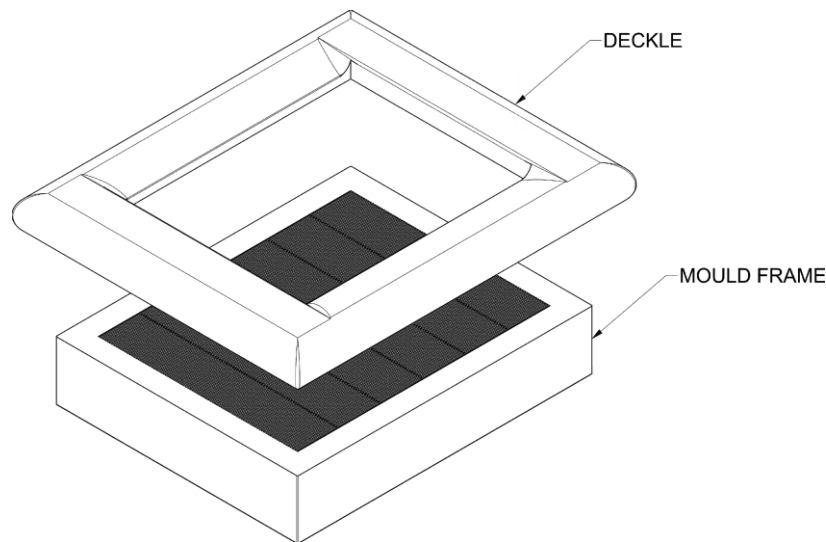


3D Printed Papermaking Mould Version 3

Presented here is Version 3 of a 3D printed hand papermaking mould creating a 4 ¼ x 5 ½” sheet of paper. While the size of sheet this mould produces is small the mould frame, its ribs and the deckle are full size as found in larger traditional European papermaking moulds. Although there is no standard for the construction of a papermaking mould the profiles used here mirror those used in Great Britain and parts of Europe over the last two centuries.

Orientation

When describing the orientation of a part to be printed we refer to its natural orientation during use.



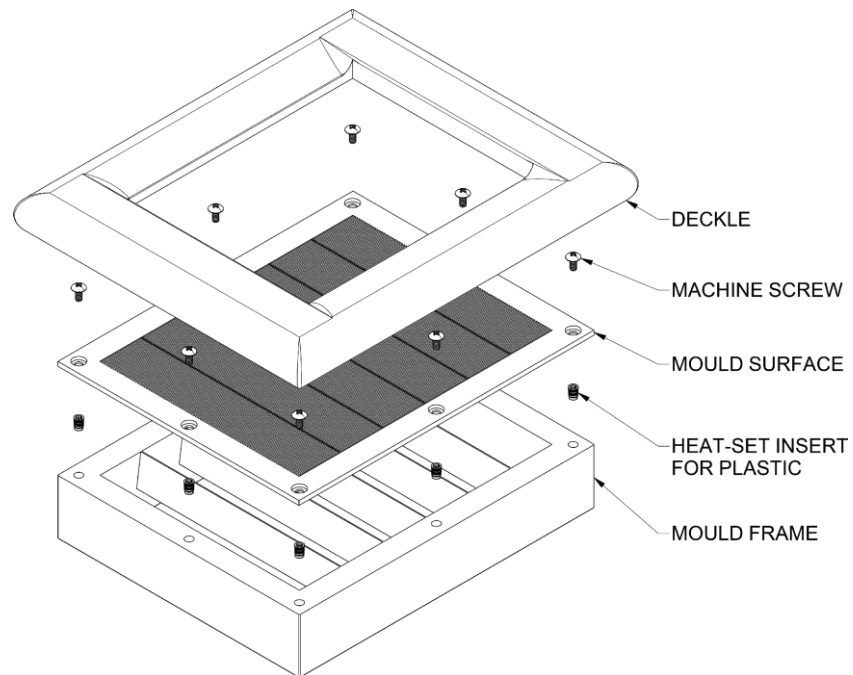
This illustration shows the orientation of a papermaking mould except the deckle is floating above the mould frame for clarity. If a part is described as being printed right side up its orientation will be as pictured as above. If a part is to be printed upside down it is rotated 180 degrees.

Printer Settings

All versions of these models have been successfully printed on an Ultimaker S5 printer using a 0.4mm nozzle and 0.2mm layer height.

