
PRECISION TOOLMAKING. SIMPLIFIED.



MANTLE'S GOAL

Accelerate how manufacturers go from product idea to launch

by **simplifying** how steel mold tool components are made

with a 3D printing solution that delivers unmatched **accuracy**, **surface finish**, and **tool steel performance**.



MANTLE: **GAME-CHANGING SPEED, COST, AND EFFICIENCY**

PROVEN RESULTS:



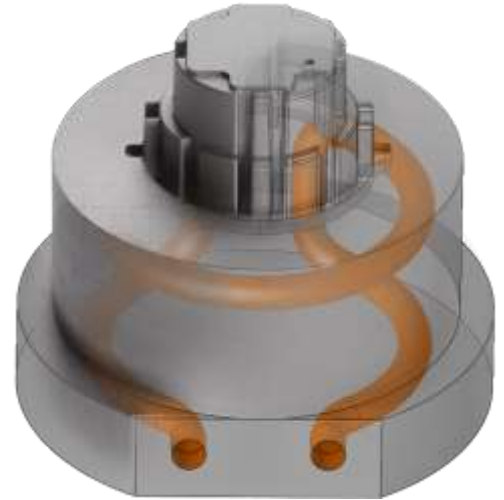
Less time
to produce
precision tooling



Less cost
to produce
precision tooling



More efficient
molding



Part Name

Medical Device Component

Application

Low Volume Injection Mold Core and Cavity

Key Metrics

- Lead time reduction from **weeks to days** and work required from **148 hours to 51.5 hours**
- **50% cost reduction**
- Accurate within 0.001" as printed without additional finishing
- Molding performance of printed inserts was equivalent to conventionally manufactured inserts

[Full Case Study Link](#)





HOW TOOLMAKING TIME WAS REDUCED

CONVENTIONAL TOOLMAKING PROCESS



TOOLMAKING OPERATIONS WITH MANTLE



* Reduced time

Part Name

Torch Packaging Housing

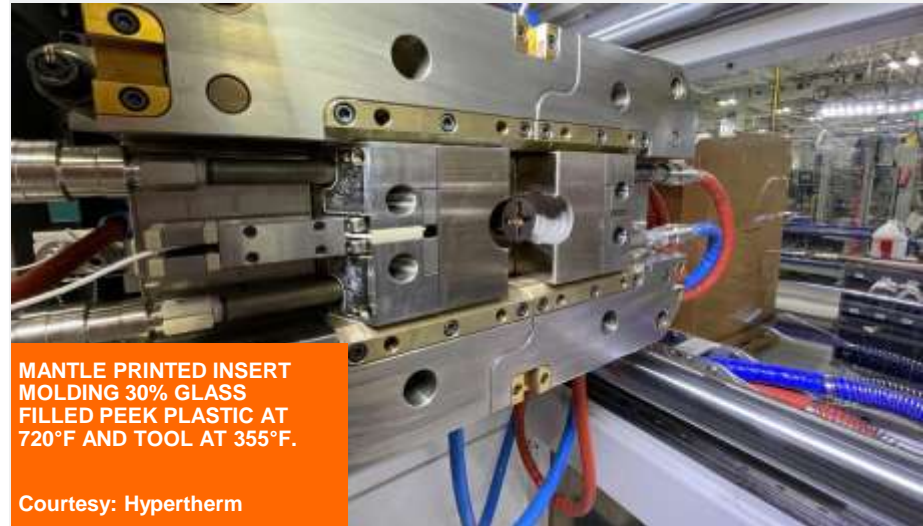
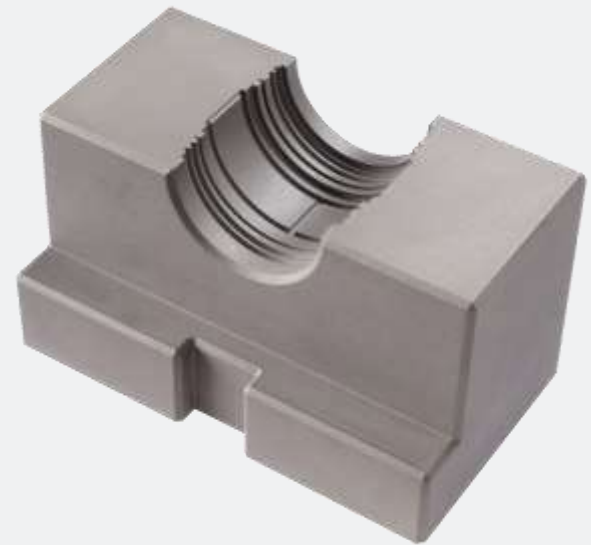
Application

Injection Mold Component (Slide)

Key Metrics

- **75% lead time reduction**
- **75% cost reduction**
- Printed tool was used with no post processing to part detail

Hypertherm



MANTLE PRINTED INSERT
MOLDING 30% GLASS
FILLED PEEK PLASTIC AT
720°F AND TOOL AT 355°F.

