ALTAIR

复杂中面网格建模革命性升级：ALTAIR HYPERMESH 最新亮点解析

方献军　　HyperWorks高级技术经理

大纲

1 新界面

2 AI赋能

3 几何与网格的融合

4 中面抽取及直接中面网格

5 特征修复

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新界面

HyperMesh演进史

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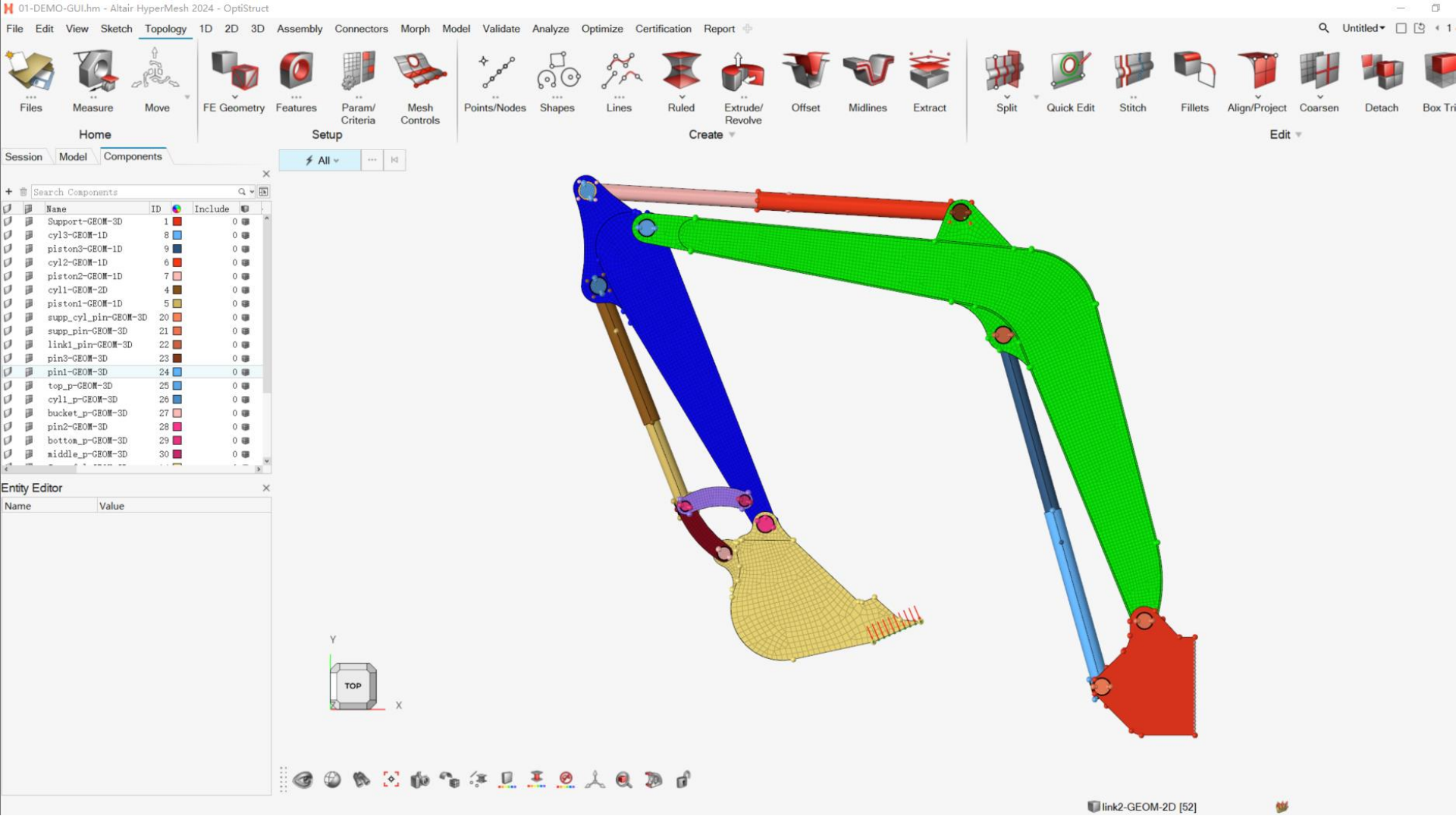
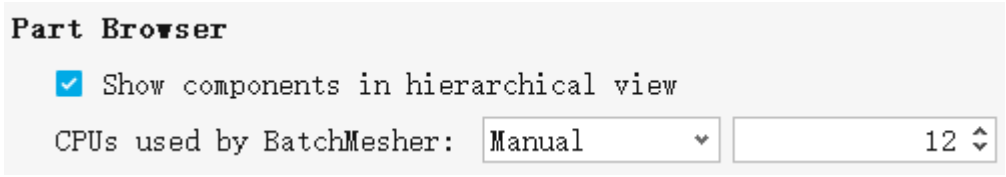
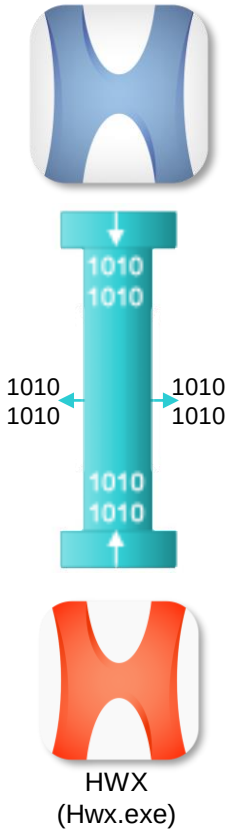

01-DEMO-GUI.hm - Altair HyperMesh 2024 - OptiStruct
File Edit View Sketch Topology 1D 2D 3D Assembly Connectors Morph Model Validate Analyze Optimize Certification Report
Untitled
Files Measure Move
Home
FE Geometry Features Param/ Criteria Mesh Controls
Setup
Points/Nodes Shapes Lines Ruled Extrude/ Revolve Offset Midlines Extract
Create
Split Quick Edit Stitch Fillets Align/Project Coarsen Detach
Edit
Session Model Components
All
Search Components
Name ID Include
Support-GEOM-3D 1 0
cyl3-GEOM-1D 8 0
piston3-GEOM-1D 9 0
cyl2-GEOM-1D 6 0
piston2-GEOM-1D 7 0
cyl1-GEOM-2D 4 0
piston1-GEOM-1D 5 0
supp_cyl_pin-GEOM-3D 20 0
supp_pin-GEOM-3D 21 0
link1_pin-GEOM-3D 22 0
pin3-GEOM-3D 23 0
pin1-GEOM-3D 24 0
top_p-GEOM-3D 25 0
cyl1_p-GEOM-3D 26 0
bucket_p-GEOM-3D 27 0
pin2-GEOM-3D 28 0
bottom_p-GEOM-3D 29 0
middle_p-GEOM-3D 30 0
Entity Editor
Name Value
Y
TOP
X
link2-GEOM-2D [52]

性能提升

- **双**进程改为单进程
- **界面响**应速度提升
- **移除全部面板**
- **开始支持python二次开**发(继续支持Tcl)
- Part browser调用BatchMesher时支持多CPU





为何选择新界面？

因为简单

因为强大

因为开放

因为自由！

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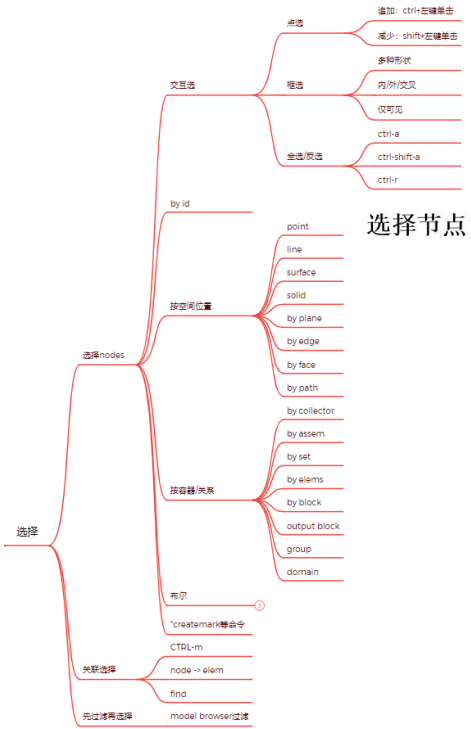
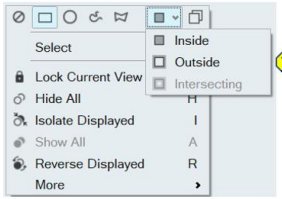
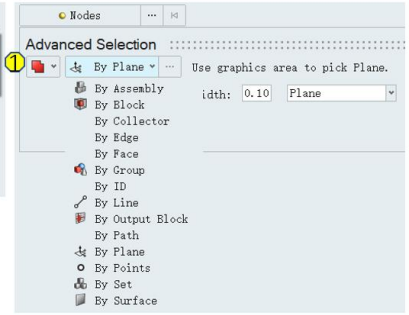
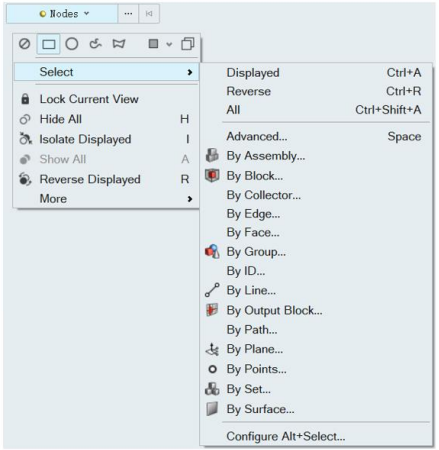
自由选择



选择节点







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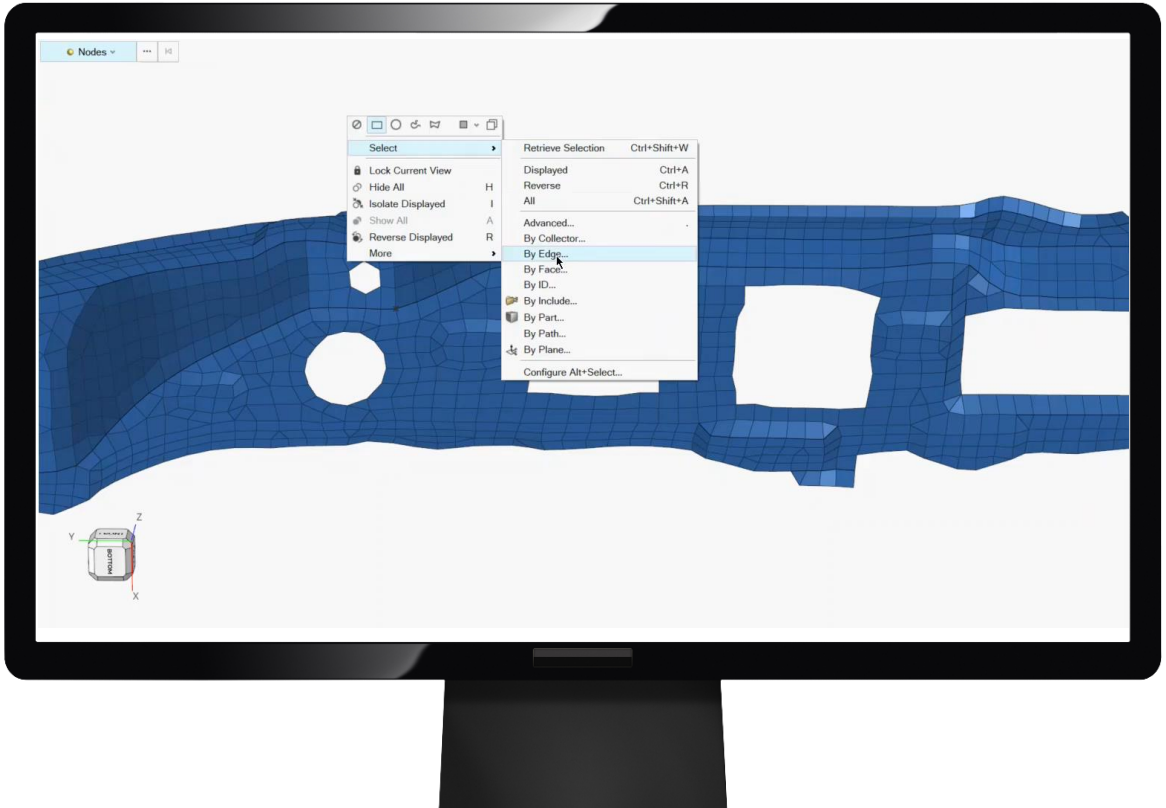
选择对象



