



# Foundry 101

**NEENAH** **NF**  
FOUNDRY  
The NEI Group

# Foundry 101

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- 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

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



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# Melt

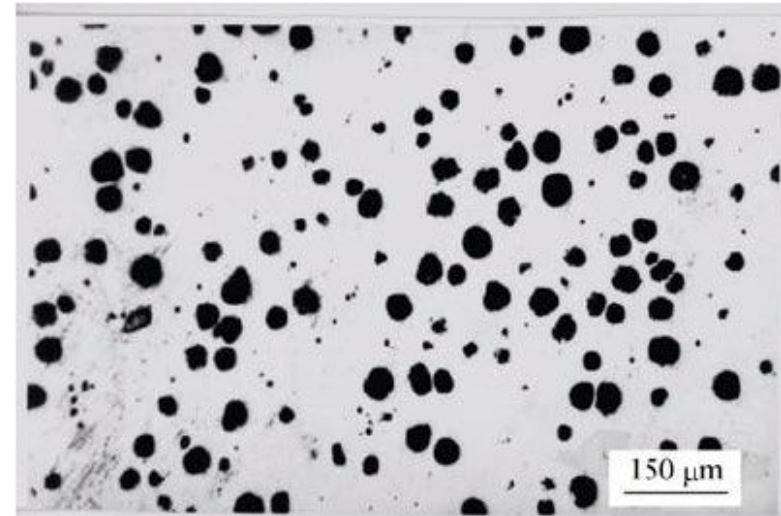
# Melt

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- Grey Iron
  - Graphite flakes
  - Brittle