Courtesy: Hypertherm

HOW TOOLMAKING TIME WAS REDUCED



CONVENTIONAL TOOLMAKING PROCESS



OUT OF HOUSE
LEAD TIME



8 WEEKS

\$15,000

TOOLMAKING OPERATIONS WITH MANTLE



TOTAL TIME



2 WEEKS

\$3,750

* Reduced time

Part Name

Dental Guide

Application

Low Volume Injection Mold Core and Cavity

Key Metrics

- 40% lead time reduction
- Total operations time reduced from 200 hours to 110 hours
- EDM operation time reduced from 100 hours to 27 hours

[Full Case Study Link](#)



Part Name

Deodorant Stick Thumbwheel

Application

Production Injection Mold Core

Key Metrics

- **Over 1.4 million cycles** and counting with no signs of wear on the printed tool
- Printed inserts produced weeks faster than conventional machined inserts
- Mantle's metal 3D printed H13 and P2X inserts have proven to be as accurate and durable as traditionally S7 steel machined inserts

[Full Case Study Link](#)



Part Name

Medical Tweezer Core and Cavity

Application

Injection Mold Core and Cavity

Key Metrics

- From part design to molded parts within 3 weeks
- Successfully molded bio-based, recyclable 65% glass-filled PA11 polymer
- Incorporated conformal cooling to control insert temperature precisely

[Full Case Study Link](#)



Westminster Tool



Part Name

Fluid Barb Fitting

Application

Injection Mold Core and Cavity

Key Metrics

- 50% lead time reduction
- \$1,200 cost savings



Part Name

Medical Device Component

Application

Low Volume Injection Mold Core and Cavity

Key Metrics

- Lead time reduction from **12 weeks to 4 weeks**
- Reduced tooling cost from **\$63k to \$21k**
- Accurate within 0.001" as printed without additional finishing

[Full Case Study Link](#)



MANTLE PRINTED INSERT
IN MASTER UNIT DIE
DURING MOLDING

Part Name

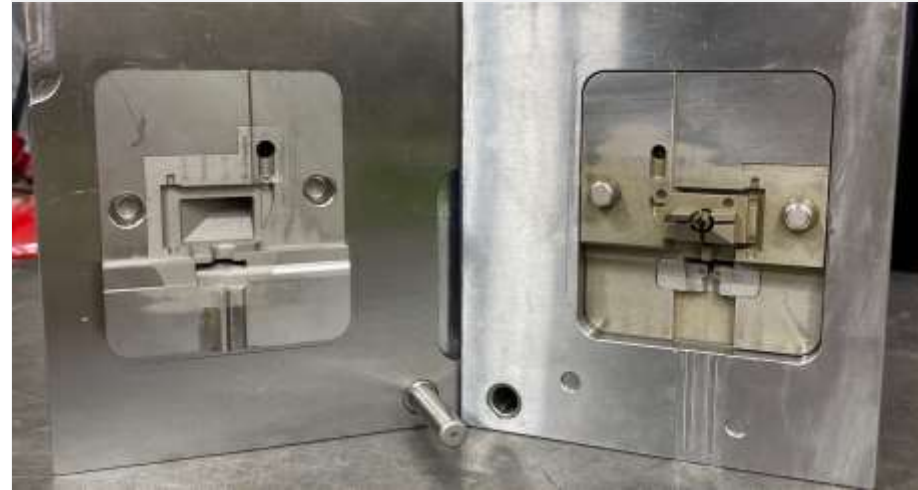
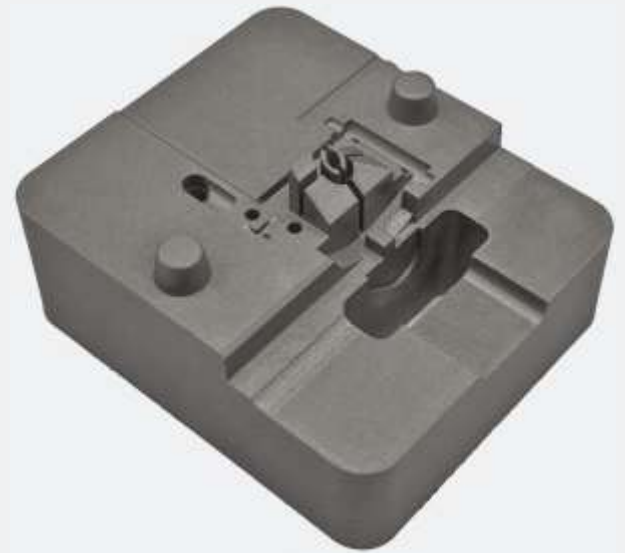
CAM lock latch

