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Mold Flow Analysis



Dialogue 目录

- Product Info. 产品信息
- Material Data & Molding Parameter 材料信息和注塑参数
- Product Thinkness Anysis 产品壁厚分析
- Injection Gate Design 进胶口设计
- 3D Mesh Analysis 3D 网格分析
- Cooling Channel Design Analysis 冷却水道设计分析
- Fill time (Animate & Contour) 填充时间 (动态+轮廓)
- Flow Front Temperature 前端温度
- Pressure at the V/P switchover 转保压压力
- Injection pressure 注塑压力
- Clamp Force 锁模力
- Weld lines 熔接线
- Air Traps 困气
- Cooling Channels 冷却管道
- Mould Surface Temperature 模具表面温度
- Time to freeze 产品冷却时间
- Volumetric shrinkage at ejection 顶出时体积收缩
- Deflection 变形
- Conclusions and suggestions 结论和建议

Product Info.产品信息

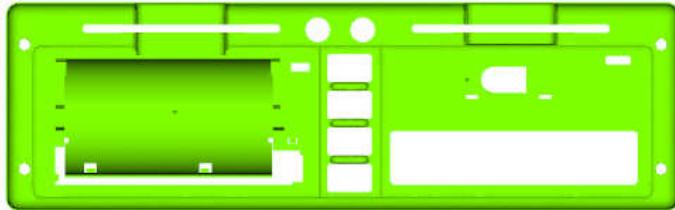
Part Name 产品名称:Panel

Mold Number 模具编号:TBD

Prepared by 报告制作: *asher wang*

Date Prepared 日期: may 29th 2017

Version 版本 : Rev.1



Actual of cavities 实际出模数: 2

Number of cavity analysis 分析时出模数: 1

Part Material 塑胶材料:PC+ABS

Type of analyses 分析类型: Cool + Flow + Warp

Analysis Purpose	<ul style="list-style-type: none">➤ Validate potential problem after the part and mold design 验证可能存在的问题在产品和模具设计完成后➤ Check the fill balance pattern, weld line, air traps, and predict the needed clamp force and injection pressure, warpage. 指出流动模式, 熔接线位置, 困气位置, 所需锁模力和注塑压力, 产品变形➤ Estimate cycle time 评估周期
Input Model Description	<ul style="list-style-type: none">➤ The runner system and cooling circuits is simulated as the mold design. 根据模具设计建立流道和运水为分析
Result Required	<ul style="list-style-type: none">➤ Filling result 流动结果➤ Cycle time result 周期结果➤ Warpage result 变形结果

Product Info.产品信息

Part Details and Tool Description

Part Name: 产品名称	/
CAD File / Version/ Date 模型格式和版本	X-T
Part Volume 产品体积	40.7(1) cm^3
Nominal Wall Thickness 产品平均厚度	1.7mm
Tool Description 出模数	1Cavities
Injection machine Tonnage 注塑机台	/

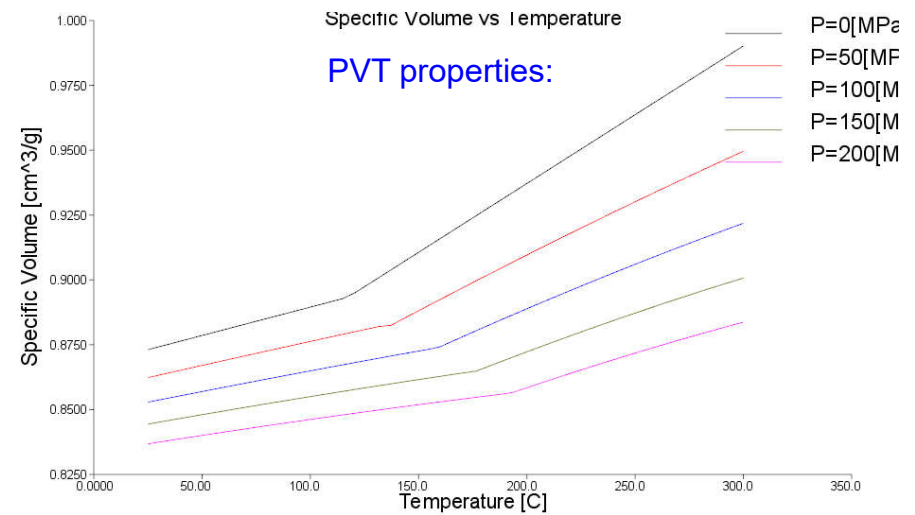
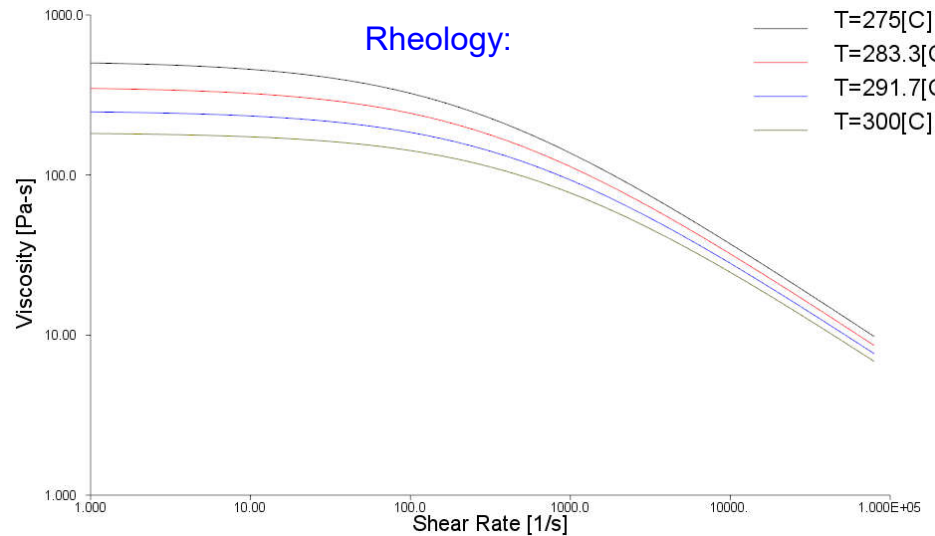
Process Setup

Material 塑胶材料	PC+ABS
Injection time 注塑时间	0.8s
Material temp 材料温度	290 [deg.c]
Mold temp 模具温度	75 [deg.c]
Velocity/Pressure Transfer (% volume) 转保压体积	98 %
Packing Pressure/Time 保压压力/时间	80%filling pressure /5s, 80%filling pressure /3s
Project Area 产品投影面积	94(1) cm^2

Material Data & Molding Parameter 材料信息和注塑参数

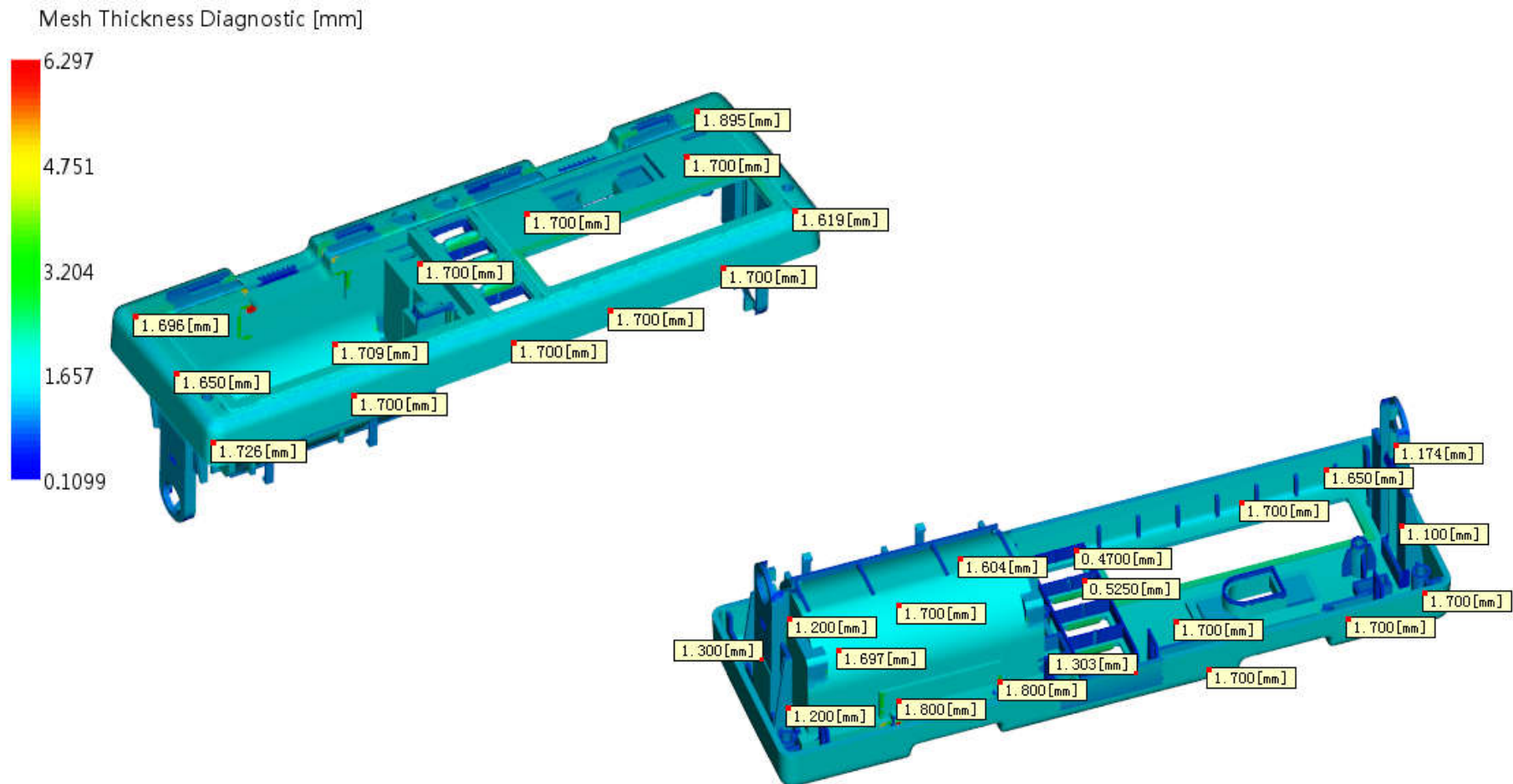
- The material datas are from supplier is in moldflow database and shown in the pictures below

Material Property			
PC+ABS (Cycloy XCY630 from SABIC Innovative Plastics US, LLC)		Melt Temperature Range (°C)	275~300
Solid Density (g/cm ³)	1.1453	Mold Temperature Range (°C)	60~90
Maximum Shear Rate (1/s)	60000	Ejection Temperature (°C)	103
Maximum Shear Stress (MPa)	0.4	Absolute Maximum Melt Temperature (°C)	340
MFR (g/10min) (275°C/ 5 Kg)	400	Recommended Melt Temperature (°C)	290
Filler	Unfilled	Recommended Mold Temperature (°C)	75



