



勢流科技

SIEMENS



Star CCM+ 應用於沉浸式水冷

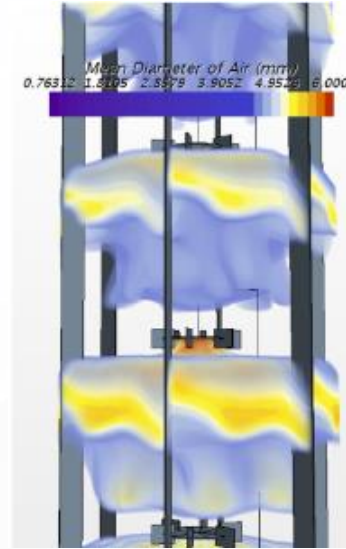


-  Gary Lai PhD
-  CFD Division/ CFD Engineer
-  gary.lai@flotrend.com.tw

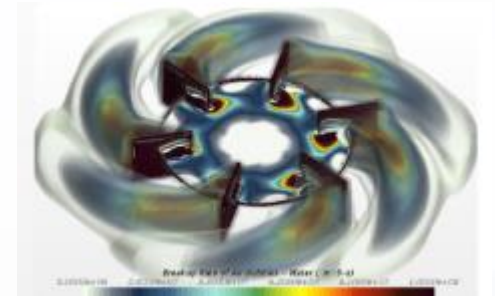


Star CCM+ 多相流 Model

- Eulerian Multiphase Model-EMP
 - 兩相 continuous-continuous
 - 兩相 continuous-dispersed