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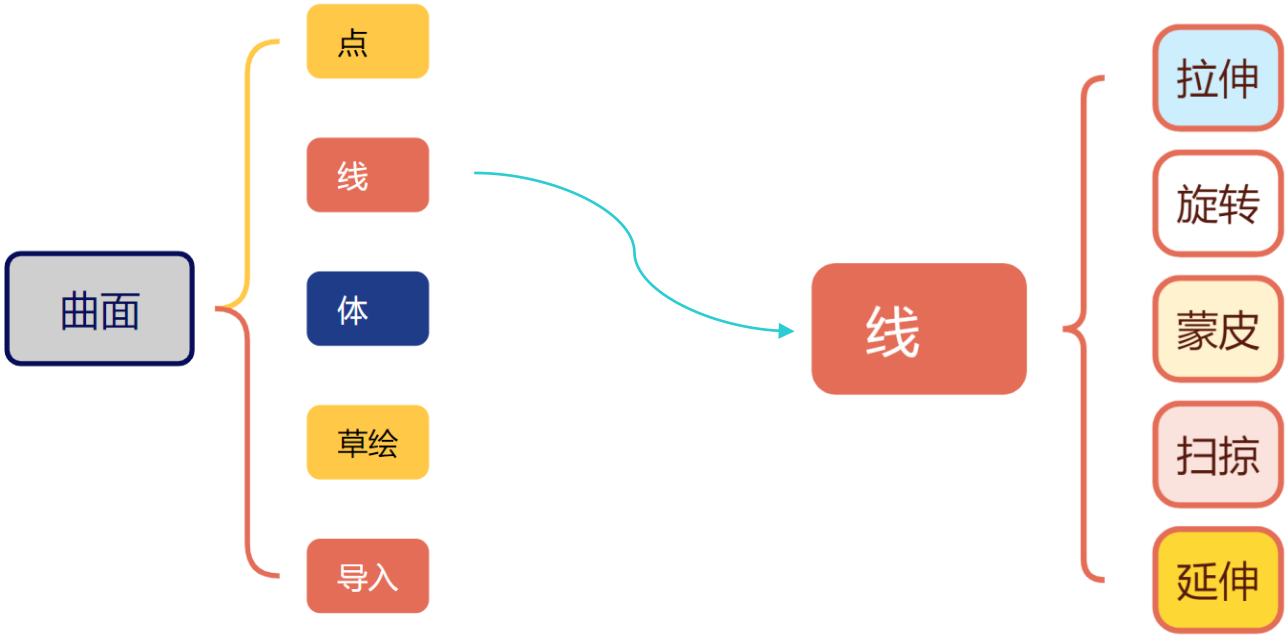
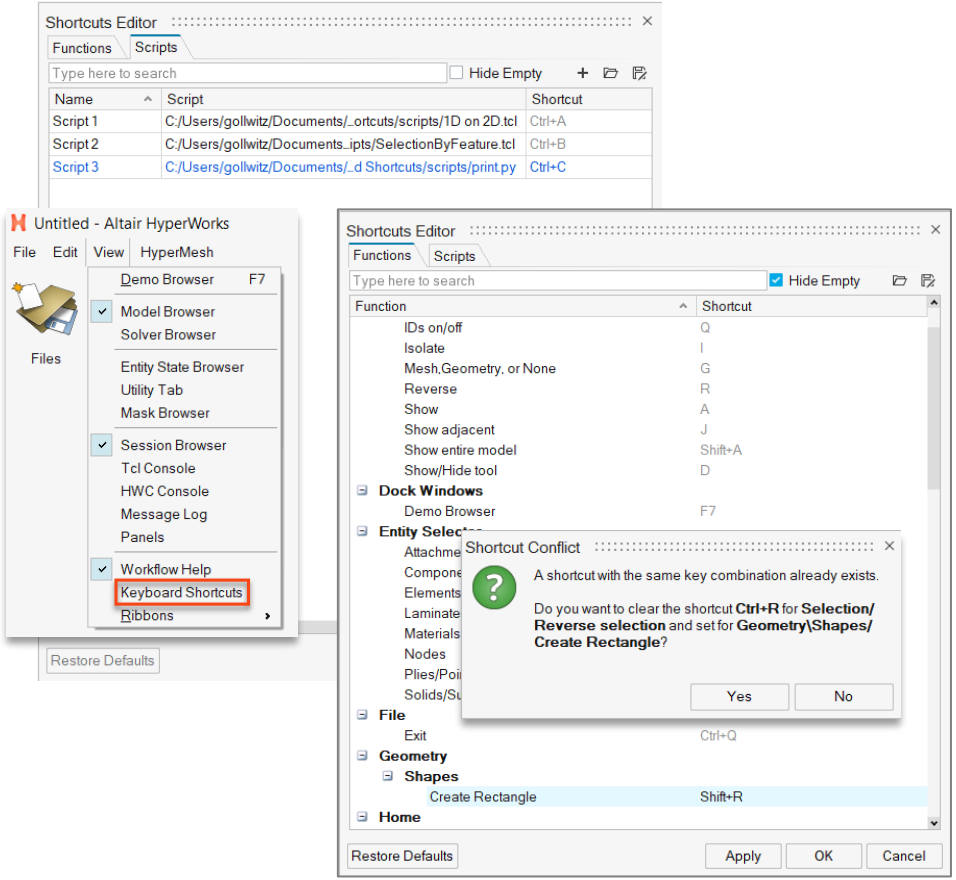
创建曲面



自定义快捷键

- **保留大部分F系列快捷**键
- **支持快捷**键和工具栏上的图标，**也支持**调用脚本
- **支持.xml文件**导入导出定义快捷键
- **覆盖前会提示用**户
- **其它**优点
  - **可**过滤出有快捷键的功能
  - **搜索功能**
- **修改快捷**键: Ctrl / Shift



“

如何更快？  快捷键 + 脚本”

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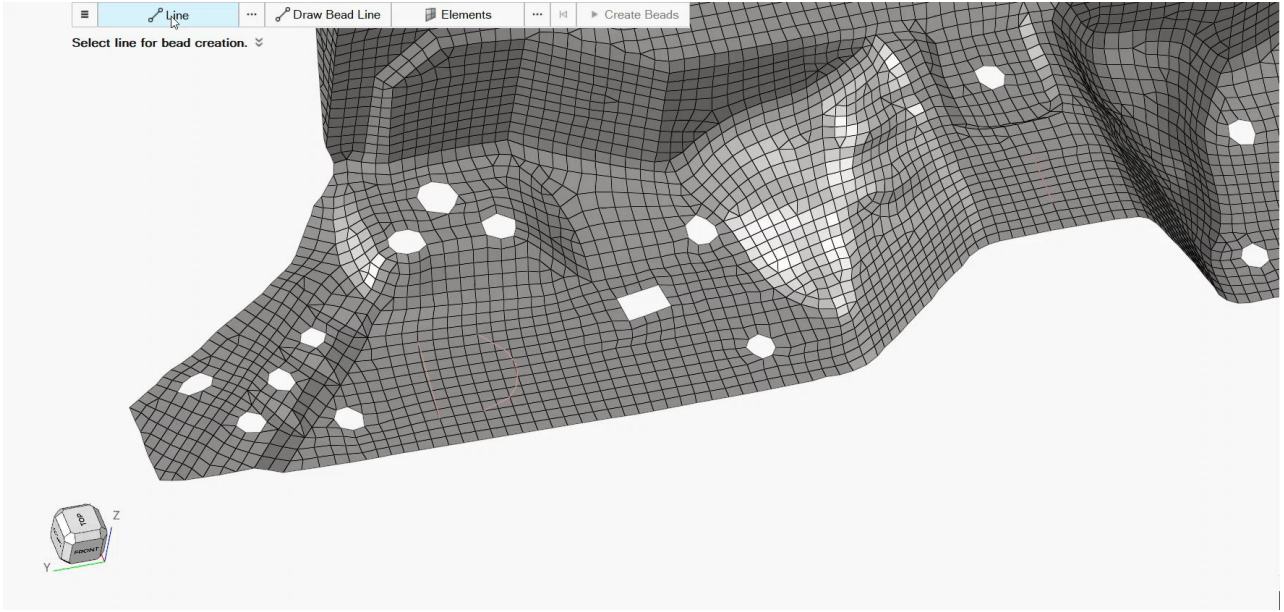
钣金件快速加筋工具

- **曲**线路径
- **直接**选择网格节点确定路径
- **交互**调整筋的形状参数



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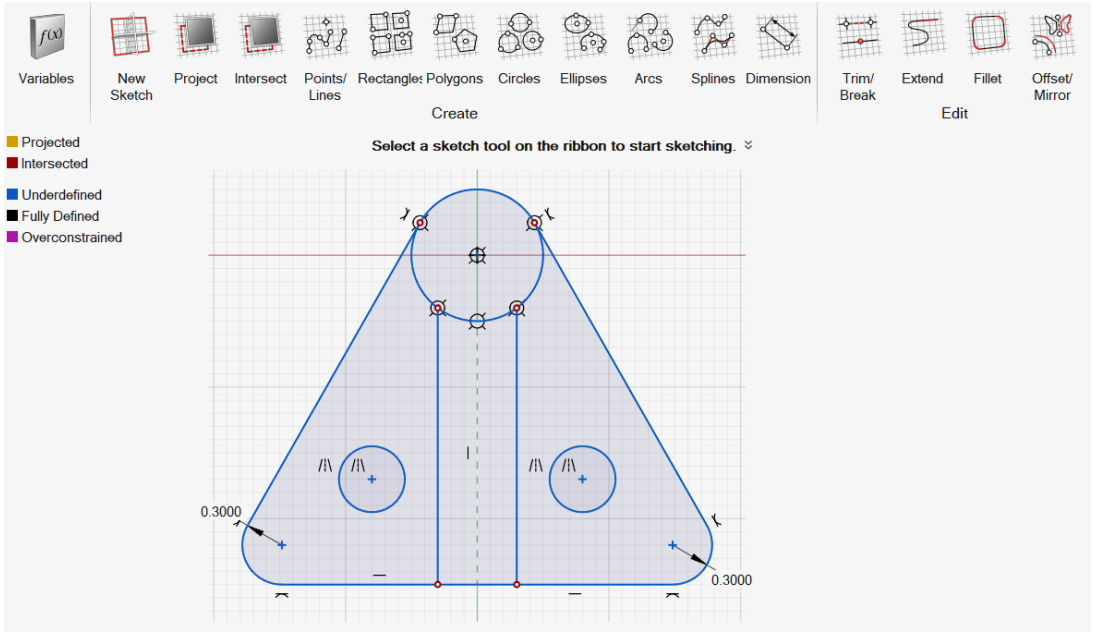
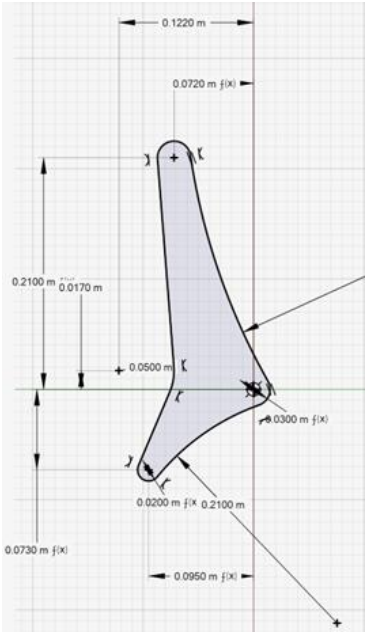
草绘

- 用于创建与编辑 2D 草绘
- 草绘可以转成几何线、面





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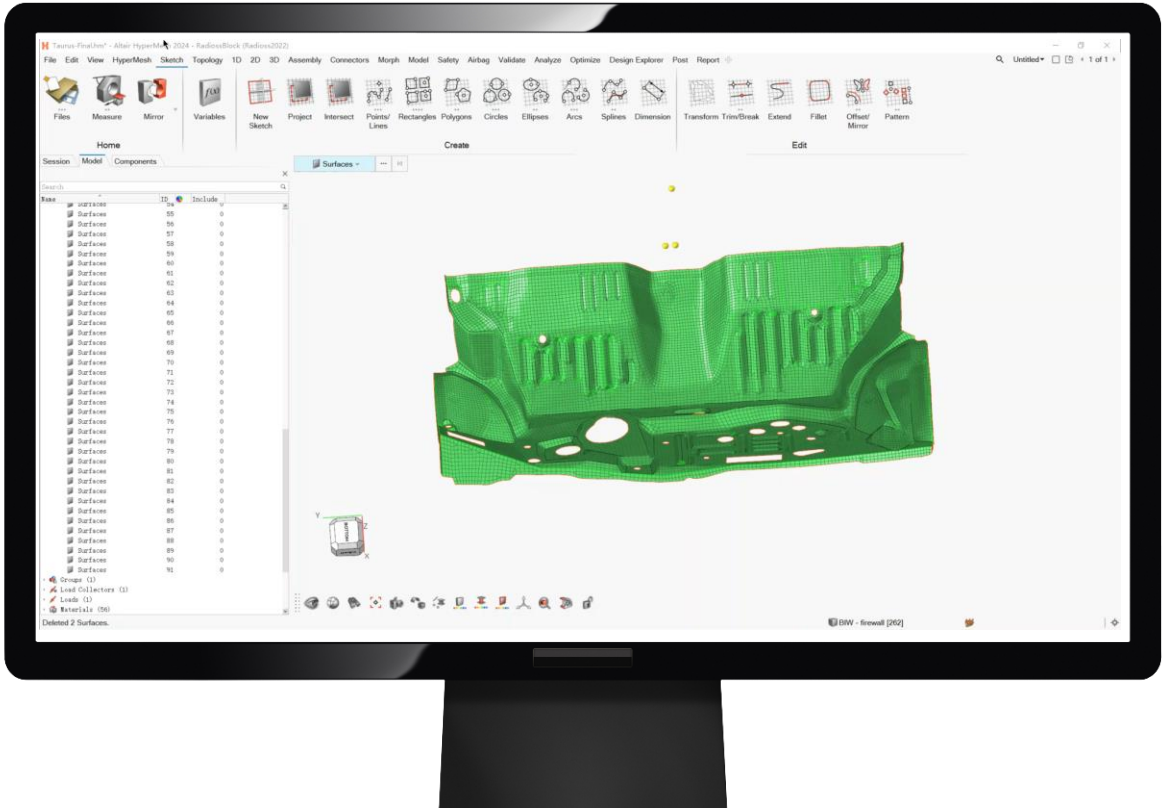
草绘加强筋



