INDO-MIM™
COMPLEXITY SIMPLIFIED
Issue 6, September 2015

Complexity Simplified

Metal Injection Molding (MIM) is the preferred manufacturing method for complex parts. In this issue, we introduce a component with cross-hole, undercuts, curved profile and hollow centre, which is a nightmare to manufacture through other competing manufacturing methods.

Manufacturing Challenge

- **Earlier method** : Machining operations on 3 parts + Brazing
- **Reason for change** :
  - Inability to meet customer schedules because of high lead time
  - Low repeatability because of multiple machining operations
  - High costs due to material wastage

Bolt

Solution

- Three separate designs were combined into one design. The new design was manufactured through MIM with the help of minor machining operations

Engineering Challenge

- **Few manufacturing options :**
  - Unique curved contour causing material wastage
  - 22 separate machining operations
  - High tolerance requirements of ± 10 microns

Newsletter Spotlight

The part won the "MPIF Award of Distinction" in the "Recreation" category

Indo-MIM created estimated cost savings of 35% over the previous manufacturing method

Indo-MIM delivers hundred thousand pieces annually to the customer

Design features cross-hole & undercuts, requiring complex core matchings' in tool cavity

Material used was MIM 4605 steel with hardness of 28-35 HRC

Solution

- **Precise temperature & pressure control during molding :**
  - Prevented void & sink formation
- **Specially designed ceramic supports used during sintering :**
  - Prevented distortion at high temperatures

Indo-MIM Receiving MPIF Award For The Component

MPIF President Richard Pfingstler presented the award, at San Diego, California to Indo-MIM CEO Mr. Krishna Chivukula Jr. & Territory Manager Mr. Rajesh

Component Application

- **Part of Bolt Action Mechanism**

Component Function

- As the bolt is thrust forward, it pushes a magazine into the chamber and cocks the system
- After the completion of the cycle, the empty cartridge case is retained on the bolt-face
- As the bolt is thrust backward, the ejector flings the empty cartridge case out through the ejector port opening