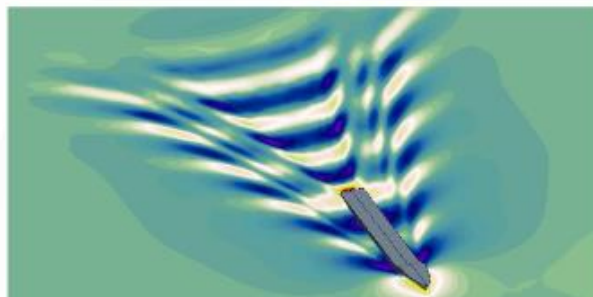


Mixing Tank – Location of Large Bubbles

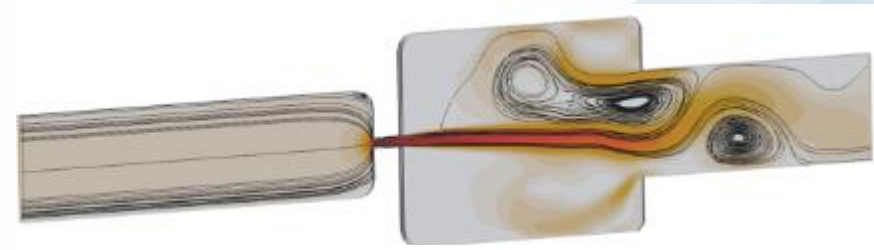


Breakup Rate of Bubbles

- Volume Of Fluid-VOF
 - 簡化的EMP model，特性為 continuous-continuous



Kelvin waves around vessel

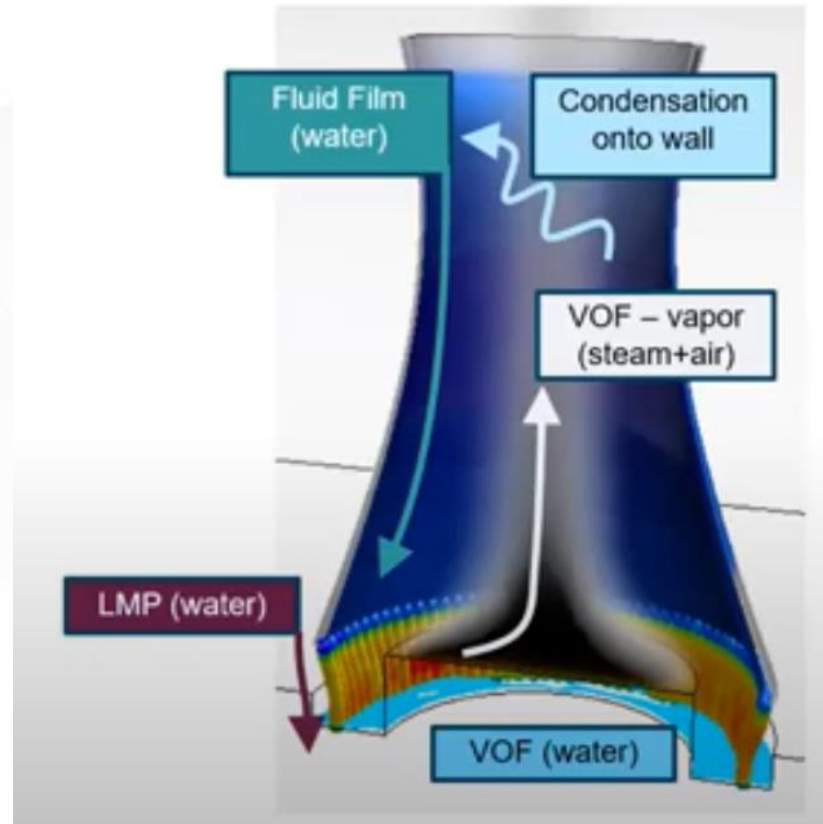


Cavitating throttle



Star CCM+ 多相流Model

- 混和建模和相間相互作用模型-Hybrid Model Simulation
 - VOF to multi component gas mixture
 - Multi-component gas mixture to liquid fluid(Condensation) and air Separated
 - Establish a recirculation cycle



