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AUTODESK® MOLDFLOW®

Moldflow Summit

June 2017

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Product Manager for Moldflow

Agenda

- Quarterly Update Review
  - 2017R2
  - 2017.3
- Moldflow & Helius 2018.0
- Outlook

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Moldflow 2017
Year Review

Moldflow 2017 releases

Moldflow Insight 2017

AUTODESK MOLDFLOW

Autodesk Licensing Changes

Subscription Business Model
- Term license (NTS)

Local, network and cloud solves for Moldflow Insight

Variable cloud consumption for DOE

Usability and Productivity Improvements

Workflow efficiency improvements
- Ribbon Optimization
- Cutting plane lock
- Local mesh refinement
- Improved Cool(FEM) meshing

Improve custom reporting
- Automation Tools for Report Generation
- New Meshing Tools
  - Local mesh refinement
  - Advanced surface mesh modification tools

Tech Leadership: Material Data and Solver Improvements

Speed and accuracy
- 3D Mesh, Flow, Fiber and warp accuracy

Composite overmolding
- Anisotropic insert properties

New capabilities
- Two-shot Overmolding Cooling
- Overmolding thermoplastic over thermoset and vice verse
- Improved foaming support:
  - Blowing Agents support (Foaming)
  - Include Core-back
  - Induction Heating support
- Support Cooling for Gas assisted Inj. Molding
- Extend Solver API

Material database enhancements:
- Confidential fields
- Free tool for hiding material data
- Fiber orientation parameters as material data

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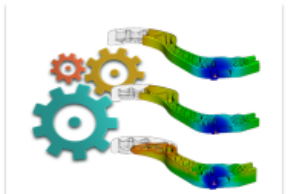
Moldflow Insight 2017 R2 | Release Highlights

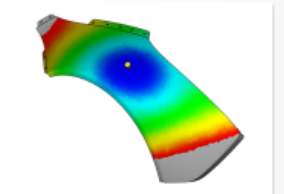


Market Impact

- Parametric Product Optimization
- Adviser Re-packaging
  - Add adviser launchers in CAD systems
- 49 materials with Non-linear mechanical data HPFA-P

Experience & Customer Intimacy

- Direct Geometry Editing
- SJM Improvements
  - Usability
  - Stability
- Improve Cool(FEM) heater element setup



Leadership

- Leadership in 3D Solver Tech
  - 3D Fiber Improvement
  - 3D Warp
  - 3D Wall slip
- 3D RTM
- Cool(FEM):
  - Transient coolant flow rate

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Moldflow Insight 2017.3 | Release Summary

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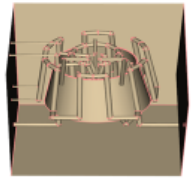
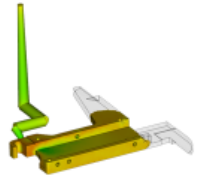
Market Impact

- Linux HPC support:
  - Meshing on Linux
  - Distribution queue on Linux



Productivity & Customer Intimacy

- Improve Model setup speed
  - Automatic refinement
  - Create Mold as Solid Model
- Usability improvements:
  - Study duplication with data
  - SJM retain temporary data
  - Robustness improvement large files
- Geometry:
  - Delete/move bodies
  - New CAD export formats
- Power user tools
  - Valve gate timing dialogue



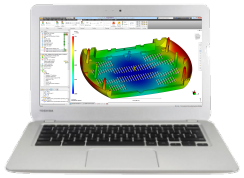
Leadership

- Powder Injection Molding (3D)
  - Metal Injection Molding
  - Ceramic Injection Molding

Local, Network and Cloud Solves for Moldflow Insight

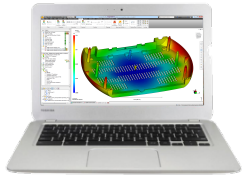
2016

Moldflow Insight



Moldflow Job Manager

Moldflow Flex



Simulation Job Manager

Moldflow Job Manager

Moldflow Insight Standard (1 solve)

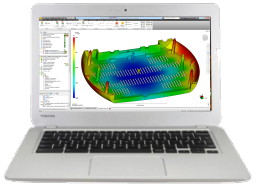
Moldflow Insight Premium (3 solves)

Moldflow Insight Ultimate (3 solves)

Named User license with Moldflow Insight Ultimate level functionality (many solves, consumes Cloud Credits)

2017

Moldflow Insight



Simulation Job Manager

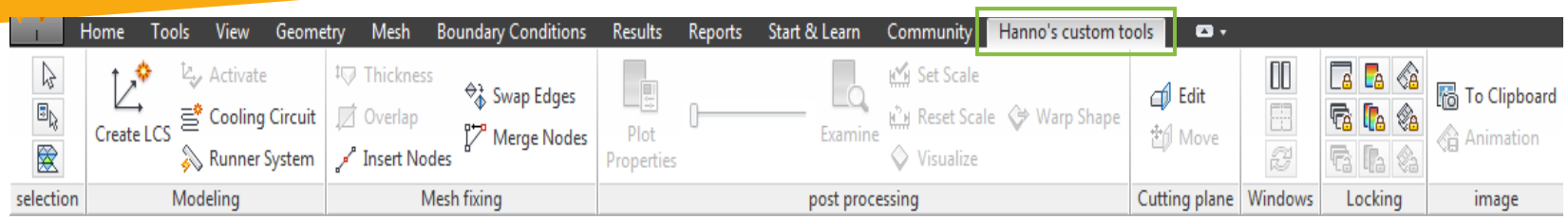
Moldflow Insight Standard (1 solve)

Moldflow Insight Premium (3 solves)

Moldflow Insight Ultimate (3 solves)

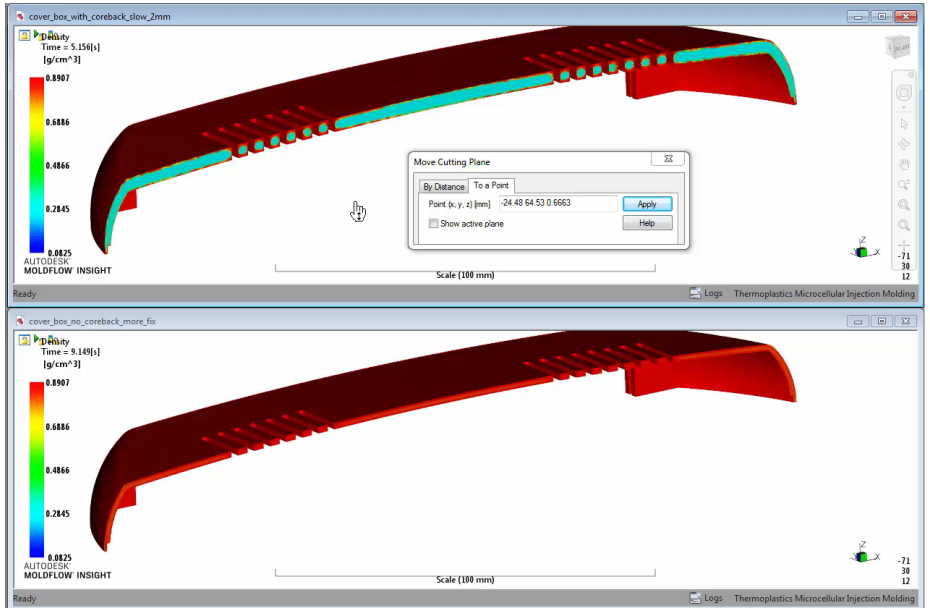
Capabilities at the same license level as available at the local and remote solves. Named user model and will require Cloud Credits.

