



Simcenter FLOEFD

What's new 2205

Simcenter FLOEFD strategy



Electrification, EV

Electronics, Electrification, Thermal management



Synergy & Interoperability in SIEMENS

Teamcenter, Simcenter 3D, Amesim, EDA, CCM+



Multiphysics

EM, Lighting/Optics, Structural, 1D elements



Productivity, Lower the Barriers to Access

CAD integration, Interactive CFD, UX, Performance



Simcenter FLOEFD 2205 Overview

Xcelerator Share

MBO

- Official release
- Convergent geometry support in NX

EDA Bridge Improvements

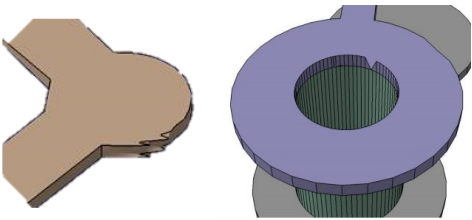
- Detailed (Layered) Thermal Territory
- Via Filler material in explicit, layered mode

Smart PCB

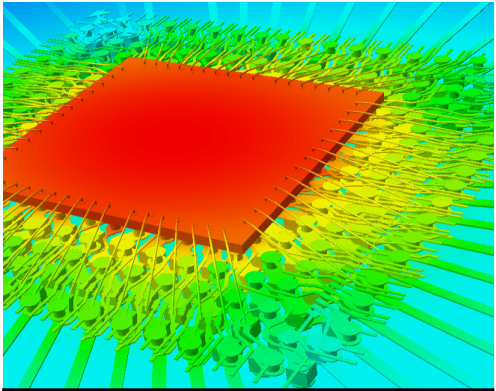
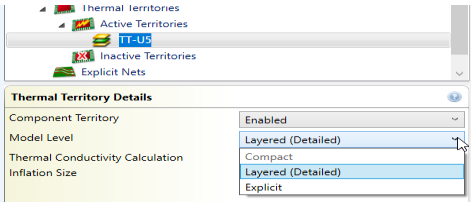
- Improve Homogenization performance

Multiphysics

- Non-penetrating contacts
- Improve EMAG postprocessing
- Improved condensation flux on angled surfaces
- 1D multichain
- CGNS Export



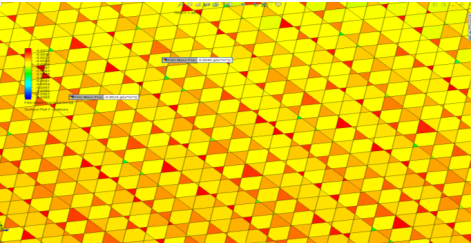
	CAD Boolean	Own Boolean	MBO
Preprocessing	84 %	17 %	3 %
Meshing	16 %	9 %	3 %
Total	100 %	26 %	6 %



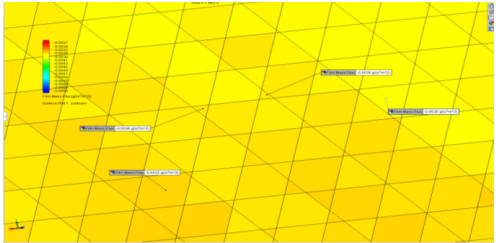
Total mesher time: 5 min

	Memory Peak, Gb		CPT size, Gb
	Mesher	Solver	
22.1	51.5	51.5	4 169 980
2205	1.6	14.0	53 327

22.1



2205

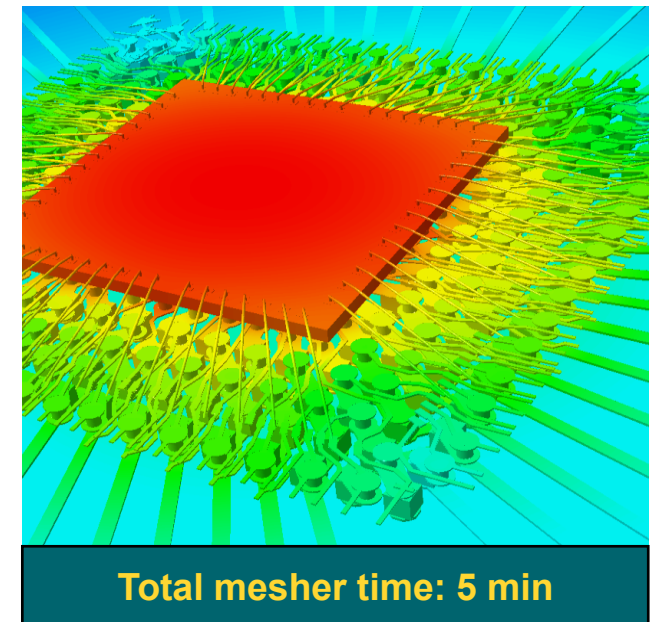
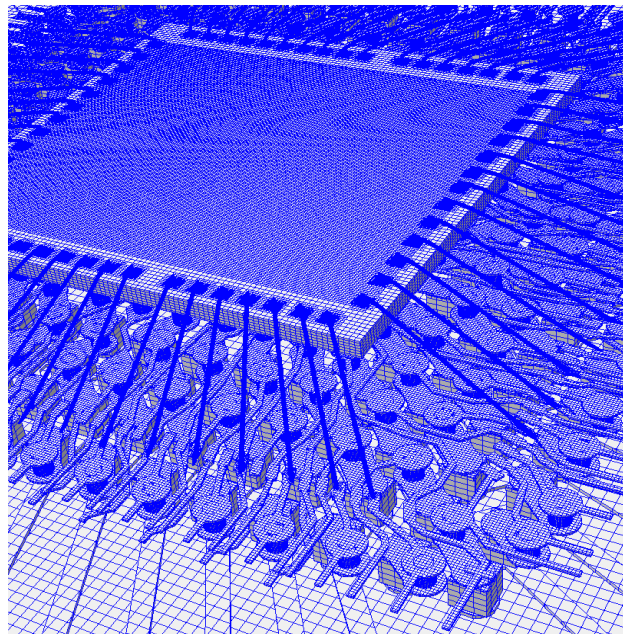
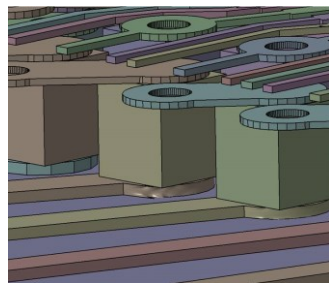
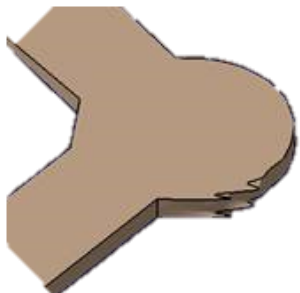
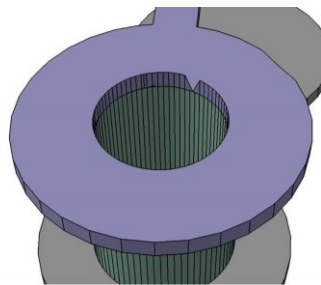
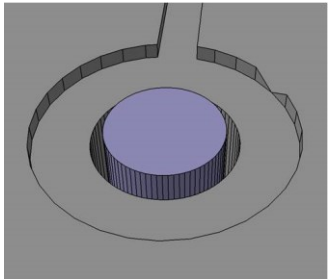


