

3D Printing Replacement Parts

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Not All Parts Can Be 3D Printed:

- Too difficult (or time-consuming) to model
- Injection molded plastic parts
- Very thin parts (< 1mm thick or in any dimension)
- Metal parts (strength issue)
- Clear parts (3D printed is translucent, not transparent)
- High precision parts where fit or mesh is critical
- Parts subjected to high degree of wear and tear (friction)
- Air or water tight parts (TPE or TPU filament is worth a try)
- Parts exposed to extreme temperatures
- Parts exposed to strong sunlight (ABS white is a better choice)

Measurements:

- Measure broken part (if available)
- Measure whatever part needs to fit
- Identify critical dimensions

Process:

1. Create a rough sketch of the object
2. Take careful measurements using caliper and annotate sketch
3. Determine the critical dimensions
(often thickness does not matter)
4. Create model in Tinkercad
5. 3D print just enough to measure critical dimensions of 3D printed part.
(May be necessary to rotate object on bed.)
6. Compare actual vs desired. If off, determine percentage (usually < 2%)
7. Either adjust Tinkercad model or scale in slicer
(sometimes you only need to scale 1 dimension)
8. 3D print again and measure again.
(If object is small, try several scale factors +.025, +.050, +.075)
9. Once successful, print entire part in correct orientation

Process for Flat Objects:

1. Scan object on flat bed scanner. Save as JPG
2. Using Paint or Photoshop, turn into high contrast, B&W .BMP
3. Print resulting image. Take careful measurement and annotate.
4. Determine critical dimension(s),
5. Import into Cura and convert image. Typically Lighter is Higher.
6. Use scale tool to measure model. Scale one of more dimensions as necessary.
7. 3D print just enough to measure critical dimensions of 3D printed part.
8. Compare actual vs desired. If off, determine percentage (usually < 2%)

9. Adjust scale in slicer
(sometimes you only need to scale 1 dimension)
10. 3D print again and measure again.
(If object is small, try several scale factors +.025, +.050, +.075)
11. Once successful, print entire part in correct orientation

NOTE: You can export object as STL, then edit in Tinkercad

Sample Projects:

- Jeep antenna washer
- Fitbit band
- Antenna cap
- Tripod mount
- Flag ring
- Light cover
- Salt shaker plug

Exercises:

- Practice sketching and measuring objects
- Identify critical dimensions
- Extrude Dental pick
- Simple Tinkercad exercise (washer, antenna cap)