



Foundry 101

NEENAH **NF**
FOUNDRY
The NEI Group

Foundry 101

- What is a casting?
 - An object made by pouring molten metal or other material into a mold.
- How is a casting formed/shaped?
 - By liquid (molten iron) taking the shape of the container (mold)
- Why are castings a good choice for manufacturing?
 - Castings allow for near net (almost finished) shape requiring less post production and allowing for complex shapes.
 - High production
 - Recyclability

Process of Making a Casting

- Melt
- Core making
- Molding
- Pouring
- Cooling/shakeout
- Cleaning
- Inspection/shipping
- Engineering



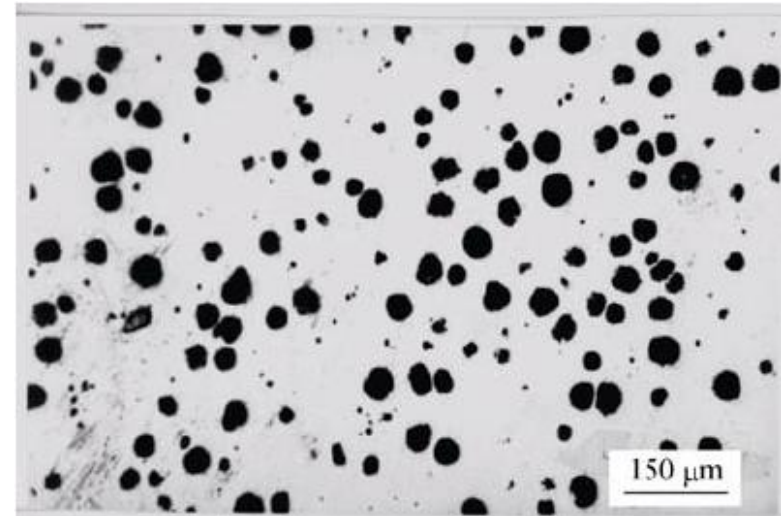
Melt

Melt

- Grey Iron
 - Graphite flakes
 - Brittle

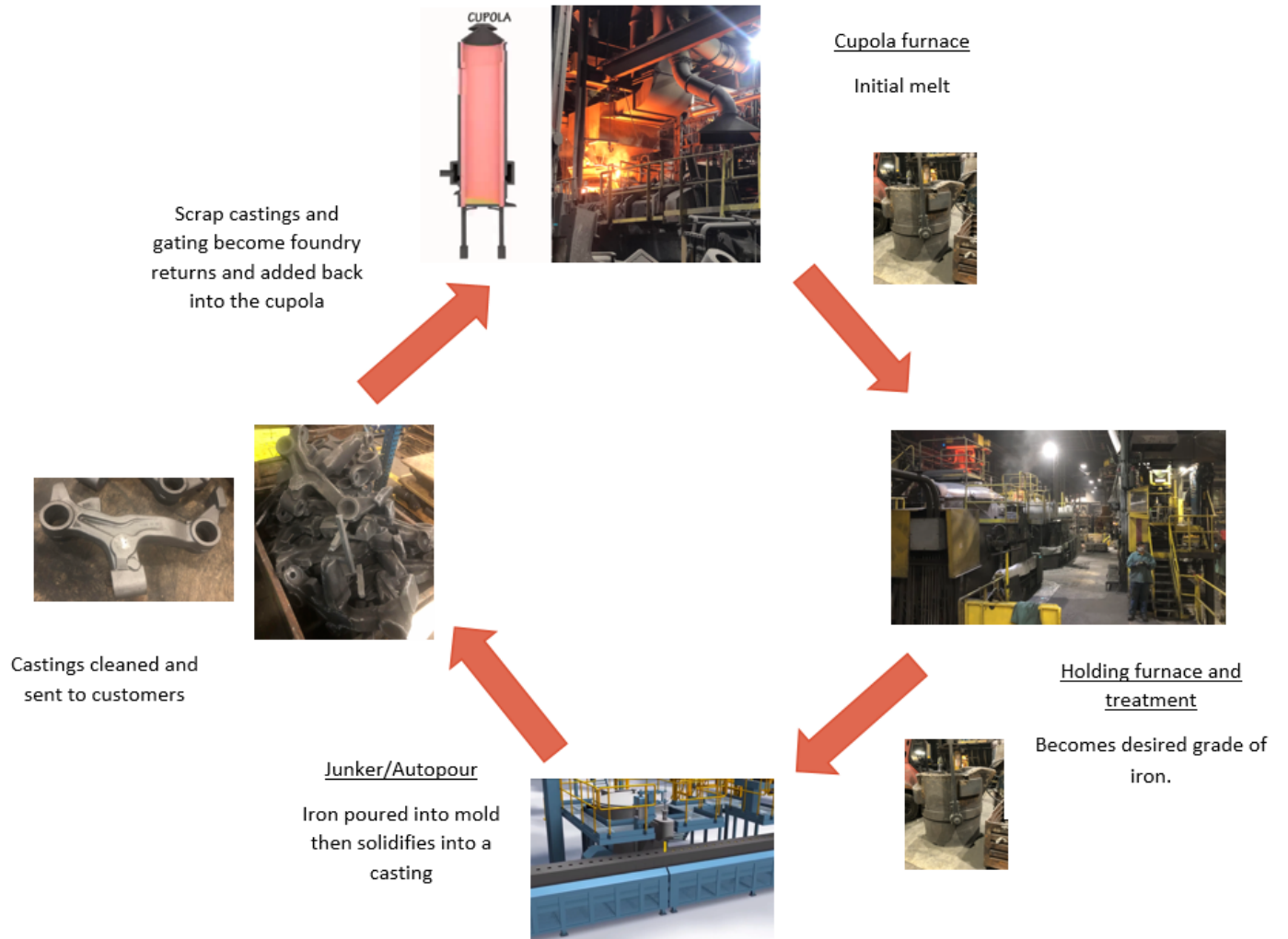


- Ductile Iron
 - Graphite spherules
 - Ductile



Melt

- Cupola
(raw iron)
- Holding furnace
(raw iron)
- Alloy station
(specific grade)
- Junker/Autopour
(specific grade)



Note: This is one of many flow scenarios.

Core Making

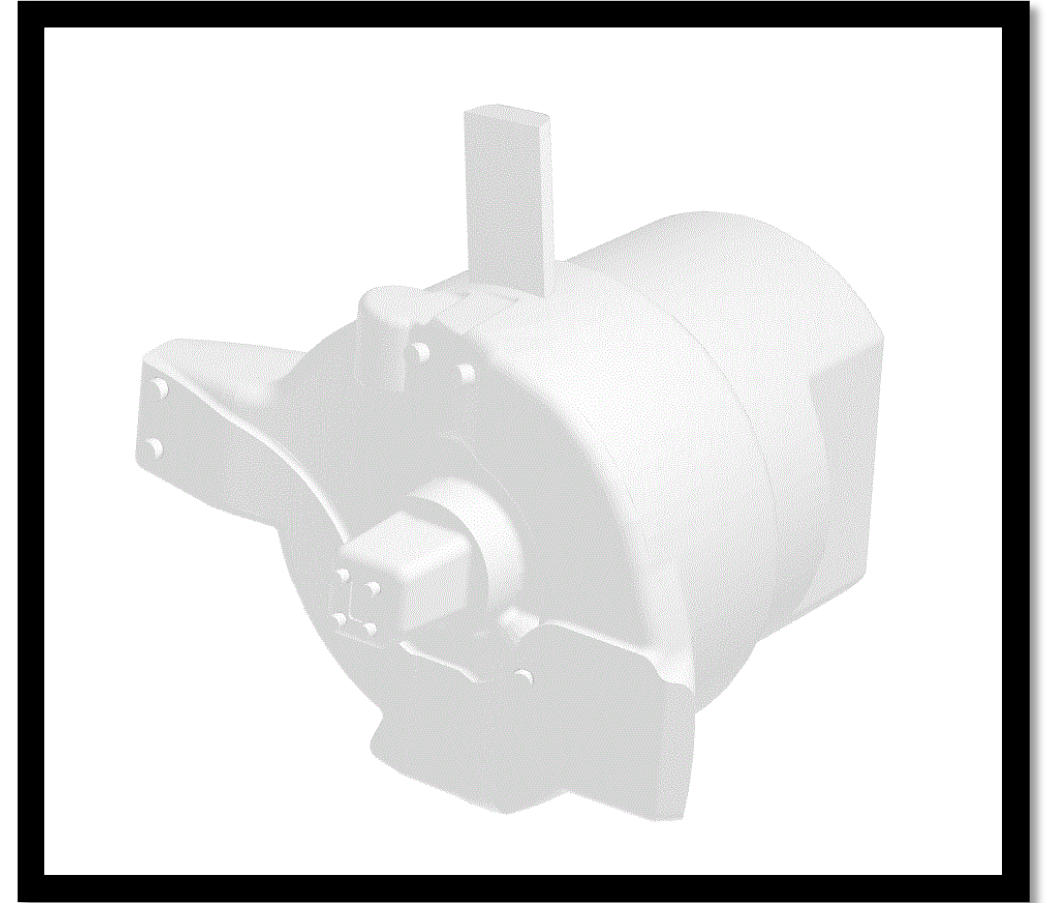
Core Making

- What is a core and why do we use it?
 - A consumable sand product used to shape features we can't shape with greensand
 - Undercuts
 - Internal features



