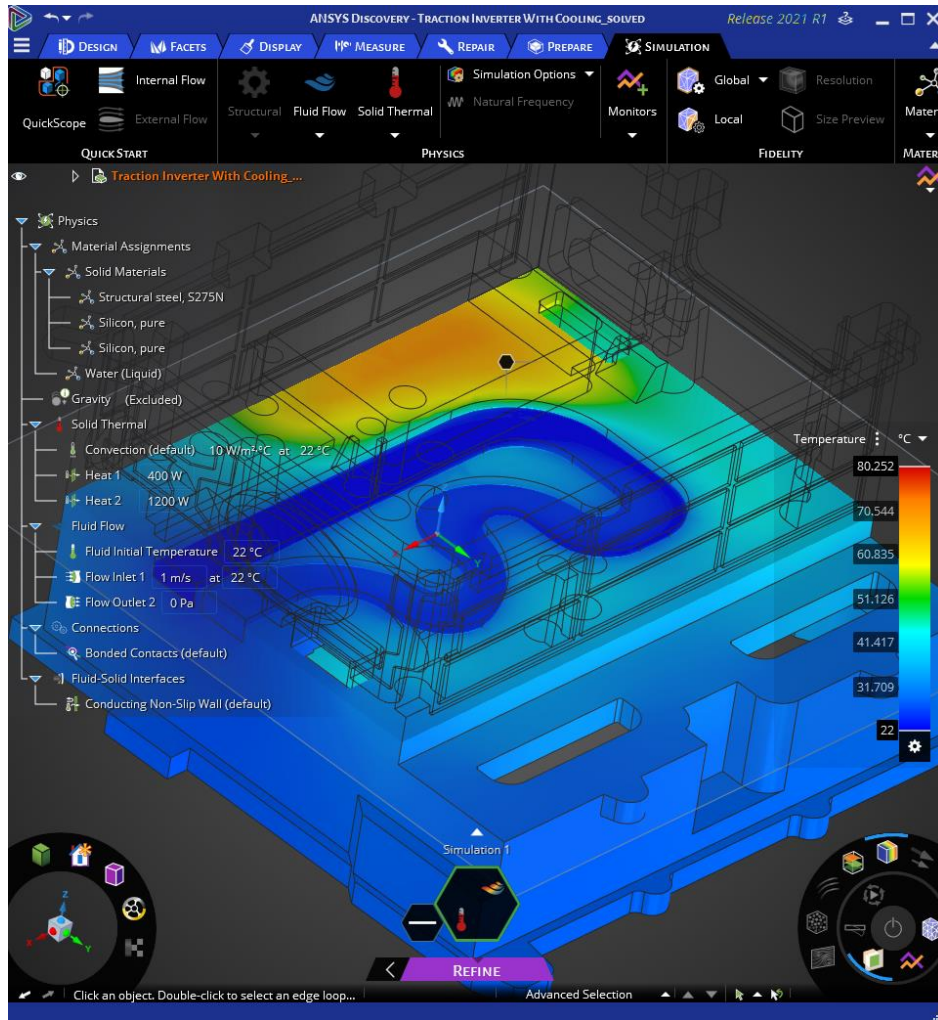


Ansys 2021 R1 Highlights

Ansys Discovery



Discovery 2021 R1 - Enhancements



Liquid cooled traction inverter
(Structural-fluid thermal simulation)

Thermal Management
(manifolds, heat exchangers,
electronics cooling)

**Coupled fluid-structural
thermal simulation (Refine)**
Automated physics-aware
workflow

Flow Control Devices
(valves, manifolds)

Improved Explore fluids accuracy
Engineering-based convergence
Refine results during solve

Strength & Stiffness
(bolted/welded assemblies)

Explore prevented contact (R2.5)
Remote displacement (Refine)
Frozen regions for topology
optimization (Explore)
Prevented contact for topo. opt.

Physics Use Cases

Collaboration & Interop.

Ansys Cloud w/ VDI
Report generation
Direct launch of Mech/Fluent
Mesh transfer to Mechanical
Student edition

Productivity

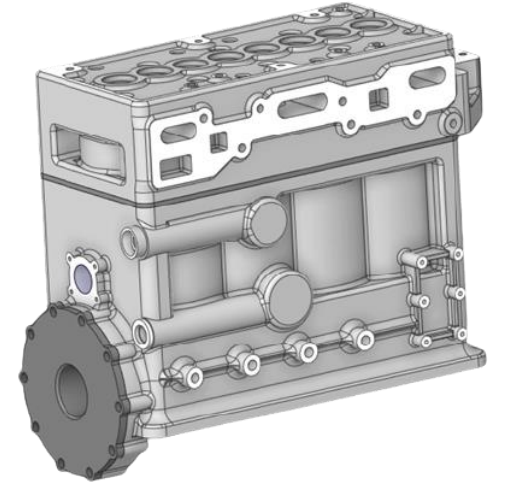
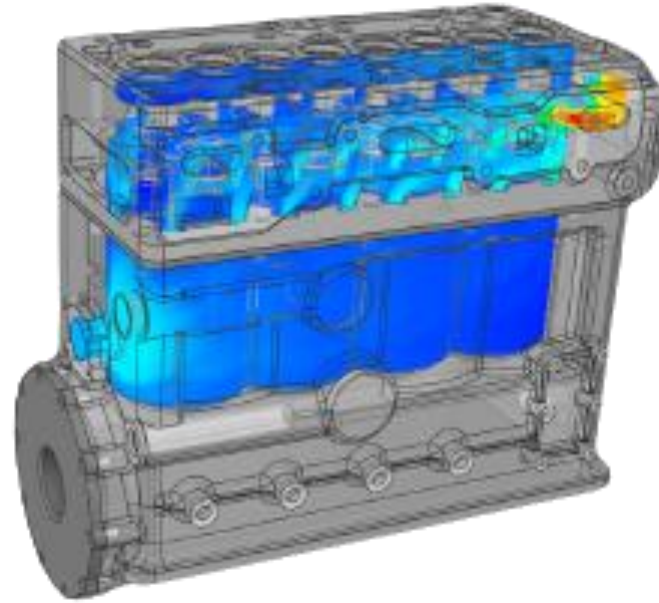
Large performance improvements
Parameterize physics inputs
Quick Scope tool
Control physics legend units
Faster and smoother result rendering
Visualize min feature size (Explore)
High-quality geometry transfer from
SpaceClaim
Results/visibility settings stored per
simulation
New monitor types & locations
Export monitor values
Interference & Clearance tools
Many user experience updates to
accelerate workflows and improve
feedback



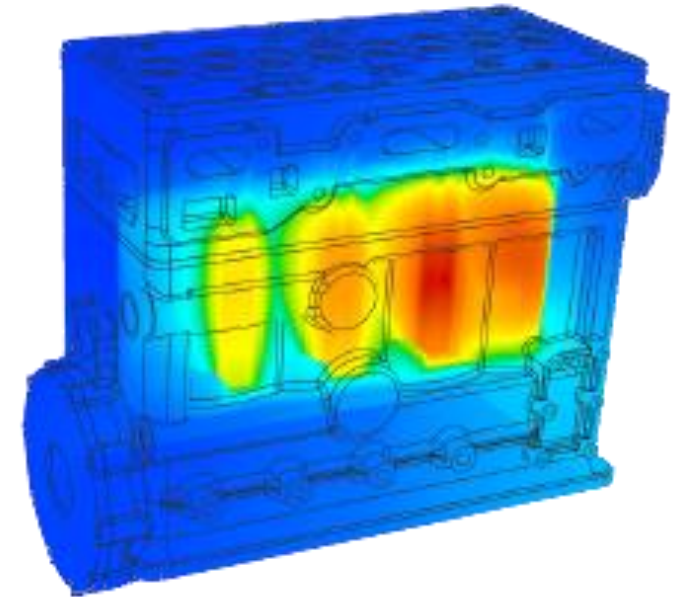
Physics

Fluid-Solid Thermal Simulation (Refine)

- Automated workflow for fluid-solid-thermal simulation (CHT)
 - Fluid and solid thermal regions automatically defined by materials and conditions
 - Automatic definition of fluid-solid interfaces and bonded thermal solid connections
- Evaluate thermal and fluid performance of manifolds, water jackets and heat exchangers

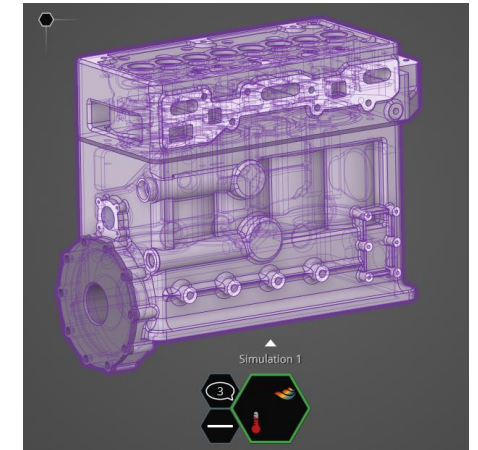
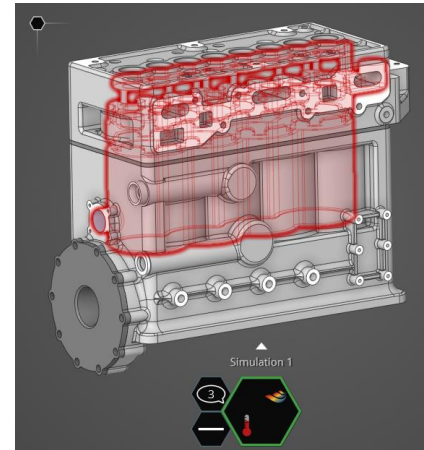


Engine water jacket conjugate heat transfer, fluid velocity and fluid and solid temperature

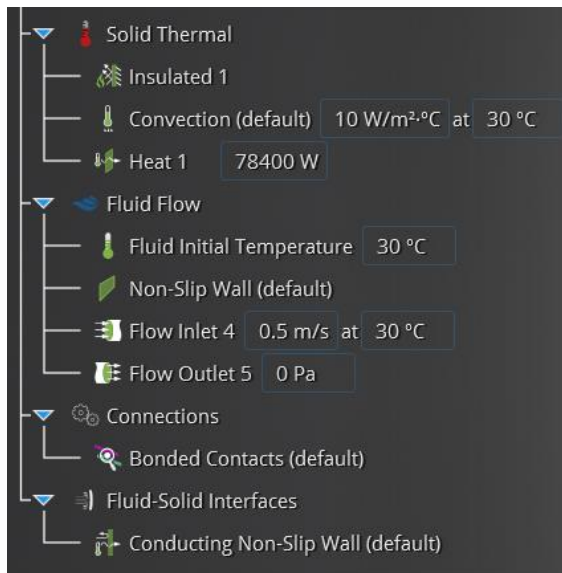


Fluid-Solid-Thermal Simulation (Refine)

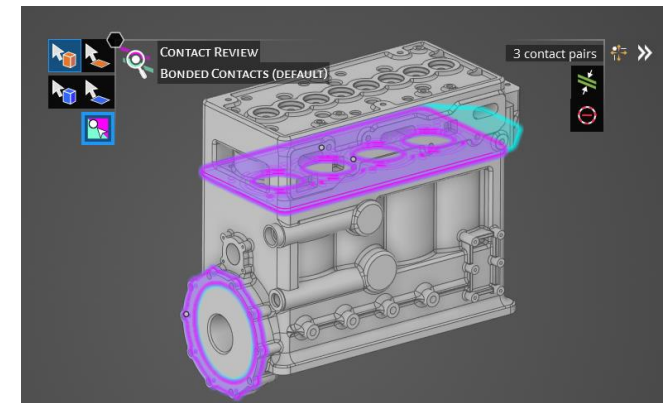
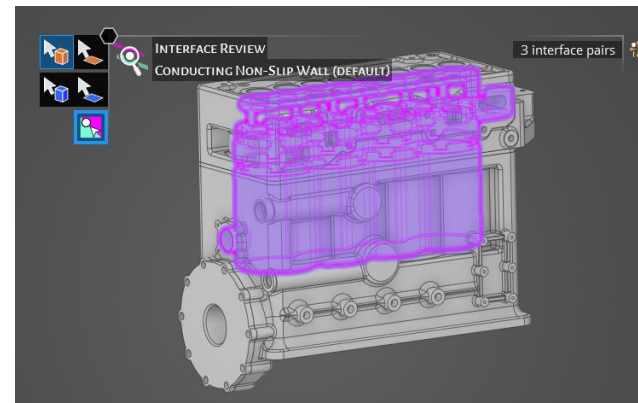
- Many productivity and automation features
 - Automatic definition of physics regions
 - Automatic tree grouping of physics and interfaces
 - Review tools for fluid-solid interfaces and bonded connections



Hover over SID icons to identify fluid and solid regions



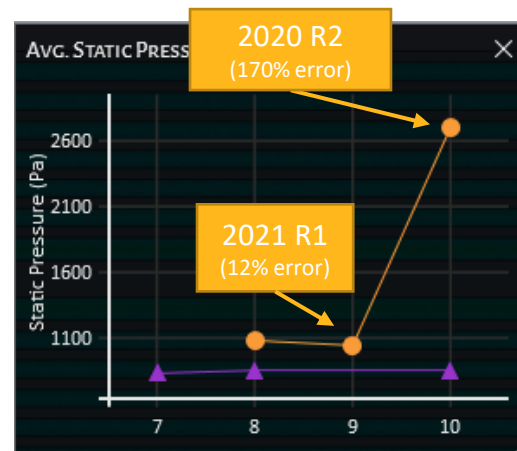
Automatic grouping of physics



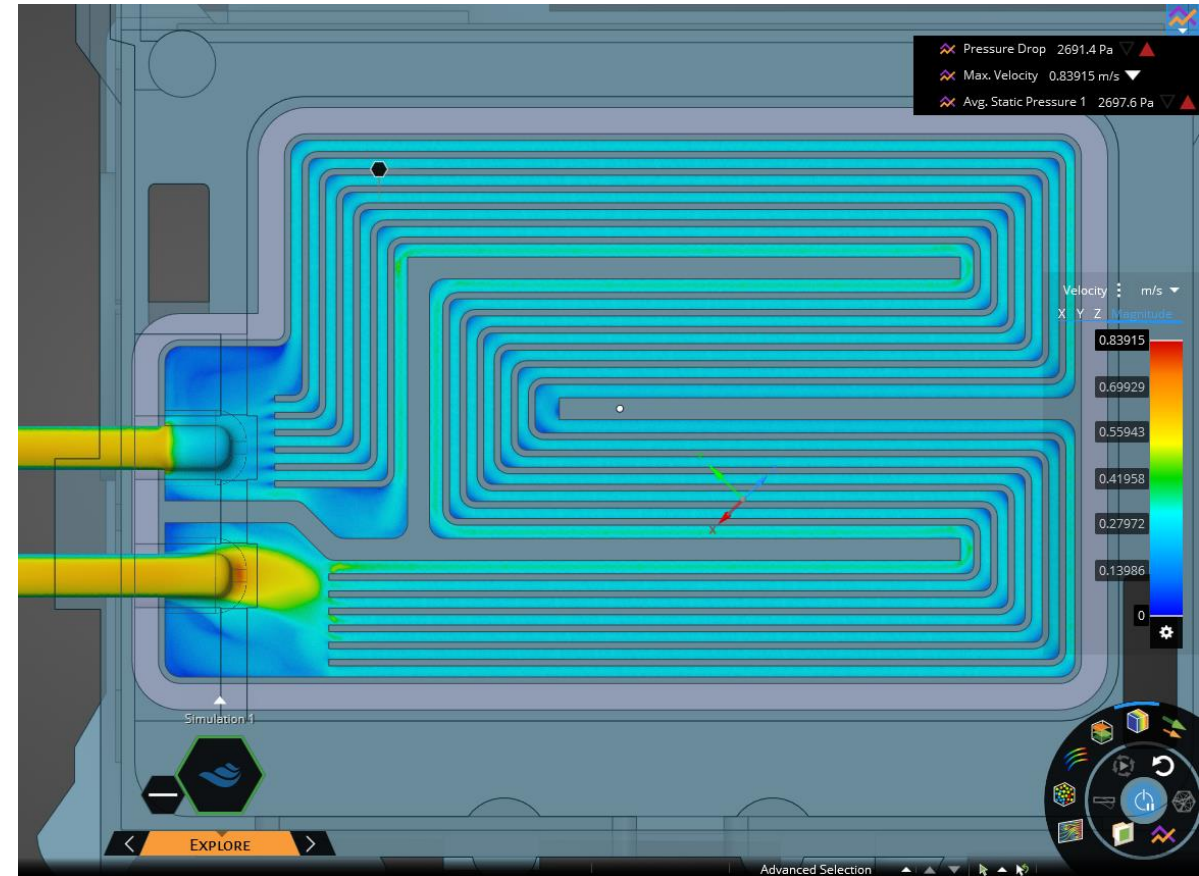
Review fluid-solid interfaces and connections using interface review tools

