2024-04 2026-10

COMPUTATIONAL FLUID DYNAMICS

# FLOW 360

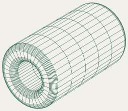
## 让复杂 CFD 仿真流程更清晰、更可控

Designing clarity and confidence for complex CFD workflows

Design by leeC

# PROJECT INTRODUCTION

## 背景介绍



From Python-driven simulation to a visual workflow.

| WHAT<br>**Flow 360 是什么?** | WHO<br>**用户是谁?** |
|---|---|
| Flow360 是 Flexcompute 的云端 GPU 加速 CFD 仿真平台，面向工程师提供高性能的流体、热学、声学等多物理场仿真能力。 | 主要用户为 **汽车 / 飞机 / 无人机** 公司的仿真工程师，覆盖从模型设置、仿真计算到结果分析的完整工作流程。 |

WYH

## 为什么需要 Web UI?

早期，工程师主要通过 Python 配置和驱动仿真任务。虽然代码能够完成计算，但整个仿真过程缺少直观的可视化与交互体验。

ROLE

## 我的角色

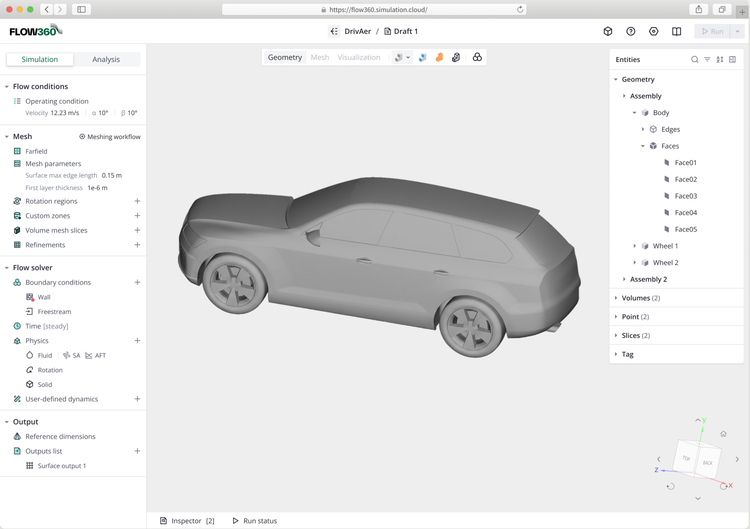
从 0 → 1 构建 Flow360 Web UI，负责交互设计、视觉设计、Design System 以及 Vibe Coding。

# WORKBENCH DRAFT

## 工作台

### 布局：让用户看懂复杂系统

人能记忆的信息类型大概是3-5个，所以抛弃复杂的工具栏和分区，把信息架构从 **信息层级 / 使用频率 / 实体关联性 / 用户思考顺序** 等纬度重新排布



https://flow360.simulation.cloud/

Velocity 12.23 m/s | α 10° | β 10°

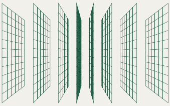
Surface max edge length 0.15 m

First layer thickness 1e-6 m

FLOW360
DrivAer / Draft 1
Run
Simulation
Analysis
Flow conditions
Operating condition
Mesh
Meshing workflow
Farfield
Mesh parameters
Rotation regions
Custom zones
Volume mesh slices
Refinements
Flow solver
Boundary conditions
Wall
Freestream
Time [steady]
Physics
Fluid | SA AFT
Rotation
Solid
User-defined dynamics
Output
Reference dimensions
Outputs list
Surface output 1
Geometry
Mesh
Visualization
Entities
Geometry
Assembly
Body
Edges
Faces
Face01
Face02
Face03
Face04
Face05
Wheel 1
Wheel 2
Assembly 2
Volumes (2)
Point (2)
Slices (2)
Tag
Y
Z
X
TOP
BACK
Inspector [2]
Run status

| 1. 3D Viewer<br>用户模型和结果 | 2. Simulation<br>仿真的所有设置项，高密度信息区 | 3. Entity 面板<br>用户导入和创建的所有实体（图层） | 4. Inspector & Run status<br>系统提示和报错信息，运行状态监控 |
|---|---|---|---|
| • 建立空间与任务上下文<br>• 对设置应该快速反馈 | • 组织方式与工程师的思考顺序一致<br>• 尽可能减少信息层级<br>• 非线性访问方式 | • 看见、找到使用同一套对象模型<br>• 克制：只保留和 3D View 对应内容 | • 保持错误和系统状态可见<br>• 辅助位：存在但不影响主工作区 |

直接操作 / 识别而非回忆 / 状态的可视性

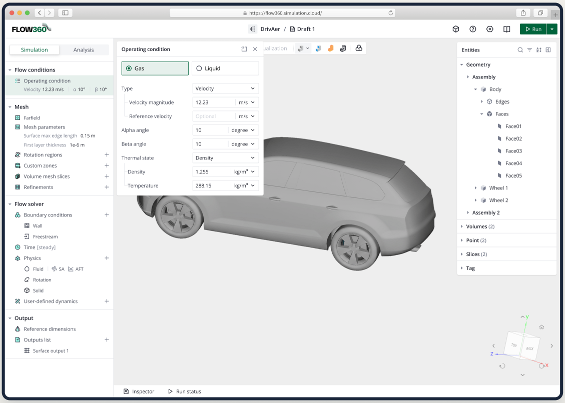


# SIMULATION PANEL

## 配置仿真面板：运行前的核心工作

并不是简单的一长串参数表单，而是一条包含对象依赖、空间选择、长任务运行与结果分析的 CFD 决策链。

定义工况 / 配置模型 / 控制输出，核心内容都在侧栏中，单击其中一项则设置对应的参数。



Operating condition

● Gas ○ Liquid

Type: Velocity

Velocity magnitude: 12.23 m/s

Reference velocity: Optional m/s

Alpha angle: 10 degree

Beta angle: 10 degree

Thermal state: Density

Density: 1.255 kg/m³

Temperature: 288.15 kg/m³

https://flow360.simulation.cloud/
FLOW360
DrivAer / Draft 1
Run
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Analysis
Flow conditions
Operating condition
Velocity 12.23 m/s | α 10° | β 10°
Mesh
Farfield
Mesh parameters
Surface max edge length 0.15 m
First layer thickness 1e-6 m
Rotation regions
Custom zones
Volume mesh slices
Refinements
Flow solver
Boundary conditions
Wall
Freestream
Time [steady]
Physics
Fluid | SA AFT
Rotation
Solid
User-defined dynamics
Output
Reference dimensions
Outputs list
Surface output 1
Entities
Geometry
Assembly
Body
Edges
Faces
Face01
Face02
Face03
Face04
Face05
Wheel 1
Wheel 2
Assembly 2
Volumes (2)
Point (2)
Slices (2)
Tag
TOP
BACK
Y
Z
X
Inspector
Run status

### 面临挑战

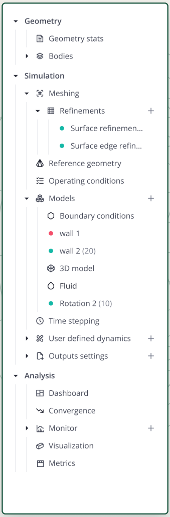
- 参数之间互相依赖如何处理？
- 如何组织内容类目？
- 弹窗空间小，参数多如何展示结构？
- 配置如何快速复用？
- 用户如何理解学术参数的含义？
- 如何快速处理错误？

...

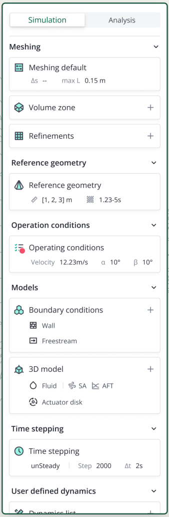
## DESIGN ITERATION — 面板的设计迭代

不断总结和调研的设计迭代方案

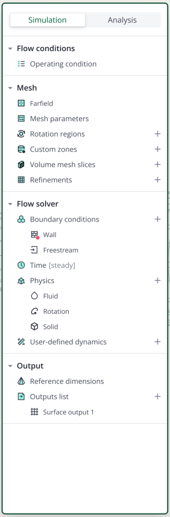
V1


Geometry
Geometry stats
Bodies
Simulation
Meshing
Refinements
Surface refinemen...
Surface edge refin...
Reference geometry
Operating conditions
Models
Boundary conditions
wall 1
wall 2 (20)
3D model
Fluid
Rotation 2 (10)
Time stepping
User defined dynamics
Outputs settings
Analysis
Dashboard
Convergence
Monitor
Visualization
Metrics

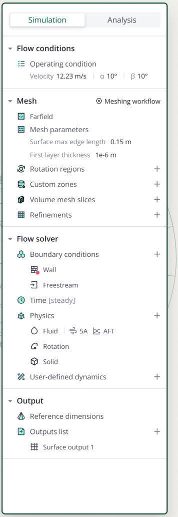
V2


Simulation
Analysis
Meshing
Meshing default
Δs --
max L 0.15 m
Volume zone
Refinements
Reference geometry
Reference geometry
[1, 2, 3] m
1.23-5s
Operation conditions
Operating conditions
Velocity 12.23m/s
α 10°
β 10°
Models
Boundary conditions
Wall
Freestream
3D model
Fluid
SA
AFT
Actuator disk
Time stepping
Time stepping
unSteady
Step 2000
Δt 2s
User defined dynamics
Dynamics list

V3


Simulation
Analysis
Flow conditions
Operating condition
Mesh
Farfield
Mesh parameters
Rotation regions
Custom zones
Volume mesh slices
Refinements
Flow solver
Boundary conditions
Wall
Freestream
Time [steady]
Physics
Fluid
Rotation
Solid
User-defined dynamics
Output
Reference dimensions
Outputs list
Surface output 1