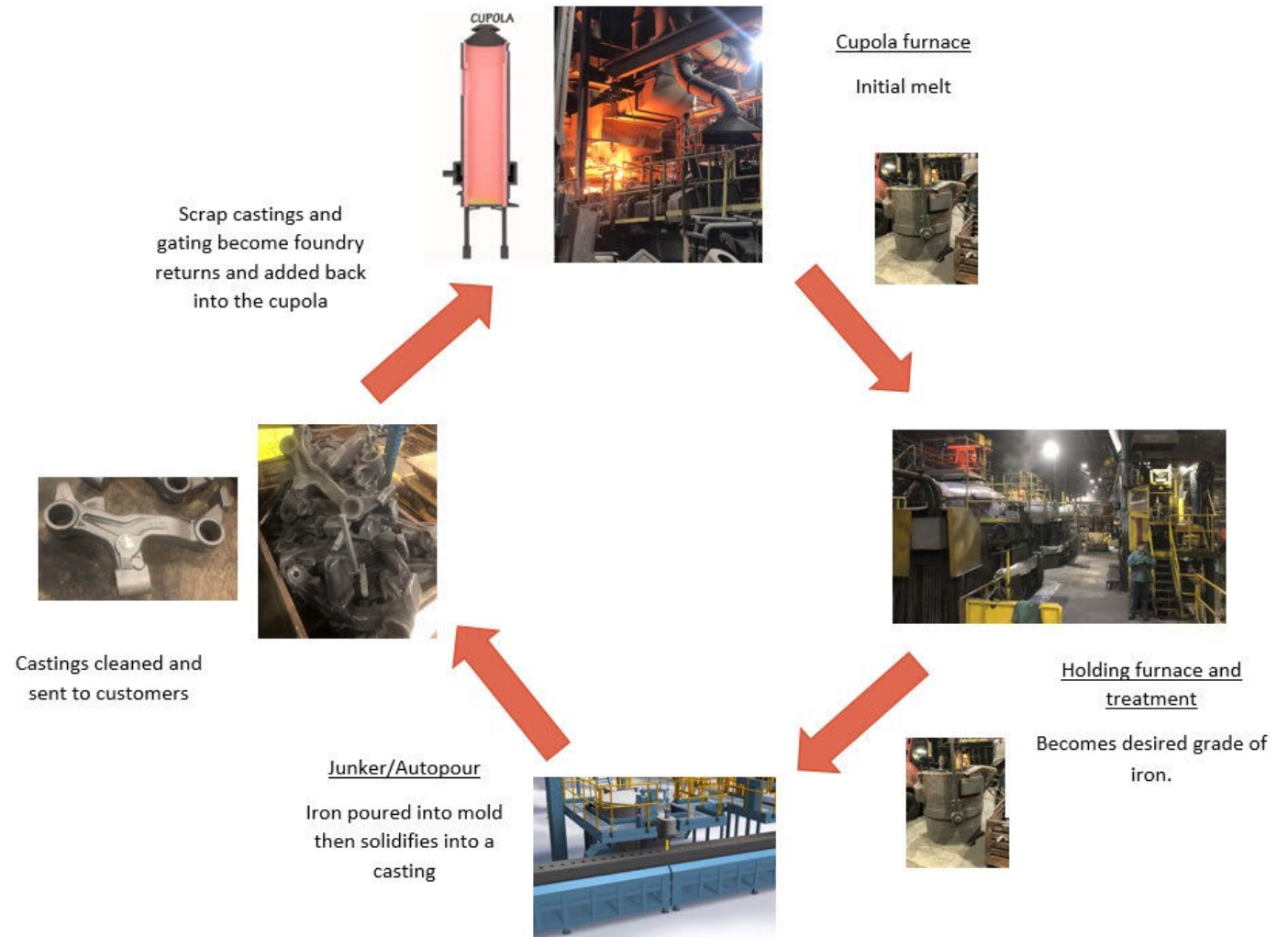


- Ductile Iron
  - Graphite spheres
  - Ductile



# Melt

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



Note: This is one of many flow scenarios.

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# Core Making

# Core Making

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- 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

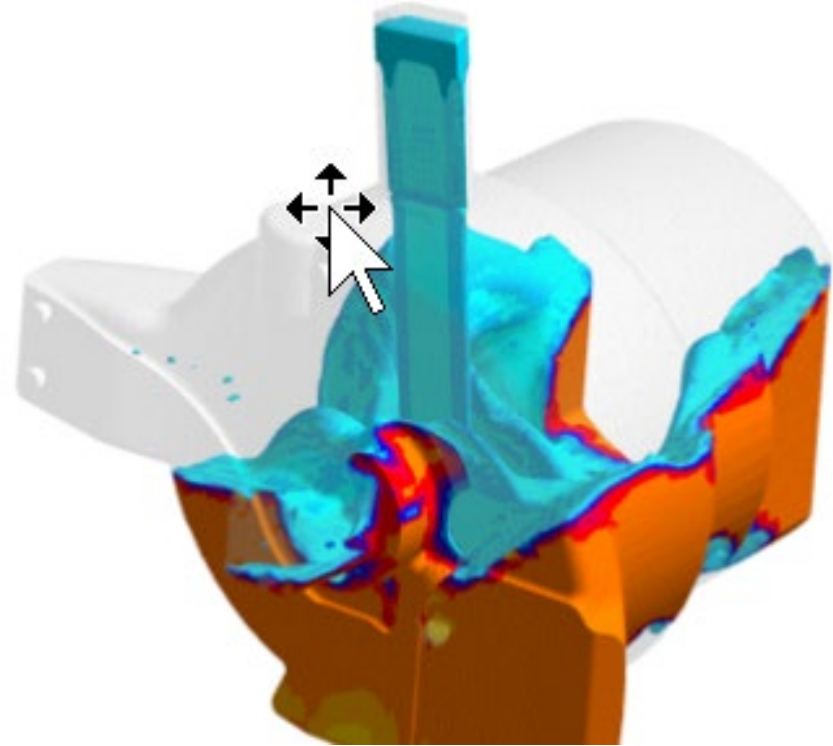




# Core Making

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



# Core Making



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# Molding

# Molding

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



AMERICAN COLLOID COMPANY

# Molding

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- 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