Application

Injection Mold Core and Cavity

Key Metrics

- 45% lead time reduction
- Tools required only 10 hours of final finishing and fitting
- Injected Nylon PA 6/6 35% glass filled





The **accuracy** of a CNC machine

The **freedom** of a 3D printer

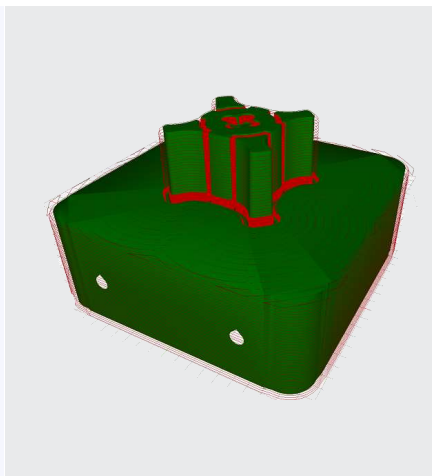
Designed and priced **for every shop**



TOOL STEELS



SOFTWARE



HARDWARE

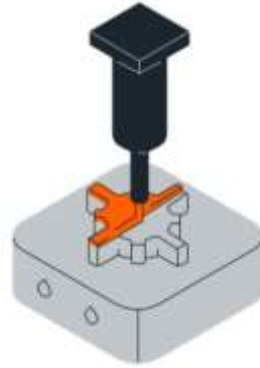


3D PRINTER

FURNACE

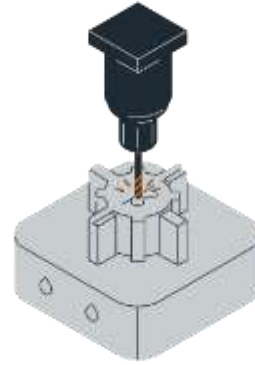
The solution includes:

HARDWARE
SOFTWARE
TOOL STEELS

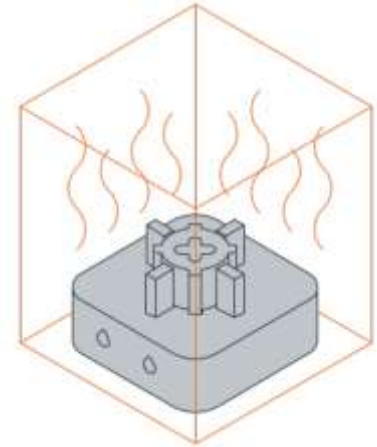


PRINT

Print & shape metal paste in custom printer



SHAPE



SINTER

Heat & sinter paste into a solid metal part in custom furnace

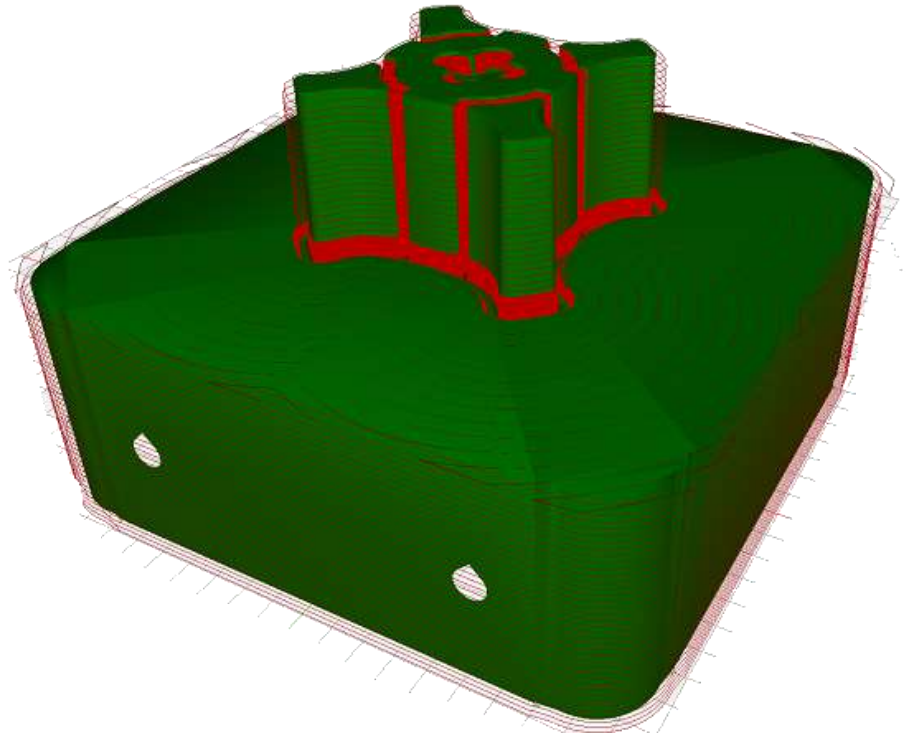
MANTLE SOFTWARE

**Generate toolpaths in minutes
(additive and subtractive)**

No programming required

No CAM experience required

Train users in minutes

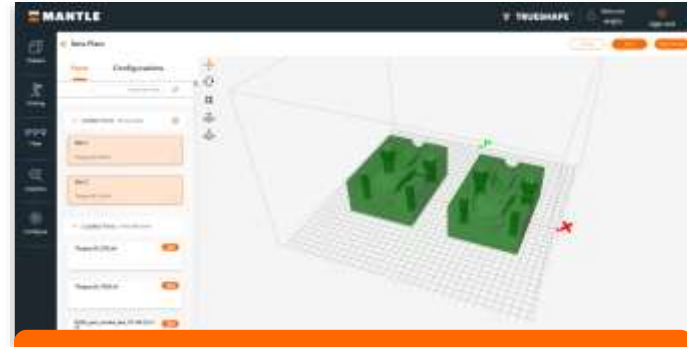


MANTLE SOFTWARE

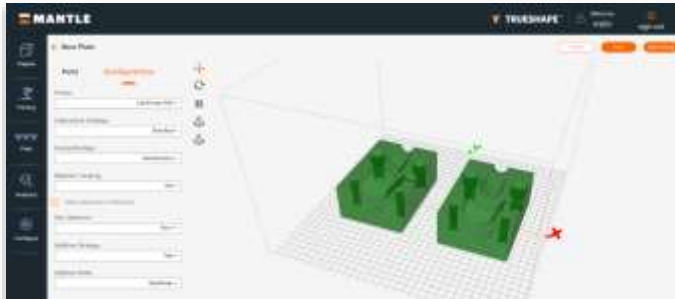
4 easy steps



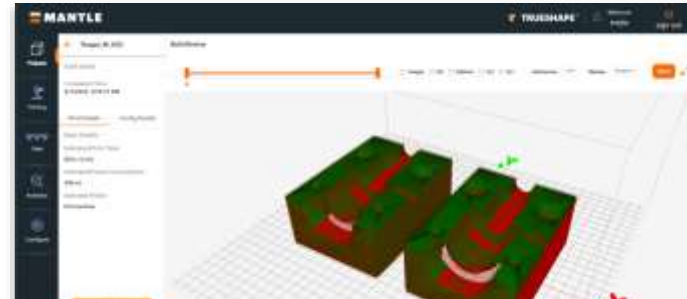
1. IMPORT PART FILES



2. ARRANGE PARTS ON BUILD PLATE



3. OPTION TO MODIFY BUILD STRATEGY



4. GENERATE TOOLPATHS, SEND TO PRINTER

TWO MATERIALS OPTIMIZED FOR TOOLING



P2X: P20 Equivalent Tool Steel

32 HRC

Compatible with standard tooling operations:
grinding, milling, machining, welding, EDM
Superior corrosion and abrasion resistance

H13 Tool Steel

HRC 42 As Sintered
HRC > 50 after Heat Treatment

Compatible with standard tooling
operations: grinding, milling,
machining, welding, EDM



TEXTURE AND POLISH LIKE STANDARD TOOL STEELS

TEXTURING

Chemical etch
Deep chemical etch
Laser etch



POLISHING

Achieved A2 finish



“This material took texturing just like P20 with the same settings. We could polish it to an A2 finish.”