V4


Simulation
Analysis
Flow conditions
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Velocity 12.23 m/s
α 10°
β 10°
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Surface output 1

| | |
|---|---|
| **V1** | • 绝大多数竞品采取的组织方式，以树结构囊括所有项，无线扩展，但层级不可控，规律弱。在项目初期个人对业务不够熟悉，求稳的阶段，采用了这个方案； |
| **V2** | • 通过 Segment 划分 ‘Simulation（配置）’ 和 ‘Analysis（结果）’，这两个部分使用场景差异较大，所以理应分离； # 纯设计驱动<br>• 把树结构转换成列表结构，层级变浅；<br>• 把 **核心参数** 暴露在列表上，不必打开弹窗也能看到值，减轻记忆负担。 |
| **V3** | • V2 的空间利用率太低，为了更好的扫视内容，替换占空间的卡片样式，且移除暴露的核心参数；<br>• V1 和 V2 在组织配置项上太过分散，结合工程师的思考顺序，将内容划分为 4 组，数量在人的工作记忆上限（3-5）内； |
| **V4** | • V3 版本为了空间利用率移除了暴露的核心参数，后续用户反馈暴露的核心参数有足够的价值，重新加回。 |

## FORM / SETTINGS — 配置仿真表单

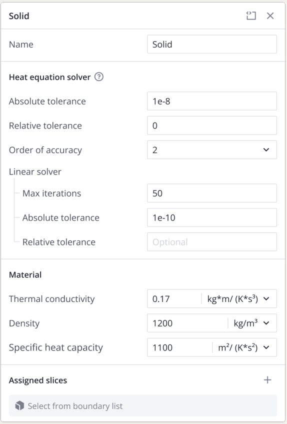
配置项表单的思考和细节

**DESIGN PROCESS**

## 表单组织结构

真正的认知负担不是字段多，而是缺乏结构和上下文

- 结构能够帮助用户理解参数之间的关系
- [组] - [普通字段] - [从属字段] 三层为表单的基础结构
- 结构层次不宜过多，会带来更高的认知负担



**Solid**

| | |
|---|---|
| Name | Solid |

**Heat equation solver**

| | |
|---|---|
| Absolute tolerance | 1e-8 |
| Relative tolerance | 0 |
| Order of accuracy | 2 |
| Linear solver | |
| Max iterations | 50 |
| Absolute tolerance | 1e-10 |
| Relative tolerance | Optional |

**Material**

| | | |
|---|---|---|
| Thermal conductivity | 0.17 | kg*m/ (K*$s^3$) |
| Density | 1200 | kg/$m^3$ |
| Specific heat capacity | 1100 | $m^2$/ (K*$s^2$) |

**Assigned slices** +

Select from boundary list

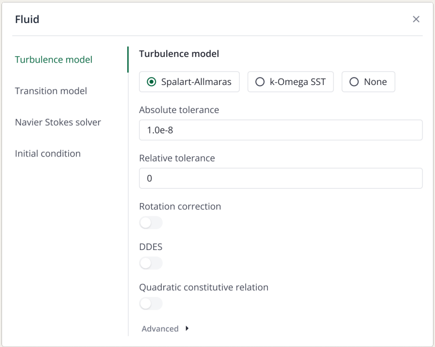
---

**DESIGN PROCESS**

## 渐进式的表单

某次表单改进的成功案例

- 处理大量字段，第一时间不暴露太多内容，分批暴露
- 上百个字段按类用 Tab 分 → 展开组暴露 → Advance 暴露
- 分批依据：埋点数据和用户访谈
- 改进结果：大幅度减少空间，却提高了用户效率



**Fluid**

Turbulence model
Transition model
Navier Stokes solver
Initial condition

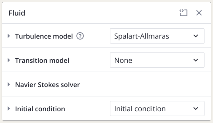
**Turbulence model**

● Spalart-Allmaras ○ k-Omega SST ○ None

| | |
|---|---|
| Absolute tolerance | 1.0e-8 |
| Relative tolerance | 0 |
| Rotation correction | ○ |
| DDES | ○ |
| Quadratic constitutive relation | ○ |

Advanced ▸

↓ 优化



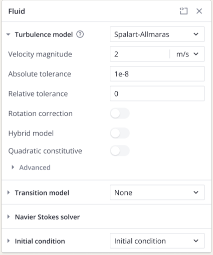
Fluid

Turbulence model: Spalart-Allmaras

Transition model: None

Navier Stokes solver

Initial condition: Initial condition



Fluid

Turbulence model: Spalart-Allmaras

Velocity magnitude: 2 m/s

Absolute tolerance: 1e-8

Relative tolerance: 0

Rotation correction

Hybrid model

Quadratic constitutive

Advanced

Transition model: None

Navier Stokes solver

Initial condition: Initial condition

---

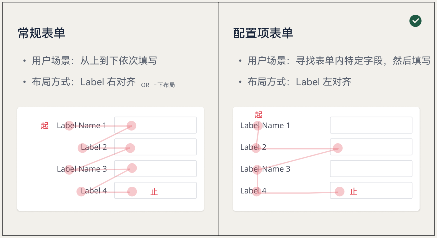
## DESIGN PROCESS

### 场景决定表单布局方式

Flow30 配置项表单用户路径：

- 锁定配置项
- 打开配置项的表单浮窗
- **找到其中的某个别字段**
- 完成字段输入

决策依据：哪个布局中的 Label 适合快速扫视



**常规表单**

- 用户场景：从上到下依次填写
- 布局方式：Label 右对齐 OR 上下布局

起
Label Name 1
Label 2
Label Name 3
Label 4
止

**配置项表单**

- 用户场景：寻找表单内特定字段，然后填写
- 布局方式：Label 左对齐

起
Label Name 1
Label 2
Label Name 3
Label 4
止

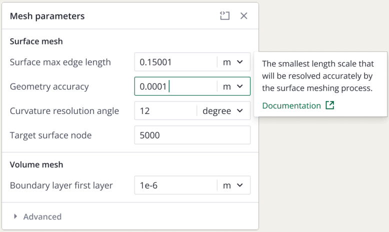
---

## DESIGN PROCESS

### 描述

较多字段晦涩难懂，提供描述必不可少

- Focus 状态才显示Tooltip：拒绝加上 ⓘ 等元素干扰扫视
- 添加文档链接：快速定位到更详细的解释文档中



Mesh parameters

Surface mesh

Surface max edge length: 0.15001 m

Geometry accuracy: 0.0001 m

Curvature resolution angle: 12 degree

Target surface node: 5000

Volume mesh

Boundary layer first layer: 1e-6 m

Advanced

The smallest length scale that will be resolved accurately by the surface meshing process.

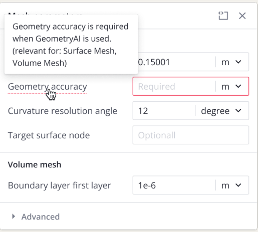
Documentation

DESIGN PROCESS

## 错误 / 必填选填

这类辅助信息依旧以**不打断用户扫视**为目的

- 错误信息：Hover Label 才显示 Inspector 区域也显示
- 必填选填：用 Placeholder 展示字段是否必填，克制且有效



Geometry accuracy is required when GeometryAI is used. (relevant for: Surface Mesh, Volume Mesh)

0.15001 m

Geometry accuracy: Required m

Curvature resolution angle: 12 degree

Target surface node: Optionall

Volume mesh

Boundary layer first layer: 1e-6 m

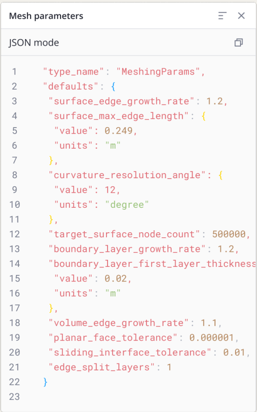
---

DESIGN PROCESS

## 配置可复用

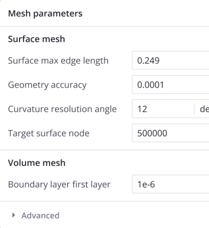
相同 / 相似的配置需要方便的复用

- 单独复用：每个浮窗也有独立的 JSON 形态，方便复制/粘贴
- 缺陷：缺少将整体或单个浮窗的配置存为模板



Mesh parameters
JSON mode

```
  "type_name": "MeshingParams",
  "defaults": {
   "surface_edge_growth_rate": 1.2,
   "surface_max_edge_length": {
    "value": 0.249,
    "units": "m"
   },
   "curvature_resolution_angle": {
    "value": 12,
    "units": "degree"
   },
   "target_surface_node_count": 500000,
   "boundary_layer_growth_rate": 1.2,
   "boundary_layer_first_layer_thickness
    "value": 0.02,
    "units": "m"
   },
   "volume_edge_growth_rate": 1.1,
   "planar_face_tolerance": 0.000001,
   "sliding_interface_tolerance": 0.01,
   "edge_split_layers": 1
  }
```



Mesh parameters

Surface mesh

Surface max edge length: 0.249

Geometry accuracy: 0.0001

Curvature resolution angle: 12 de

Target surface node: 500000

Volume mesh

Boundary layer first layer: 1e-6

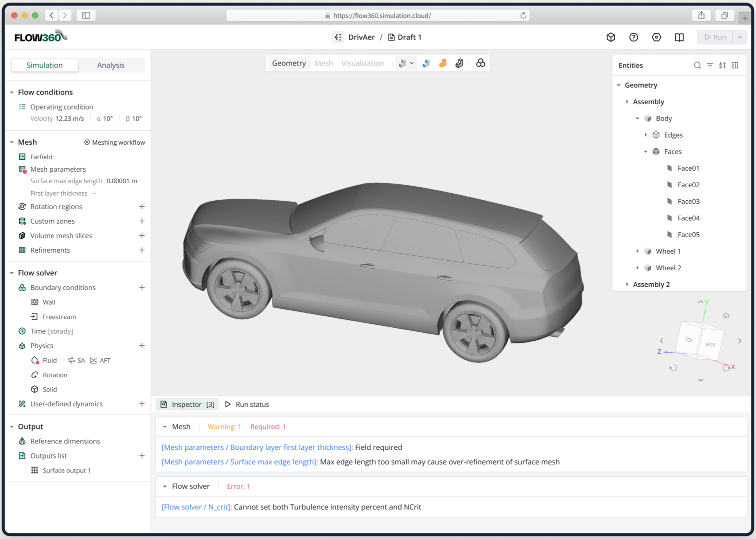
## ERROR PREVENTION — 将错误前置

CFD 运行任务长达数小时，把错误尽可能早的暴露出来，能减少发现错误的沮丧。

## 01 / Inspector 面板

**把报错变成可以直接修复的路径：**将前端校验和后端诊断统一汇总，按照工程模块和严重程度组织，单击问题定位到问题字段；

除了错误类型 **Error**，还包括对运行错误的预警 **Warning** 。


https://flow360.simulation.cloud/
FLOW360
DrivAer / Draft 1
Run
Simulation
Analysis
Geometry
Mesh
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Entities
Geometry
Assembly
Body
Edges
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Wheel 2
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Operating condition
Mesh
Meshing workflow
Farfield
Mesh parameters
Rotation regions
Custom zones
Volume mesh slices
Refinements
Flow solver
Boundary conditions
Wall
Freestream
Time [steady]
Physics
Fluid
SA
AFT
Rotation
Solid
User-defined dynamics
Output
Reference dimensions
Outputs list
Surface output 1
Inspector [3]
Run status
TOP
BACK