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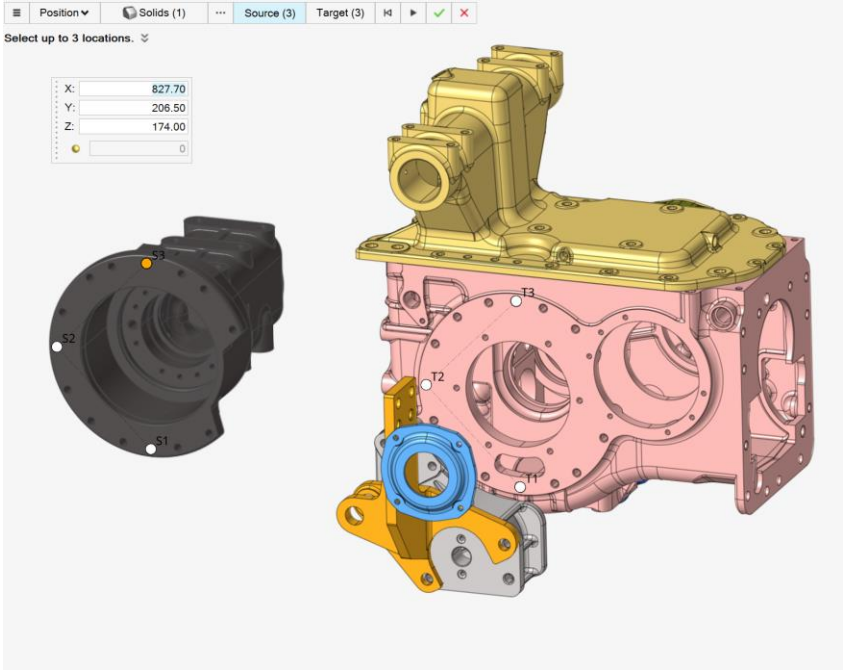
移动/定位工具

- CTRL-C CTRL-V复制(支持跨窗口)
- 移动工具提供了新的Position 模式
- 可以使用 1、2 或 3 个源/目标位置对进行定位
- 支持移动子系统



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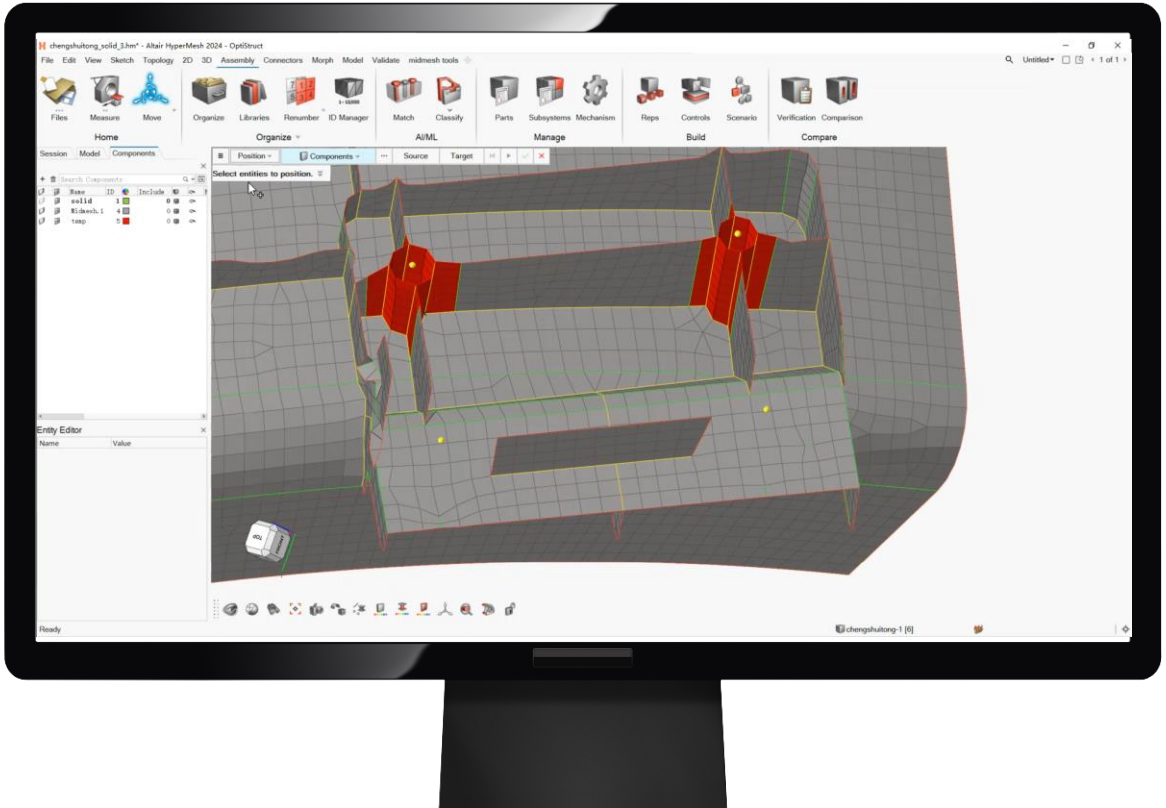
移动/定位工具



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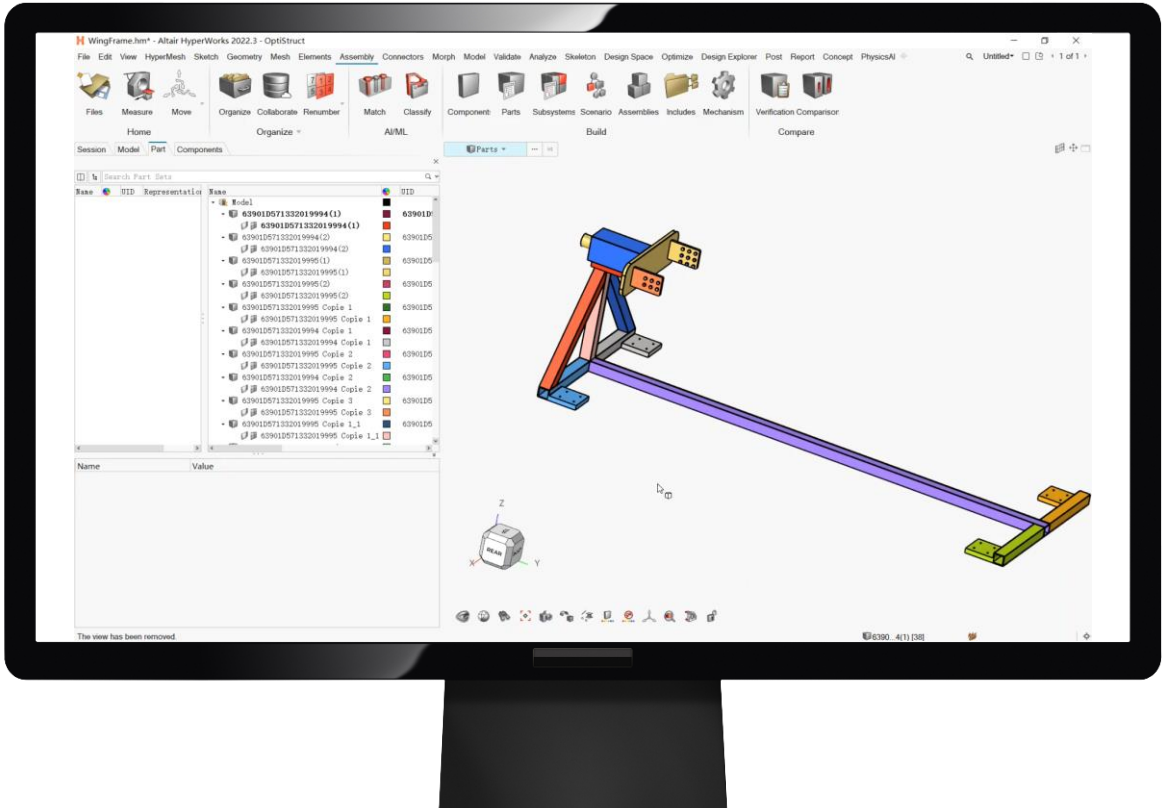
Part&instance：相同的件只划一次



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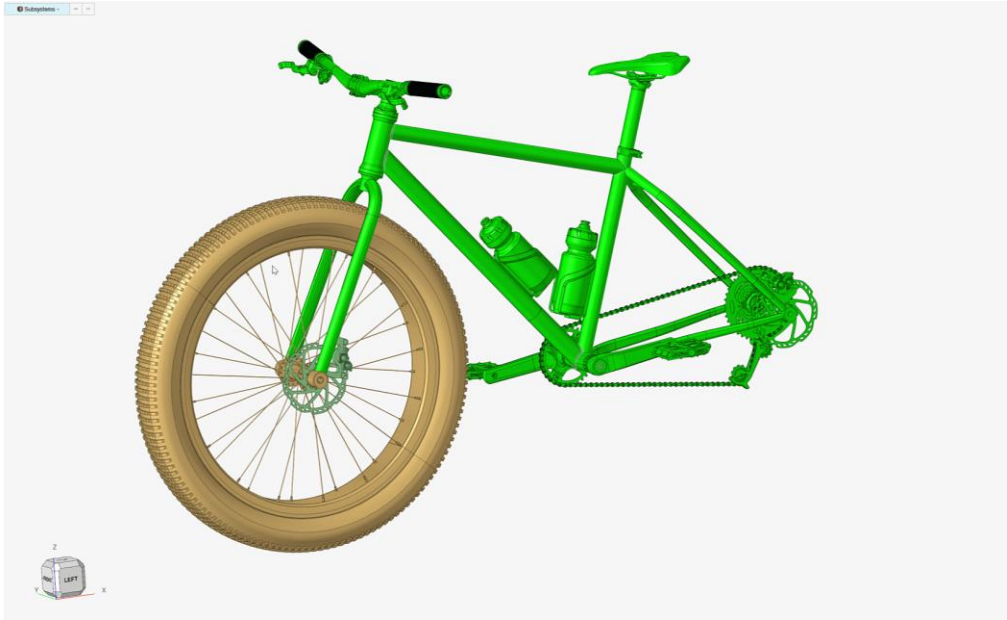
子系统实例化：简化建模

- 简化建模:
  - 轻松复制内容
  - **有效地将**变更推送到多个子系统
- **熟悉的外**观和感觉:
  - **基于部件**浏览器行为



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AI赋能

ALTAIR COPILOT AI ASSISTANT (BETA)

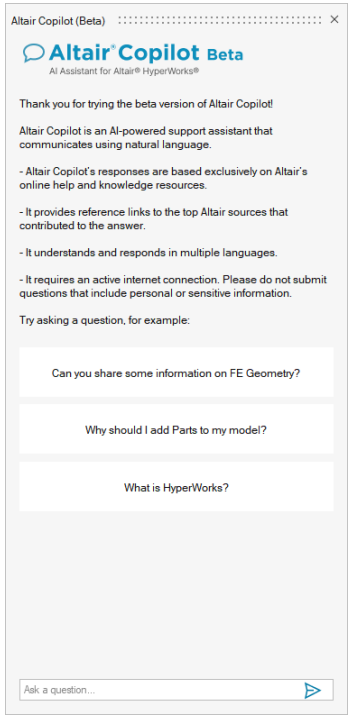
ALTAIR

Altair® Copilot Beta

AI Assistant for Altair® HyperWorks®

Altair Copilot 是一款 AI 支持助手，能理解多种自然语言，并完全根据 Altair 的在线帮助和其它 Altair 知识资源回答问题。

- 知识来源不断扩大,包括: Altair 社区知识库、Altair HowTo系列视频、Altair 电子学习材料等。
- 限定了学习素材库，防止它一本正经地胡说八道
  - 这并不意味着它可以做到万无一失，取决于问题和可供学习用的源的质量
- 自动跟踪当前和上一个问题，因此可以根据最后一个答案进一步提问
- 系统会根据活动应用程序和求解器配置文件（如果适用）自动缩小主题范围
  - 例如，如果使用 HyperMesh + OptiStruct 配置文件，它只会为这些产品生成答案
- 它使用互联网连接来处理您的问题并从在线帮助源中检索答案。请勿提交包含个人信息或敏感信息的问题。