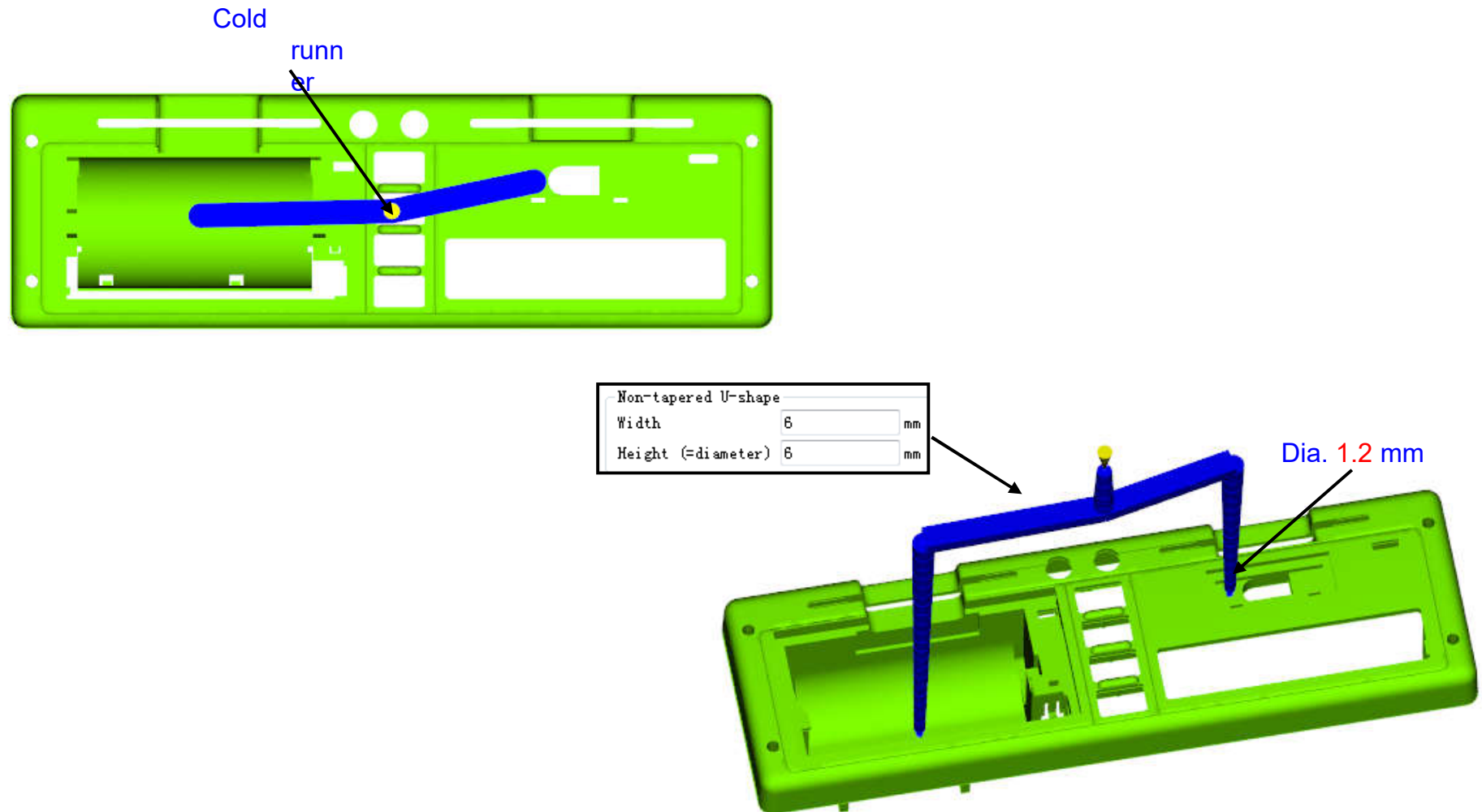
Please provide an accurate material list

Product Thickness Ansys 产品壁厚分析



- This above plot used different color to show the thickness of this part.
- We can see that: the average thickness of this part is 1.7mm.
- Total part weight = 45g (1) , the cold runners weight =6.4g

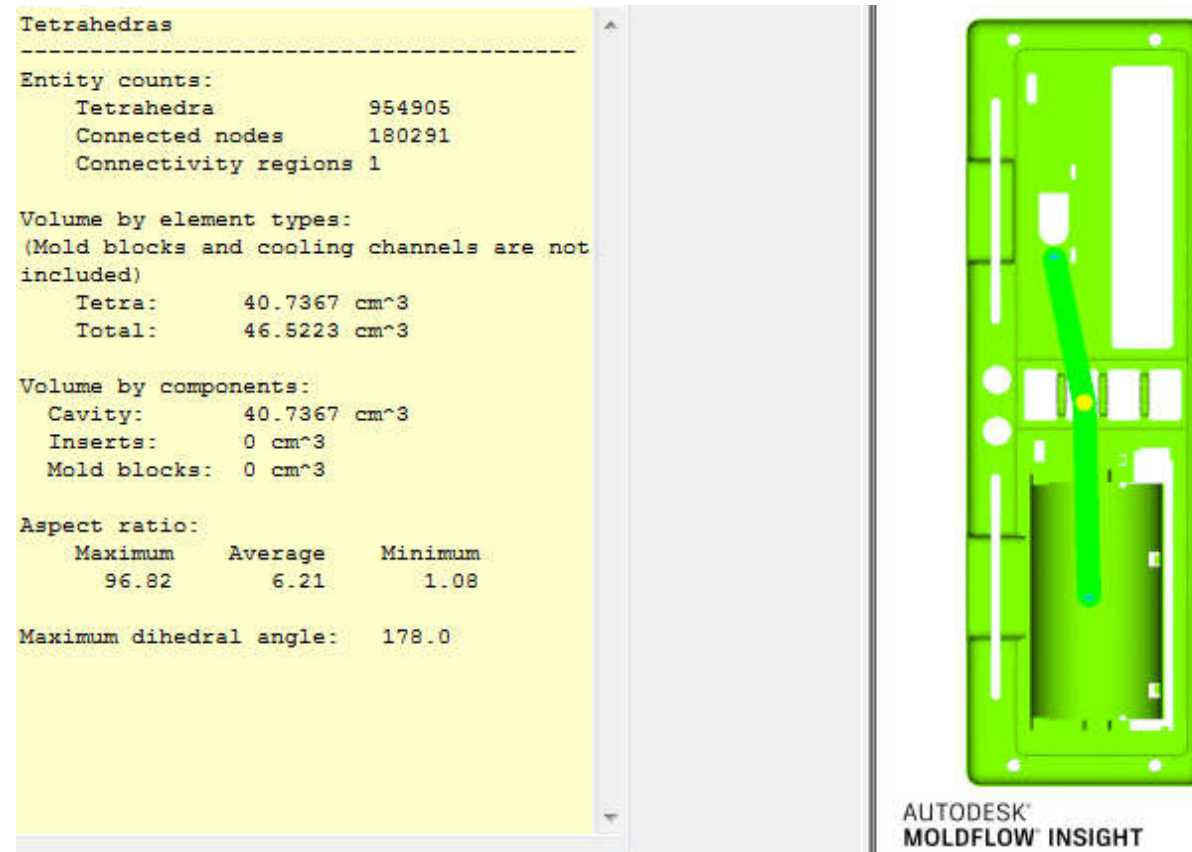
Injection Gate Design 进胶口设计



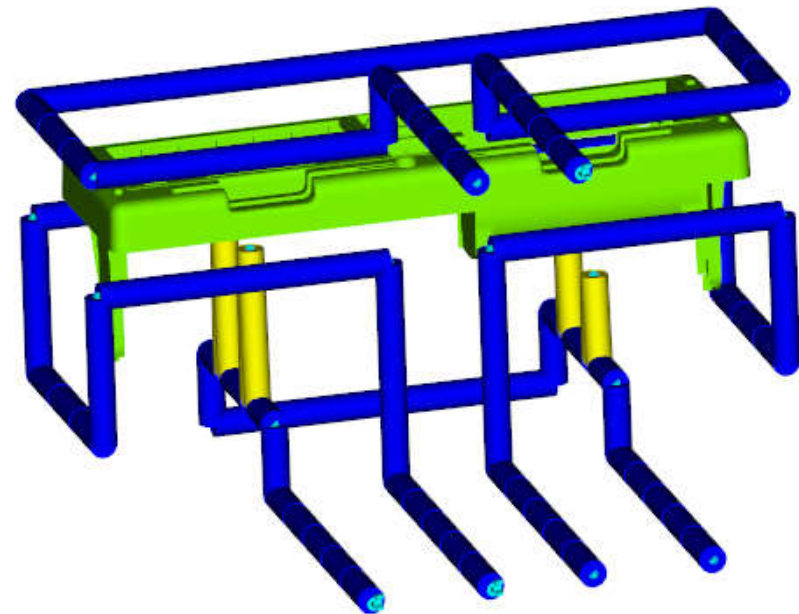
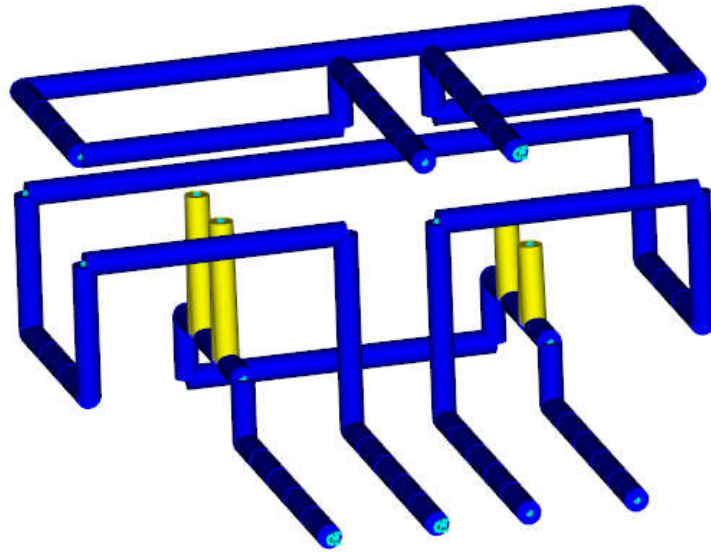
- The mold is the cold runner and point gate
- The runner layout was based on the 3D drawing.