Velocity 12.23 m/s | α 10° | β 10°

Surface max edge length 0.00001 m

First layer thickness --

Mesh | Warning: 1 Required: 1

[Mesh parameters / Boundary layer first layer thickness]: Field required

[Mesh parameters / Surface max edge length]: Max edge length too small may cause over-refinement of surface mesh

Flow solver | Error: 1

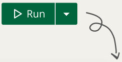
[Flow solver / N_crit]: Cannot set both Turbulence intensity percent and NCrit

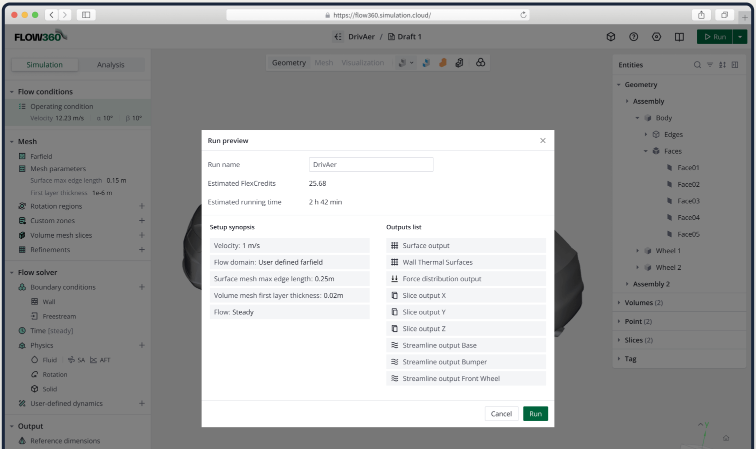
## 02 / 运行前一次可验证的承诺

ERROR PREVENTION

Run Preview 不是普通的确认弹窗，而是一次计算提交前的风险检查点。

将对结果和计算成本影响最大的设置提取为摘要，使用户无需浏览全部表单，就能大致确认运行条件、网格尺度、输出内容和计算资源等。




https://flow360.simulation.cloud/
FLOW360
DrivAer / Draft 1
Run
Simulation
Analysis
Geometry
Mesh
Visualization
Entities
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Face02
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Wheel 2
Assembly 2
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Operating condition
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Output
Reference dimensions

Velocity 12.23 m/s | α 10° | β 10°

Surface max edge length 0.15 m

First layer thickness 1e-6 m

**Run preview**

| | |
|---|---|
| Run name | DrivAer |
| Estimated FlexCredits | 25.68 |
| Estimated running time | 2 h 42 min |

| Setup synopsis | Outputs list |
|---|---|
| Velocity: 1 m/s | Surface output |
| Flow domain: User defined farfield | Wall Thermal Surfaces |
| Surface mesh max edge length: 0.25m | Force distribution output |
| Volume mesh first layer thickness: 0.02m | Slice output X |
| Flow: Steady | Slice output Y |
| | Slice output Z |
| | Streamline output Base |
| | Streamline output Bumper |
| | Streamline output Front Wheel |

Cancel Run

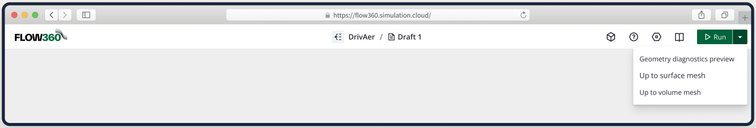
Outputs list
Surface output 1
TOP
BACK
Z
X
Inspector
Run status

## 03 / 分段运行

ERROR PREVENTION

**将高成本提交拆分为可逐步验证的过程。**

除了直接 Run， 还提供 Geometry diagnostics preview / Up to surface mesh / Up to volume mesh 的选项。


https://flow360.simulation.cloud/
FLOW360
DrivAer / Draft 1
Run
Geometry diagnostics preview
Up to surface mesh
Up to volume mesh

*[Design Principle]* 提前避免的问题应通过约束避免，无法提前避免的问题，应明确指出原因并提供恢复路径

*[Design Principle]* 重要操作应当至少做到“可撤销、经过检查或提交前确认”之一

# GEOMETRY OBJECT .

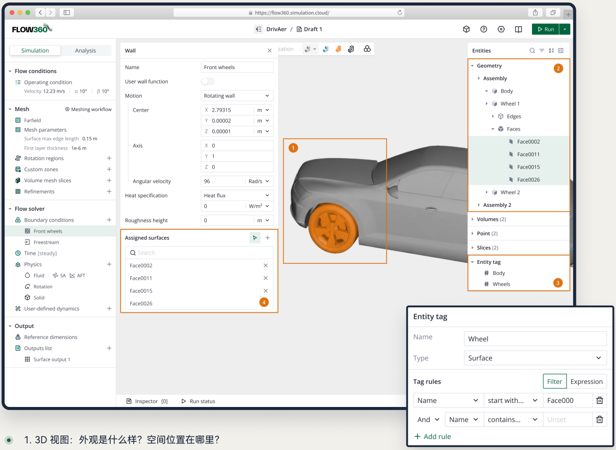
# 3D VIEW INTERACTION

## 3D 区域的交互

CFD 参数通常要指定作用对象——三维模型，所有面板都是围绕模型展开；

表单不是放在三维模型旁边，而是让三维模型成为整个配置过程的交互上下文。

同一个几何对象可能需要通过**模型外观**、**名称**、**标签**来识别，所以同一份模型数据以多维度展示：


https://flow360.simulation.cloud/
FLOW360
DrivAer / Draft 1
Run
Simulation
Analysis
Flow conditions
Operating condition
Mesh
Meshing workflow
Farfield
Mesh parameters
Rotation regions
Custom zones
Volume mesh slices
Refinements
Flow solver
Boundary conditions
Front wheels
Freestream
Time [steady]
Physics
Fluid
SA
AFT
Rotation
Solid
User-defined dynamics
Output
Reference dimensions
Outputs list
Surface output 1
Wall
Entities
Geometry
Assembly
Body
Wheel 1
Edges
Faces
Face0002
Face0011
Face0015
Face0026
Wheel 2
Assembly 2
Volumes (2)
Point (2)
Slices (2)
Entity tag
Body
Wheels
1
2
3
4
Inspector [0]
Run status

Velocity 12.23 m/s | α 10° | β 10°

Surface max edge length 0.15 m

First layer thickness 1e-6 m

Name: Front wheels

User wall function

Motion: Rotating wall

Center: X 2.79315 m, Y 0.00002 m, Z 0.00001 m

Axis: X 0, Y 1, Z 0

Angular velocity: 96 Rad/s

Heat specification: Heat flux, 0 W/m²

Roughness height: 0 m

Assigned surfaces: Face0002, Face0011, Face0015, Face0026

Entity tag

Name: Wheel

Type: Surface

Tag rules (Filter | Expression)

Name start with... Face000

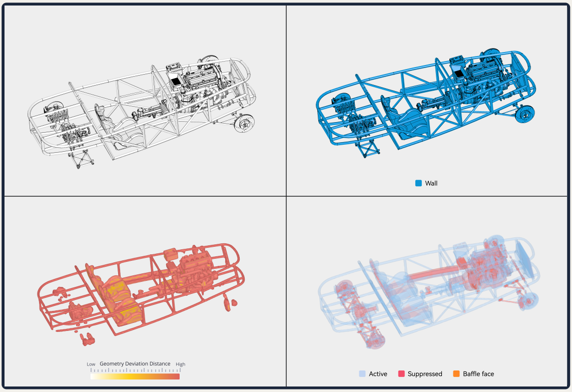
And Name contains... Unset

+ Add rule

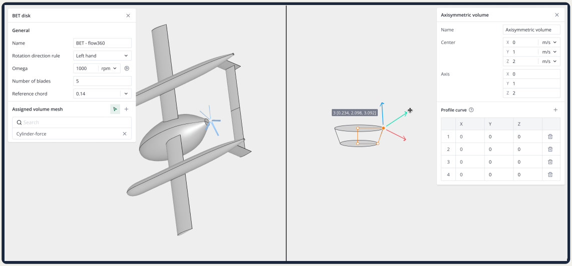
- 1. 3D 视图：外观是什么样？空间位置在哪里？
- 2. Entity - Geometry：它叫什么？组织结构在哪一层？
- 3. Entity - Tag：自定义分类归在哪？
- 4. 浮窗表单：参数配置作用给了谁？

多维度展示互补，并让选择、高亮等状态在不同纬度保持同步。

## 提供多种渲染模式，抛开参数，让用户更直观的看到仿真过程的含义和变化：


Wall
Low
Geometry Deviation Distance
High
Active
Suppressed
Baffle face

## 尽可能的所见即所得：让用户在配置的同时能在 3D 视图看到变化：


3 [0.234, 2.098, 3.092]

**BET disk**

**General**

Name: BET - flow360
Rotation direction rule: Left hand
Omega: 1000 rpm
Number of blades: 5
Reference chord: 0.14

**Assigned volume mesh**

Search
Cylinder-force

**Axisymmetric volume**

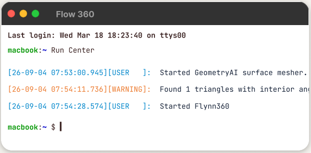
Name: Axisymmetric volume
Center: X 0 m/s, Y 1 m/s, Z 2 m/s
Axis: X 0, Y 1, Z 2

