



## Redesign on a Dime

The purpose of this project was to demonstrate the ability to:

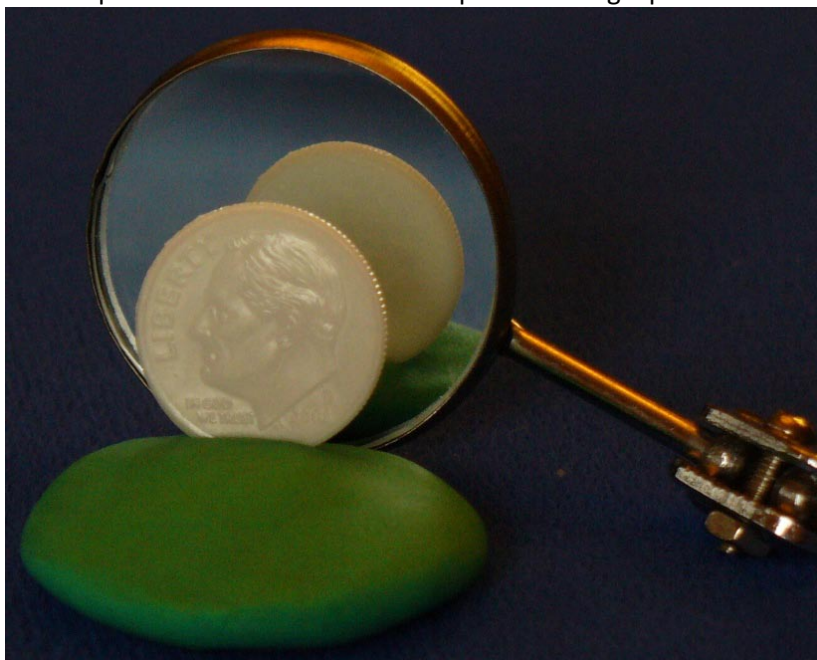
1. Use X-ray Computed Tomography (CT) scanning to capture very small details
2. Work with materials not suited to CT scanning i.e. dense metals
3. Process the scan data (STL) to provide a true representation of the item being scanned
4. Create a physical object using the processed scan data

The scanning was done on a Zeiss Metrotom 800 which is able to produce 3D data accurate to better than  $5\mu$  and can detect both internal and external features as small as  $10\mu$ . The resulting STL files for this project had resolutions of  $\sim 30\mu$ .

A Dime is made of fairly dense metals which are not well suited to Zeiss' CT scanners. To get around this, a Dime was used as a pattern to create urethane plastic replicas of each side using silicone rubber molds. The materials were chosen for their ability to accurately reproduce fine details. Both materials were carefully vacuum degassed prior to pouring.



It's also possible to cast an accurate replica as a single piece.



The plastic replicas were scanned and the CT data exported as high resolution STL files. The files captured all of the details, but the surfaces were textured like coarse sandpaper and there were a couple of very small defects caused by air bubbles in the plastic.



The files were processed using Rapidform® XOR™3 Redesign software to align and merge the scans and then to correct the defects and to smooth and enhance the surfaces while still retaining the detailed features.

The software was then used to scale the Dime up 6.7X\* and to selectively decimate the file to keep the file size manageable.

Several scaled Dimes were printed on an Objet Eden series 3D printer using 16µ build layers. The one shown in the picture (top) was painted with aerosol paint to show the level of detail captured. One of the other enlarged Dimes was used as a pattern to create a silicone rubber mold to cast the red (head's), white (center) and blue (tail's) urethane plastic version shown below.



\* 6.7X was chosen based on encapsulating the Reverse Austin logo at business card size as shown.

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