3D Mesh Analysis 3D 网格分析

- Specification: the type of model used 3D mesh analysis



Cooling Channel Design Analysis 冷却水道设计分析

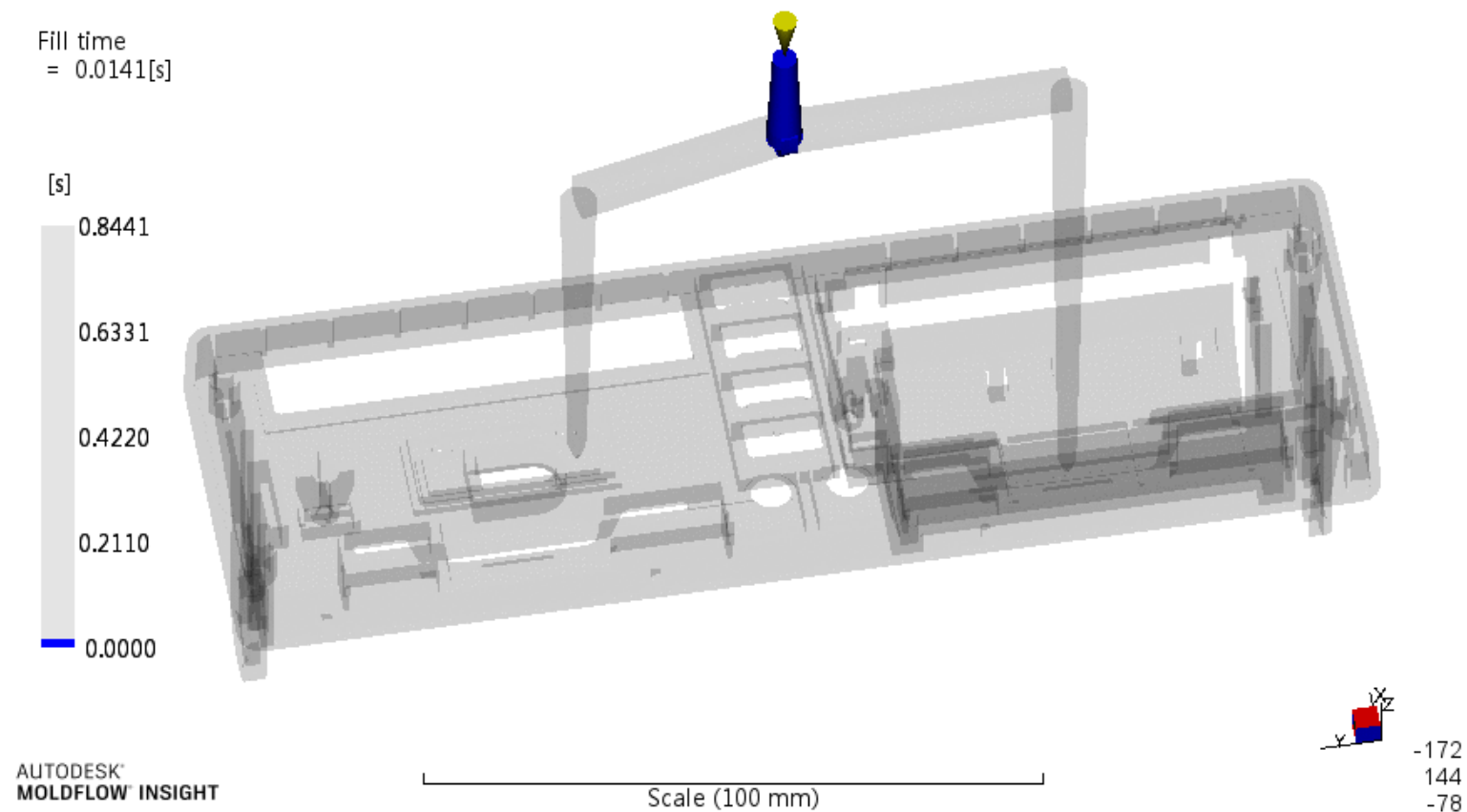


■ Coolant was specified as water 75C, Cooling time as 25 s

Fill time (Animate & Contour) 填充时间 (动态+轮廓)

- This result shows how the melt flows through the cavity. Fill time is about: 0.8sec.

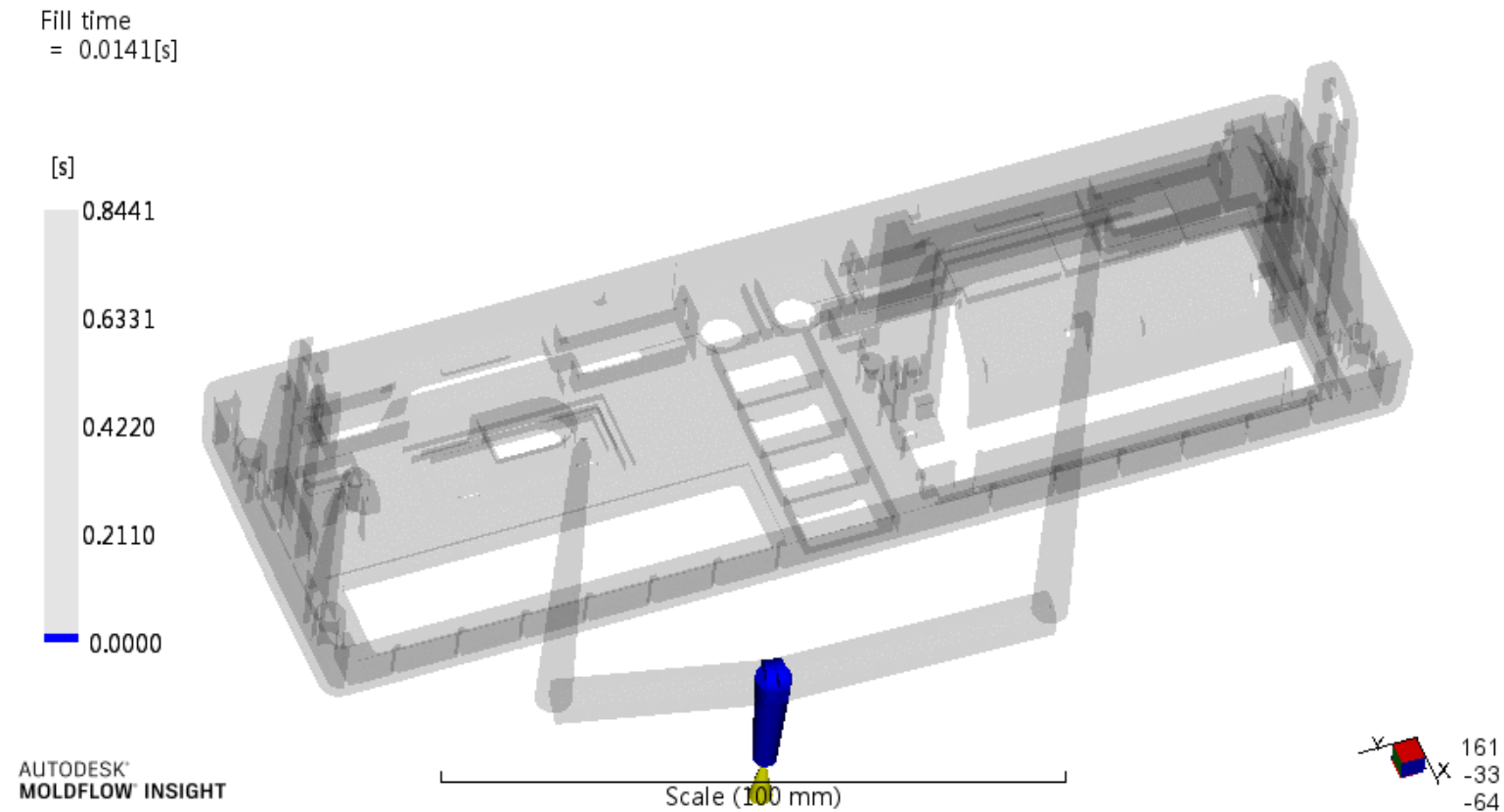
[Shift+F5, you will see the animated flow](#)



Fill time (Animate & Contour) 填充时间 (动态+轮廓)

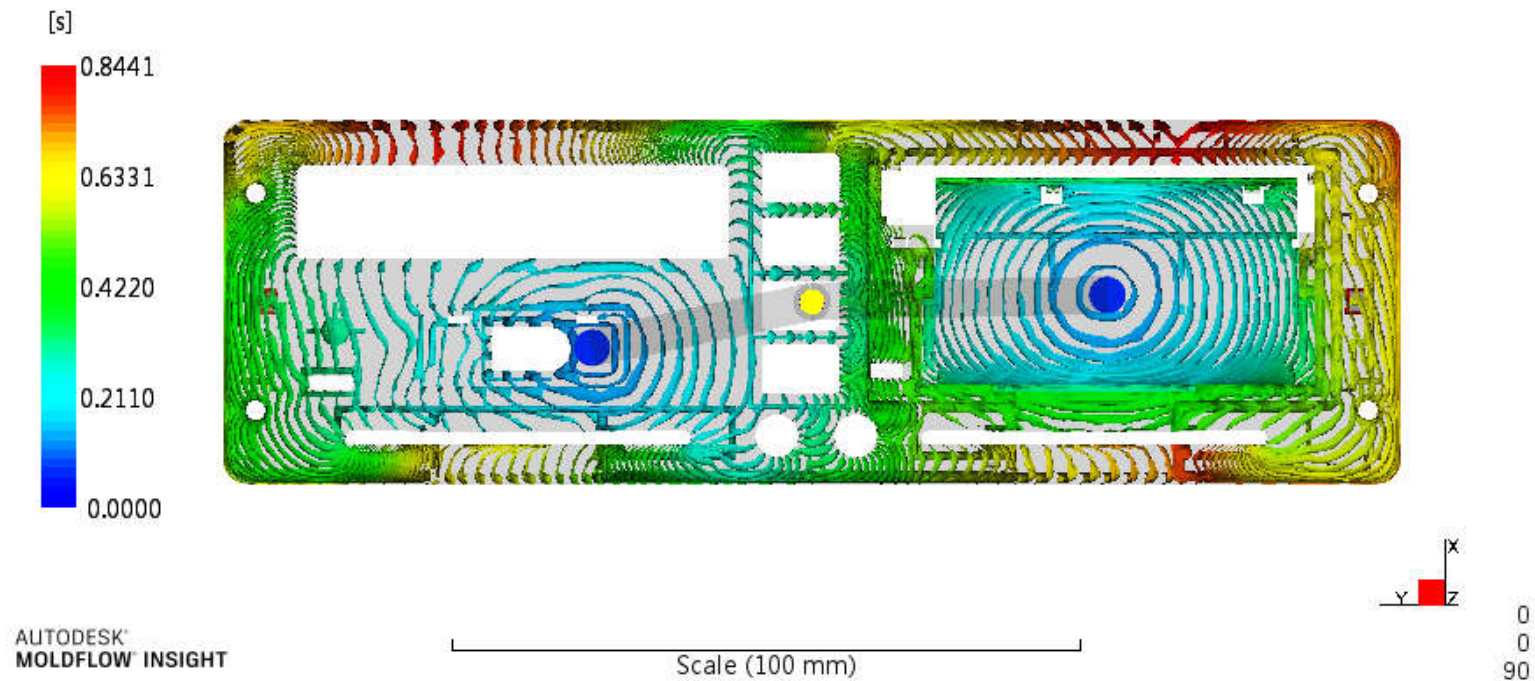
- This result shows how the melt flows through the cavity. Fill time is about: 0.8sec.