**Profile curve**

|  | X | Y | Z |
|---|---|---|---|
| 1 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 |

- 添加会增加虚拟实体（如图螺旋桨）的配置后，在 3D 区域**即时渲染**并添加随时播放暂停的**动画**，让用户对配置感受更直观；
- 配置参数不仅仅支持填写，也能通过在 3D 区域的 Handle 直观的拖拉拽。

F — L — O — W — 360 — N — E — X — T



```
Last login: Wed Mar 18 18:23:40 on ttys00
macbook:~ Run Center

[26-09-04 07:53:00.945][USER   ]:  Started GeometryAI surface mesher.
[26-09-04 07:54:11.736][WARNING]:  Found 1 triangles with interior an
[26-09-04 07:54:28.574][USER   ]:  Started Flynn360

macbook:~ $ 
```

# RUN STATUS

## 运行监控

### 长任务需要可解释、可控制的过程

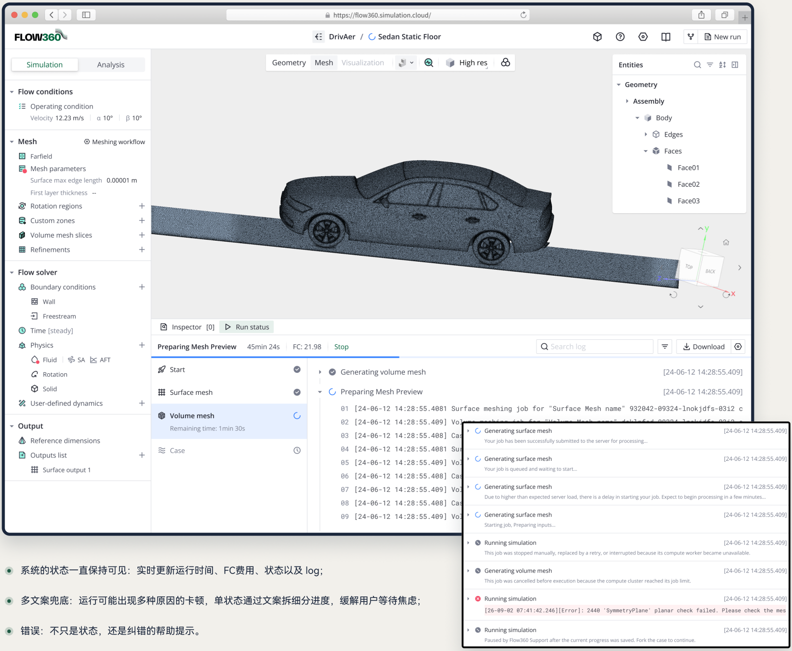
状态可见性并不等于“显示进度”，而是让用户理解系统当前处于哪个阶段、为什么等待，以及还可以采取什么行动。

回答用户真正关心的问题：任务正在排队、生成网格、求解，还是处理结果？

## 01 / 运行状态面板

RUN STATUS

提交运行（Run）后，自动弹出 Run status：


https://flow360.simulation.cloud/
FLOW360
DrivAer / Sedan Static Floor
New run
Simulation
Analysis
Flow conditions
Operating condition
Mesh
Meshing workflow
Farfield
Mesh parameters
Rotation regions
Custom zones
Volume mesh slices
Refinements
Flow solver
Boundary conditions
Wall
Freestream
Time [steady]
Physics
Fluid
SA
AFT
Rotation
Solid
User-defined dynamics
Output
Reference dimensions
Outputs list
Surface output 1
Geometry
Mesh
Visualization
High res
Entities
Geometry
Assembly
Body
Edges
Faces
Face01
Face02
Face03
TOP
BACK
Y
X
Inspector [0]
Run status
Stop
Search log
Download
Start
Surface mesh
Volume mesh
Case

Velocity 12.23 m/s α 10° β 10°

Surface max edge length 0.00001 m

First layer thickness --

Preparing Mesh Preview 45min 24s FC: 21.98

Volume mesh Remaining time: 1min 30s

Generating volume mesh [24-06-12 14:28:55.409]

Preparing Mesh Preview [24-06-12 14:28:55.409]

```
01 [24-06-12 14:28:55.4081 Surface meshing job for "Surface Mesh name" 932042-09324-lnokjdfs-03i2 c
02 [24-06-12 14:28:55.409] Vol
03 [24-06-12 14:28:55.408] Cas
04 [24-06-12 14:28:55.4081 Sur
05 [24-06-12 14:28:55.409] Vol
06 [24-06-12 14:28:55.408] Cas
07 [24-06-12 14:28:55.409] Vol
08 [24-06-12 14:28:55.408] Cas
09 [24-06-12 14:28:55.409] Vol
```

Generating surface mesh [24-06-12 14:28:55.409]
Your job has been successfully submitted to the server for processing...

Generating surface mesh [24-06-12 14:28:55.409]
Your job is queued and waiting to start...

Generating surface mesh [24-06-12 14:28:55.409]
Due to higher than expected server load, there is a delay in starting your job. Expect to begin processing in a few minutes...

Generating surface mesh [24-06-12 14:28:55.409]
Starting job, Preparing inputs...

Running simulation [24-06-12 14:28:55.409]
This job was stopped manually, replaced by a retry, or interrupted because its compute worker became unavailable.

Generating volume mesh [24-06-12 14:28:55.409]
This job was cancelled before execution because the compute cluster reached its job limit.

Running simulation [24-06-12 14:28:55.409]

```
[26-09-02 07:41:42.246][Error]: 2440 'SymmetryPlane' planar check failed. Please check the mes
```

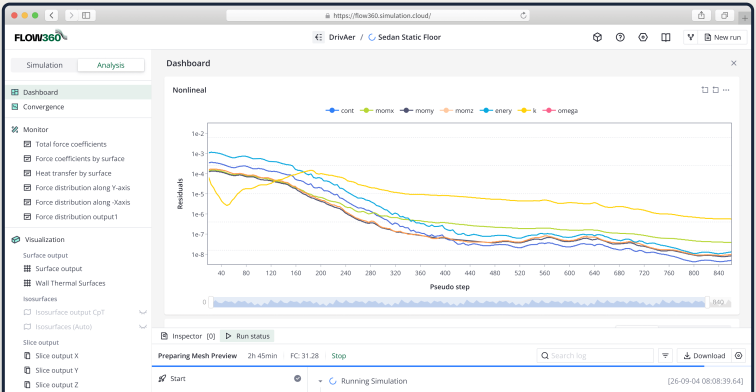
Running simulation [24-06-12 14:28:55.409]
Paused by Flow360 Support after the current progress was saved. Fork the case to continue.

- 系统的状态一直保持可见：实时更新运行时间、FC费用、状态以及 log；
- 多文案兜底：运行可能出现多种原因的卡顿，单状态通过文案拆细分进度，缓解用户等待焦虑；
- 错误：不只是状态，还是纠错的帮助提示。

## 02 / 残差曲线

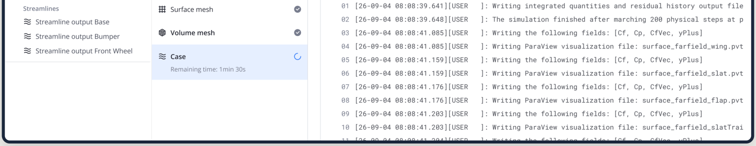
RUN STATUS

不仅仅是 log，用图表展示运行过程中关键值的变化，能更好的体现运行状态。


https://flow360.simulation.cloud/
FLOW360
DrivAer / Sedan Static Floor
New run
Simulation
Analysis
Dashboard
Convergence
Monitor
Total force coefficients
Force coefficients by surface
Heat transfer by surface
Force distribution along Y-axis
Force distribution along -Xaxis
Force distribution output1
Visualization
Surface output
Surface output
Wall Thermal Surfaces
Isosurfaces
Isosurface output CpT
Isosurfaces (Auto)
Slice output
Slice output X
Slice output Y
Slice output Z
Dashboard
Nonlineal
cont
momx
momy
momz
enery
k
omega
Residuals
1e-2
1e-3
1e-4
1e-5
1e-6
1e-7
1e-8
40
80
120
160
200
240
280
320
360
400
440
480
520
560
600
640
680
720
760
800
840
Pseudo step
0
840
Inspector [0]
Run status
Stop
Search log
Download
Start

Preparing Mesh Preview 2h 45min FC: 31.28

Running Simulation [26-09-04 08:08:39.64]


Streamlines
Streamline output Base
Streamline output Bumper
Streamline output Front Wheel
Surface mesh
Volume mesh
Case
Remaining time: 1min 30s

```
[26-09-04 08:08:39.641][USER   ]: Writing integrated quantities and residual history output file
[26-09-04 08:08:39.648][USER   ]: The simulation finished after marching 200 physical steps at p
[26-09-04 08:08:41.085][USER   ]: Writing the following fields: [Cf, Cp, CfVec, yPlus]
[26-09-04 08:08:41.085][USER   ]: Writing ParaView visualization file: surface_farfield_wing.pvt
[26-09-04 08:08:41.159][USER   ]: Writing the following fields: [Cf, Cp, CfVec, yPlus]
[26-09-04 08:08:41.159][USER   ]: Writing ParaView visualization file: surface_farfield_slat.pvt
[26-09-04 08:08:41.176][USER   ]: Writing the following fields: [Cf, Cp, CfVec, yPlus]
[26-09-04 08:08:41.176][USER   ]: Writing ParaView visualization file: surface_farfield_flap.pvt
[26-09-04 08:08:41.203][USER   ]: Writing the following fields: [Cf, Cp, CfVec, yPlus]
[26-09-04 08:08:41.203][USER   ]: Writing ParaView visualization file: surface_farfield_slatTrai
```