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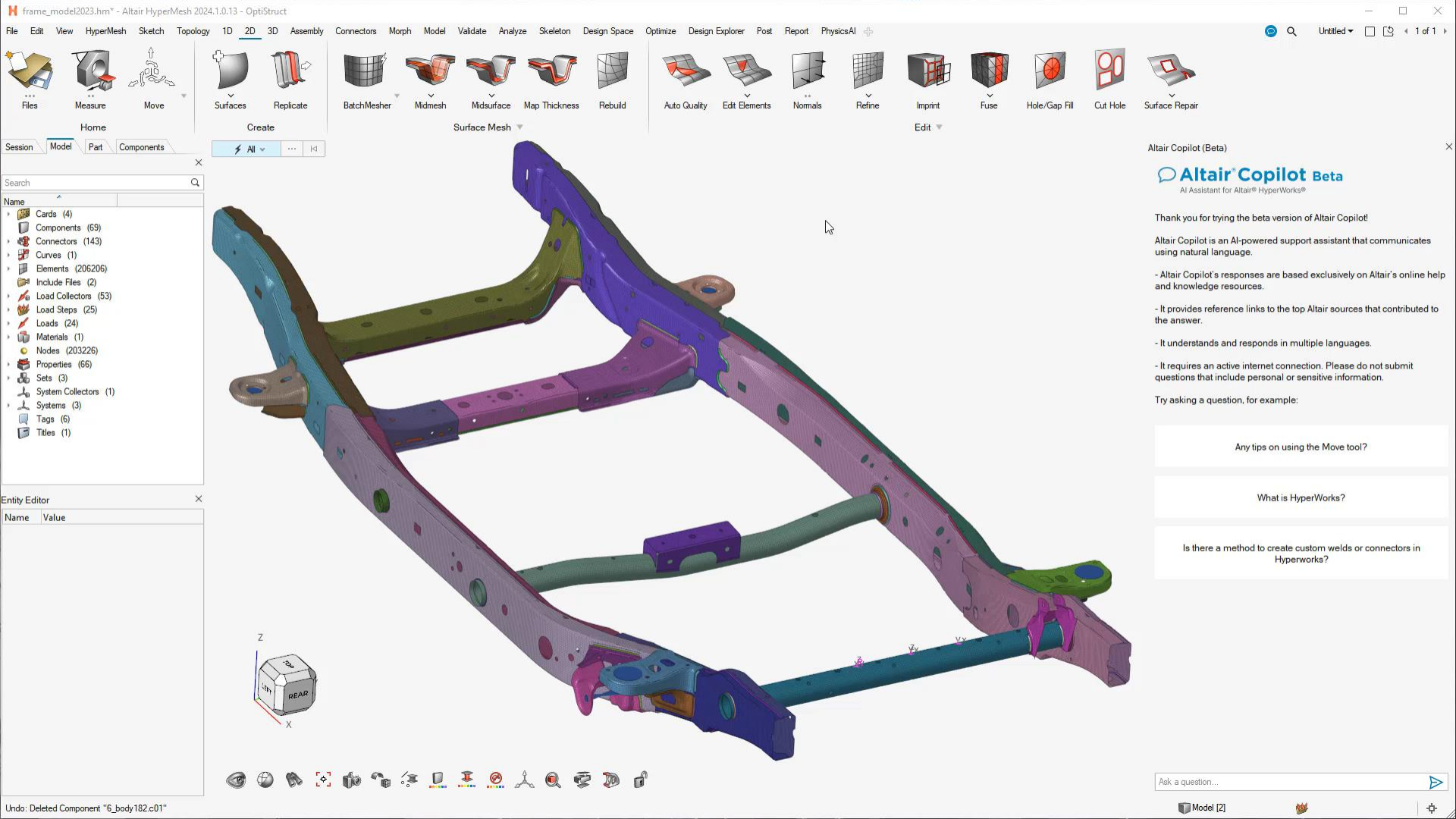

frame_model2023.hm* - Altair HyperMesh 2024.1.0.13 - OptiStruct
File Edit View HyperMesh Sketch Topology 1D 2D 3D Assembly Connectors Morph Model Validate Analyze Skeleton Design Space Optimize Design Explorer Post Report PhysicsAI
Untitled
1 of 1
Files Measure Move
Surfaces Replicate
BatchMesher Midmesh Midsurface Map Thickness Rebuild
Auto Quality Edit Elements Normals Refine Imprint Fuse Hole/Gap Fill Cut Hole Surface Repair
Home
Create
Surface Mesh
Edit
Session Model Part Components
All
Search
Name
Cards (4)
Components (69)
Connectors (143)
Curves (1)
Elements (206206)
Include Files (2)
Load Collectors (53)
Load Steps (25)
Loads (24)
Materials (1)
Nodes (203226)
Properties (66)
Sets (3)
System Collectors (1)
Systems (3)
Tags (6)
Titles (1)
Entity Editor
Name Value
Z
X
REAR
Altair Copilot (Beta)
Altair Copilot Beta
AI Assistant for Altair® HyperWorks®
Thank you for trying the beta version of Altair Copilot!
Altair Copilot is an AI-powered support assistant that communicates using natural language.
- Altair Copilot's responses are based exclusively on Altair's online help and knowledge resources.
- It provides reference links to the top Altair sources that contributed to the answer.
- It understands and responds in multiple languages.
- It requires an active internet connection. Please do not submit questions that include personal or sensitive information.
Try asking a question, for example:
Any tips on using the Move tool?
What is HyperWorks?
Is there a method to create custom welds or connectors in Hyperworks?
Ask a question...
Undo: Deleted Component "6_body182.c01"
Model [2]

Door_B03.hm - Altair HyperMesh 2024.1.0.13 - OptiStruct

File Edit View HyperMesh Sketch Topology 1D 2D 3D Assembly Connectors Morph Model Validate Analyze Skeleton Design Space Optimize Design Explorer Post Report PhysicsAI

Untitled 1 of 1

Files Measure Move — Home

Surfaces Replicate — Create

BatchMesher Midmesh Midsurface Map Thickness Rebuild — Surface Mesh

Auto Quality Edit Elements Normals Refine Imprint Fuse Hole/Gap Fill Cut Hole Surface Repair — Edit

Session Model Part Components Properties

Properties

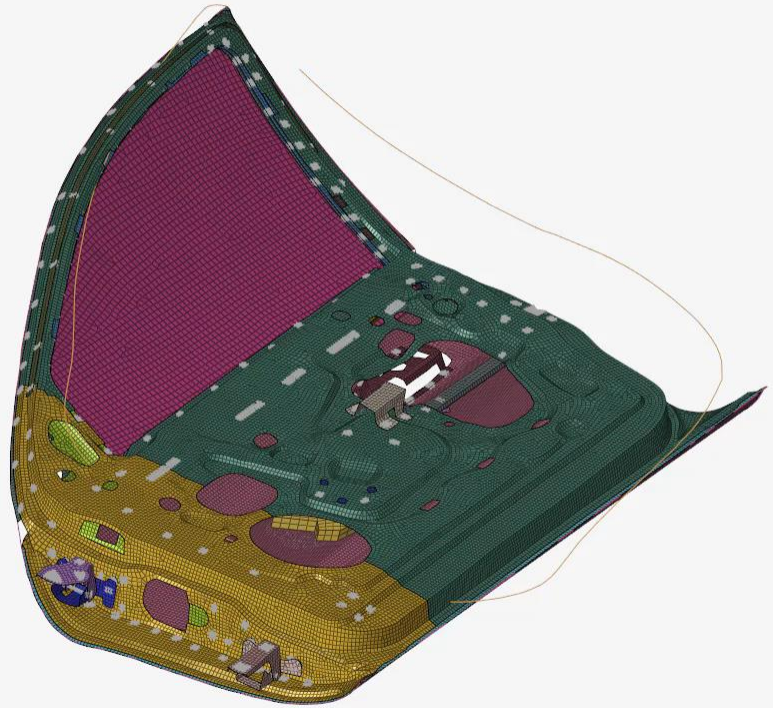
Search Properties

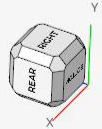
Name	ID	Include
OB - door trim - FT - R.	2201000	0
OB - door - FT - R - O	2201001	0
OB - door - FT - R - I	2201002	0
OB - door handle - FT - R	2201003	0
OB - window - FT - R	2201004	0
OB - door window sill - FT - R	2201005	0
OB - door bracket 1 - FT - R	2201006	0
OB - door up reinforce - FT - R	2201007	0
OB - door bracket 2 - FT - R	2201008	0
OB -door side impact bar- FT-R	2201009	0

Entity Editor

Name	Value

Model Info: C:/Users/cueva/OneDrive - Altair Engineering, Inc/2024/Chatbot/Door_B03.hm





Altair Copilot (Beta)

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Try asking a question, for example:

How do I sync metadata to PDM?

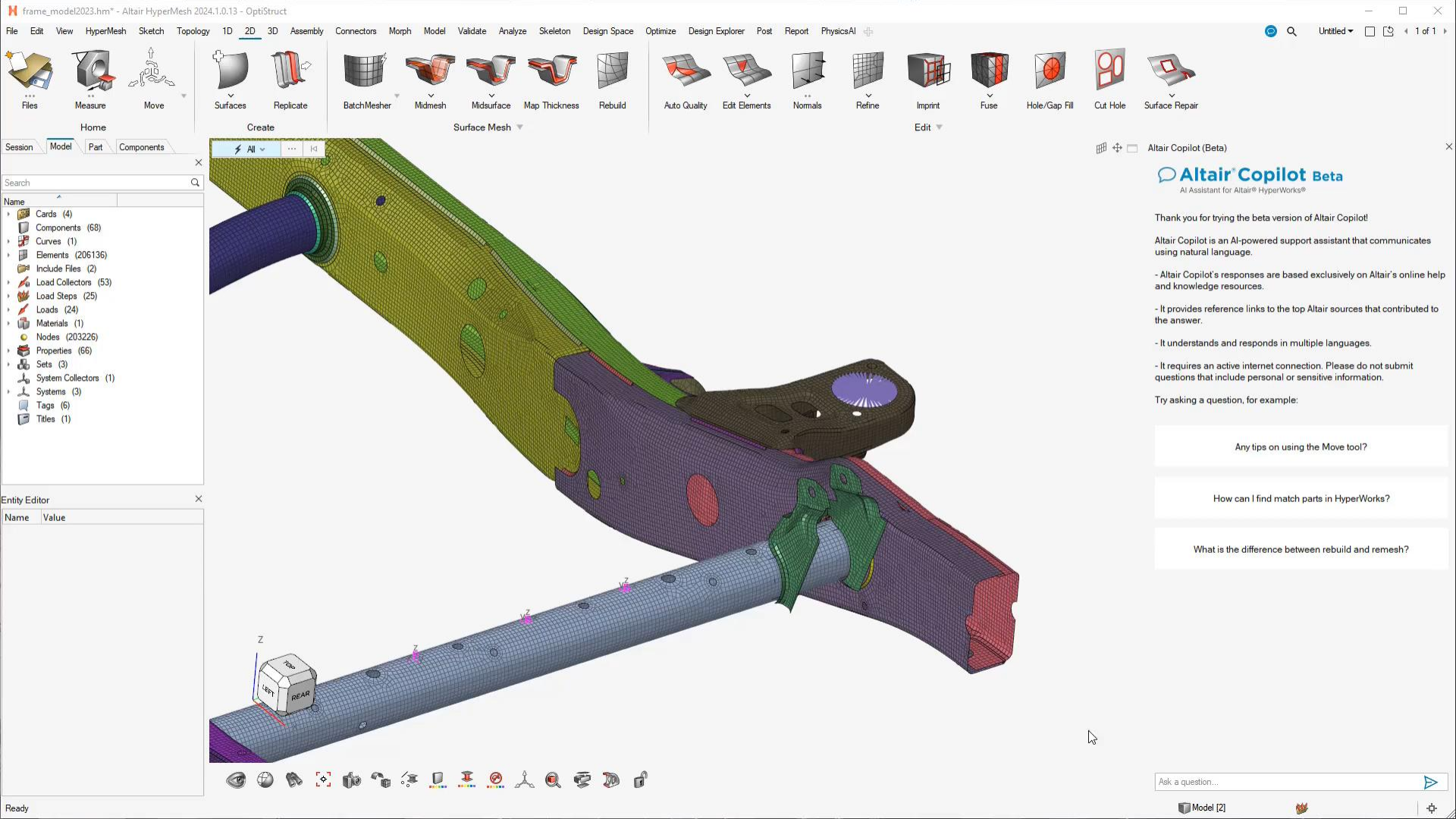
How can I find match parts in HyperWorks?

What steps can I follow to create a DOE?

Ask a question...

