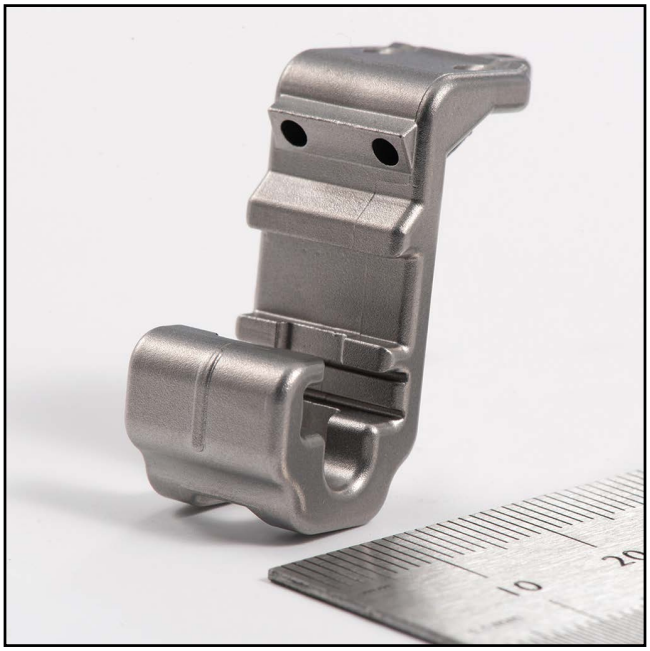
CASE STUDY



A 2021 Grand Prize Winner in the Medical/Dental category for metal injection molded components

Compression Frame

Process:
Metal injection molding (MIM)

Material:
MIM-420 stainless steel

Density:
7.7 g/cm^3

Tensile Strength:
1,730 MPa (250,000 psi)

End Use and Function

The compression frame is essential for holding and aligning the targeting drill guide during tarsometatarsal fusion.

Fabrication

The parts are produced using MIM-420 stainless steel in a single cavity open and shut mold with two slides. The first forms the rectangular opening. The second forms the two holes at a 60-degree angle on the opposite end of the frame. Hot isostatic pressing (HIP) is required to achieve an average density of 7.7 g/cm^3. After HIP, an annealing process is performed prior to secondary operations. The parts are sized in a die with two slides, so that forces can be applied in perpendicular directions to the parts. A hole is drilled, and a countersink added. The frames are vacuum heat treated and tempered to meet a 40 HRC minimum hardness, and the frames are passivated prior to shipment.

Results

MIM was selected for net-shape manufacturing, high production volume, and cost reductions. The MIM process provided better material utilization, the so-called “buy to fly ratio”, as it achieves a net-shape part without processing scrap, where machining would have resulted in a volume of processing scrap that was greater than the part itself.