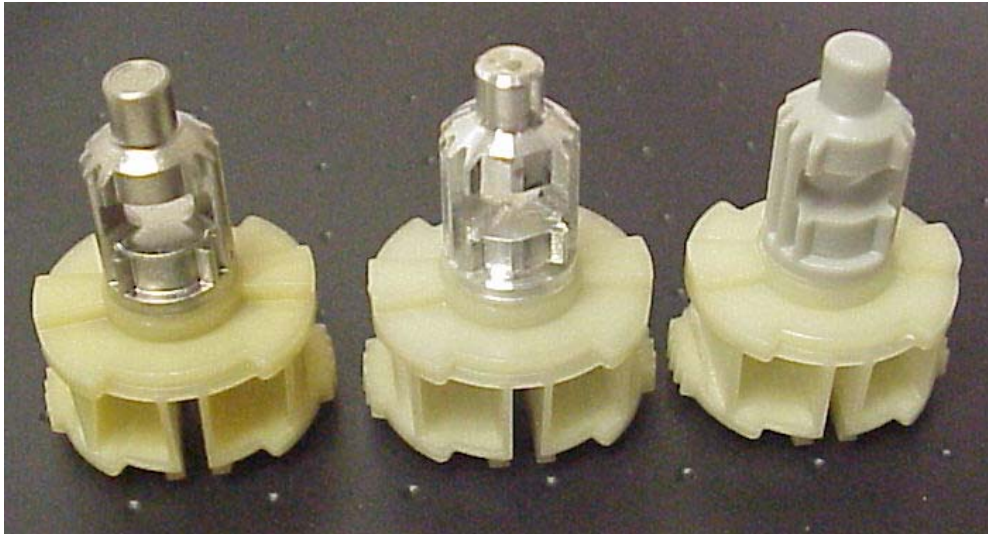


MIM Case Study—Art Gear



Application: Medical instrument—interior mechanical component

Functional requirements: mechanical strength, precision for overmolding

Competing technologies: plastic injection molding, machining

Overall size: L x W x H = 0.460 in. x 0.386 in. x 0.895 in.

Part weight: 6.1 grams

Material: MIM-17-4 PH

Key Characteristics—Art Gear

Gear teeth as molded. Strength over plastic, lower cost than machining



Smooth surface, no burrs or sharp edges from machining

Interrupted tooth, window for mating part

Diameter/roundness for overmold shutoff surface $\pm.0015$

MIM Case Study—Art Gear

- Why MIM?
 - Cost savings—20% the cost of machined part
 - High production rates. Over 10k per cav/wk
 - Strength over plastic
 - Good surface finish on gear teeth
 - Little material waste
 - Fewer burr removal problems

MIM Case Study—Art Gear

- MIM Issues
 - Roundness <0.003 in. required for shut-off surface during overmold process
 - Mold flow uniform in area of shut-off diameter
 - Gravity effects negligible and sagger drag isolated away from critical diameter
 - Coining step prepared for but not necessary due to process capability
 - Stability during processing/quality of gear teeth
 - Custom setters
 - Interrupted gear teeth shut-offs

MIM Case Study—Art Gear

- Economics
 - No individual part handling once stacked from molding
 - No secondary operations
 - Qualified with same material part through processing to allow for smaller lot size until volume increases
- Conclusion
 - Good application for MIM
 - Fast turnaround from release of model to part approval
 - Cost saving for customer and profitable for MIM supplier