Bolt Action Mechanism—Locked

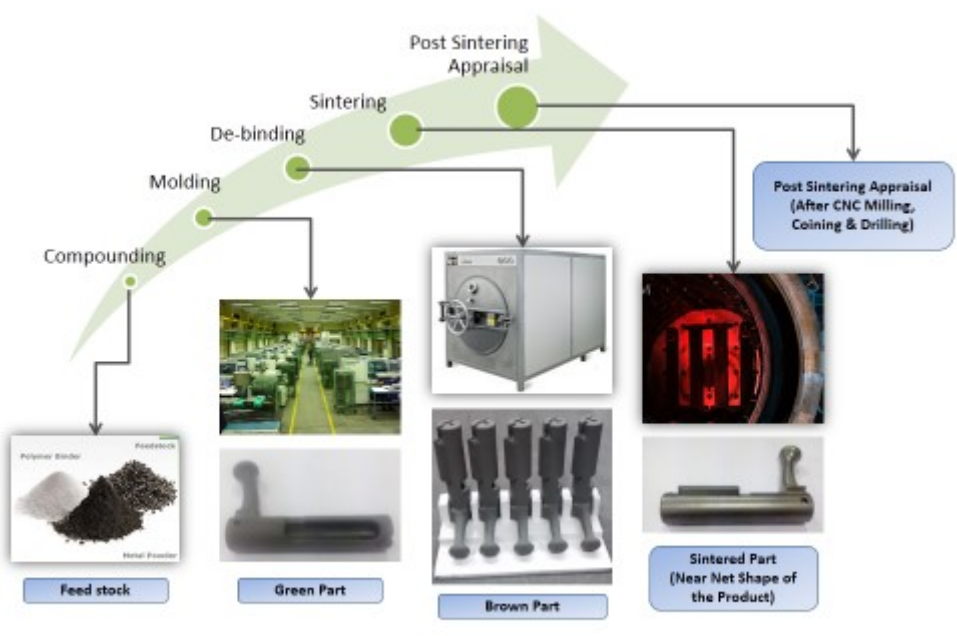
Bolt Action Mechanism—Unlocked

Tool Challenge

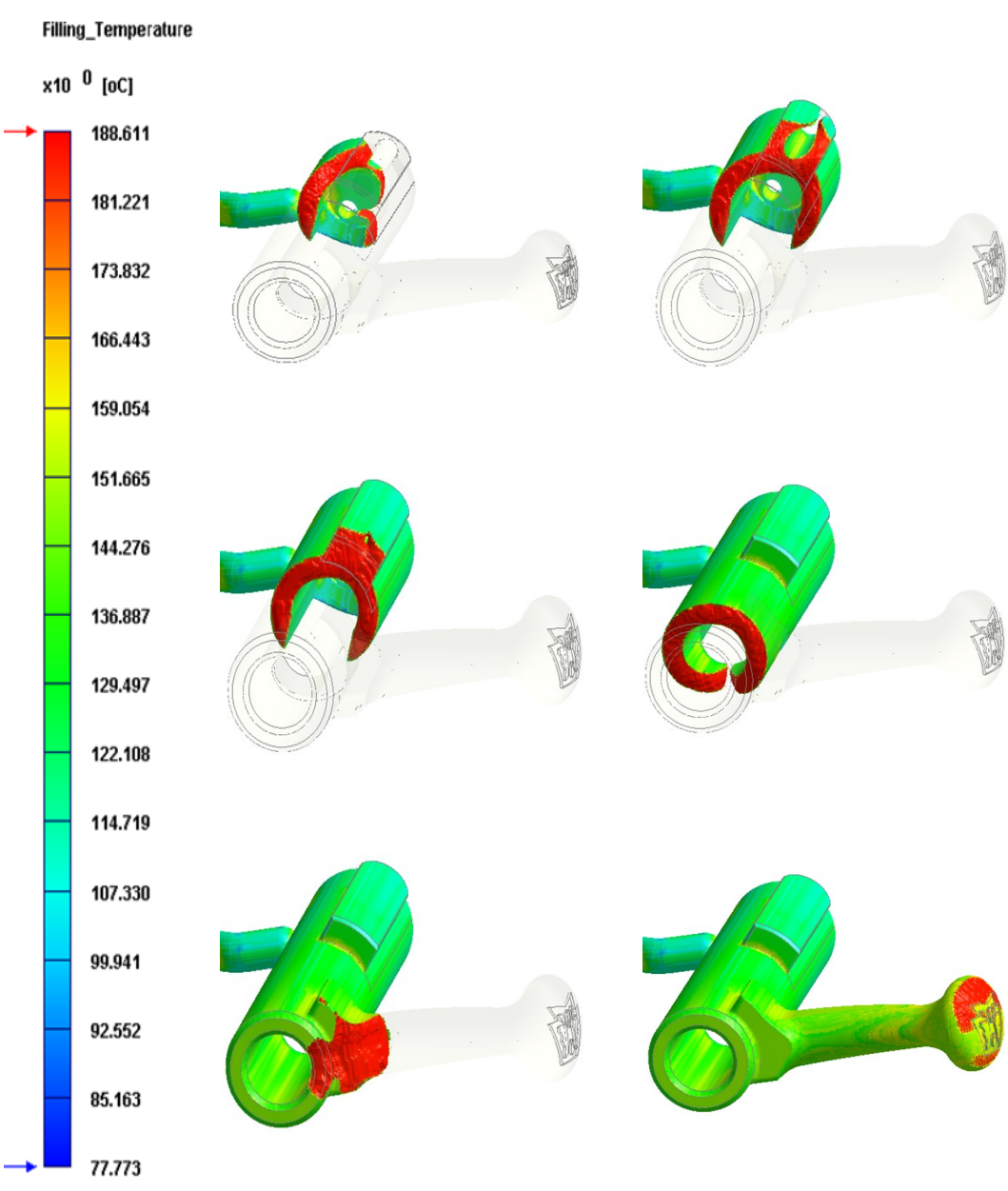
- **Angular slides with feather edge :**
  - Removed flashes
- **Small slides within main slide :**
  - Completely eliminated milling operations
- **Dog leg mechanism :**
  - Facilitated delay in tool movement for unobstructed movement of slides

Tool picture

How Indo-MIM Made The Component



Mold Flow Analysis—Top Plate For Shock Absorber



Indo-MIM Advantages

Indo-MIM reduced the manufacturing cost of the component by 35% over the previous method. No industrial pollutants were released during the manufacturing process.

Indo-MIM's specialty lies in manufacturing highly complex parts. Mechanical properties of parts produced through MIM is superior to castings & powder metallurgy (reflecting fine particle size & high sintered density). Parts made through MIM are near net shape.

Wide range of alloys available:

* Case Hardened Steels
* Hardened & Tempered Steels
* Stainless Steels
* Tool Steels
* Magnetic Materials
* Tungsten Heavy Alloys
* Titanium & Titanium Alloys

Questions or comments - Write to us at innovation@indo-mim.com or call at +91 80 2204 8800/2797 1419

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