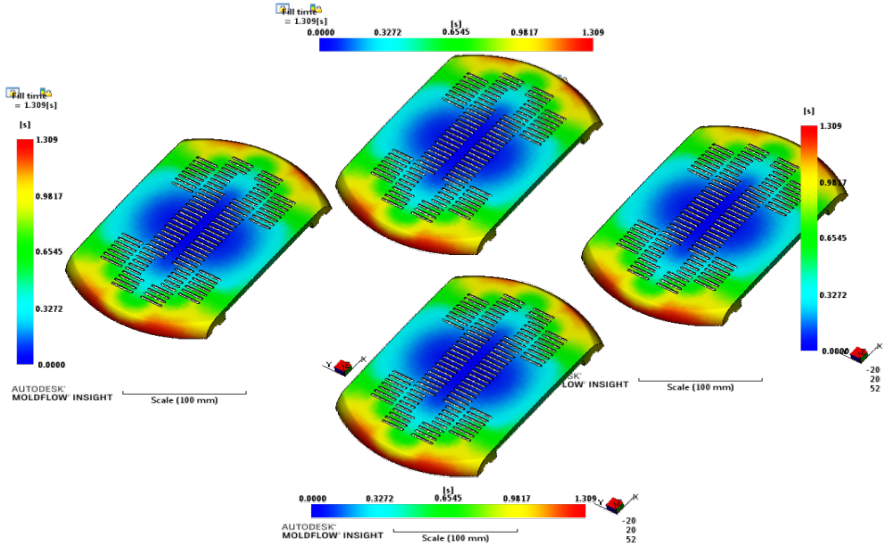
Workflow Efficiency Improvements



Ribbon Customization

Cutting Plane Synchronization

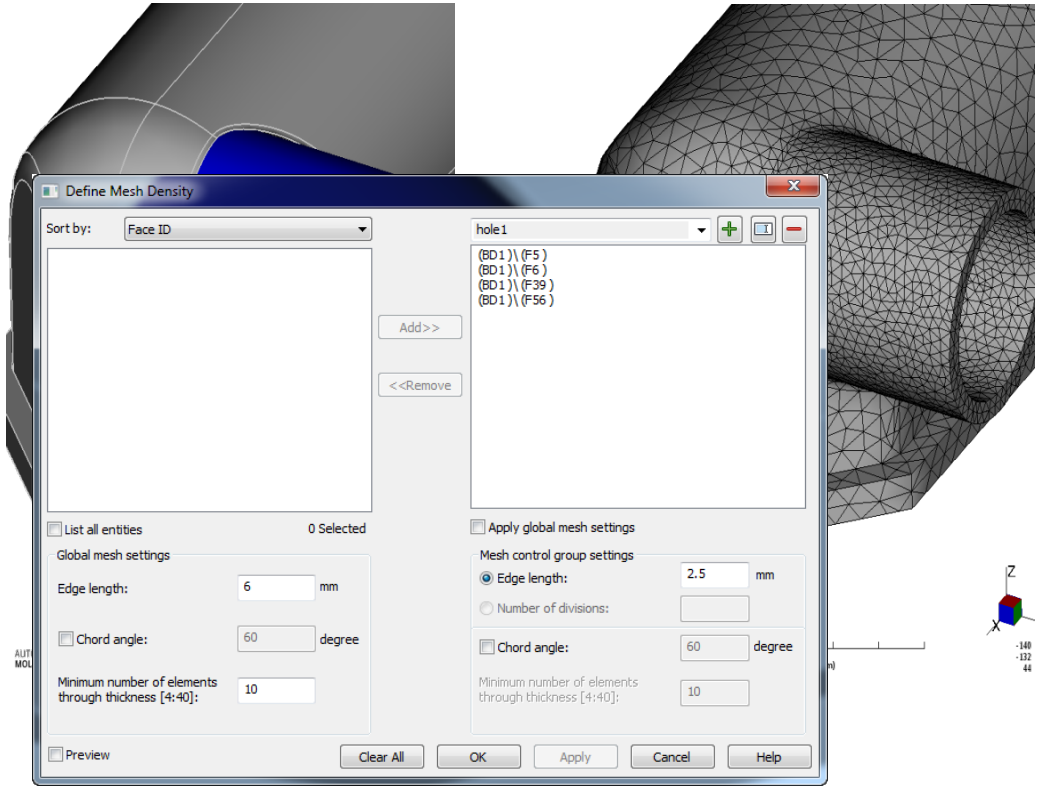




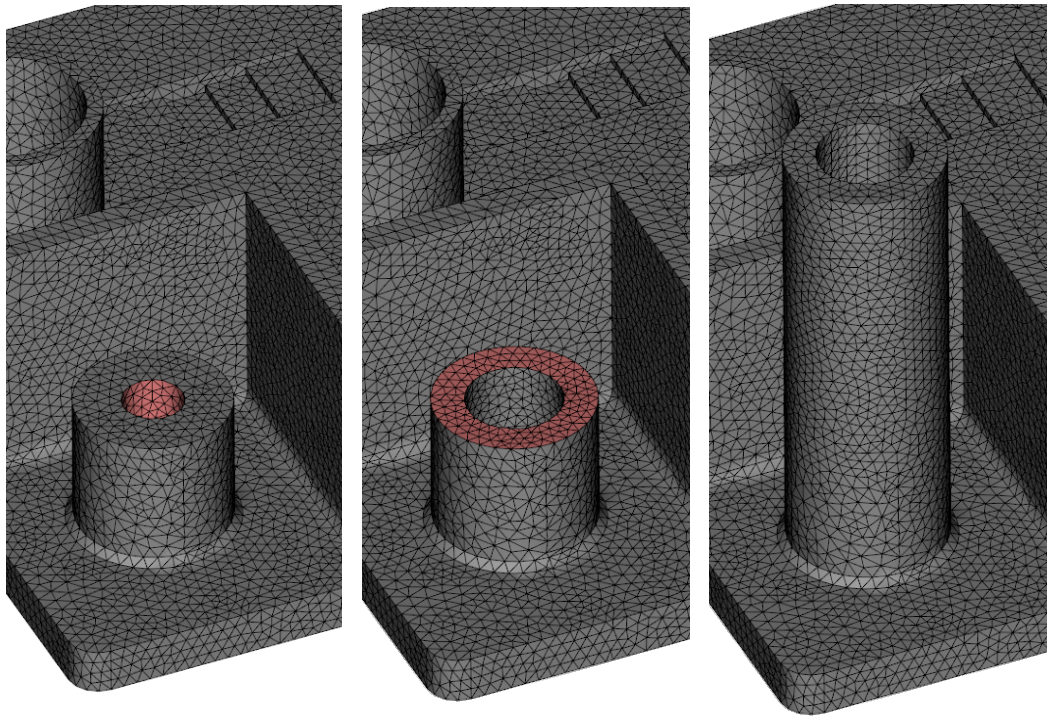
Customizable Legend Bar

New Meshing Tools

Local Mesh Refinement



Advanced Surface Mesh Modification Tools



1. Original

2. Offset operation

3. Extrude operation

Direct Geometry Modification

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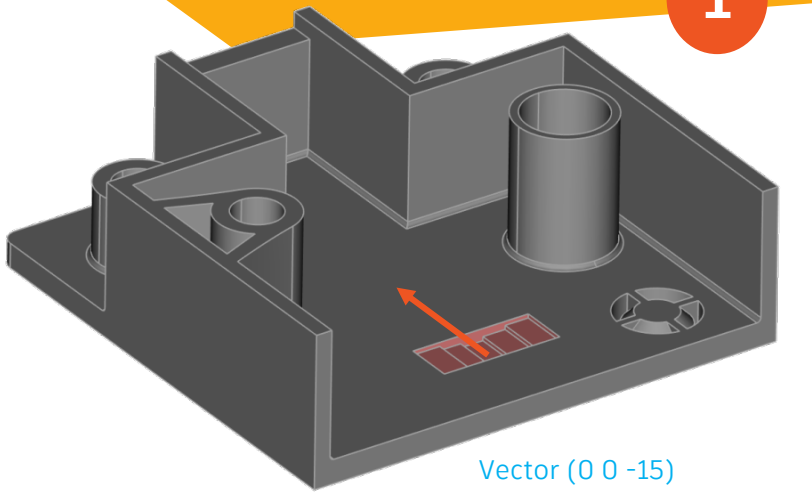
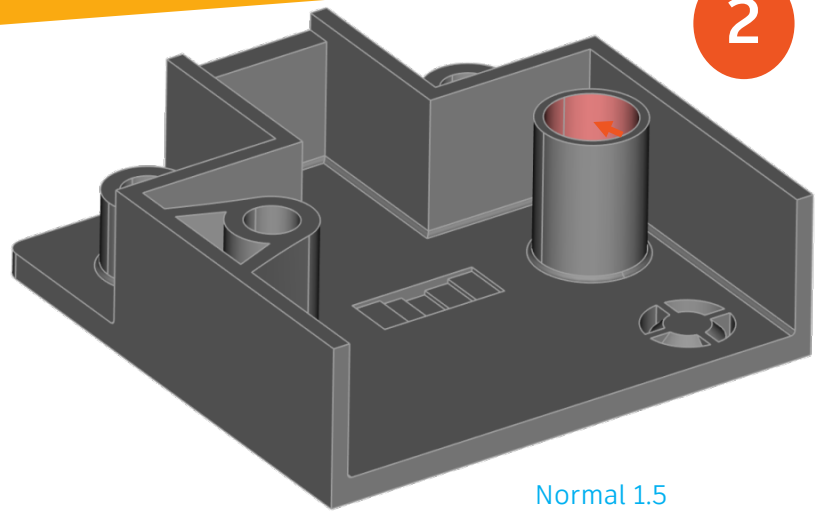
1



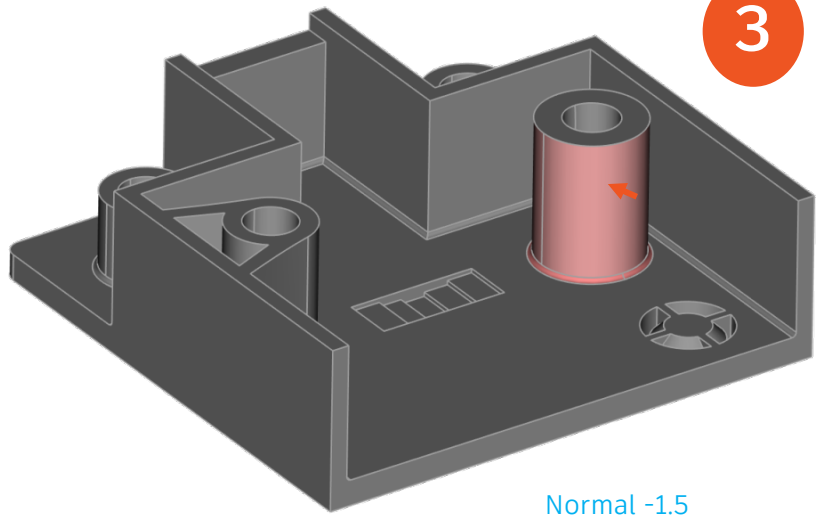
Vector (0 0 -15)

2



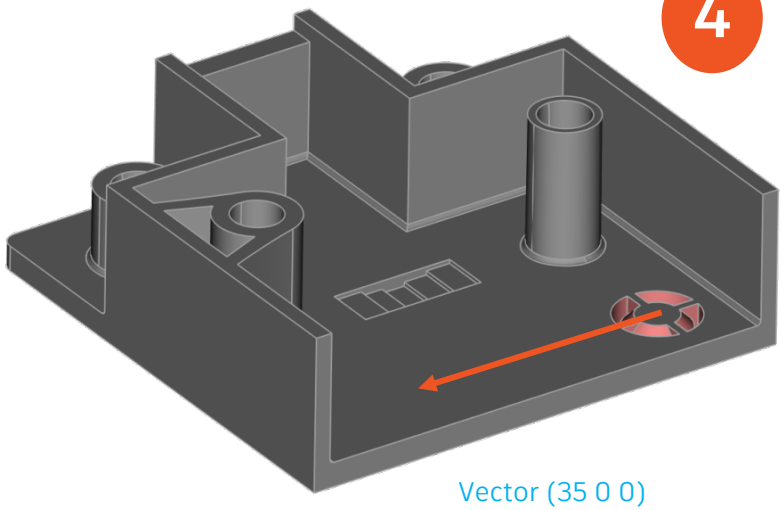
Normal 1.5

3



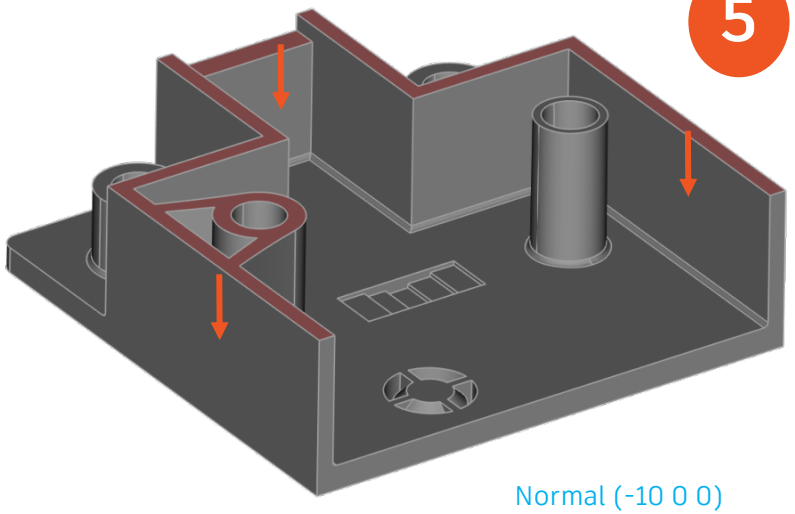
Normal -1.5

4



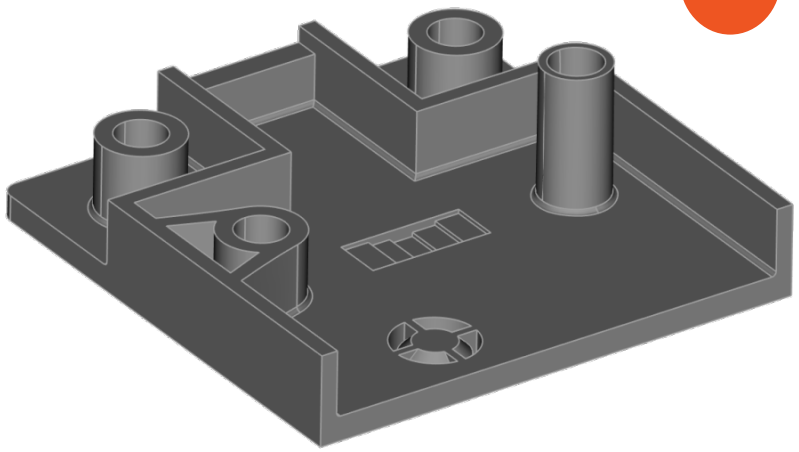
Vector (35 0 0)