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# Molding



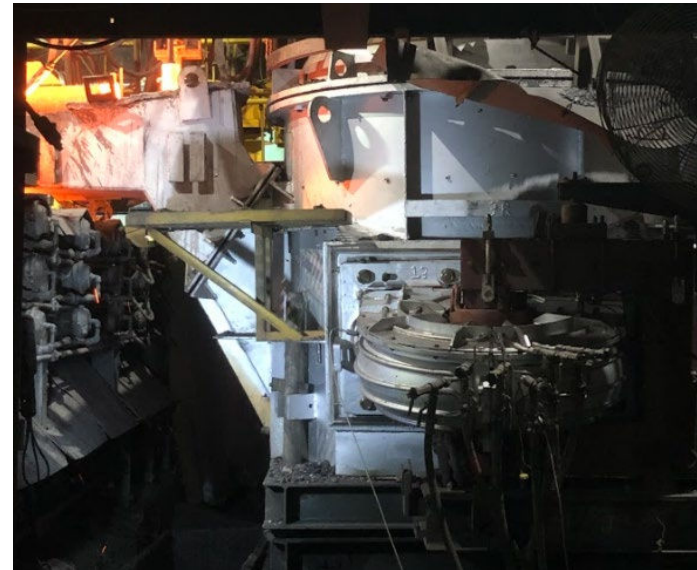
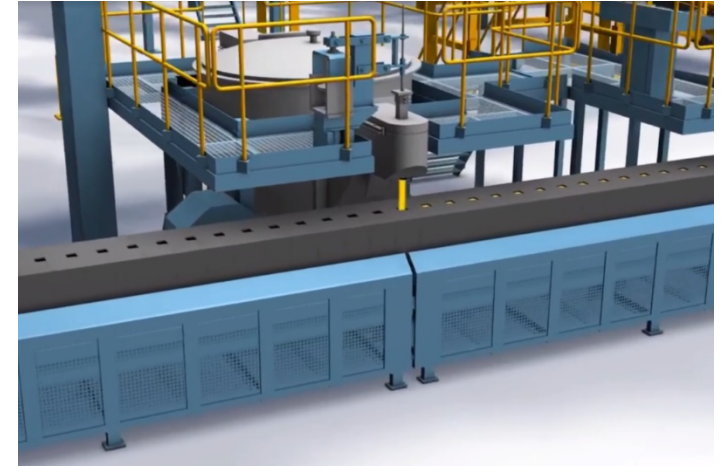
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# Pouring