Version 3

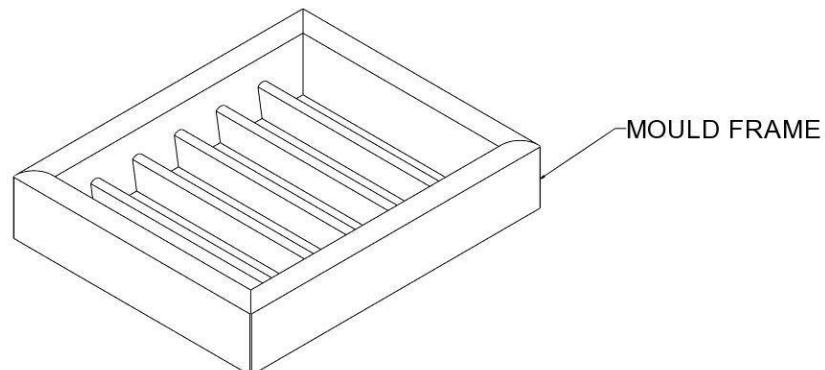
Three Part Set with threaded inserts



Version 3 is the same as Version 2 except that the holes in the mould frame are larger in diameter to accept a heat set threaded insert and machine screws are used in place of sheet metal screws.

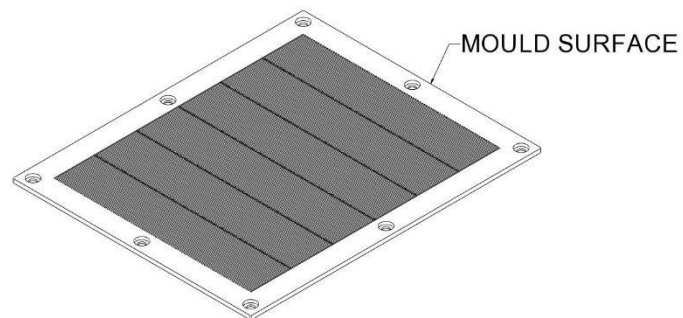
Mould Frame

The mould frame is printed upside-down as shown below and requires no supports.



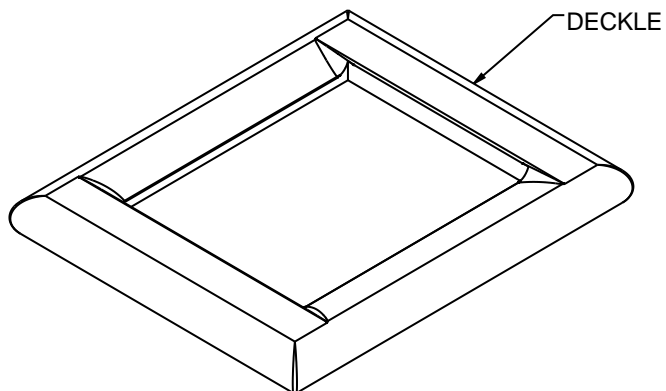
Mould Surface

The mould surface is printed right side up as shown below and requires no supports.



Deckle

The preferred orientation for printing the deckle is as pictured below, right side up. This requires support for the underside. Printed in this orientation the more finished surface is the topside. Any roughness on the underside resulting from the support structure can be sanded and is hidden during use. The deckle is the same for all three versions of this mould.