5

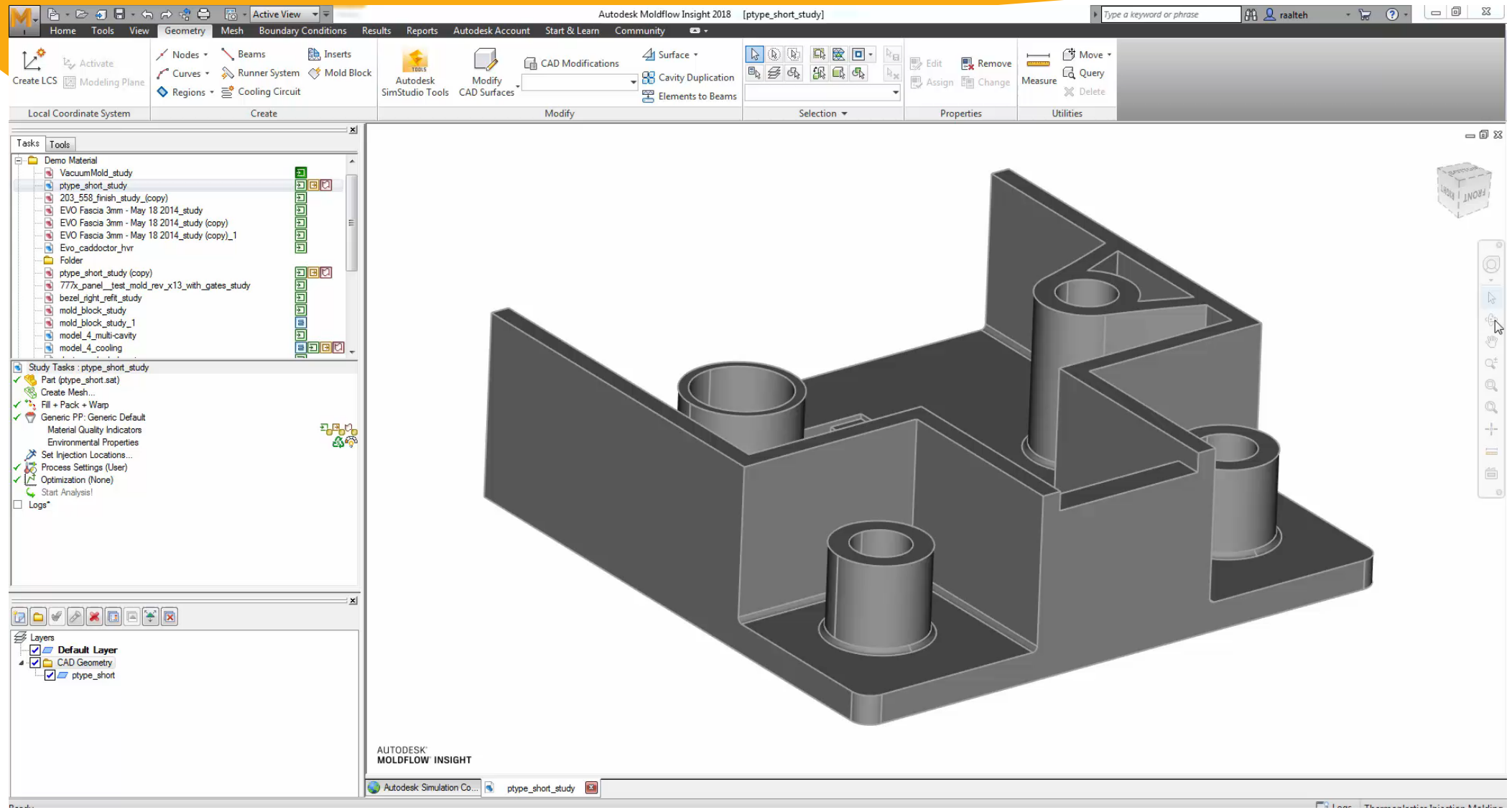


Normal (-10 0 0)