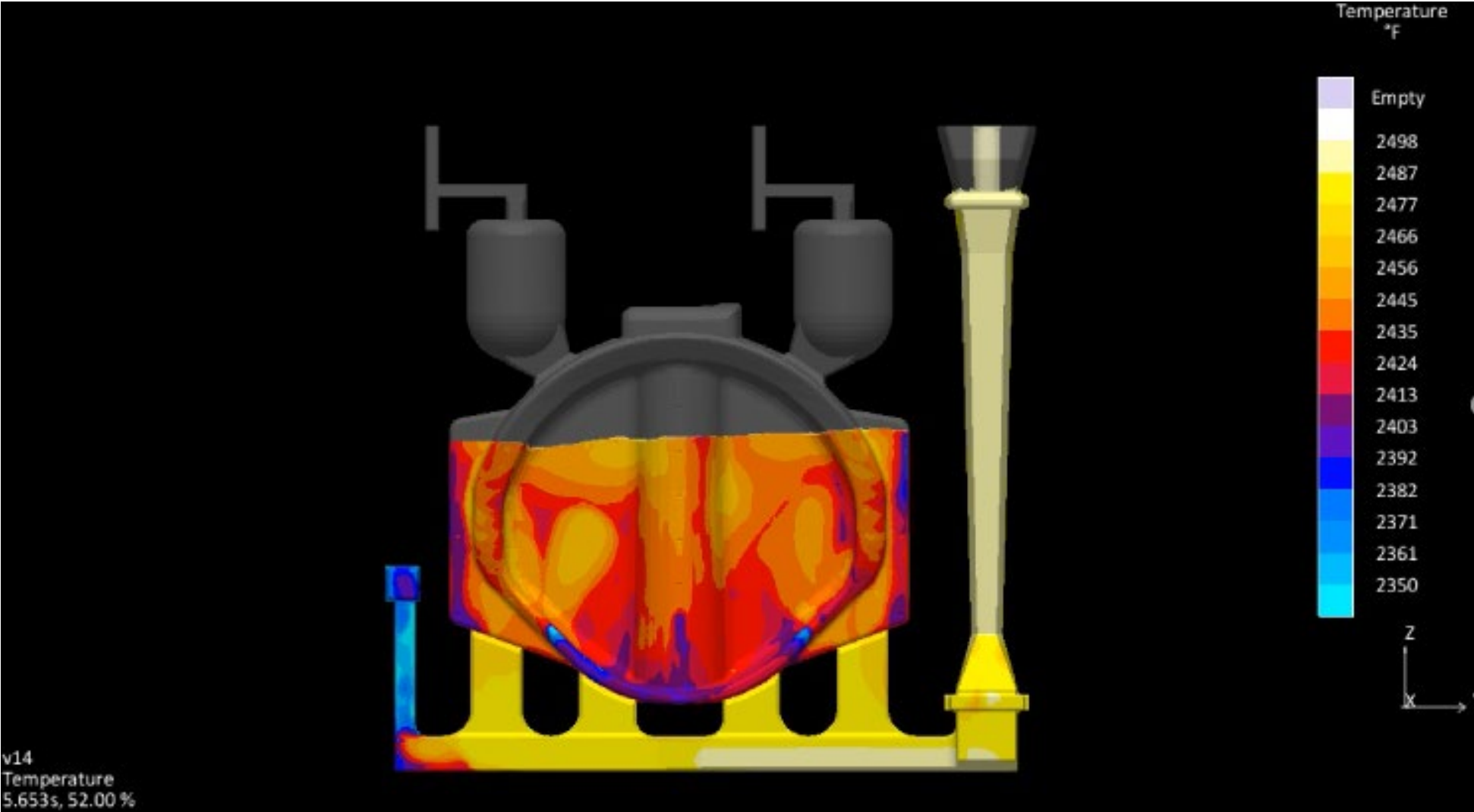


# Pouring

- 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



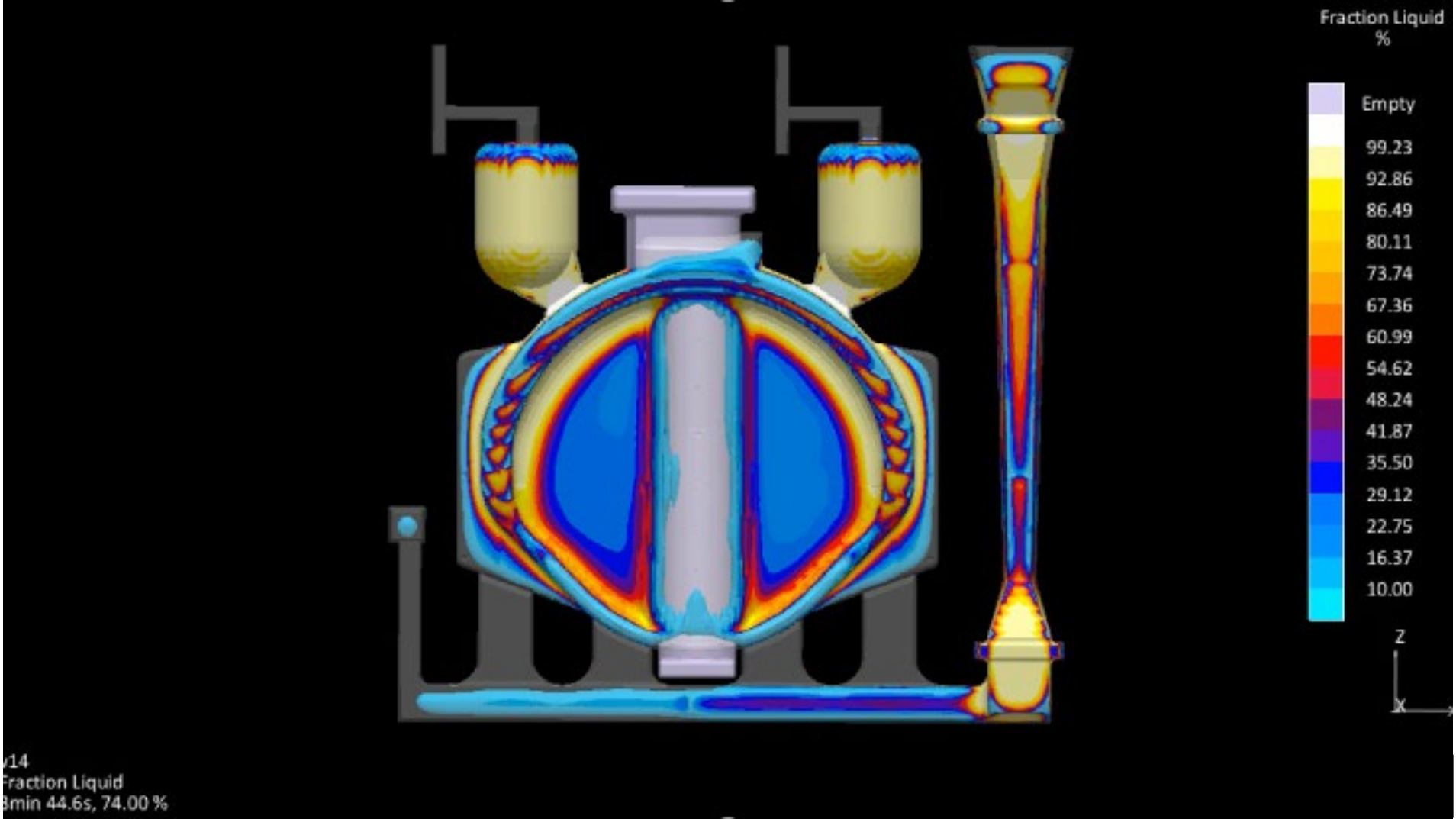
