

3D Printed Fixtures

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3D printing can be a relatively fast and cheap way to create custom parts needed for lab work. Custom parts are needed for lab work in order to minimize damage or contamination to samples when they're being stored or worked on.

Sample Cleaning Fixture

Design Goals

- Design sample cleaning fixture with handle for easy removal.
- Create two designs with different sizes of sample wells to fit different sizes of samples.

Design Constraints

- Sample cleaning fixture must be able to:
 - fit inside the inner chamber of the ultrasonic cleaner with the lid closed.
 - leave the most area of the sample exposed while cleaning to allow particles to fall away from sample and avoid build up.
 - easily hold sample without creating damages or scratches during the cleaning process.

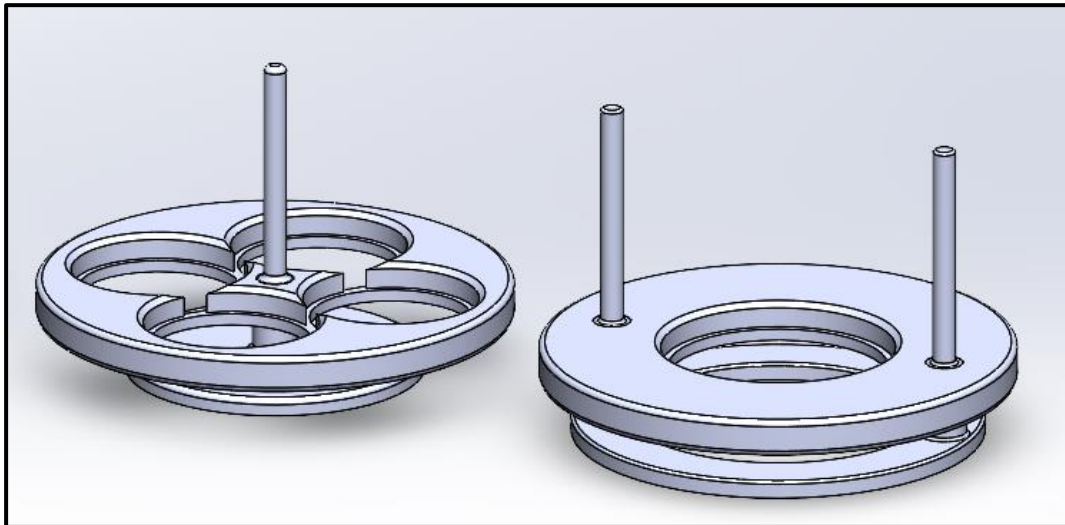


Figure 1: SolidWorks assemblies of Sample Cleaning Fixture for smaller samples (left) & larger samples (right).

Design Impact

- The samples being cleaned in this fixture are examined at very high magnification. Any small imperfections can distort the image, so samples need to be cleaned well to ensure good data can be taken from the specimen.

Scanning Electron Microscope (SEM) Stub Fixture

Design Goals

- Design a holder to store six SEM stubs inside a specimen box.
- Include a handle to easily remove SEM stub fixture from specimen box.

Design Constraints

- SEM stub fixture must be able to:
 - fit inside a closed specimen box.
 - keep the SEM stubs upright and stable during data collection.

Design Impact

- Keeping the SEM stubs and mounted specimens upright and stable with the SEM Stub Fixture allows for easier examination of the specimens with a microscope and X-ray florescence (XRF) analyzer.