Improved Accuracy for Steady-State Fluids (Explore)

- Enhanced Steady-State Fluids
 - Improved discretization of the fluid domain more accurately represents wall surfaces
 - Improves accuracy of pressure drop and flow field for cases where pressure loss is primarily due to surface friction
 - Better correlation with Refine results

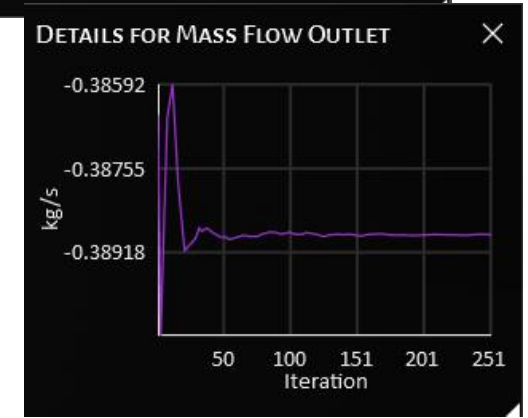
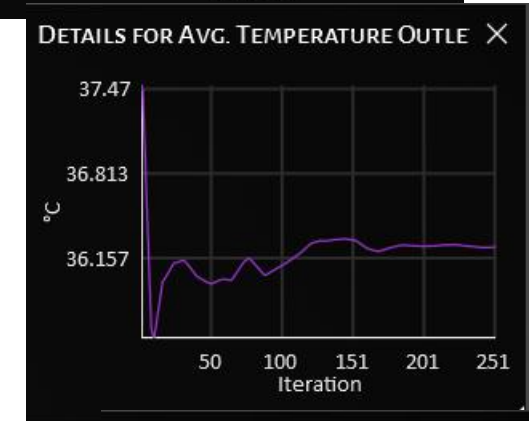
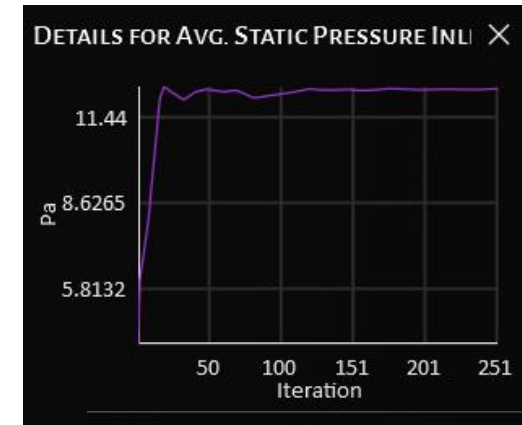
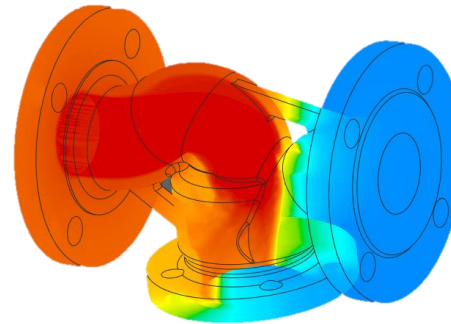
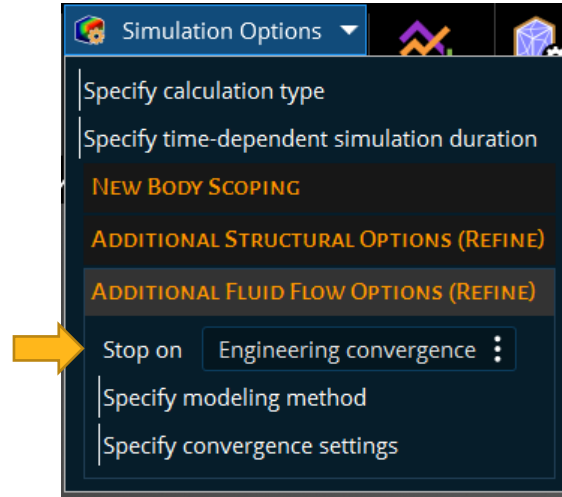


Largest improvements can be seen when flow surfaces are not well aligned to grid axes (X/Y/Z)



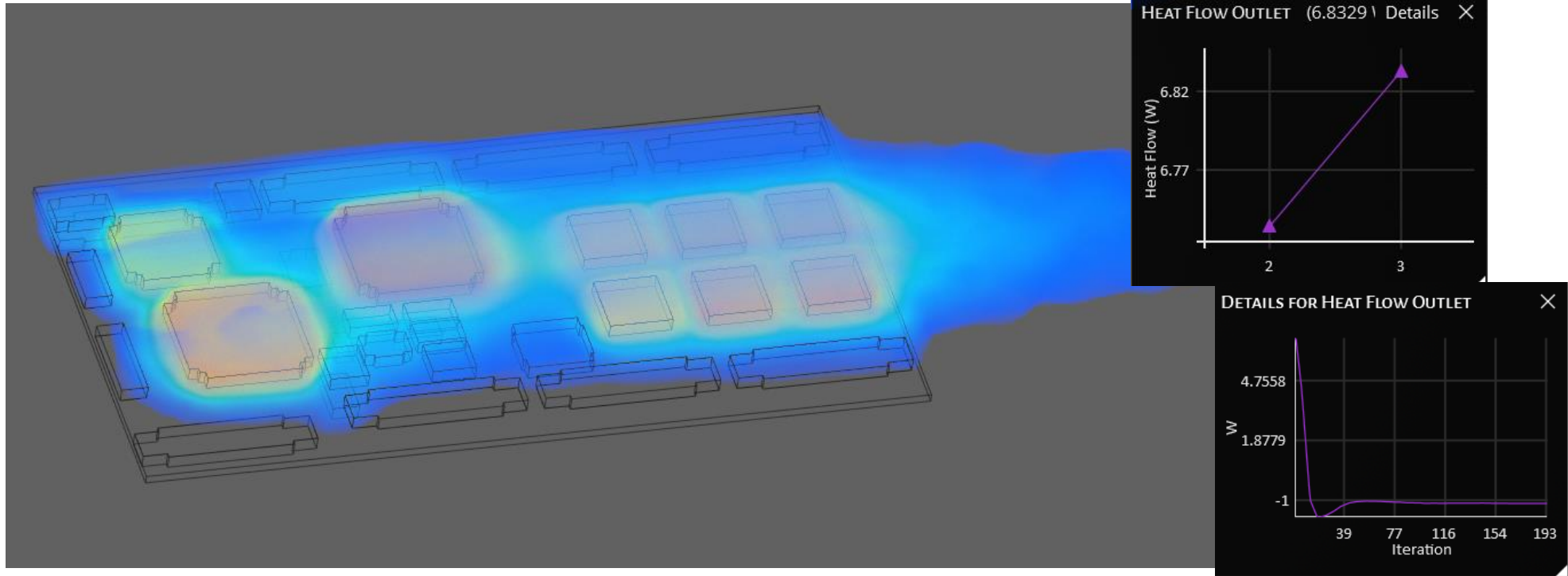
New Default Engineering Convergence (Refine)

- Engineering Convergence
 - Automatically defines convergence monitors based on physics and conditions
 - Monitors engineering quantities on inlets, outlets, walls and fluid-solid interfaces
 - Velocity, mass flow, total pressure, temperature and/or heat flux depending on condition
 - Stops solution when all engineering quantities are stable
 - Can define additional user defined monitors to review convergence behavior
 - Automatically ensures engineering quantities are stable
 - Pressure drop, mass flow, heat flux, etc.



Monitor Enhancements

- New Fluid Monitors for Heat Flow and Heat Flux (Refine)
 - Useful for evaluating & understanding heat transfer



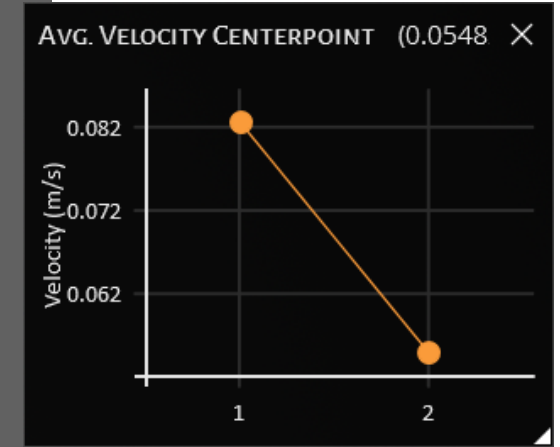
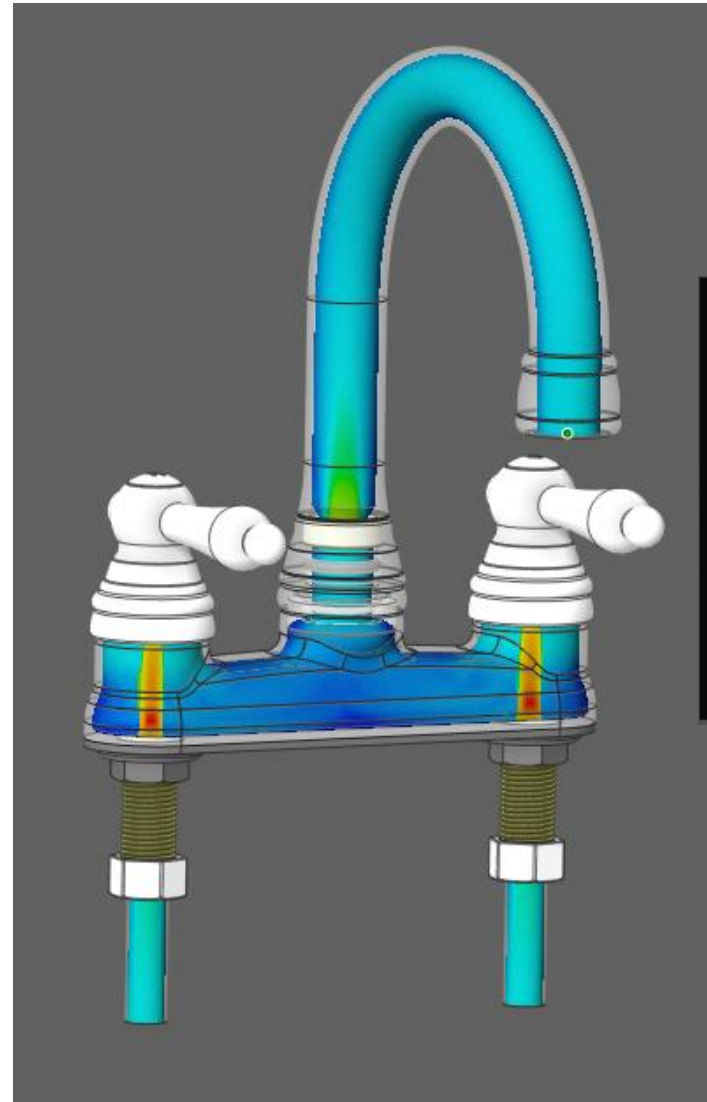
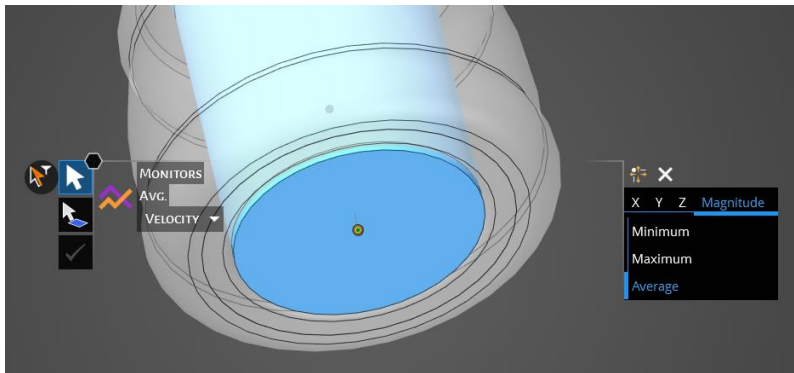
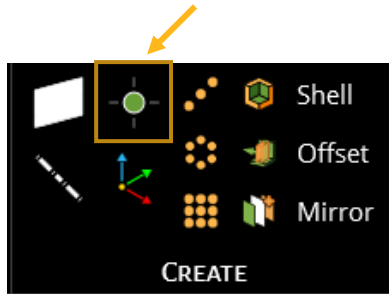
Evaluate heat balance and heat convergence with heat flow monitors



Monitor Enhancements

- New option to create Monitors at datum points (Explore)
 - Provides additional flexibility for monitoring results

