ALL-SAFE

Laparoscopic Box Trainer

Build Instructions

ALL-SAFE Consortium: Pan-African Academy of Christian Surgeons, University of Michigan, Southern Illinois University, Soddo Christian Hospital, AIC Kijabe Hospital, and Mbingo Baptist Hospital

Materials Required for Initial Assembly

- 8 sheets of cardboard
    - 5 sheets - minimum 14” x 8.5” (or 355mm x 215mm)
    - 1 sheet - minimum 14” x 10.5” (or 355mm x 250mm)
    - 2 sheets - minimum 7.57” x 13.77” (192.4 mm x 350 mm)
- 5 rubber bands (3mm thick)
- Ruler
- Pencil/writing utensil
- Box cutter/utility knife, and/or scalpel (#11 is ideal)
- Tape
- Pins (straight or sewing), if possible
- Access to the templates (Parts A, B, C, D, E of the box)

Preparation Instructions:

For all of the following steps, you may print each part (Parts A, B, C, D, E) on pieces of paper and use straight pins to secure onto the pieces of cardboard and use a box cutter/utility knife/scalpel and a ruler/straight edge to cut over the template before assembly.

- Parts A, B, C, and E can be printed on 14” x 8.5” (or 355mm x 215mm) paper
- Part D can be printed on minimum 14” x 10.5” (or 355mm x 250mm) paper

Alternatively, you can simply use the templates as a measurement guide and assemble as described below. All template dimensions are given in millimeters.

<u>Part A (make 2 pieces)</u>

- Use a pencil/writing utensil and ruler to draw the Part A measurements on 8.5” x 14” (215mm x 355mm) sheet of cardboard
- Use a box cutter to cut out the general shape of Part A and the light source window
    - Note: the light source window at the top of the box is optional, the size may also be adjusted
- Use a scalpel or utility knife to cut out the thin, angled slit of Part A

Part B

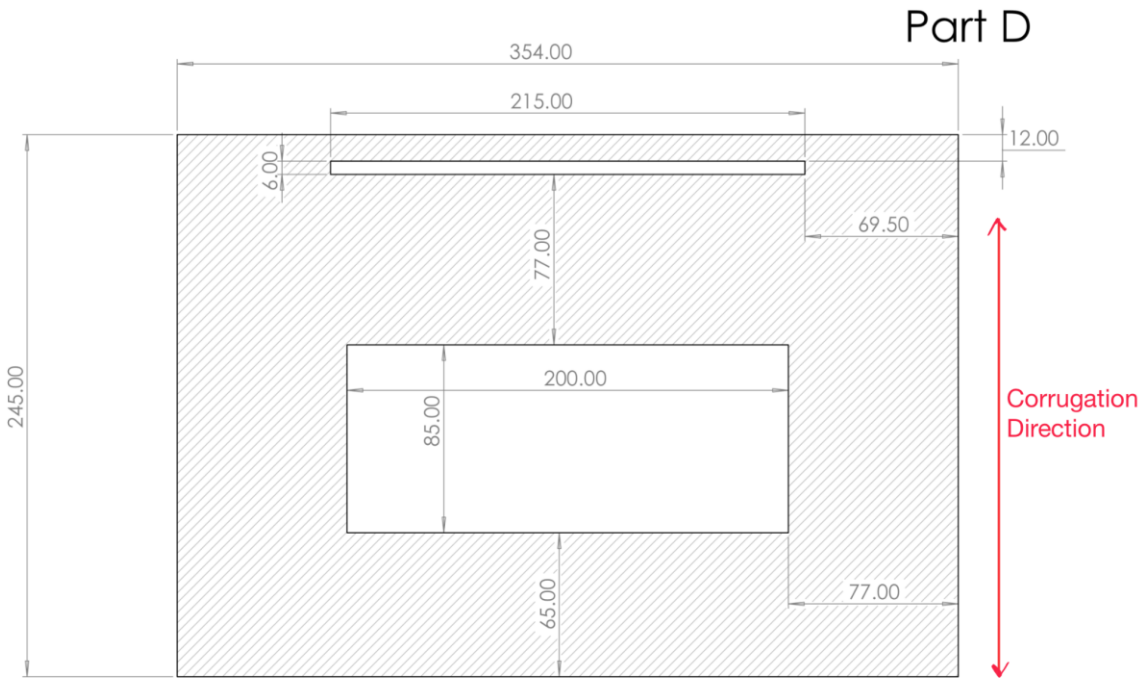
- Use a pencil and ruler to draw the Part B measurements on 8.5” x 14” (215mm x 355mm) sheet of cardboard
- Use a box cutter to cut out the general shape of Part B
- Use a scalpel to cut out the thin, slit of Part B
- Use a scalpel to cut out the small holes of Part B
    - Stab the scalpel through the cardboard and then rotate to make a circle cutout
- Loop 3 rubber bands together to form a strand and thread the strand through both holes
    - Tie the rubber band strand together using a normal knot