| Performance

MBO (Mesh Boolean Technology) technology

Complex geometry handling with revolutionary meshing technology

A new “Mesh Boolean” technology enables handling of complex and extremely bad geometry even faster and easier. When CAD cannot conduct Boolean operations successfully because of bad or dirty geometry (bad topology with missing entities, self-intersecting faces, etc.), the Mesh Boolean option can be used, which first meshes bodies separately and then conducts Boolean operations of the meshed bodies without using any CAD Boolean operations. This technology can prepare and mesh even very dirty models 5-15 times faster and easier without any user prior adjustments or healing of the model, i.e., automatically. In addition, MBO supports convergent geometry in NX.



Total mesher time: 5 min

Mesh Boolean Operations

Performance gain

“CAD Boolean” is the default option. “Preprocessor Boolean” is FLOEFD’s Boolean approach activated with “Improved Geometry Handling” in previous versions. Both cases are complex electronics cooling geometry.

Case 1	CAD Boolean	Preprocessor Boolean	MBO
Preprocessing	88 %	12 %	5 %
Meshing	12 %	6 %	8 %
Total	100 %	18 %	13 %

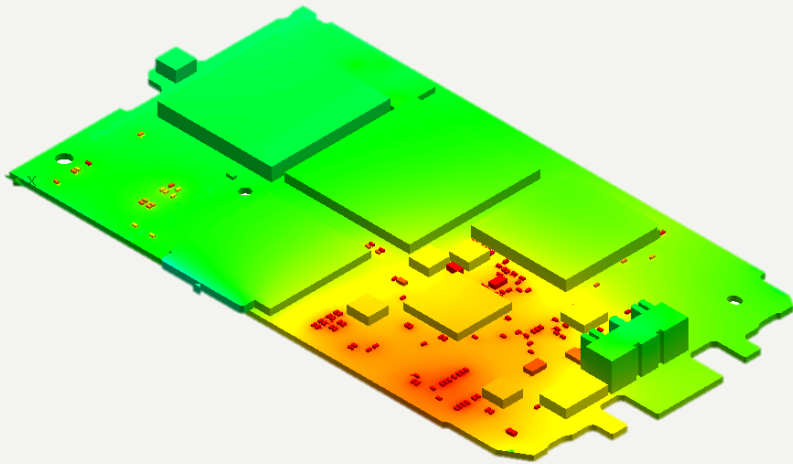
Case 2	CAD Boolean	Preprocessor Boolean	MBO
Preprocessing	84 %	17 %	3 %
Meshing	16 %	9 %	3 %
Total	100 %	26 %	6 %

Mesh Boolean Operations

UI Changes and Diagnostic

The Mesh Boolean technology can be used together with the CAD Boolean diagnostic, combining the power of Mesh Boolean and the convenience of getting additional information, such as a diagnostic of the fluid domain. If the CAD Boolean diagnostic fails to detect the fluid domain, you still can proceed and mesh the model with Mesh Boolean. In that case additional subdomain diagnostics will be displayed in the Solver Monitor dialog. You are free to choose the default way of handling the geometry (CAD Boolean, Preprocessor Boolean (formerly called “Improved Geometry Handling” mode) or Mesh Boolean, as well as you can disable the CAD Boolean diagnostics.

