

Christopher Tool

Use Case – 3D Printed CMM Fixtures

Customer Profile

A family-owned business since 1951, Christopher Tool and Mfg. Co. provides quality machined parts on time with zero defects. Areas of concentration include aerospace, oil and gas, robotics, fluid power, and diesel engine components, with job sizes ranging from prototypes to medium-range production runs. A core goal of the company is continually improving its manufacturing expertise to support customer needs.

Challenge

Parts that need inspection on the coordinate measuring machine (CMM) require precise positioning to achieve accurate measurement readings. Fixturing the parts has typically been achieved with magnets, vices, and other means which are not exacting and risk introducing measurement errors. In addition, the setup process is time-consuming, incurs non-value-added costs, and isn't repeatable, with each fixturing arrangement equivalent to a custom setup.

Solution

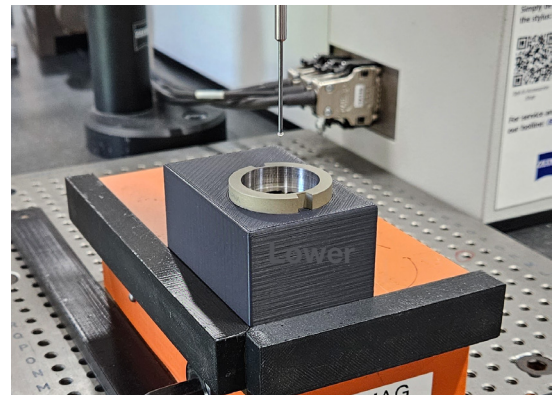
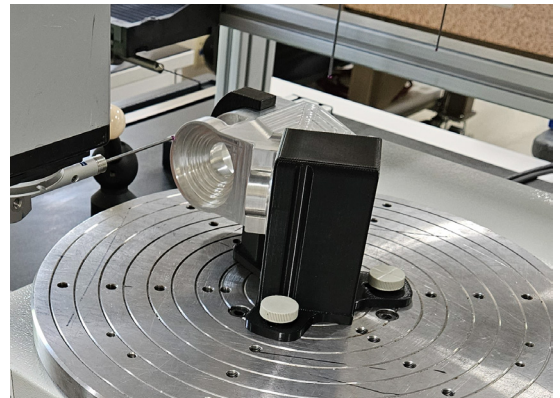
To reduce error, cost, and setup time, Christopher Tool engineers 3D printed CMM fixtures with a Stratasys F370® printer using ABS thermoplastic material. This solution allows engineers to design each fixture to optimally position the parts for the inspection. The F370's soluble support material increases design freedom by enabling the creation of complex fixture shapes. It also reduces labor because the support material dissolves hands-free in a dissolution tank.

Impact

After implementing 3D printed CMM fixtures, the entire inspection process has significantly improved, resulting in the following benefits:

- Faster inspection
- Improved accuracy
- Easier and faster fixturing setup

Reload times (placing additional parts in the fixtures) have been reduced from 3 minutes per part on average to just seconds because base alignment time can be skipped with part-specific fixtures. When multiplied by the number of parts that require CMM inspection on a per-time basis, the savings is significant, resulting in decreased labor and subsequent cost savings.



Two examples of 3D printed CMM fixtures used to constrain machined parts.

Increased



Inspection Accuracy

Time Savings



90%

Reduced Labor Cost



Vs. Reload without Fixture