Part C

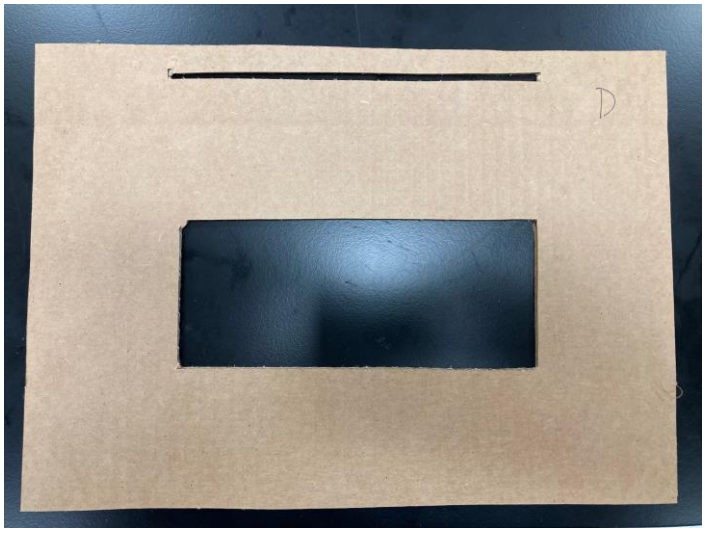
- Prepare Part C on an 8.5” x” (215mm x 355mm) sheet of cardboard

Part D

- Use a pencil/writing utensil and ruler to draw the part D measurements on a 14”x10.5” (or 355mm x 250mm) sheet of cardboard
  - Note: If module 3 (Penetrating Trauma) is to be implemented, the corrugation direction is important when orienting the template. The corrugation should be oriented front to back as seen in the figure below.



- Use a box cutter to cut out the general shape of part D
- Use a box cutter to cut out the rectangular light source window
  - Note: the light source window is a crucial step if module 3 (Penetrating Trauma) is to be implemented.
- Use a scalpel to cut out the thin, slit of part D

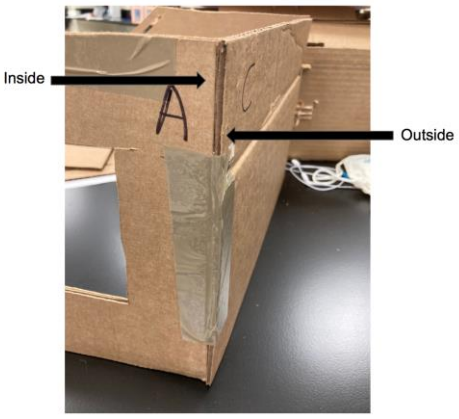


Part E

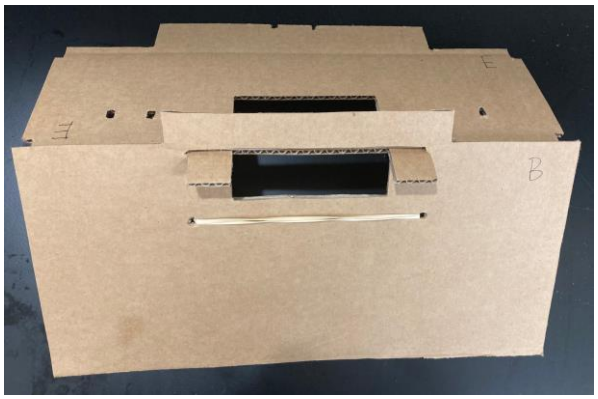
- Use a pencil and ruler to draw the Part E measurements on 8.5” x 14” (215mm x 355mm) sheet of cardboard
- Use a box cutter to cut out the shape of Part E
- Use a scalpel to cut out the laparoscopic tool holes, the middle slot, and the top rectangular cutouts
- Loop two rubber bands together and place one rubber band in the top rectangular cutouts

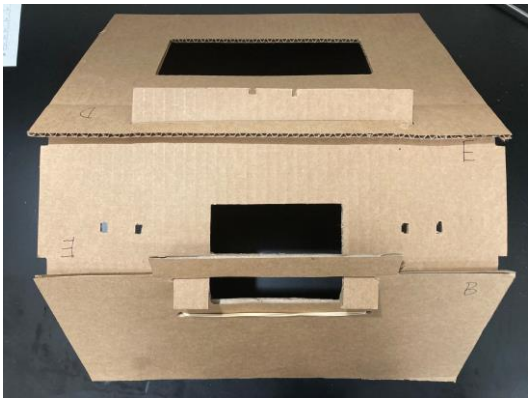
Assembly Instructions:

- Use tape to attach the two of the Part A pieces to Part C
    - The Part A pieces will form the sides of the Laparoscopic trainer box while the Part C piece will form the back wall
    - Make sure both Part A pieces are assembled on the inside of Part C
    - Tape both the outside and inside corner



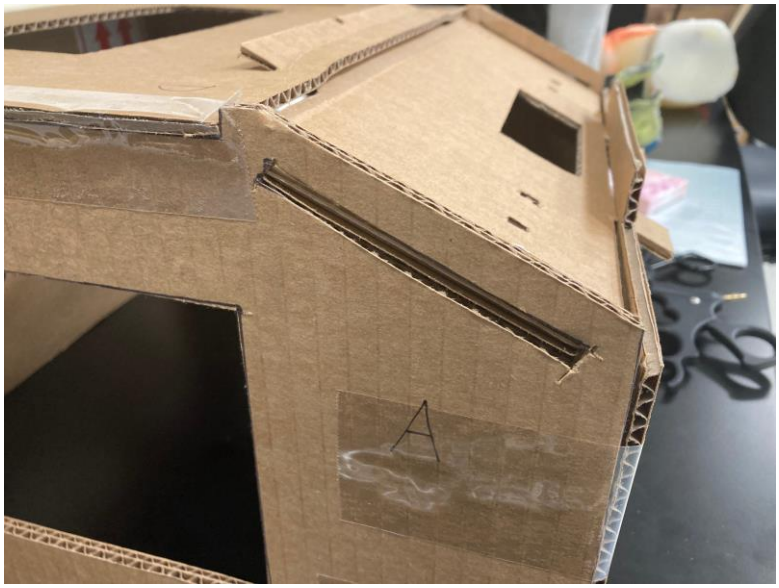
- Take Part E and place it into the corresponding slits in Part B and Part D
    - Part E forms the angled work surface, while Part B is the front wall of the Laparoscopic trainer box and Part D is the top





