Innovation erreichen mit Fusion und Advanced Manufacturing Solution

Walter van Doorne

Senior Technical Sales Specialist

AUTODESK. UNIVERSITY

MAKE IT WITH AUTODESK

Das richtige Produkt

Im richtigen Moment

Für den richtigen Preis

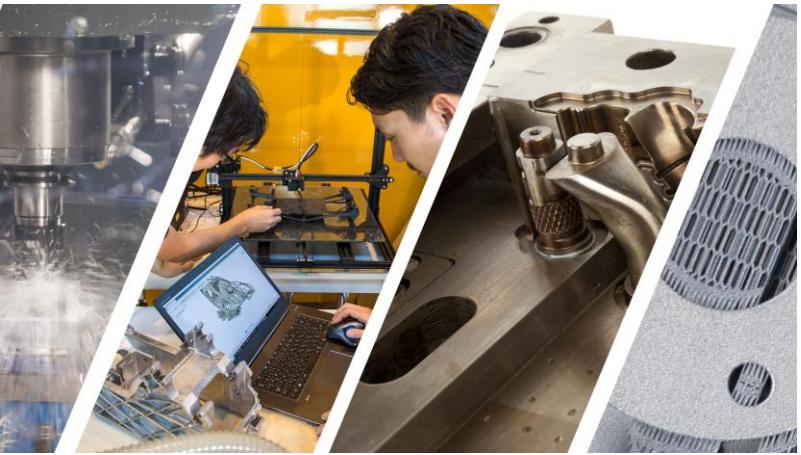
AUTODESKs VORTEIL

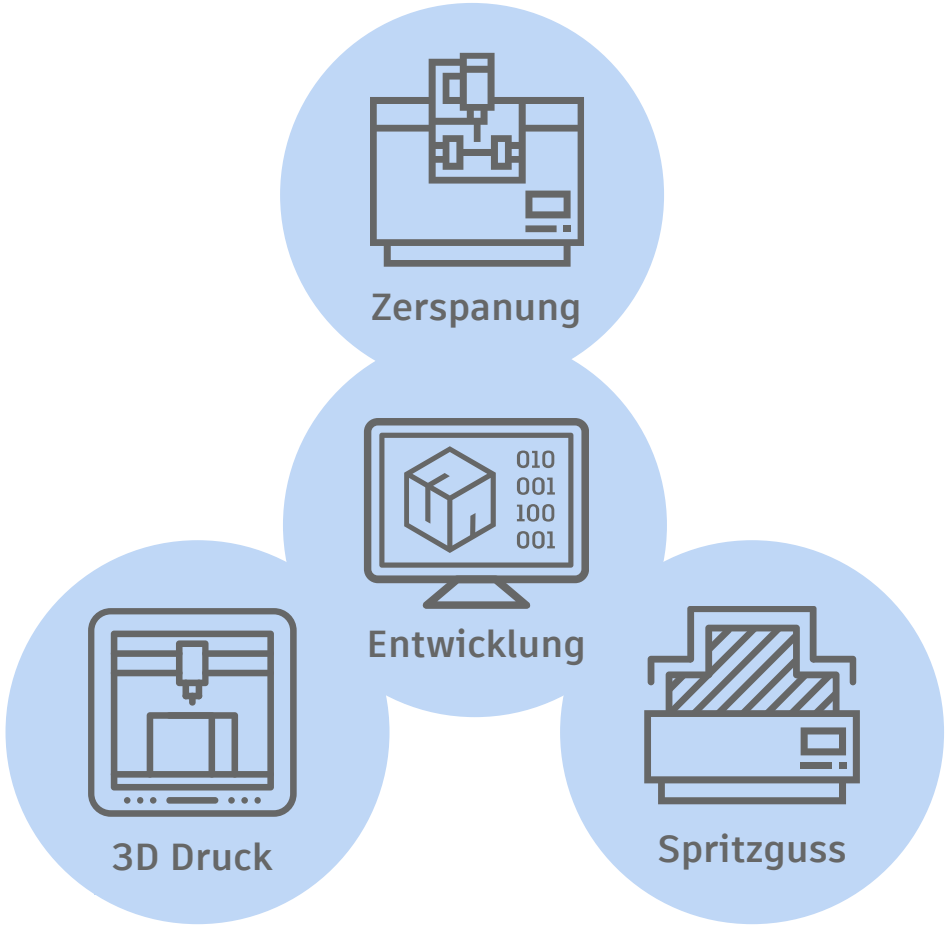
Zerspanung

Spritzguss

Additive Fertigung

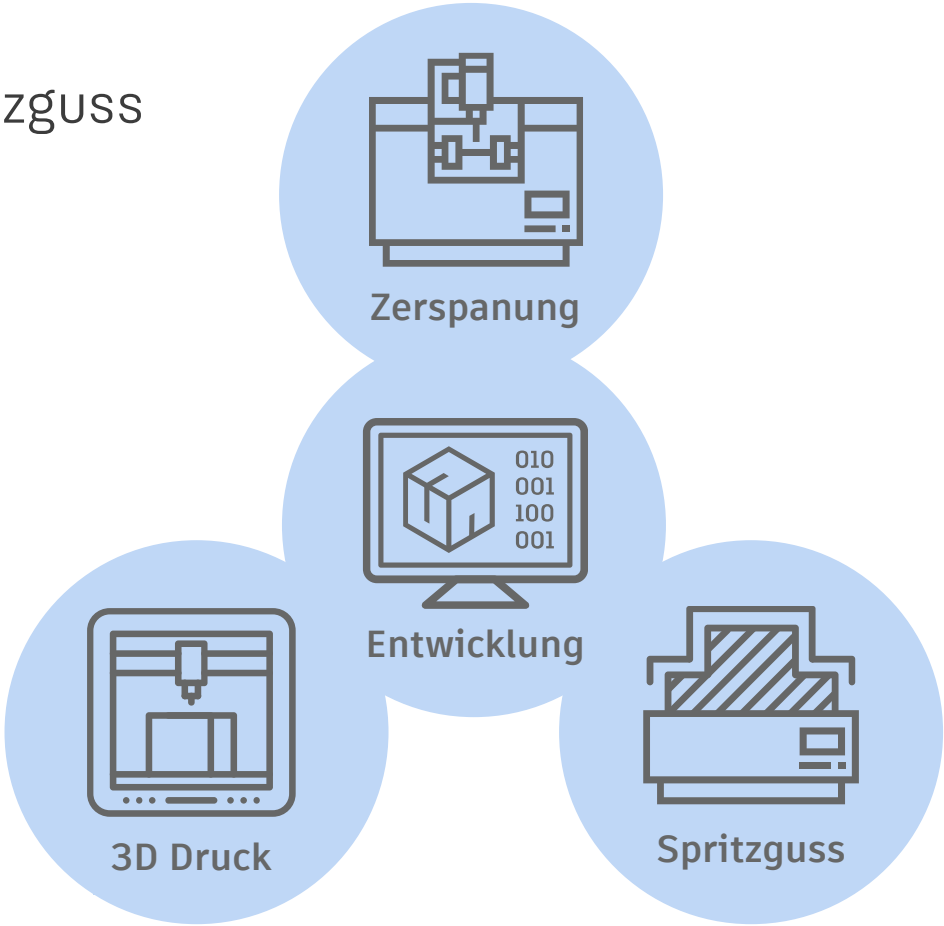
AUTODESKs VORTEIL



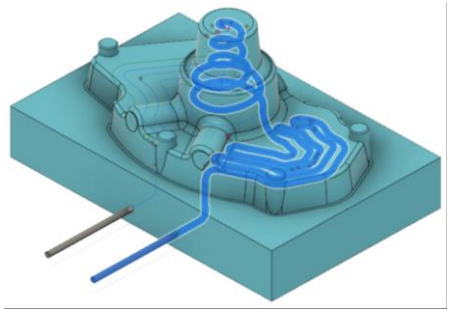


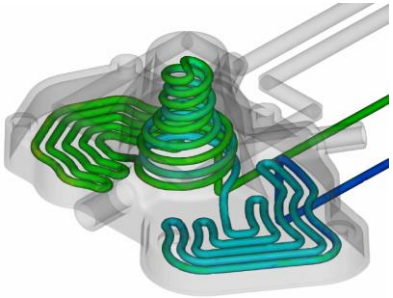
Fallbeispiel 1

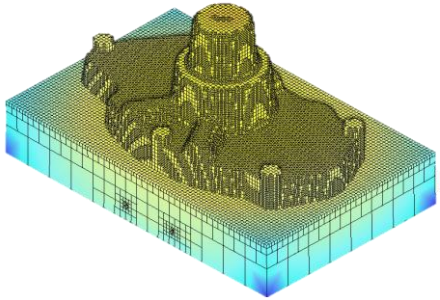
Oberflächennahe Kühlung im Spritzguss

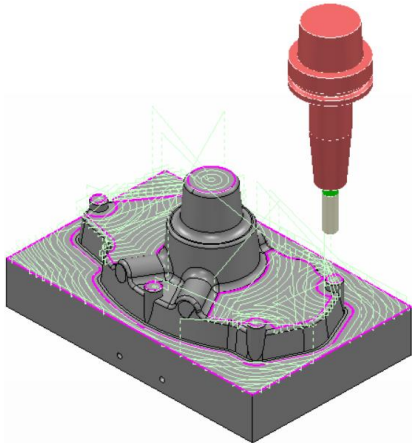


Oberflächennahe Kühlung im Spritzguss







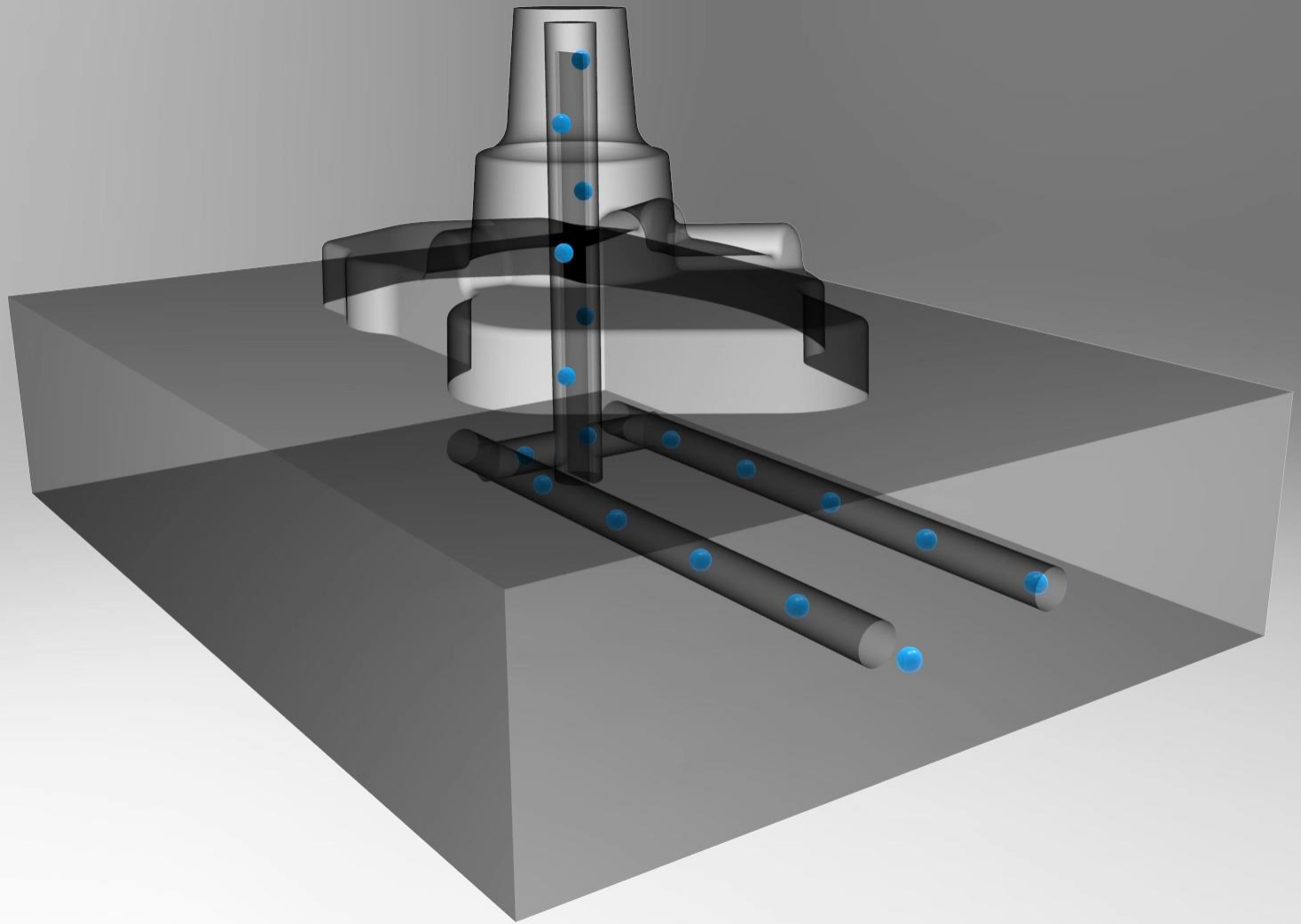


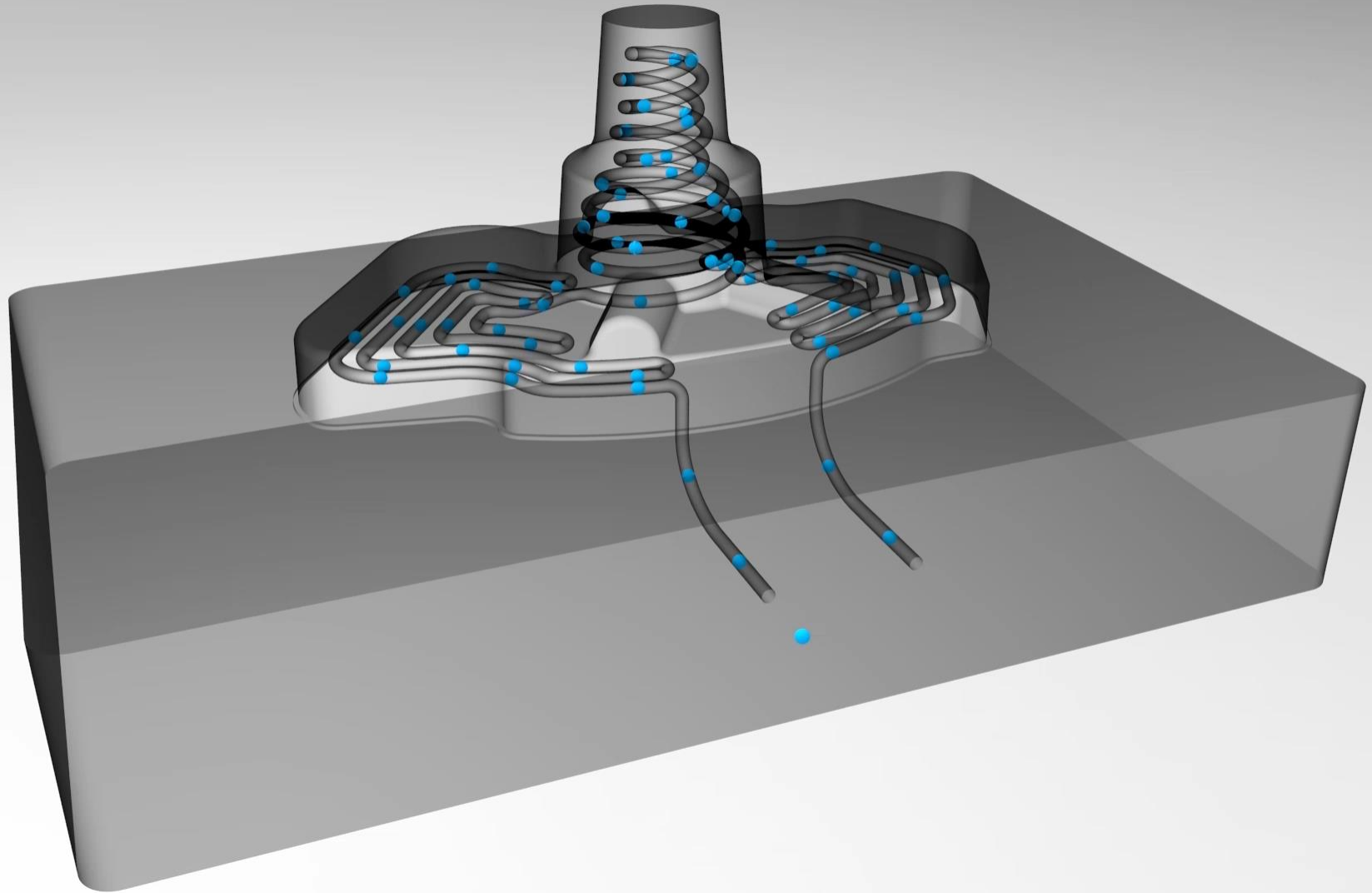
Entwicklung Produkt + Form

Spritzguss Analyse

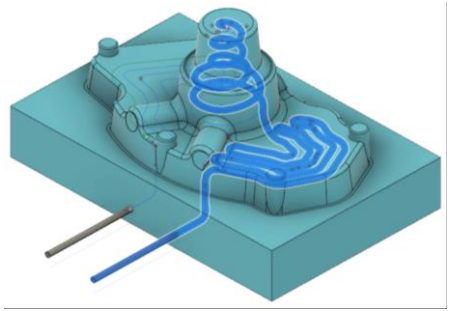
3D Druck

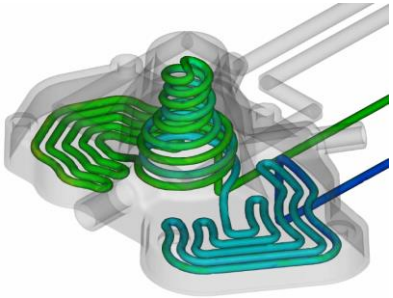