Ready

Dash Cro...mber RHD [98]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Sets (3)
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Altair Copilot (Beta)
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Try asking a question, for example:
Any tips on using the Move tool?
How can I find match parts in HyperWorks?
What is the difference between rebuild and remesh?
Ask a question...
Ready
Model [2]

Altair® Copilot Beta

AI Assistant for Altair® HyperWorks®

Tips. 如何协助您的 AI 助手

- 从不同的部分来源收集答案
  - 目前更适合一次从 1-3 个来源生成答案。未来的更新可能会为跨越更多来源的更复杂问题提供更智能的答案
- 追加提问
  - 只能跟踪当前和最后一个问题。只有当所有必要的信息都可以根据当前+前一个问题假设时，跟进和澄清提示才会起作用
- 技术同义词和术语
  - 如果找不到现有的答案，请尝试使用更通用的术语来重新提问。例如，说“rigids”或“RBEs”比说“spiders”更好。
- #script
  - 这是一项实验性功能。AI 生成的脚本的质量是不稳定的，可能需要进行一些调整或调试
  - 如果您在代码中发现了特定的错误或问题，您可以尝试根据已识别的问题编辑提示，将助手引导到正确的方向
- Beta
  - 这意味着它是一个不断发展的功能，其部分或全部组件可能会发生变化

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几何与网格的融合

“

设想网格和几何可互换的未来”

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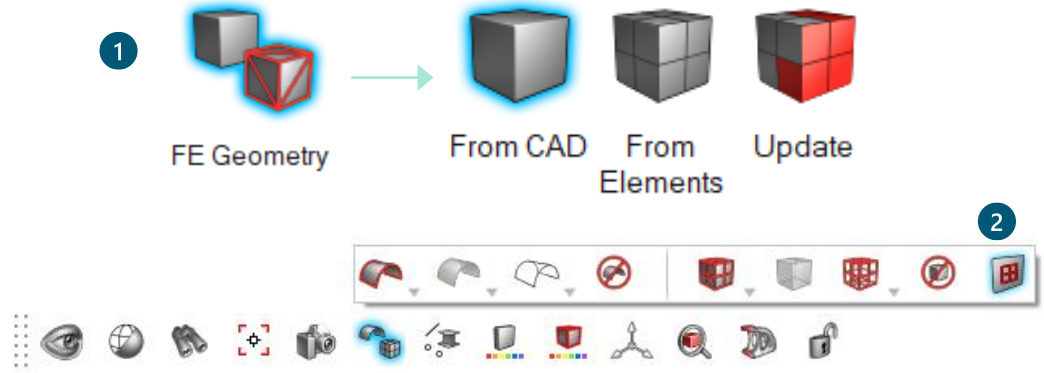
几何与网格的融合—FE-GEOM

- **网格和几何合二**为一
- **全面支持所有几何**类型: 1D, 2D, 3D
- 优化工具布局，**增**强用户体验



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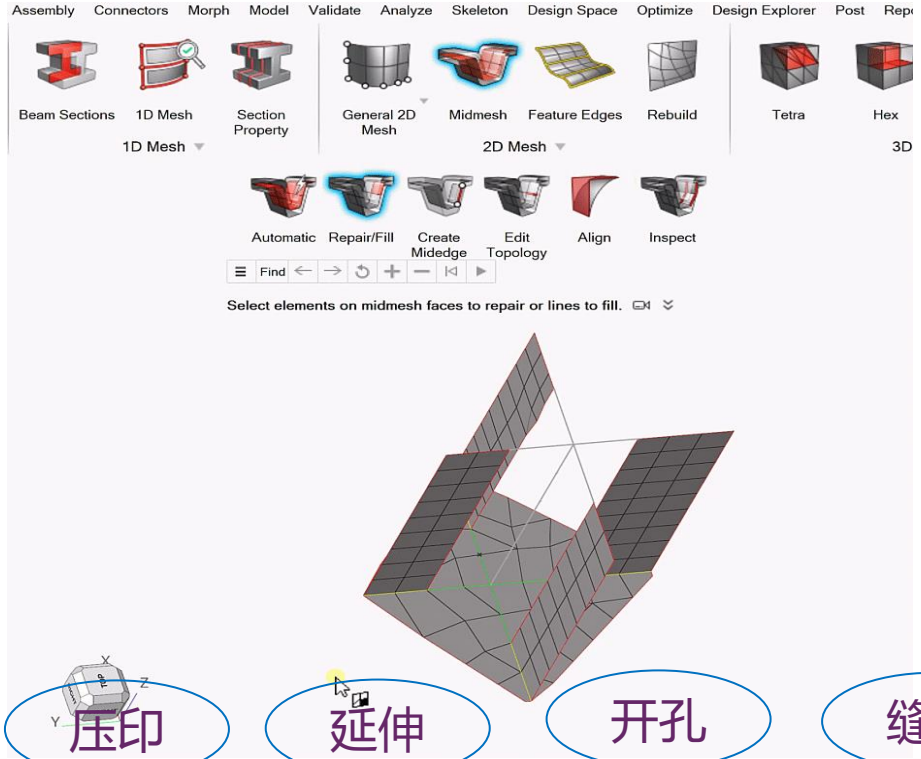
新增FE Geometry概念，大幅提升网格创建与编辑效率

- **像操作几何一**样去操作网格
- 对网格进行填充、**拉伸、切割等**
- 选择网格就像在选择几何
- 扩大FE geometry**适用范**围



填充　拉伸　切割　压印　延伸　开孔　缝合

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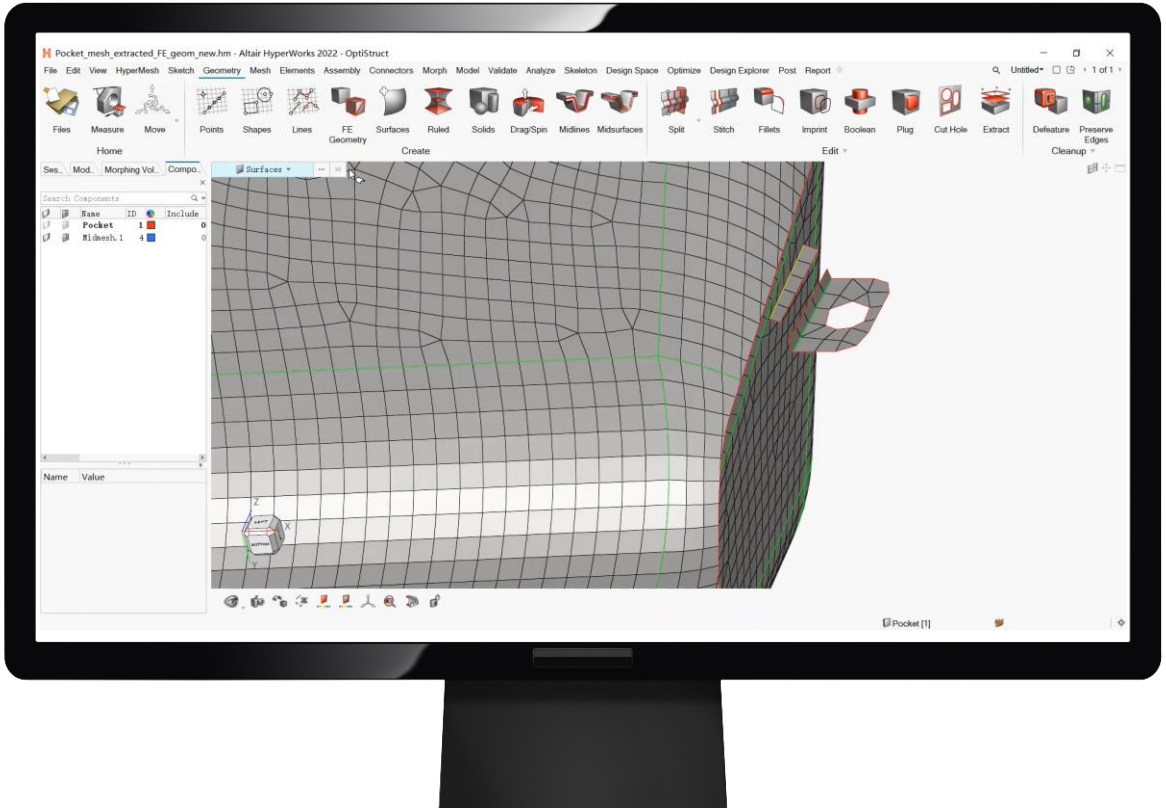
像操作曲面一样操作网格



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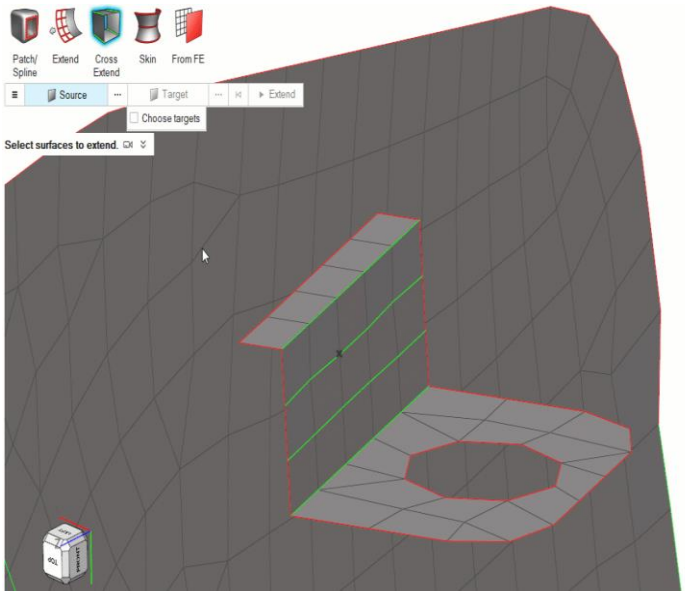
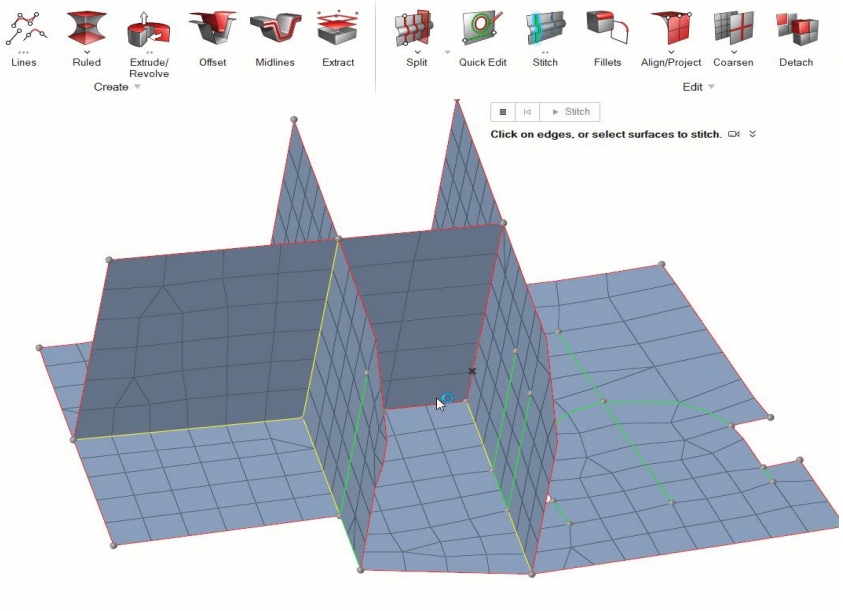
2024新增

Cross Extend（交叉延伸）



Stitch（缝合 ）



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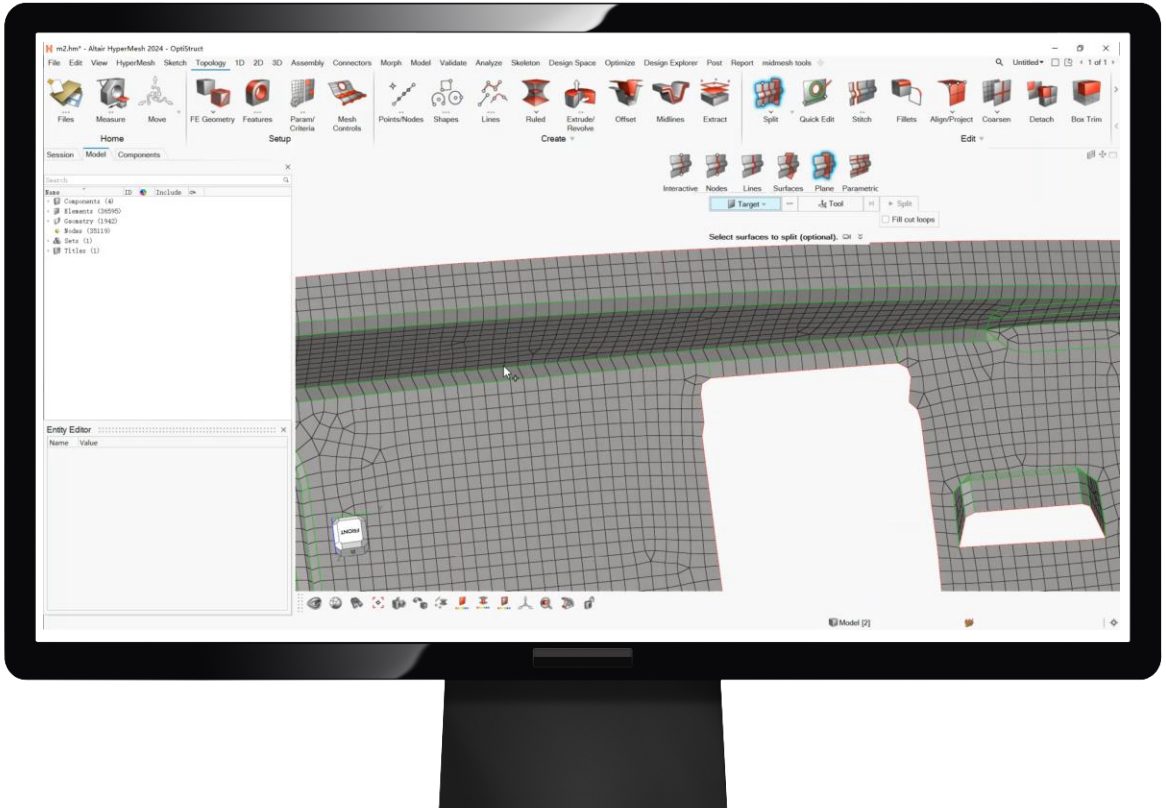
塑料件加筋



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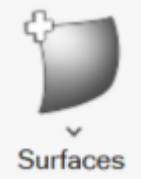
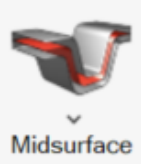
中面抽取和直接中面网格