Assembly Instructions, continued

- Place the side tabs of Part E into the corresponding angled slits in both Part A pieces

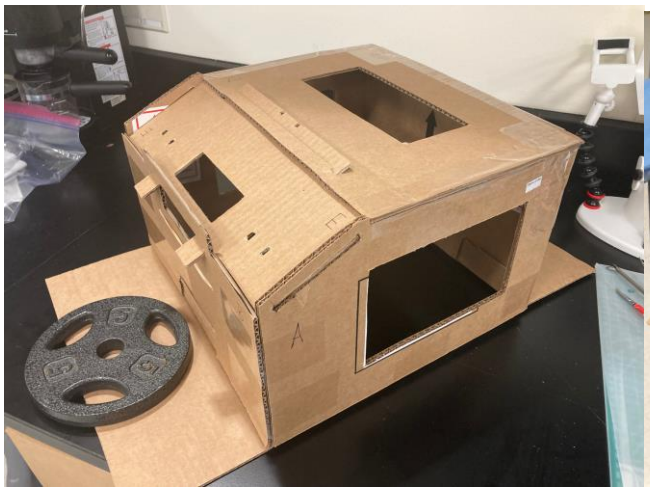


- Use tape to attach Part D to both Part A pieces and Part C
    - Part D sits on top of Part A and Part C
- Use tape to attach Part B to both Part A pieces
    - Make sure both Part A pieces are attached to the inside of Part B

Final Project: The ALL-SAFE Laparoscopic Box Trainer

Additional Stabilization of Trainer Box

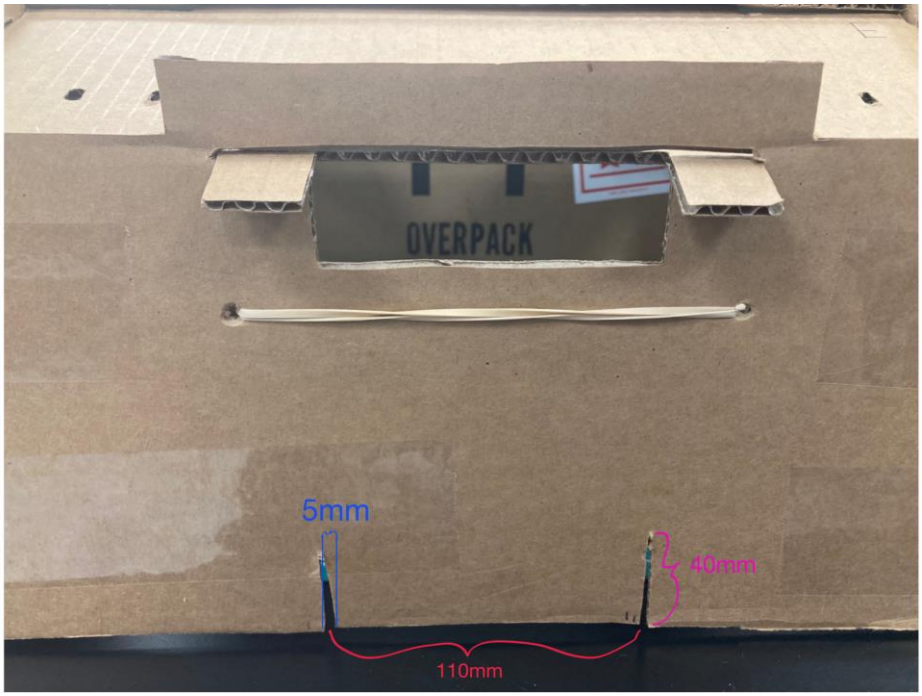
If additional stability is needed, adding cardboard flaps to the front and the back of the box can provide means to anchor the box to a floor or table by placing heavy objects on them. See figures below.