6

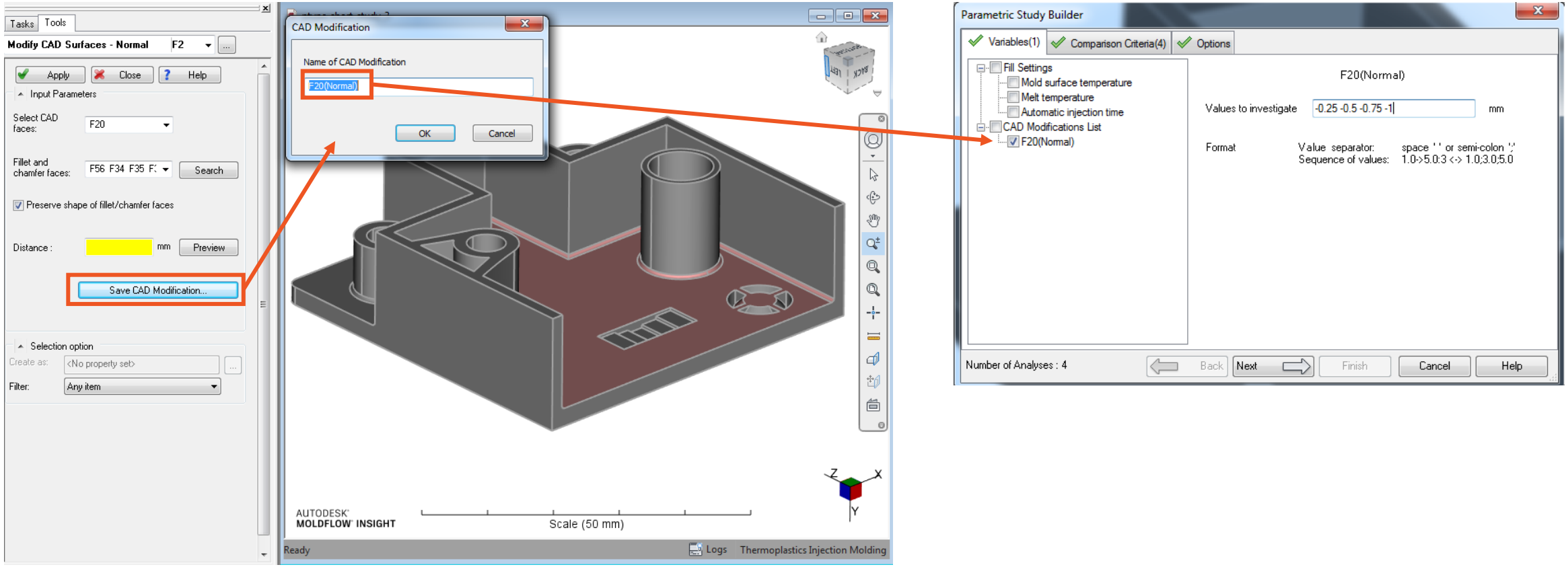


Direct Geometry Modification

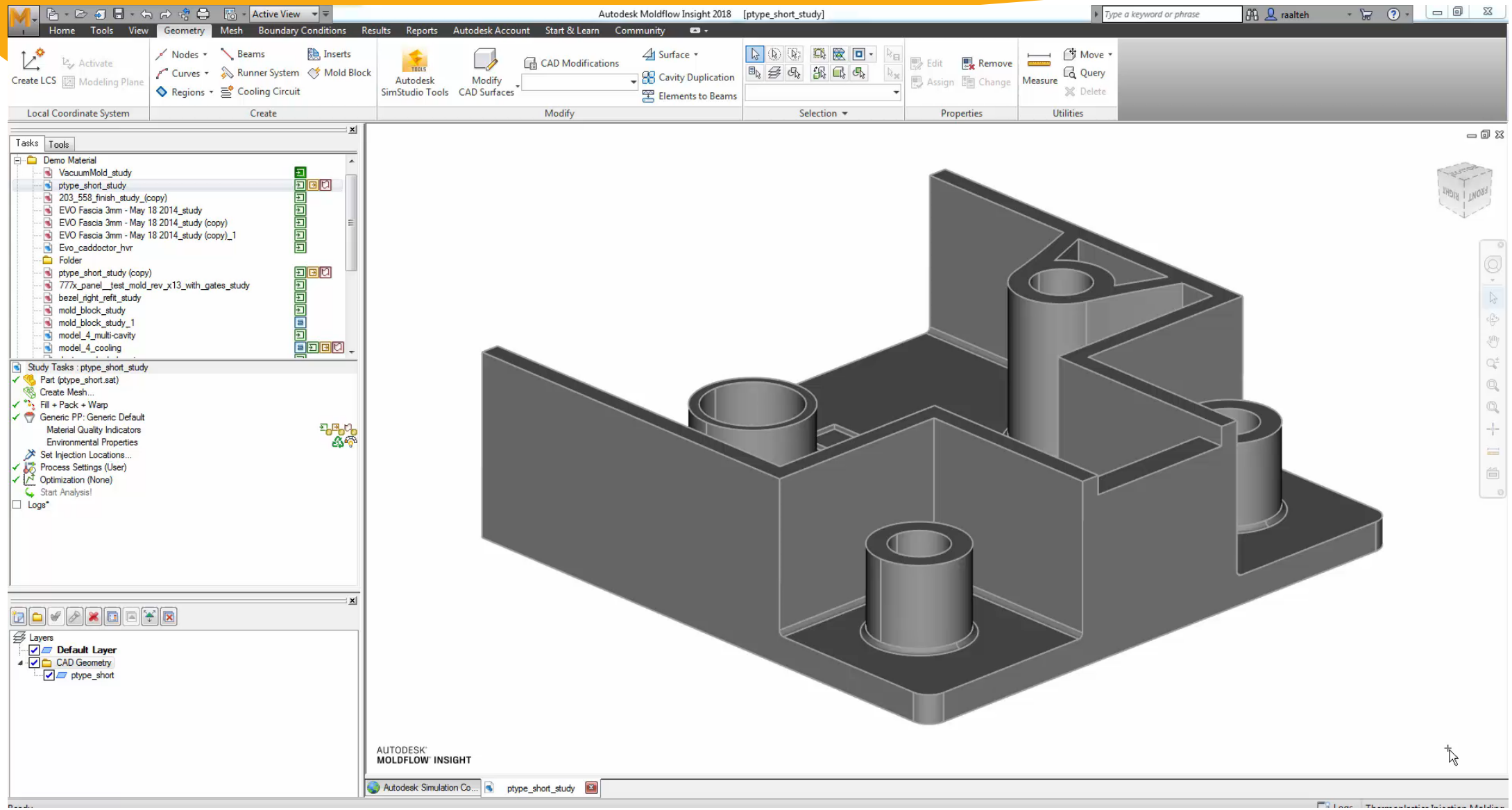


Parametric Geometry Optimization

- Select faces and save them as variables for in the Parametric Study

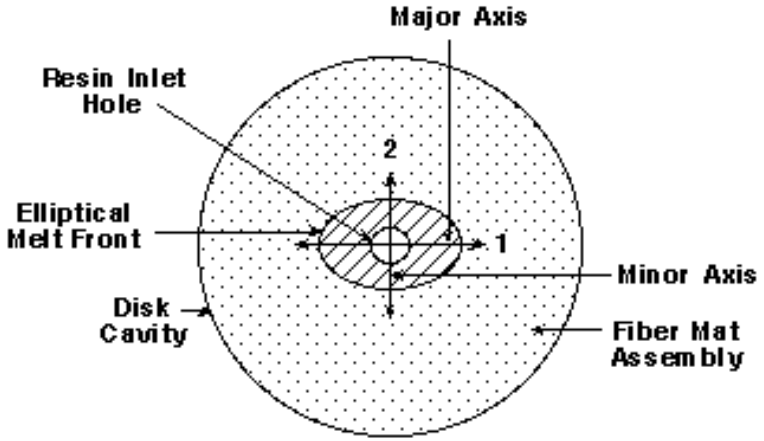


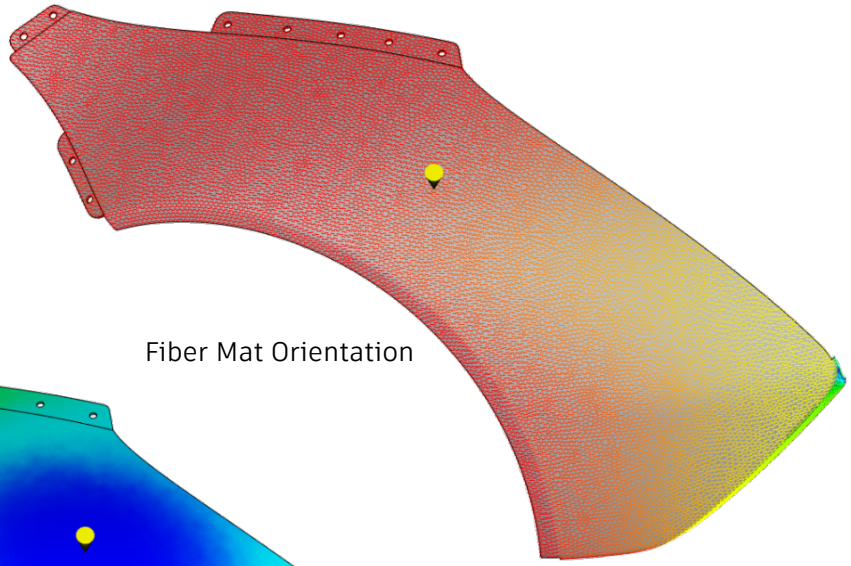
Parametric Geometry Optimization



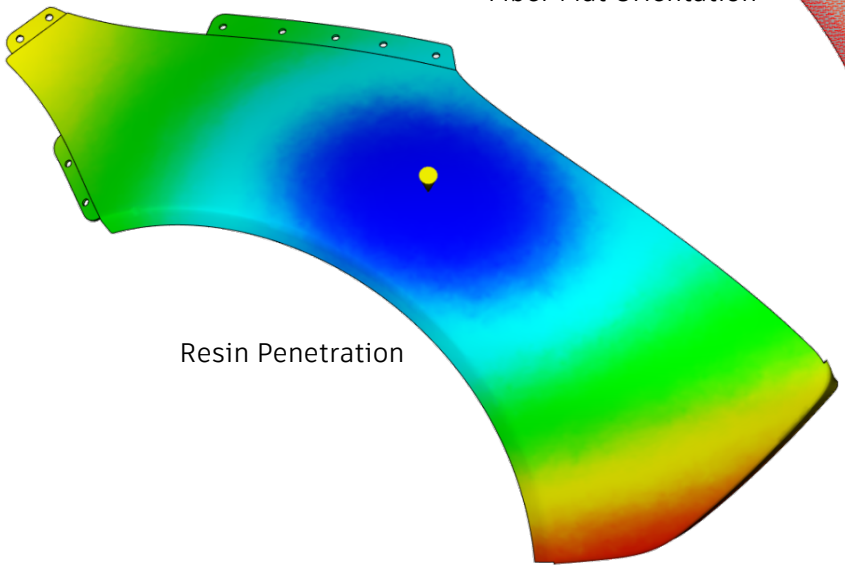
RTM and SRIM in 3D

- Simulate the Resin Transfer Molding process (RTM) in 3D
  - Apply a dry fiber mat properties where needed. Permeability properties automatically follow the shape of the product.
  - Detect areas where resin cannot penetrate.
  - Vacuum locations can be assigned





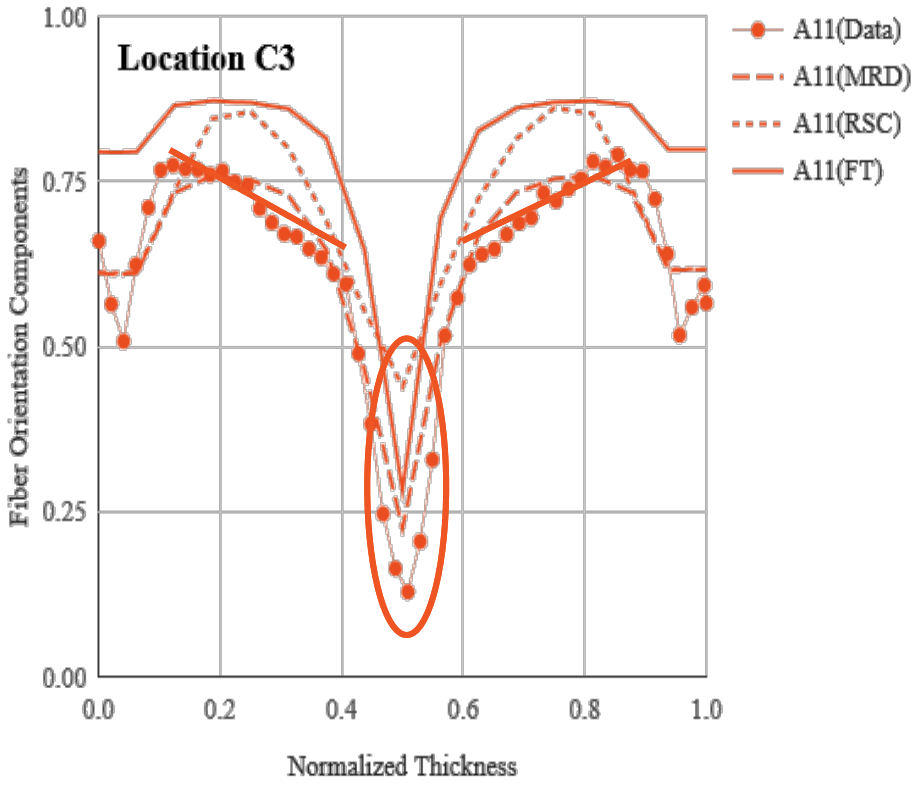
Fiber Mat Orientation



Resin Penetration

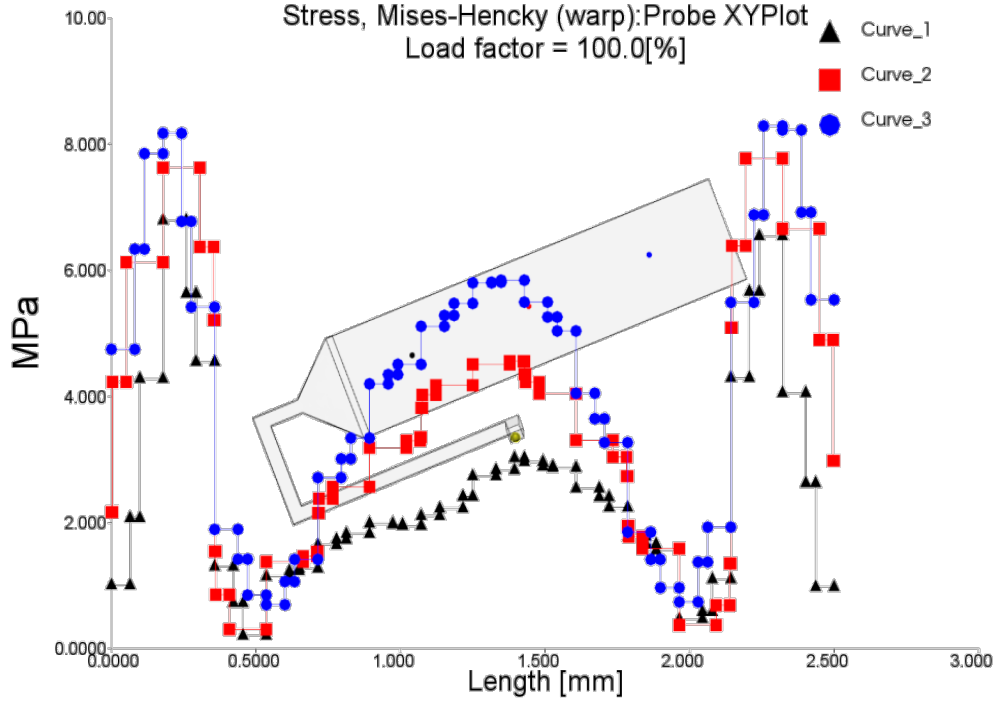
Fiber Orientation Improvements for 3D Flow

- Improved Fiber Orientation predictions for 3D (particular the core prediction)
  1. New default fiber orientation model
     - Moldflow Rotational Diffusion (MRD) model
  2. New default settings for RSC model
  3. New ORE closure model



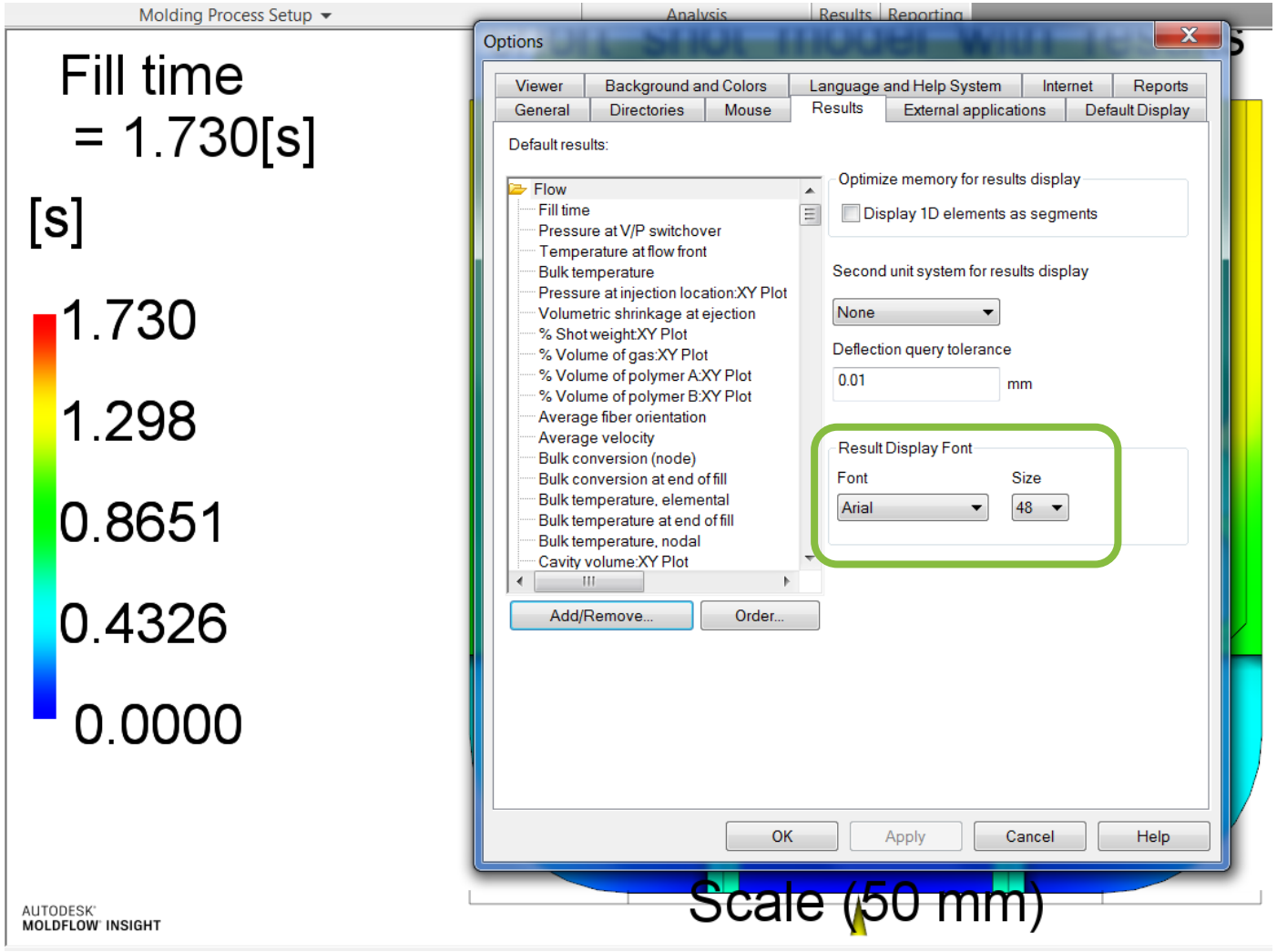
Residual Stress based 3D warp predictions

