



Phillips Metal Injection Molding

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Manager
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Phillips Metal Injection Molding

Stout Technology Park Menomonie, WI



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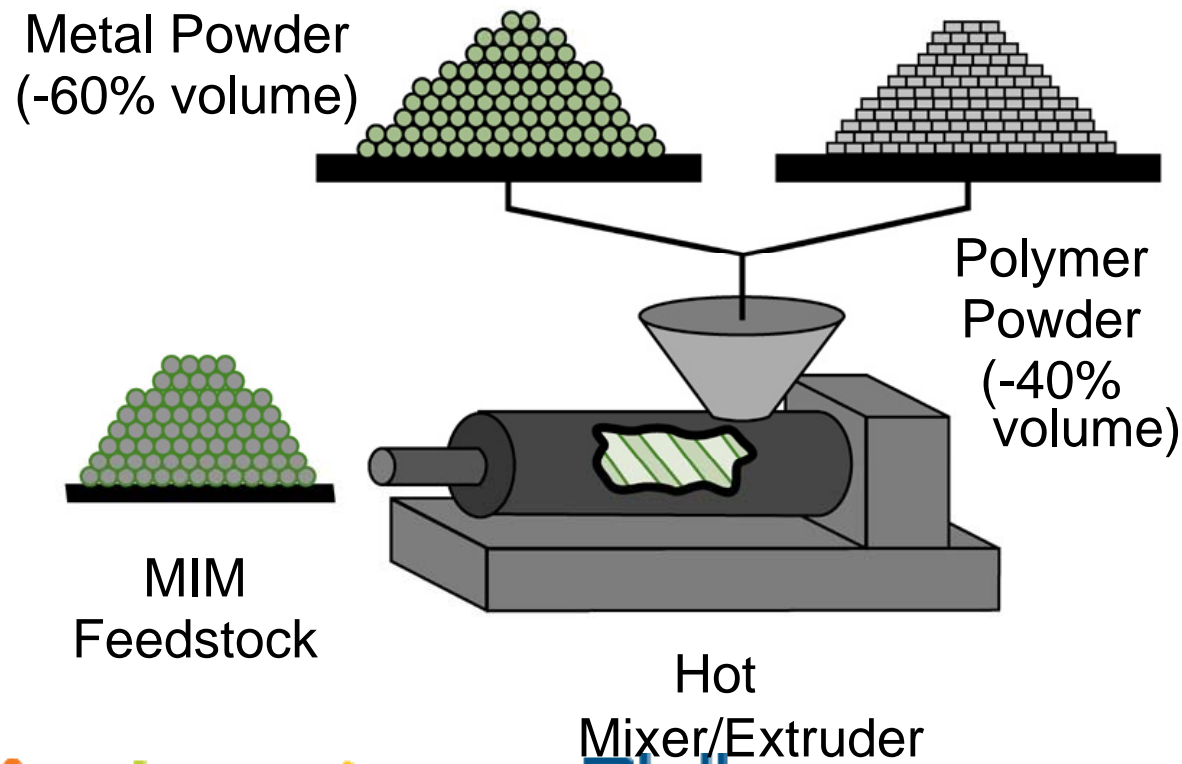


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Raw Material Mixing and Pelletization

Process Keys:

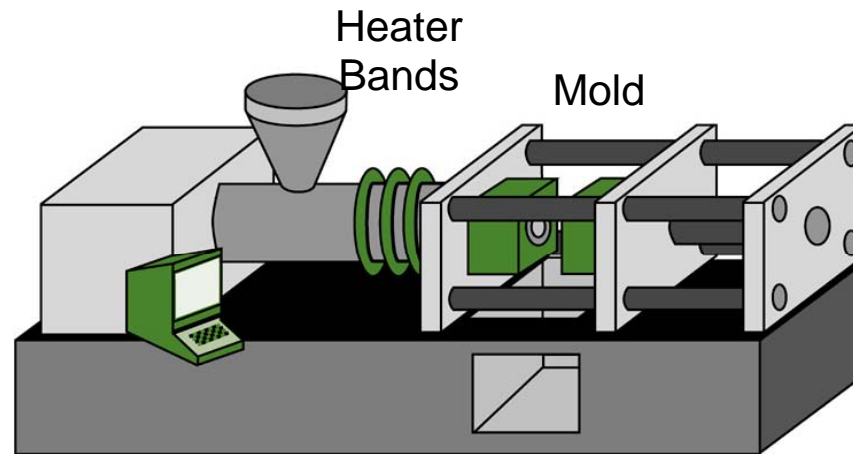
- Consistency of powder size distribution
- Consistency of powder loading