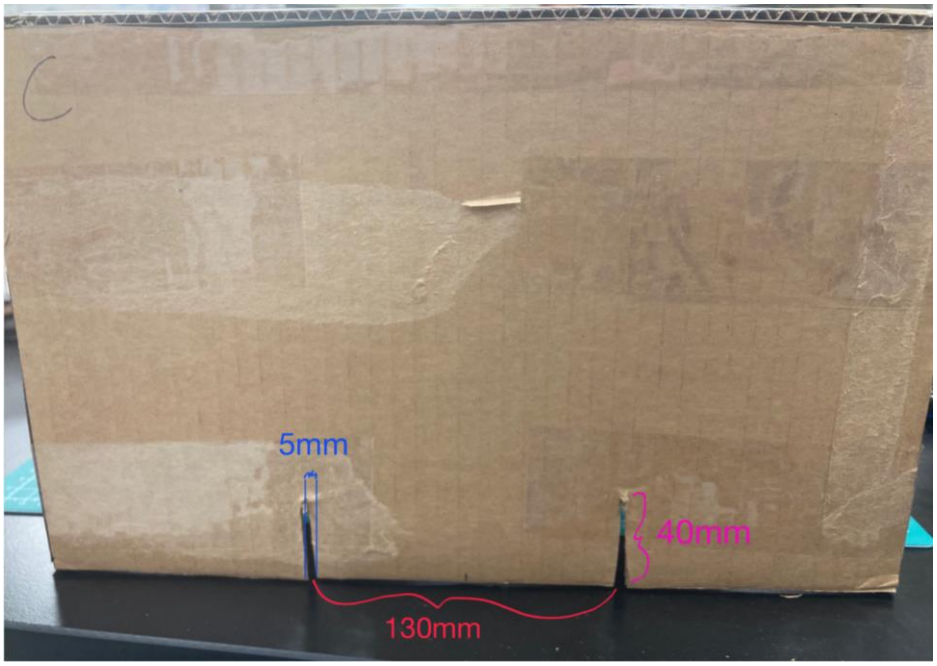
Front

Back

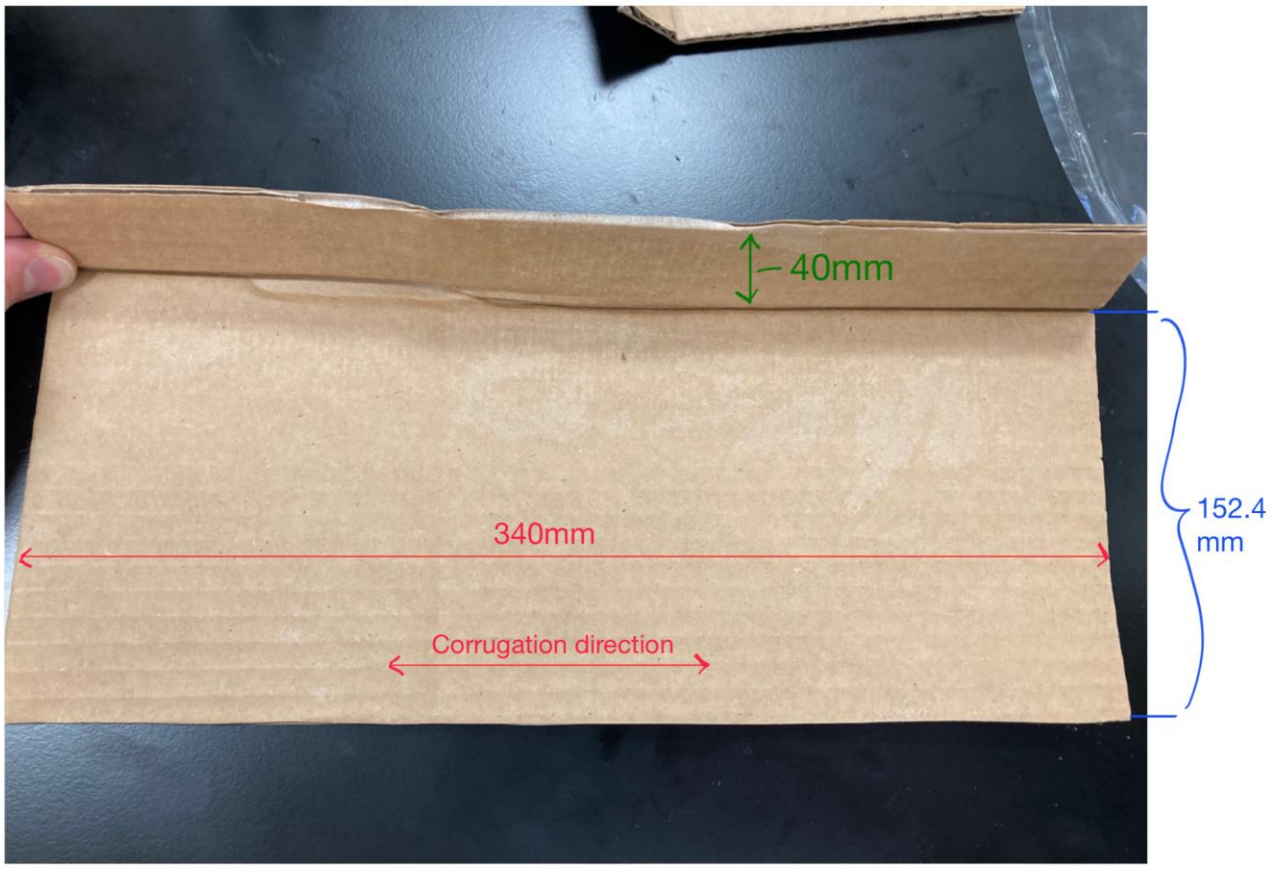
A. Cut two wide slots in the front of the box (Part B) as shown below. The slots should be roughly 5 mm wide, 110 mm apart, and centered on the front of the box.