# Pouring



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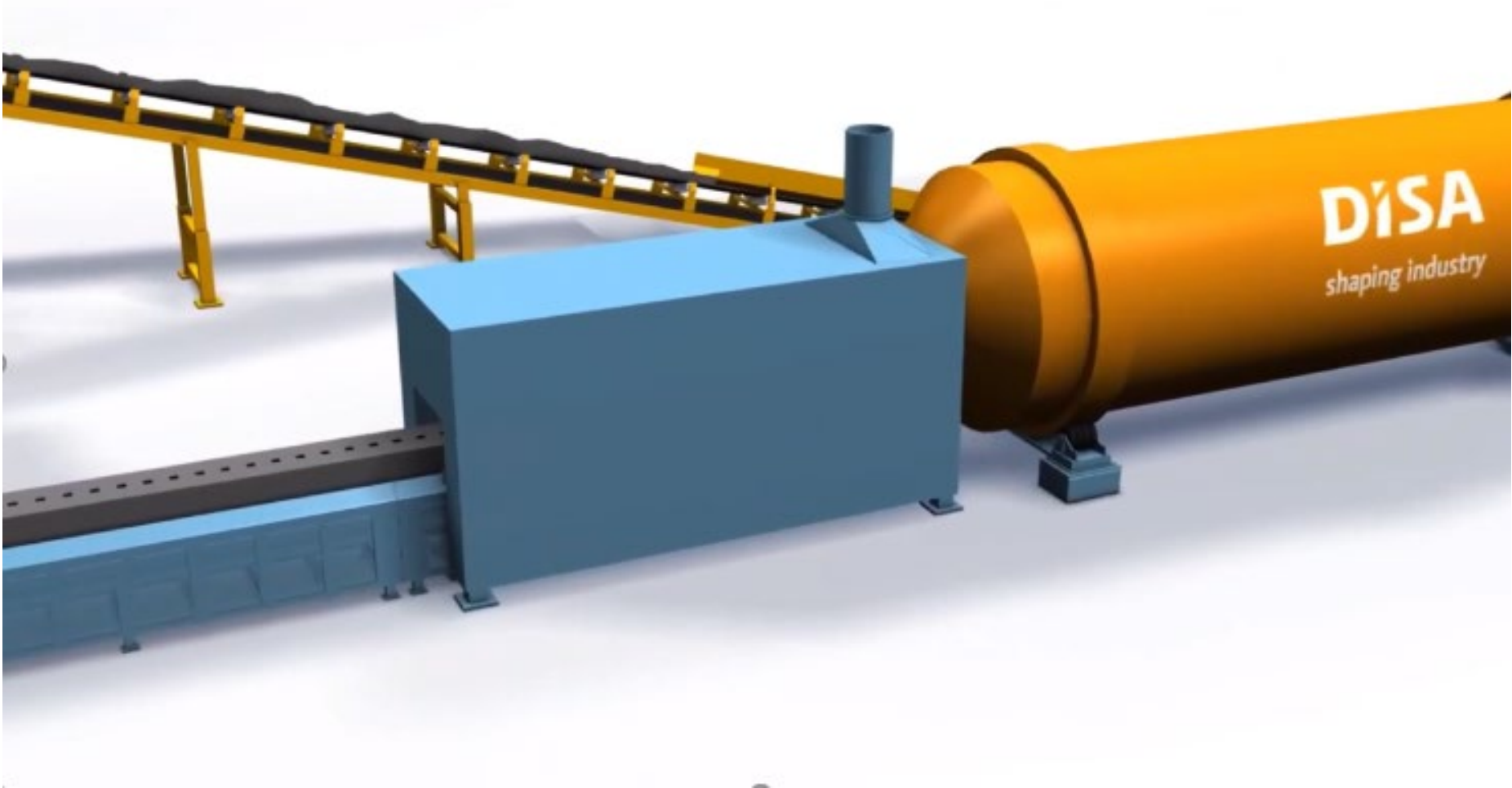
# Cooling/Shakeout