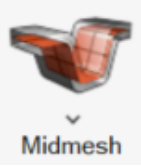
中面网格的三类方法



构造曲面 → 几何清理 → 网格划分 → 单元质量提升



抽中面 → 几何清理 → 网格划分 → 单元质量提升



直接中面网格 → 拓扑清理 → 单元质量提升

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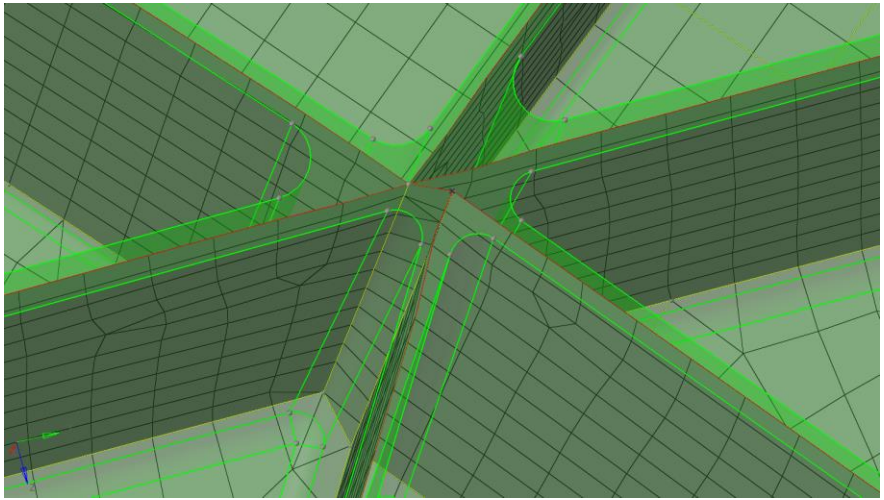
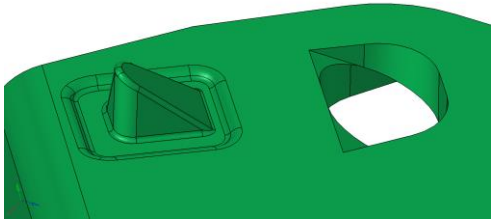
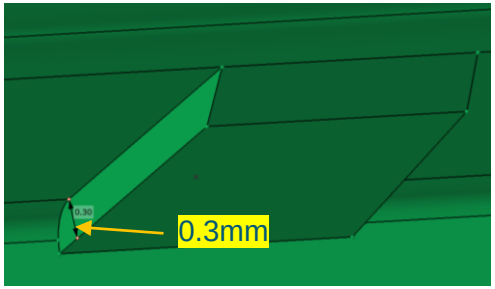
为什么铸造件/注塑件的中面网格划分难划？

- 3D和2D的不可等效性
- 结构特征多且复杂
- 变厚度
- 单元尺寸和几何特征过于接近







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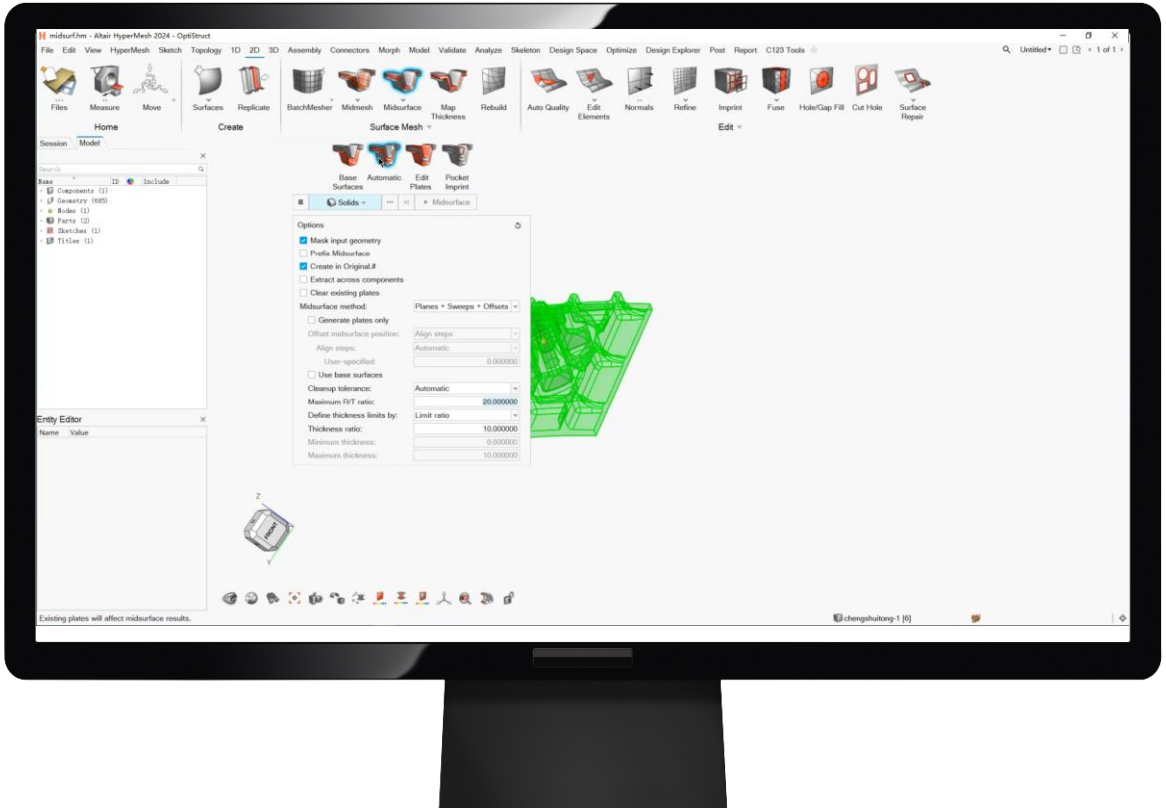
中面抽取+FE-GEOM



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中面网格

直接从几何模型抽取中面网格（无中面抽取步骤）

- 主要针对注塑件等中面抽取困难的情况
- 支持BatchMesher

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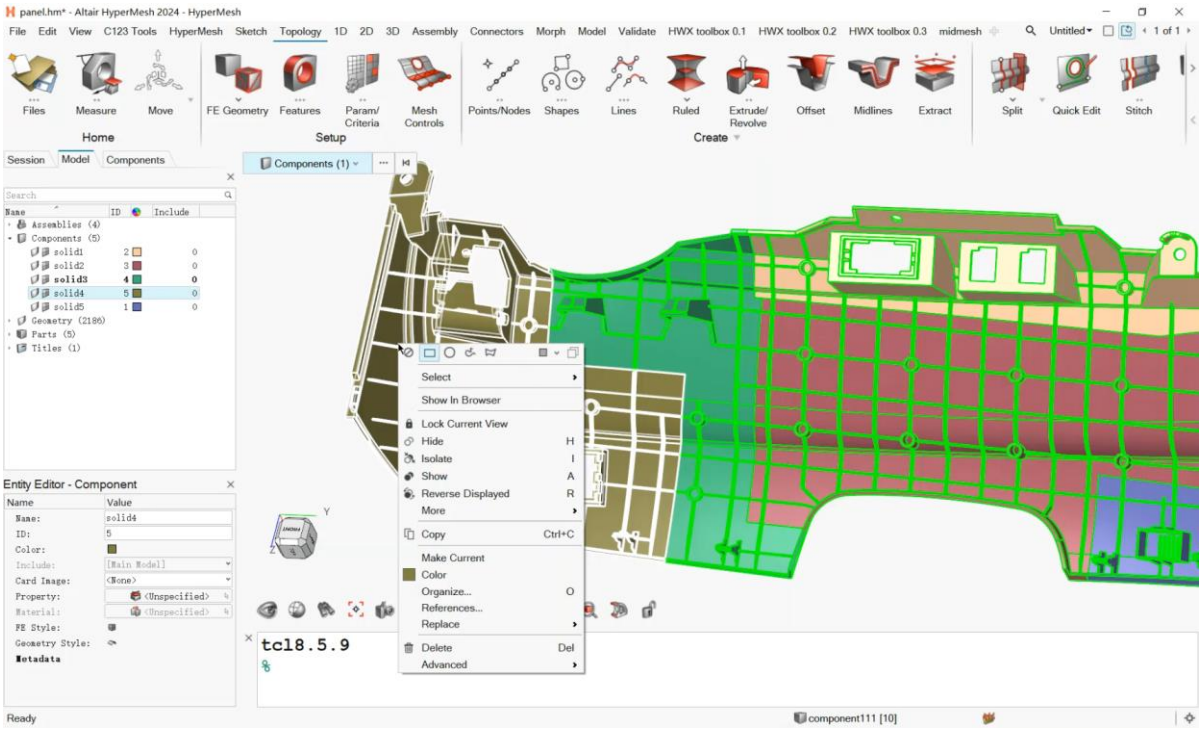
分拆大型零件并行划分



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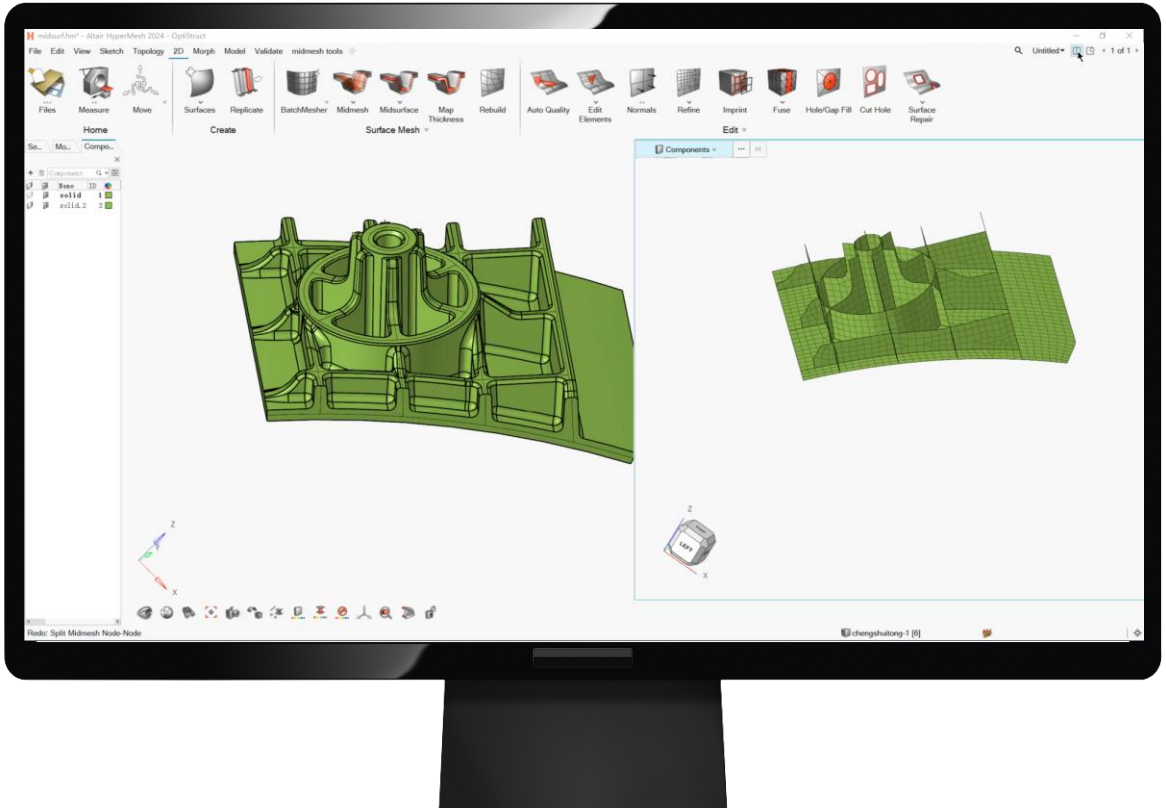
支持多个HyperMesh窗口——同时看到中面网格和3D几何



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Replicate_ribs.hm - Altair HyperWorks 2021 - OptiStruct

File Edit View HyperMesh Assembly Geometry Mesh Elements Morph Connectors Model Validate Analyze Design Space Optimize Design Explorer Post Report

Untitled 1 of 1

Files Measure Move Masses Springs Gaps Normals Auto Quality Edit Elements Replicate Refine Coarsen Detach Imprint/ Extend Fuse Hole/Gap Fill Map Thickness

Home 0D Edit

Session Model

Elements (5) Stitch Edges Move Replicate

Use the manipulator to position the selected elements at the desired location.