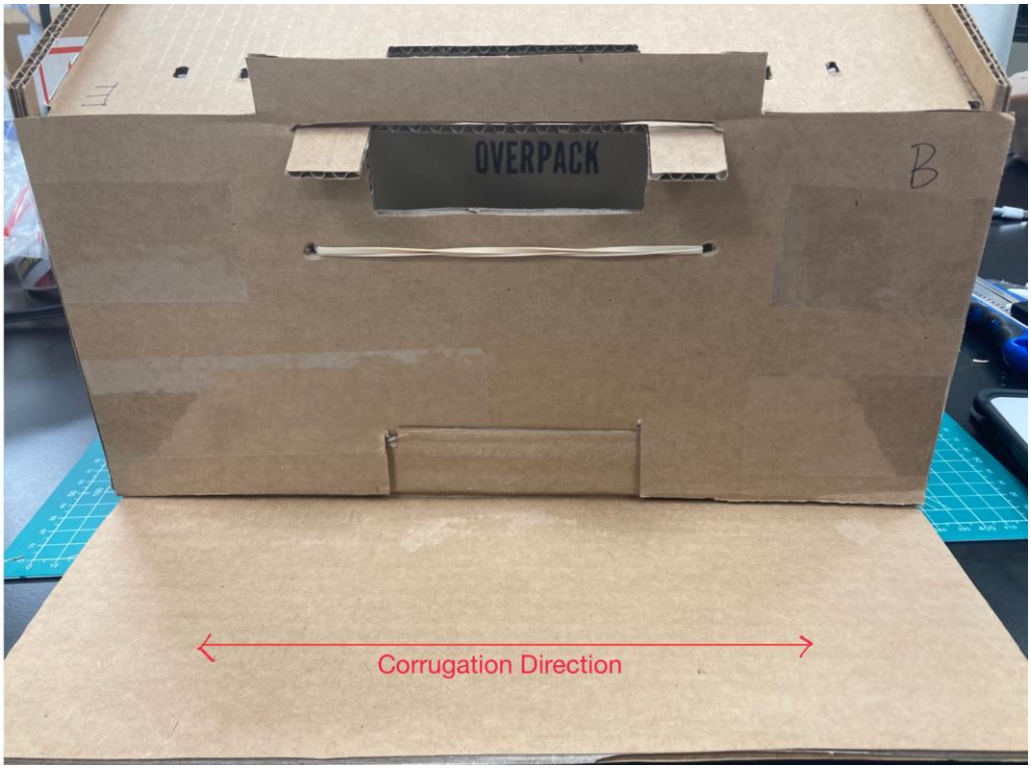
B. Similar to the last step, cut two wide slots in the back of the box as shown below. Again, the slots should be roughly 5 mm wide and centered on the back of the box. However, the slots should be roughly 130 mm apart. This is important if module 3 is to be installed later.



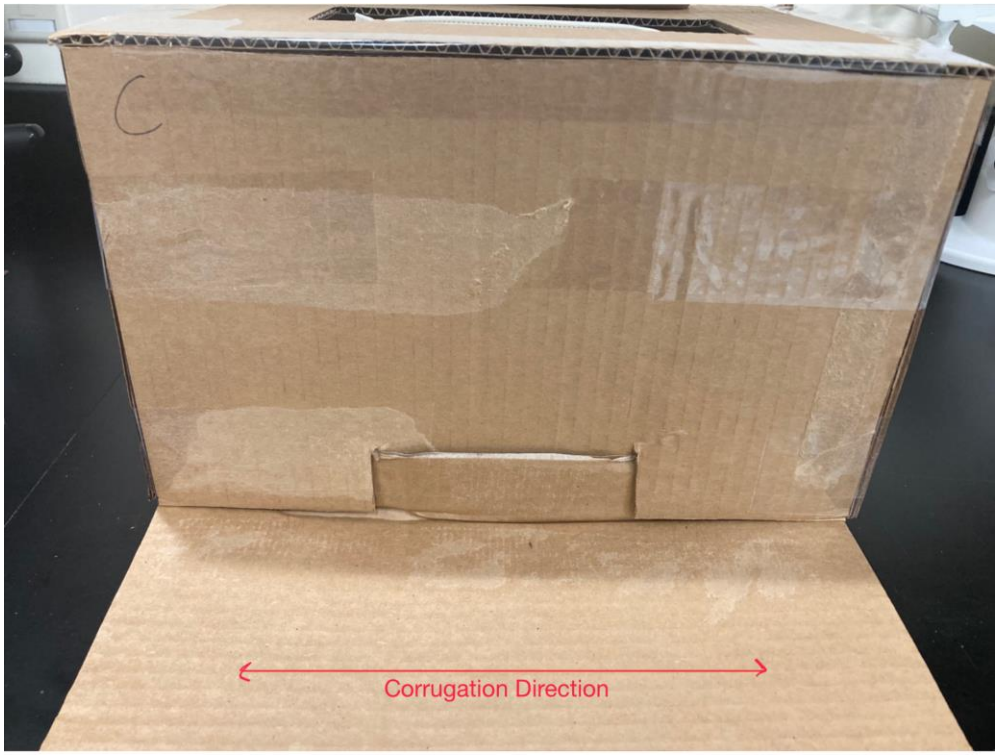
C. Cut two new pieces of cardboard to 7.57” x 13.77” (192.4 mm x 340 mm)
    a. Make sure to cut these pieces with the cardboard corrugation oriented parallel to the 340 mm side. This allows you to bend the cardboard on the long side as shown below. The bend should be made 40 mm from the side.



D. Slide the bent tab into the two slots as shown below.



E. Do this for the front and back of the box.



Weights can now be placed on the flaps to prevent the laparoscopic box from sliding around while in use. Alternatively, tape can be used to tape the flaps down to the working surface as well.

Internet/App Setup Instructions

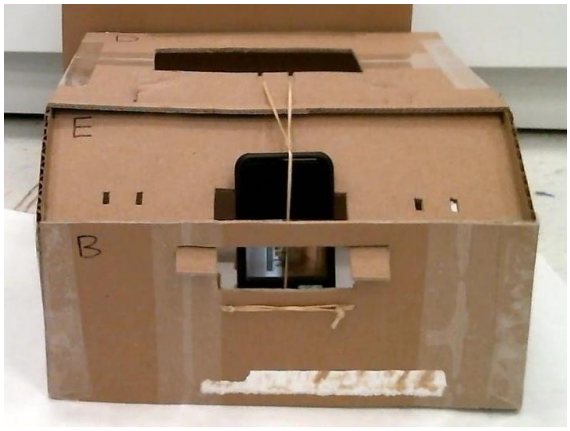
- Load the app (EpocCam) on the smartphone
- Make sure the restricted rotation option is off on the smartphone
- Start the app (EpocCam) on the smartphone and then open Zoom on a corresponding computer/tablet
    - Go to preferences in Zoom and under the video tab, pick the camera as the EpocCam
    - Alternatively, the smartphone can be connected directly to the computer/tablet with a USB cord
- The computer/tablet will simulate the laparoscope monitor