Molding

Process Parameters:

- High viscosity
- High thermal conductivity
- Tool Temperatures – 250° F

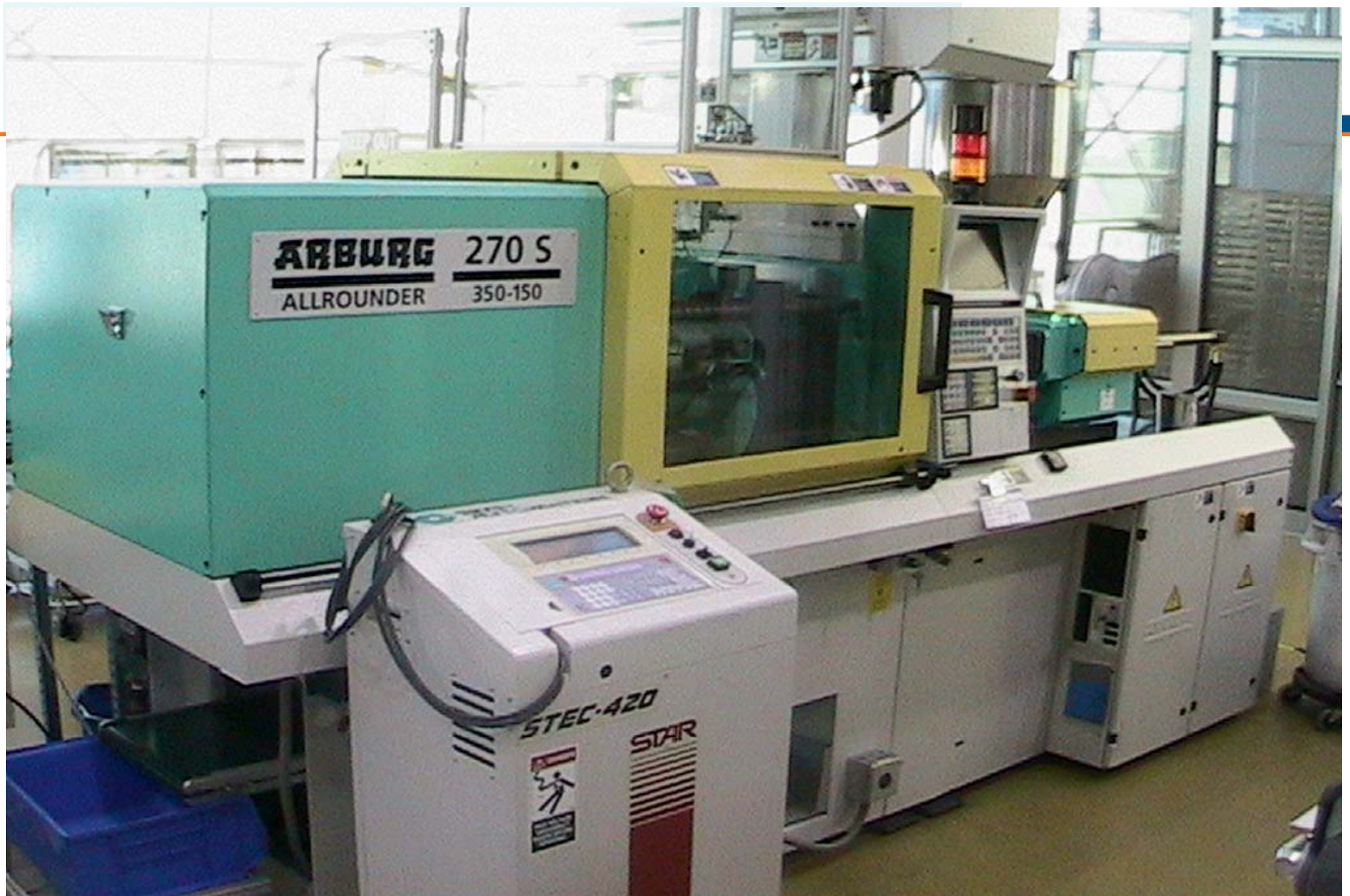


Injection Molding Machine:

Advanced instrumentation

Closed loop control from pressure transducer to assure ultimate uniformity in molded part weight