1 Flip: X Y Z Replicate

0.00

Name ID Include

Components (2)
Elements (131)
Nodes (182)
Titles (1)

Name Value

Ready

Rib [2]

中面网格特征修复（占总工作量的90%）

中面特征的修复

中面特征修复就是处理各种瑕疵：

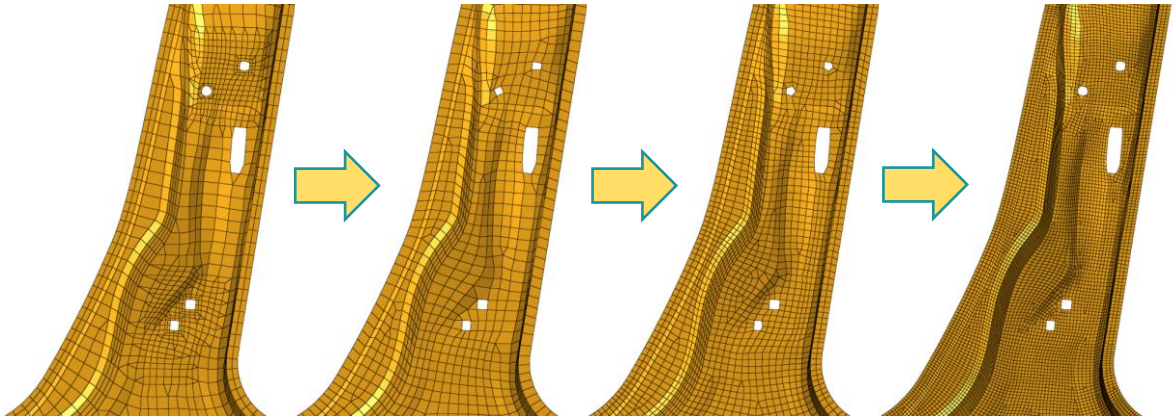
- 丢面
- **位置偏离**
- **网格重叠**
- ……

流程：

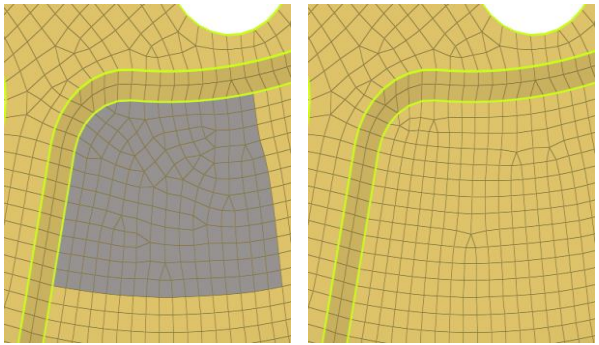
直观　简单　快速

Rebuild mesh（质量提升）

- 类似Batchmesh**重划分网格，网格**质量高，**流向好**
- **用于直接中面网格的粗化/**细化**/局部**质量调整
- **相比**automesh+**手工**调整的方式可节省大量时间

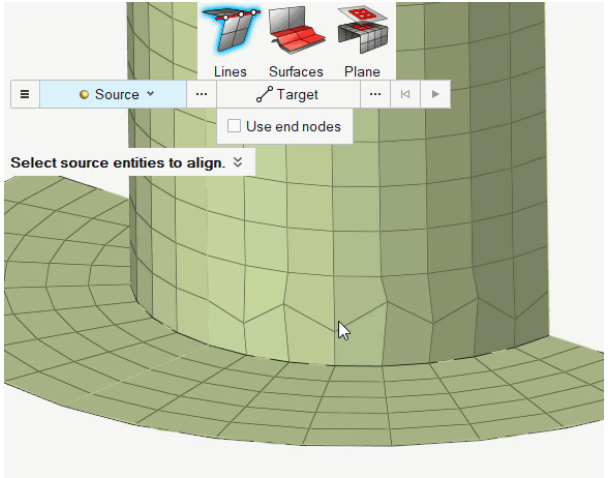


使用rebuild得到多个不同尺寸的网格

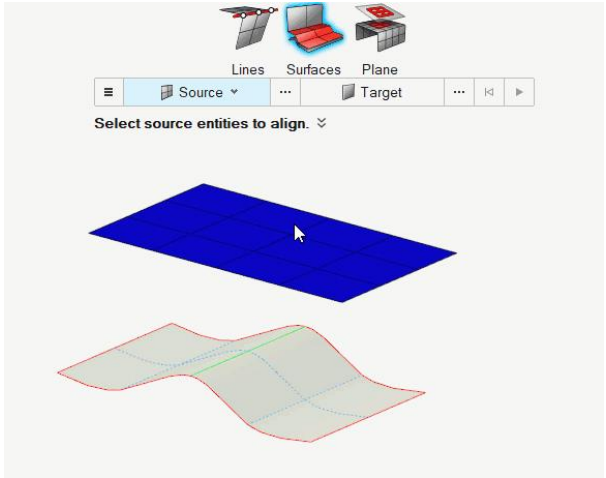


改进网格流向

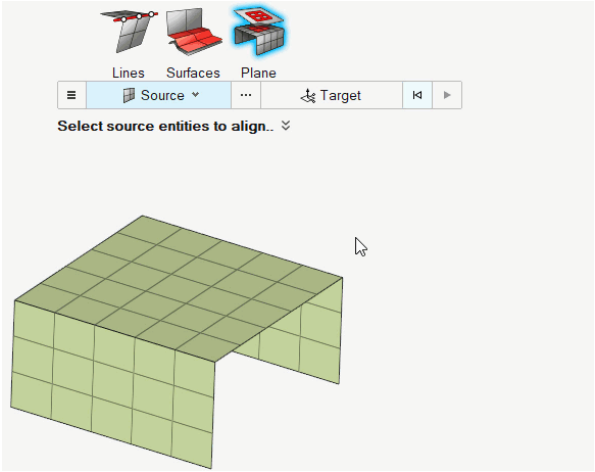
投影工具



Align + Offset



Align to surface



Align to plane

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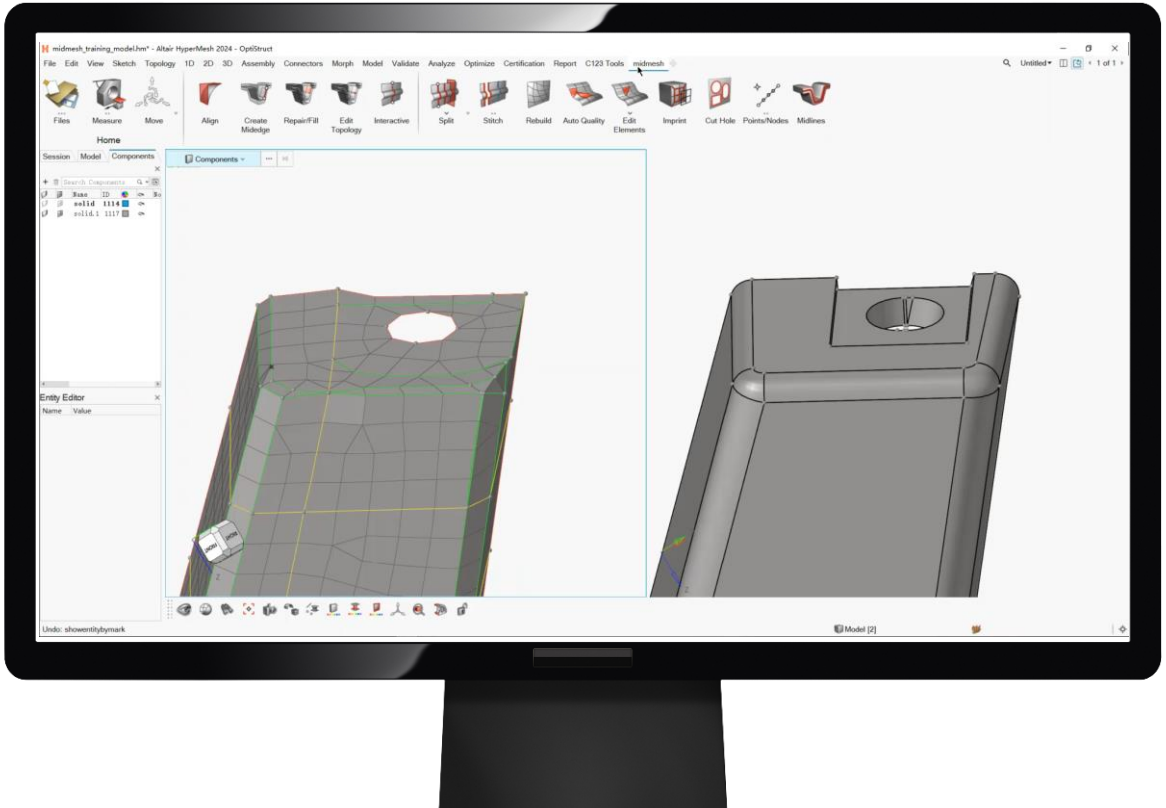
投影工具



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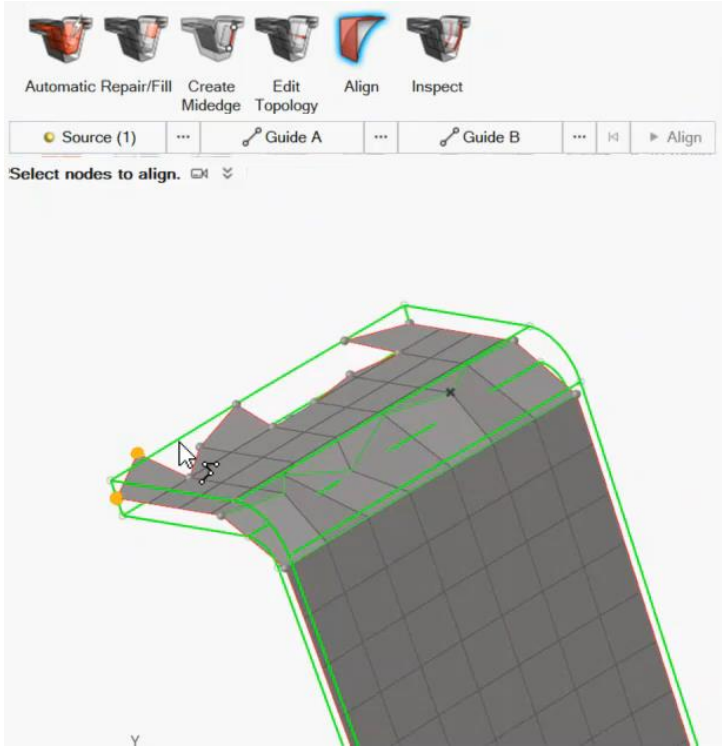
对齐到线

- 选择两条线时自动定位中线位置
- 选择一条线时会先将线偏置



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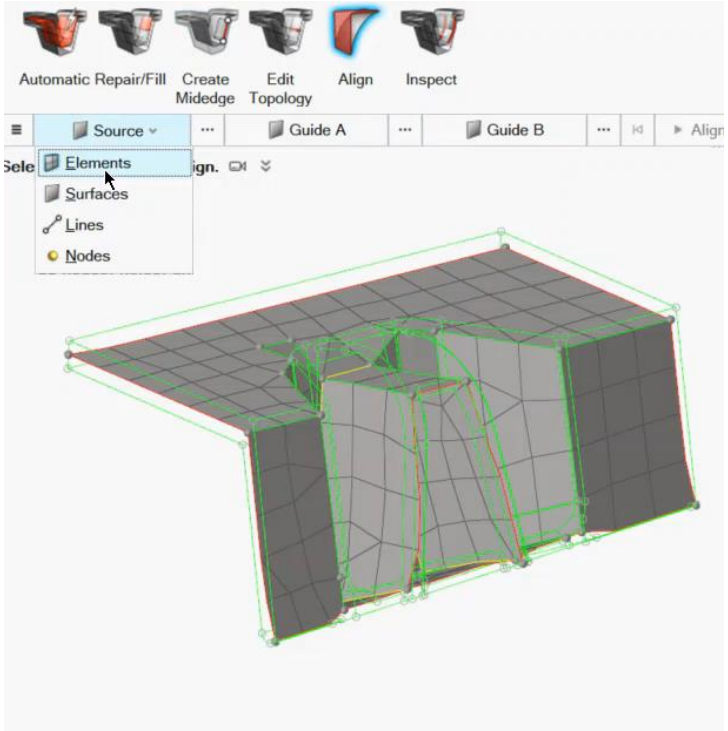
对齐到面

- 选择两个面时自动定位中面位置
- 选择一个面时会先将面偏置



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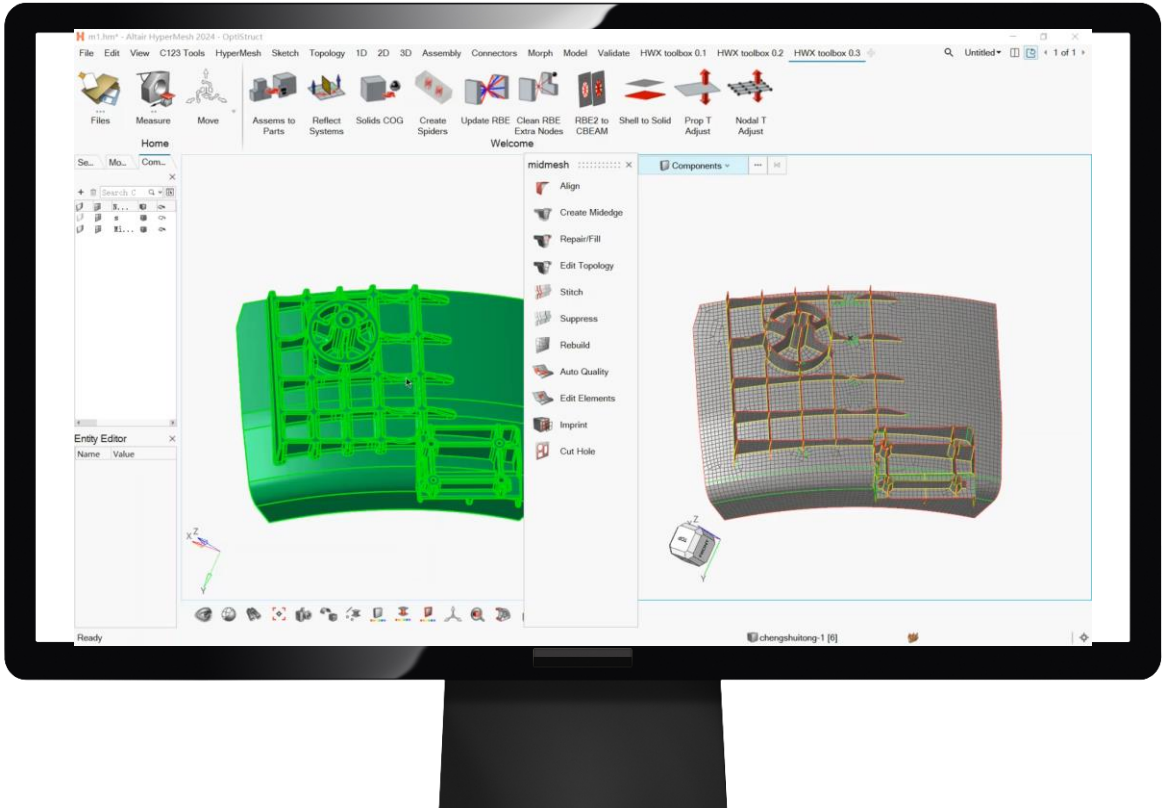
特征修复演示 – 简单筋