Acquiring the Proper View:

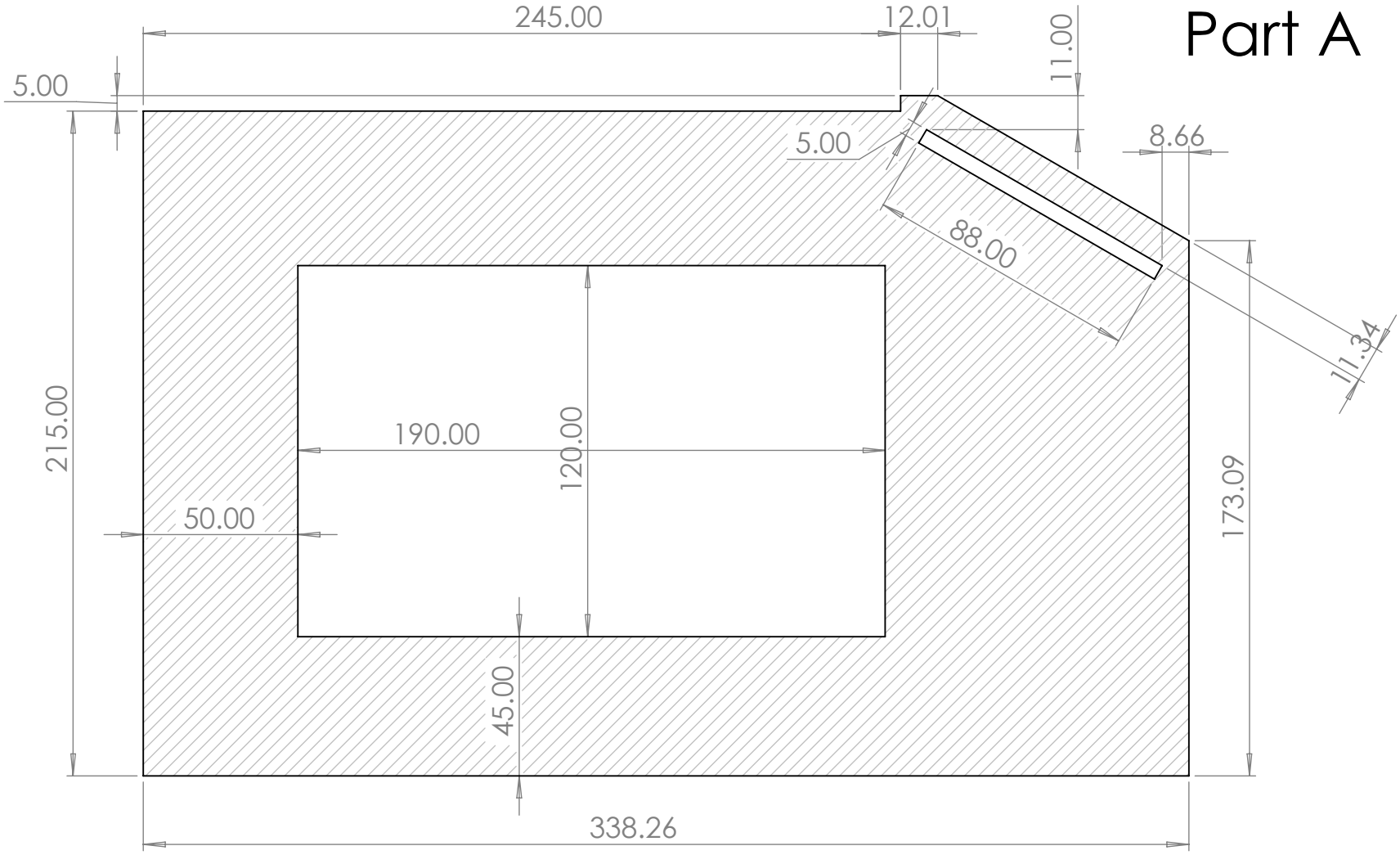
- For a zero-degree (0°) view, place the smartphone on Part E so that the screen faces you and the camera points into the rectangular cutout
    - The phone will rest against the top lip of Part B
    - Adjust the smartphone position and/or the training object in the box until the proper view is acquired

- For a 30-degree (30˚) view, stretch the free rubber band hanging from the top of Part E around the smartphone in the vertical direction

  - Lower the smartphone into the rectangular cutout in Part E
  - Use the rubber bands attached to Part B to secure the smartphone
  - Adjust the smartphone position and/or the training object in the box until the proper view is acquired