Create datum points to define results monitors at point locations

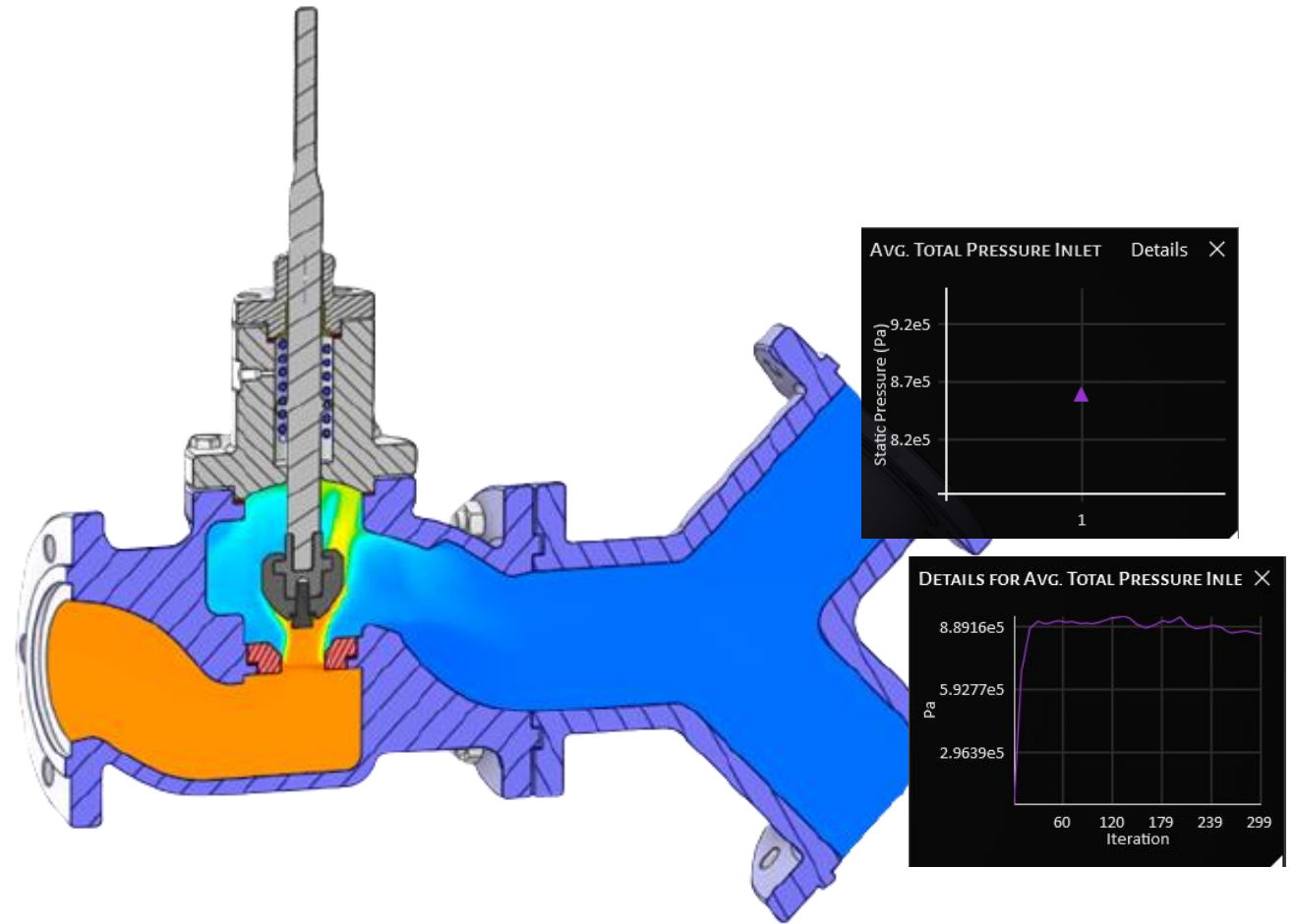


Velocity monitor at center point of faucet outlet



New Results Variables

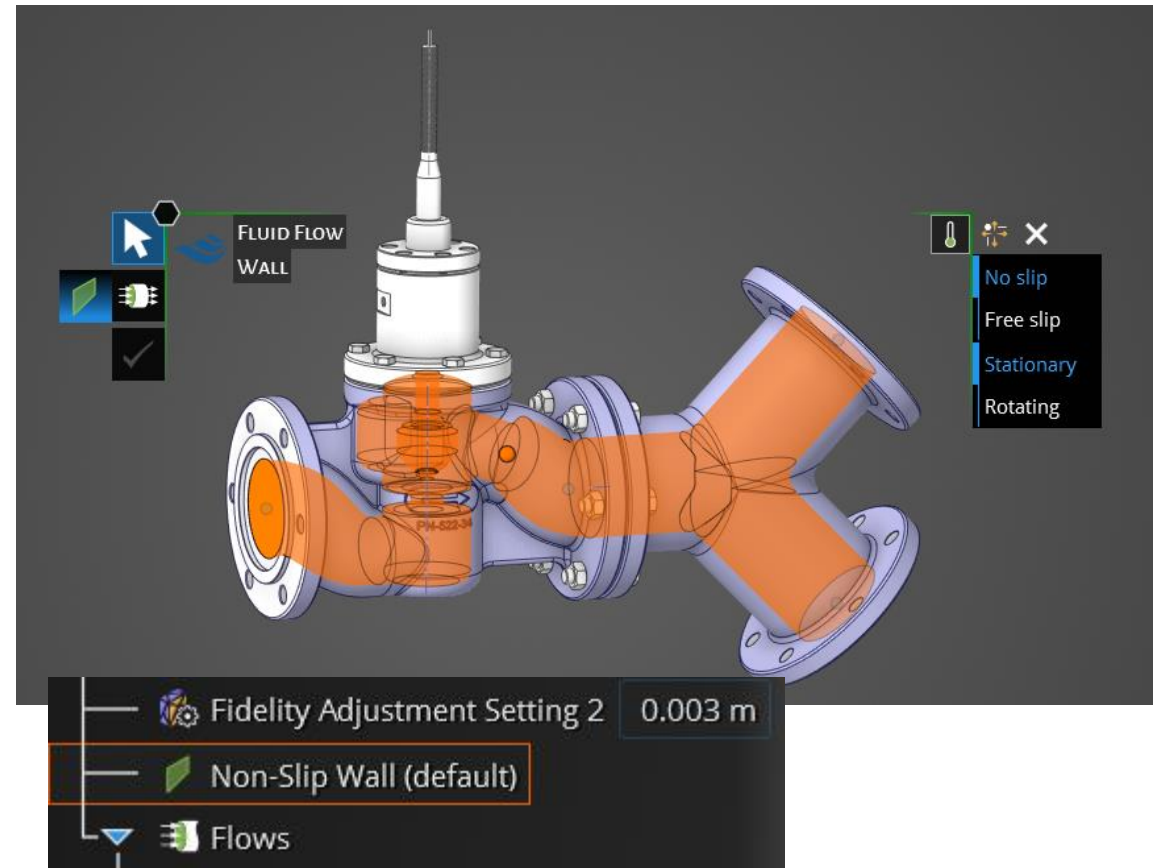
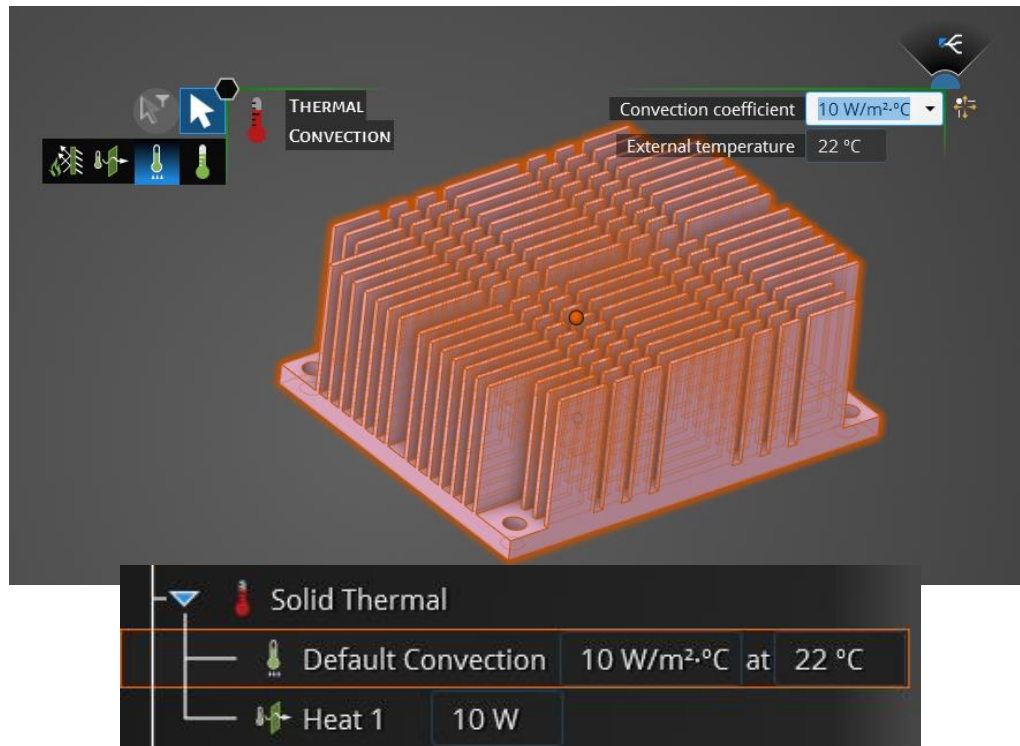
- New Pressure Results
 - Static Pressure and Total Pressure
 - Static pressure (formally Pressure) is the gauge pressure
 - Total pressure is the gauge pressure obtained by bringing the fluid to rest, also referred to as stagnation pressure
 - Pressure drop calculation now based on total pressure
 - Improves accuracy of pressure drop, and provides more realistic pressure values for high velocity applications where the dynamic pressure is significant



Total Pressure Contour Results and Monitors

Display of Default Walls and Convection

- Default fluid walls and default convection now display location highlighting



Easily review locations of default convection and default wall conditions

Results Display During Fluid Solution (Refine)

- New physics setting to display intermediate results during Refine fluids solution
 - Display velocity, pressure, temperature, etc.
- Provides visual feedback of fluid results during solution

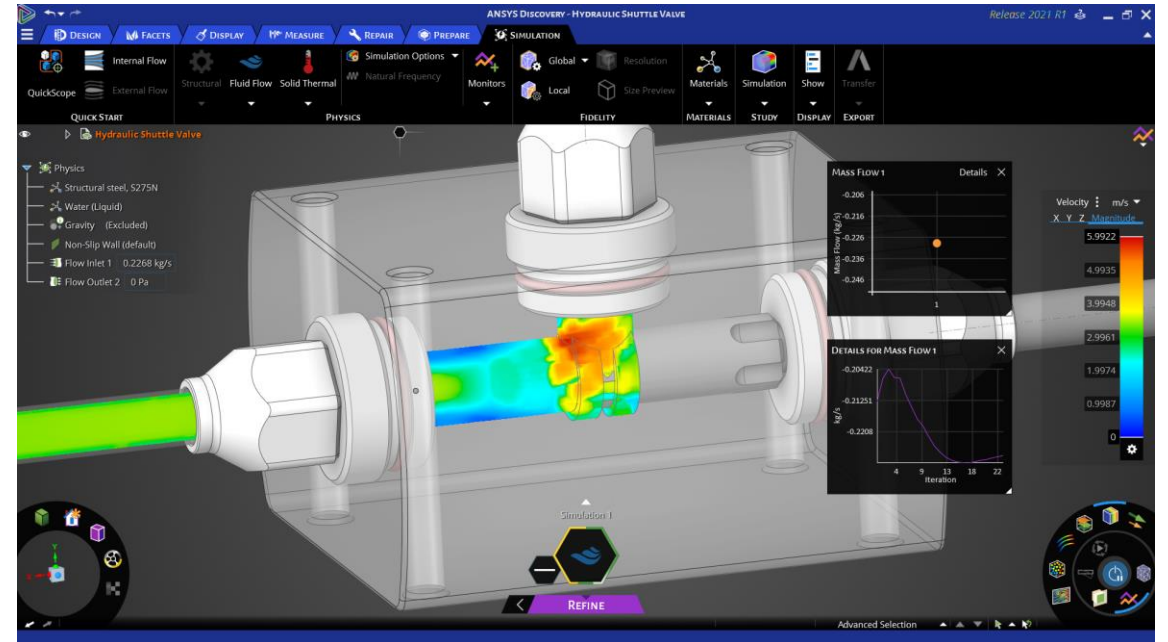
SOLVER SETTINGS

Max number of processors Use solver default 2

Contact detection (in Explore) Prioritize accuracy (restart recommended)

Fluid solution (in Explore) Improved steady-state (recom (restart recommended)

Results display while solving (in Refine) On (show intermediate results)

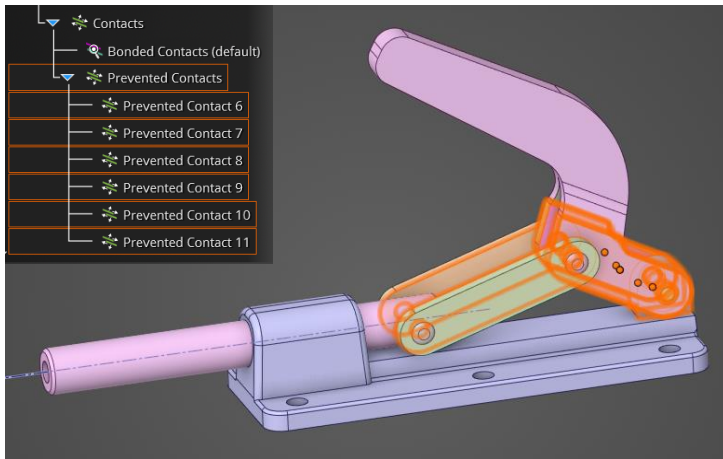


Review intermediate results velocity contour during solution

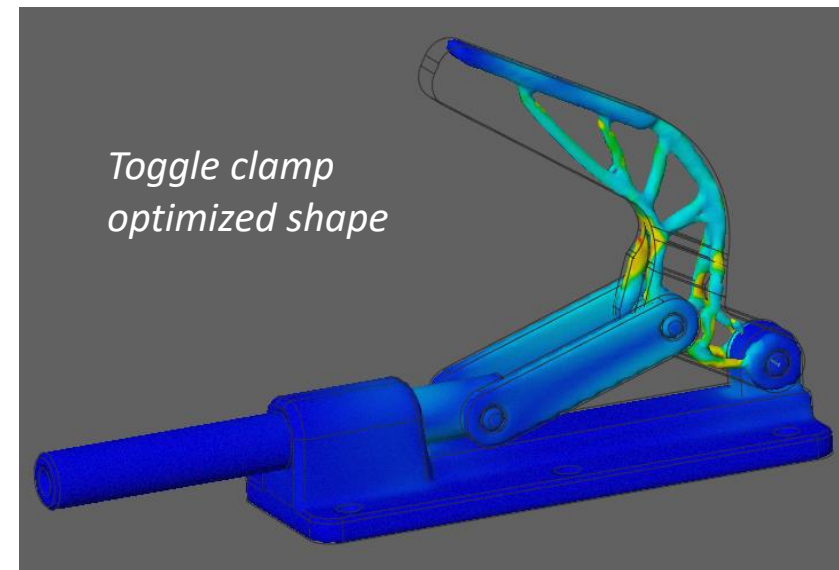


Topology Optimization Enhancements (Explore)

- Optimize selected bodies
 - Enables optimization of individual parts within an assembly
- Include prevented contact
 - More realistic assembly interactions
- Highlight protected distance
 - Easily visualize protected regions