Core Making

- 2 part resin coated sand.
 - Chemical reaction hardens the core.
- Vaporized catalyst to harden core. (Coldbox)



Core Making



Molding

Molding

- Green sand
 - Contains moisture (water)
 - Ingredients
 - Silica sand
 - Water
 - Clay (binder)
 - Sea coal
 - Soda ash



AMERICAN COLLOID COMPANY

Molding

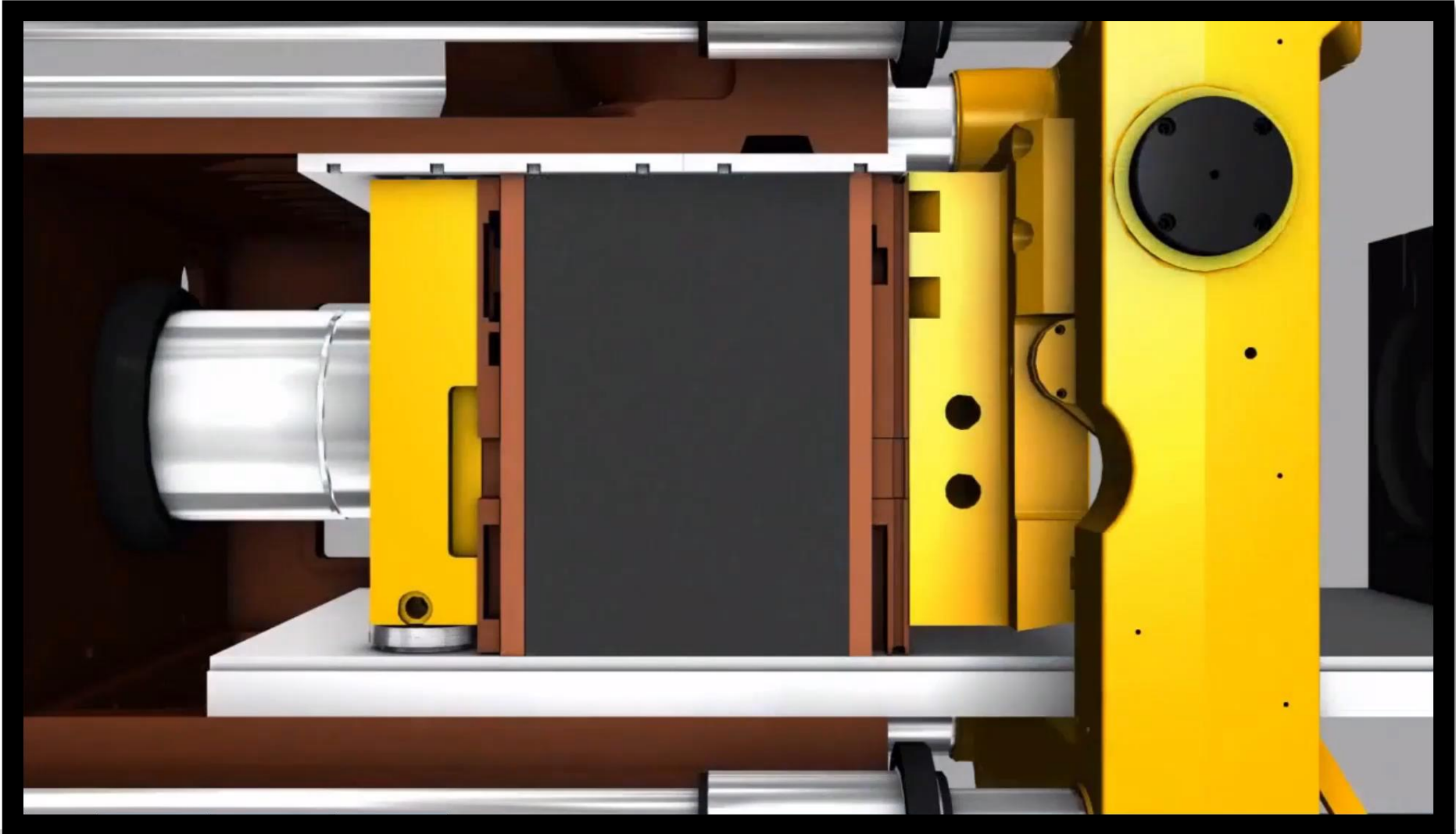
- Sand properties
 - Compactability
 - Measure of how much the sand blend can be compacted
 - Permeability
 - Amount of air flow through compacted sand
 - Moisture
 - Moisture content within the sand blend
 - Methylene blue
 - Measure of active bond in the sand mix
 - Green strength