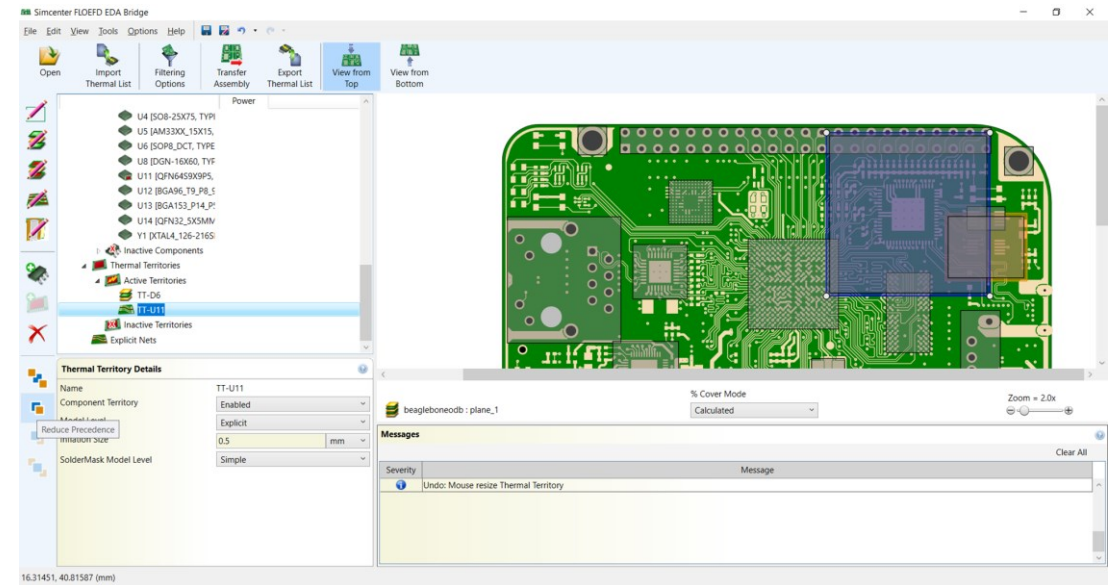
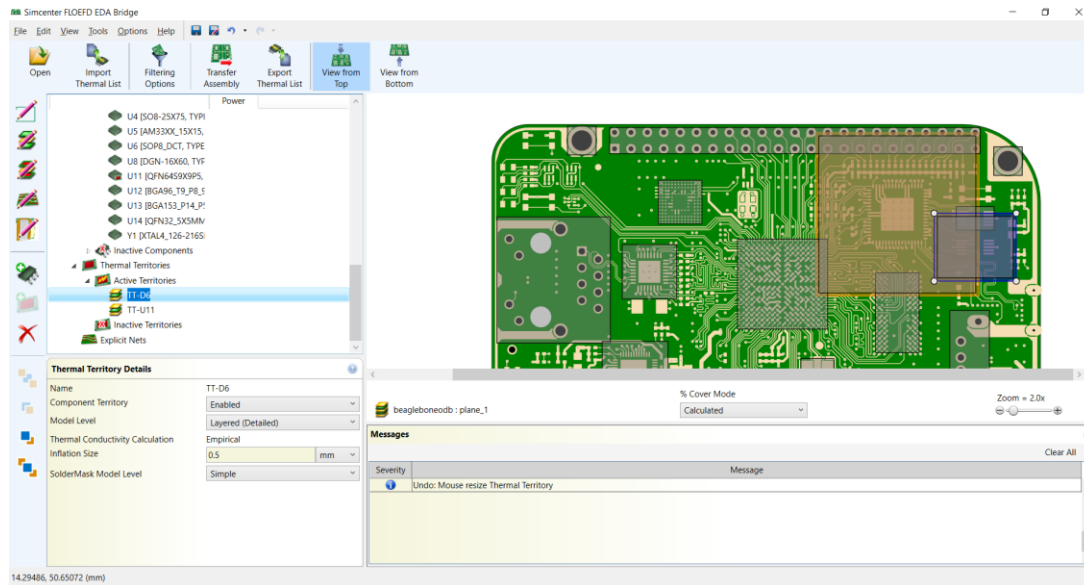
| Electronics Cooling & Thermal Management



EDA Bridge Improvement

Layered (Detailed) Thermal Territory

The Thermal Territory around a package can now be represented in Layered (former called Detailed) mode in addition to the already existing Explicit mode. In Layered mode each layer is given an effective thermal conductivity. You can easily define precedence of the overlapped Thermal Territory, so the territory with higher precedence will be applied in the overlapping region.



EDA Bridge Improvement

Via Filler and Pin Filler Material definition for Explicit and Layered mode

You can set material for Via Filler and Pin Filler. Currently you can define up to 4 different materials for Explicit or Layered modes. In Smart PCB mode, filler materials and via and pin groups can be adjusted after importing and the number of materials is not limited.

Pin/Via Filler Editor

Via Groups

Pin Groups

Name	Signal Layers (From - To)	Count	Diameter (mm)	Plated	Filled	Filler Material
VIA0.35DR0.125_noSM	1 - 2	2869	0.12499	✓	✓	Copper
VIA0.3DR0.125_noSM	1 - 2	5696	0.12499	✓	✓	Copper
VIA0.35DR0.125_noSM	7 - 8	13529	0.12499	✓	✓	Copper
VIA0.9DR0.5	1 - 8	845	0.5	✓	✓	Non-Conductive

Pin/Via Filler Editor

Via Groups

Pin Groups

Name	Count	Diameter (mm)	Plated	Filled	Filler Material
R3.0DR2.075dk+_-0.05	125	2.075	✓	✓	Solder
R10.0DR5dk+_-0.1_Int-R10.0	14	4.99999	✓	✓	Solder
R1.85DR1.04dk+_-0.05_Int-R1.85	52	1.04	✓	✓	Solder
R2.6DR1.6dk+_-0.075	12	1.599994	✓	✓	Solder
R2.6DR1.6dk+_-0.075_MS-R3.5_MS	36	1.599994	✓	✓	Solder

Filler Details

Close

Preferences

Modeling Defaults

Filtering Defaults

Warning Controls

Default Units

Geometry Controls

View Options

Material Defaults

Filler Property Definition

Filler 1 Material

Name

Non-Conductive

Isotropic Thermal Conductivity

0.21

W/(m K)

Density

1200

kg/m^3

Specific Heat

880

J/(kg K)

Electrical Resistivity Type

Dielectric

Filler 2 Material

Name

Conductive

Isotropic Thermal Conductivity

7.8

W/(m K)

Density

4200

kg/m^3

Specific Heat

880

J/(kg K)

Electrical Resistivity Type

Dielectric

Filler 3 Material

Name

Air

Isotropic Thermal Conductivity

0.026

W/(m K)

Density

1.225

kg/m^3

Specific Heat

717

J/(kg K)

