

Objective: The objective of this protocol is to test, measure and evaluate potential material to be used as the bottom surface of the chemical bath. This material will act as the bottom surface as polymer is pressed between it and the build platform. There are currently five (5) material candidates which will be tested as part of this test. The amount of shear force required to free cured polymer from the surface of the material will determine which material is used in the final design.

Scope: This test will be performed in the Brinkman metrology lab and will be conducted using the following equipment:

Equipment

- Cabinet Enclosure
- Projector: Sharp PGMB60X
- Lens Cap: Quartz
- Photopolymer: Custom Blend
- Shear Force Generator
- Round Force-Sensitive Resistor (FSR)
- Laptop PC w/ MS PowerPoint
- Micrometer
- Aluminum Foil
- Isopropyl Alcohol
- Rubber Gloves
- Paper Towel
- Blank White Paper

This test will be conducted to evaluate the performance of the following material:

Material – Glass types

- Standard Plexiglas
- Soda Lime Silica
- Fused Silica
- B270
- Borofloat

The results of this testing will be evaluated and summarized in a completion report that will be published after successful completion of testing. This report will be posted to the team's EDGE site, complete with a decision and rationale for the material that was chosen for the final design.

Setup

1. Install projector in cabinet using the existing slotted holes. Position to project images up through existing hole.
2. Connect projector to PC via projector input 2.
3. Fit quartz lens cap onto projector.
4. Project test image up through hole onto blank white paper. Adjust height of projector within slotted holes until image is as focused as possible.
5. Create 2 slides in MS ppt. First create an all black blank slide. Next, create an all white blank slide.
6. Set the duration of time for each slide to 10 seconds.
7. Test setup by projecting the slides onto the blank paper. The entire image should project through the hole and onto the paper.
8. Cut 1"x 1" and 2"x 2" squares out aluminum foil sheet. The foil will control the thickness of the polymer layer.
9. Determine thickness of foil sheets using micrometer.

Procedure

1. Fill out the following form beginning with the 1" square and a predetermined amount of force.
2. Create a form for each material as it is used for the top surface.
 - a. Cure polymer according to the cure time and dimension chosen.
 - b. Using the force generator, separate the bottom surface from the cured layer of polymer.
 - c. Measure force applied using Force Sensor.
 - d. Record outcome of separation onto form.
3. Record the outcome as different materials are used as the bottom surface.
4. Repeat using 2" square and the same range of forces applied.
5. The polymer, cure time (10 sec), layer thickness and distance from light should be held constant for each sample.
6. The form below is a sample. Print out as many forms as needed or input results electronically. This will be left to the discretion of the testers.
7. Record observations throughout testing for the various samples.
8. Clean glass windows prior to and after each round of testing.

Date:				
Polymer:			Separation from Bottom Surface? (yes/no)	Observations
Top Surface:				
Cure Time (sec):		Bottom Surface	Plexiglass	
Force Applied (lb/in ²):			Soda Lime	
Layer Thickness (μm):			Fused Silica	
Distance from Light Source (mm):			Borafloat	
			B270	

Sample Testing Form