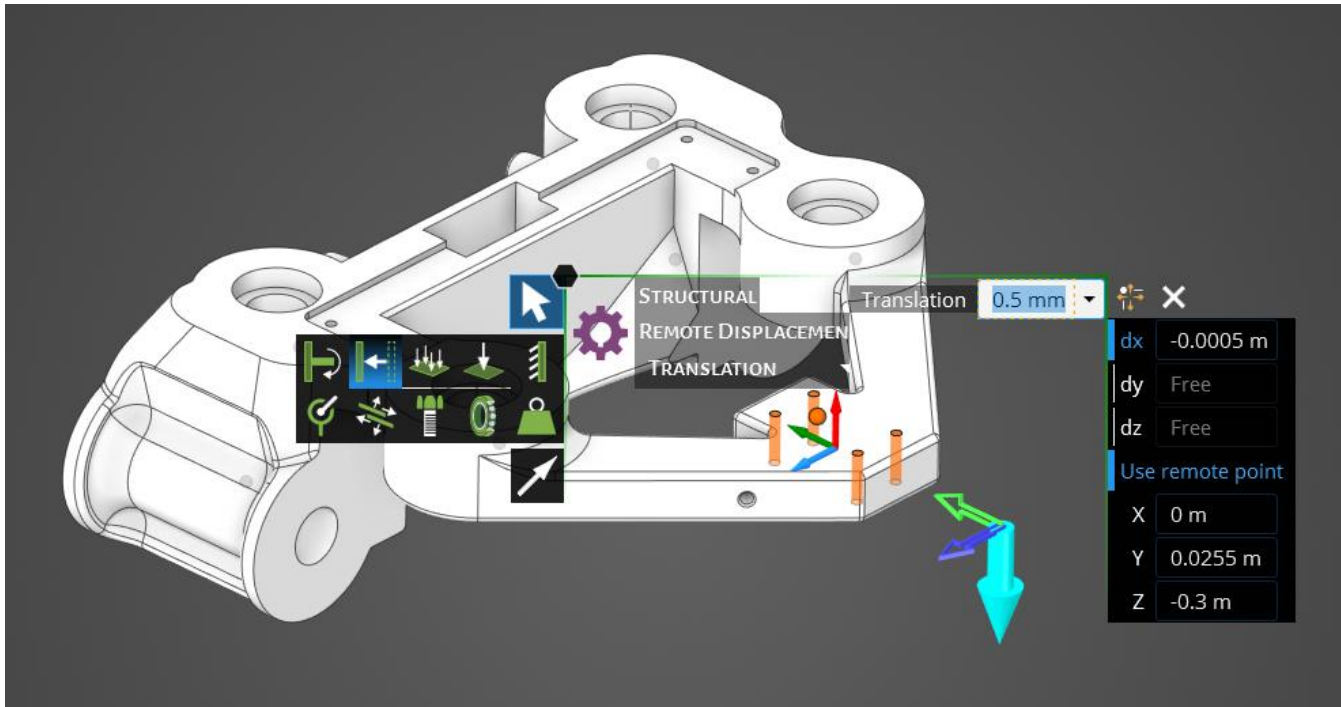


Prevent bonded contacts

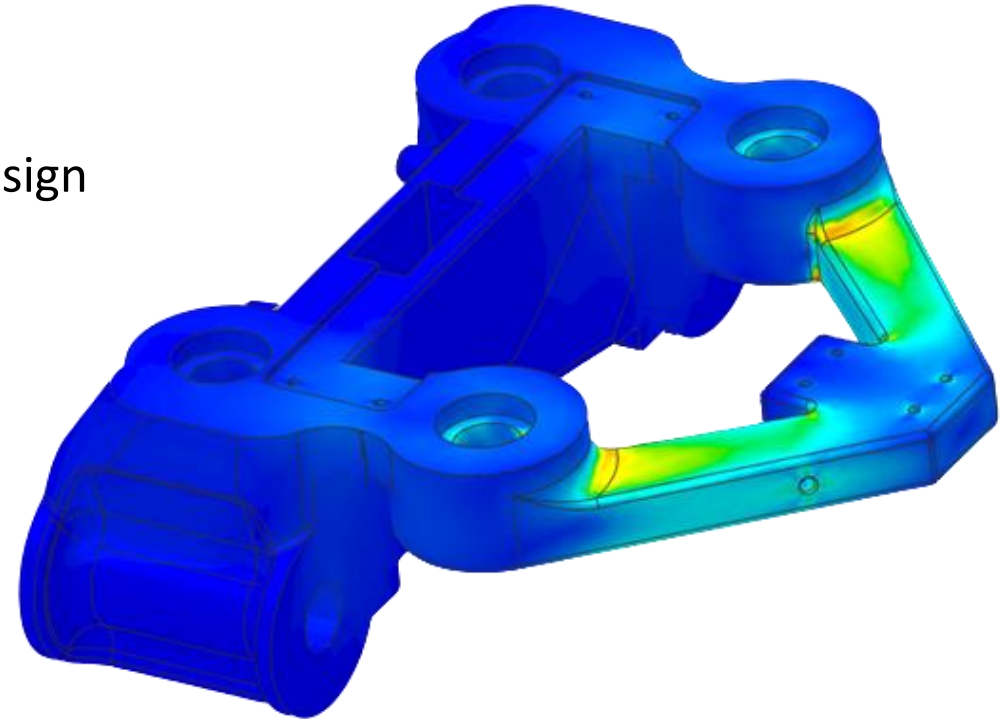


Remote Displacement (Refine)

- Displacement condition supports remote point
 - Allows displacement conditions to be applied outside of design



Remote displacement applied to a video slider bracket

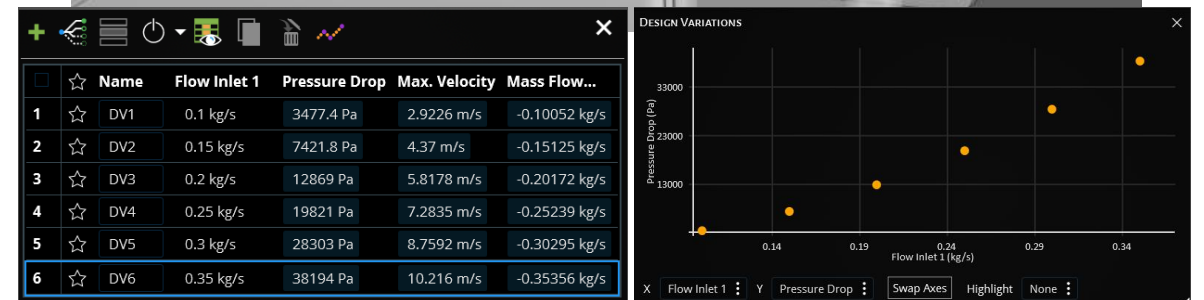
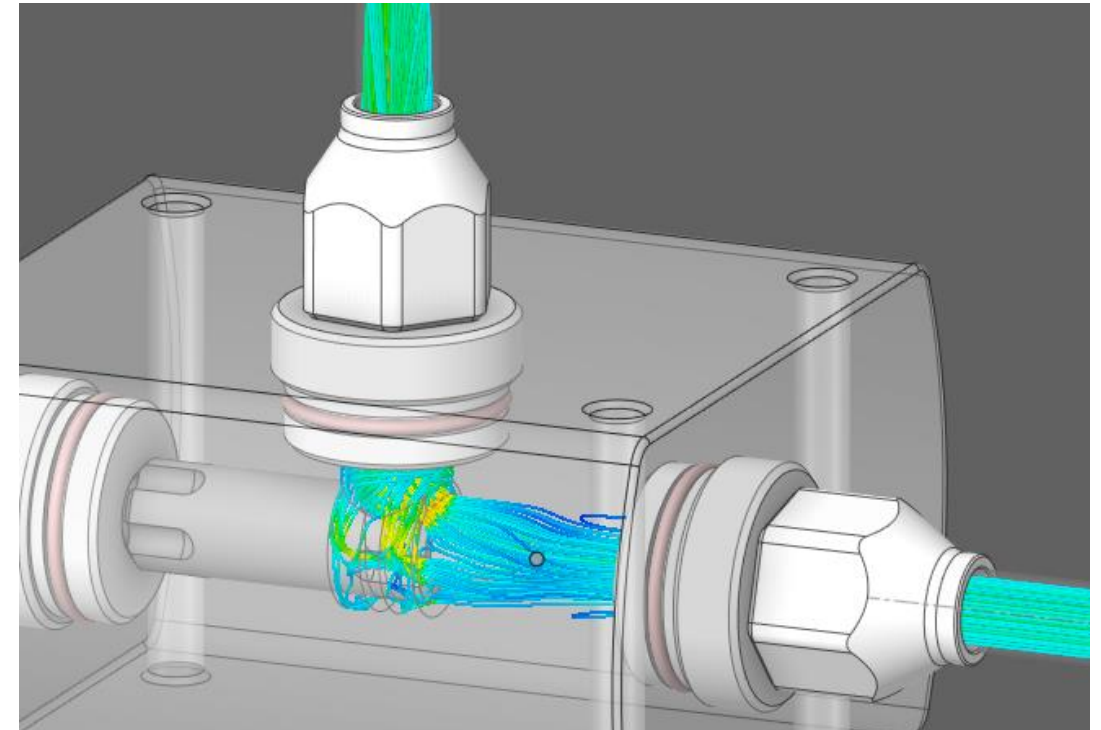
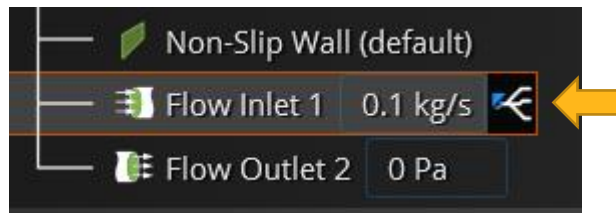
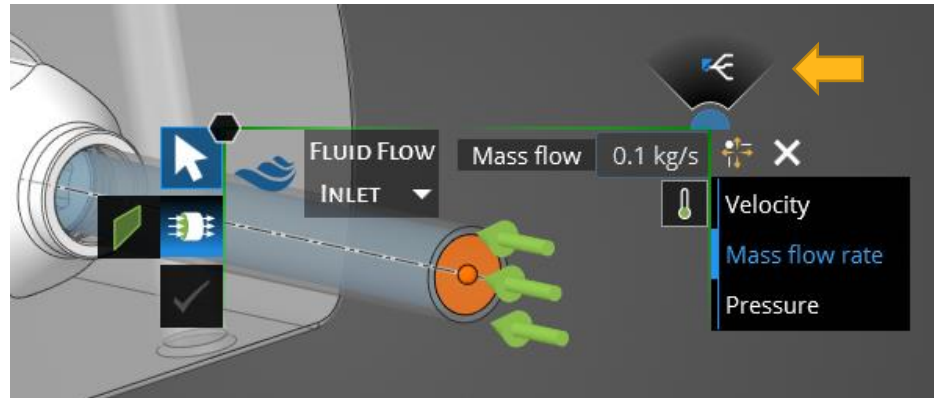


Slider bracket, von Mises stress results



Design Variations Enhancements (Explore)

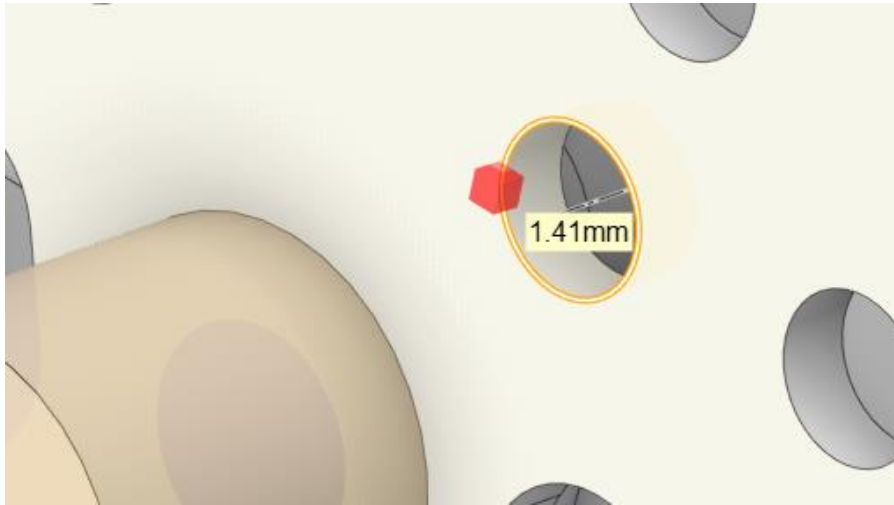
- Parameterize numeric inputs for physics conditions
 - Available from the HUD and physics tree
- Perform design studies including physics and geometric variations



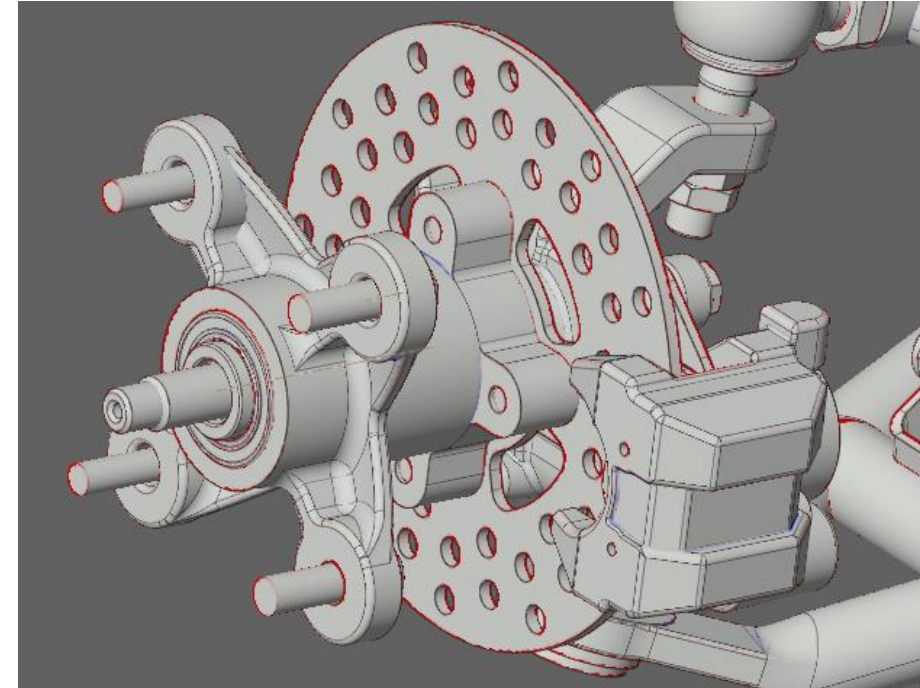
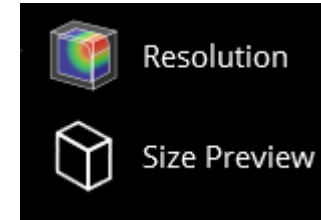
Investigate pressure drop as a function of flow rate

Resolution and Size Preview (Explore)

- New Fidelity options to display Resolution and Size Preview
 - Resolution displays areas that are not being captured by the simulation
 - Size Preview displays the volume element size



Size Preview display element volume element size with current Fidelity setting

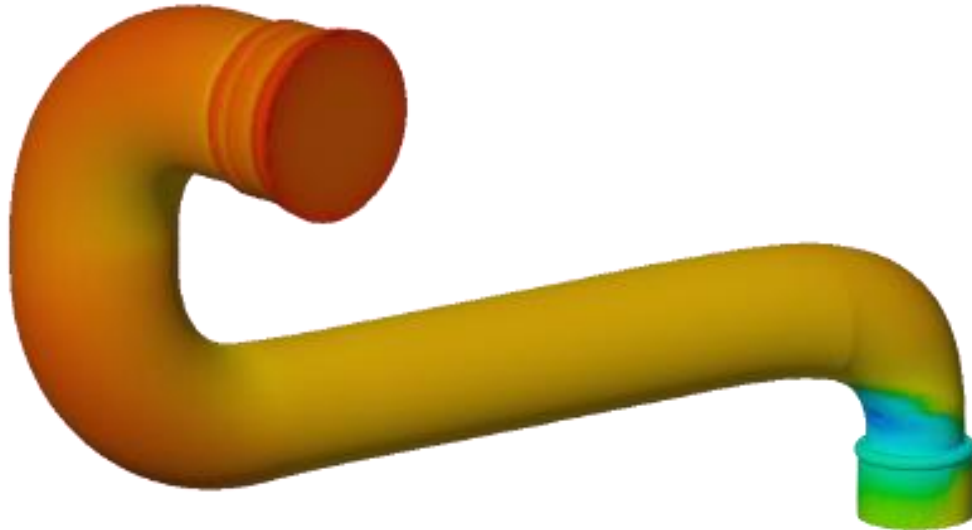


Resolution shows areas that are not being captured (red) with current Fidelity setting