[Shift+F5, you will see the animated flow](#)



Fill time (Animate & Contour) 填充时间 (动态+轮廓)

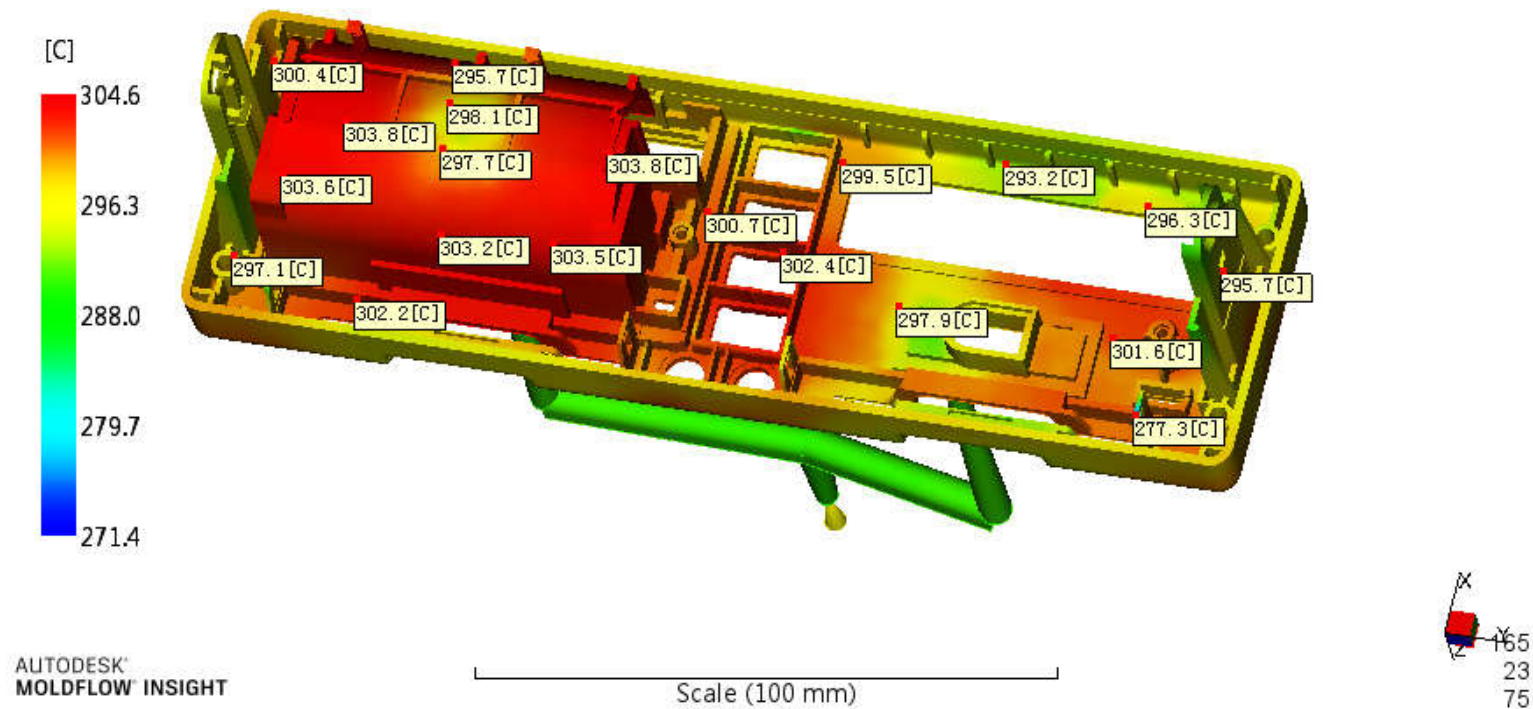
Fill time
= 0.8441[s]



- The area with dense lines in the above picture represents the area with lower flow velocity;
and the area with sparse lines represents the area with higher flow velocity.

Flow Front Temperature 前端温度

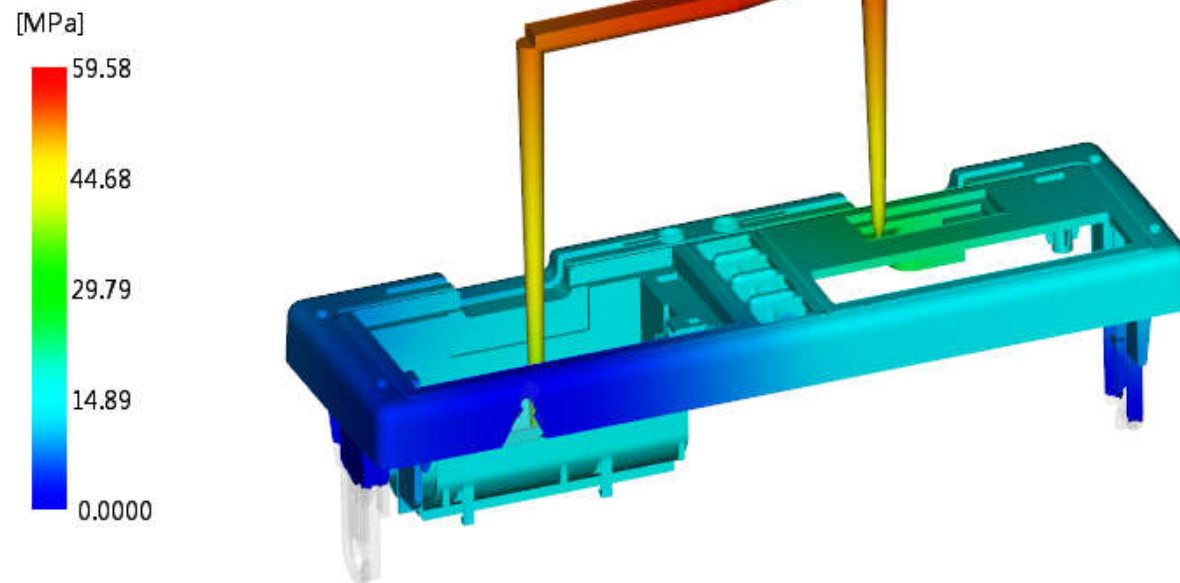
Temperature at flow front
= 304.6[C]



- Above figure showed the temperature at the part. Melt enters cavity at 290°C
- The polymer recommended temperature range: 275~300°C
- From above plot we can see that the temperature drop on the part are in this polymer recommend rang.

Pressure at the V/P switchover 转保压压力

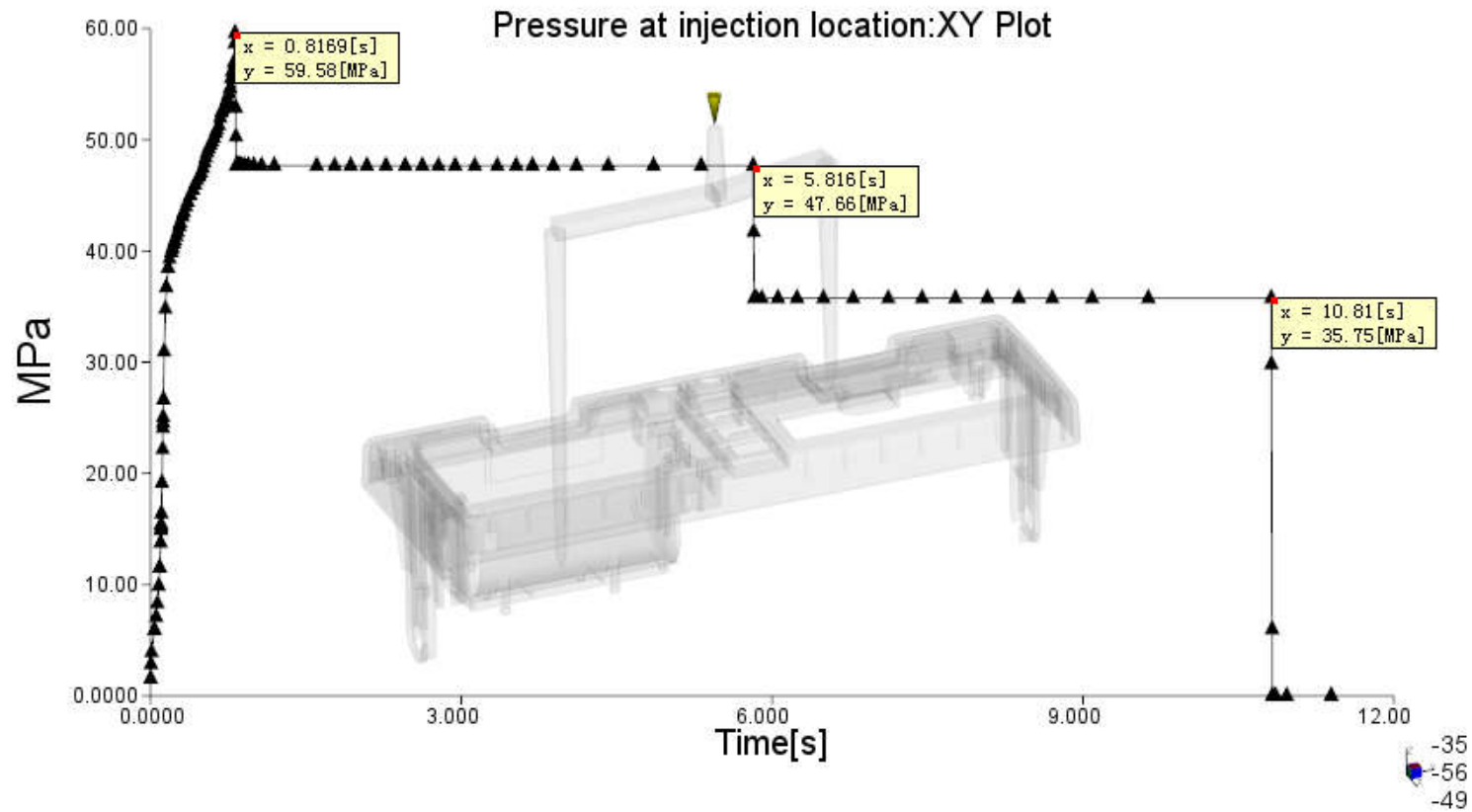
Pressure at V/P switchover
= 59.58[MPa]



■ Above figure shows the pressure distribution through the flow path inside the mold, at the V/P switchover of the filling phase.

Injection pressure 注塑压力

- The maximum value is 60Mpa, Injection pressure specified at Packing is 48 Mpa
- The filling pressure are within moldflow recommend value which can acceptable.