Electrical Resistivity Type

Dielectric

Filler 4 Material

Name

Solder

Isotropic Thermal Conductivity

78.4

W/(m K)

Density

7400

kg/m^3

Specific Heat

306

J/(kg K)

Electrical Resistivity Type

Conductor

Electrical Resistivity

10.4

microOhm cm

Reset To Defaults

OK

Cancel

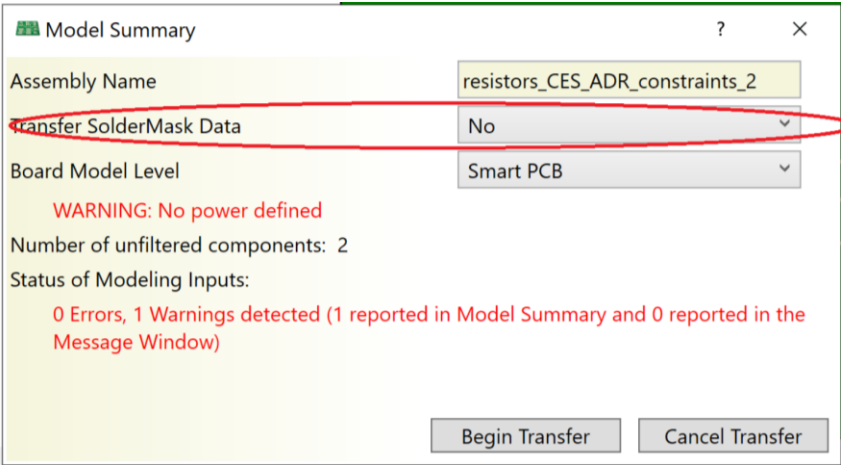
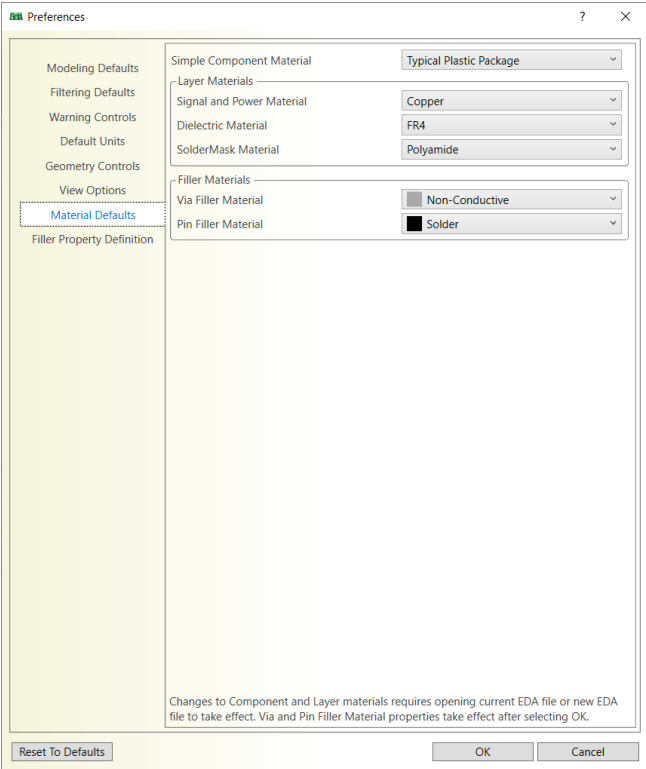
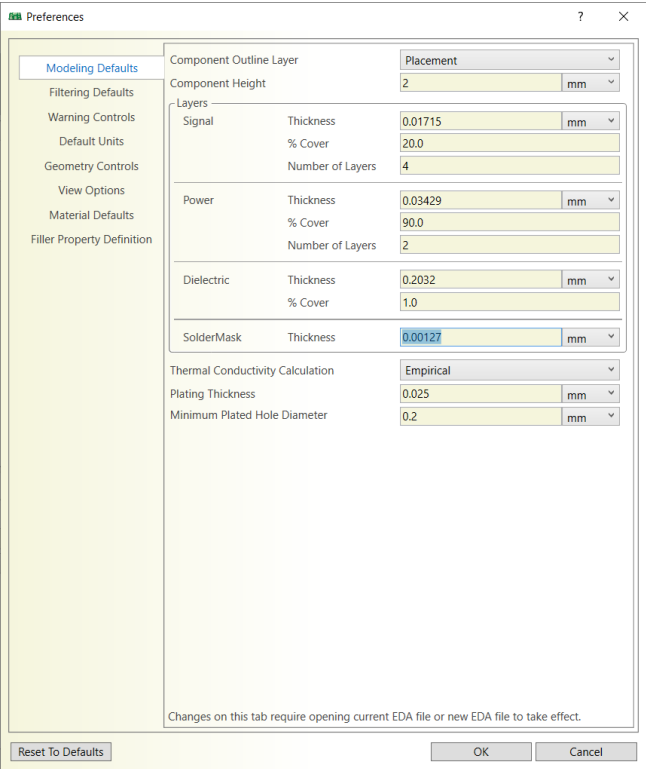
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SIEMENS

