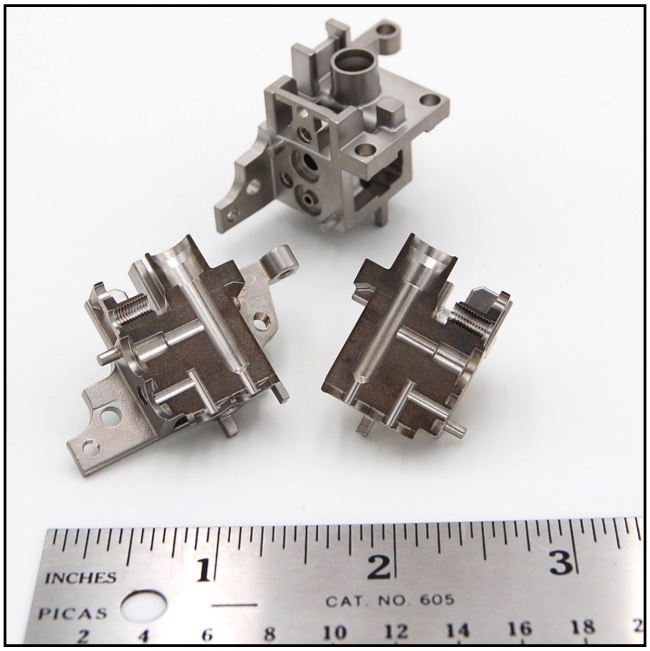
CASE STUDY



A 2018 Award of Distinction winner in the Hardware/Appliances category

EPR Flow Block Single Sensor

Process:
Metal injection molding

Material:
MIM 316L stainless steel

Density:
7.6 g/cc

Tensile Strength:
520 MPa

Yield Strength:
175 MPa

Hardness:
67 HRB

End Use and Function

This metal injection molded (MIM) stainless steel EPR flow block single sensor is part of the specimen inlet module of gas chromatography analytical equipment. Previously manufactured using casting and machining, the complex geometry of this component was perfect for the MIM process. Two dedicated internal channels manage gas in and out of the five ports without permitting leakages.

Fabrication

This component was redesigned to take advantage of MIM's processing capabilities. The fabrication process involves a two-plate mold. Due to its geometric complexity, four sides of the part use a design-with-slider interlock system. Both internal channels are formed during the MIM process. Forming the 90-degree internal channels required the use of a hydraulic core-pull slider system. The sensor also comprises several through holes and intricate features which only MIM can produce. Only one flat surface is available for the part to rest on during debinding and sintering. The component is processed close to net shape per print by MIM. The only secondary operation is the tapping of the several MIM pre-formed holes to get threading on them.

Results

A cost savings of approximately 40% was achieved versus the previous casted and machined component.
The entire process generated less than 5% material waste. All material runners from the injection process can be recycled.