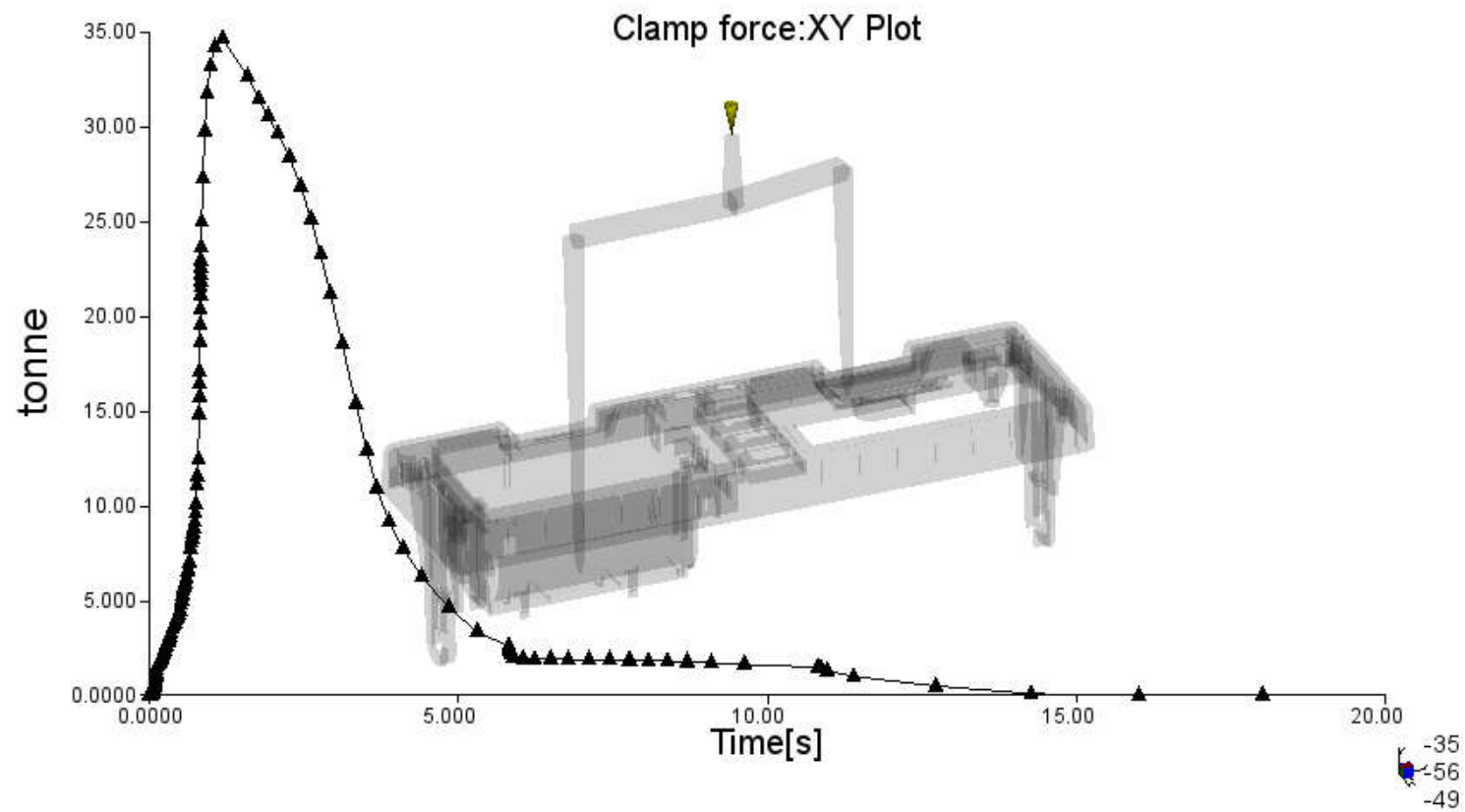


Packing profile plot

Clamp Force 锁模力

■ The maximum clamp force is 35Tons.

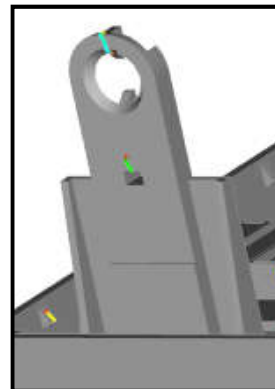
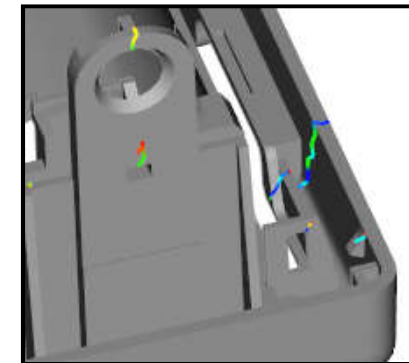
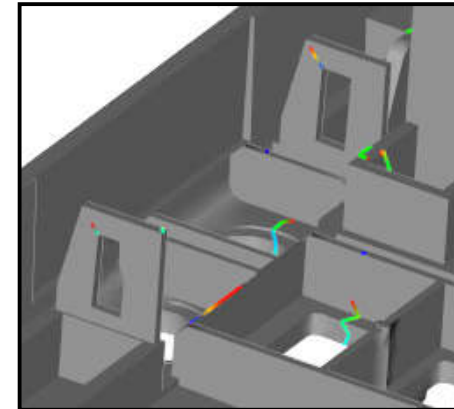
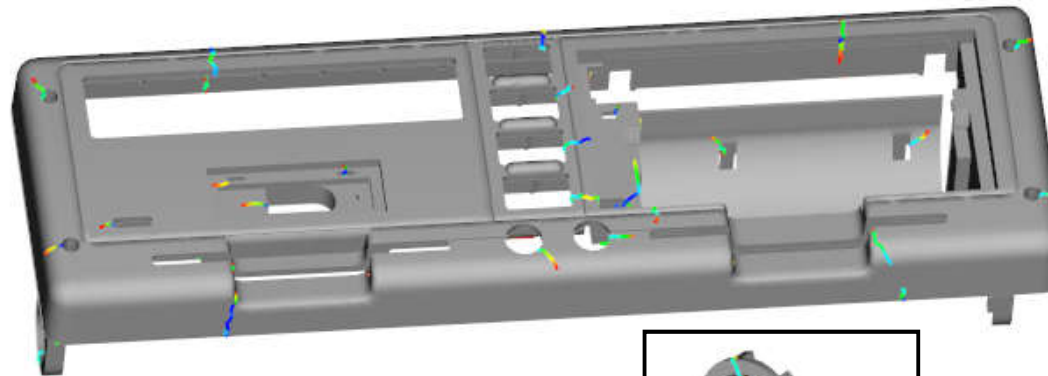
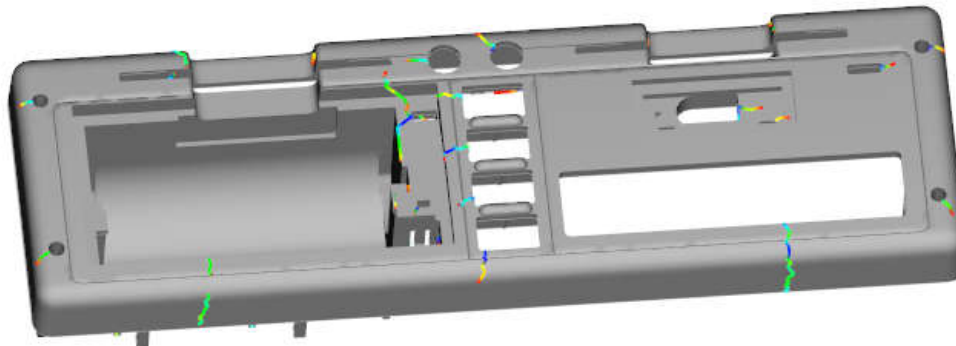
最大锁模力为 35tonne.



Weld lines 熔接线

Weld lines
= 135.0[deg]

[deg]

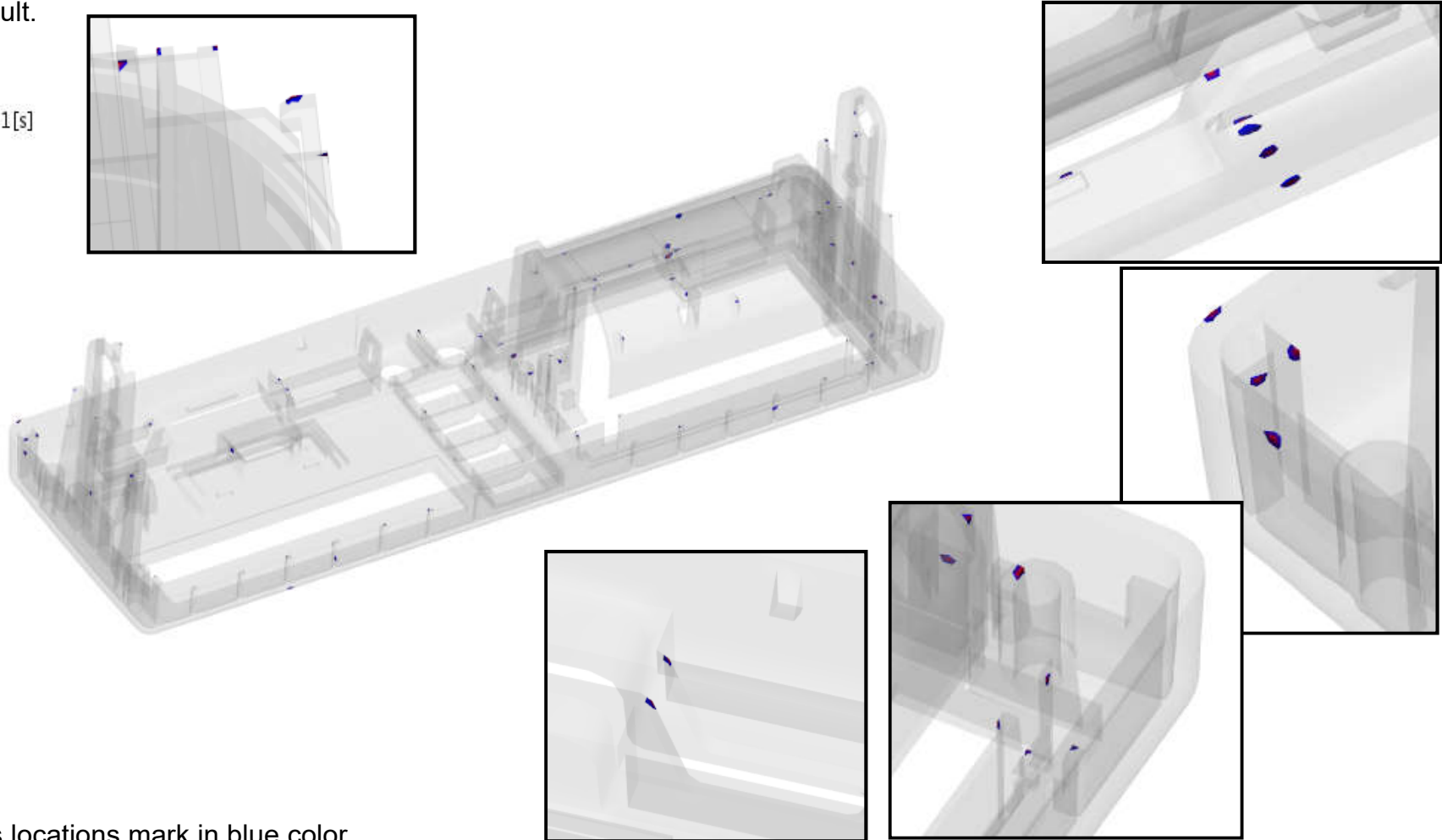


The weld lines position increases the exhaust

Air Traps 困气

■ The result shows areas of the cavity that may require additional venting, it should be viewed in combination with the filling pattern result.

