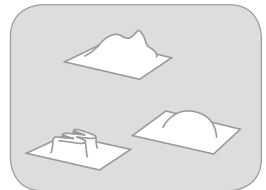
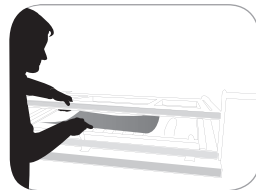
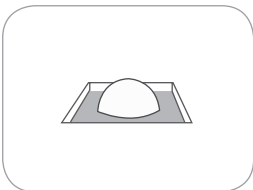




**SAIC Sullivan Center  
Fabrication Shops  
Vacuum Former  
Instructional Handbook**



# the VACUUM FORMER



## what to know:

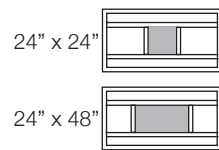
The Vacuum Forming Machine uses heat and vacuum suction to form sheet plastics over tools.

The Sheet of plastic (24x24" or 24x48") is clamped into the forming frame and slid into the oven for heating. Once it has reached a formable temperature, the sheet is pulled from the oven into position above the forming table (Platen). The platen, carrying the tool (form), is pneumatically lifted pressing the tool into the plastic and creating an airtight seal between the plastic and the edge of the platen. The air between the tool and the plastic is then evacuated, drawing the plastic tight against the tool. It is held in this state until the plastic has cooled and will retain the shape of the tool.

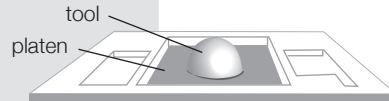
# step by step

**1** Ask the Manager on duty to unlock the machine for you - they will be glad to help you with the machine. Make sure that all ventilation (spray booth, wax hood and dust collector) in the mold making room is on. The door may be propped open to increase airflow.

**2** Make sure the material clamp system and platen is set up for the proper material dimensions.



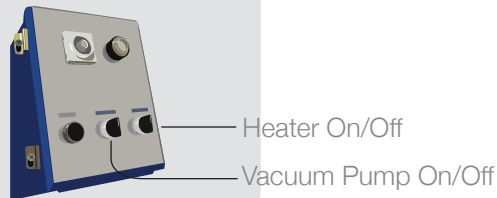
**3** Raise the platen to its top position. Place your tool on the platen. Lower the platen.



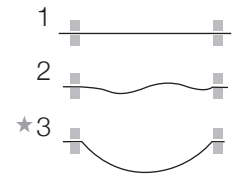
**4** Unlock and lift the clamping frame with one hand, Slide the plastic sheet into the frame with the other. Lock the sheet into place. Have someone help you.



**5** Turn on the heater and wait approximately 5 minutes for it to warm up.



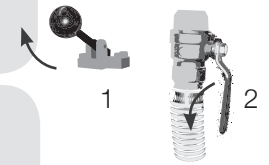
**6** The plastic sheet will go through a series of changes. It will first deform both upward and downward. Then it will droop downward and begin to smooth out. Once the plastic sags droop extends smoothly to all four corners★, the sheet is ready to form.



**7** Using the handle, slide the frame and sheet into the oven. Make sure vacuum valve is closed. Once the sheet starts to deform, turn on the Vacuum Pump and allow it to build up pressure. It will be loud.



**8** Pull the frame out of the oven and fully forward. Do not hesitate. Activate the table lift by raising the actuator valve (1): up is up, and down is down.



**9** As soon as the table has come up all the way, open the vacuum line (2, red lever) by pushing it downward. The air will be sucked out by the vacuum pump.

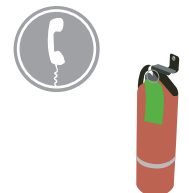
red lever down = valve open

**10** Turn off the heaters, and leave the vacuum on until the plastic has cooled to the touch. Use the cooling fan to speed cooling. Once cool, Turn off the vacuum and lower the forming table. Have someone help you lift the frame and remove your work.