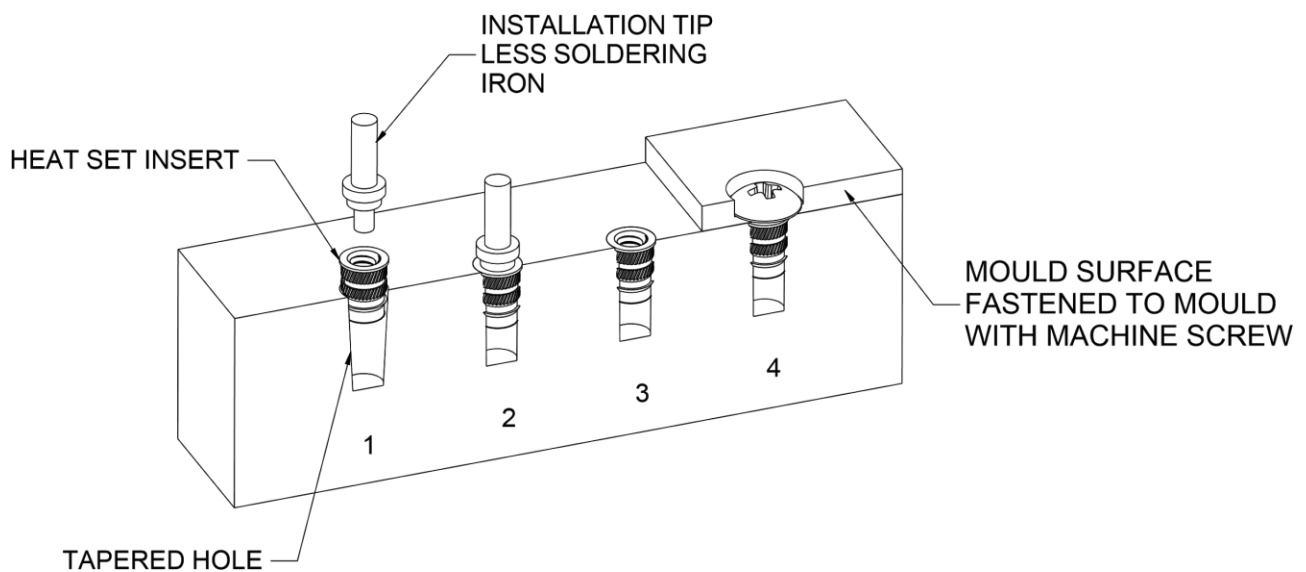


Heat Set Inserts for Plastic

These brass inserts are designed to melt into plastic parts to create a threaded base for machine screws. Unlike the threads created by a sheet metal screw, which wear down with repeated use, these brass threads hold their shape over a long life. They fit part way in the tapered holes on the mould and are then heated with the tip of a soldering iron which melts the plastic until they are flush with the upper surface of the mould. As the plastic cools, it solidifies around the knurls and ridges on the insert for excellent resistance to both torque and pull-out.

A pointed tip of any soldering iron can be used but McMaster-Carr sells an installation tip designed for the 4/40 inserts used on this mould. In fact you may want to purchase all three parts to ensure they all work together, the 40 Watt Economy Soldering Iron, installation tip and the brass inserts themselves.

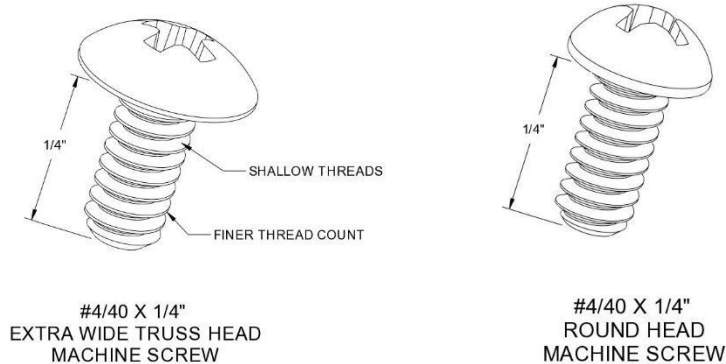
Care must be taken while installing the brass inserts to ensure they are positioned perpendicular to the mould frame's surface. After installing an insert, partly screw in one of the machine screws and rotate the mould frame to see that it's perpendicular in all directions. If it's not the insert can be reheated and straightened.



This section drawing illustrates the steps for inserting the heat set inserts.

- 1 - The insert resting part way in the tapered hole.
- 2 - The installation tip inside the insert after it has melted the plastic and the insert is flush with the top surface.
- 3 - The finished insert.
- 4 - The mould surface fastened with a machine screw.

Machine Screws



Unlike sheet metal screws machine screws have finer threads and do not taper to a point at the end. They're designed to be threaded into a nut or a threaded hole in another part. In our case it threads into a heat set threaded insert. Machine screws are designed to hold parts in place but unlike sheet metals screws can be removed and fastened numerous times. A truss head machine screw is preferred because it has a larger diameter and shallower head but a standard round head machine screw will also work.

Part Numbers and Supplier

The following parts can be purchased from McMaster-Carr, a large supplier of hardware and tools based in Elmhurst, Illinois USA. If it's impracticable to purchase from McMaster-Carr their website can still be useful. Enter the part number in the search bar and then select Product Detail in the highlighted box for that part. Print out the resulting page to bring to your hardware store to see if they have same part.

The McMaster-Carr parts listed below are made of stainless steel or in the case of the heat-set inserts, brass. I recommend these materials if the mould is to be used for making paper on an ongoing basis as they will not rust in water but if a stainless steel screw is not available, common zinc or chrome plated screws will suffice for intermittent use.

McMaster-Carr part numbers for parts used in Version 3

91773A106, 4-40 Phillips Round Head Machine Screw 1/4" long

91770A092, 4-40 Phillips Extra-Wide Truss Head Machine Screw 1/4" long

93365A122, 4-40 Brass Tapered Heat-Set Inserts for Plastic

92160A115, Installation Tip for 4-40 Thread Size Heat-Set Inserts for Plastics

7662A696, Economy Soldering Iron, 40W