EDA Bridge Improvement

Solder mask support

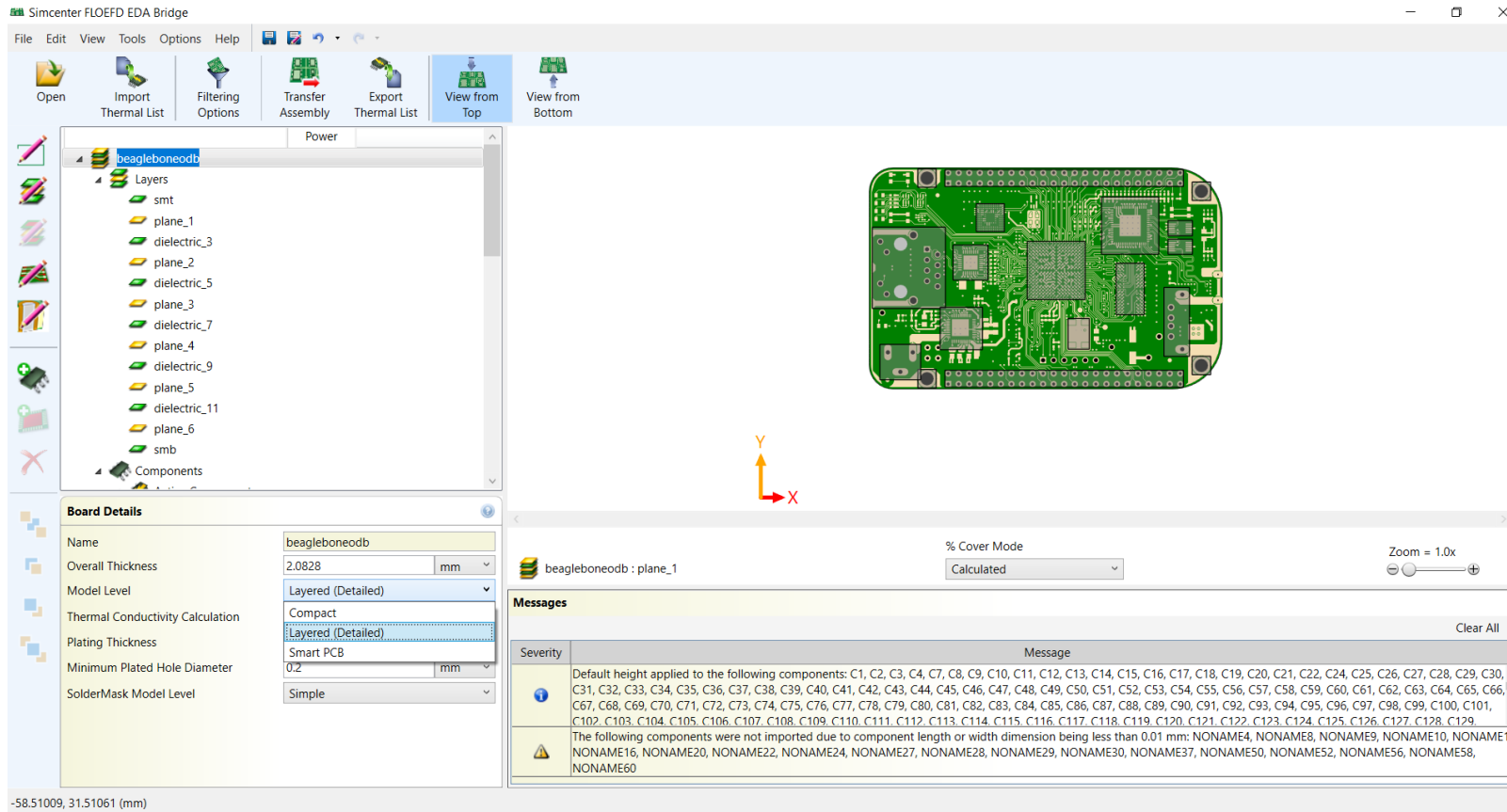
The solder mask is added as solder top (smt) and solder bottom (smb) layers. You can define solder mask thickness and material. In the Smart PCB mode additional bodies are created for solder mask, please check the thickness of solder mass in advance. You can choose to add solder mask or not in the Model Summary dialog upon transferring. By default solder mask is disabled.



EDA Bridge Improvement

UI Improvement

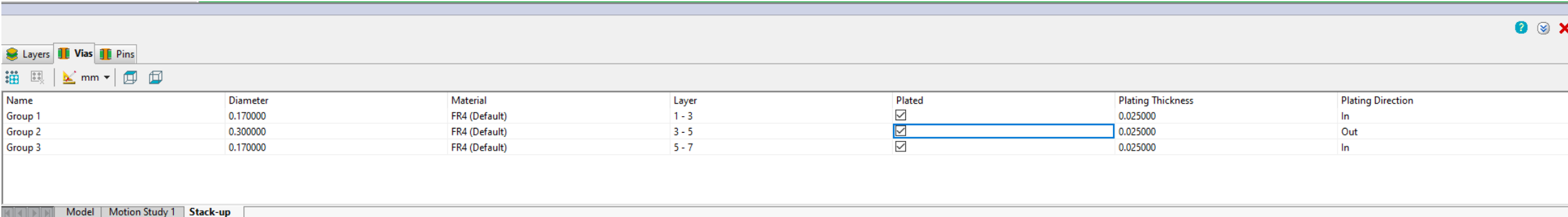
The “Material map” mode is renamed to “Smart PCB”. This is now consistent with the “Smart PCB” name already used in Simcenter FLOEFD after the transfer from Simcenter FLOEFD EDA Bridge.



Smart PCB

Via Plating Direction, Performance and Accuracy

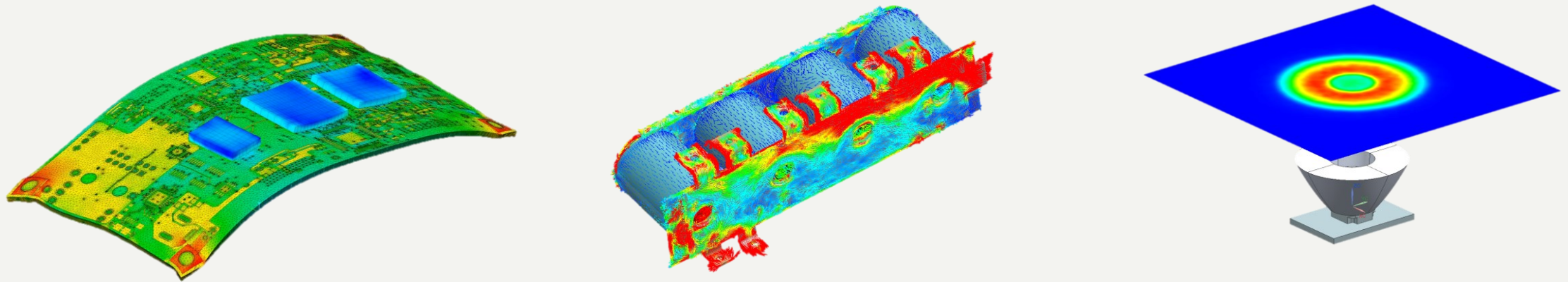
- **Via Plating direction: In/Out.** For a via group with plating you can define whether the obtained via diameter is the hole diameter before plating (so the final hole diameter after plating will be smaller for the double thickness of plating) or after the plating (so the obtained diameter is the final hole diameter after plating).