Molding



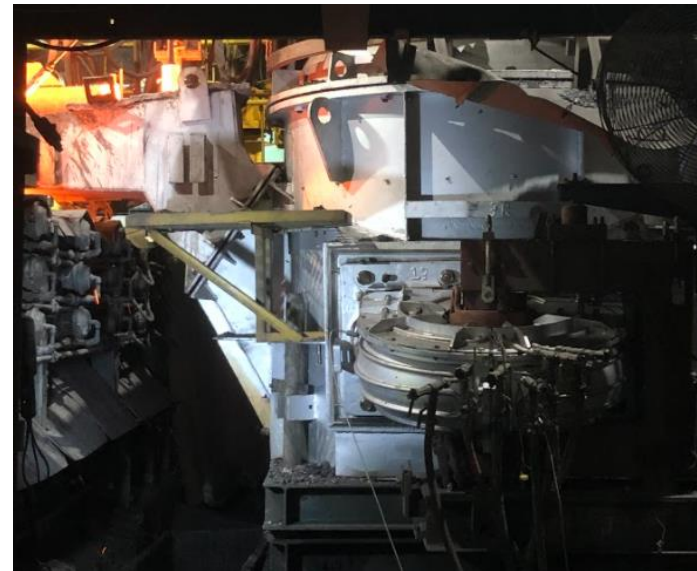
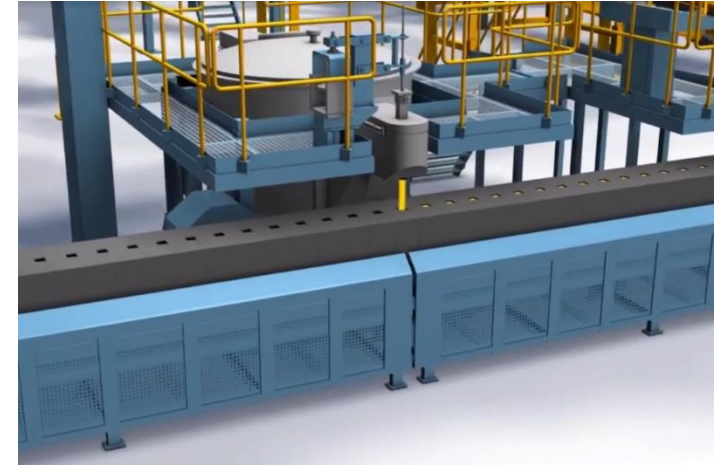
Molding