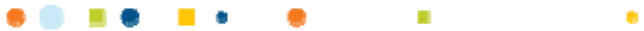
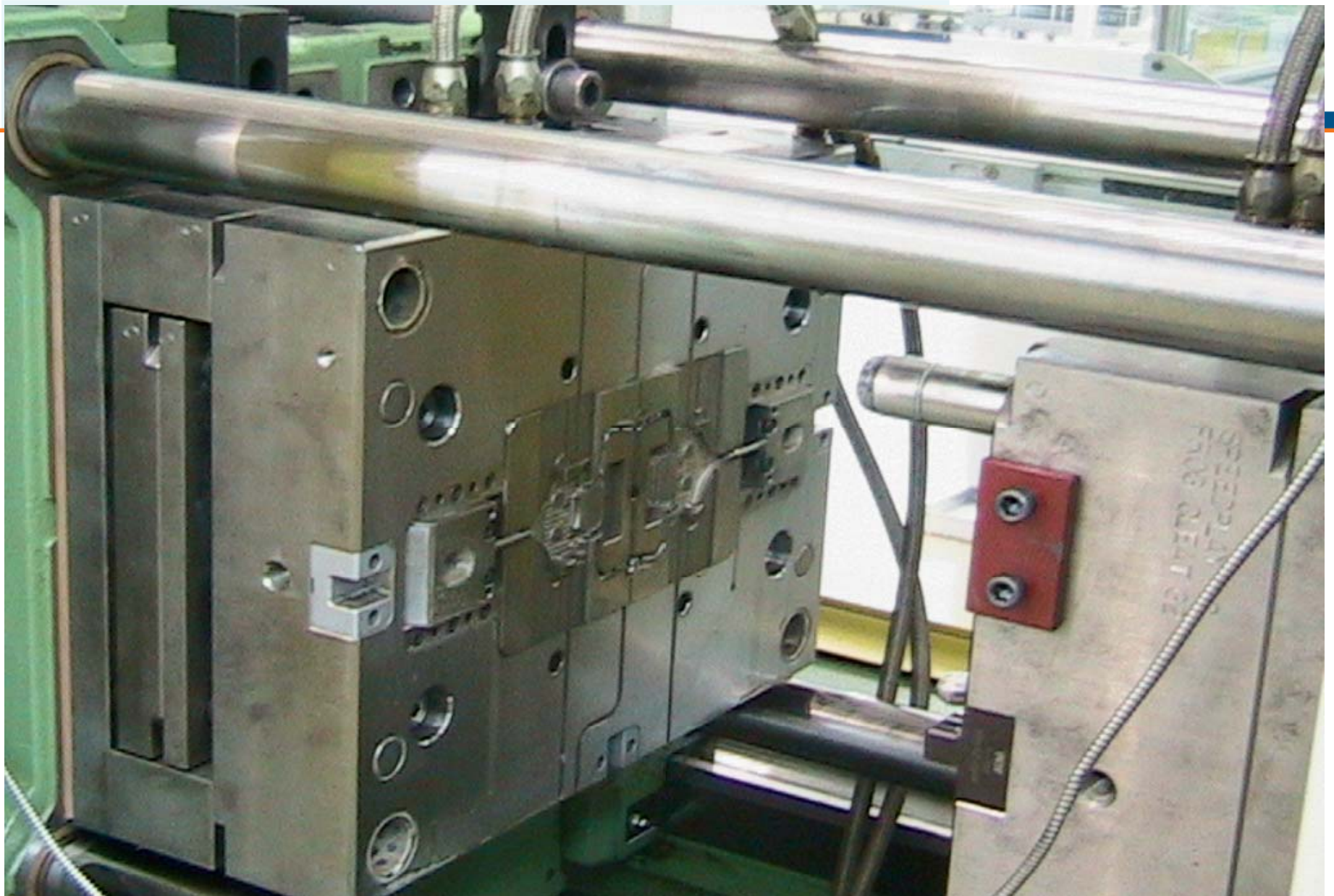