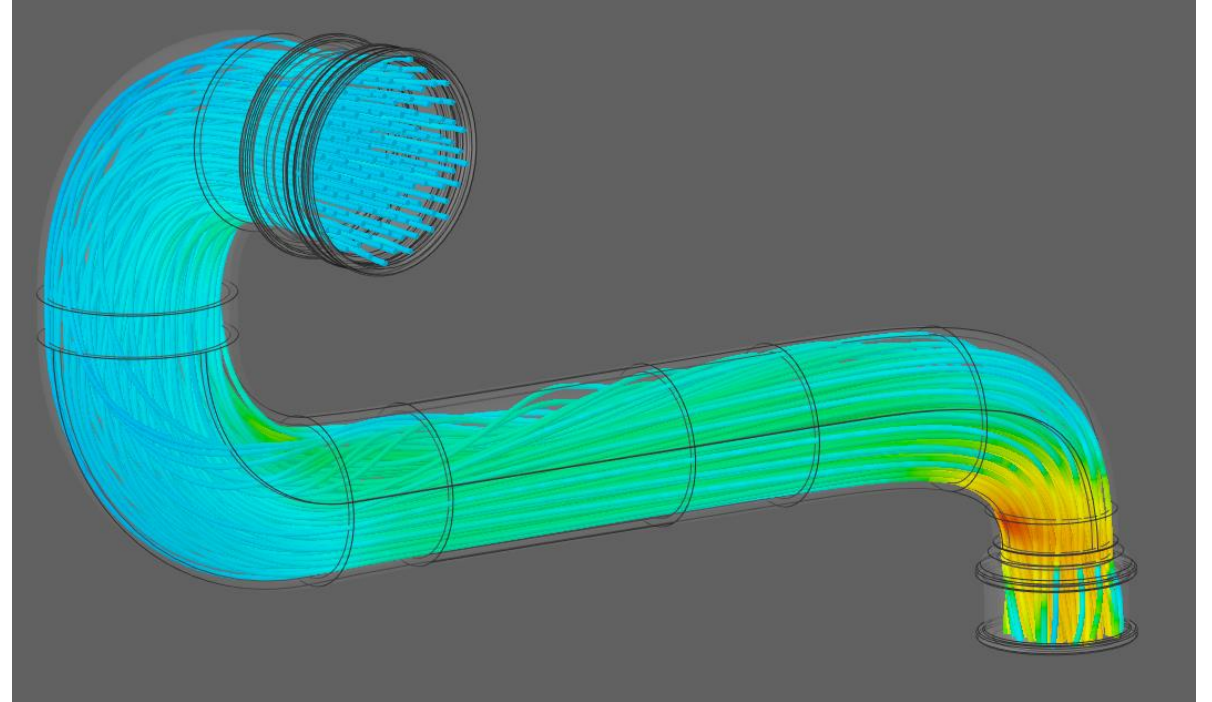


Improved Results Display (Explore)

- Improved results rendering
 - Smoother results displays
- Improved streamline displays
 - Streamlines transverse the entire fluid domain



Smoother results contours

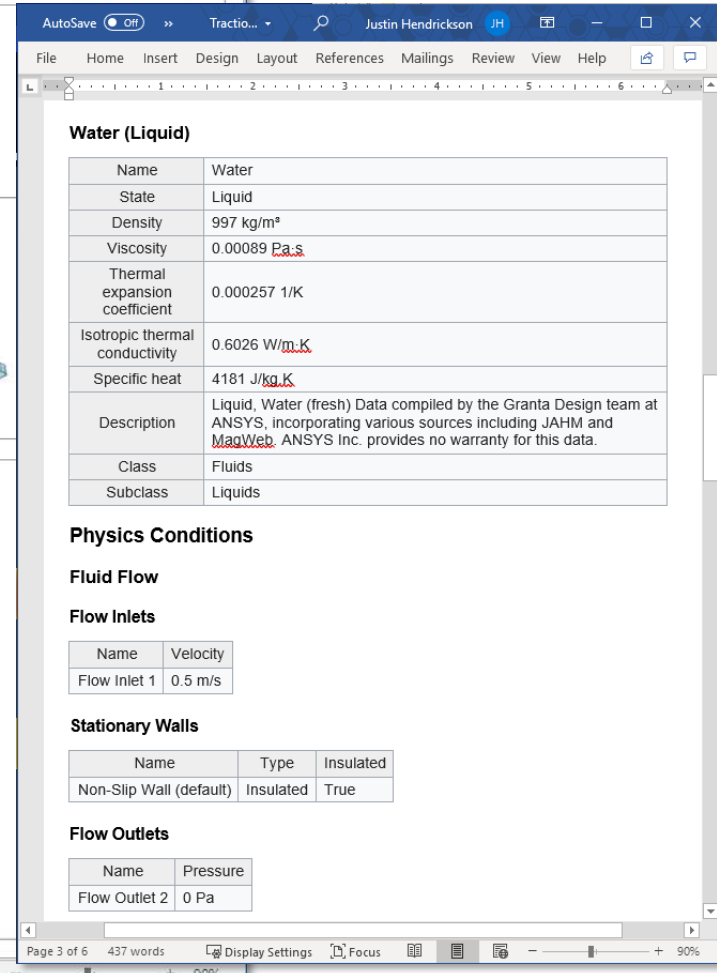
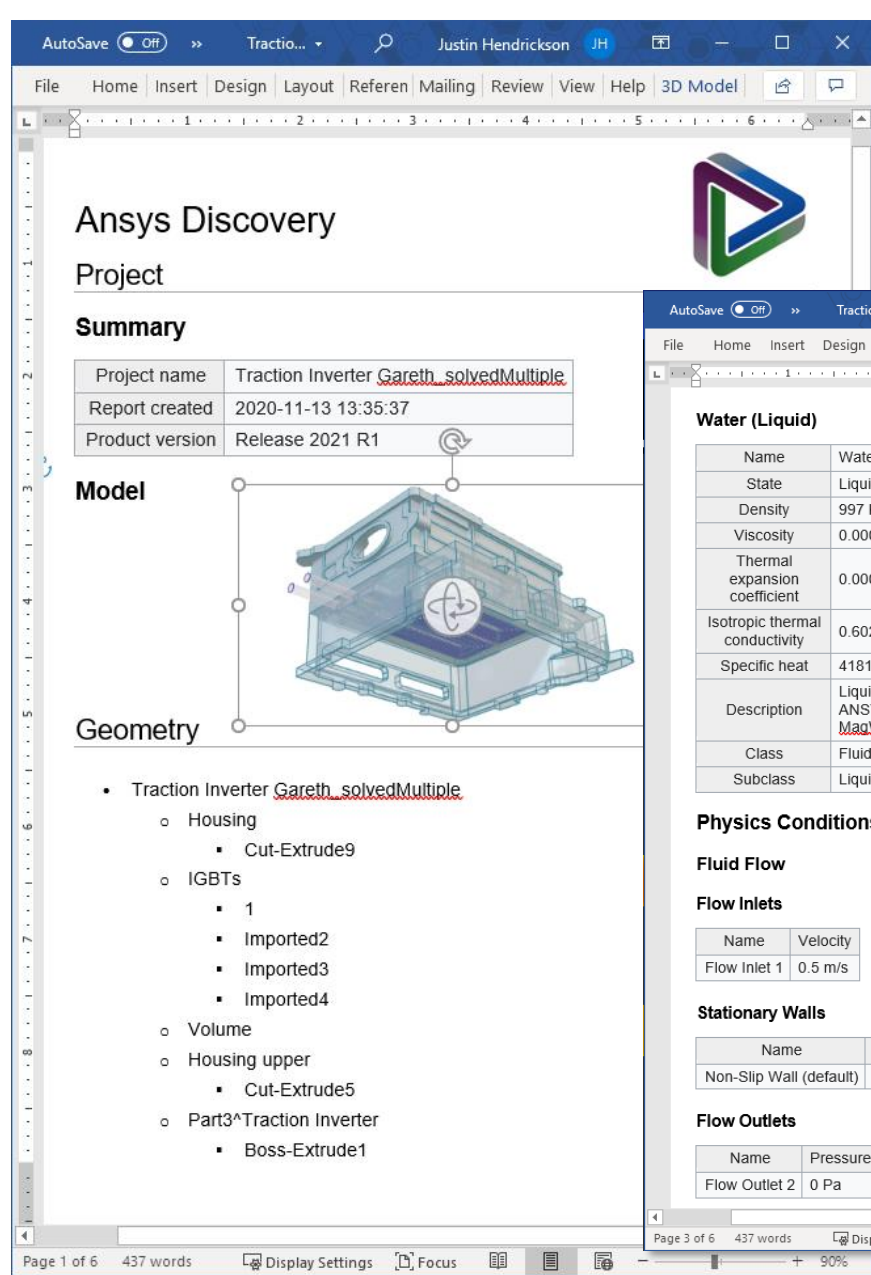
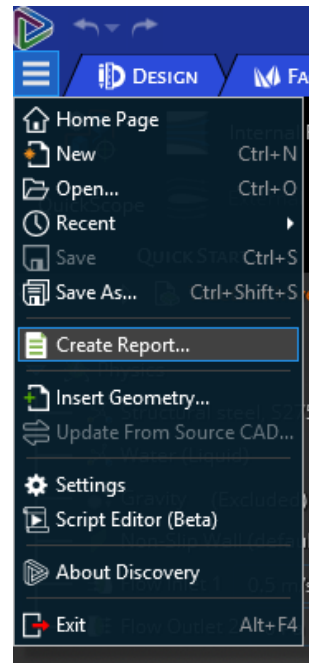


Streamlines transverse entire fluid domain



Reports

- Generate report as html or MS Word document
- Report includes:
 - 3D image of model
 - Assembly structure
 - Material properties
 - Boundary conditions
 - Monitor/chart values
 - Connection/contact information



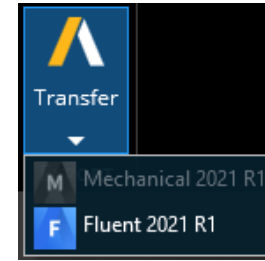
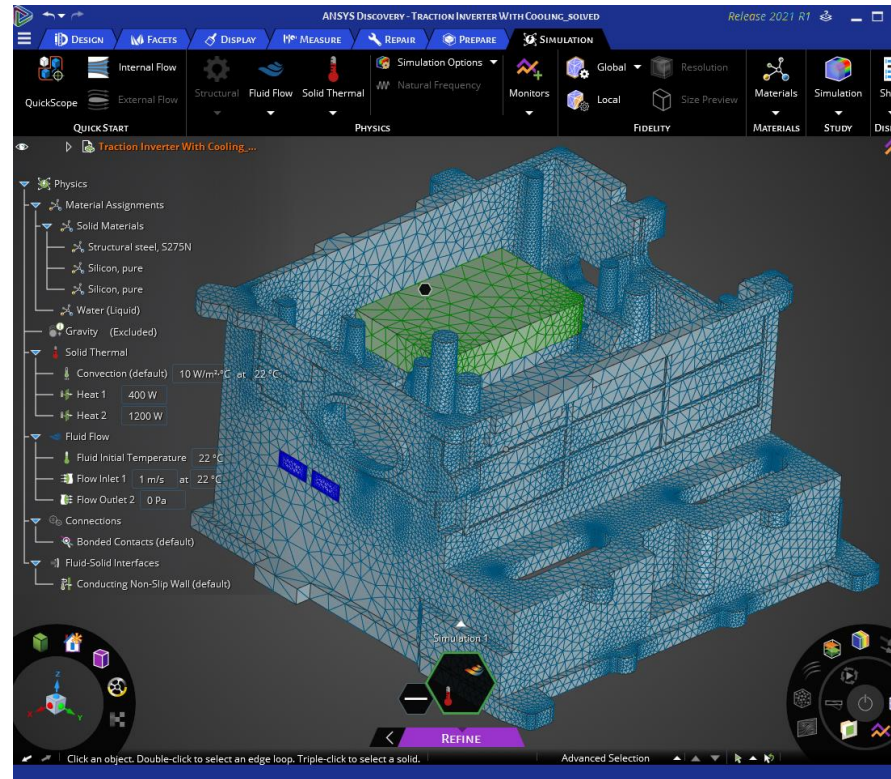
Monitors

Pressure Drop

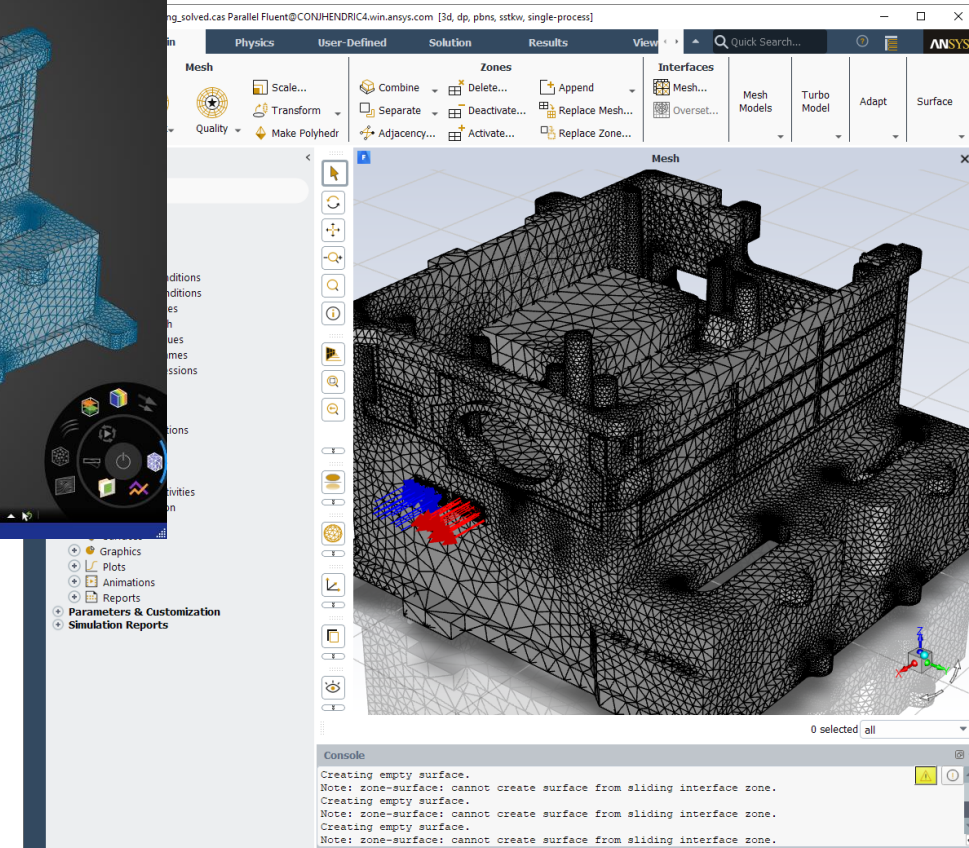
Design	Refine	Explore
1	2573.5 Pa	1958.7 Pa
2		2241.2 Pa
3		2181.5 Pa
4		2159.1 Pa
5		2441 Pa
6		2439.7 Pa
7	817.6 Pa	
8	838.9 Pa	1063.2 Pa
9		1025.8 Pa
10	842.41 Pa	