# Cooling/Shakeout



# Cooling/Shakeout

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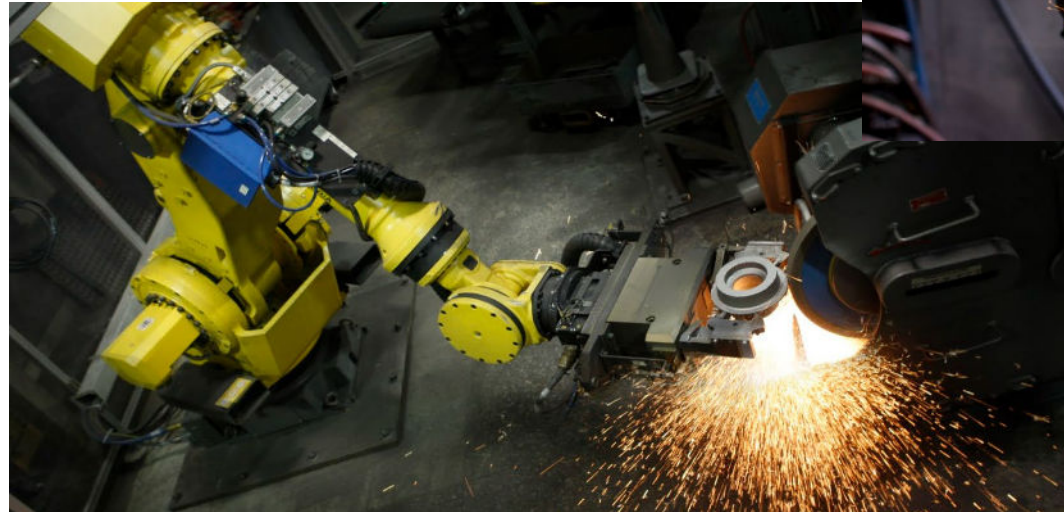
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# Finishing

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- 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



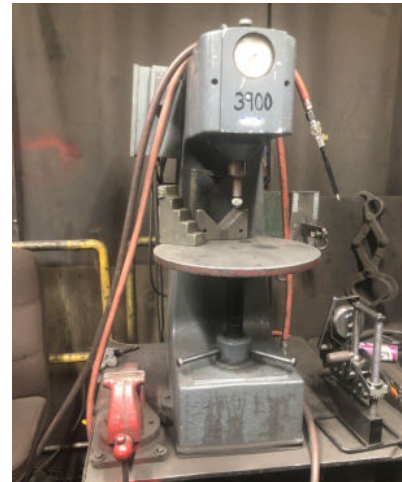
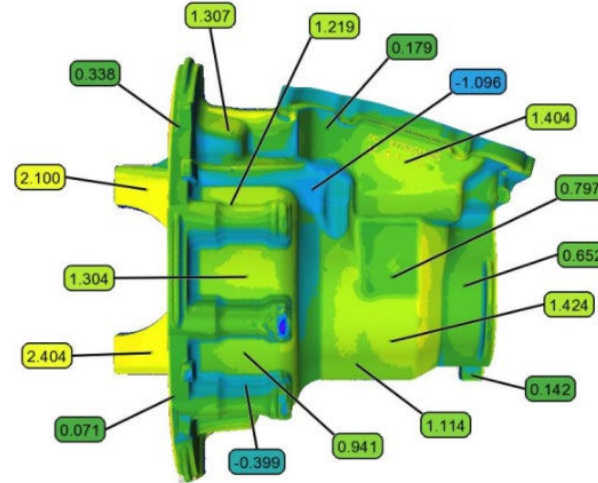