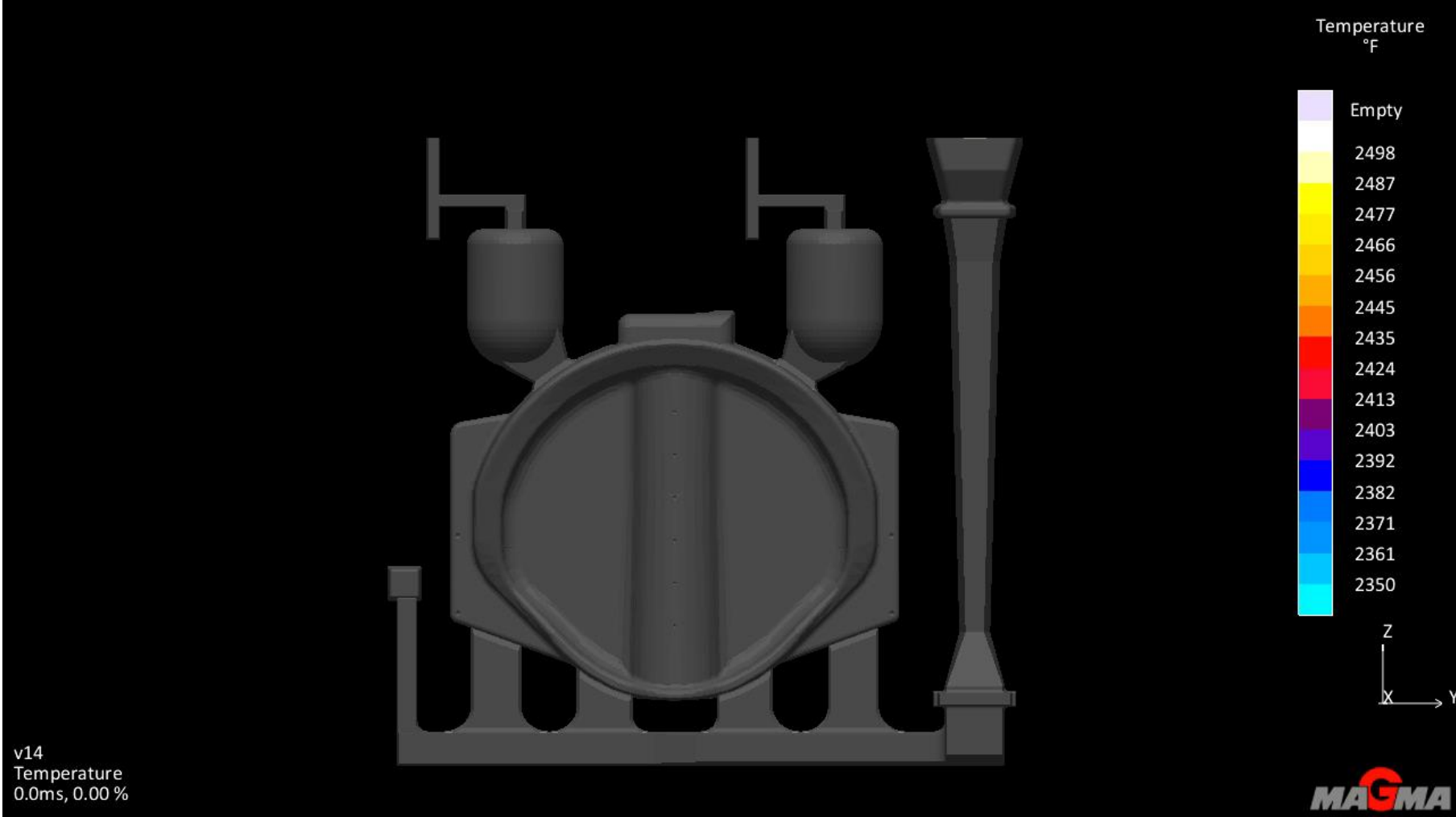
Pouring

Pouring

- Laser autopour
- Nitrogen pressure
- Ceramic stopper rod
- 2470°-2520°F
- Try to fill as fast as possible without erosion and turbulence (30lbs/sec)
- Pouring too slow can cause misruns or short pours as the iron cools
- Pouring too fast can cause inclusions of slag or sand