Zerspanen

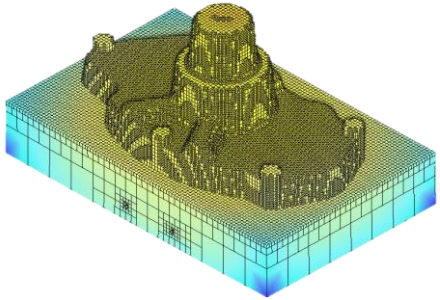


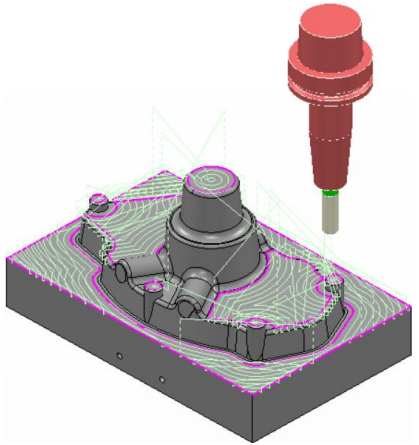


Oberflächennahe Kühlung im Spritzguss









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FUSION 360™

Spritzguss Analyse → 3D Druck → Zerspanen

Autodesk Fusion 360

Lewis' version v11*

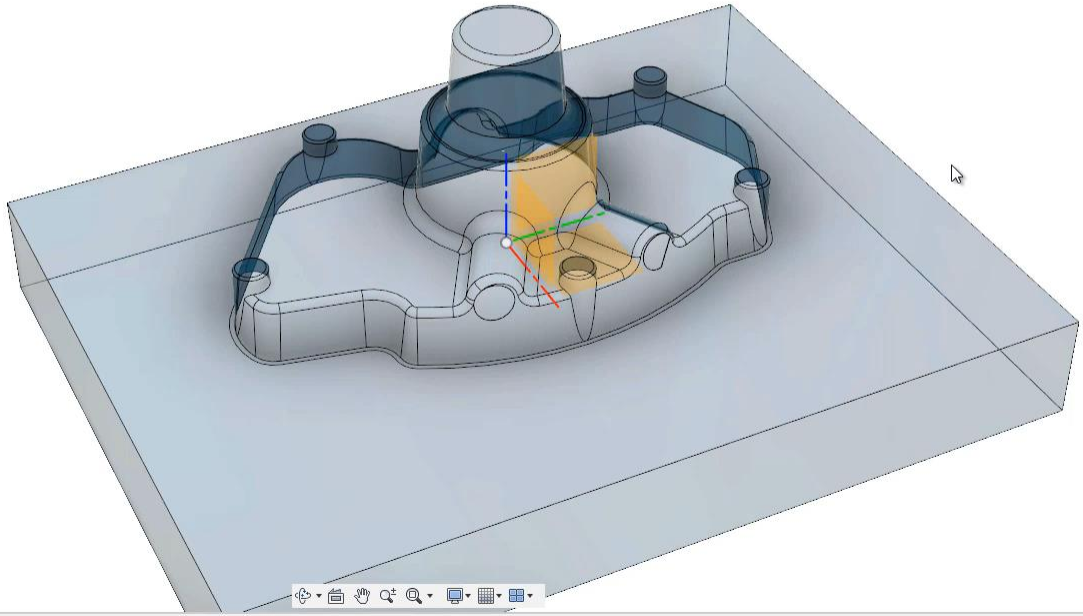
Lewis Gilday

MODEL

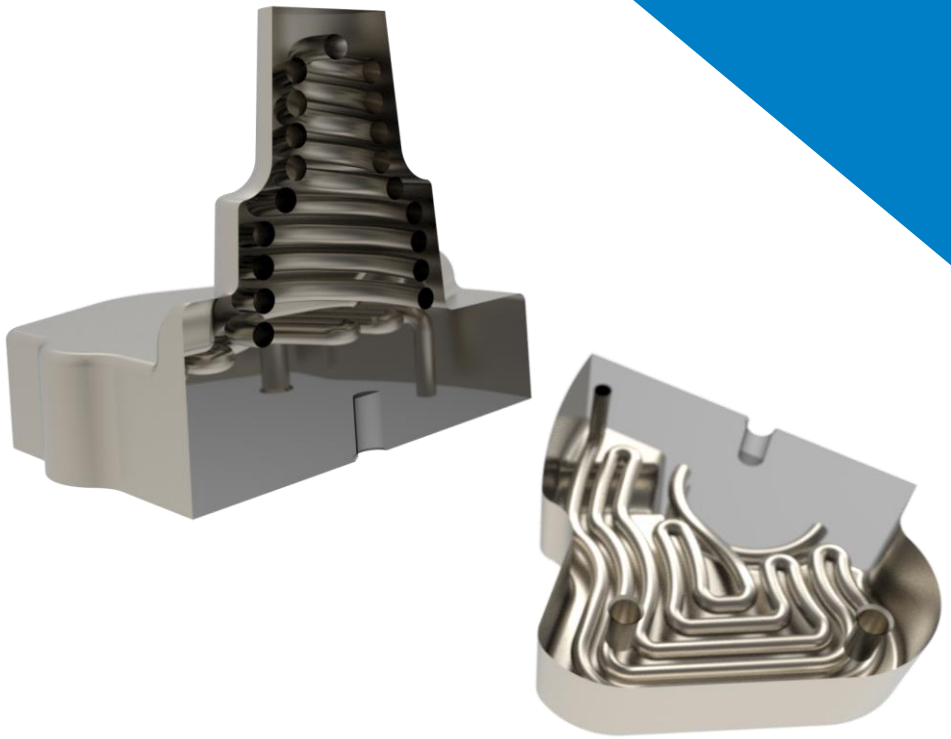
SKETCH | CREATE | MODIFY | ASSEMBLE | CONSTRUCT | INSPECT | INSERT | MAKE | ADD-INS | SELECT

BROWSER

- Lewis' version v11
  - Document Settings
  - Named Views
  - Origin
  - Bodies
    - Body3
    - Body13
  - Sketches
  - Construction
    - Plane1
    - Plane7
    - Plane8
    - Plane2
  - Component1:1
  - Component1(Mirror):1



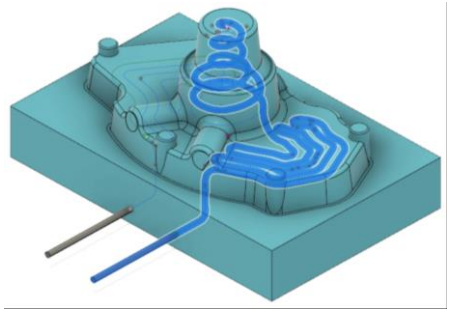
TEXT COMMANDS

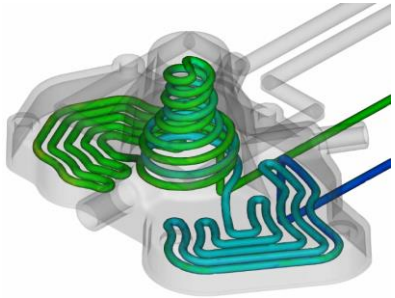


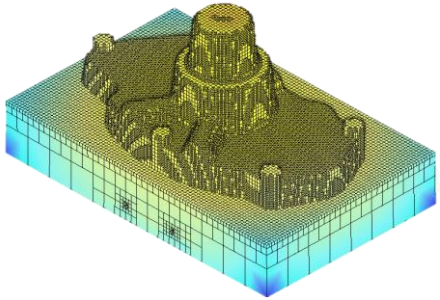
KÖNNEN WIR DIE FORM JETZT FERTIGEN?