Name	Diameter	Material	Layer	Plated	Plating Thickness	Plating Direction
Group 1	0.170000	FR4 (Default)	1 - 3	<input checked="" type="checkbox"/>	0.025000	In
Group 2	0.300000	FR4 (Default)	3 - 5	<input checked="" type="checkbox"/>	0.025000	Out
Group 3	0.170000	FR4 (Default)	5 - 7	<input checked="" type="checkbox"/>	0.025000	In

- Memory requirements for thermal simulations are significantly decreased. For example, a PCB with 30 million tiles can be simulated with a 64 Gb memory machine.
- Automatic merge of the few adjacent identical layers. For manufacturing reasons, a thick dielectric layer can be split into a few dielectric layers with the same properties. Such layers will be automatically merged in Smart PCB into one layer.

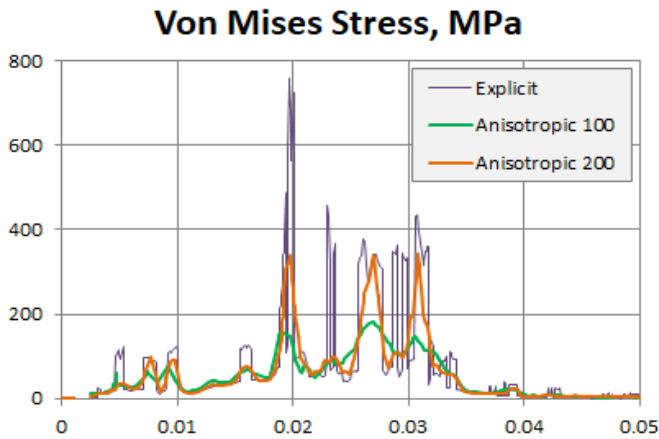
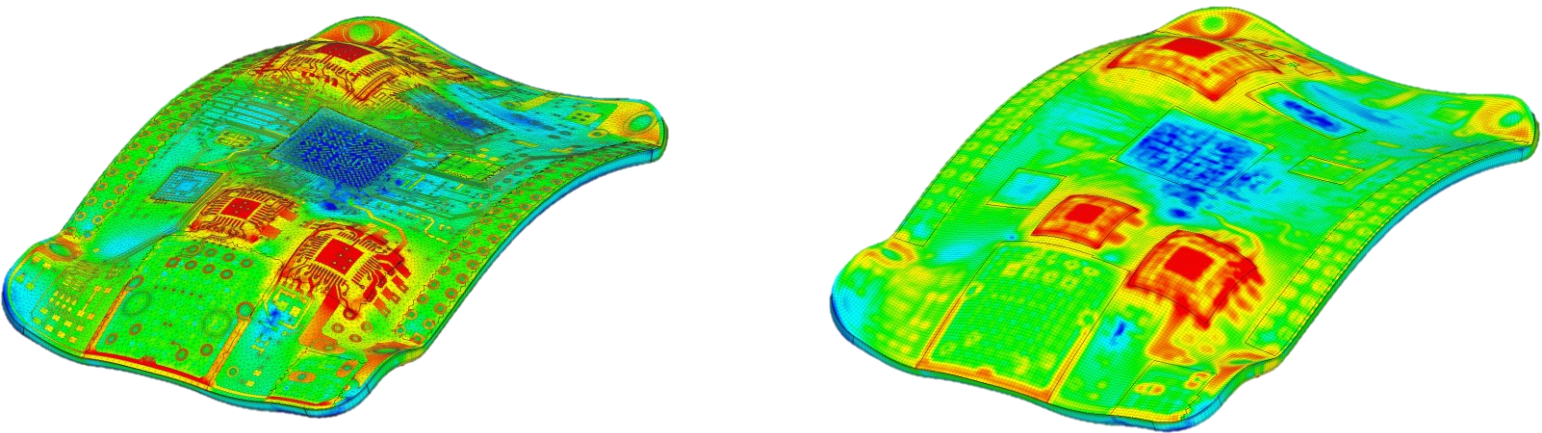
Multiphysics



Smart PCB/Structural

Homogenization performance is significantly improved.