- 结果前置：残差曲线不是数据完整了才展示，而是在有值的时候就展示，用户对不满意的运行可以提前终止；

*[Design Principle]*　系统应持续告知用户发生了什么，使用户能够理解上一操作的结果并判断下一步

# RESULT ANALYSIS

## 计算结果到可信判断

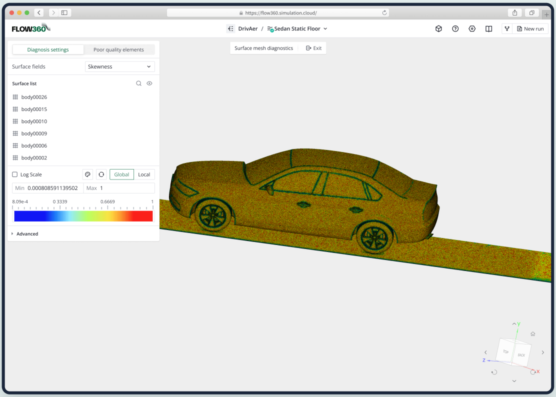
计算完成不是最终目标。用户真正需要的是判断结果是否可信、问题发生在哪里，以及不同方案之间有什么差异。

## 01 / 验证网格质量

ANALYSIS

将诊断过程定义为：**整体分布** - **阈值筛选** - **空间定位** - **数值确认。** 即先提供整体概览，再筛选和聚焦，最后查看具体细节；

用户可以从全局异常逐步下钻到具体网格单元，同时保留空间上下文。

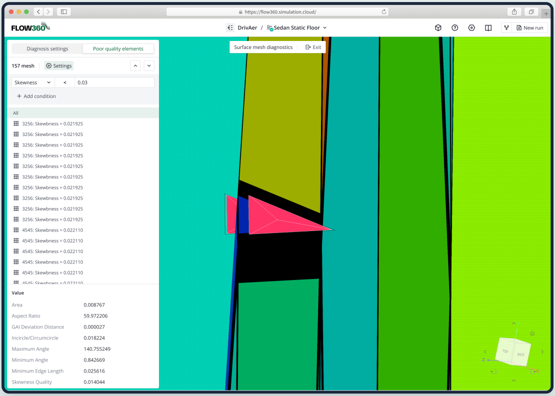

https://flow360.simulation.cloud/
FLOW360
DrivAer / Sedan Static Floor
New run
Diagnosis settings
Poor quality elements
Surface mesh diagnostics
Exit
Surface list
body00026
body00015
body00010
body00009
body00006
body00002
Global
Local
8.09e-4
0 3339
0.6669
1
Advanced
TOP
BACK
y
z
x

Surface fields　Skewness

☐ Log Scale

Min 0.000808591139502　Max 1

- 抽象数值异常映射回真实空间对象
- 选择列表自动定位放大问题网格
- 键盘快捷键 ▼ ▲ 依次预览


https://flow360.simulation.cloud/
FLOW360
DrivAer / Sedan Static Floor
New run
Diagnosis settings
Poor quality elements
Surface mesh diagnostics
Exit
157 mesh
Settings
Add condition
TOP
BACK

Skewness < 0.03

All

- 3256: Skewbness = 0.021925
- 3256: Skewbness = 0.021925
- 3256: Skewbness = 0.021925
- 3256: Skewbness = 0.021925
- 3256: Skewbness = 0.021925
- 3256: Skewbness = 0.021925
- 3256: Skewbness = 0.021925
- 3256: Skewbness = 0.021925
- 3256: Skewbness = 0.021925
- 3256: Skewbness = 0.021925
- 4545: Skewbness = 0.022110
- 4545: Skewbness = 0.022110
- 4545: Skewbness = 0.022110
- 4545: Skewbness = 0.022110
- 4545: Skewbness = 0.022110

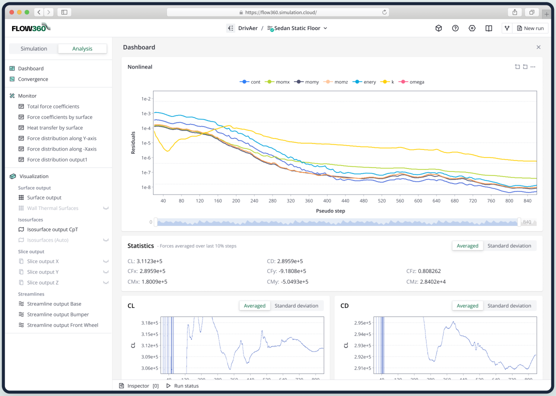
| Value | |
|---|---|
| Area | 0.008767 |
| Aspect Ratio | 59.972206 |
| GAI Deviation Distance | 0.000027 |
| Incircle/Circumcircle | 0.018224 |
| Maximum Angle | 140.755249 |
| Minimum Angle | 0.842669 |
| Minimum Edge Length | 0.025616 |
| Skewness Quality | 0.014044 |

## 02 / 仿真结果

ANALYSIS

**先判断结果是否可信**，再解释流场发生了什么；

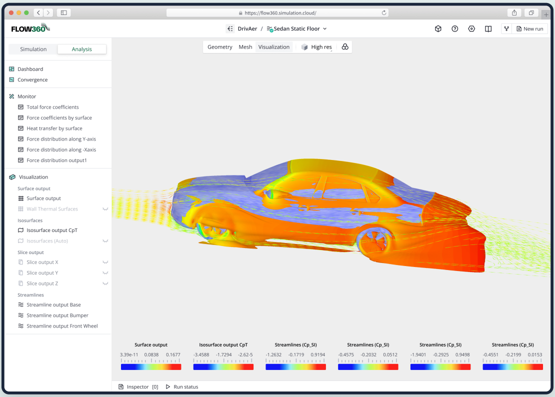
- Dashboard、Convergence 和 Monitor 作为全局判断入口；
- 再通过 Visualization 进入局部空间分析；


https://flow360.simulation.cloud/
FLOW360
DrivAer / Sedan Static Floor
New run
Simulation
Analysis
Dashboard
Nonlineal
cont
momx
momy
momz
enery
k
omega
Residuals
1e-2
1e-3
1e-4
1e-5
1e-6
1e-7
1e-8
40
80
120
160
200
240
280
320
360
400
440
480
520
560
600
640
680
720
760
800
840
Pseudo step
0
840
Averaged
Standard deviation
CL
3.18e+5
3.15e+5
3.12e+5
3.09e+5
3.06e+5
CD
2.95e+5
2.94e+5
2.93e+5
2.92e+5
2.91e+5
Inspector [0]
Run status

- Dashboard
- Convergence
- Monitor
  - Total force coefficients
  - Force coefficients by surface
  - Heat transfer by surface
  - Force distribution along Y-axis
  - Force distribution along -Xaxis
  - Force distribution output1
- Visualization
  - Surface output
    - Surface output
    - Wall Thermal Surfaces
  - Isosurfaces
    - Isosurface output CpT
    - Isosurfaces (Auto)
  - Slice output
    - Slice output X
    - Slice output Y
    - Slice output Z
  - Streamlines
    - Streamline output Base
    - Streamline output Bumper
    - Streamline output Front Wheel

Statistics - Forces averaged over last 10% steps

CL: 3.1123e+5
CD: 2.8959e+5
CFx: 2.8959e+5
CFy: -9.1808e+5
CFz: 0.808262
CMx: 1.8009e+5
CMy: -5.0493e+5
CMz: 2.8402e+4


https://flow360.simulation.cloud/
FLOW360
DrivAer / Sedan Static Floor
New run
Simulation
Analysis
Dashboard
Convergence
Monitor
Total force coefficients
Force coefficients by surface
Heat transfer by surface
Force distribution along Y-axis
Force distribution along -Xaxis
Force distribution output1
Visualization
Surface output
Surface output
Wall Thermal Surfaces
Isosurfaces
Isosurface output CpT
Isosurfaces (Auto)
Slice output
Slice output X
Slice output Y
Slice output Z
Streamlines
Streamline output Base
Streamline output Bumper
Streamline output Front Wheel
Geometry
Mesh
Visualization
High res
Surface output
3.39e-11 0.0838 0.1677
Isosurface output CpT
-3.4588 -1.7294 -2.62-5
Streamlines (Cp_SI)
-1.2632 -0.1719 0.9194
Streamlines (Cp_SI)
-0.4575 -0.2032 0.0512
Streamlines (Cp_SI)
-1.9401 -0.2925 0.9498
Streamlines (Cp_SI)
-0.4551 -0.2199 0.0153
Inspector [0]
Run status

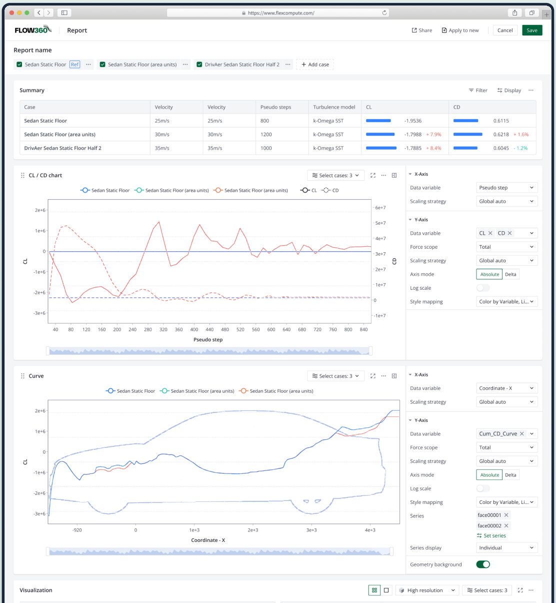
- 列表按工程判断过程组织
- 从可信度判断自然过渡到物理现象解释
- 趋势 – 变量 – 分布 – 细节

## 03 / 结论和汇报

ANALYSIS

**仿真结果不是终点，从数据中获得结论更有意义。**

不只是看多个结果，更是**解释方案差异**，通过同步相机、并列三维视图、配置差异和自定义曲线，将“参数发生了什么变化”与“结果因此如何变化”放在同一个证据链中。


https://www.flexcompute.com/
FLOW360
Report
Share
Apply to new
Cancel
Save

Report name

☑ Sedan Static Floor Ref ☑ Sedan Static Floor (area units) ☑ DrivAer Sedan Static Floor Half 2 + Add case

Summary

| Case | Velocity | Velocity | Pseudo steps | Turbulence model | CL | CD |
|---|---|---|---|---|---|---|
| Sedan Static Floor | 25m/s | 25m/s | 800 | k-Omega SST | -1.9536 | 0.6115 |
| Sedan Static Floor (area units) | 30m/s | 30m/s | 1200 | k-Omega SST | -1.7988 + 7.9% | 0.6218 + 1.6% |
| DrivAer Sedan Static Floor Half 2 | 35m/s | 35m/s | 1000 | k-Omega SST | -1.7885 + 8.4% | 0.6045 - 1.2% |

Filter
Display
CL / CD chart
Select cases: 3
Sedan Static Floor
Sedan Static Floor (area units)
Sedan Static Floor (area units)
CL
CD
2e+6
1e+6
0
-1e+6
-2e+6
-3e+6
CL
6e+7
5e+7
4e+7
3e+7
2e+7
1e+7
0
-1e+7
CD
40 80 120 160 200 240 280 320 360 400 440 480 520 560 600 640 680 720 760 800 840
Pseudo step

X-Axis
Data variable: Pseudo step
Scaling strategy: Global auto
Y-Axis
Data variable: CL, CD
Force scope: Total
Scaling strategy: Global auto
Axis mode: Absolute / Delta
Log scale
Style mapping: Color by Variable, Li...