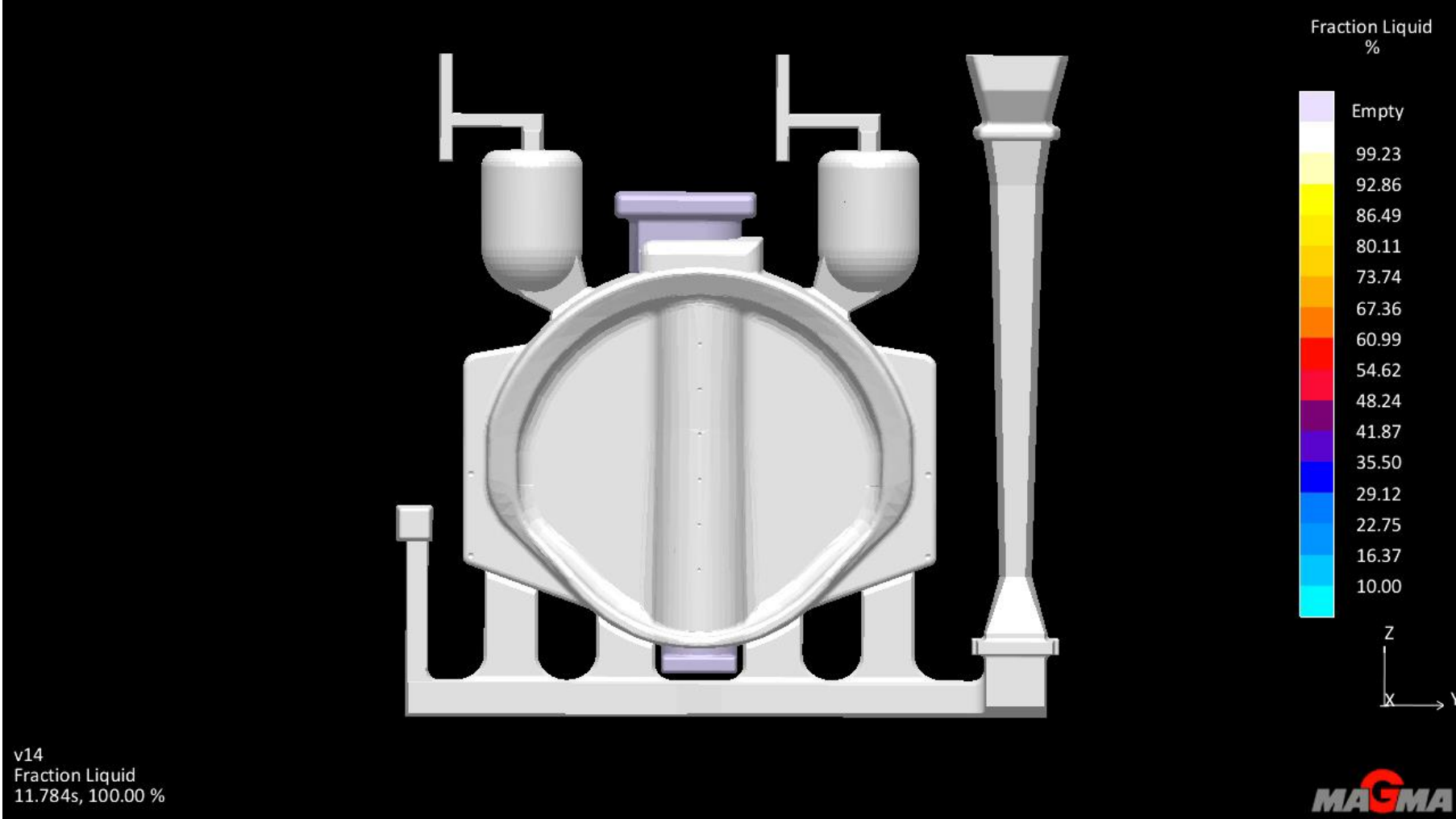


Pouring

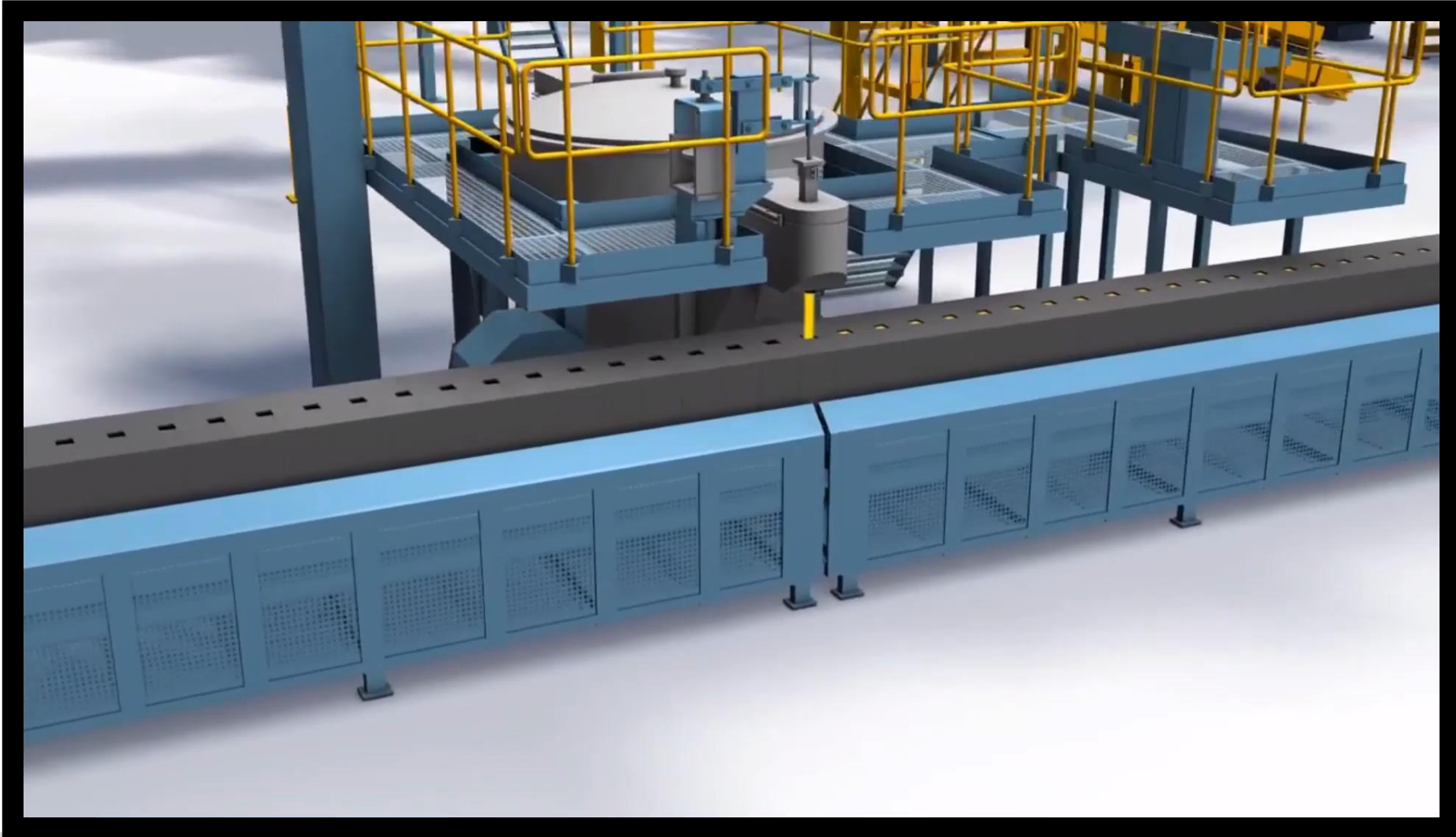


Cooling/Shakeout

Cooling/Shakeout



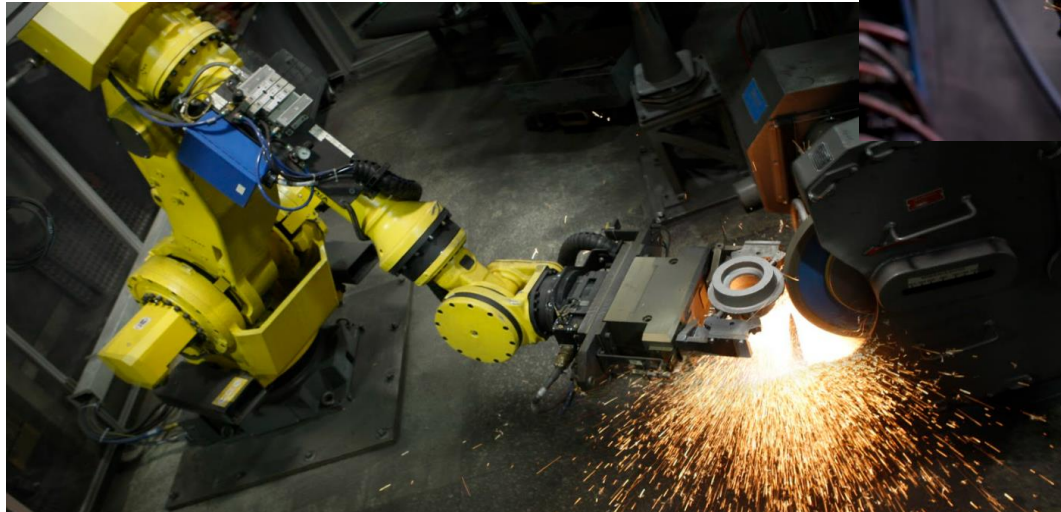
Cooling/Shakeout



Finishing

Finishing

- Chipping and grinding
- Trim press
- Automated finishing
- Paint



Finishing

