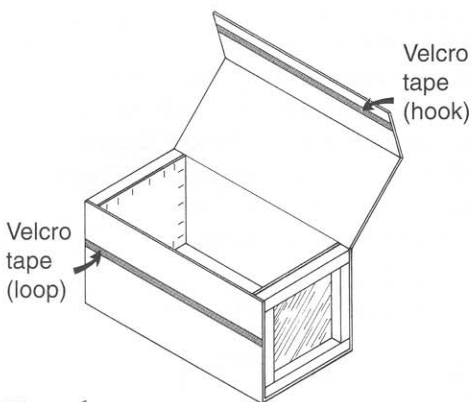


Figure 6.

Options

Handles

Handles can improve the ease of moving large containers. Choosing appropriate handle locations can also help reduce the height from which a container might be dropped in the event of an accident. Handles can be easily fabricated for the triwall container by spanning the frame members with a short length of wood (Figure 7).

Alternative Closures

If desired, the stretch and security of the closure can be increased by using hardware such as T-nuts or draw latches to secure the lid and fastening flap during transport.

Water Resistance

If a water-resistant barrier is desired, one or two coats of lacquer may be applied to the exterior of the container.

Rub Strips

Rub strips on the base of large containers allow easy movement and help avoid contact between the triwall material and wet floor. Rub strips can be attached to the base of the container with nails or bolts. The rub strips can be oriented along the length or width of the container. Figure 7 shows one possible arrangement.

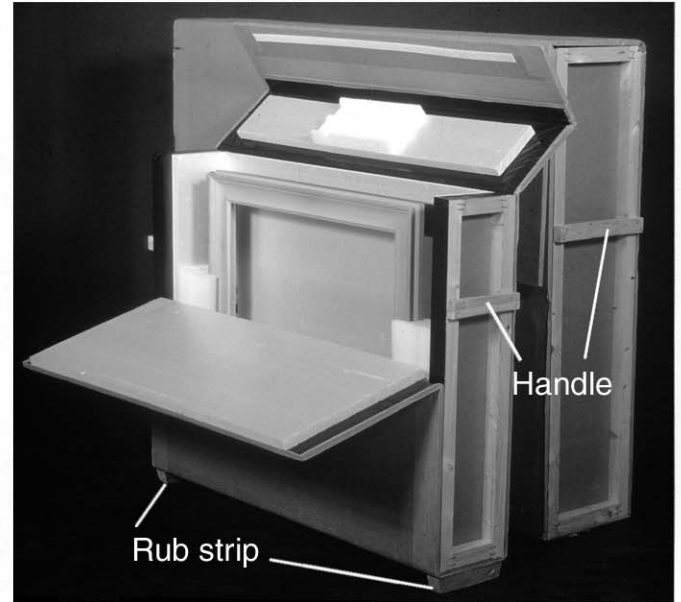


Figure 7.

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