- Residual Stress based warpage prediction:
  - ‘Pressure at freeze’
  - ‘Stress tensor (warp)’ (after deformation)
  - ‘Strain tensor (warp)’ (after deformation)
  - ‘Maximum shear stress’ (warp)
  - ‘Stress, Mises-Hencky (warp)’ (after deformation)



Font Settings

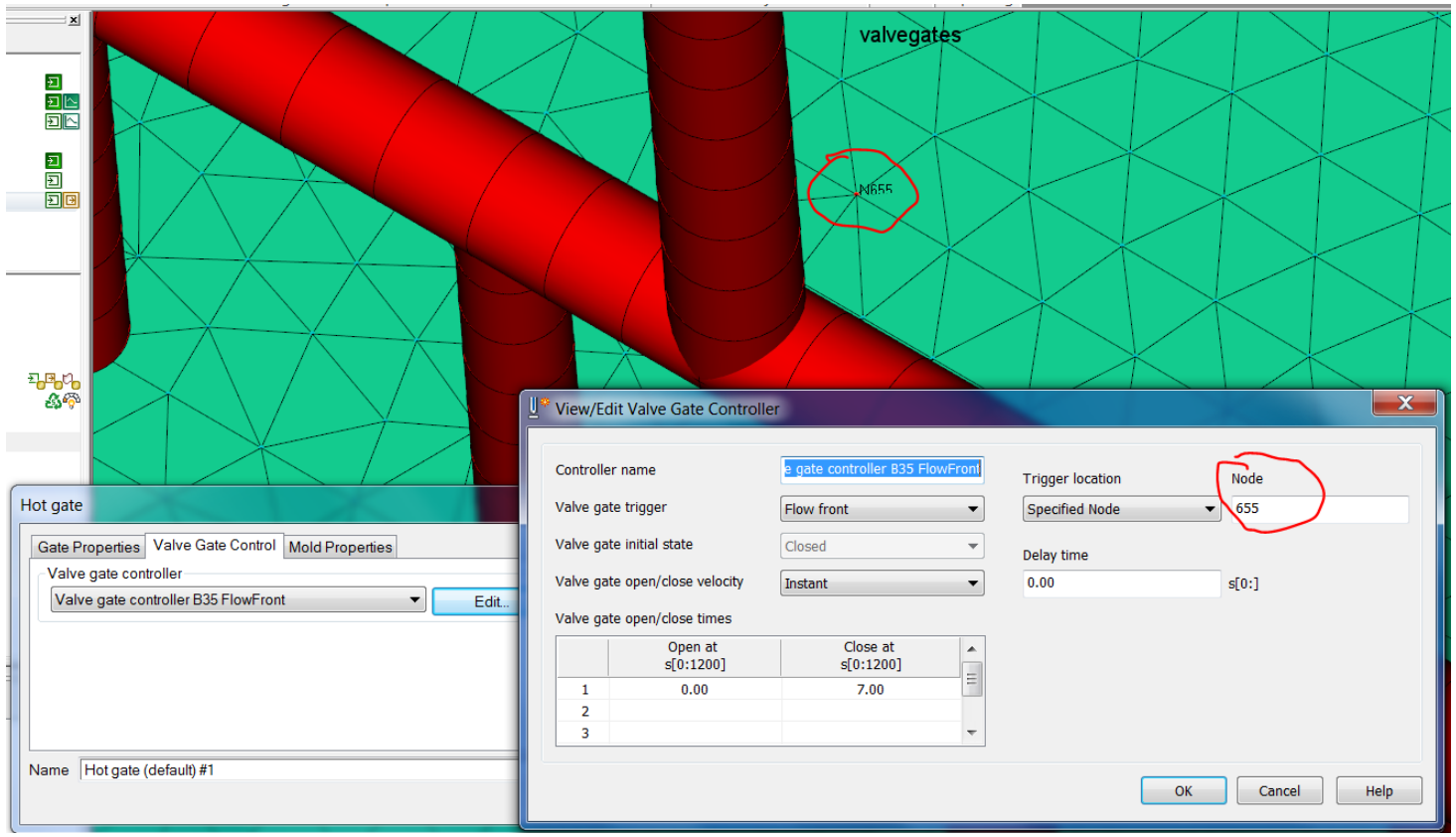
- Set Font Size/Type for Plot
  - Available in AMI/AMA/AMC
  - Also Available in 2017 Sp2
  - Set in Options > Results Tab



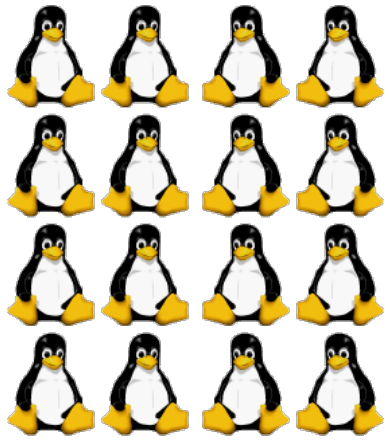
Valve Gate Trigger node Enhancement

Valve Gate Trigger Node

1) Highlight Trigger node with Node Name
2) Auto Update Node Number after mesh editing (e.g. Global merge to re-number nodes)

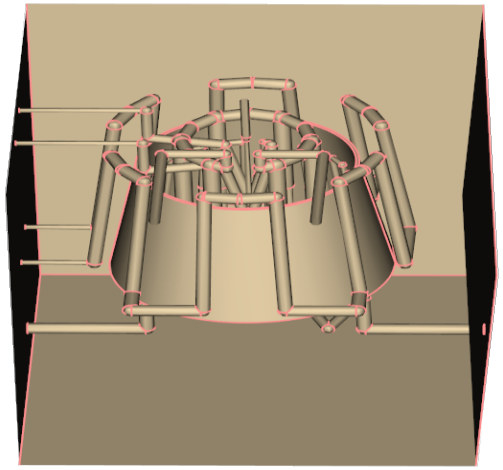


Moldflow Insight 2017.3 | Tentative Release Summary



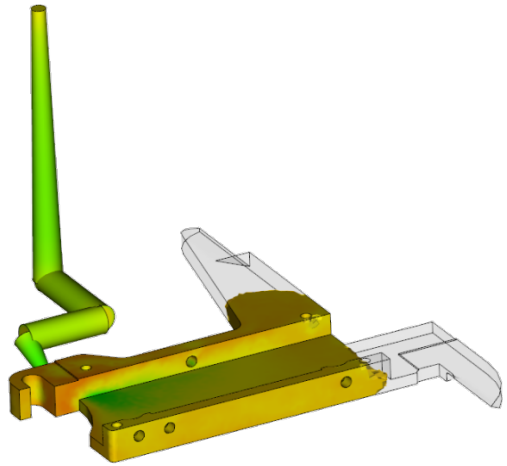
Market Impact

- Linux HPC support:
  - Meshing on Linux
  - Distribution queue on Linux



Productivity & Customer Intimacy

- Improve Model setup speed
  - Automatic refinement
  - Create Mold as Solid Model
- Usability improvements:
  - Study duplication with results
- SJM:
  - Retain temporary data
  - Robust transfer for large results
- Mesh aggregation for new 3D Warp
- Geometry:
  - Delete/move bodies
  - New CAD export formats
- Valve gate timing dialogue

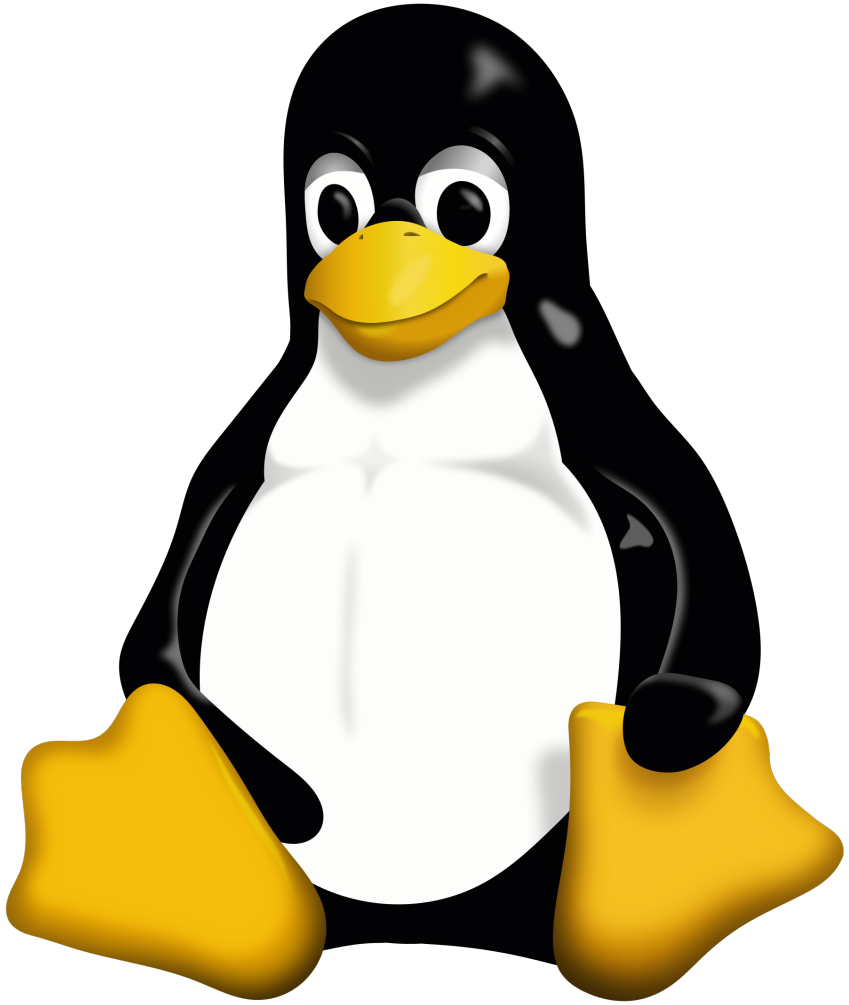


Leadership

- Moldflow on Autodesk Trust Center
  - Scoping work starting
- Powder Injection Molding (3D)
  - Metal Injection Molding
  - Ceramic Injection Molding

Expand Linux HPC Support

- Expanded support for Moldflow Insight on Linux to further support
  - Meshing can now be done on Linux
  - The new job manager now has a distribution queue for Linux