Improved Connections to Mechanical & Fluent

- Direct launch of Mechanical & Fluent
- Export of Fluent CAS file or Discovery Export File (for transfer to Mechanical)
- Export includes:
 - Geometry
 - Meshing
 - Materials
 - Physics



Traction Inverter With Cooling_solved.dsco
Discovery Files (*.dsco)
Discovery Files (*.dsco)
Discovery Export Files (*.dscodat)
Fluent CAS File (*.cas.h5)



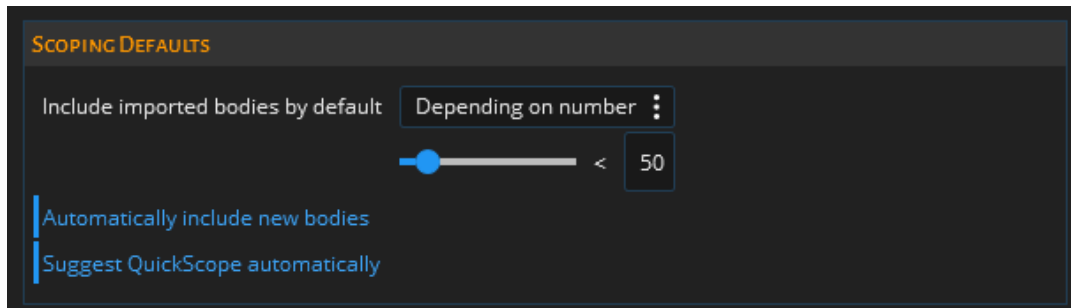


Productivity

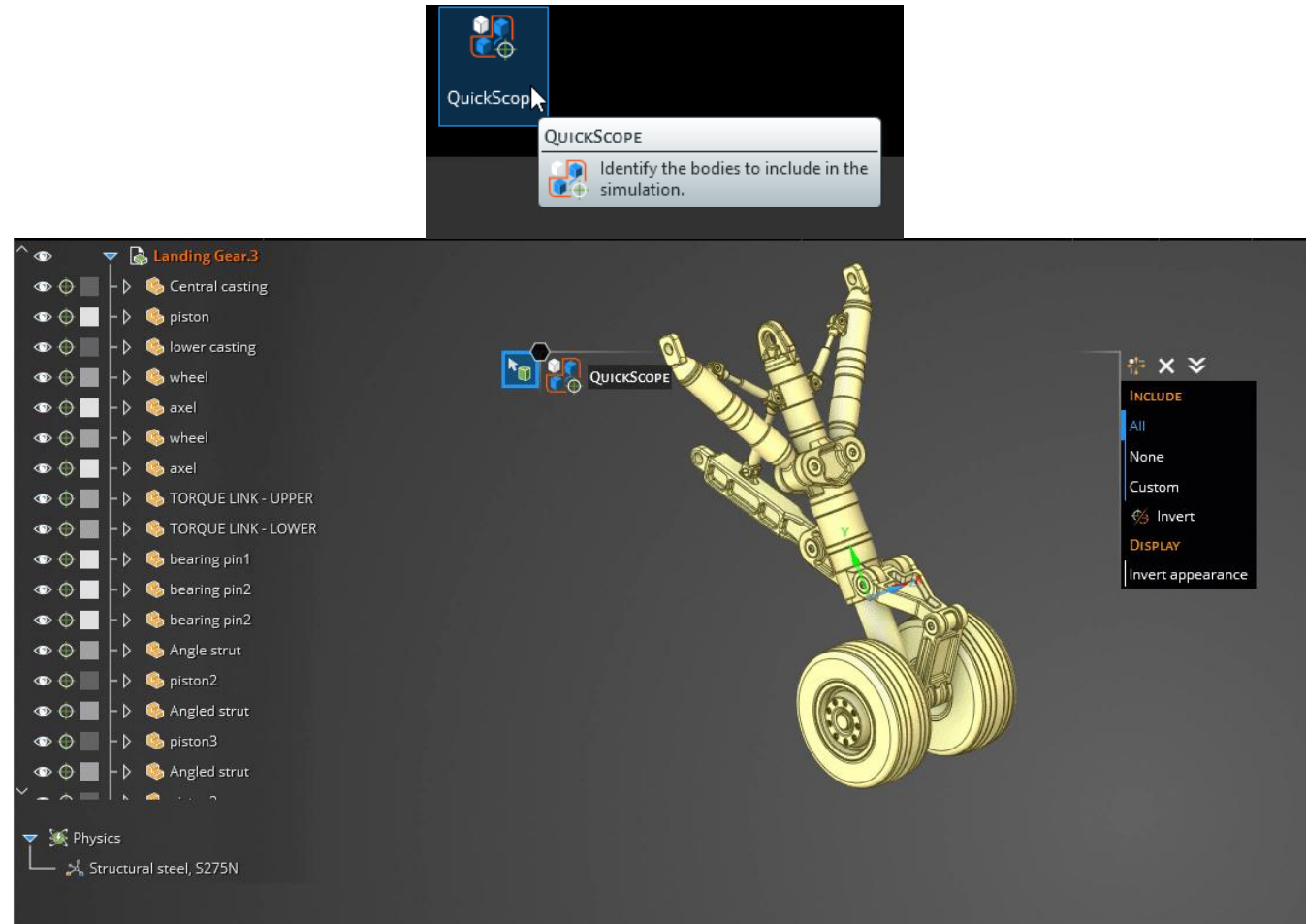


New QuickScope Tool

- Easily choose which bodies to include or exclude from a simulation
- Enhanced visualization clearly identifies bodies included in the simulation



New options determine which bodies are scoped to a new simulation



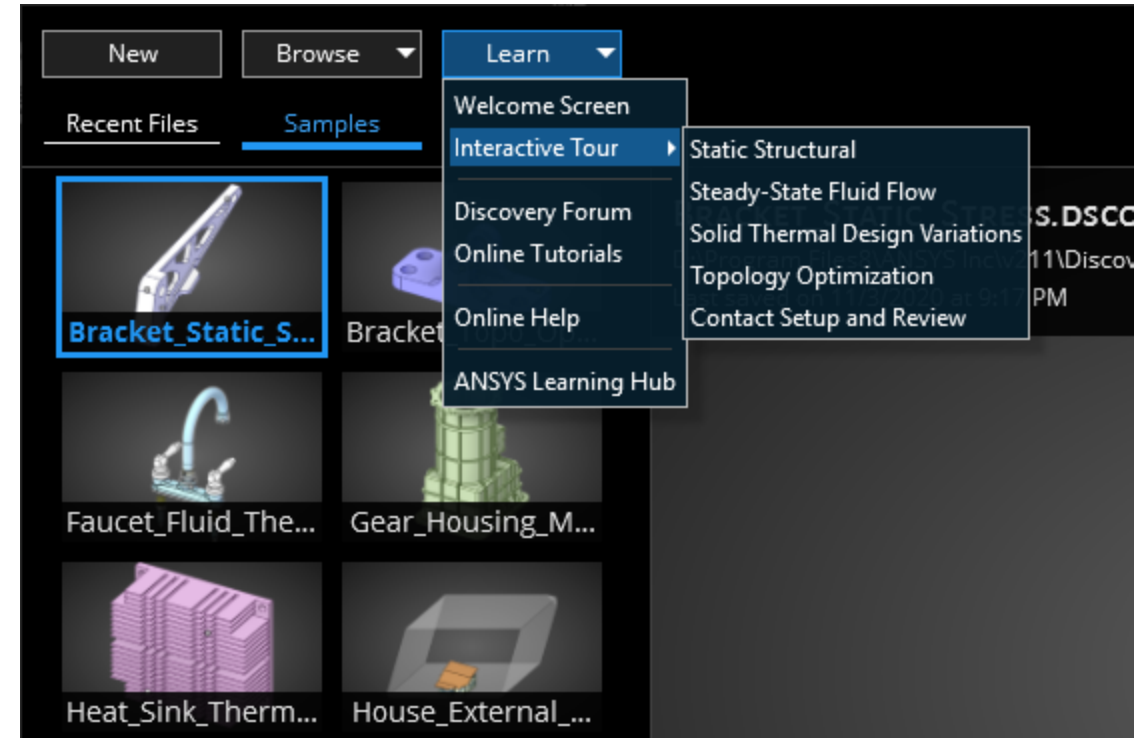
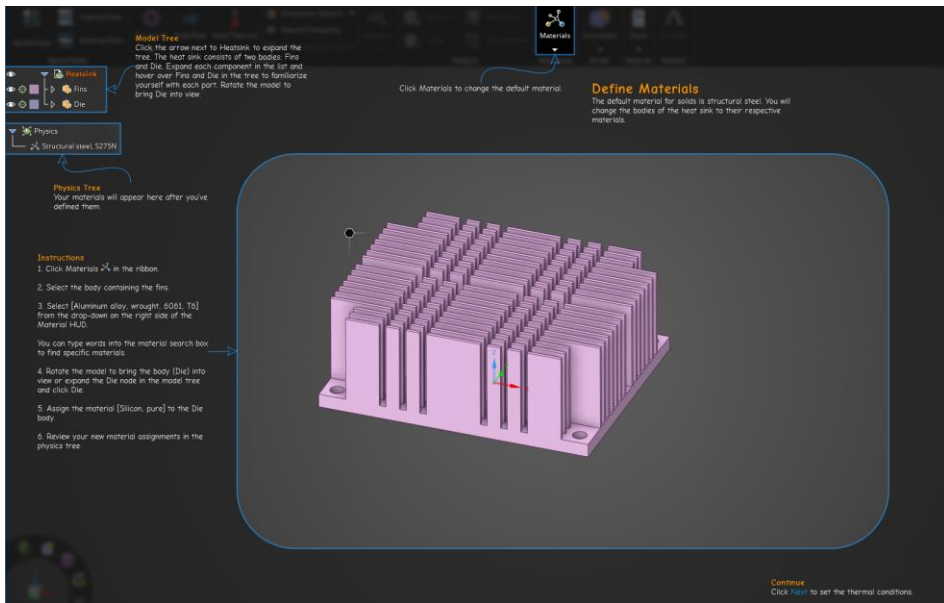
Cloud Launcher

- Quickly launch a remote session on the Ansys Cloud and review previous sessions run
- Requires prepaid Ansys Elastic Currency to cover cloud usage
- Allows users without suitable hardware to access all Discovery workflows
- Upload and download files via secure transfer

The image displays the Ansys Cloud Launcher interface. On the left, a sidebar menu includes options for Dashboard, Jobs, Files, Downloads, Applications, Analytics, and Developer. The main area shows a 'Discovery' session running, with a job ID of 5fac50c3d6f1a324e467f713 and a duration of 0h16m53s. The session is titled 'ANSYS Discovery - TUBE ASSEMBLY'. The interface includes a toolbar with various simulation options like Design, Facets, Display, Measure, Repair, Prepare, and Simulation. A 3D model of a tube assembly is visible in the center. Below the model, a tree view lists simulation parameters such as Physics, Structural steel, Gravity, Fixed Supports, Remote Mass, and Connections. At the bottom right, a 'LAUNCH REMOTE SESSION' button is highlighted, with a 'MODIFY PROFILE' button below it. The profile is set to 'DiscoSim'. The account balance is shown as 5024 AEU. At the bottom, there are buttons for 'ABORT', 'TRANSFER & END', and 'ALL SESSIONS'.

Interactive Tutorials

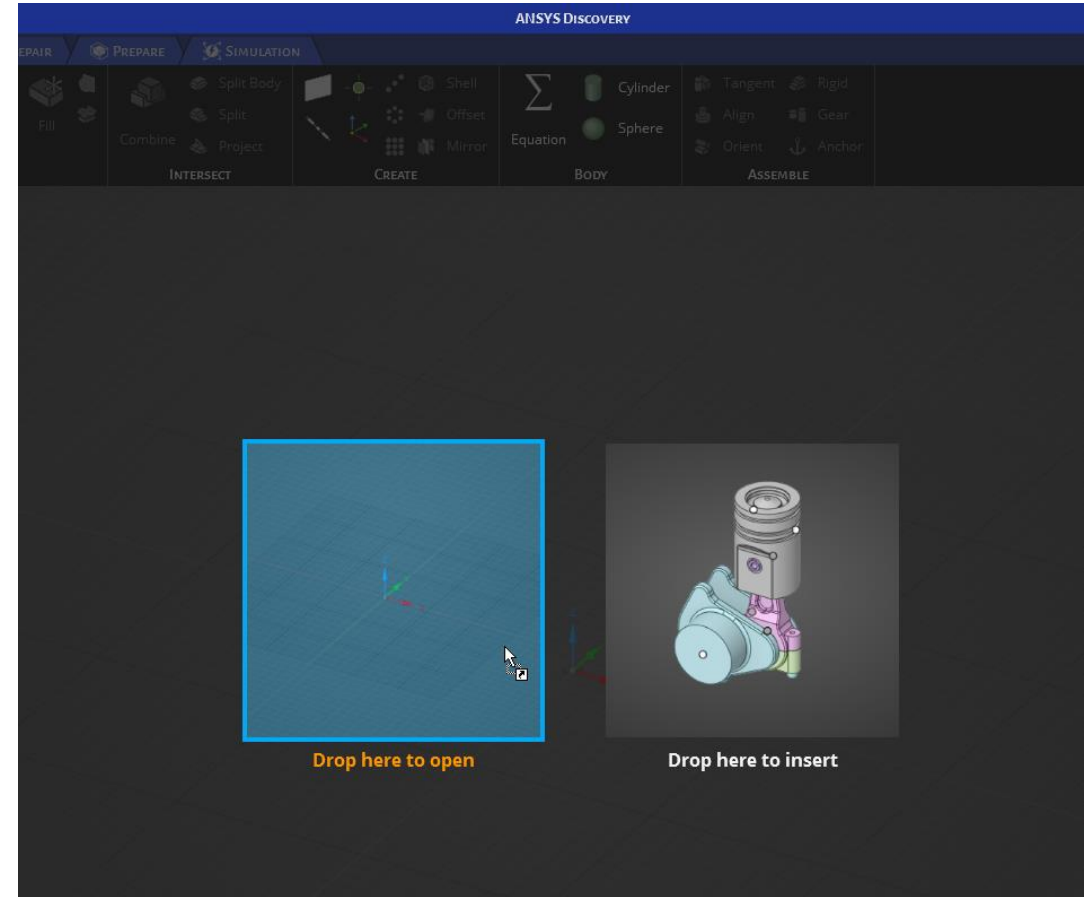
- New interactive tutorials for Topology Optimization, Solid Thermal Design Variations, and Contact Setup help familiarize new users to Discovery