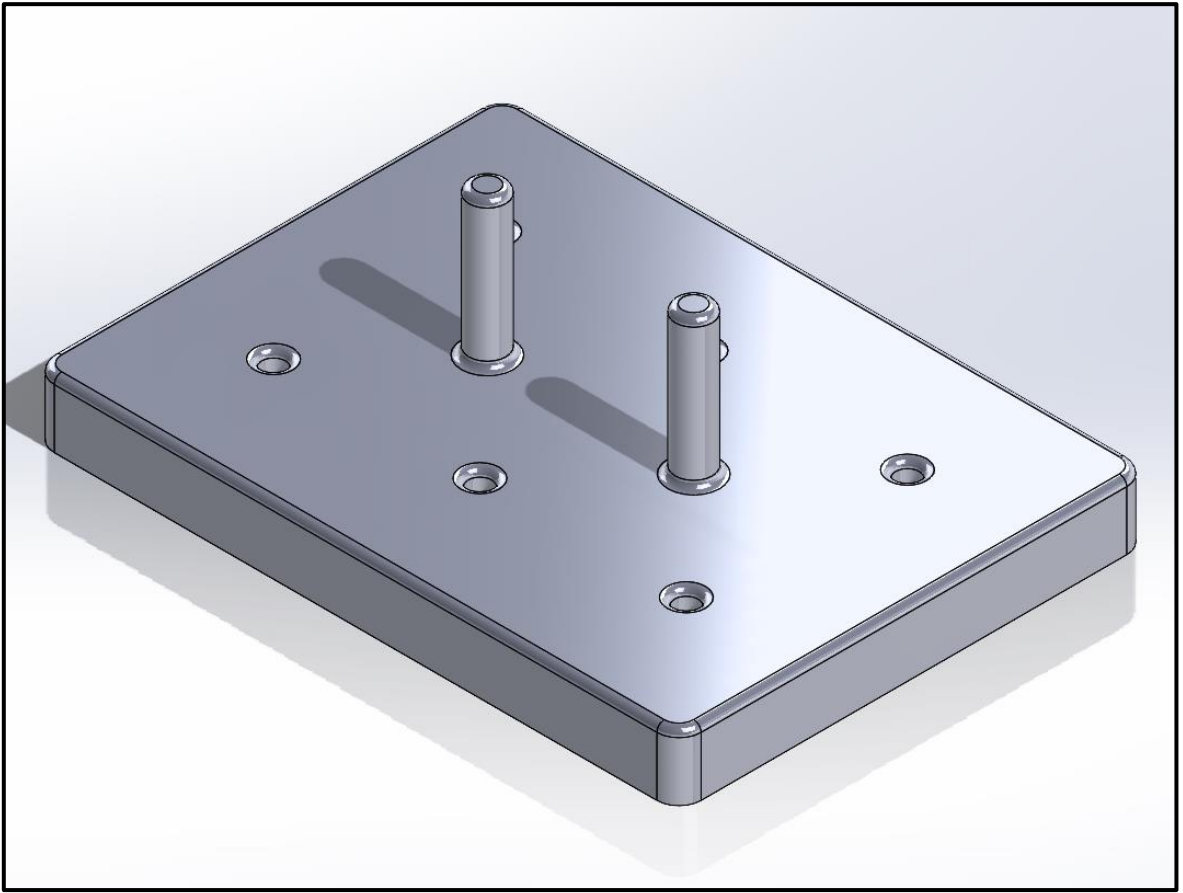


Figure 2: SolidWorks model of SEM Stub Fixture.

High Speed Precision Saw Fixture

Design Goals

- Design a fixture to hold a specimen in place and guide a high speed precision saw blade to cut the specimen into four pieces.

Design Constraints

- High Speed Precision Saw Fixture must be able to:
 - fit over glass cutting surface.
 - secure specimen in place during cutting.
 - align the bandsaw blade to make repeatable cuts and create uniform samples.

Design Impact

- Producing repeatable, uniform samples with the High Speed Precision Saw Fixture at a faster rate allows for tests on the sample to be completed faster and more accurately.

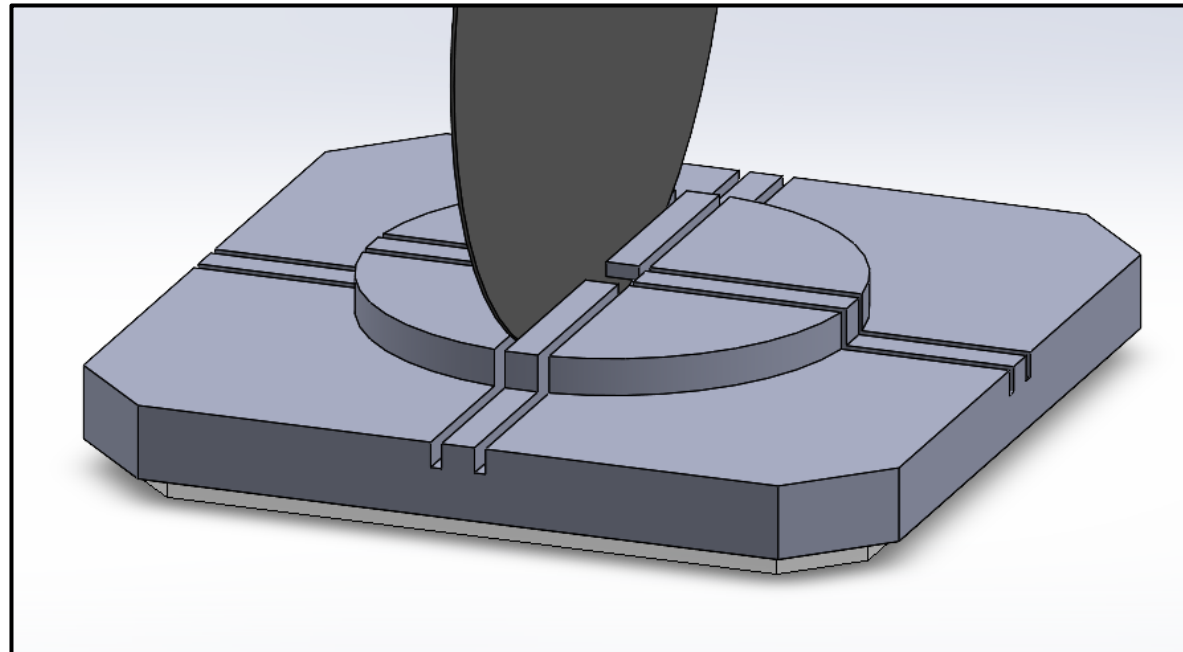


Figure 3: SolidWorks assembly of High Speed Precision Saw Fixture with a saw blade and glass cutting surface.

Parts need to be designed with an appropriate tolerance to account for inaccuracies made during the 3D printing process. Custom 3D printed parts for lab work can help minimize cost and time spent on projects.