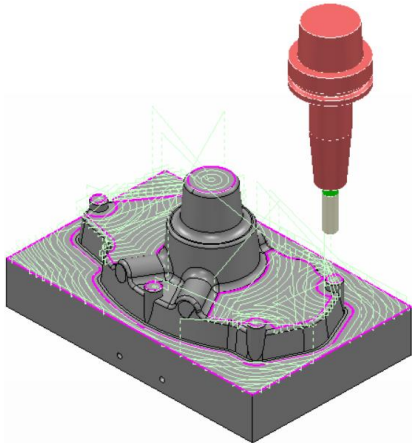
WATER IN
WATER IN

Oberflächennahe Kühlung im Spritzguss







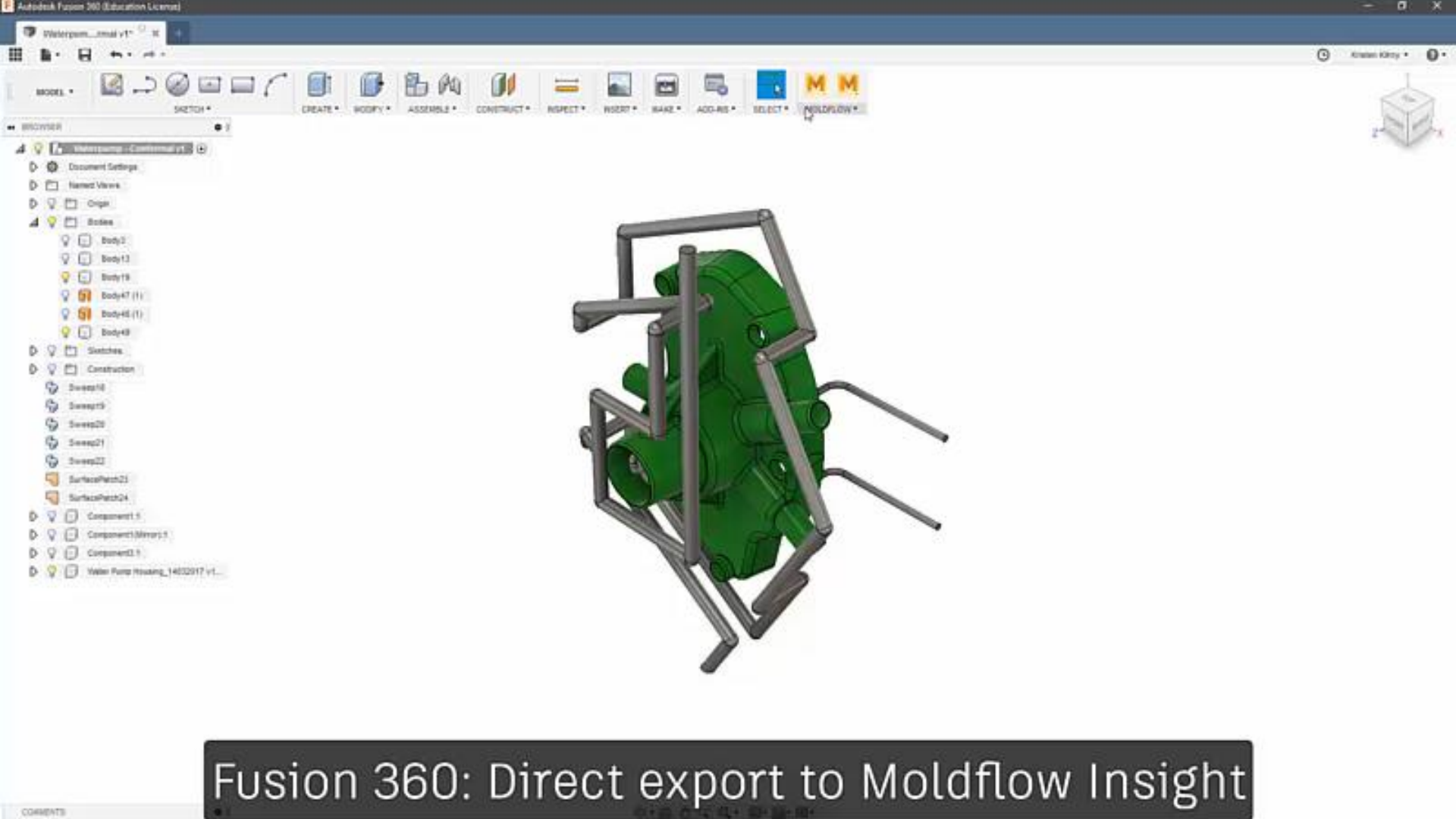


AUTODESK® FUSION 360™

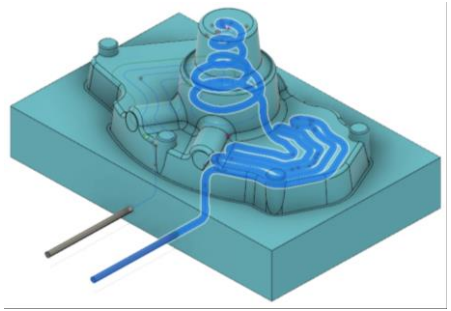
AUTODESK® MOLDFLOW®

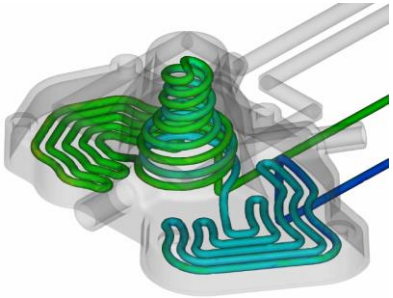
3D Druck

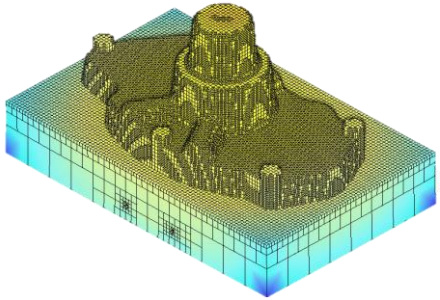
Zerspanen

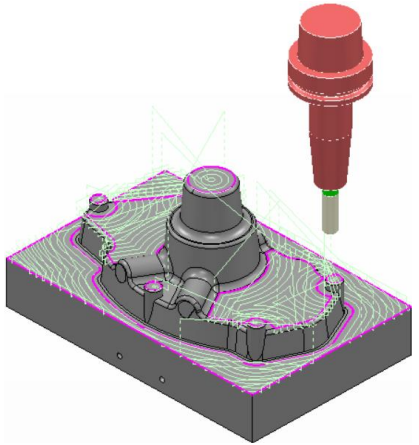

Fusion 360: Direct export to Moldflow Insight

Oberflächennahe Kühlung im Spritzguss









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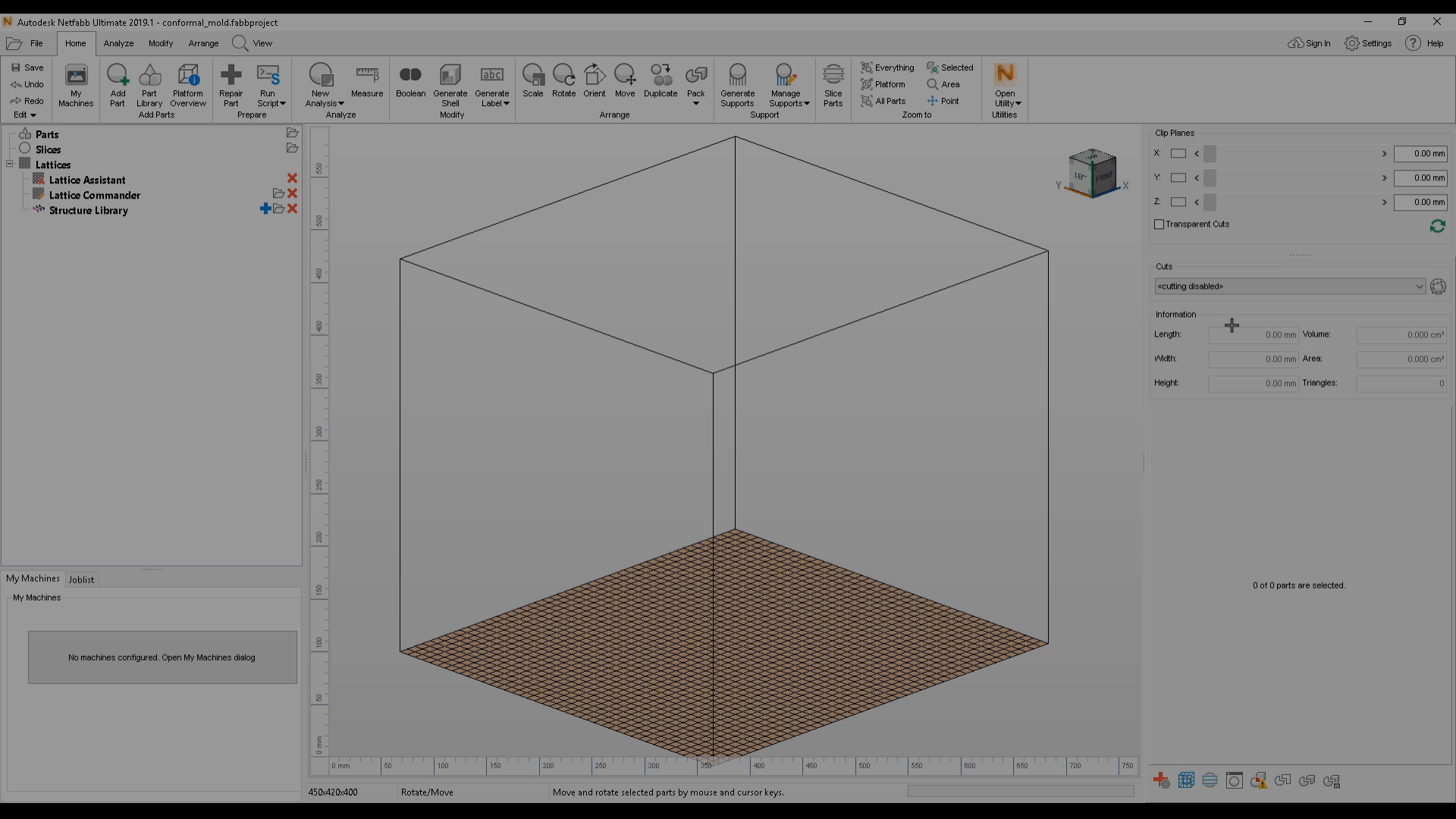
AUTODESK® NETFABB®

Zerspanen


Autodesk Netfabb Ultimate 2019.1 - conformal_mold.fabbproject
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Home
Analyze
Modify
Arrange
View
Sign In
Settings
Help
Save
Undo
Redo
Edit
My Machines
Add Part
Part Library
Platform Overview
Add Parts
Repair Part
Run Script
Prepare
New Analysis
Measure
Analyze
Boolean
Generate Shell
Generate Label
Modify
Scale
Rotate
Orient
Move
Duplicate
Pack
Arrange
Generate Supports
Manage Supports
Support
Slice Parts
Everything
Platform
All Parts
Selected
Area
Point
Zoom to
Open Utility
Utilities
Parts
Slices
Lattices
Lattice Assistant
Lattice Commander
Structure Library
My Machines
Joblist
My Machines
No machines configured. Open My Machines dialog
Clip Planes
X:
Y:
Z:
0.00 mm
Transparent Cuts
Cuts
«cutting disabled»
Information
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Width:
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Area:
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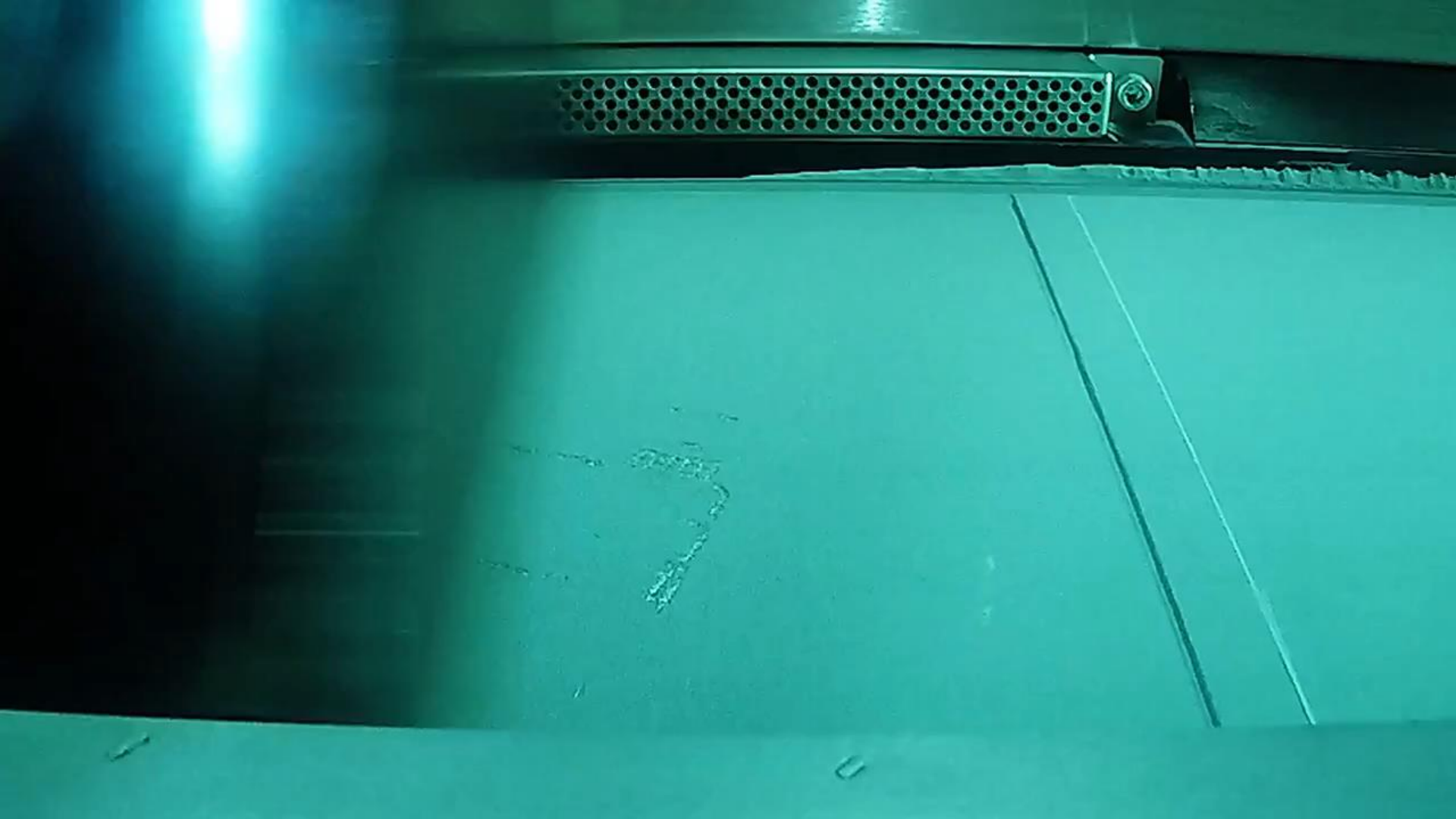
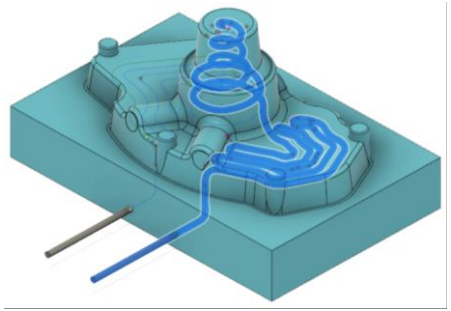
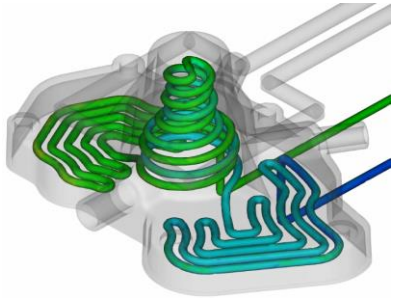
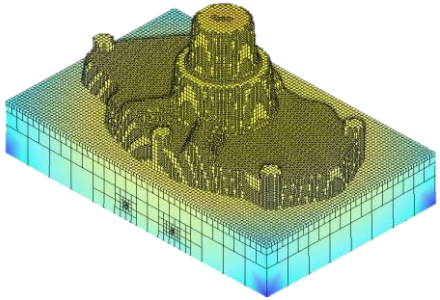
Move and rotate selected parts by mouse and cursor keys.

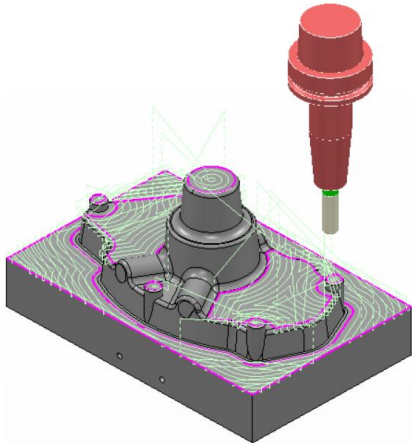


Oberflächennahe Kühlung im Spritzguss









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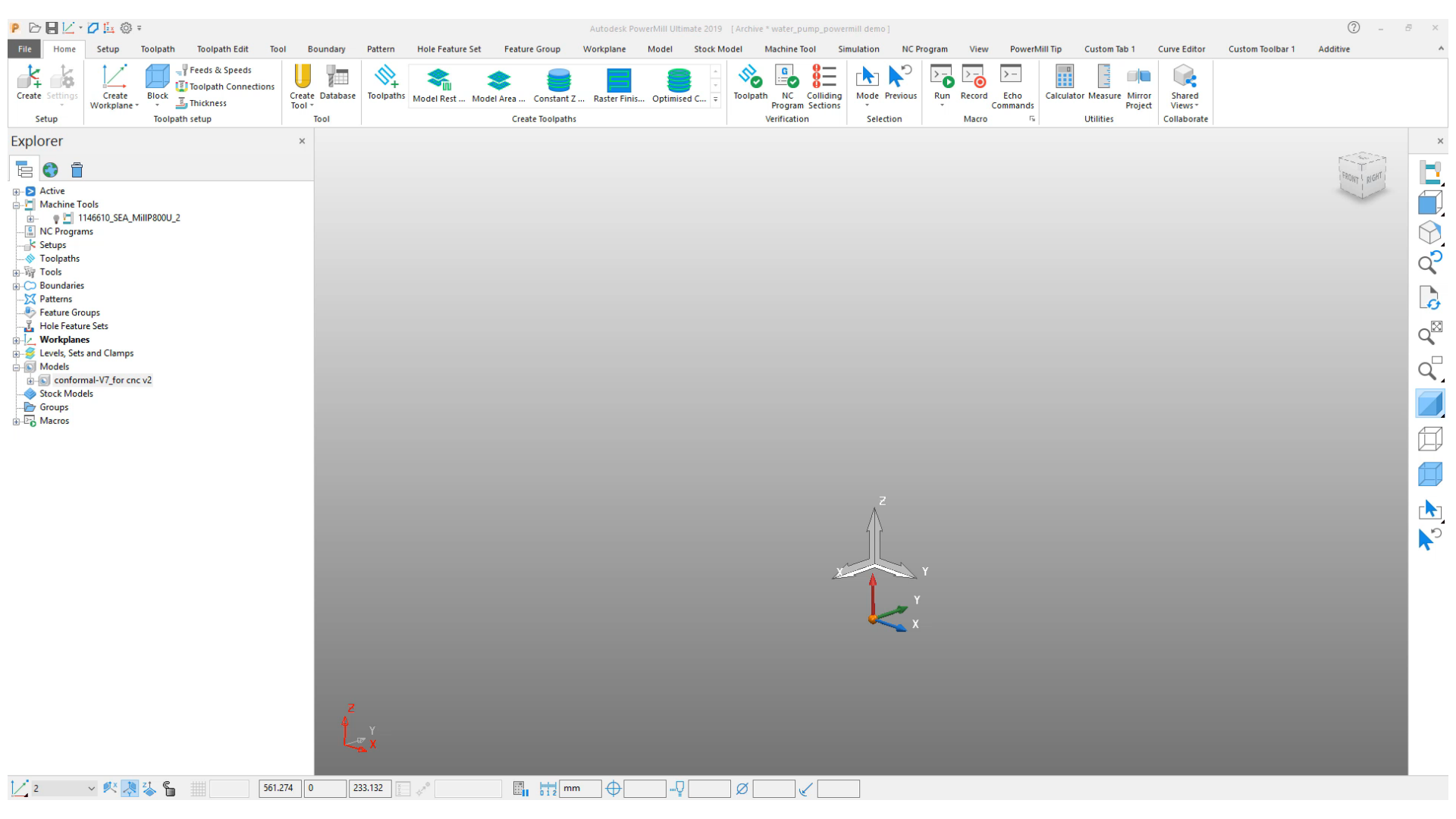
AUTODESK® NETFABB®