Tutorials can be accessed on the home screen

Drag and Drop Support

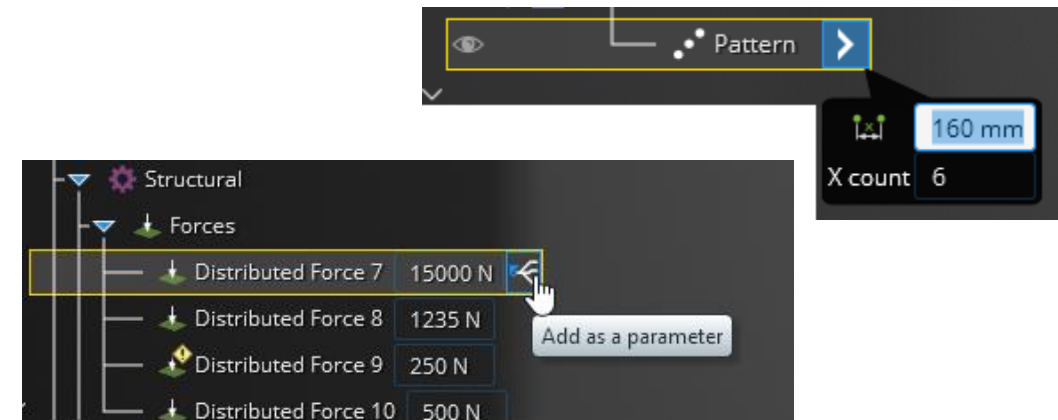
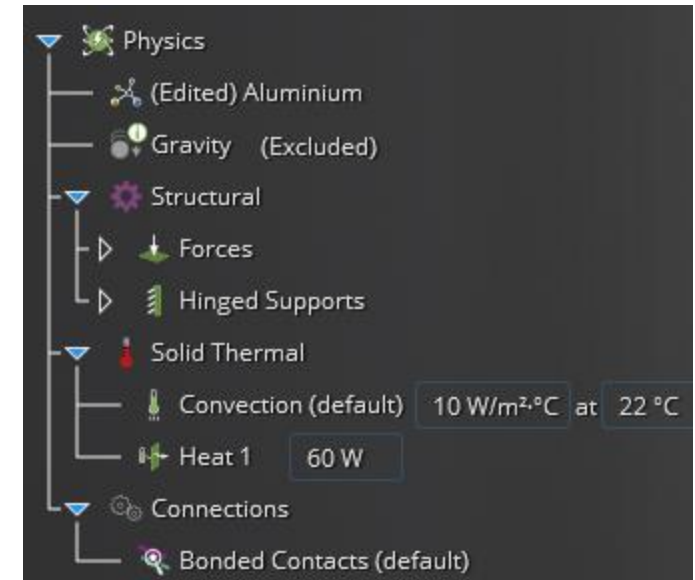
- Drag and drop .dsco, .scdoc or any other native or neutral file directly into the Discovery environment
- Files can be dragged from windows explorer, Outlook, or even a browser



Choose to Insert or open a new document based on your drag

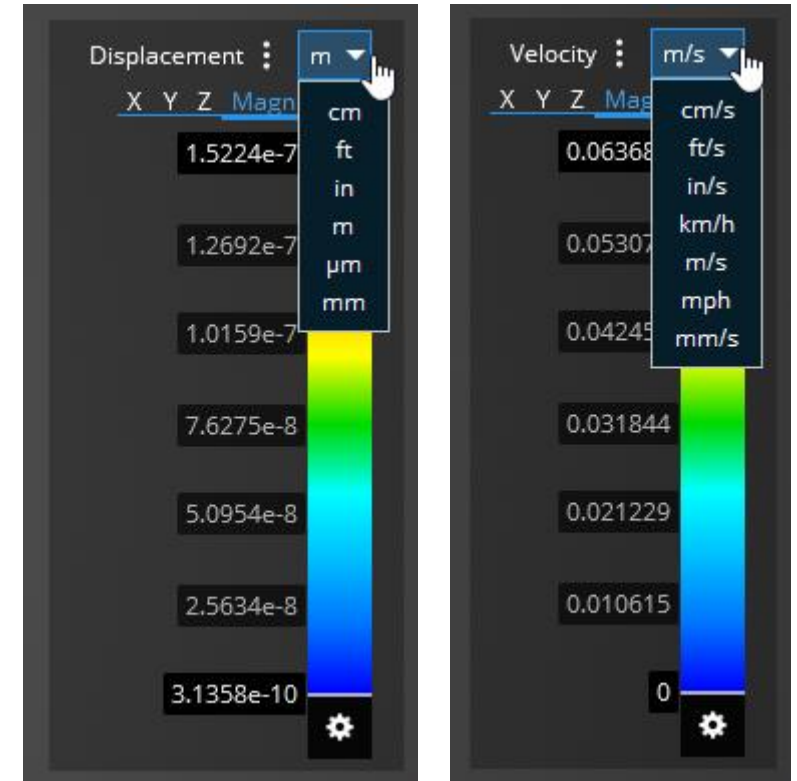
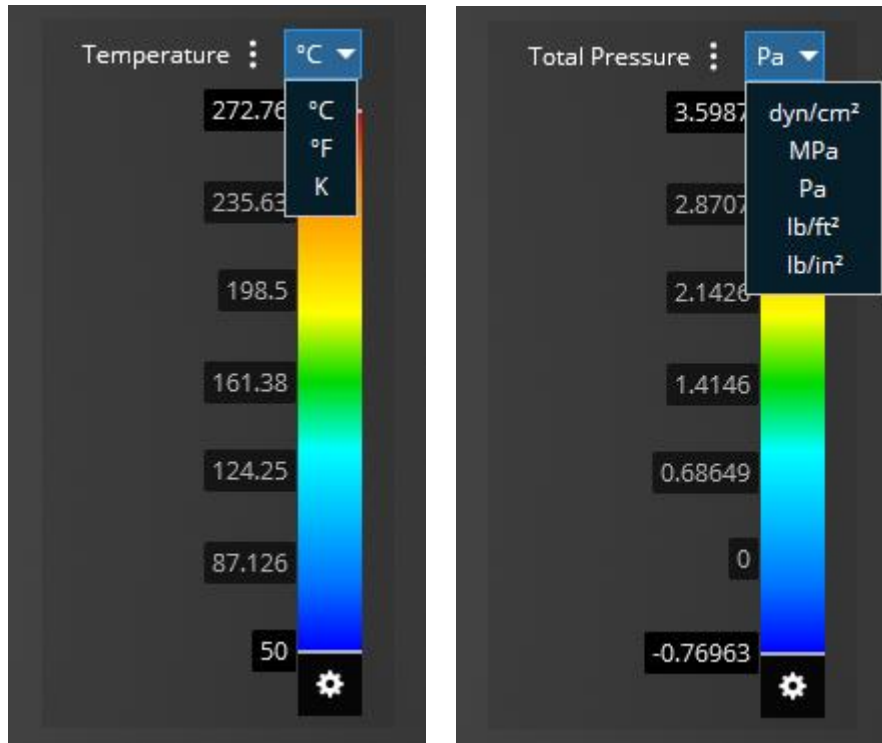
Many, Many Tree Refinements

- Drag and drop for reordering in model tree
- Visibility and suppression states remembered per simulation
- Grouping of boundary conditions by physics
- Modeling tools allow selecting objects in the tree
- Physics tree icons & tooltips provide error information
- Ability to parameterize physics conditions
- Ability to edit pattern count and distance within the tree



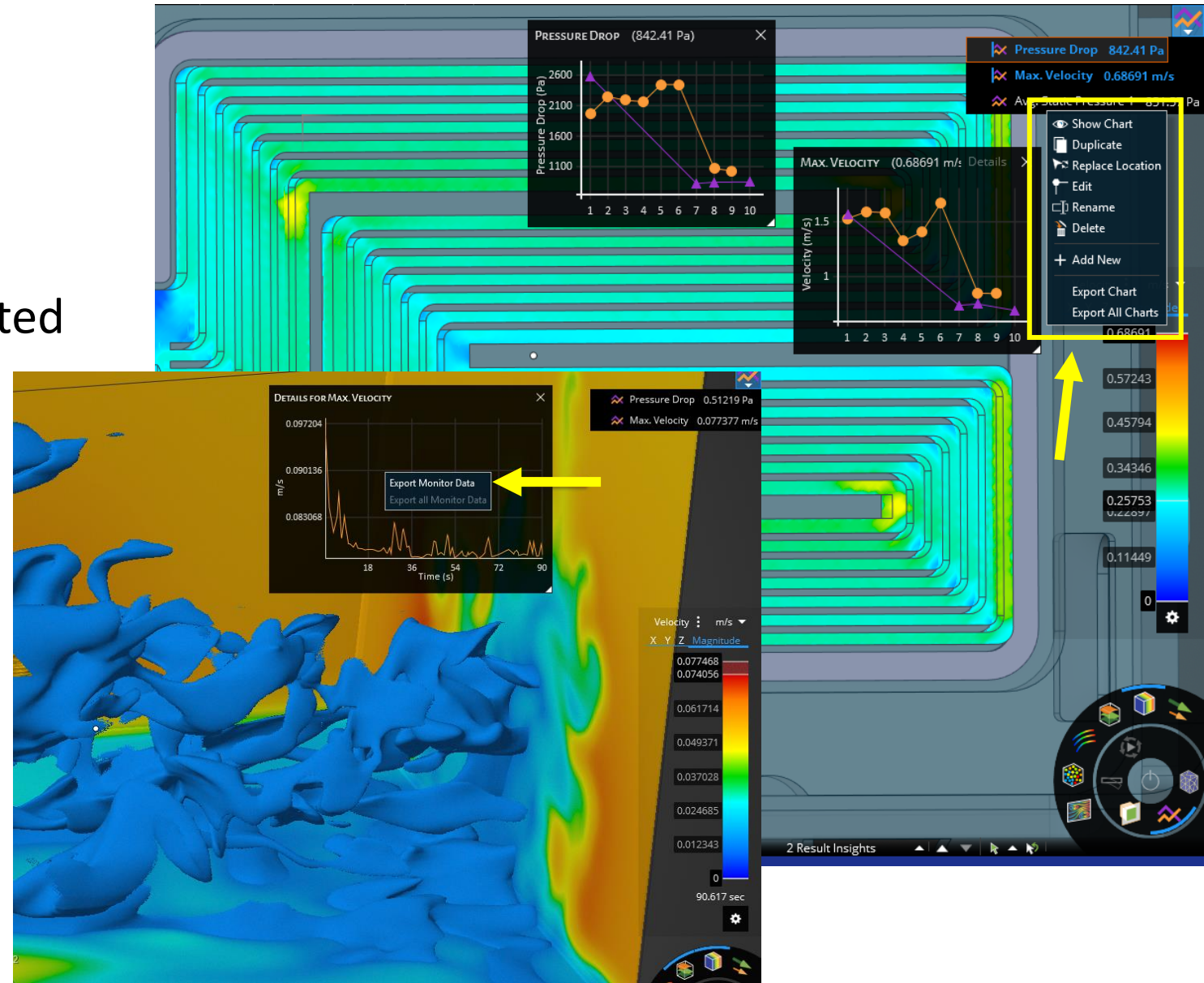
Unit Display in Legend

- Quickly toggle units within the legend to better understand simulation results
- Unit modification is included for all major result types



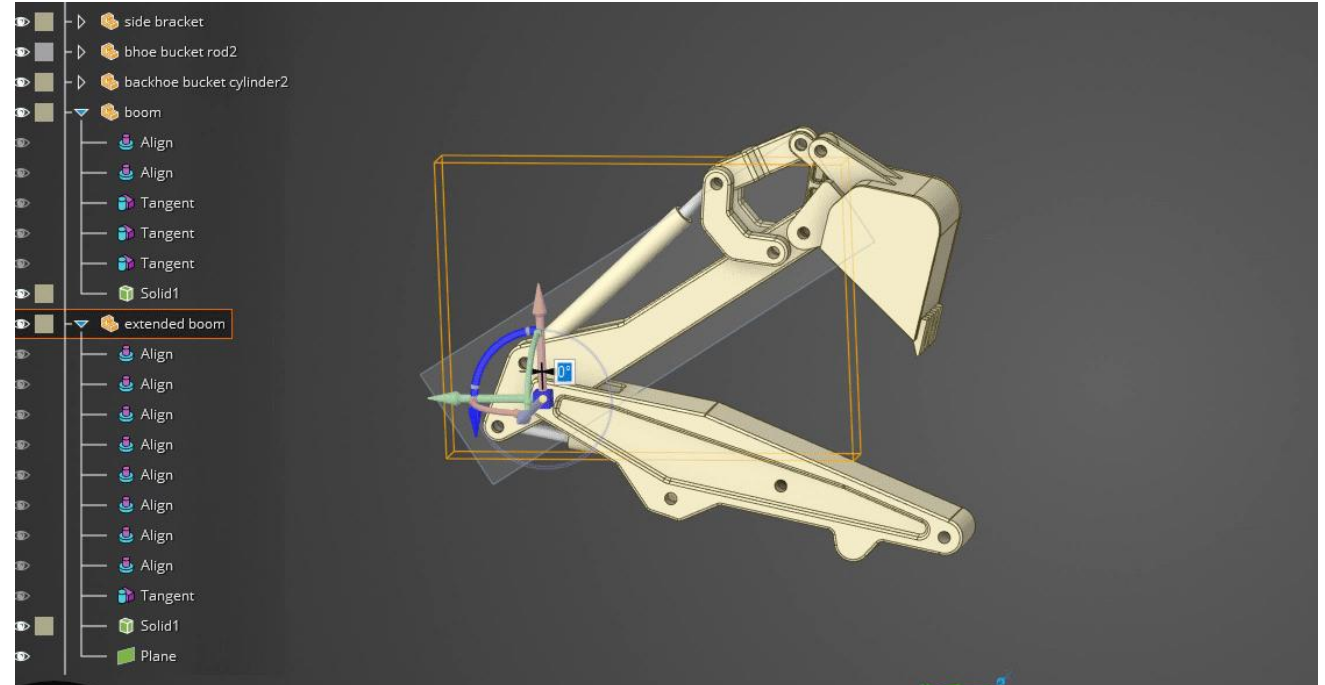
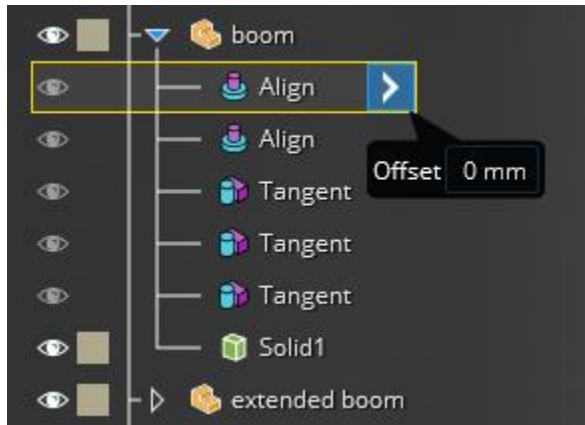
Monitor Data

- Export Monitor data to csv file
- Single monitor or all monitors
- Transient 'detail' data also supported