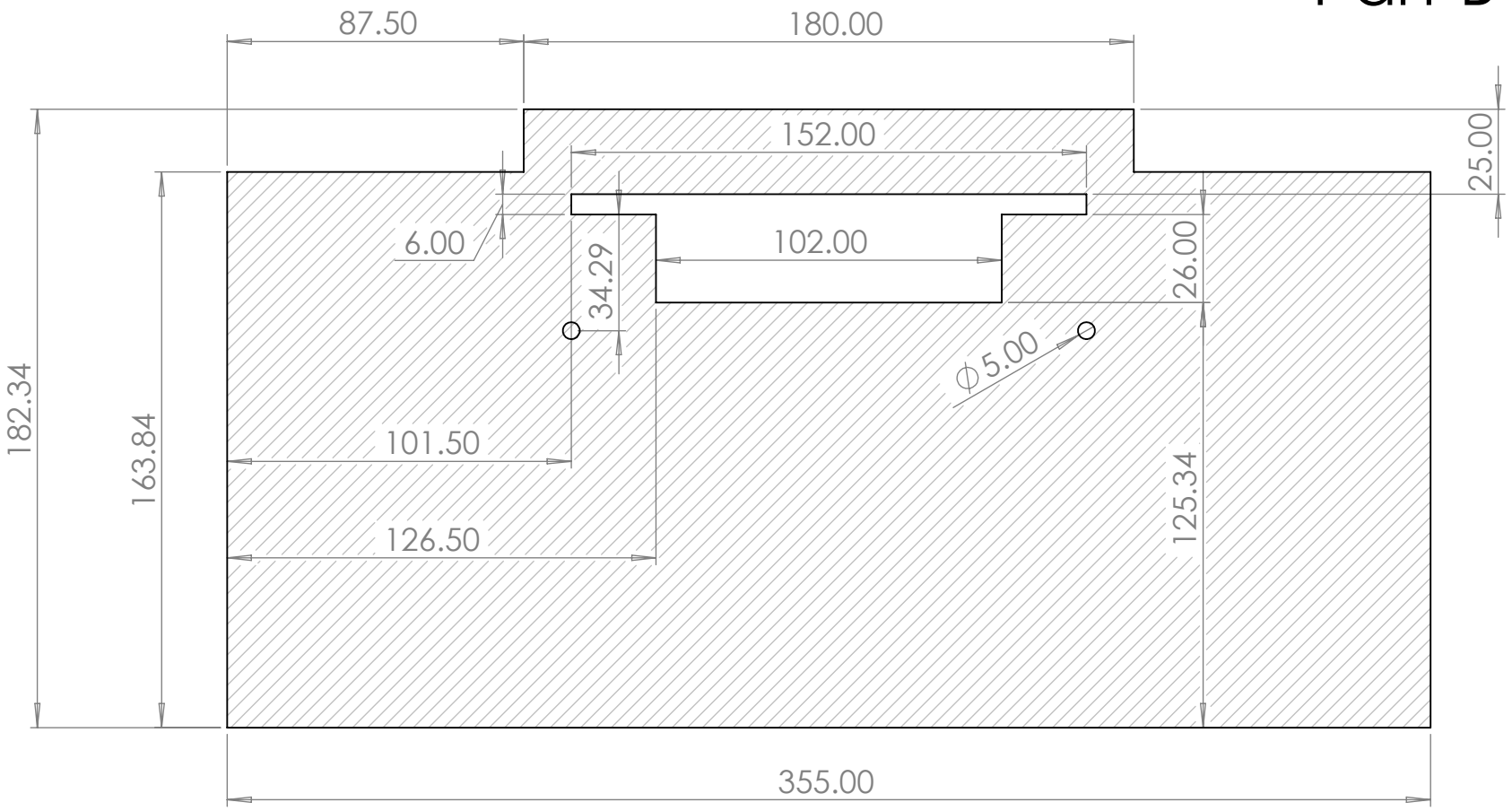


Part A



Drawing Scaled 1:2

Part B

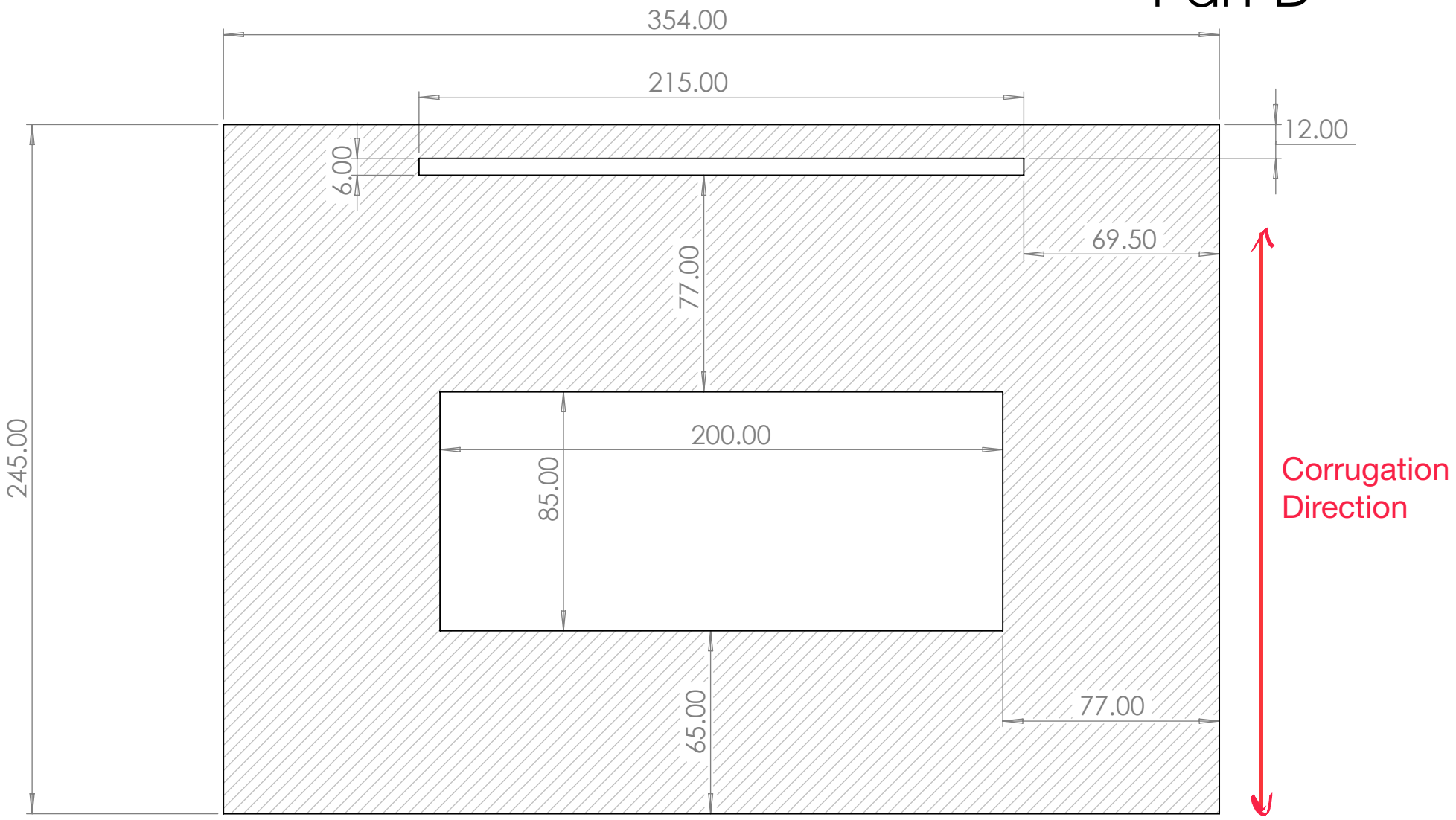


Drawing Scaled 1:2

Part C