Curve
Select cases: 3
Sedan Static Floor
Sedan Static Floor (area units)
Sedan Static Floor (area units)
2e+6
1e+6
0
-1e+6
-2e+6
-3e+6
CL
-920
0
1e+3
2e+3
3e+3
4e+3
Coordinate - X

X-Axis
Data variable: Coordinate - X
Scaling strategy: Global auto
Y-Axis
Data variable: Cum_CD_Curve
Force scope: Total
Scaling strategy: Global auto
Axis mode: Absolute / Delta
Log scale
Style mapping: Color by Variable, Li...
Series: face00001, face00002
Set series
Series display: Individual
Geometry background

Visualization
High resolution
Select cases: 3

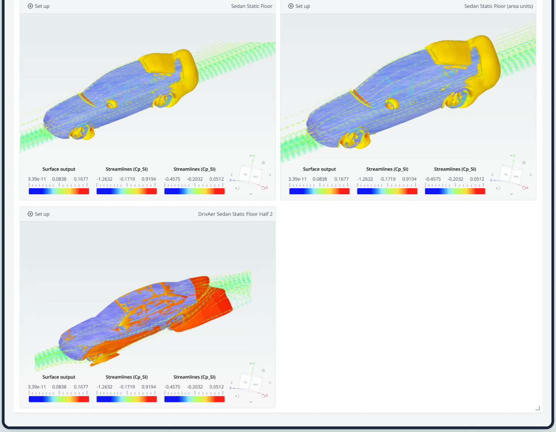
### Summary

- 指定 Reference，奠定比较基准；
- 自定义表字段，聚焦差异参数；
- Table 包含可视化关键结果，更直观。

### 2D Chart

- 高自由度的维度、指标；
- 2D 图表结合模型轮廓，精准洞察。

### Visualization


Set up
Sedan Static Floor
Set up
Sedan Static Floor (area units)
Set up
DrivAer Sedan Static Floor Half 2
Surface output
3.39e-11 0.0838 0.1677
Streamlines (Cp_SI)
-1.2632 -0.1719 0.9194
Streamlines (Cp_SI)
-0.4575 -0.2032 0.0512

- 多个视图提供互补信息并保持协调；
- 保证结果 / 空间视觉同步

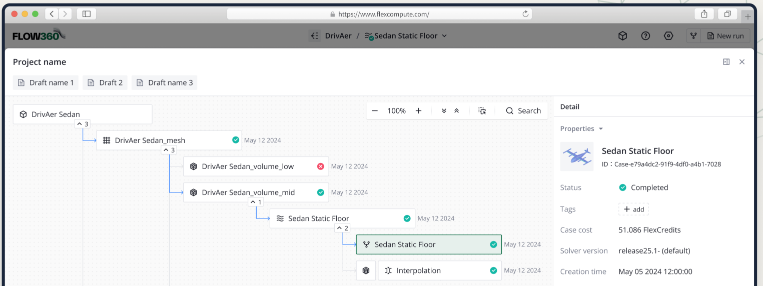
*[Design Principle]*　先提供整体概览，再筛选和聚焦，最后查看具体细节

*[Design Principle]*　缺乏统一基准和联动的多窗口，反而会增加用户对齐信息的成本

# PROJECT TREE

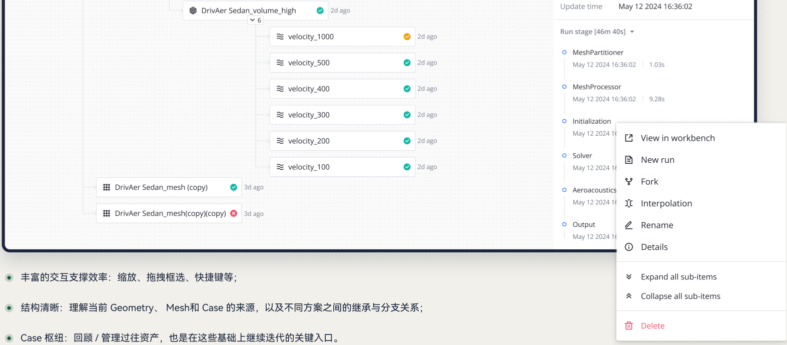
## 仿真管理

用户在同一个项目中运行大量 Case 后，用普通的树组件布局限性较大。而画布的交互方式相对传统软件的 Case 管理，是 **降维打击**


https://www.flexcompute.com/
FLOW360
DrivAer / Sedan Static Floor
New run
Project name
Draft name 1
Draft 2
Draft name 3
DrivAer Sedan
3
DrivAer Sedan_mesh
May 12 2024
3
DrivAer Sedan_volume_low
May 12 2024
DrivAer Sedan_volume_mid
May 12 2024
1
Sedan Static Floor
May 12 2024
2
Sedan Static Floor
May 12 2024
Interpolation
May 12 2024
100%
Search
Detail
Properties

Sedan Static Floor
ID：Case-e79a4dc2-91f9-4df0-a4b1-7028

Status Completed
Tags + add
Case cost 51.086 FlexCredits
Solver version release25.1- (default)
Creation time May 05 2024 12:00:00


DrivAer Sedan_volume_high
6
2d ago
velocity_1000
velocity_500
velocity_400
velocity_300
velocity_200
velocity_100
DrivAer Sedan_mesh (copy)
DrivAer Sedan_mesh(copy)(copy)
3d ago
Update time
May 12 2024 16:36:02
Run stage [46m 40s]
MeshPartitioner
May 12 2024 16:36:02 1.03s
MeshProcessor
May 12 2024 16:36:02 9.28s
Initialization
Solver
Aeroacoustics
Output
View in workbench
New run
Fork
Interpolation
Rename
Details
Expand all sub-items
Collapse all sub-items
Delete

- 丰富的交互支撑效率：缩放、拖拽框选、快捷键等；
- 结构清晰：理解当前 Geometry、 Mesh和 Case 的来源，以及不同方案之间的继承与分支关系；
- Case 枢纽：回顾 / 管理过往资产，也是在这些基础上继续迭代的关键入口。

*[Design Principle]* 系统与现实世界匹配”原则强调，界面应使用用户熟悉的概念和自然顺序

OB-1370
DASHBOARD WORKSPACE
首页 / 工作空间

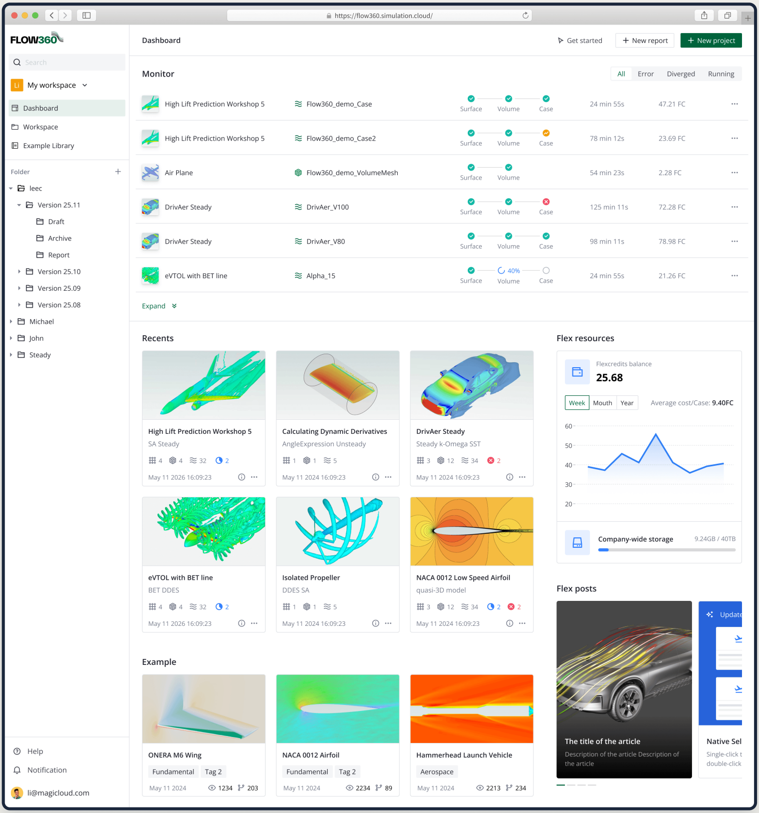
围绕工程师的日常工作流，重新组织首页、项目管理与搜索体验，让用户能够快速理解当前状态、恢复工作上下文，并高效管理复杂的仿真项目。

## DASHBOARD — 首页

工作状态概览比功能入口更重要

**工作状态 +最近上下文 + 快速继续工作**

首屏优先呈现项目状态发生改变的仿真状态、最近项目及计算资源，让用户打开 Flow360 后能够立即判断“**提交的任务怎么样了**”以及“**下一步去哪里**”。


https://flow360.simulation.cloud/
FLOW360
Search
Li My workspace
Dashboard
Workspace
Example Library
Folder
leec
Version 25.11
Draft
Archive
Report
Version 25.10
Version 25.09
Version 25.08
Michael
John
Steady
Help
Notification
li@magicloud.com
Dashboard
Get started
New report
New project
All
Error
Diverged
Running
Expand