### IN CASE OF EMERGENCY

If the plastic is left in too long, it will sag until it falls into the bottom heaters. If this occurs, do not panic. Turn off the main power. If needed, there is a Fire Extinguisher, and Emergency Phone next to the shut off. Evacuate the room quickly. Report the incident to the shop manager and security immediately.



# design considerations

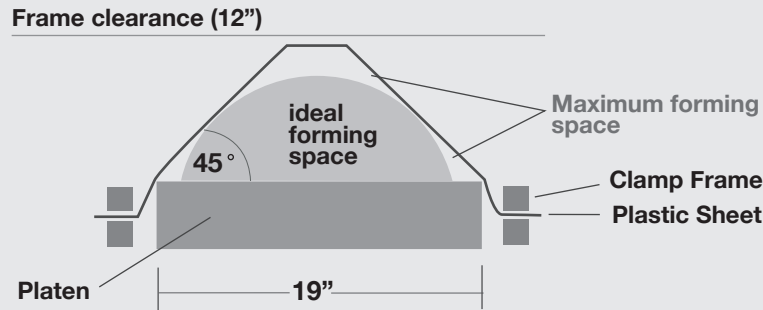
## undercut

When creating a tool, be aware of “undercut”. Keep in mind that you may not be able to separate the tool from the plastic if undercut is present.



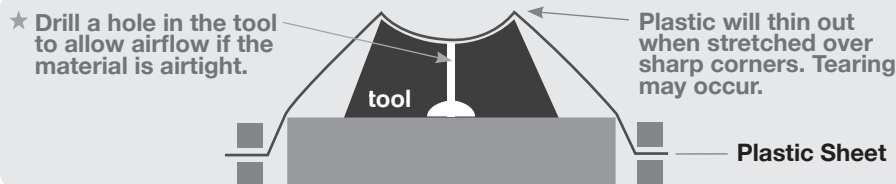
## size restrictions

As the platen is pressed into the plastic, a seal is formed that is intrinsic to the process. If your tool is too tall, too close to the edge, the seal will be broken and the vacuum cannot form the plastic. Our platen is 19” x 19”. The maximum height to clear the frame is 12” the angle from the edge not to exceed is 45 degrees.



## thinning & tearing

The plastic is stretched when it is formed and becomes thinner in areas depending on the shape being formed. On a half sphere the thickness can decrease by as much as 50 percent. On more vertical surfaces, the thickness will be even thinner. Very sharp corners will be extremely thin, and may tear.



## narrow spaces

The plastic will not readily pull into sharp corners or narrow spaces.

## draft

As with all casting processes, there needs to be at least 5 degrees of draft. (No vertical surfaces! You will not be able to remove the plastic from the form.)

## ★ airtight materials

If your forming tool is made of an airtight material, small holes may need to be drilled to facilitate suction. See illustration, facing page, under “Thinning & Tearing”.

## approved materials

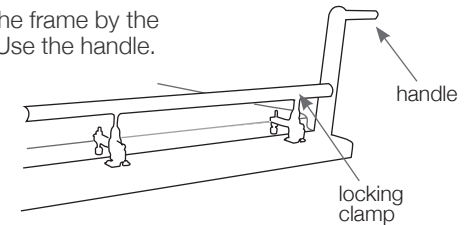
Use only approved materials purchased through the SFS resale center or approved by the studio manager.

# safety

Goggles & ear plugs should be worn when operating the vacuum former.



Do not handle the frame by the locking clamp. Use the handle.



Higher temperatures make plastics softer, and form better. Be careful not to touch the plastic until it has had several minutes to cool - it is very hot. Also, care should be taken not to overheat or burn the plastic. If it begins to boil or smoke, it has become too hot and emits toxic fumes. Do not breathe these fumes.

Never reach under the frame or climb into or on top of the machine.

## Instructional Fabrication

Instructional Fabrication is a division of the Department of Instructional Resources & Facilities Management.



**School of the Art Institute  
of Chicago**