AUTODESK® POWERMILL®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Toolpath
Toolpath Edit
Tool
Boundary
Pattern
Hole Feature Set
Feature Group
Workplane
Model
Stock Model
Machine Tool
Simulation
NC Program
View
PowerMill Tip
Custom Tab 1
Curve Editor
Custom Toolbar 1
Additive
Create
Settings
Setup
Create Workplane
Block
Feeds & Speeds
Toolpath Connections
Thickness
Toolpath setup
Create Tool
Database
Tool
Toolpaths
Model Rest ...
Model Area ...
Constant Z ...
Raster Finis...
Optimised C...
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Toolpath
NC Program
Colliding Sections
Verification
Mode
Previous
Selection
Run
Record
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Calculator
Measure
Mirror Project
Utilities
Shared Views
Collaborate
Explorer
Active
Machine Tools
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NC Programs
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Tools
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Patterns
Feature Groups
Hole Feature Sets
Workplanes
Levels, Sets and Clamps
Models
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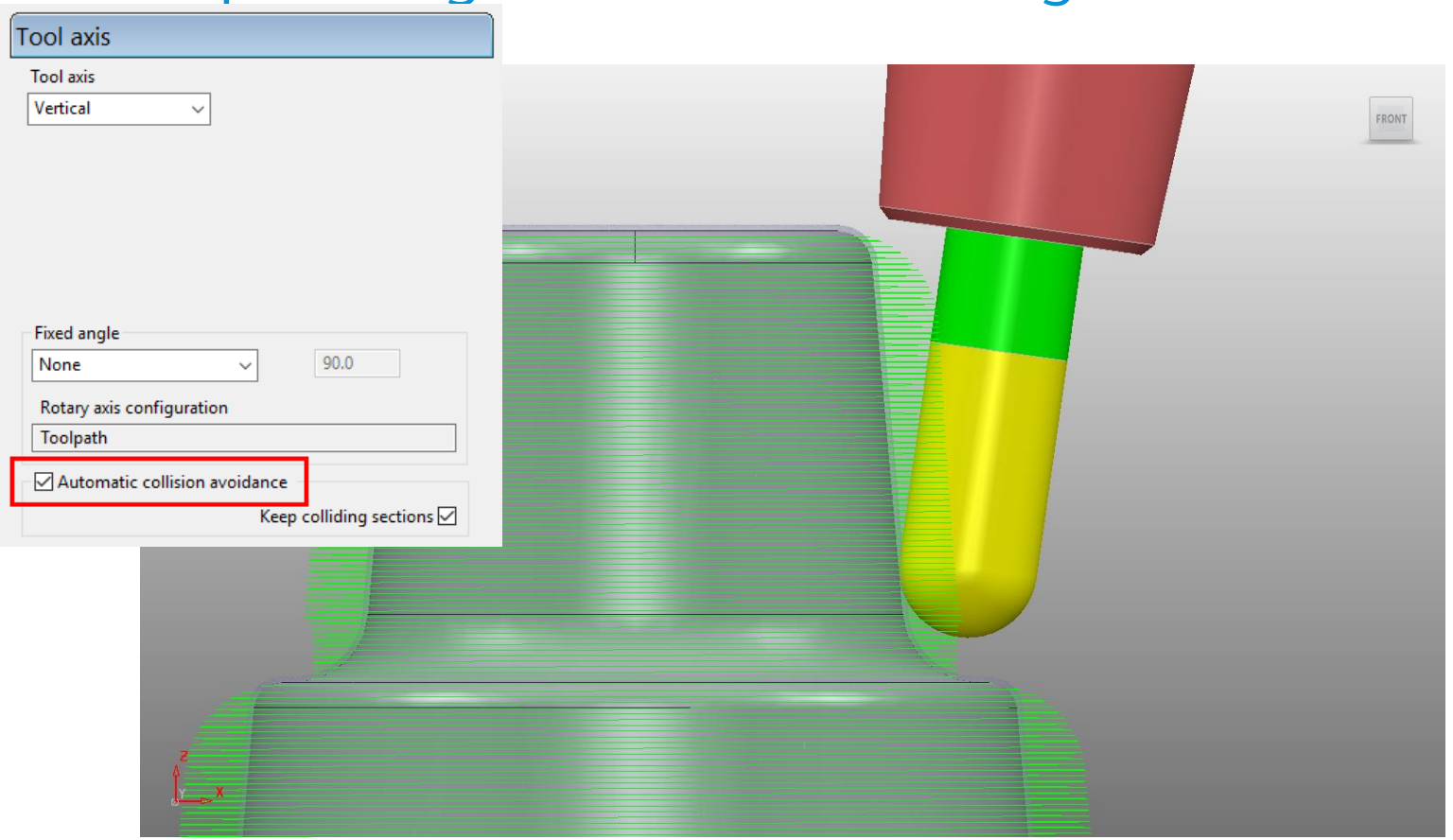
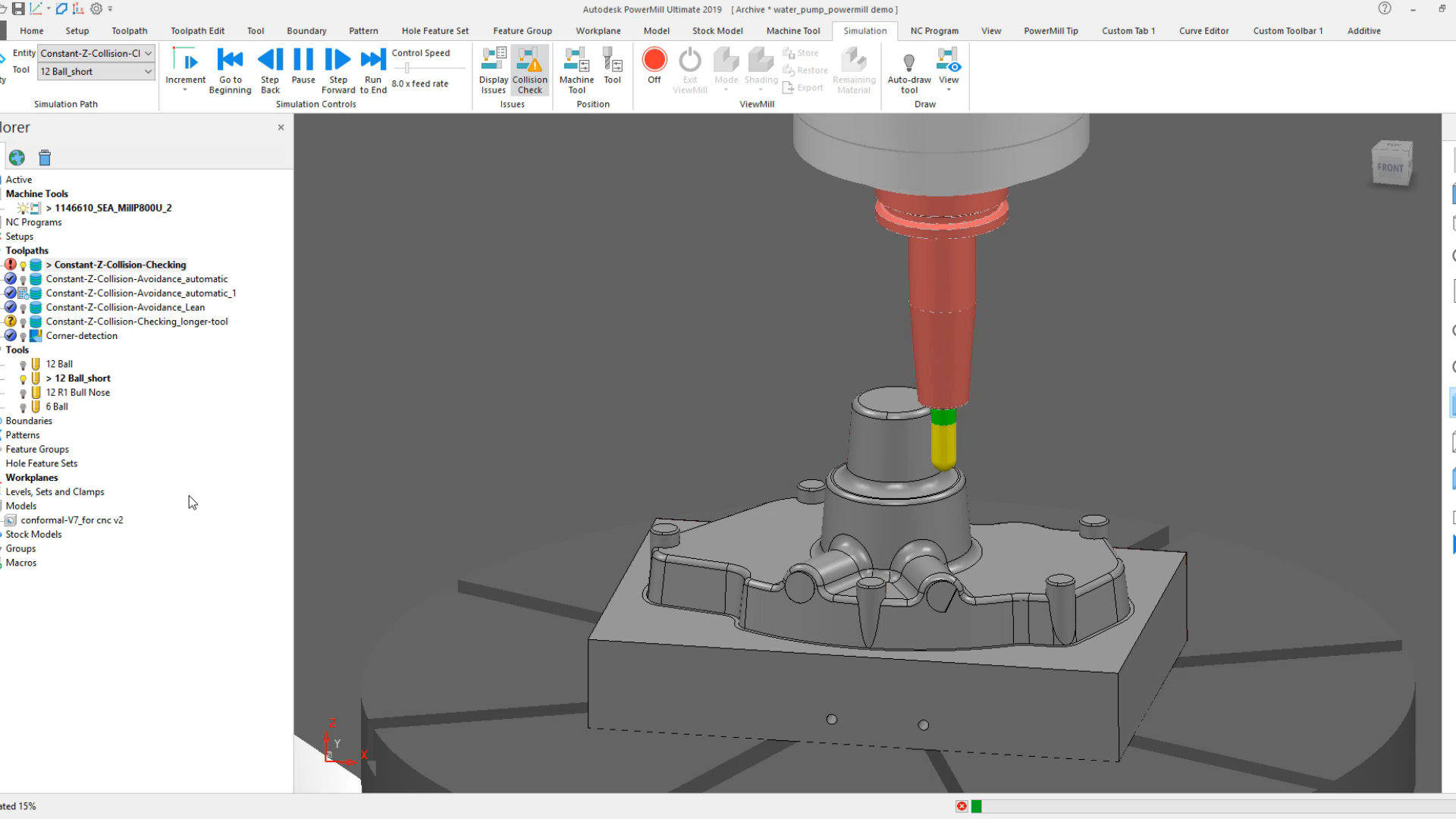
Kollisionsprüfung und -vermeidung

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Machine Tool
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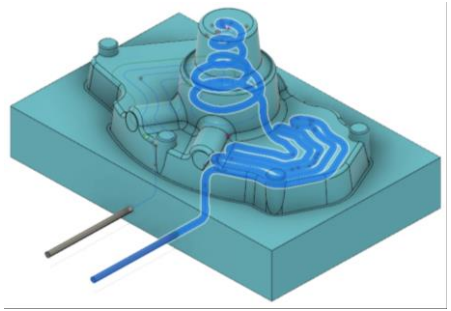
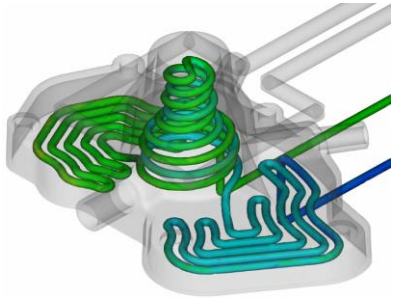
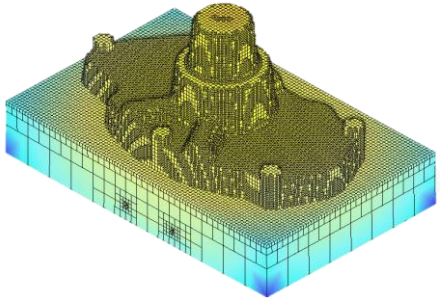
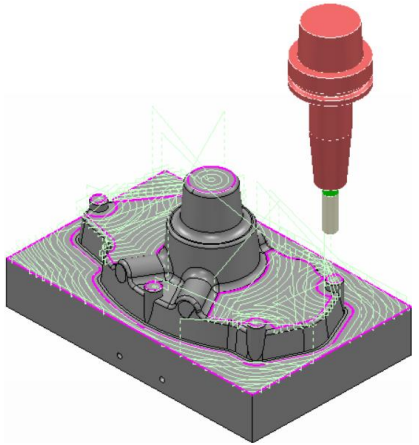
NC Program
View
PowerMill Tip
Custom Tab 1
Curve Editor
Custom Toolbar 1
Additive
Entity
Constant-Z-Collision-Cl
Tool
12 Ball_short
Simulation Path
Increment
Go to Beginning
Step Back
Pause
Step Forward
Run to End
Control Speed
8.0 x feed rate
Simulation Controls
Display Issues
Collision Check
Issues
Machine Tool
Tool
Position
Off
Exit ViewMill
Mode
Shading
Store
Restore
Export
Remaining Material
ViewMill
Auto-draw tool
View
Draw
lorer
Active
Machine Tools
> 1146610_SEA_MillP800U_2
NC Programs
Setups
Toolpaths
> Constant-Z-Collision-Checking
Constant-Z-Collision-Avoidance_automatic
Constant-Z-Collision-Avoidance_automatic_1
Constant-Z-Collision-Avoidance_Lean
Constant-Z-Collision-Checking_longer-tool
Corner-detection
Tools
12 Ball
> 12 Ball_short
12 R1 Bull Nose
6 Ball
Boundaries
Patterns
Feature Groups
Hole Feature Sets
Workplanes
Levels, Sets and Clamps
Models
conformal-V7_for cnc v2
Stock Models
Groups
Macros
FRONT
Z
Y
X
ted 15%