Air traps
Time = 0.8441[s]



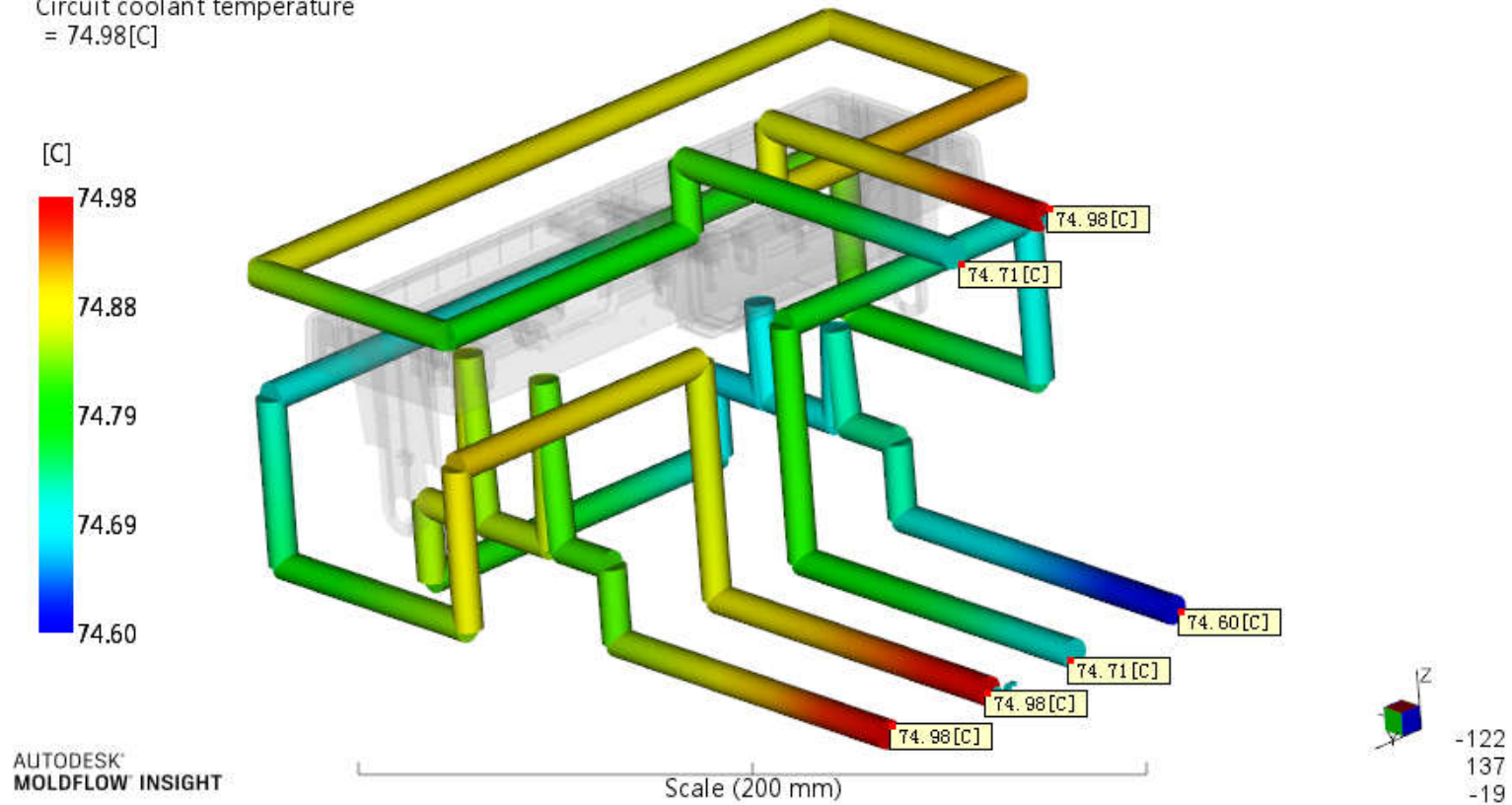
■ Air traps locations mark in blue color.

■ Most of the air trapped appear at the edge of part and the tip of ribs that is easy to vent.

Cooling Channels 冷却管道

- which is in Moldflow Guidelines (temperature rise not to exceed 2~3 C).

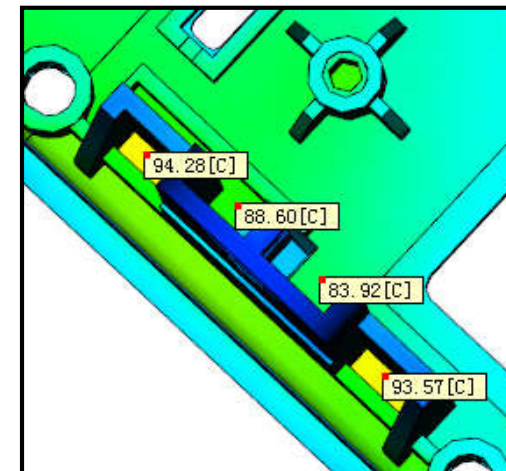
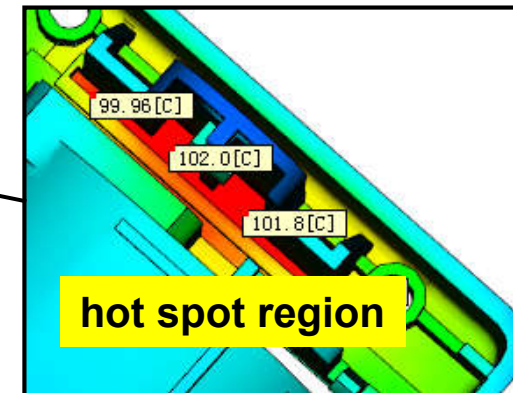
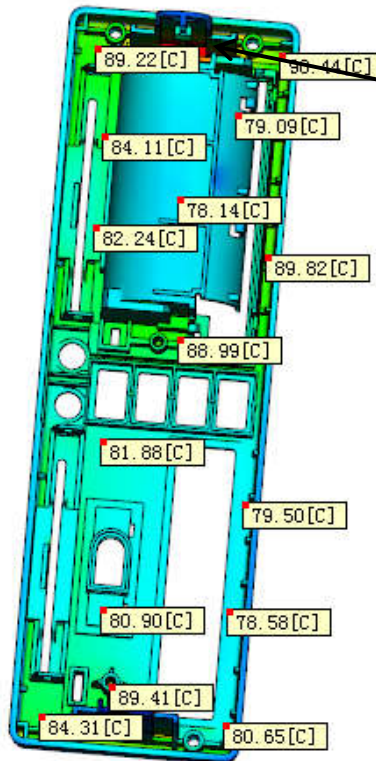
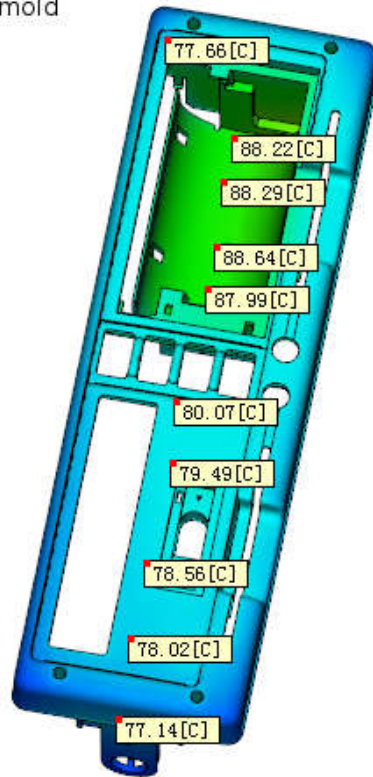
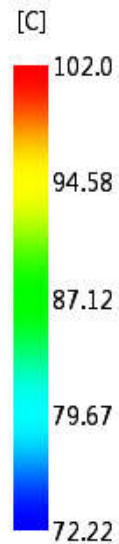
Circuit coolant temperature
= 74.98[C]



Mould Surface Temperature 模具表面温度

- From the analysis, the mould temperature is expected to be 72.22~102C for cavities which out of the target 60~90 C temperature.

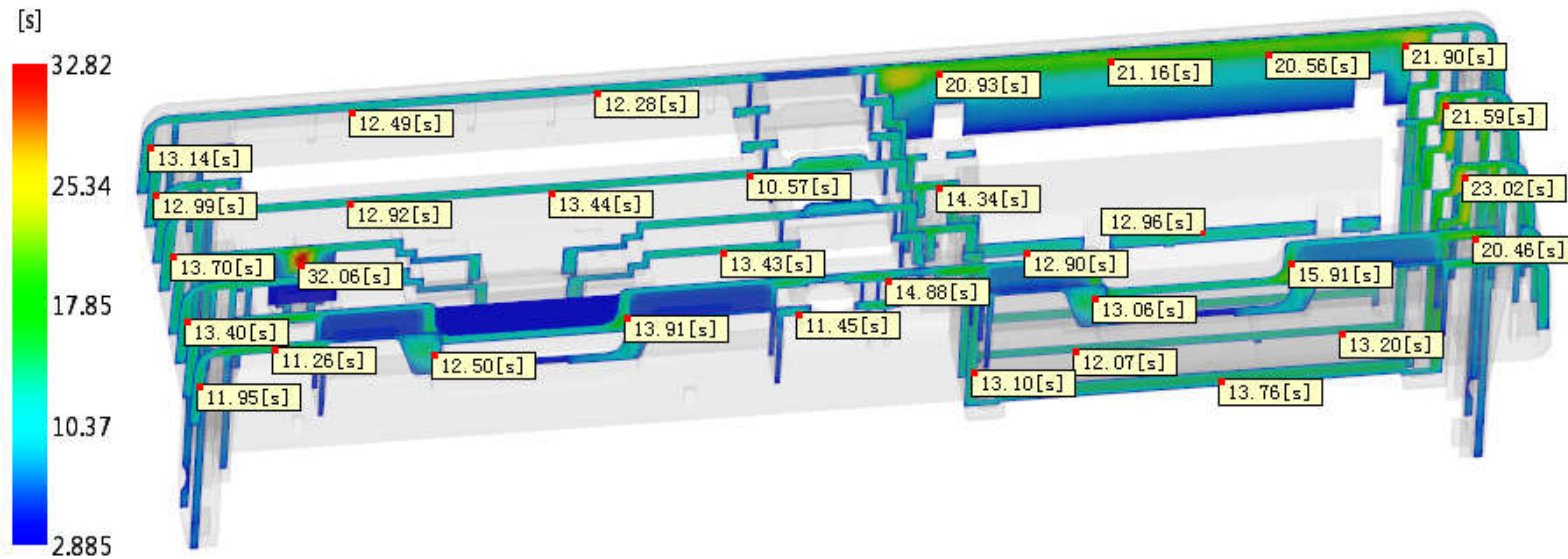
Temperature, mold
= 102.0[C]



Time to freeze 产品冷却时间

- The result shows the amount of time taken for all of the elements in the part to freeze to ejection temperature.

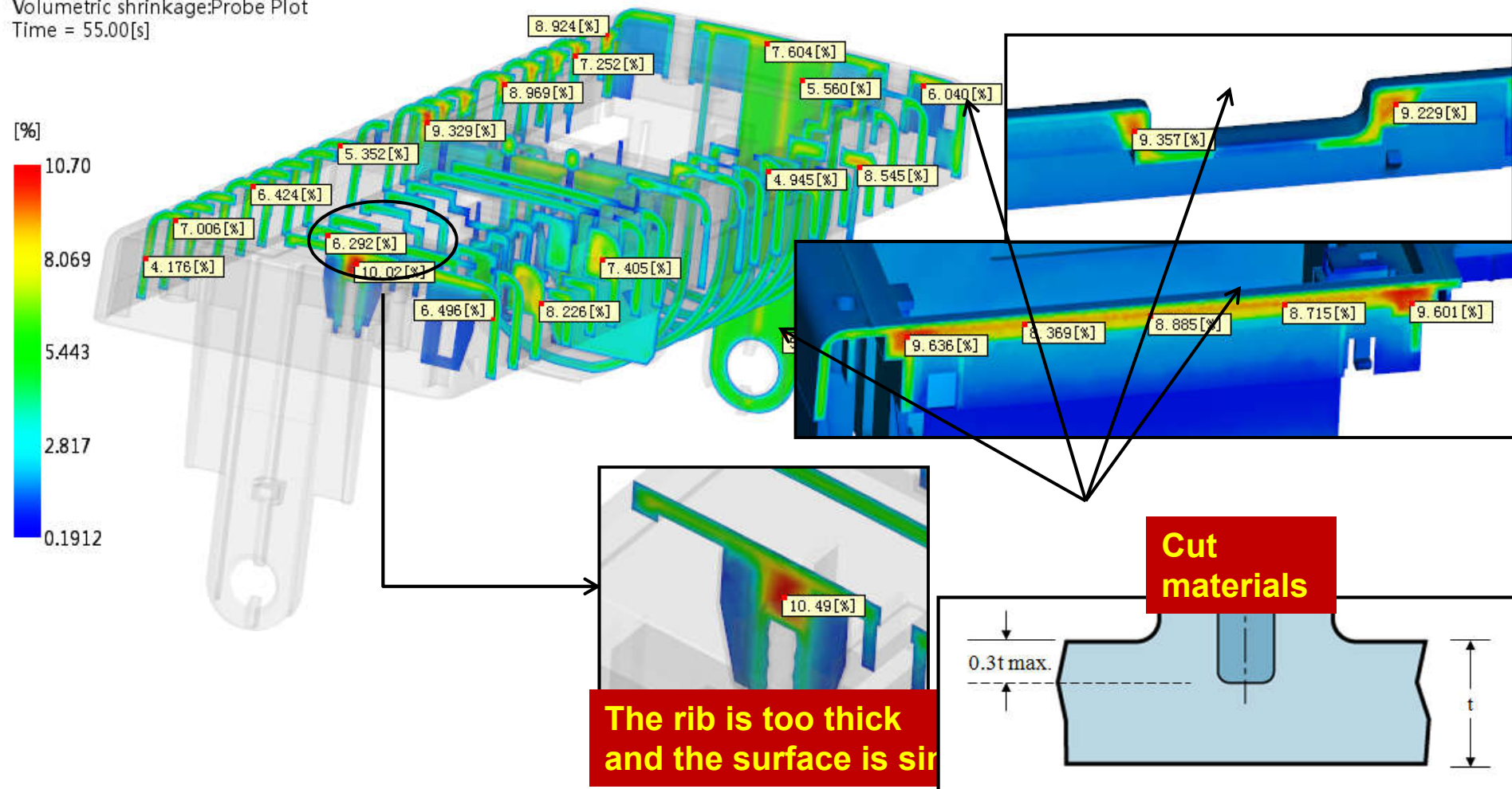
Time to reach ejection temperature, part:Probe Plot
Time = 55.00[s]