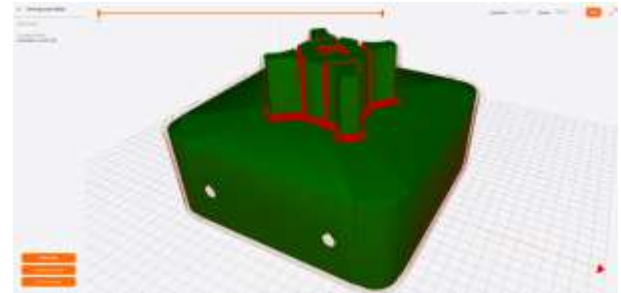
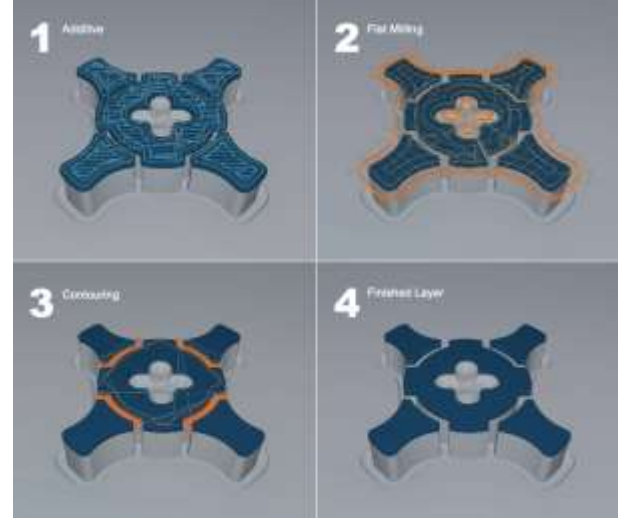
- Mold-Tech

SOFTWARE TO ELIMINATE MANUAL OPERATIONS

From CAD to part - digitally

Automatic additive and
subtractive toolpath
generation – **no programming
required**

Remote print monitoring and
analytics



CONFORMAL COOLING

Without a time or cost penalty

REDUCE CYCLE TIME

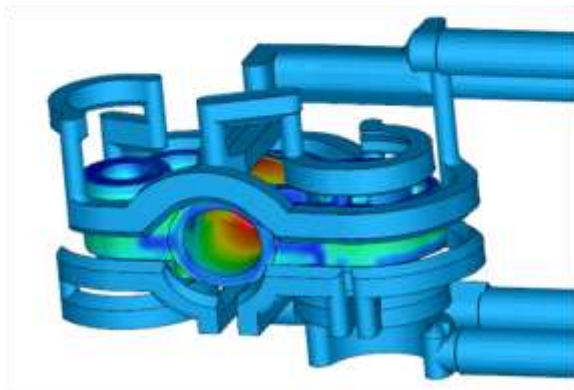
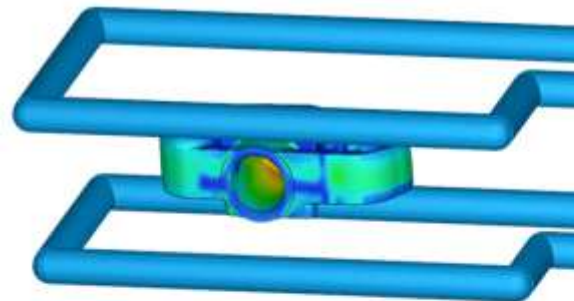
- Faster cooling times
- Increase press capacity

LOWER PART COST

- More parts faster
- Reduce tool cavitation

INCREASE PART QUALITY

- More controlled shrinkage
- Reduce total part warpage
- Precisely address trouble areas with cooling
- Better shot-to-shot dimensional consistency



TRADITIONAL

CONFORMAL

LET'S DO A PROJECT TOGETHER

WHERE MANTLE WINS:

Like all manufacturing processes, how well Mantle fits is application dependent. The following criteria help build an ideal application for Mantle.

- Complex tool designs that require multiple machining and EDM operations to build traditionally
- Molding of challenging plastics (high temp, filled, etc.)
- Quantity of molded parts needed is hundreds to millions
- Tool size < 4 x 4 x 2"
- The desire to learn processing parameters, so a steel tool is required
- The ability to use the printed inserts with a modular mold base
- Readily available finishing (grinding) and molding to take full advantage of Mantle lead time savings
- The ability to compare Mantle to a traditionally fabricated inserts using preexisting manufacturing data (lead times and costs) to help asses Mantle
- Optional: the desire to use conformal cooling