Fallbeispiel 1
Übersicht









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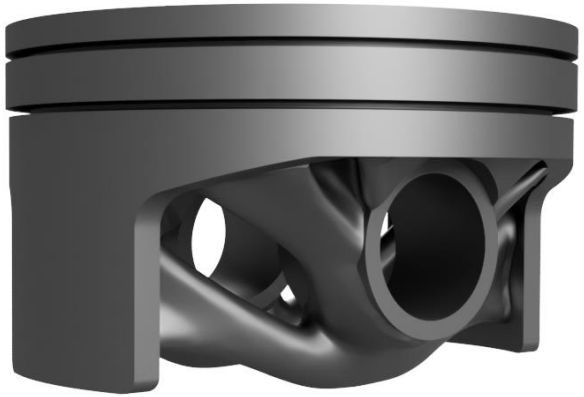
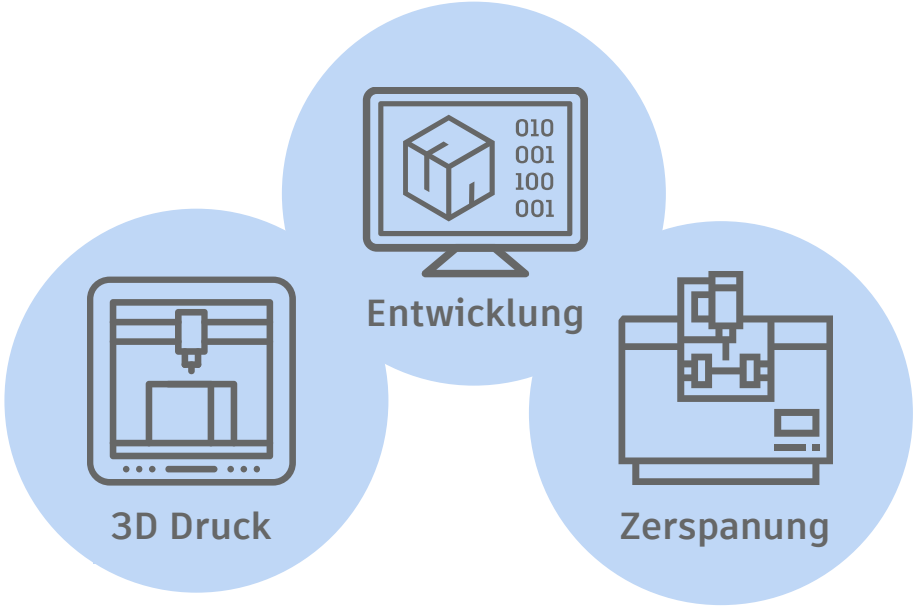
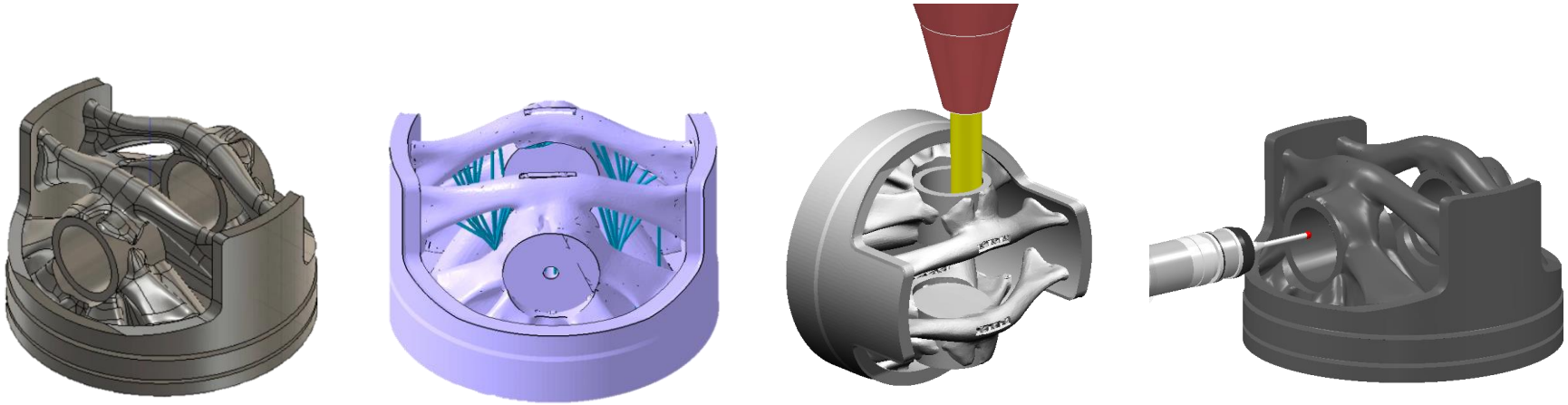
Fallbeispiel 2

Kolben

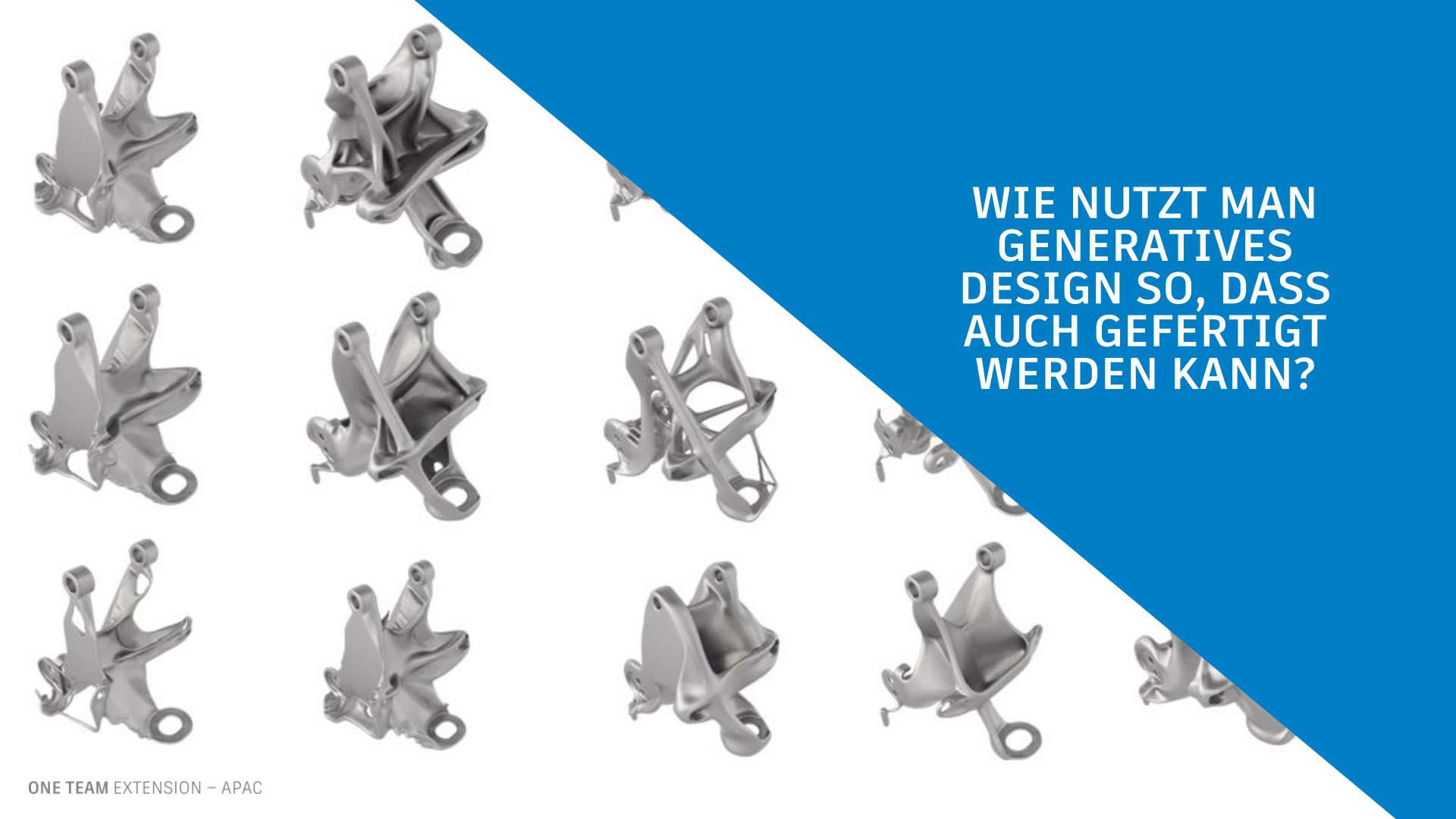




Hybride Fertigung eines Kolbens

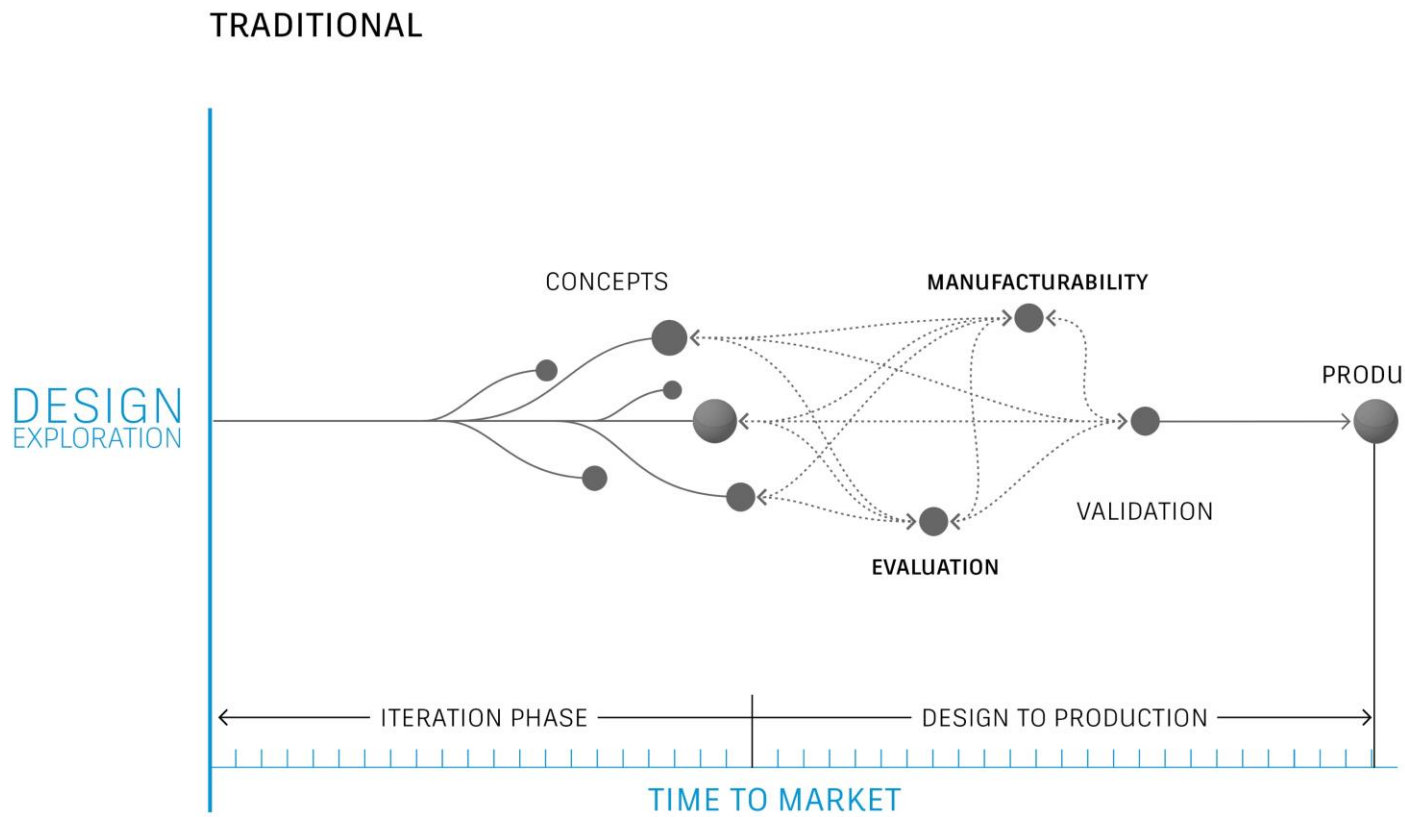


Generatives Design → 3D Druck → Zerspanen → Vermessen



WIE NUTZT MAN GENERATIVES DESIGN SO, DASS AUCH GEFERTIGT WERDEN KANN?

WIE BESCHLEUNIGT AUTODESK GENERATIVE DESIGN DEN ENTWICKLUNGSPROZESS ?



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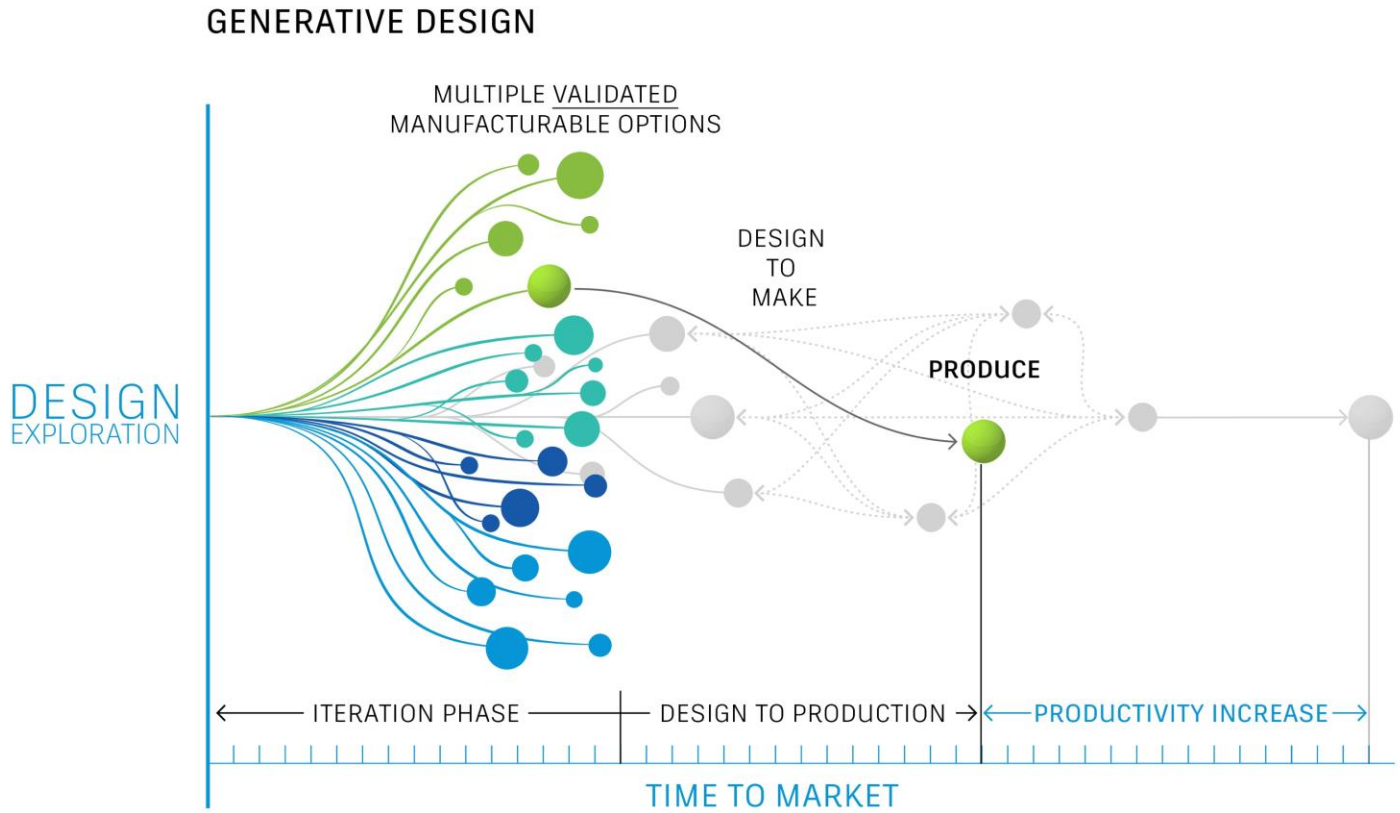
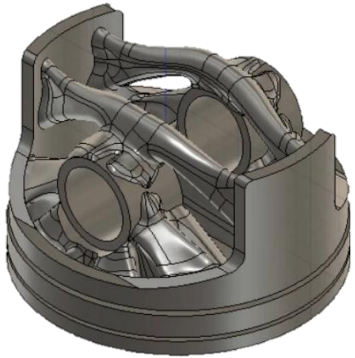
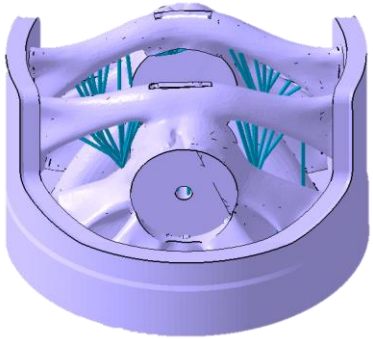
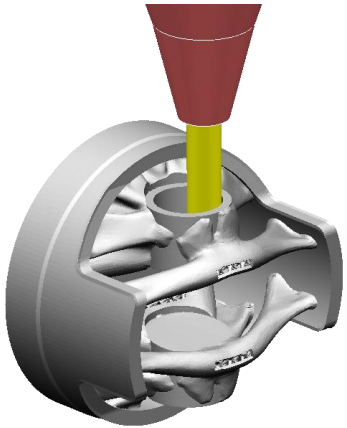
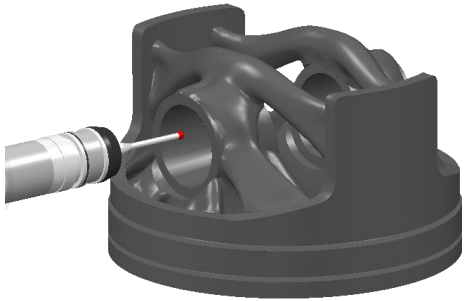