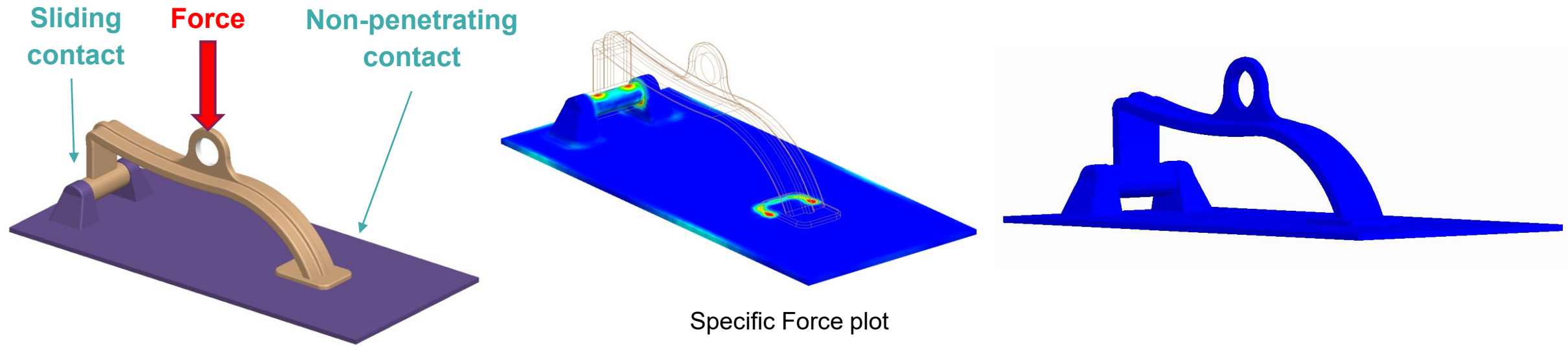
The memory requirement for PCB homogenization was significantly reduced by 2 to 30 times. The homogenization mesher and solver was accelerated. This allows making structural simulations of extremely large and complex PCBs on desktop computers feasible.



	Memory Peak, Gb		Mesh file size, Gb
	Mesher	Solver	
2022.1	51.5	51.5	4 169 980
2205	1.6	14.0	53 327

Structural: Non-penetrating contacts

New type of contact allows simulating loosening contact (in terms of linear approach): if the gap width between bodies is much less than the element size then the contact is treated as a “Sliding” contact in the portion of the contact area where surfaces are pressed together. Otherwise, the contact is not applied and the bodies are disconnected. The originally non-deformed surfaces in contact must coincide or overlap to let Simcenter FLOEFD find the contact area using Boolean operations. Use “Specific Force” postprocessor parameters or its components to locate resulting contact area.



Structural, EMAG, Lighting

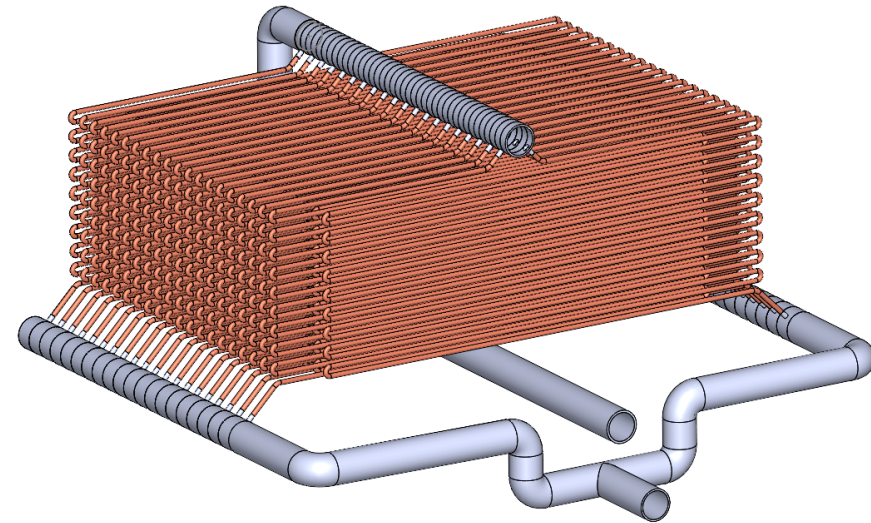
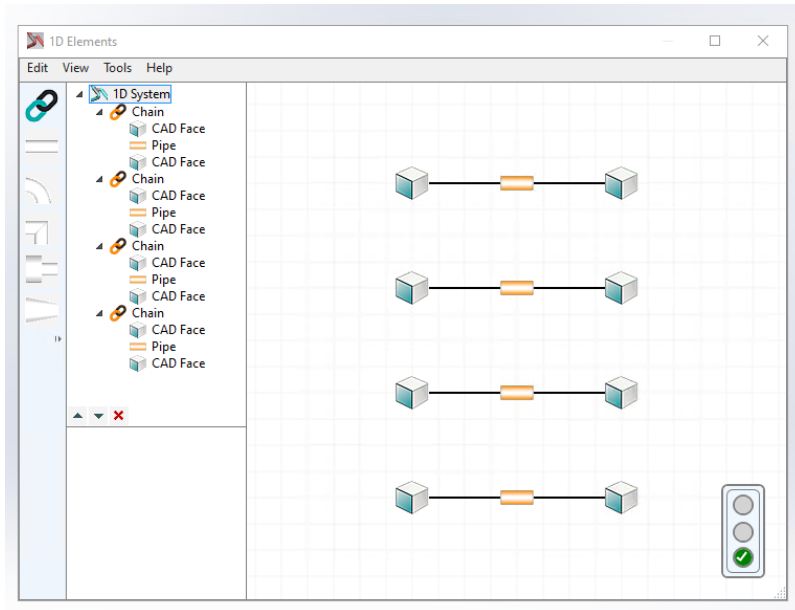
Various enhancements

- **Structural: Multi-edit support for conditions.** You can now edit several Structural conditions at once.
- **Structural/EMAG: Disabled body support.** Disabled solid bodies (treated as fluid volumes) are supported for Structural and EMAG simulations.
- **EMAG: Improved results visualization.** A new electromagnetics data mapping method eliminates spotting.
- **EMAG: New visualization Parameters.** New parameters are added, among them Electric Field Strength (E) and Magnetic Field Strength (H).
- **EMAG: Flux plot support.** Electromagnetic Loss is added to Flux plots.
- **Lighting/Radiation: Ray Visualization is added to the Compare tool.** Ray plots can now be compared with the Compare tool or in Parametric Study's built-in comparison functionality.