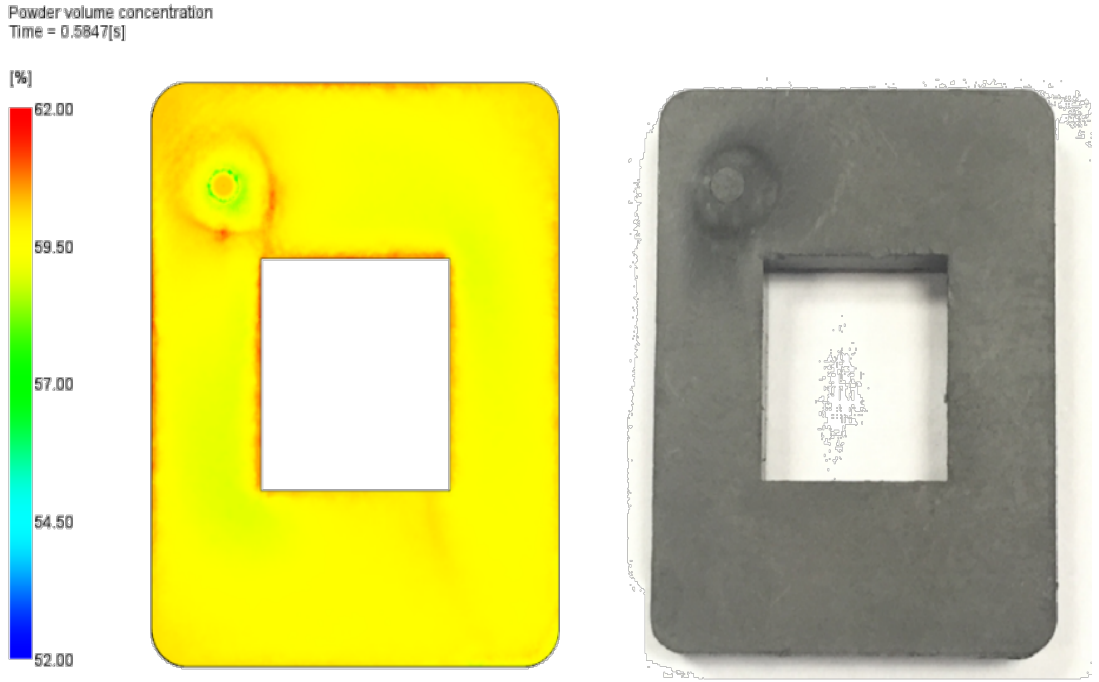
Simulate Powder Injection Molding (3D)

Powder Injection Molding (PIM) Process

- Mold filling simulation of Metal Injection Molding (MIM) and Ceramic Injection Molding (CIM) materials
- Predict the powder concentration
- Powder Volume Concentration

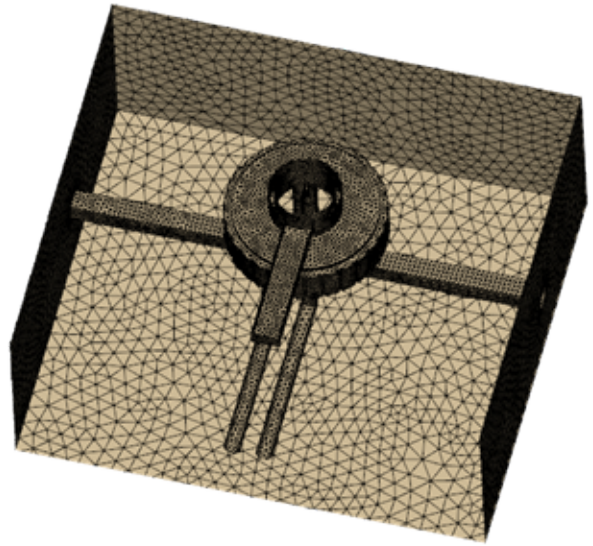
Material data for PIM

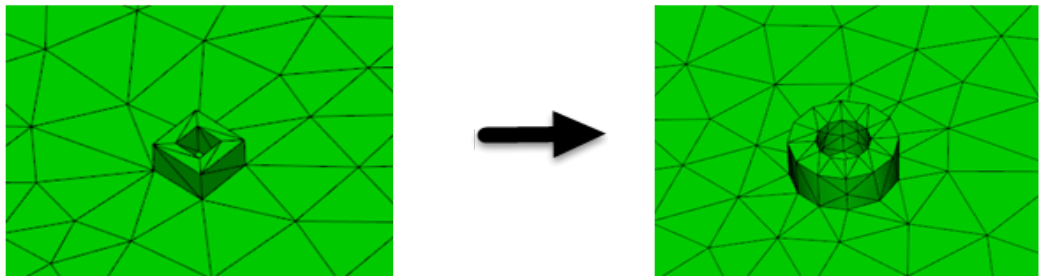
- Material test available
- Material data fitting support



Auto-sizing for CAD Surface Mesh Generation

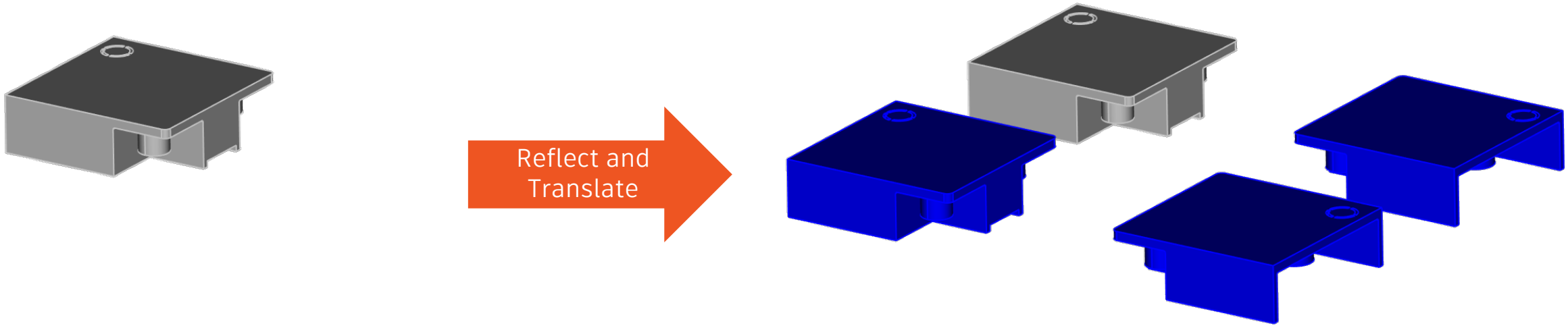
- Automated local edge length control
- Users can adjust edge length by a “scale factor”
- User defined settings override automatic options
- Fillets are ignored
- Large elements on external Mold boundaries, smaller elements on internal boundaries
- Same edge length on surface meshes of assembly contact interfaces





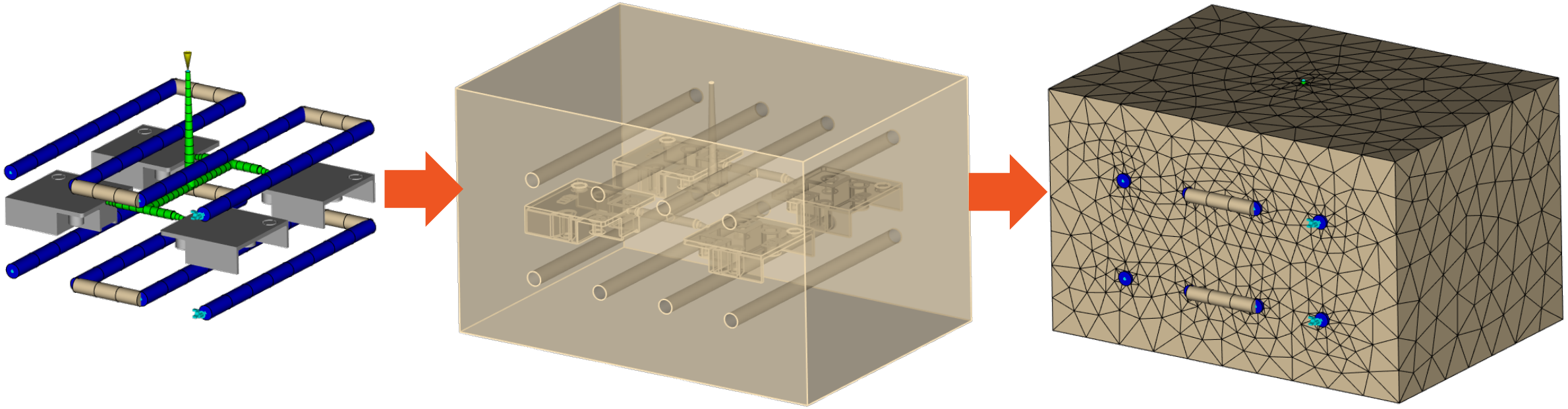
Improved abilities working with CAD models

- Improvement in CAD model handling in Moldflow Synergy and new CAD export format
  - Delete components of an assembly or mold that are not needed.
  - Copy and move individual CAD bodies.
  - Export Warped or Windage model in .step format



Model preparation Quality and Speedup Mold Meshes

- Mold setup wizard can now create a Solid model of a Mold around a model for Cool(FEM)
  - Overall improved quality, robustness and workflow.



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Moldflow 2018.0

Moldflow Insight 2018.0 | What's New

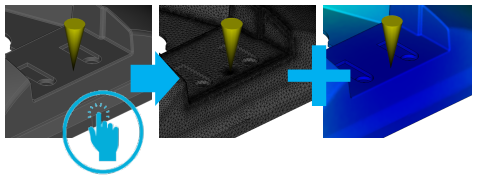
Market Impact

DOE/Parametric Study Improvements

- Design Optimization on Linux

Helius PFA entitled through Insight Ultimate MUS license

Productivity & Customer Intimacy

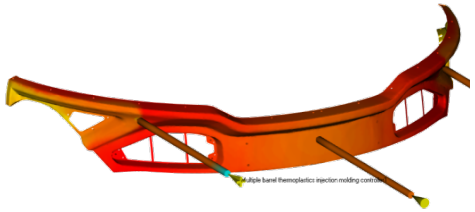


Analysis setup improvements:

- Ones click Mesh + Solve

Updated support for 3D Connection devices

Leadership



Multi-barrel inj. Molding Simulation

- Mipdlane/Dual Domain/3D
- Individual control for Molding Barrels

Compression Molding Improvement

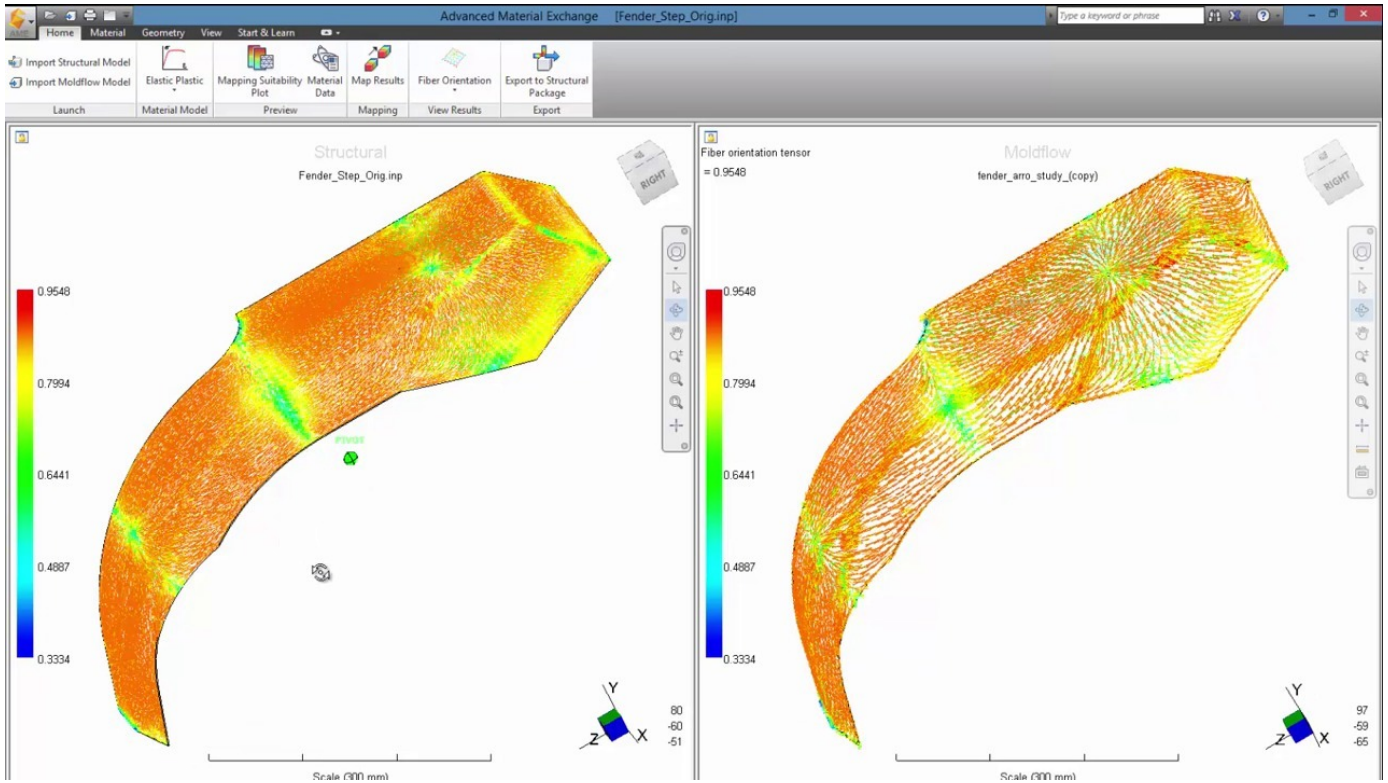
- (Injection) Compression Molding + Injection Overmolding
- Improved Pre-conditioning in Reactive Compression Molding

Expanded Solver API support

- Solidification

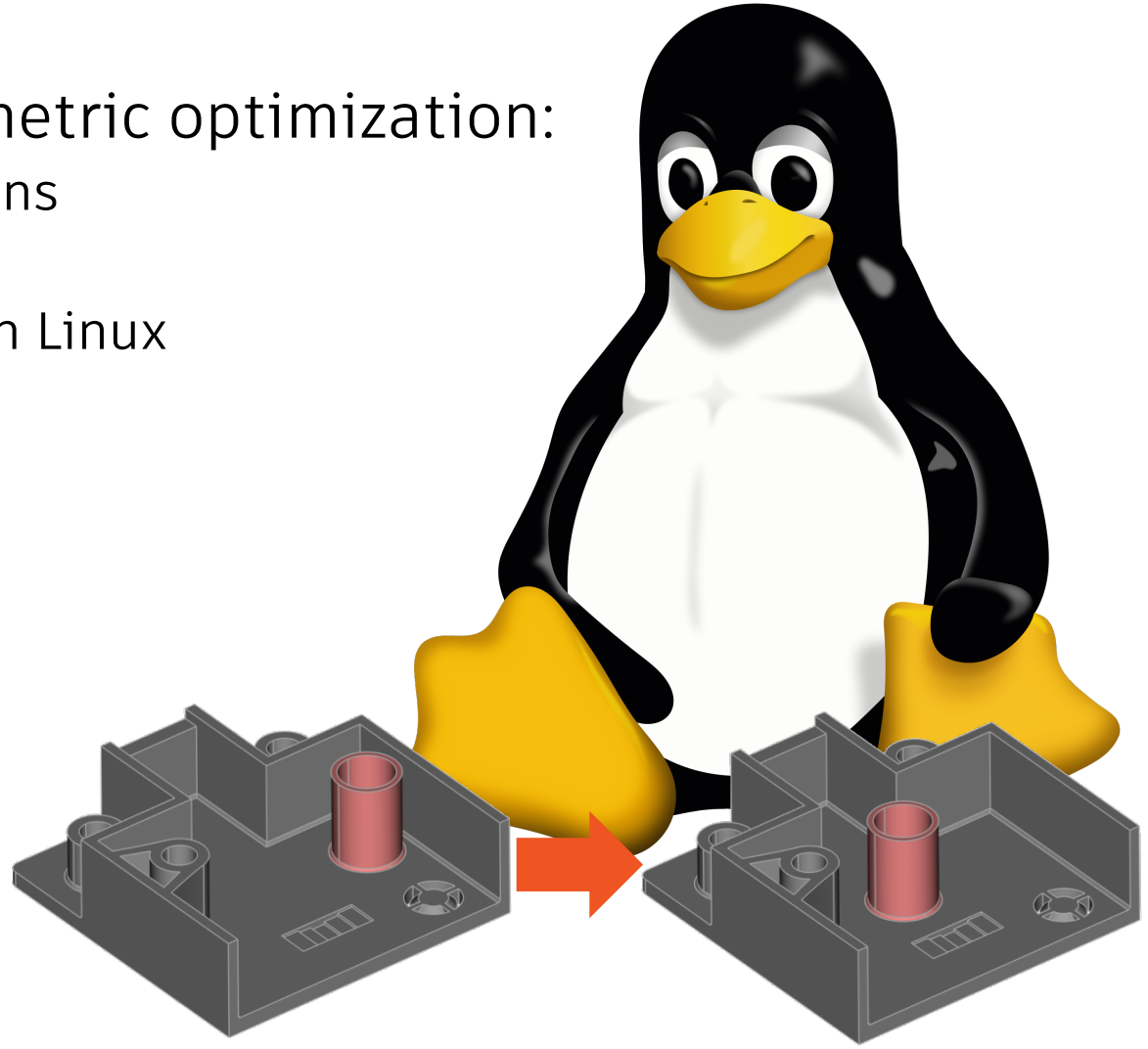
Moldflow Insight 2018.0 | Helius PFA On Moldflow Insight Ultimate Subscription

- Moldflow Insight Ultimate Subscription licenses also provide access to Helius PFA.
  - Look at structural performance of plastic parts
  - Material data is optimized between Moldflow and Helius.

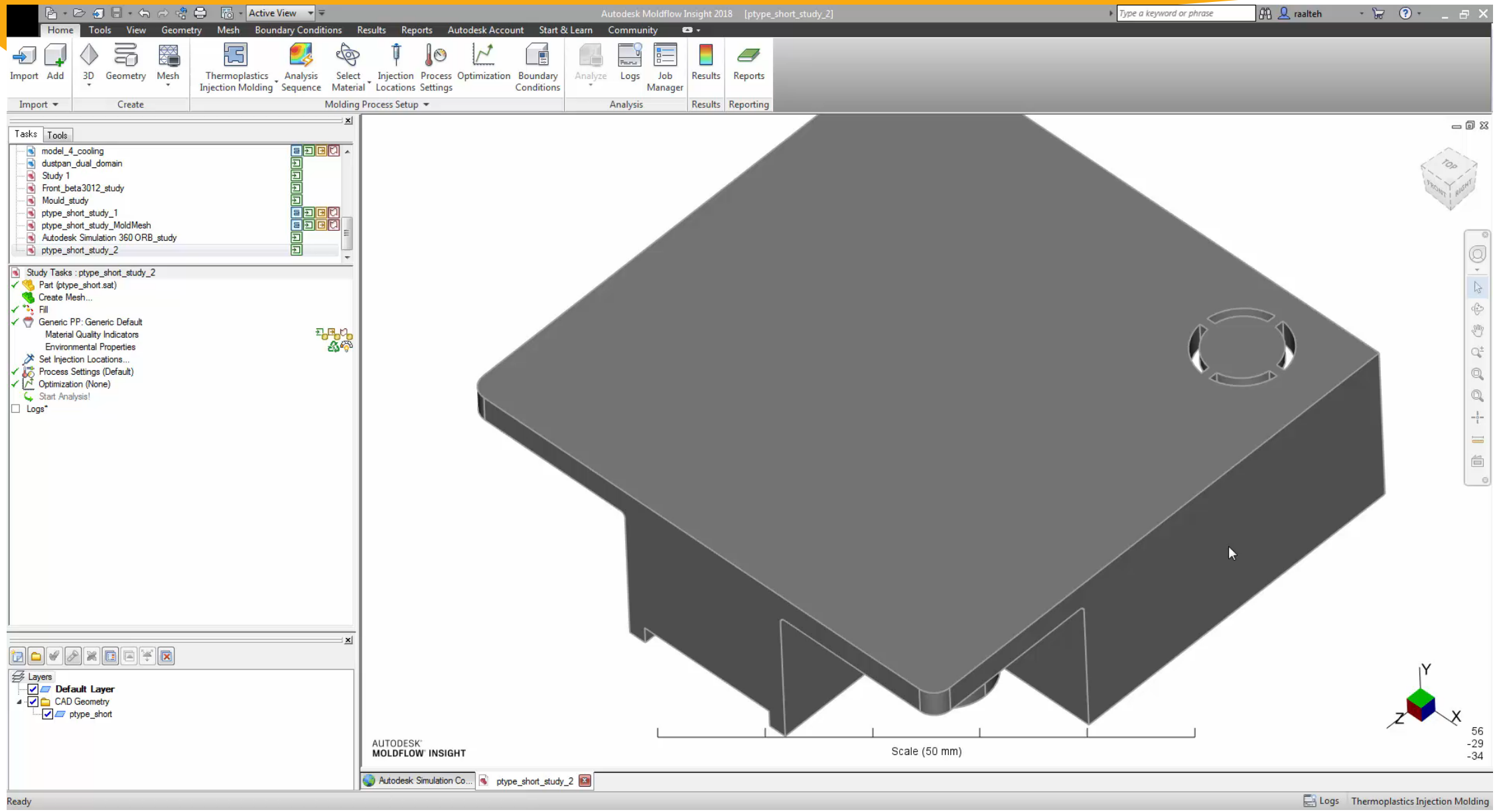


Moldflow Insight 2018.0 | DOE/Parametric Study Improvements

- Improve design change and Parametric optimization:
  - Success with much larger deformations
  - API support for model changes
  - Design Optimization study support on Linux