Hybride Fertigung eines Kolbens









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3D Druck → Zerspanen → Vermessen

todesk Fusion 360

V8 MAST...BLE v2*

SOLID SURFACE FORM MESH ASSEMBLE TOOLS

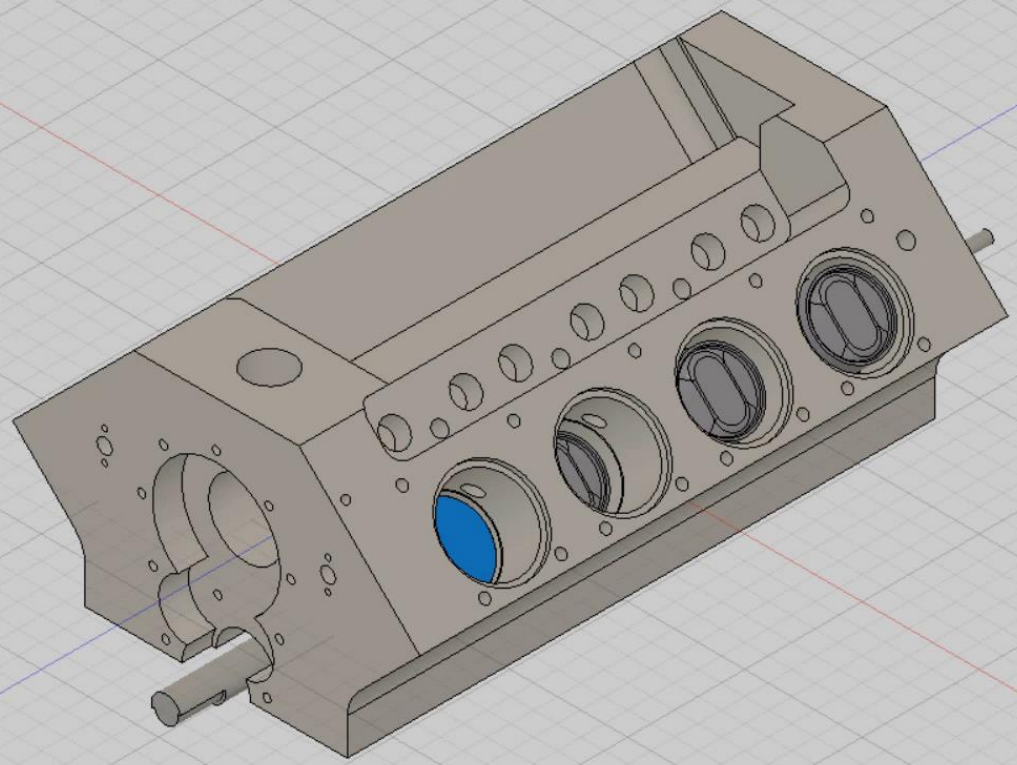
CREATE MODIFY CONSTRUCT INSPECT INSERT SELECT

Divy Kishor Tiwary

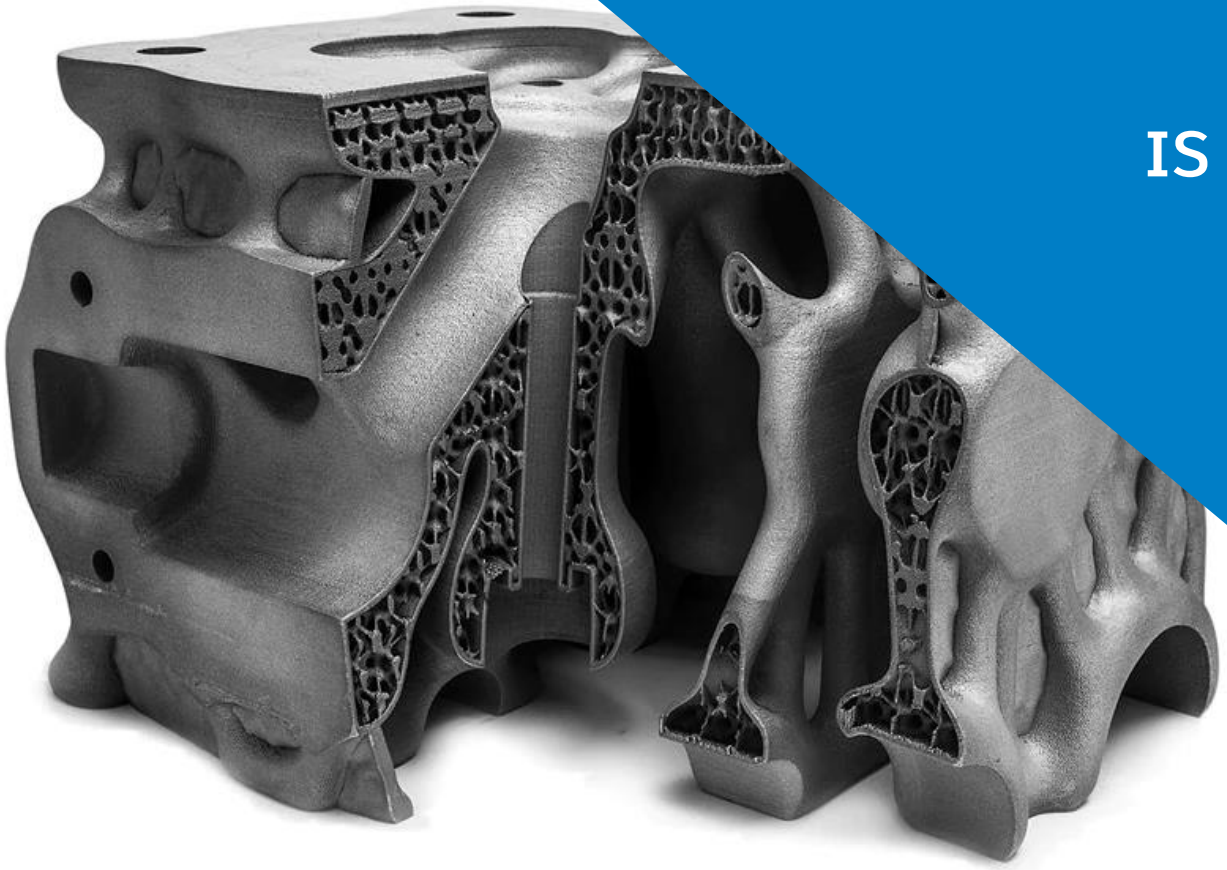
ROWSER

V8 MASTER ASSEMBLE v2

- Document Settings
- Named Views
- Origin
- BLOCK:1
- CRANKSHAFT - SUB ASSEMBLE:1
- PISTON - 1:1
- PISTON - 4:2
- PISTON - 4:3
- PISTON - 4:4
- PISTON - 4:5
- PISTON - 4:6
- PISTON - 4:7
- PISTON - 4:8
- ROD:1
- ROD:2
- ROD:3
- ROD:4
- ROD:5
- ROD:6
- ROD:7
- ROD:8
- ROD BEARING:1
- ROD BEARING:2

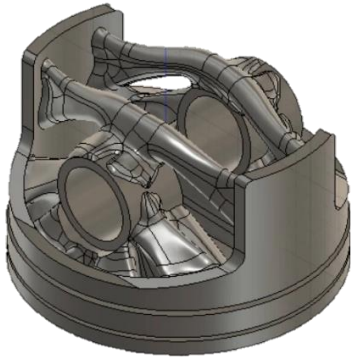


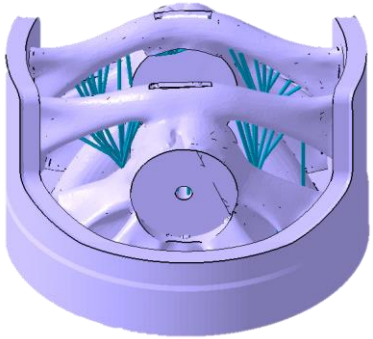
XT COMMANDS

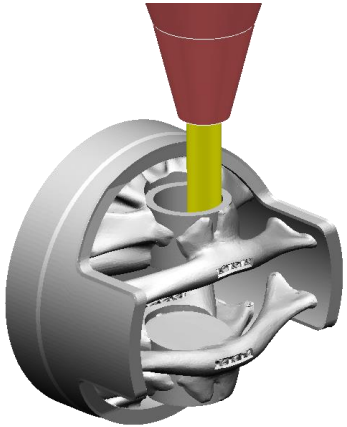


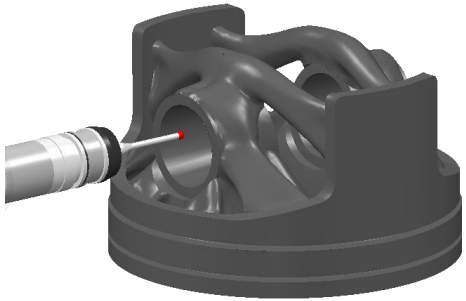
IS THIS THE BEST DESIGN?

Hybride Fertigung eines Kolbens









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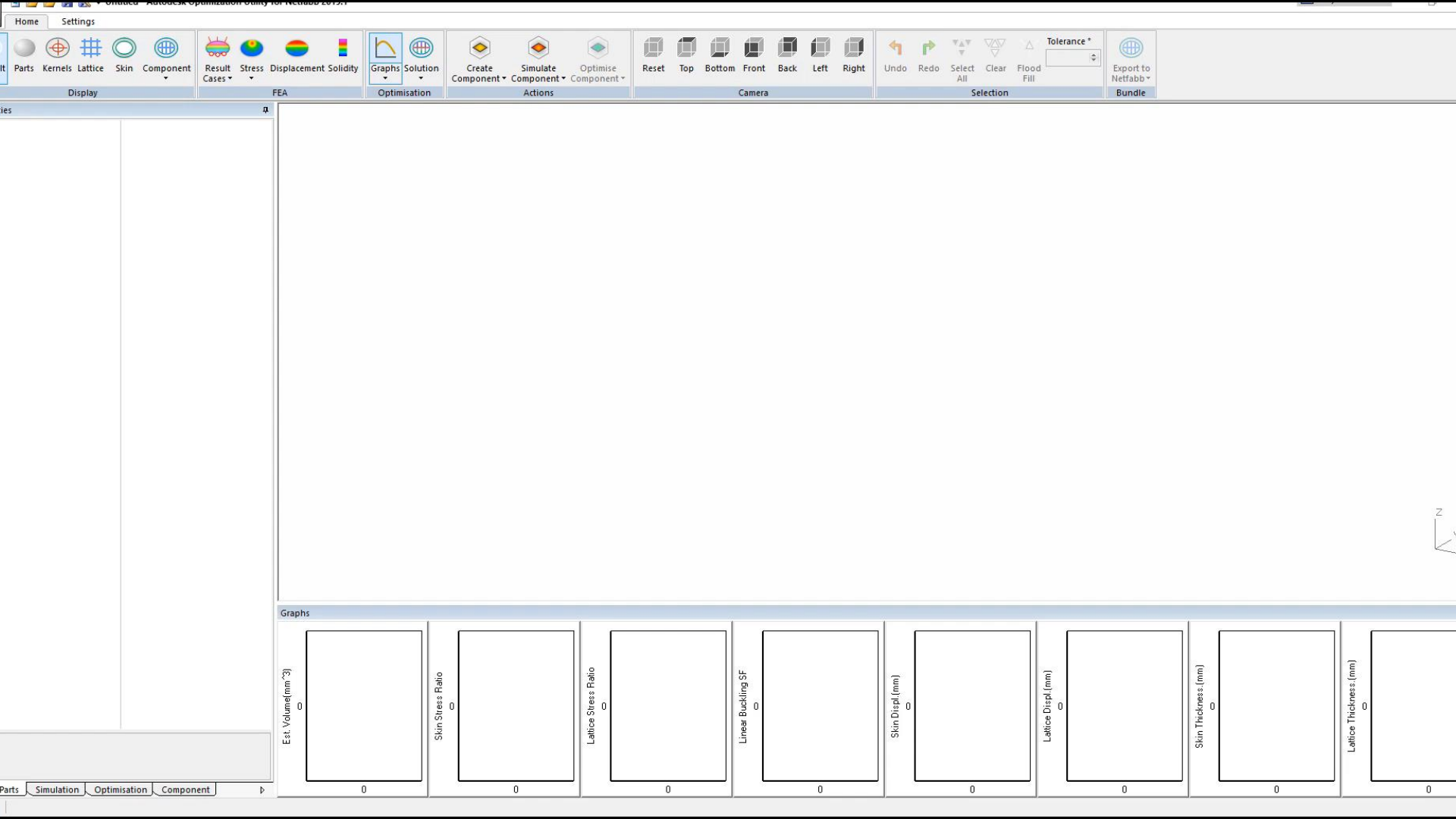
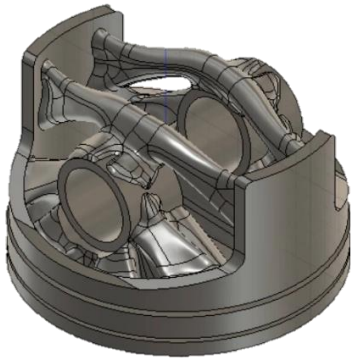
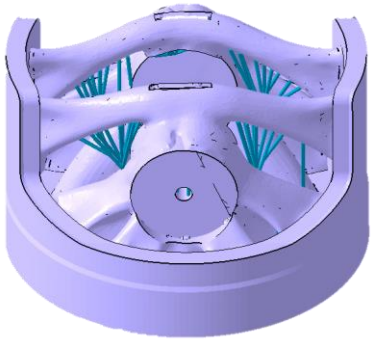
Zerspanen