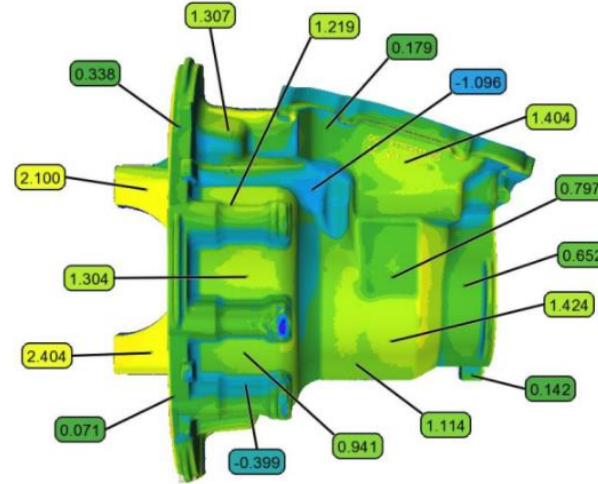
- Cleaning:
 - Fin removal, riser contacts, ingate contacts, scabs, salvageable defects
- Each job has a calculated finishing rate to determine output and piece rate.
- Each feature has a grinding spec
- Tools used:
 - Cup grinders
 - pencil grinders
 - Cutting wheels
 - Hammers