1D Elements

The ability to simulate 1D elements embedded in a 3D CFD Simcenter FLOEFD analysis was introduced in 2021. New enhancements in 2205 include:

- Multiple chains can be now created
- Gravity is now supported
- Support for Linux solving

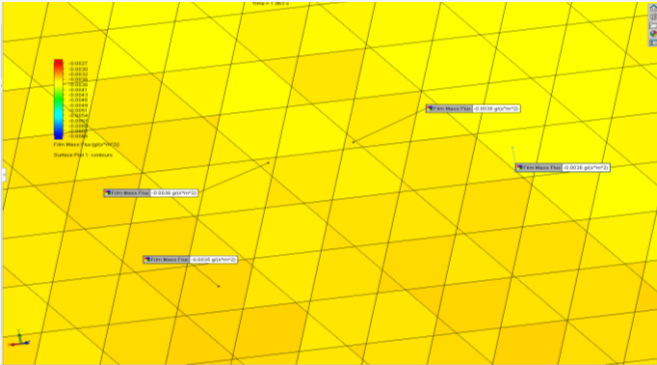
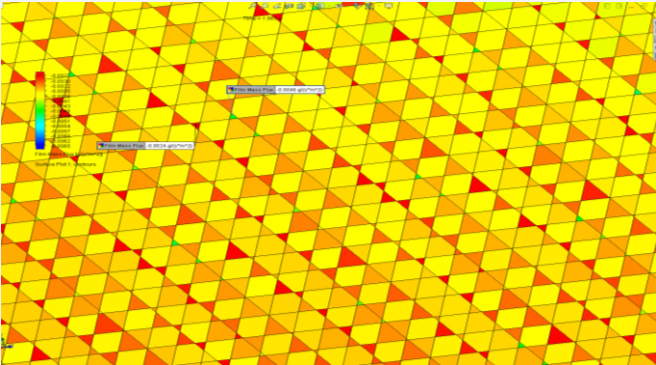


Productivity and Usability



Other Improvements

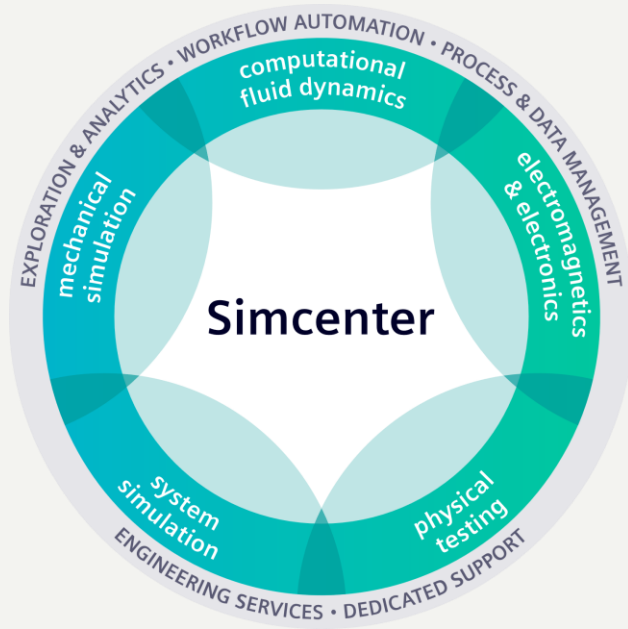
- **Goals: New goals are added.** The Total Energy Balance is added. The Volumetric Heat Generation Rate and the Heat Generation Rate, Mass of Solid parameters and goals are added.
- **Solver Monitor: Speed up of last iteration.** The completing of mesher and solver operations takes much less time due to optimizations of memory freeing.
- **Film: Improved visualization on angled surfaces.** Film mass flux visualization on angled surfaces is now more uniform.

	2205	2022.1
Film Mass Flux Plot		

Other Improvements

- **Export results: Transient Explorer support.** In Transient Explorer mode, you can now export results for a specified time range with the given time step or for the active time moment.
- **Load results after calculation default option.** You can set not to load results after calculation by default.
- **Documentation: HTML based User Guide.** The Simcenter FLOEFD Help is now available in HTML format.

Interoperability



Xcelerator Share Support

Xcelerator Share is now supported for all FLOEFD products. All products are now listed in price as XaaS product.

Xcelerator Share is all about assisting collaboration, especially in distributed working environments.

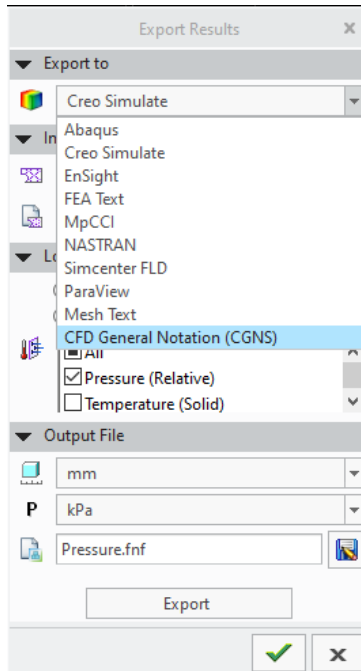
It allows you to synchronize files to cloud storage directly from Simcenter FLOEFD with the embedded browser.

Please note that Xcelerator Share requires the new XaaS enabled Simcenter FLOEFD License type.



CGNS (CFD General Notation System) Export

You can export static and transient results into CGNS format in two ways: CGNS file is created by Simcenter FLOEFD or CGNS file is created by another tool, imported into Simcenter FLOEFD and Simcenter FLOEFD outputs results values into the originally created CGNS file. The latter approach is recommended. For example, you can use CGNS export for acoustic analysis in Simcenter 3D based on FLOEFD field distribution. More about CGNS: [CGNS](https://cgns.github.io) (cgns.github.io).



| CAD Integration

CAD Specific

- **Convergent geometry support.** Convergent geometry is now supported for Mesh Boolean mode (NX and SC).
- **Updated NX version support.** Siemens NX series 2007 (2019, 2023, 2027) and 2206 (tested versions 2206 beta) are supported (FLOEFD for NX and FLOEFD SC).
- **Creo: Assembly feature.** The assembly feature is supported.