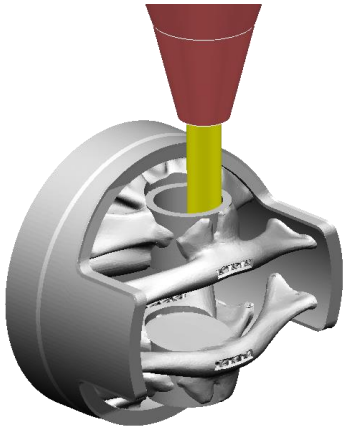
Vermessen

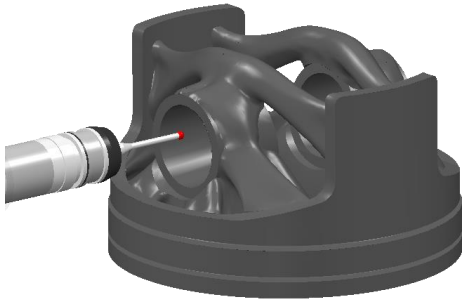

Home
Settings
Parts
Kernels
Lattice
Skin
Component
Display
Result Cases
Stress
Displacement
Solidity
FEA
Graphs
Solution
Optimisation
Create Component
Simulate Component
Optimise Component
Actions
Reset
Top
Bottom
Front
Back
Left
Right
Camera
Undo
Redo
Select All
Clear
Flood Fill
Tolerance *
Selection
Export to Netfabb
Bundle
Graphs
Est. Volume(mm^3)
Skin Stress Ratio
Lattice Stress Ratio
Linear Buckling SF
Skin Displ.(mm)
Lattice Displ.(mm)
Skin Thickness.(mm)
Lattice Thickness.(mm)
Parts
Simulation
Optimisation
Component

Hybride Fertigung eines Kolbens









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AUTODESK® POWERMILL®

Vermessen

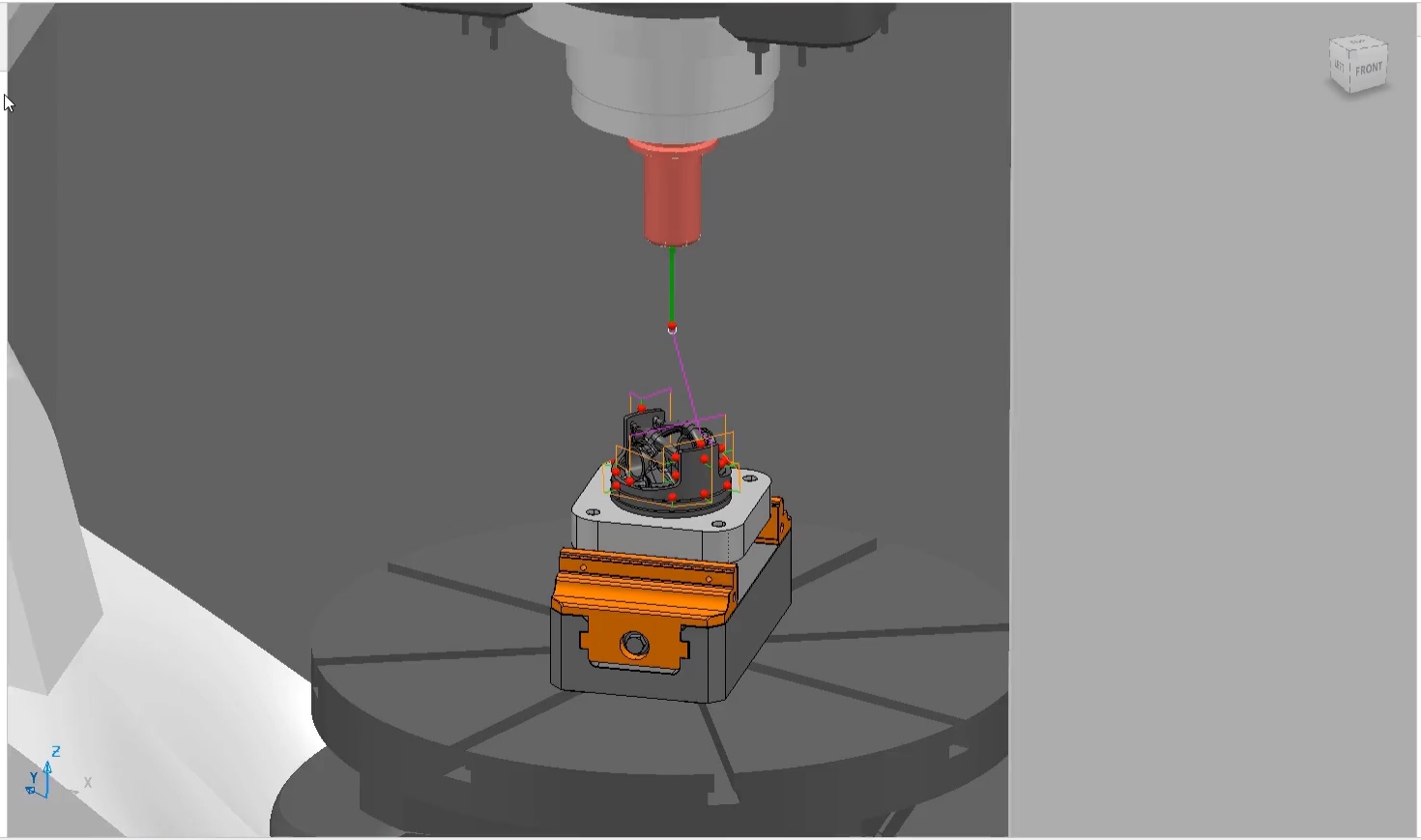
Autodesk PowerMill Ultimate 2019 [Editable Project - with-probing-2]

File | Home | Setup | Toolpath | Toolpath Edit | Tool | Boundary | Pattern | Hole Feature Set | Feature Group | Workplane | Model | Stock Model | Machine Tool | Simulation | NC Program | View | PowerMill Tip | Custom Tab 1 | Curve Editor | Custom Toolbar 1

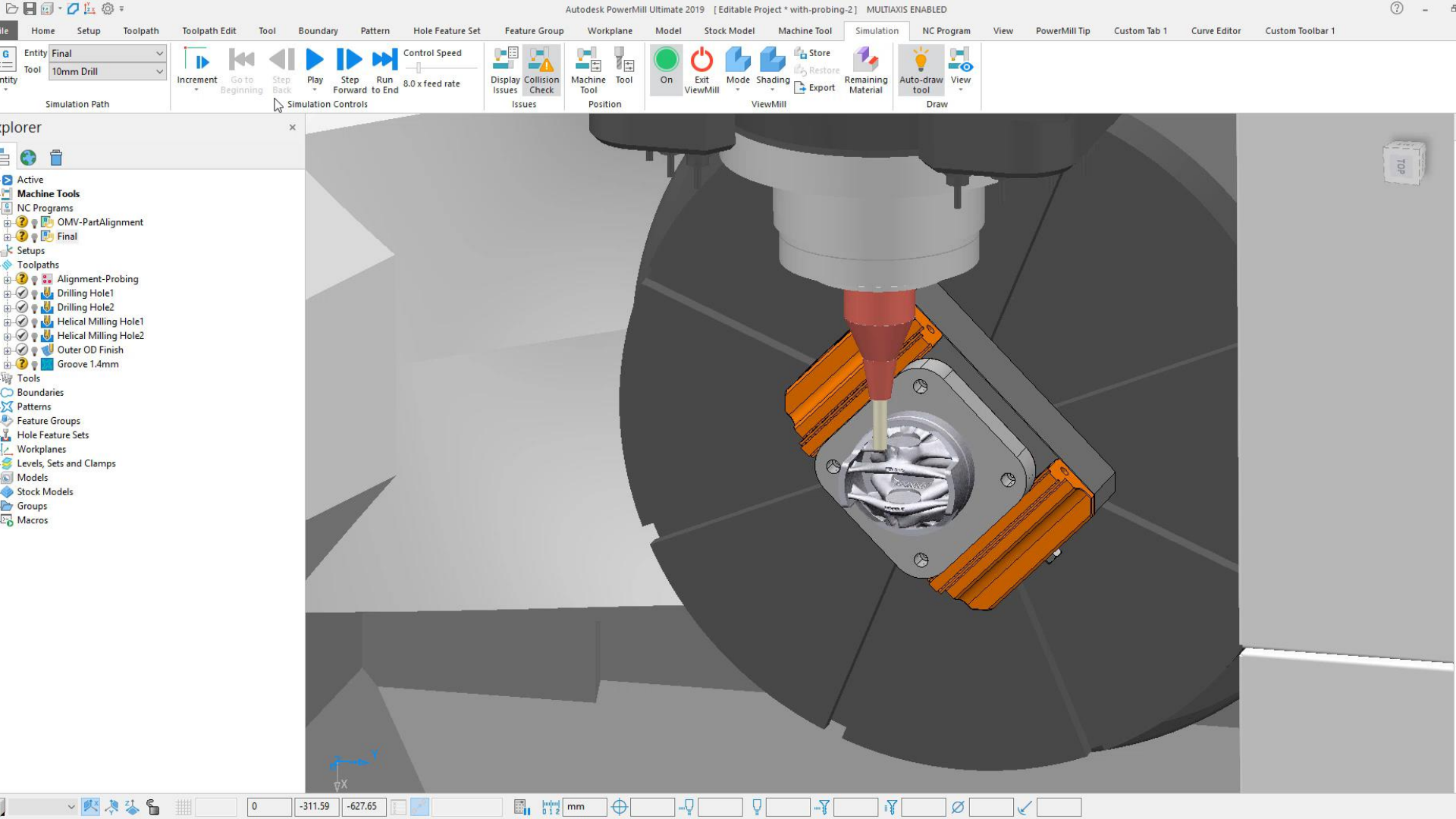
Simulation Path: Entity, Entity: Alignment-Probing, Tool: Inspection-probe-ruby
Simulation Controls: Increment, Go to Beginning, Step Back, Play, Step Forward, Run to End, Control Speed, 8.0 x feed rate
Issues: Display Issues, Collision Check
Position: Machine Tool, Tool
ViewMill: Off, Exit ViewMill, Mode, Shading, Store, Restore, Export, Remaining Material
Draw: Auto-draw tool, View

Explorer

- Active
- **Machine Tools**
- NC Programs
- Setups
- **Toolpaths**
  - **> Alignment-Probing**
  - Drilling Hole1
  - Drilling Hole2
  - Helical Milling Hole1
  - Helical Milling Hole2
  - Outer OD Finish
  - Groove 1.4mm
- **Tools**
  - 10mm Drill
  - Dia10mm End Mill
  - Dia10 Ball
  - Dia 1.2mm Grove tool
  - **> Inspection-probe-ruby**
- Boundaries
- Patterns
- Feature Groups
- Hole Feature Sets
  - 1
  - 2
- Workplanes
- Levels, Sets and Clamps
- Models
- Stock Models
- Groups
- Macros

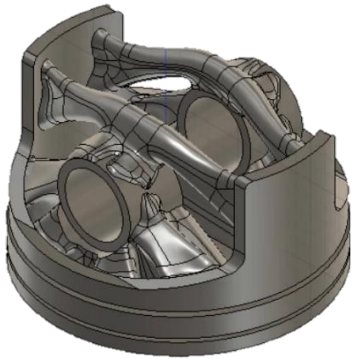


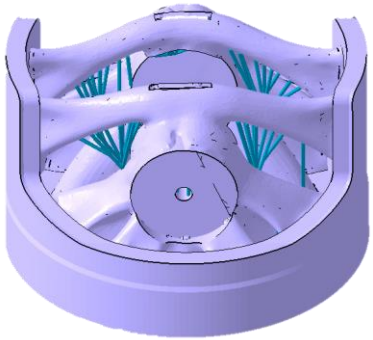
0 | 4920.47 | -654.28 | mm | 0.1 | 0.0 | 6.0

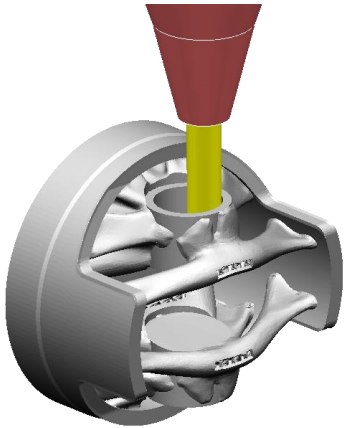

Autodesk PowerMill Ultimate 2019 [Editable Project * with-probing-2] MULTIAXIS ENABLED
Home Setup Toolpath Toolpath Edit Tool Boundary Pattern Hole Feature Set Feature Group Workplane Model Stock Model Machine Tool Simulation NC Program View PowerMill Tip Custom Tab 1 Curve Editor Custom Toolbar 1
Entity Final
Tool 10mm Drill
Simulation Path
Increment
Go to Beginning
Step Back
Play
Step Forward
Run to End
Control Speed
8.0 x feed rate
Simulation Controls
Display Issues
Collision Check
Issues
Machine Tool
Tool
Position
On
Exit ViewMill
Mode
Shading
Store
Restore
Export
Remaining Material
ViewMill
Auto-draw tool
View
Draw
Explorer
Active
Machine Tools
NC Programs
OMV-PartAlignment
Final
Setups
Toolpaths
Alignment-Probing
Drilling Hole1
Drilling Hole2
Helical Milling Hole1
Helical Milling Hole2
Outer OD Finish
Groove 1.4mm
Tools
Boundaries
Patterns
Feature Groups
Hole Feature Sets
Workplanes
Levels, Sets and Clamps
Models
Stock Models
Groups
Macros
TOP
0
-311.59
-627.65
mm

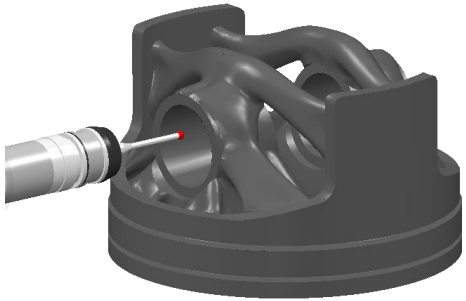
Hat das Produkt die richtigen Maße und die richtige Form?