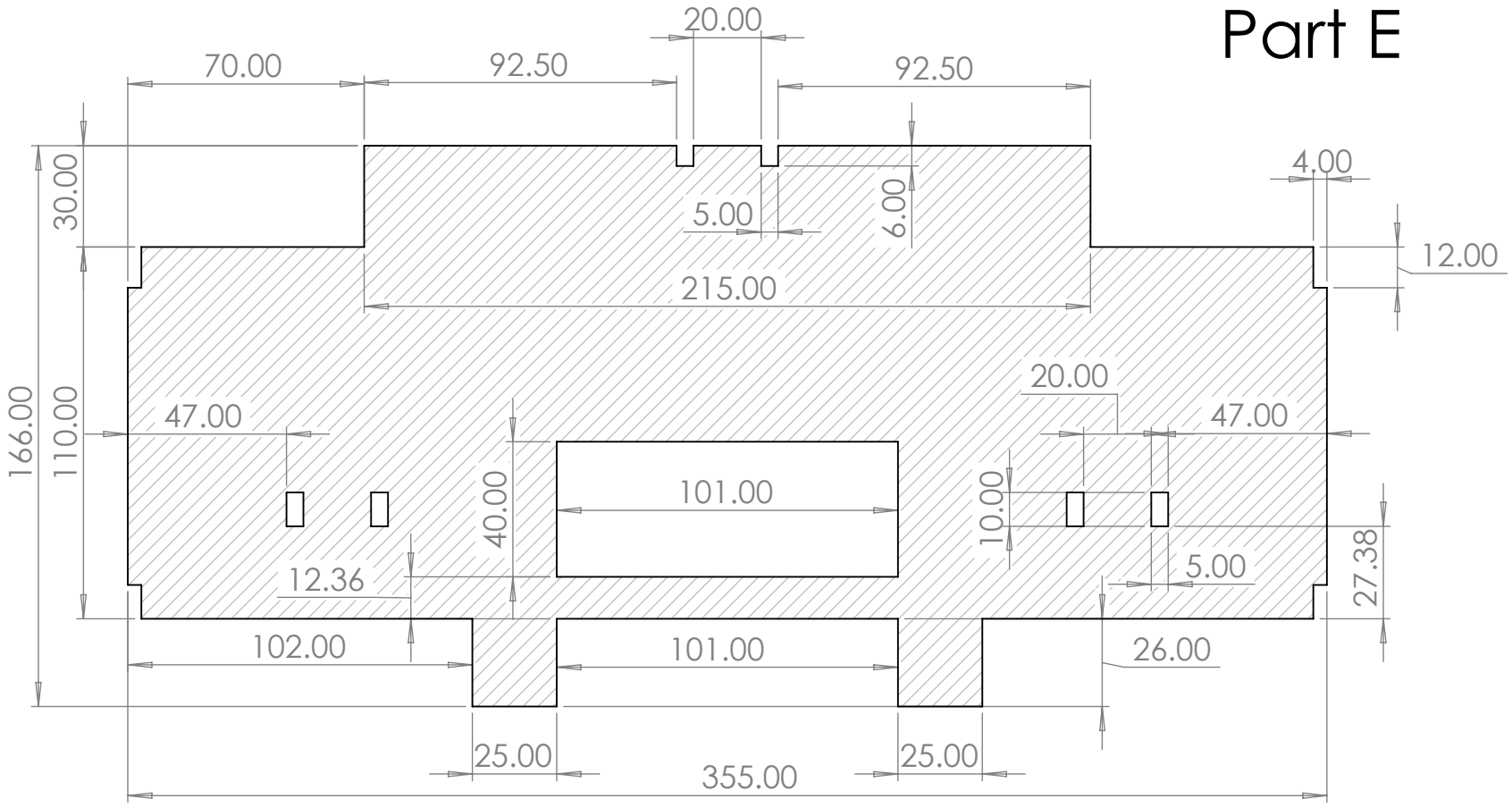
Drawing Scaled 1:2

Part D



Drawing Scaled 1:2

Part E



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