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Custom Sintering Fixtures

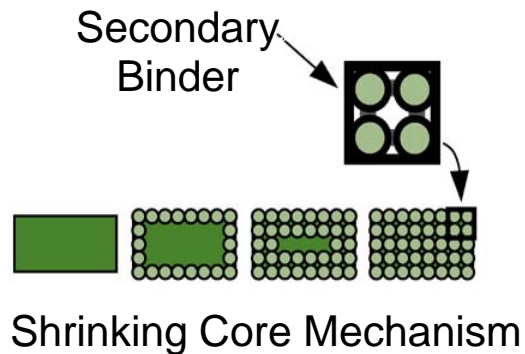
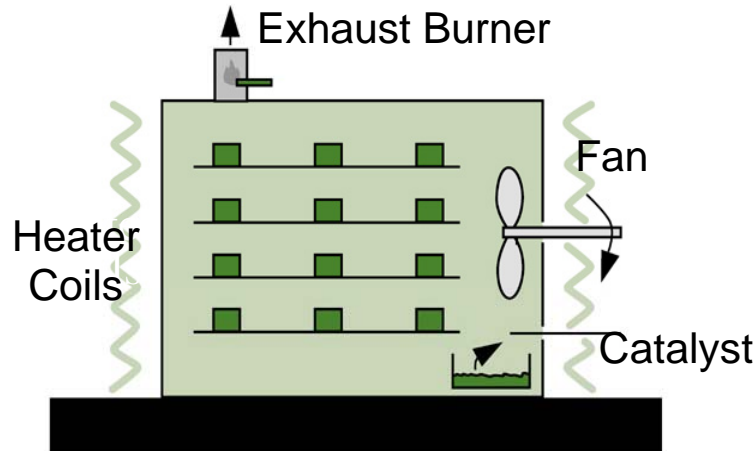


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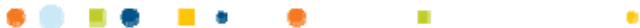
Catalytic Debinding



- Process Parameters:
- Chemical reaction
 - Shrinking core mechanism
 - Temperature is below softening point of binder

Process Keys:

- Fast (2-4 hours)
- Clean
- No distortion of parts



Continuous Debind and Sintering

Process Parameters:

- Temperature ramp to 1350° C
- 16-20 hour cycle door-to-door
- Hydrogen or nitrogen atmosphere
- Sintered density 97-99% of theoretical or wrought





Continuous Debind and Sintering



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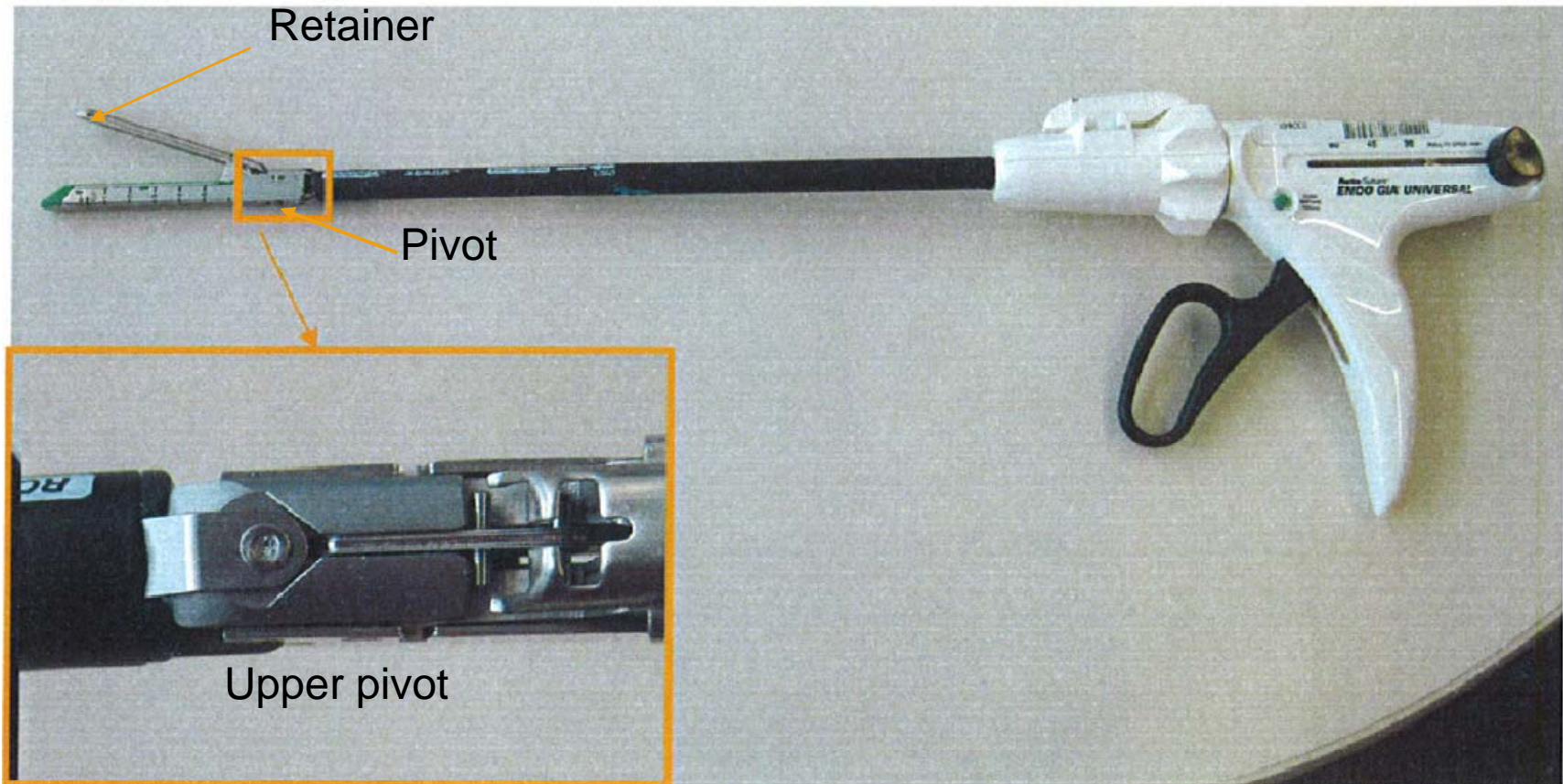
Endo Stitch program