Hybride Fertigung eines Kolbens









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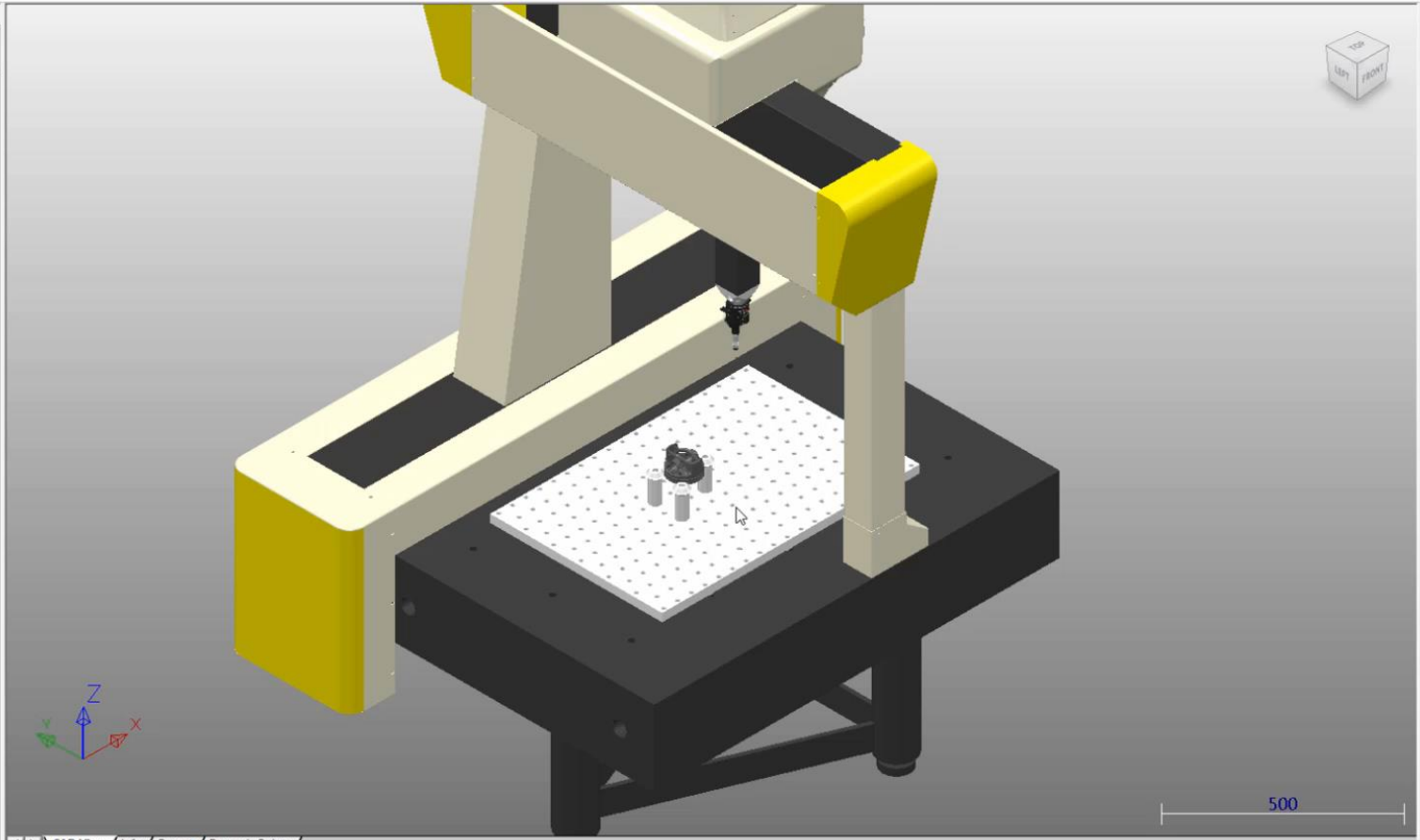
Autodesk PowerInspect Ultimate 2019 - [PowerInspect6 (MM)*]

File | Home | Geometry | Alignments & Datums | Form | Point-Cloud | Simple Measures | Probe Path | Measure | Report | Tools | View

Group | Geometry | Form | Alignment | Point-Cloud | Simple Measure — Create
Probe & Parameters | Link | Visibility | Verify | Auto-Avoid — Probe Path
Play | Simulate | CNC | E-Stop | Delay — Execute
CAD View Image | Note | Interactive Dimensions | Dimensions — Report
Wireframe Checker | Dynamic Points Editor | Move Probe | Surface Selector | Edit Geometry — Mouse Context
Reset | Delete | Paste | Cut | Copy | Copy as Points — Edit
New Shared View — Collaborate
Attach — Document

Sequence Tree | Run | CAD | Machine | Shared Views

Parts
- Piston
- User Levels

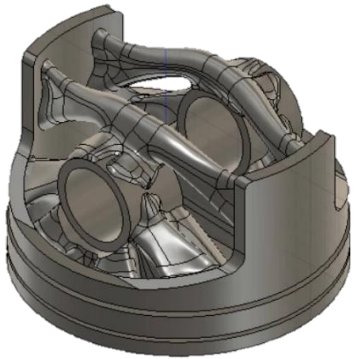


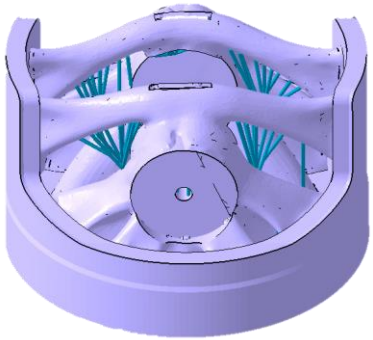
CAD View | Info | Report | Dynamic Points

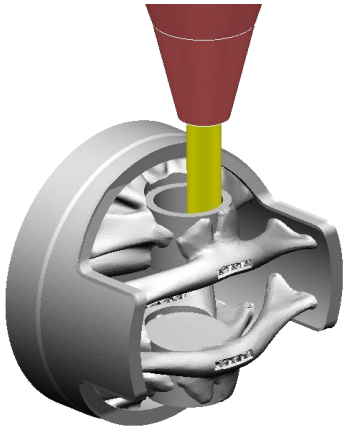
Add CAD part details to the list

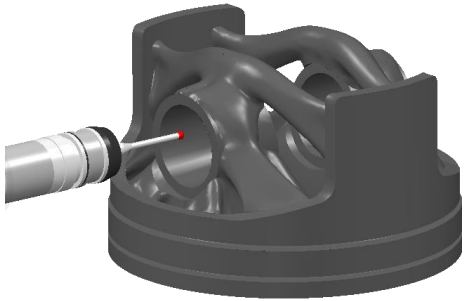
<no alignment> Master part INVALID : NO VALID SENSOR PCS 10.559 -19.806 -339.807 Not Conne

Hybride Fertigung eines Kolbens









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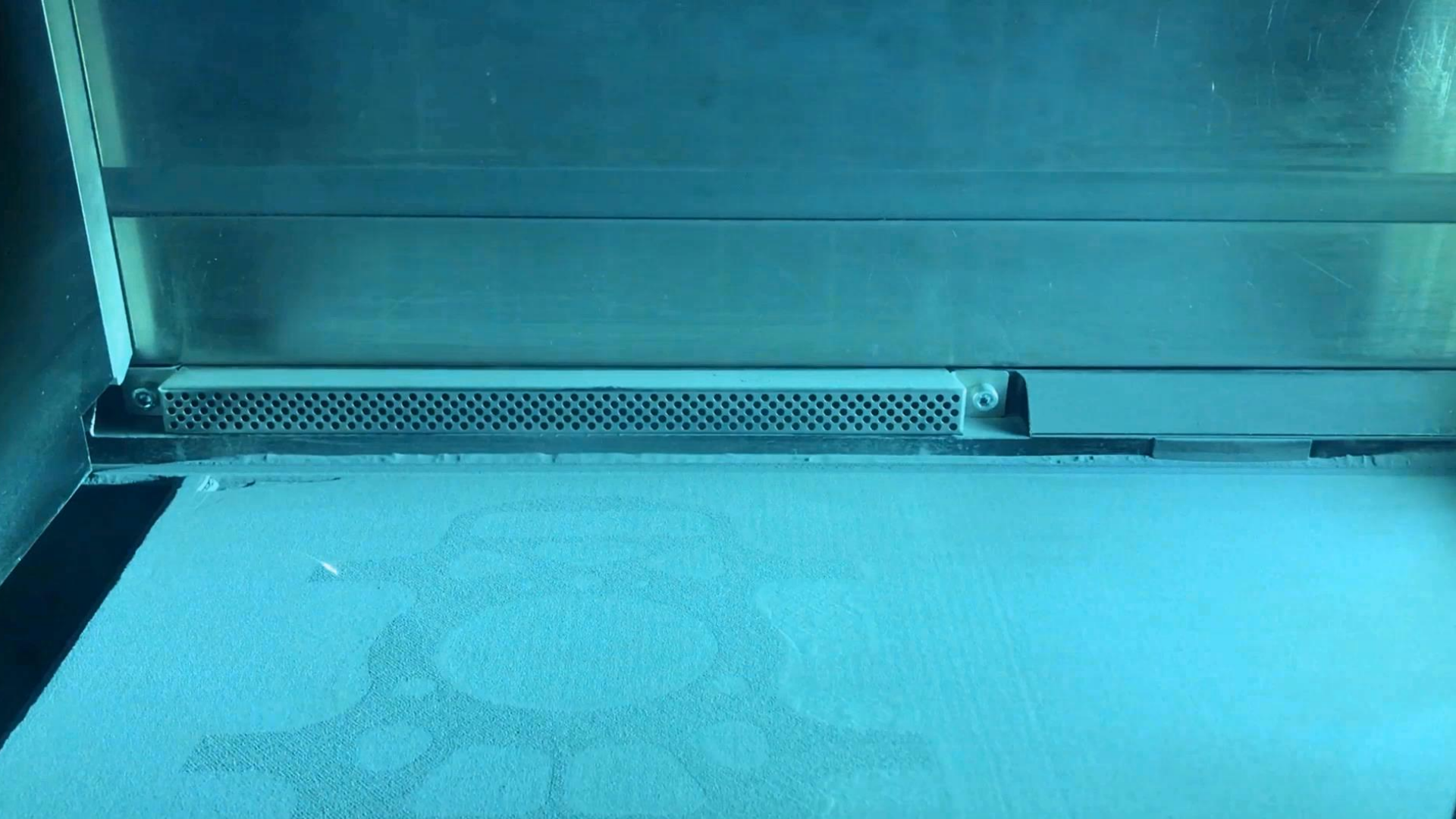

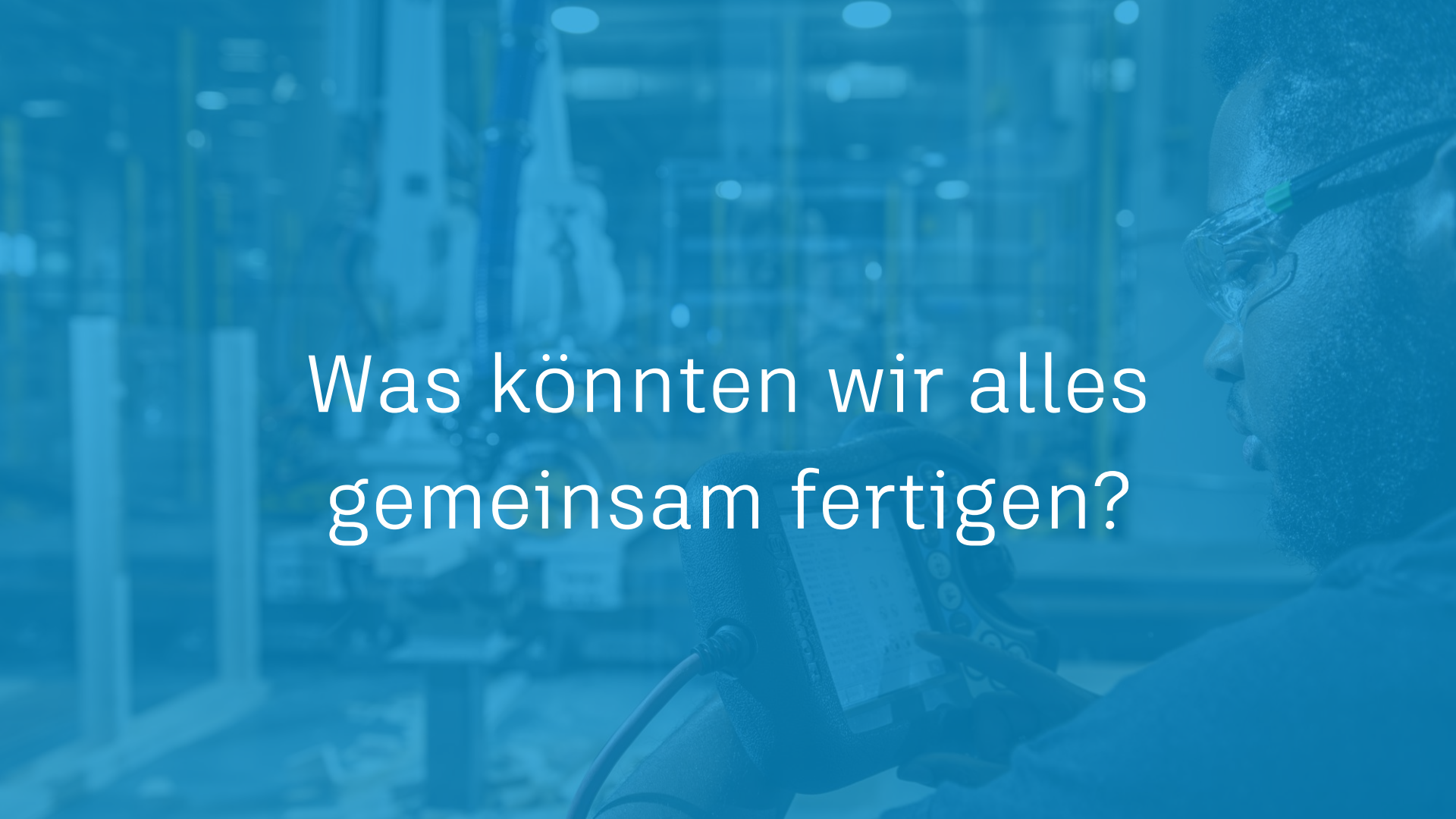

Was könnten wir alles gemeinsam fertigen?

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