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# Plastic Parts Quality Control and Reverse Engineering by X-ray CT

## About the sample: Molded plastic

Molding is the process of manufacturing by shaping liquid or pliable material using a rigid frame called a mold. For plastics, a powder or liquid polymer is put into a mold, and heat and pressure are applied to create an end product. There are many different aspects of testing the quality of these plastic parts. Their dimensions are one of them. While checking the dimensions might be easy when the parts have a simple shape with flat surfaces. But when the parts have a complex shape or there are many dimensions to be checked, the quality control process can be complicated. X-ray CT ([computed tomography](#)) can scan the part and check the entire surface, including the internal surfaces, for any out-of-spec dimensions. These scans also can be used to reverse engineer the part when the original drawing is missing.

## Analysis procedure

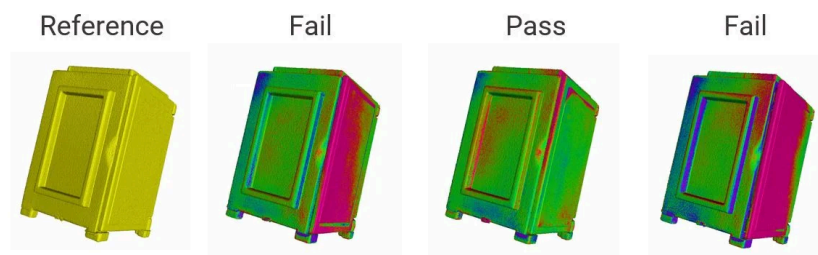
1. In this example, four pieces of plastic parts were scanned using a micro-CT scanner, [CT Lab HX](#).
2. The external and internal surfaces were detected using the [ISO-50 surface determination](#) technique.
3. A pass/fail test was applied to each part. The part design was also recreated from a CT scan.

### 1. CT scan

About 1-inch size plastic parts, one reference and three test pieces, were scanned to produce the 3D grayscale CT image.

### 2. Surface detection

The external and internal surfaces were detected using the [ISO-50 surface determination](#) technique.



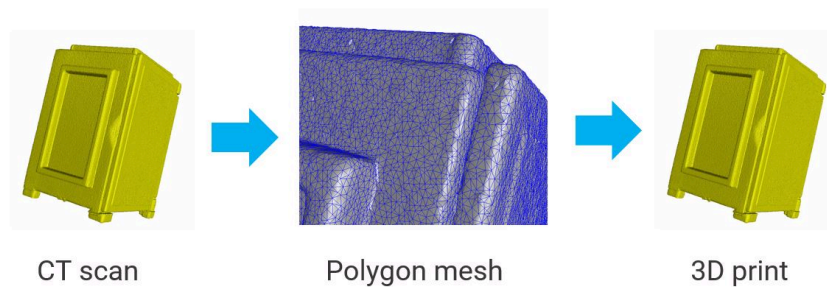
Test criteria: Maximum deviation for 90% surface  $\leq 0.1$

### 3. Pass/fail test and reverse engineering

Three test part shapes were compared to that of the reference part. In this example, instead of selected scale measurements such as height and width, the entire surface was compared. In the figure, the deviation is color-coded with green indicating a good match and blue and red/pink indicating large deviations.

The pass/fail criteria were set as that the maximum deviation of the shape and size for 90% of the part surface cannot exceed 0.1.

Once you have a reference part scanned, you can create a surface mesh or even a CAD drawing from the scan. You can use this technique when you need to reproduce an old part whose drawing is no longer available. Note that the reference shape can be obtained from an actually well-made single part or an average of multiple good parts.



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## Related products



### CT Lab HX

High-resolution benchtop microtomography of large samples