VOF可分析之物理現象

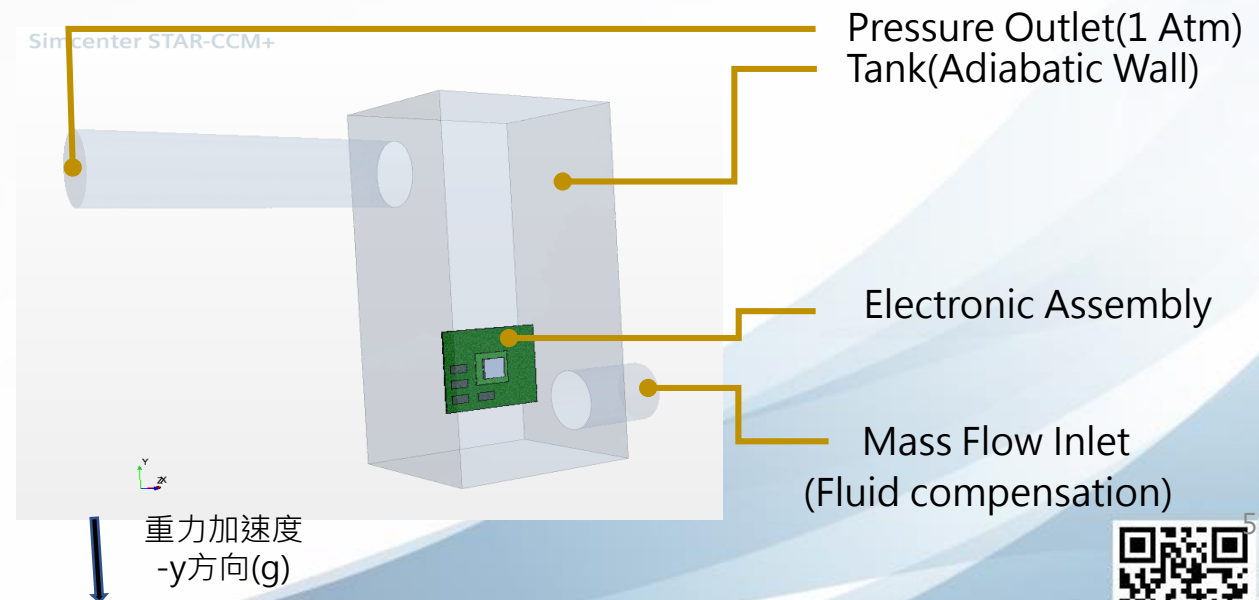
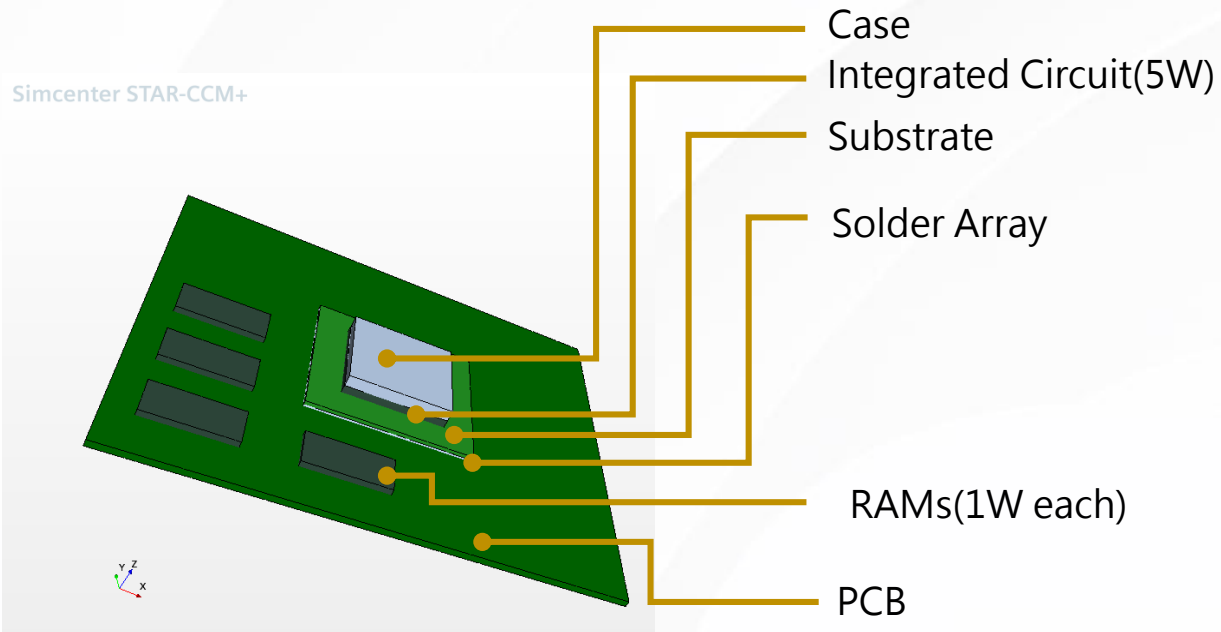
- 沸騰前：自然對流熱交換
液體因受熱體積膨脹、密度改變，導致自然對流；液氣介面上因溫差導致質傳。
主要為熱對流及質傳途徑作散熱。
- 沸騰中：氣化熱交換
分為三種熱交換方式：對流、分離、蒸發
- 凝結：
氣化後流體熱散失，溫度下降至飽和溫度以下凝結成液態。