Monitor

| | | | | |
|---|---|---|---|---|
| High Lift Prediction Workshop 5 | Flow360_demo_Case | Surface ✓ Volume ✓ Case ✓ | 24 min 55s | 47.21 FC |
| High Lift Prediction Workshop 5 | Flow360_demo_Case2 | Surface ✓ Volume ✓ Case | 78 min 12s | 23.69 FC |
| Air Plane | Flow360_demo_VolumeMesh | Surface ✓ Volume ✓ | 54 min 23s | 2.28 FC |
| DrivAer Steady | DrivAer_V100 | Surface ✓ Volume ✓ Case ✗ | 125 min 11s | 72.28 FC |
| DrivAer Steady | DrivAer_V80 | Surface ✓ Volume ✓ Case ✓ | 98 min 11s | 78.98 FC |
| eVTOL with BET line | Alpha_15 | Surface ✓ 40% Volume ○ Case | 24 min 55s | 21.26 FC |

Recents

**High Lift Prediction Workshop 5**
SA Steady
4 4 32 2
May 11 2026 16:09:23

**Calculating Dynamic Derivatives**
AngleExpression Unsteady
1 1 5
May 11 2024 16:09:23

**DrivAer Steady**
Steady k-Omega SST
3 12 34 2
May 11 2024 16:09:23

**eVTOL with BET line**
BET DDES
4 4 32 2
May 11 2026 16:09:23

**Isolated Propeller**
DDES SA
1 1 5
May 11 2024 16:09:23

**NACA 0012 Low Speed Airfoil**
quasi-3D model
3 12 34 2 2
May 11 2024 16:09:23

Example

**ONERA M6 Wing**
Fundamental Tag 2
May 11 2024 1234 203

**NACA 0012 Airfoil**
Fundamental Tag 2
May 11 2024 2234 89

**Hammerhead Launch Vehicle**
Aerospace
May 11 2024 2213 234

Flex resources

Flexcredits balance
**25.68**

Week Mouth Year Average cost/Case: **9.40FC**

60
50
40
30
20

Company-wide storage 9.24GB / 40TB

Flex posts

**The title of the article**
Description of the article Description of the article

Update
Native Sel
Single-click t
double-click

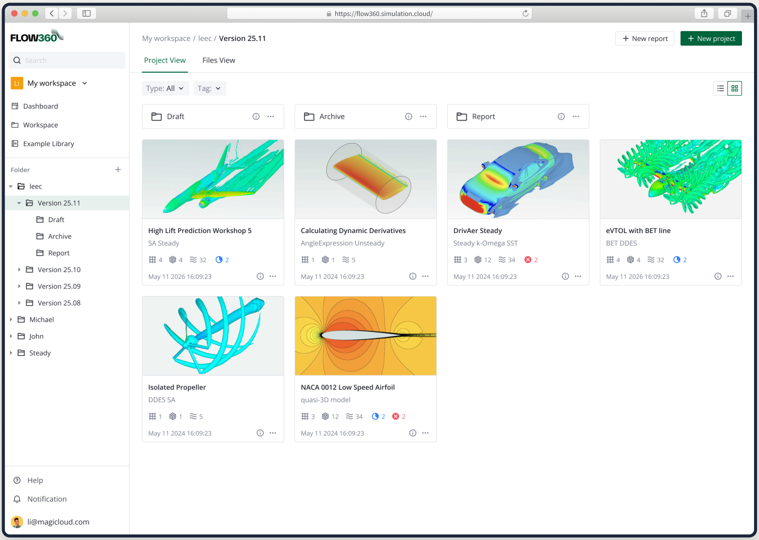
- Monitor：展示正在或者最近发生的事情；
- Recents：利用视觉缩略图 + 项目元信息帮助工程师快速恢复工作上下文；
- Resources：将资源保持可见，让用户在提交和管理仿真时能够同时感知计算成本。

# PROJECT MANAGEMENT — 项目管理

从 Web 操作转向桌面软件的操作模型

## 01 / Web Application ≠ Web Page

当工程师需要管理上百个 Project / Folder 时，传统 Web UI 的逐个点击操作会产生效率瓶颈；
因此，不完全遵循传统网页操作，借鉴 Finder / Explorer / Figma / Desktop IDE 这类专业工具的操作模型。

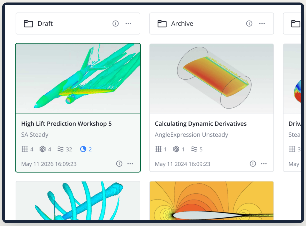

https://flow360.simulation.cloud/
FLOW360
Search
My workspace
Dashboard
Workspace
Example Library
Folder
leec
Version 25.11
Draft
Archive
Report
Version 25.10
Version 25.09
Version 25.08
Michael
John
Steady
Help
Notification
li@magicloud.com
My workspace / leec / Version 25.11
+ New report
+ New project
Project View
Files View
Type: All
Tag:
Draft
Archive
Report
High Lift Prediction Workshop 5
SA Steady
4 4 32 2
May 11 2026 16:09:23
Calculating Dynamic Derivatives
AngleExpression Unsteady
1 1 5
May 11 2024 16:09:23
DrivAer Steady
Steady k-Omega SST
3 12 34 2
May 11 2024 16:09:23
eVTOL with BET line
BET DDES
4 4 32 2
May 11 2026 16:09:23
Isolated Propeller
DDES SA
1 1 5
May 11 2024 16:09:23
NACA 0012 Low Speed Airfoil
quasi-3D model
3 12 34 2 2
May 11 2024 16:09:23

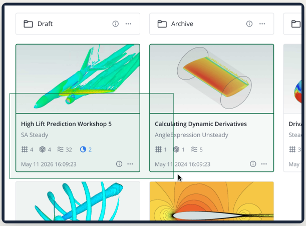
## 02 / 减少“进入选择模式”的额外步骤，让管理操作直接发生在内容本身

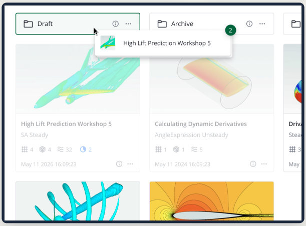
PROJECT MANAGEMENT

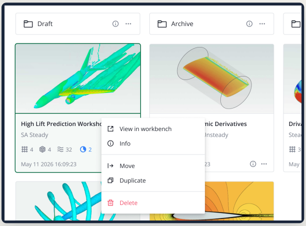
基于已有操作习惯，提高效率，也能减少 webUI 常见的误操作。

- 选择：Ctrl / Cmd 多选、Shift 连选、框选
- 操作：Drag & Drop 批量移动、右键唤出菜单


Draft
Archive
High Lift Prediction Workshop 5
SA Steady
4 4 32 2
May 11 2026 16:09:23
Calculating Dynamic Derivatives
AngleExpression Unsteady
1 1 5
May 11 2024 16:09:23


Draft
Archive
High Lift Prediction Workshop 5
SA Steady
4 4 32 2
May 11 2026 16:09:23
Calculating Dynamic Derivatives
AngleExpression Unsteady
1 1 5
May 11 2024 16:09:23


Draft
Archive
2
High Lift Prediction Workshop 5
High Lift Prediction Workshop 5
SA Steady
Calculating Dynamic Derivatives
AngleExpression Unsteady


Draft
Archive
High Lift Prediction Worksho
SA Steady
4 4 32 2
May 11 2026 16:09:23
View in workbench
Info
Move
Duplicate
Delete

# AI AUGMENTED WORKFLOW

## AI 协同工作流

在 Flow360 的设计过程中，我将 AI 用于 CFD 业务理解、需求拆解、方案探索、组件与小型功能实现，以及埋点和工程协作，并将部分高频任务沉淀为可复用的 Skill。

### 01 / “读需求”到“建立业务上下文”

AUGMENTED WORKFLOW

Flow360 最大的难点之一不是设计，而是**首先要理解一个陌生而专业的工程领域。**

面对 CFD 复杂业务，不直接从界面开始，而是先利用 AI 将 PRD、Jira、文档中的信息结构化，梳理实体关系、用户流程与边界条件，再通过产品现状和工程团队反馈验证。

PRD / Jira / 文档 → AI 解构和过滤 → 用户流程 / 实体 / 边界 → 设计上下文

### 02 / 设计探索与审查

AUGMENTED WORKFLOW

**AI 作为第二介入者，而不是代替我思考**

AI 的作用不是生成方案，而是基于已有设计稿和业务上下文，扩展可能性、挑战当前假设，并帮助检查遗漏和风险。

独立思考设计 → AI 扩展 / 挑战 / 审查 → 筛选调整 → 最终设计

### 03 / Designer → Design Engineer

AUGMENTED WORKFLOW

设计不止停留在 Figma。2026 年以设计者身份持续参与 Flow360 前端实现，累计提交 70+ PR。

**~ 70 +**

累计提交 PR

**设计系统**

基于 Ant Design ， Vibe Coding 开发和迭代组件，并在产品中验证。

**日常需求**

体量中小的需求，从设计并直接推进开发，用真实运行结果验证交互。

**设计走查**

取缔传统的设计走查流程，直接基于实际代码修正视觉与交互问题。

### 04 / Skill 沉淀

AUGMENTED WORKFLOW

从临时对话，到可复用工作流：临时对话 → 固定步骤 → 可复用能力 → 团队工作流

**需求提炼与知识库转化专家.md**

将冗长、非结构化的产品需求文档 (PRD) 转化为模块化、高信噪比的文档。

**Flow360 前端 UI 还原专家.md**

从 Figma MCP 数据或设计截图恢复 Flow360 前端 UI。

**Flow 360 埋点守则.md**

埋点、Sentry 行为事件、logBehavior、漏斗、事件下线或埋点 PR 时使用。

……

# END.

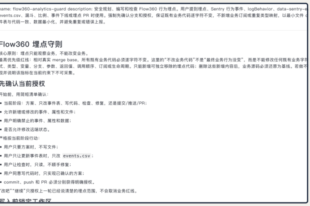
Flow360 是一个让我突破既有设计瓶颈的项目。面对完全不同的业务、行业与工程师用户，过去熟悉的设计经验没那么趁手。也正因为如此，反倒引发了我更多更底层内容的思考。

在这个项目中，和真实用户持续紧密联系。持续的深度访谈、可落地的用户体验地图，以及长时间使用自己设计的产品，让我对‘站在用户的角度’设计有了更深的感触。很多过去依赖经验做出的判断，开始能够从真实场景、用户行为和反馈中找到依据。

随着项目不断深入，我也逐渐从单一的设计，更靠近产品角色。开始从上游参与问题定义、需求判断与方案取舍，也向下游延伸到实现、验证和持续迭代。对产品链路理解得越完整，对设计决策的掌控感也越强，回头看过去的设计时，也更清楚为什么需要改变什么。

与此同时，随着 AI 的突起，设计师的定位变得越来越模糊。能力在AI 的加持下被放大，能做的事情更多了。工作流和工作方法不断改变，围绕用户体验，向需求整理、代码实现、埋点和工程协作等多个方向扩宽。在里面深入直到挖掘到最适合自己的部分...