Inspection/Shipping

Inspection/Shipping

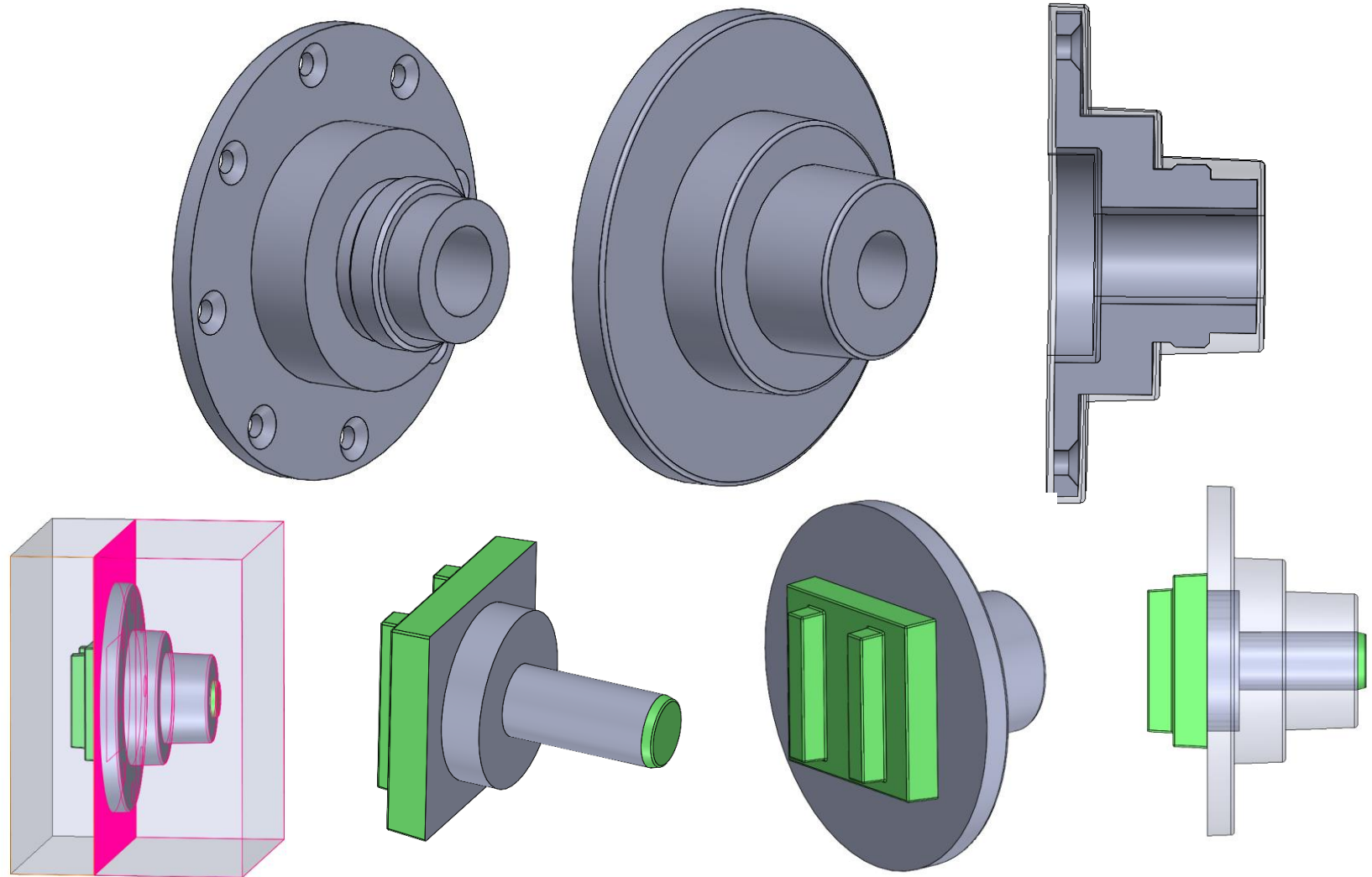
- Dimensional inspection
 - Laser scanning
 - Hardline layouts
- Material testing



Engineering

Casting Design

- Parting line
- Draft
- Machine stock
- Moldability
- Defect risk
- Core(s) and core print
- Solidification analysis
- Filling design



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