Dynamic Assembly Conditions

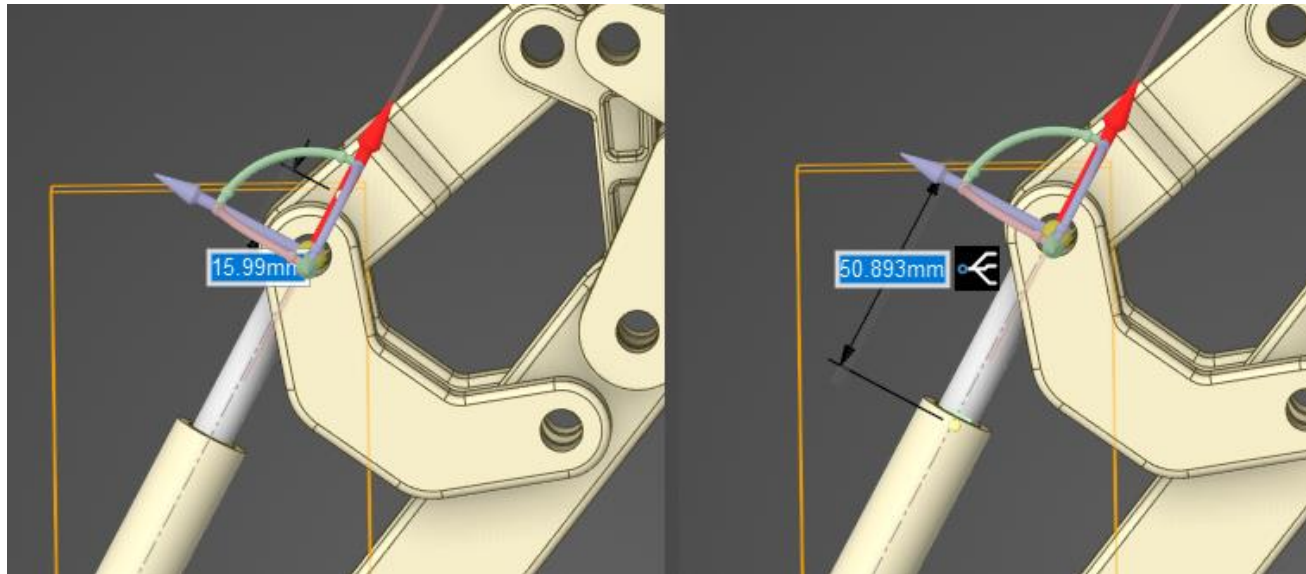
- Assembly constraints allow users to form mates and alignments in an assembly
- Using assembly conditions can quickly align parts for contact or allow contact to remain while moving parts



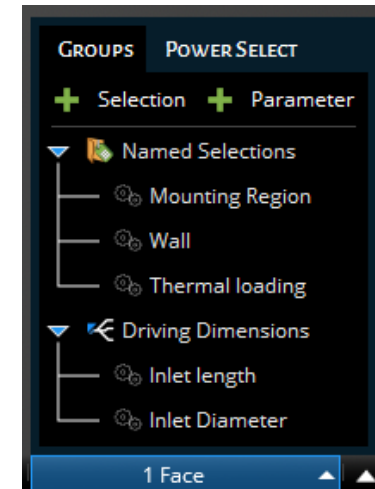
Assembly constraints allow models to sweep through a range of motion

Geometry Parameterization Improvements

- Dynamically pulling or moving geometry no longer automatically allows parameters to be created
- Create named selections or parameters in the Groups panel

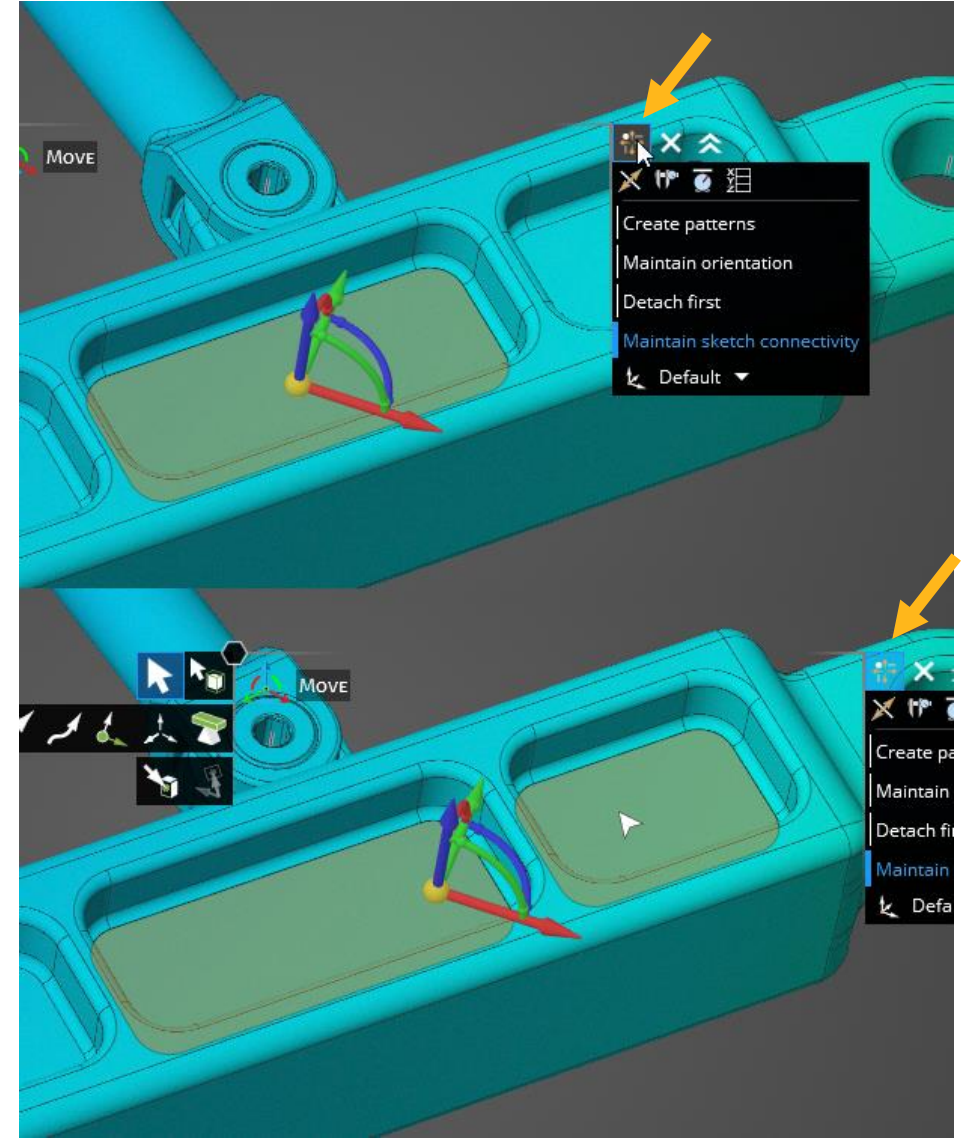
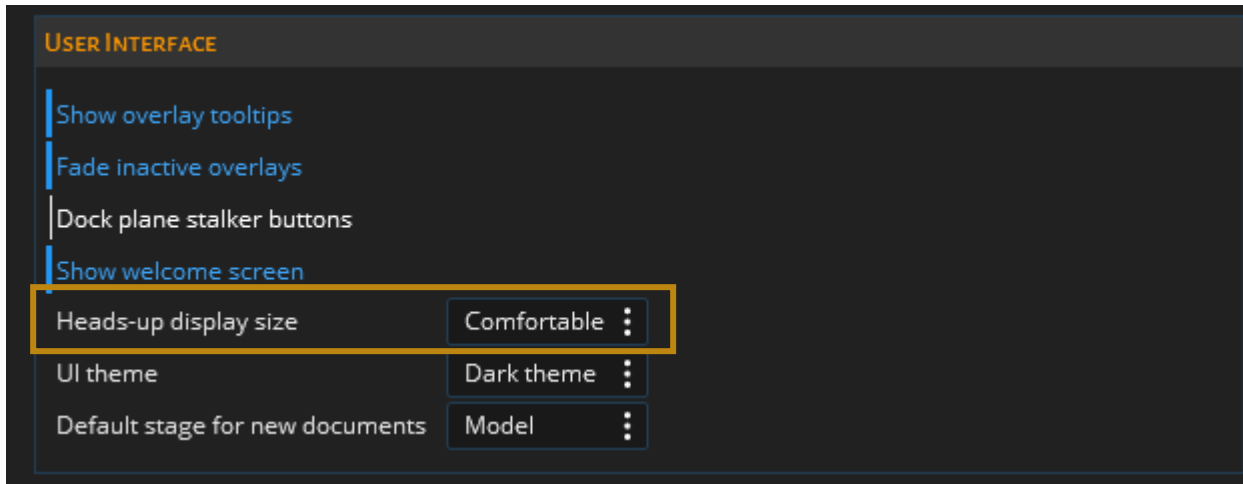


Requiring a Pull or Move dimension to be referenced to geometry allows dependable parameters to be created for design point studies



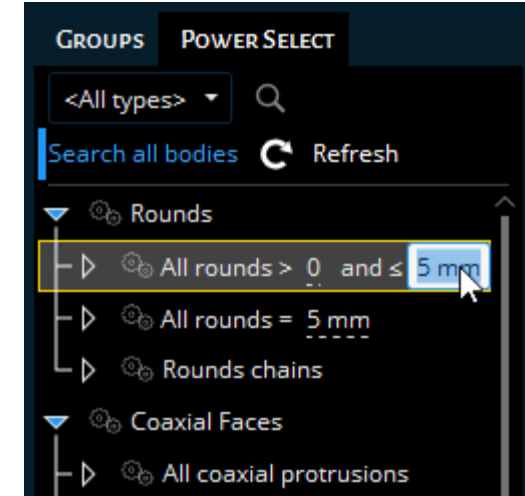
Heads-Up Display Improvements

- New option to move the Heads-Up Display (HUD) allows easy selection of objects when the HUD is obscuring the model
- Options to control the sizing of the HUD allow users to lock the HUD to a single location or decrease the spacing from your cursor

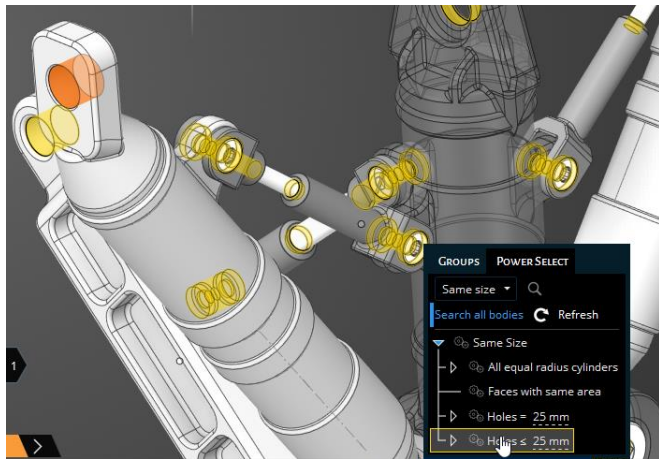


Power Select and Named Selection Improvements

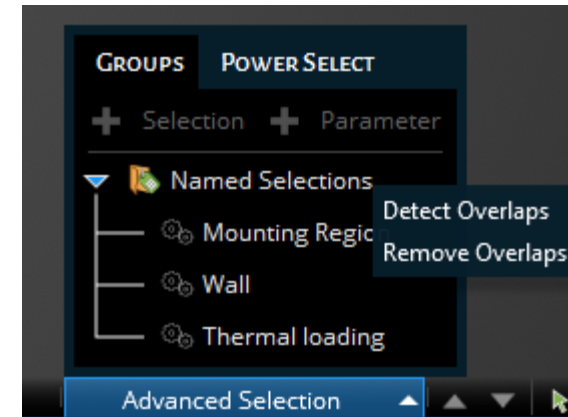
- New options to separate, add, remove, subtract and merge named selections
- Hide and hide others in named selections to easily hide faces or bodies in your assembly
- Added abilities in Power Select to control sizing and filtering aid selection in Discovery



New ability to control Power Select values can greatly speed defeaturing operations

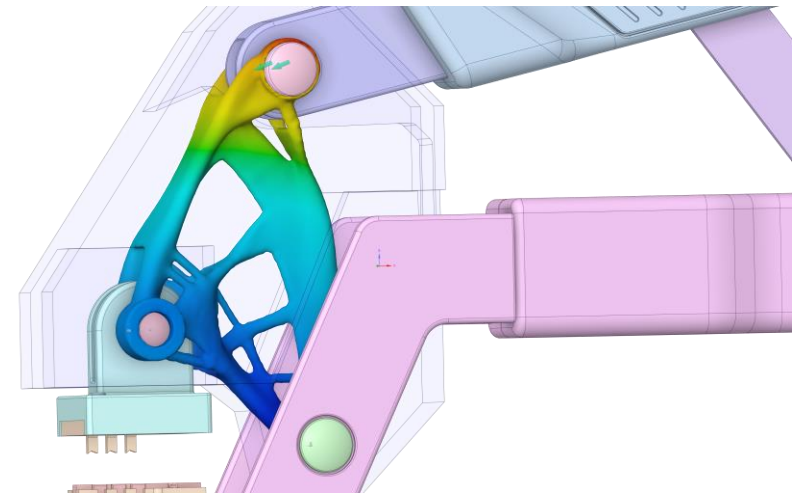
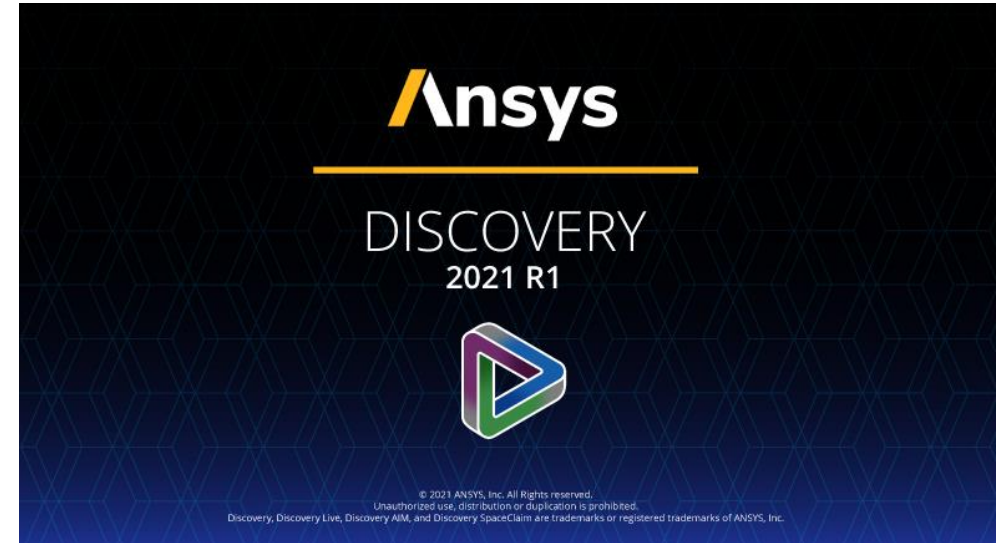


Filtering Power Select allows quicker calculation even on large assemblies



Licensing Changes

- Floating (Flex)
 - 2021 R1 version of Discovery requires 'Disco_level2' license increment
 - Discovery Ultimate (disc_ult) and Discovery Standard (disc_sta) no longer work to license the Discovery application
 - Any customer who renewed a Discovery Standard or Ultimate license in 2020 should already have a 'disco_level2' license key
 - This is part of the Ansys license manager changes to move to standard Flex license increments that do not require the Ansys LM
- Student
 - Discovery now available as free limited student edition:
 - Structures/thermal: 128k nodes/elements
 - Fluids: 512k nodes/cells
 - Geometry: Export limited to discovery files only. No size limits.



The Ansys logo is positioned on the left side of the slide. It features a yellow slanted bar to the left of the word "Ansys" in a bold, black, sans-serif font.

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