- The time to reach ejection temperature is about 20s for 100 % melt volume freezed,

Volumetric shrinkage at ejection 顶出时体积收缩

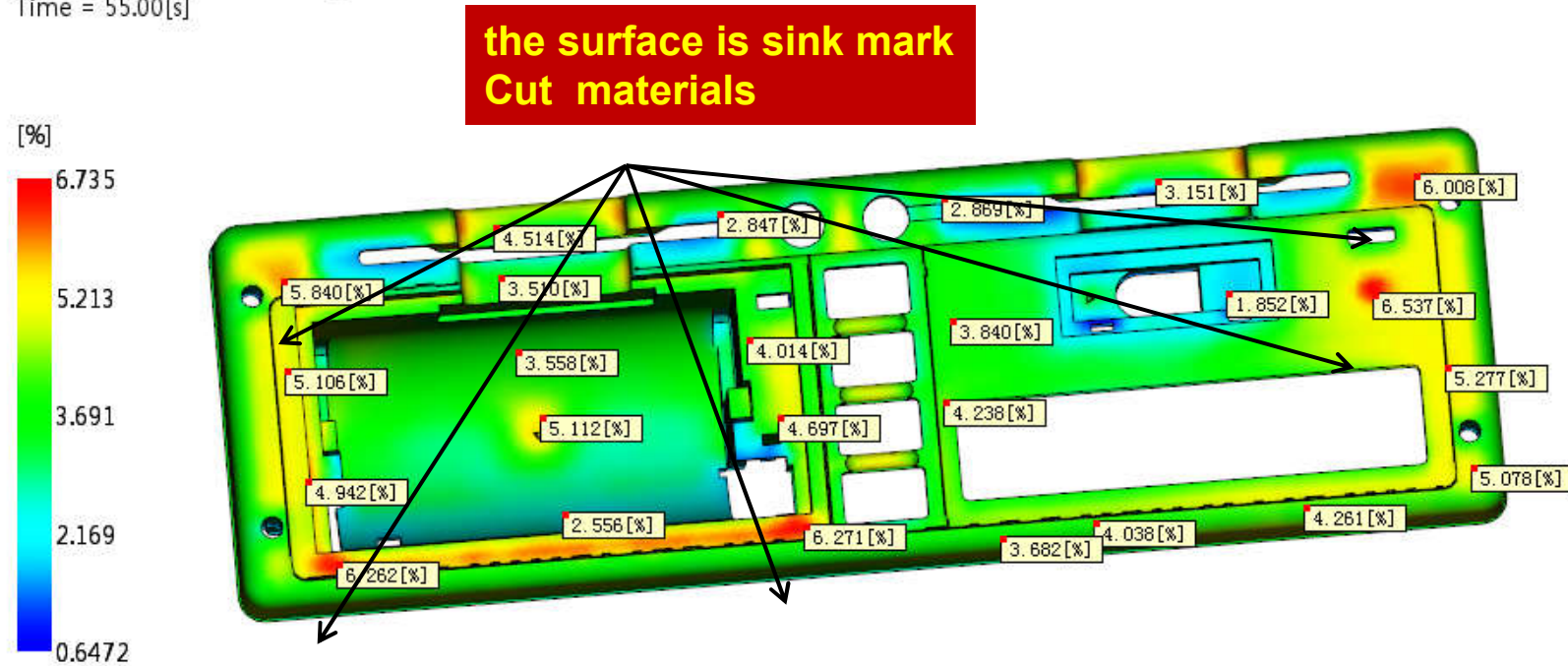
Volumetric shrinkage:Probe Plot
Time = 55.00[s]



- The maximum shrinkage at ejection is 10.7%.The minimum shrinkage at ejection is 0.19 %.

Volumetric shrinkage at ejection 顶出时体积收缩

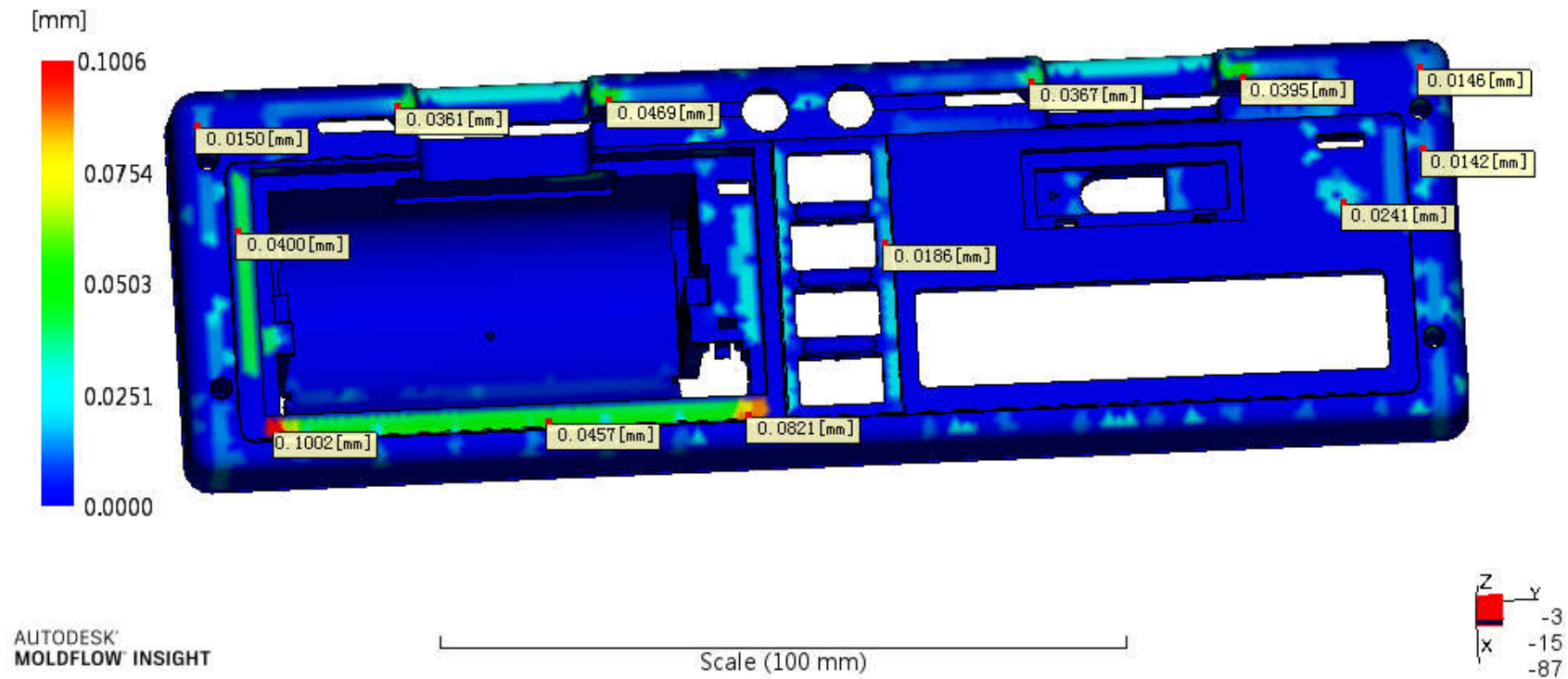
Average volumetric shrinkage
Time = 55.00[s]



- The maximum shrinkage at ejection is 6.74%.The minimum shrinkage at ejection is 0.65 %.

Volumetric shrinkage at ejection 顶出时体积收缩

Sink marks estimate
Scale Factor = 1.000

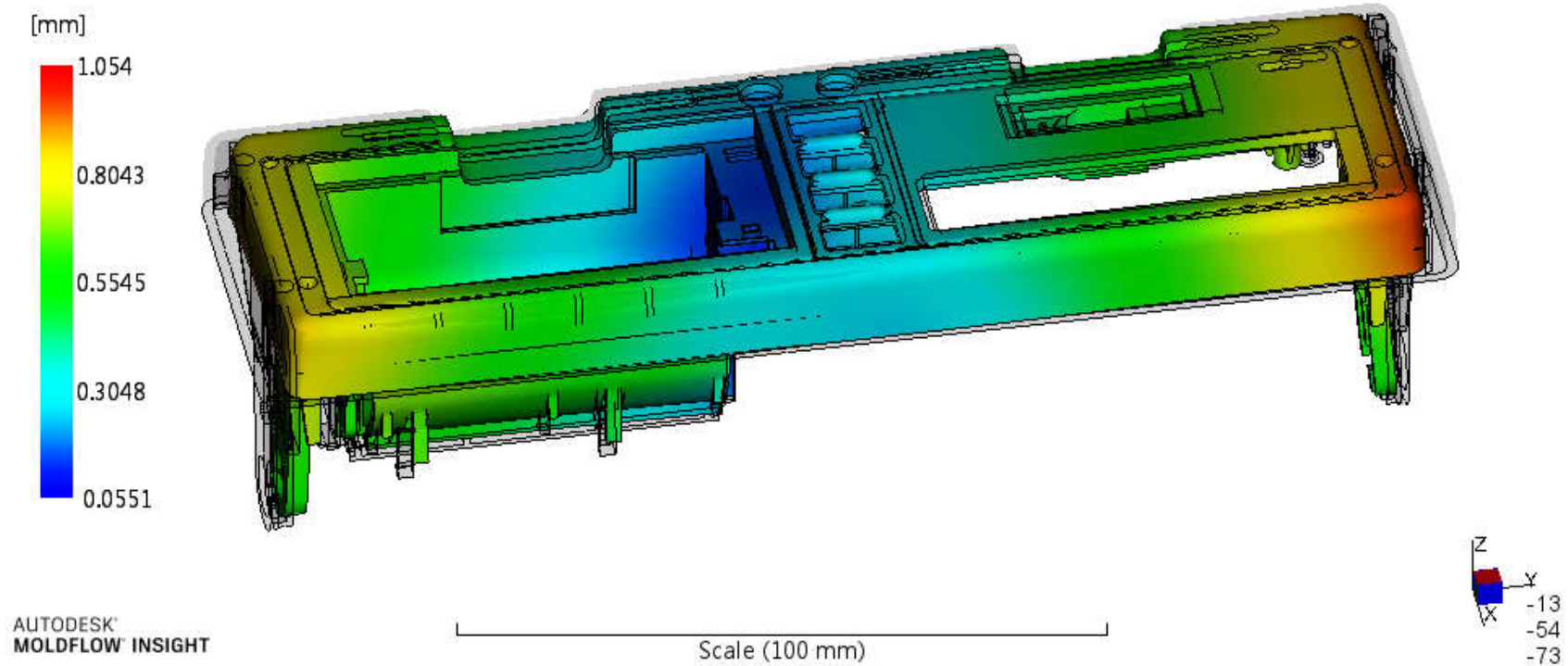


■ Sink marks estimate:0.1mm

Deflection 变形

- Note : warpage shape magnified 5X for display purposes. (The undeformed part display transparent)