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# Inspection/Shipping

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

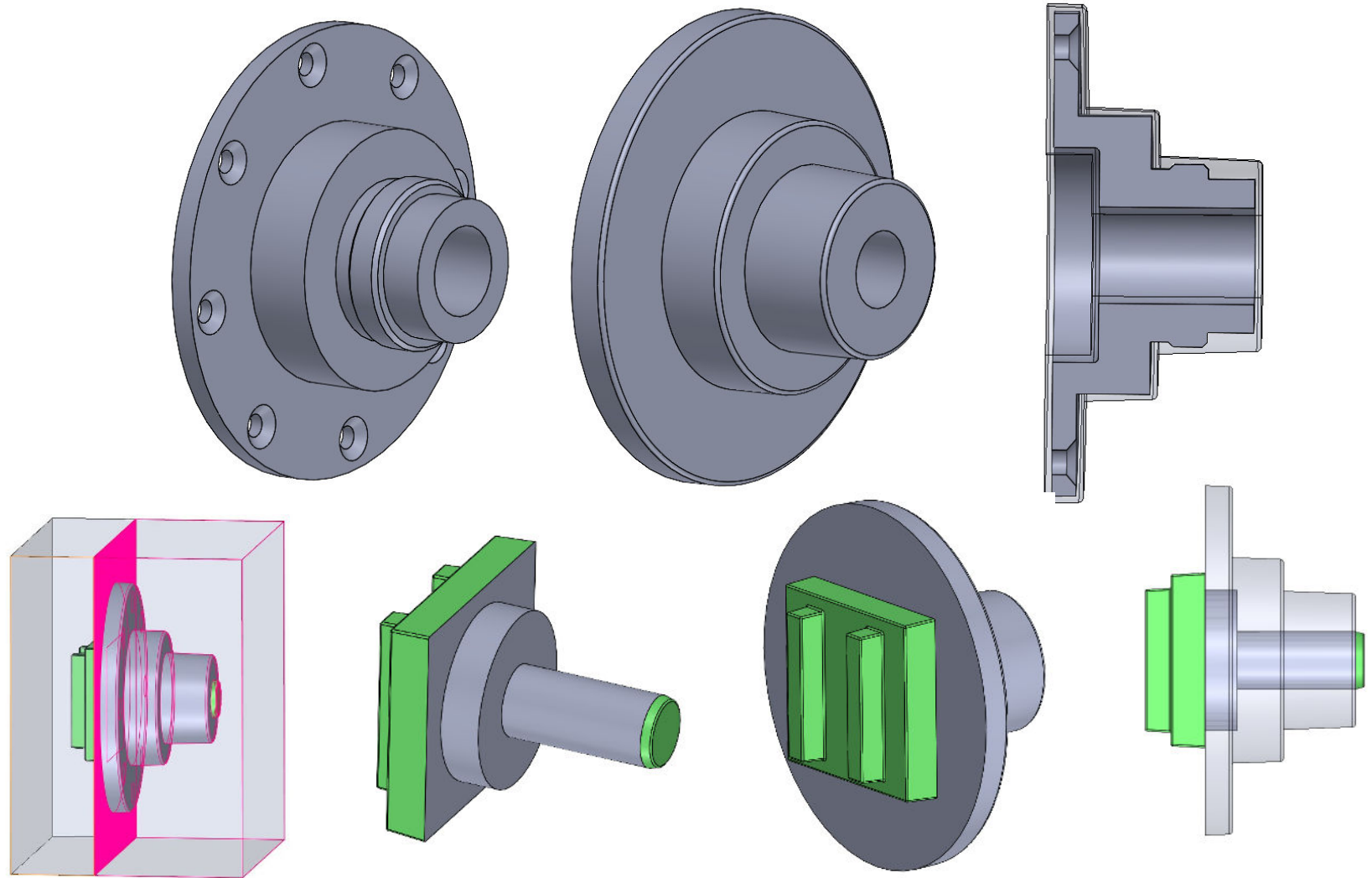


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# Engineering

# Casting Design

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



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