The ENDO STITCH™ single use suturing device has application in endoscopic surgery for the placement of interrupted or running stitches in soft tissues.



ENDO GIA Universal Stapler

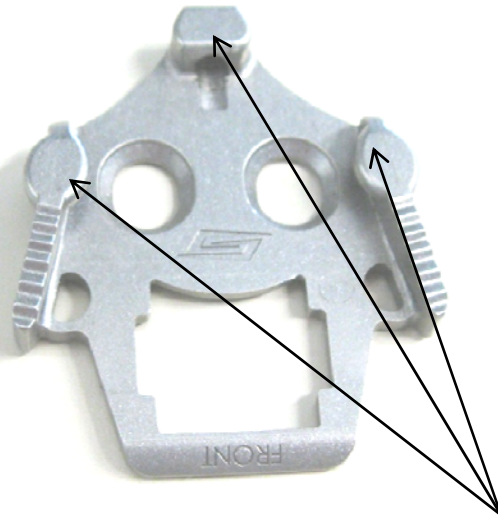


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Metal Injection Molding Design Examples



MIM design eliminated a 7 piece assembly

- Parts previously were fine blanked and then three bosses assembled with screws
- Significantly reduced component cost

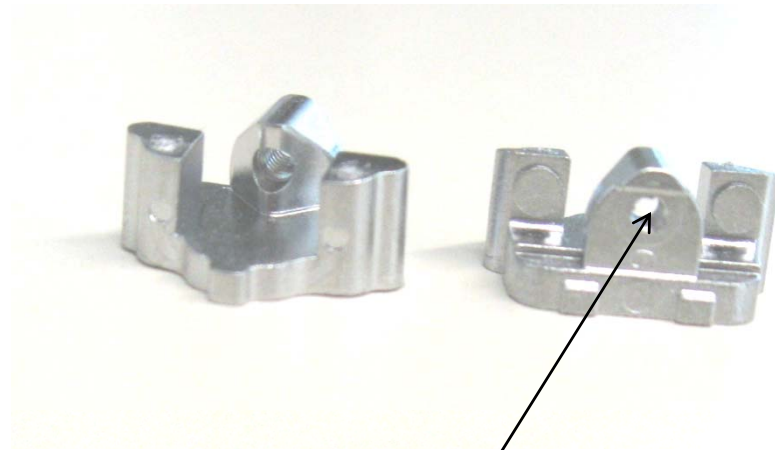




Auto-unscrewing Tools



Four cavity tool
0-80 auto-unscrewing thread



Eight cavity tool
M2 X 0.4 auto-unscrewing thread



Educational Partnerships



- UW – Stout
- Chippewa Valley Technical College
- UW - Eau Claire



Educational Partnerships

- UW – Stout
 - Leadership Academy
 - Lean Manufacturing Training
 - Scientific Injection Molding Training
 - Industrial Technology graduates
 - Plastics Engineering
 - Manufacturing Engineering
 - Product Development
 - People Process
 - Technical Interns
 - Continuing Education



Educational Partnerships



- Chippew Valley Technical College
 - Electro Mechanical Education
 - Computer Software Training
 - Precision Inspection
 - Geometric Dimensioning and Tolerancing
 - Blueprint Reading
 - Negotiating Skills



Educational Partnerships



- UW-Eau Claire
 - MBA Program
 - Leadership Training
 - Scanning Electron Microscope
 - Contour Observation
 - Fracture Analysis
 - Energy Spectrum Probe
 - Grain Boundary Analysis





Thank You!

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