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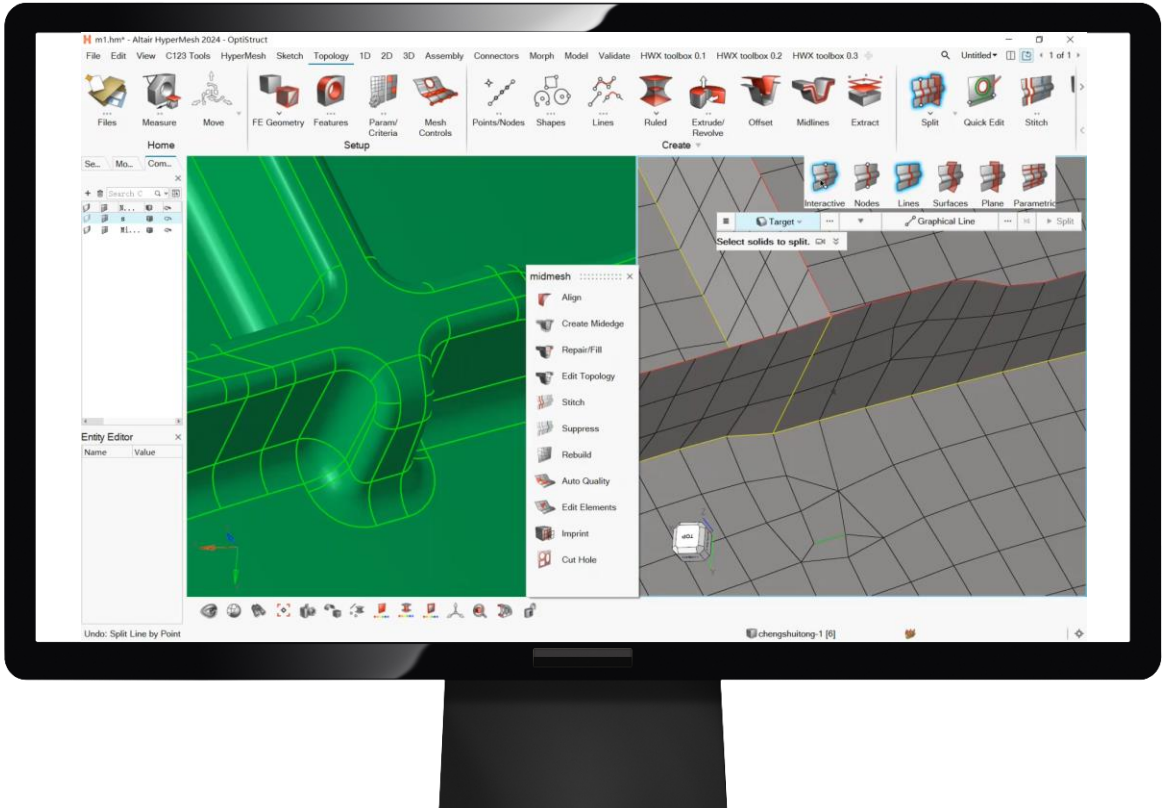
特征修复演示 – 交会筋



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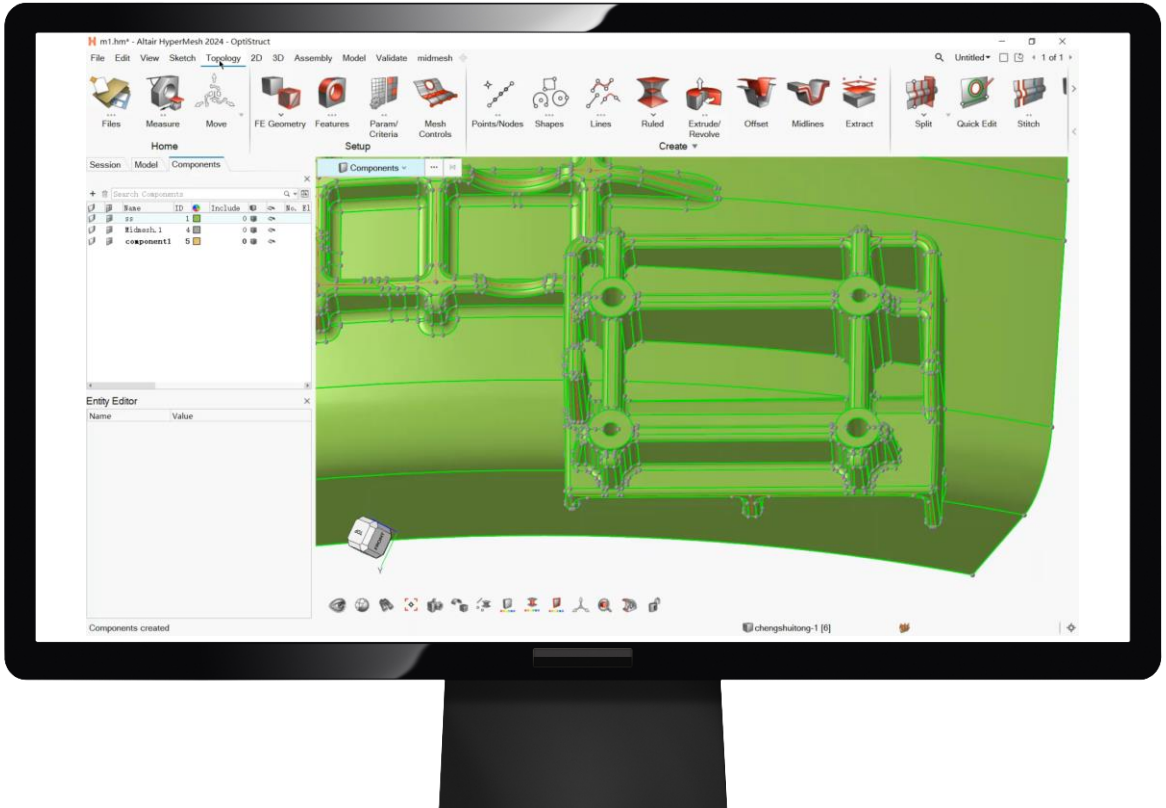
特征修复演示 – 柱面



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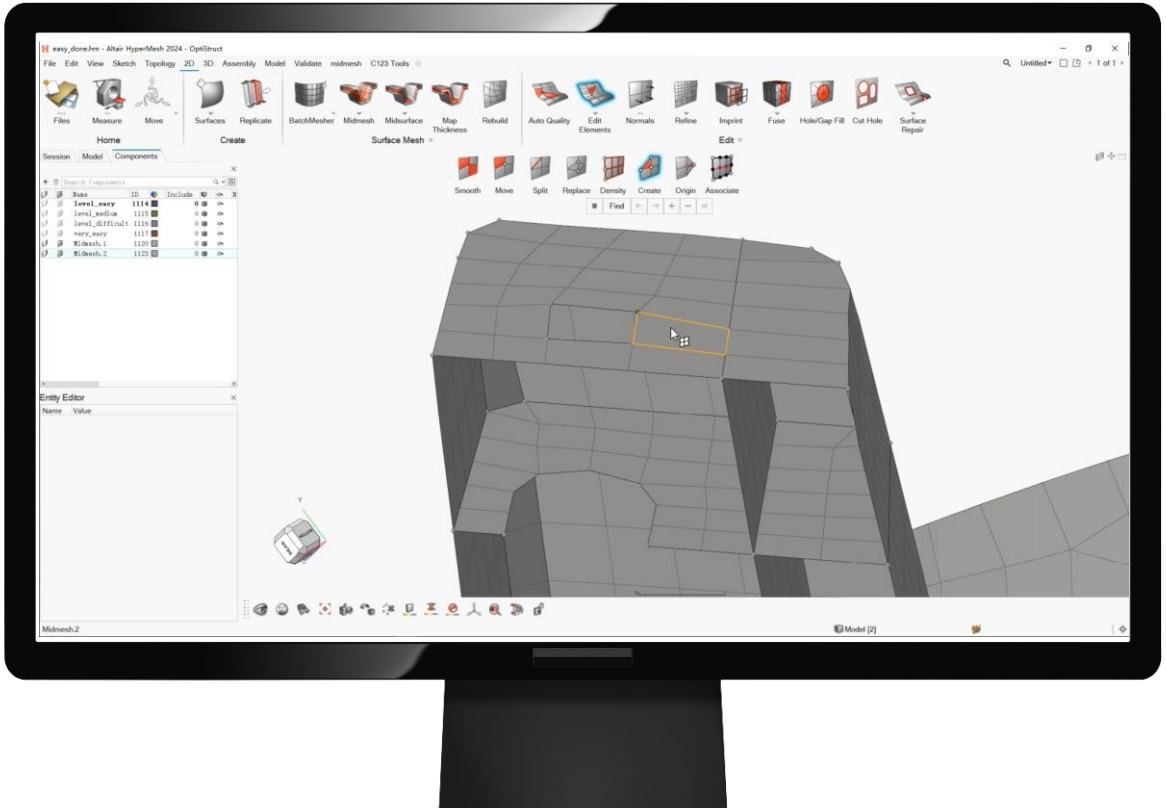
特征修复演示 – 开孔



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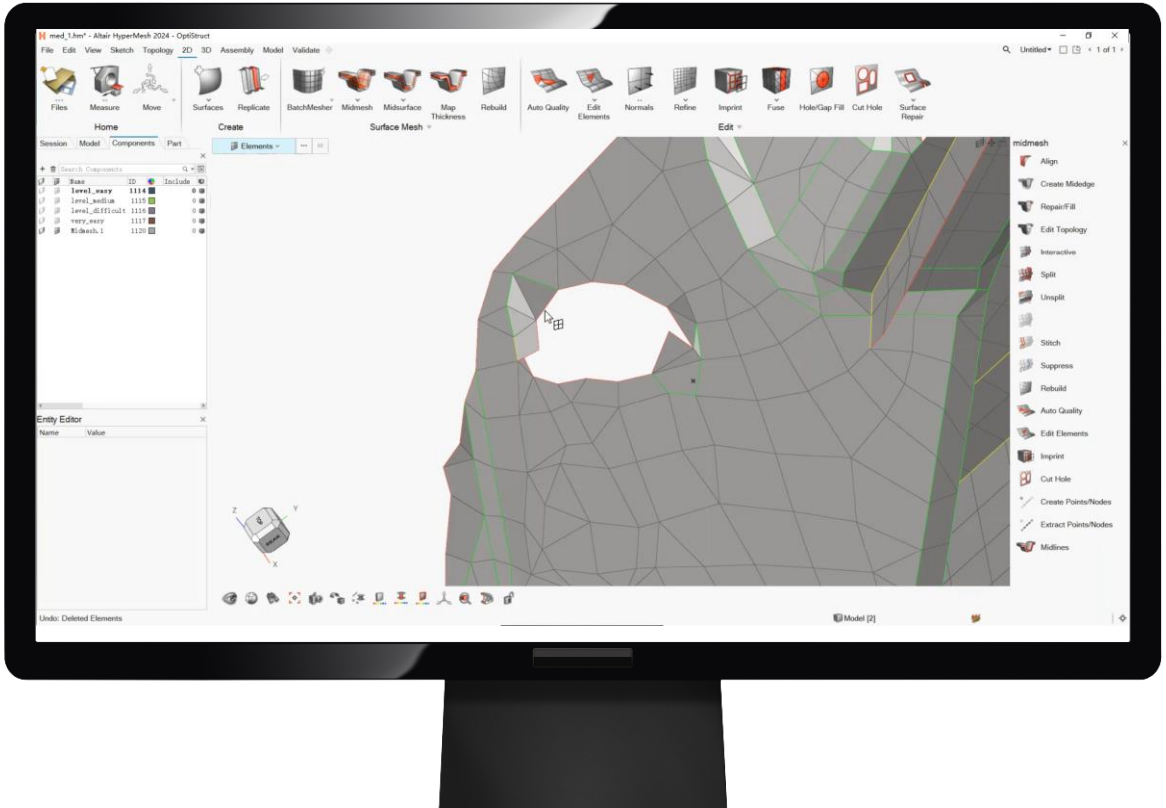
特征修复演示 – 修复异形孔



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“

如何更快？  参加培训”

THANK YOU

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