

# CASE STUDY



A 2024 Award of Distinction Winner in the Hardware/Appliances category for Metal AM components.

## Pneumatic Chuck Jaws

**Process:**  
Metal Additive Manufacturing (AM)

**Material:**  
17-4 PH Stainless Steel

**Density:**  
99.5% of Theoretical

**Ultimate Tensile Strength:**  
1250 MPa minimum

**Hardness:**  
38 HRC

### End Use and Function

This pneumatic chuck jaws set is used for work-holding the outer diameter (OD) during precision turning on a CNC lathe. Traditionally, the jaws were machined from mild steel. Although inexpensive and easy to manufacture, the traditional chuck jaws were bulky and required high clamping force to overcome centrifugal force during start up and shutdown. In addition to the three OD clamping jaws, the complete set includes a Z-axis stop.

### Fabrication

The parts are made using material jetting (MJT) and the printing process allows the inner-lattice structure to be formed without having to de-powder, eliminating the risk of any powder entrapment in difficult to access areas. Vents and drains are designed into the printed jaws to allow the mold wax to flow out during the

de-molding process. The robust part design requires no special sintering furniture. The 17-4 PH stainless steel parts are sintered at 1,350 °C in a vacuum furnace to a 99.5% relative density with a tensile strength of 1,250 MPa and a hardness of 38 HRC.

### Results

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