Deflection, all effects:Deflection
Scale Factor = 5.000



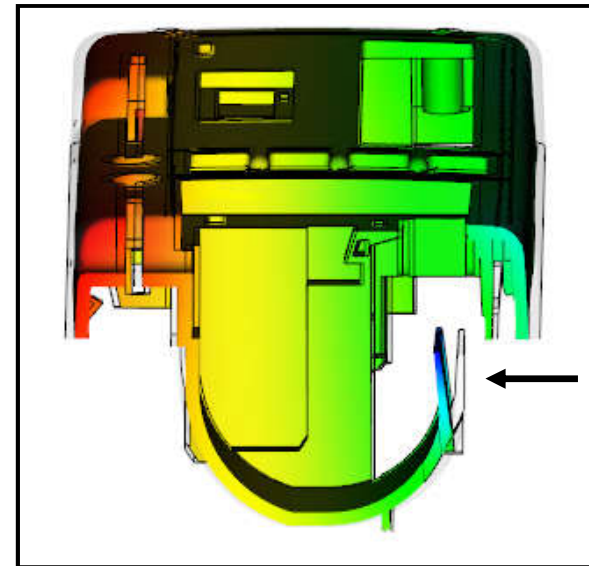
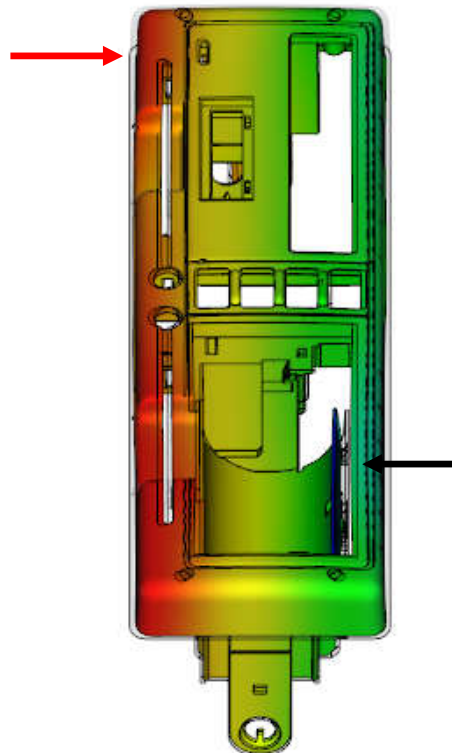
- The maximum shrinkage and deflection value is about 1.05mm.

Deflection 变形

■ Note : warpage shape magnified 5X for display purposes. (The undeformed part display transparent)

Deflection, all effects:X Component
Scale Factor = 5.000

[mm]



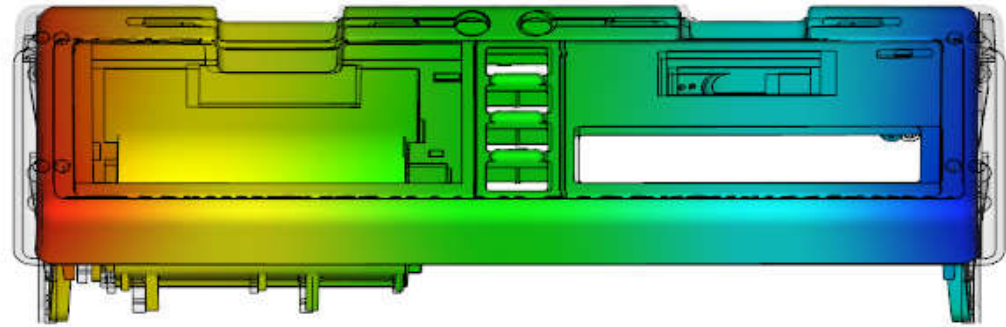
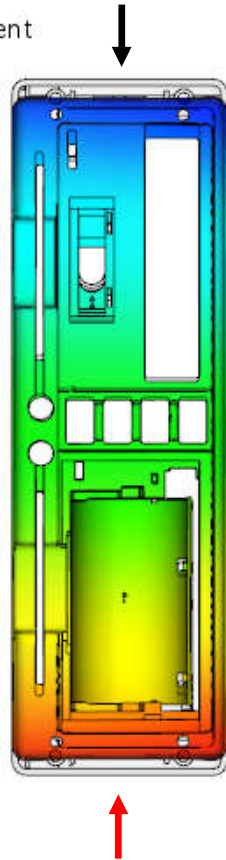
the shrinkage and deflection moved inward about $-0.63 \sim 0.31$ mm.

Deflection 变形

■ Note : warpage shape magnified 5X for display purposes. (The undeformed part display transparent)

Deflection, all effects:Y Component
Scale Factor = 5.000

[mm]

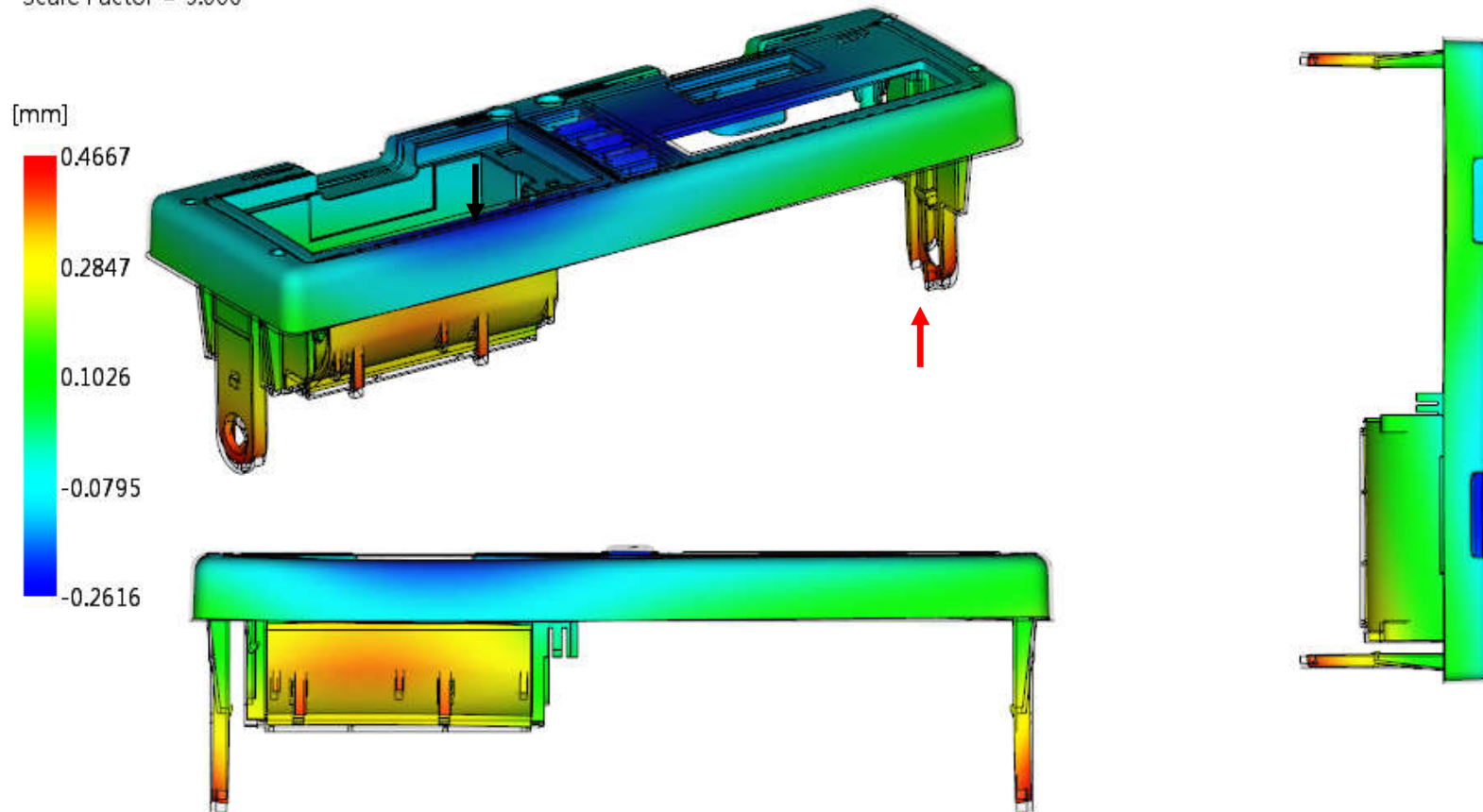


the shrinkage and deflection moved inward about $-1.05 \sim 0.94$ mm.

Deflection 变形

■ Note : warpage shape magnified 5X for display purposes. (The undeformed part display transparent)

Deflection, all effects:Z Component
Scale Factor = 5.000



the shrinkage and deflection moved upward and downward about -0.26~0.47mm.

Conclusions and suggestions 结论和建议

From the above analysis

- The cycle time is about: 0.8 (filling) + 30 (cooling + packing) + 5 (open & eject) = 36sec
- This part will not have filling problem due to the pressure are within the moldflow recommend range.
- There is Weld lines on the surface of the product. (refer page 17)
- Most of the air trapped appear at the edge of part and the tip of ribs that is easy to vent. (refer page 18)
- the surface is sink mark. (refer page 22~24)
- The deflection of X Y Z direction is acceptable (refer page 25~ 28)

Fill time	Injection pressure	Volumetric shrinkage
0.8sec	60Mpa	0.19~10.7%

Shrinkage and deflection : X Component	Shrinkage and deflection : Y Component	Shrinkage and deflection : Z Component
-0.63~0.31mm	-1.05~0.94mm	-0.26~0.47mm

Please provide an accurate material list

A person in a dark suit is shown from the chest up, holding a glowing digital globe. The globe is composed of a complex network of white and blue lines and dots, representing a global network or data. The person's hands are visible, holding the globe from the sides. The background is a light blue gradient with a subtle pattern of white dots and lines. The text "Thank you" is overlaid in the center of the globe in a bold, orange, sans-serif font.

Thank you