---



ame: flow360-analytics-guard description: 安全规划、编写和检查 Flow360 行为埋点。用户提到埋点、Sentry 行为事件、logBehavior、data-sentry-e
vents.csv、漏斗、比例、事件下线或埋点 PR 时使用。强制先确认分支和授权，保证既有业务代码逐字符不变，不新增业务订阅或重复类型映射，以最小文件
件表与代码一致、数据最小化，并避免重复或错误上报。

## Flow360 埋点守则

核心原则：埋点只能观察业务，不能改变业务。
最高优先级红线：相对真实 merge base，所有既有业务代码必须逐字符不变。这里的“不改业务代码”不是“最终业务行为没变”，而是不能修改任何既有业务字符
式、类型、变量、分支、参数、返回值、调用顺序、订阅或生命周期。只能新增可独立移除的埋点代码；删除这些新增内容后，业务源码必须还原为基线。若做不
现并说明该指标在当前约束下不可采集。

### 先确认当前授权

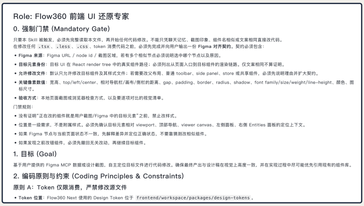
开始前，用简短清单确认：

- 当前阶段：方案、只改事件表、写代码、检查、修复，还是提交/推送/PR；
- 允许新增或修改的事件、属性和文件；
- 用户明确禁止的事件、属性和数据；
- 是否允许修改远端状态。

严格按当前阶段行动：

- 用户只要方案时，不写文件；
- 用户只让更新事件表时，只改 `events.csv`；
- 用户让检查时，只读，不顺手修复；
- 用户同意写代码时，只实现已确认的方案；
- commit、push 和 PR 必须分别获得明确授权。

“改吧”“继续”只授权上一轮已经说清楚的埋点范围，不会取消业务红线。



## Role: Flow360 前端 UI 还原专家

### 0. 强制门禁 (Mandatory Gate)

只要本 Skill 被触发，必须先完整读取本文件，再开始任何代码修改。不能只凭聊天记忆、截图印象、组件名相似或文案相同直接改代码。
在修改任何 `.tsx`、`.less`、`.css`、token 消费代码之前，必须先完成并向用户输出一份 **Figma 对齐契约**。契约必须包含：

- **Figma 来源**：Figma URL / node id / 截图区域，若有多个相似节点必须说明选中哪个节点以及原因。
- **目标元素身份**：目标 UI 在 React render tree 中的真实组件路径；必须列出从页面入口到目标组件的渲染链路。仅文案相同不算证明。
- **允许修改文件**：默认只允许修改目标组件及其样式文件；若需要改父布局、普通 toolbar、side panel、store 或共享组件，必须先说明理由并扩大契约。
- **关键像素数值**：宽高、top/left/center、相对导航栏/画布/侧栏的距离、gap、padding、border、radius、shadow、font family/size/weight/line-height、颜色、图标尺寸。
- **验收方式**：本地页面截图或浏览器检查方式，以及要逐项对比的视觉清单。

门禁规则：

- 没有证明“正在改的组件就是用户截图/Figma 中的目标元素”之前，禁止改样式。
- 位置是一级需求，不是附属样式。必须先确认目标元素相对 viewport、顶部导航、viewer canvas、左侧面板、右侧 Entities 面板的定位上下文。
- 如果 Figma 节点与当前页面状态不一致，先解释差异并定位正确状态，不要靠猜测改相似组件。
- 如果发现之前改错组件，必须先撤回无关改动，再继续目标组件。

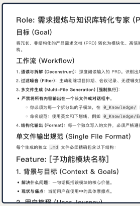
### 1. 目标 (Goal)

基于用户提供的 Figma MCP 数据或设计截图，自主定位目标文件进行代码修改。确保最终产出与设计稿在视觉上高度一致，并在实现过程中尽可能优先引用现有的组件库。

### 2. 编码原则与约束 (Coding Principles & Constraints)

#### 原则 A：Token 仅限消费，严禁修改源文件

- **Token 位置**：Flow360 Next 使用的 Design Token 位于 `frontend/workspace/packages/design-tokens`。



## Role: 需求提炼与知识库转化专家 (P

### 目标 (Goal)

将冗长、非结构化的产品需求文档 (PRD) 转化为模块化、高信噪
构。

### 工作流 (Workflow)

1. **通读与拆解 (Deconstruct)**：深度阅读输入的 PRD，识别出
2. **过滤噪音 (Filter)**：主动剔除项目排期、会议记录、无逻辑支
3. **多文件生成 (Multi-File Generation) [强制执行]**：

- **严禁将所有内容输出在一个长文件或对话框中。**
  - 你必须为每一个拆分出的子模块，在 `0_Knowledge/`
  - 命名规范：使用英文和下划线，例如 `0_Knowledge/E`

4. **结构化输出 (Format)**：每一个独立写入的文件，必须严格遵

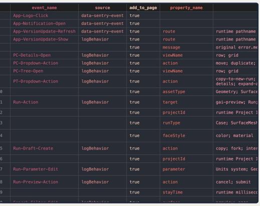
### 单文件输出规范 (Single File Format)

每个生成的独立 `.md` 文件必须精确包含以下结构：

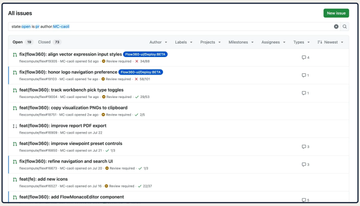
## Feature: [子功能模块名称]

### 1. 背景与目标 (Context & Goals)

- **解决什么问题**：一句话概括该模块的核心价值。
- **现状与痛点**：当前用户在使用中的具体摩擦点。



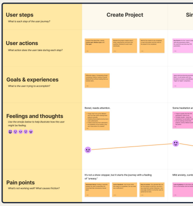
|  | event_name | source | add_to_page | property_name |  |
|---|---|---|---|---|---|
|  | App-Logo-Click | data-sentry-event | true |  |  |
|  | App-Notification-Open | data-sentry-event | true |  |  |
|  | App-VersionUpdate-Refresh | data-sentry-event | true | route | runtime pathname |
|  | App-VersionUpdate-Show | logBehavior | true | route | runtime pathname |
|  |  |  | true | message | original error.me |
|  | PC-Details-Open | logBehavior | true | viewName | row; grid |
|  | PC-Dropdown-Action | logBehavior | true | action | move; duplicate; |
|  | PC-Tree-Open | logBehavior | true | viewName | row; grid |
|  | PT-Dropdown-Action | logBehavior | true | action | copy-to-new-run;<br>details; expand-a |
| 0 |  |  | true | assetType | Geometry; Surface |
| 1 | Run-Action | logBehavior | true | target | gai-preview; Run; |
| 2 |  |  | true | projectId | runtime Project I |
| 3 |  |  | true | runType | Case; SurfaceMesh |
| 4 |  |  | true | faceStyle | color; material |
| 5 | Run-Draft-Create | logBehavior | true | action | copy; fork; inter |
| 6 |  |  | true | projectId | runtime Project I |
| 7 | Run-Parameter-Edit | logBehavior | true | parameter | Units system; Geo |
| 8 | Run-Preview-Action | logBehavior | true | action | cancel; submit |
| 9 |  |  | true | stayTime | runtime millisecc |



All issues
New issue
Open 19
Closed 73
Author
Labels
Projects
Milestones
Assignees
Types
Newest

state:open is:pr author:MC-caoli

- fix(flow360): align vector expression input styles `Flow360-ui/Deploy:BETA` — flexcompute/flex#19305 · MC-caoli opened 5d ago · Review required · ✗ 34/88 — 4
- fix(flow360): honor logo navigation preference `Flow360-ui/Deploy:BETA` — flexcompute/flex#19103 · MC-caoli opened 1w ago · Review required · ✗ 58/101 — 1
- feat(flow360): track workbench pick type toggles — flexcompute/flex#19004 · MC-caoli opened 1w ago · Review required · ✓ 29/53 — 1
- feat(flow360): copy visualization PNGs to clipboard — flexcompute/flex#18751 · MC-caoli opened 2w ago · Review required · ✓ 2/5
- feat(flow360): improve report PDF export — flexcompute/flex#16909 · MC-caoli opened on Jul 22
- feat(flow360): improve viewpoint preset controls — flexcompute/flex#16850 · MC-caoli opened on Jul 21 · ✓ 1/3 — 3
- fix(flow360): refine navigation and search UI — flexcompute/flex#16673 · MC-caoli opened on Jul 20 · Review required · ✓ 1/3 — 3
- feat(fe): add new icons — flexcompute/flex#16527 · MC-caoli opened on Jul 16 · Review required · ✓ 22/37
- feat(flow360): add FlowMonacoEditor component — 5



User steps
What is each step of the user journey?
Create Project
User actions
What action does the user take during each step?
Goals & experiences
What is the user trying to accomplish?
Feelings and thoughts
Use the emojis below to help illustrate how the user might be feeling.
Bored, needs attention.
Some hesitation a
Pain points
What's not working well? What causes friction?
It's not a show-stopper, but it starts the journey with a feeling of "uneasy."
Mild anxiety, cumb

-- By leeC