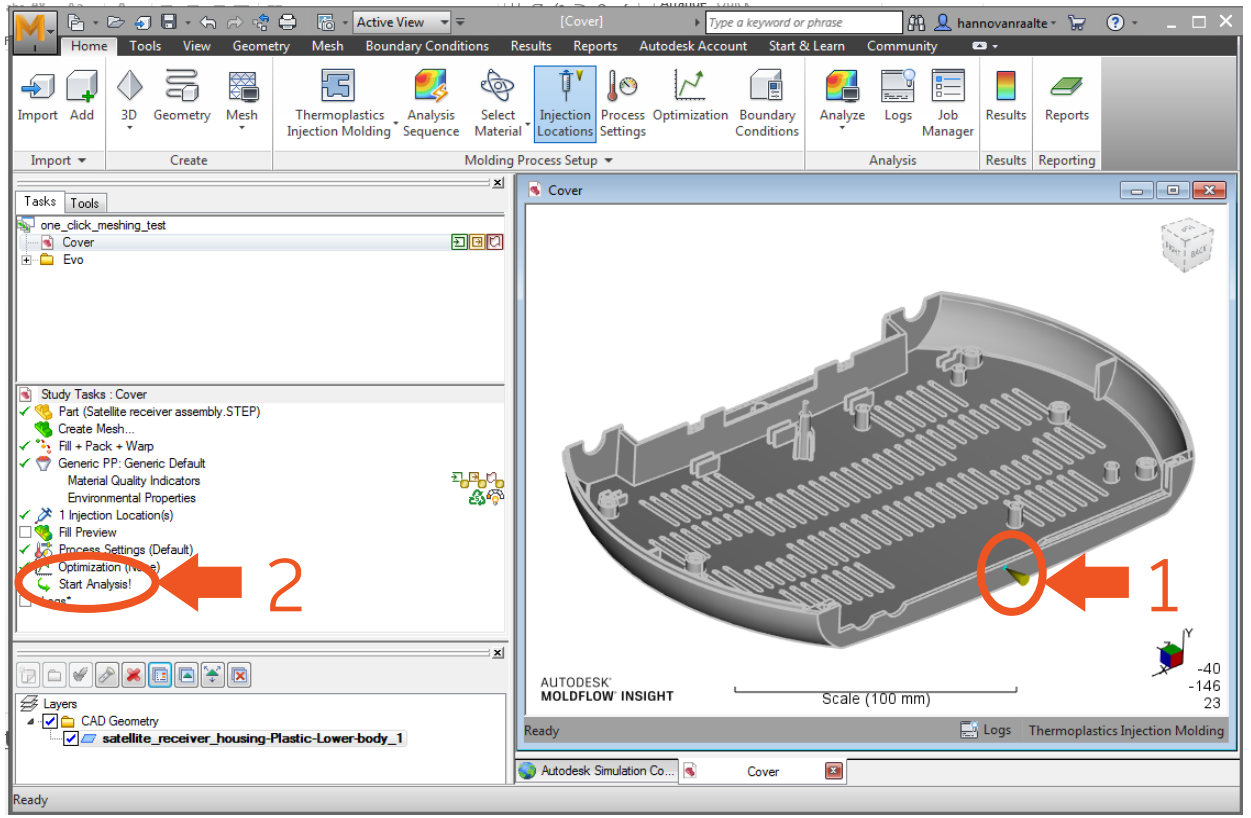


Moldflow Insight 2018.0 | Auto-mesh analysis



Start Analysis Directly from CAD model

- Shorter analysis setup time:
  - Optional workflow to start analysis directly on CAD model
  - Supported for 3D and Dual Domain
  - Meshing done automatically



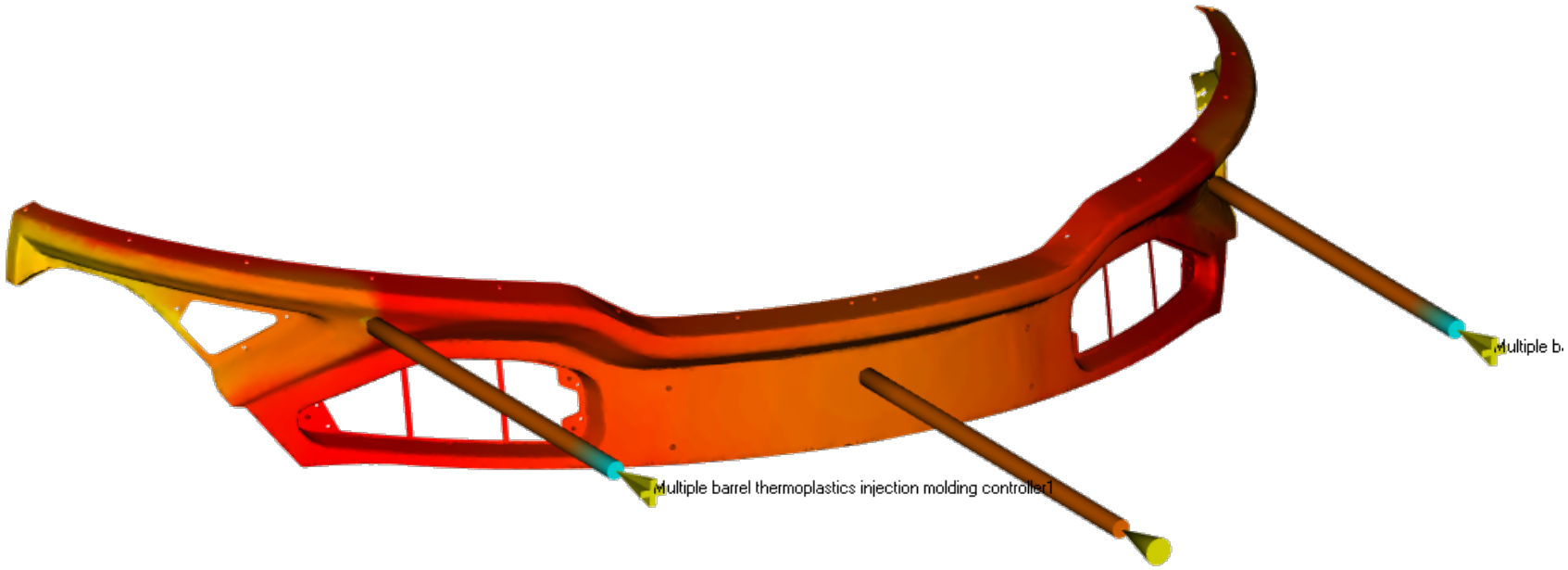
- Current Limitations:
  - Cool (FEM) not supported
  - Valve gates not supported
  - No support for 3D Hot Runners

Support latest Drivers of 3D Connection Devices

- Restored functioning of 3D Connection devices.
  - Updated to Driver version 10.x

Multiple Barrel Injection Molding Simulation

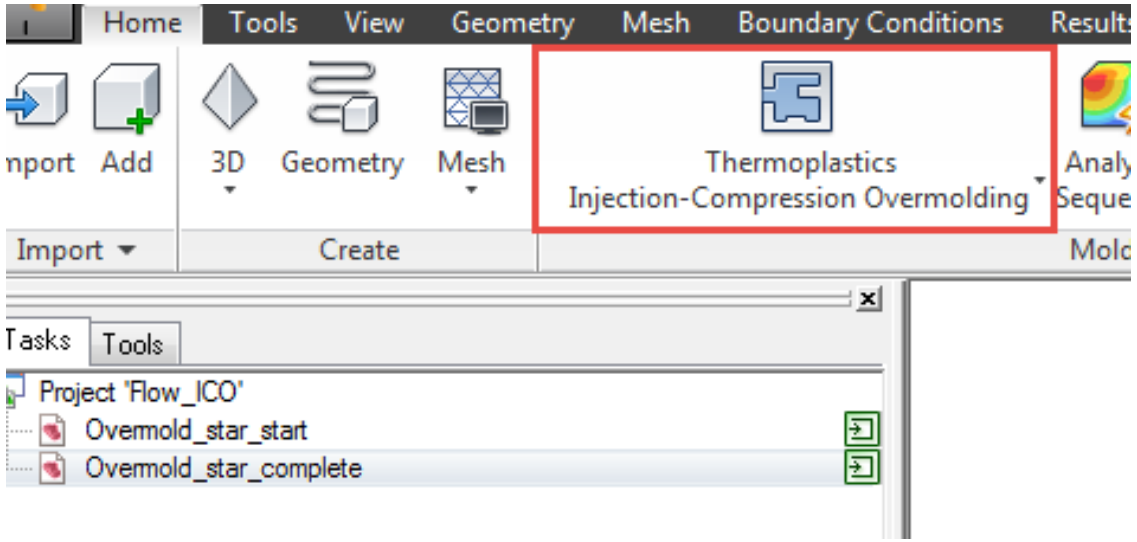
- Simulate the Multi-barrel Injection Molding process:
  - Multiple independently controlled injection molding barrels injecting into the same mold cavity.
  - Supported for Midplane, Dual Domain and 3D models.



Other Improvements

- Improvements to Injection-Compression and Compression
  - Simulate thermoplastic Injection molding and an overmolding with Injection-Compression molding
  - Calculate temperature distribution and material curing in the ‘charge’ during the pre-conditioning in thermoset compression molding

- New Solver API for solidification behavior



Outlook

Moldflow | Quarterly Cadance

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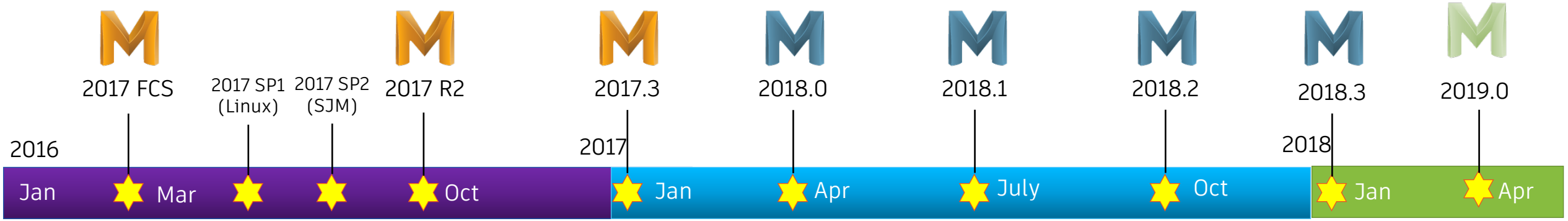
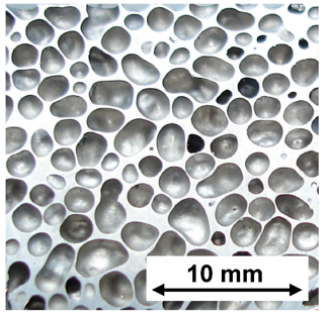
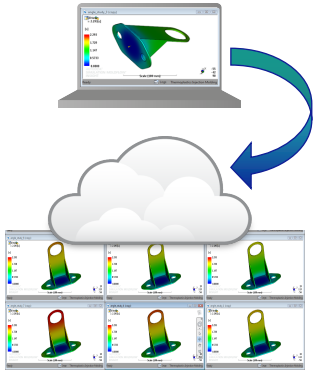




* Cloud access for Insight users
* Foaming with Core Back
* Foaming with Blowing Agent

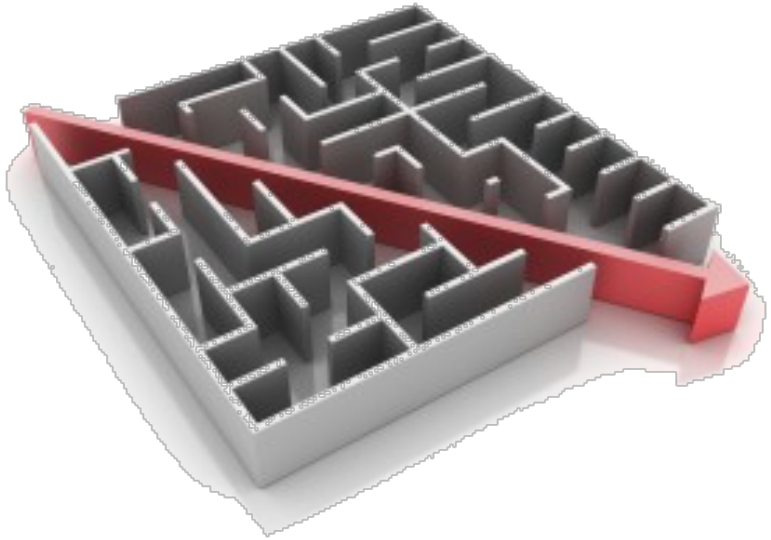


* Design Optimization
* Adviser Re-stack

* MIM/CIM
* Mesh generation improvements

* One Click Mesh+ Solve
Multi-barrel inj. Molding

Areas of Focus



Efficiency improvements

Optimization and Automation

Components

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Make anything.