模擬測試物理模型

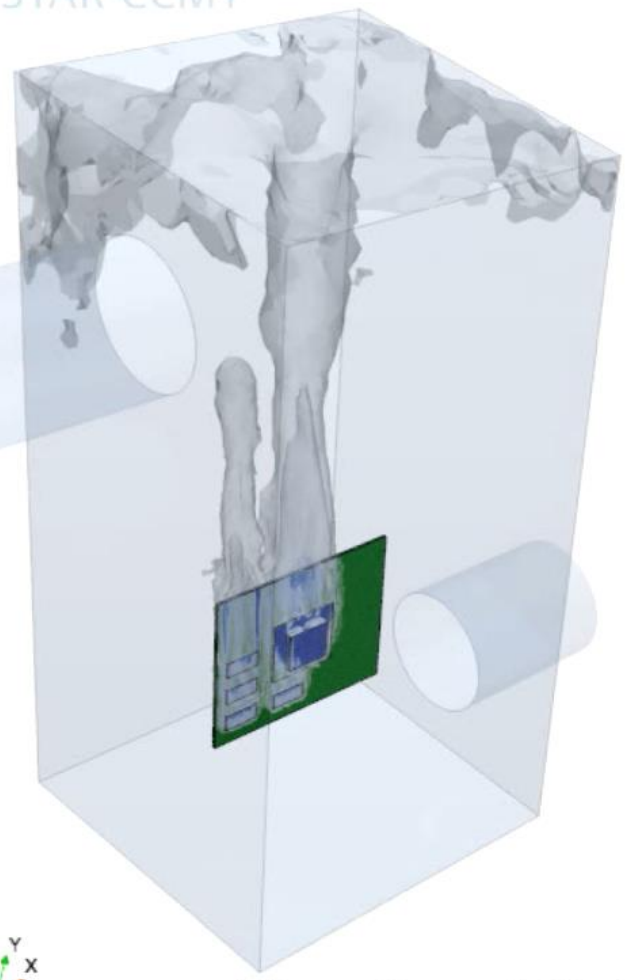
• 3D詳細模型測試

實際建立BGA封裝、記憶體及電路板，設定其材料參數，固定體積發熱瓦數，模型整合對流、傳導及沸騰熱交換。結果顯示液體汽化後確實可將熱能帶離固體，其關係應與蒸氣密度、及Boiling Model之 q_{max} 響熱交換效率。

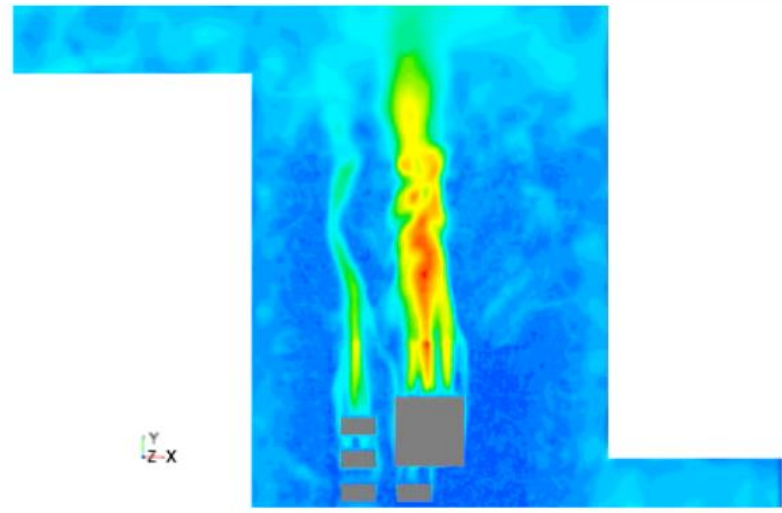
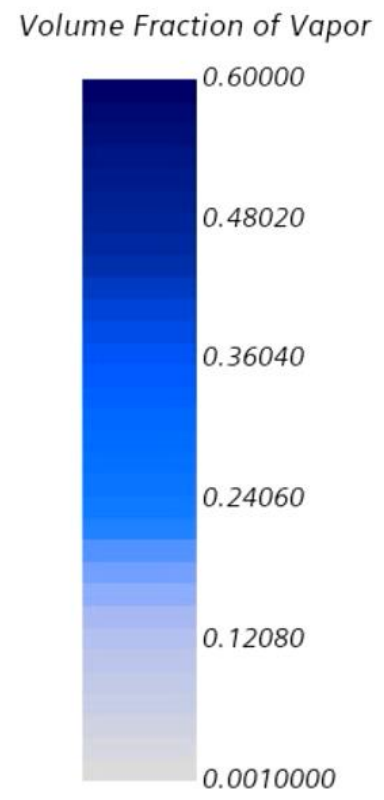


3D詳細模型測試

Simcenter STAR-CCM+



Time Step 1634
Solution Time 81.7 (s)



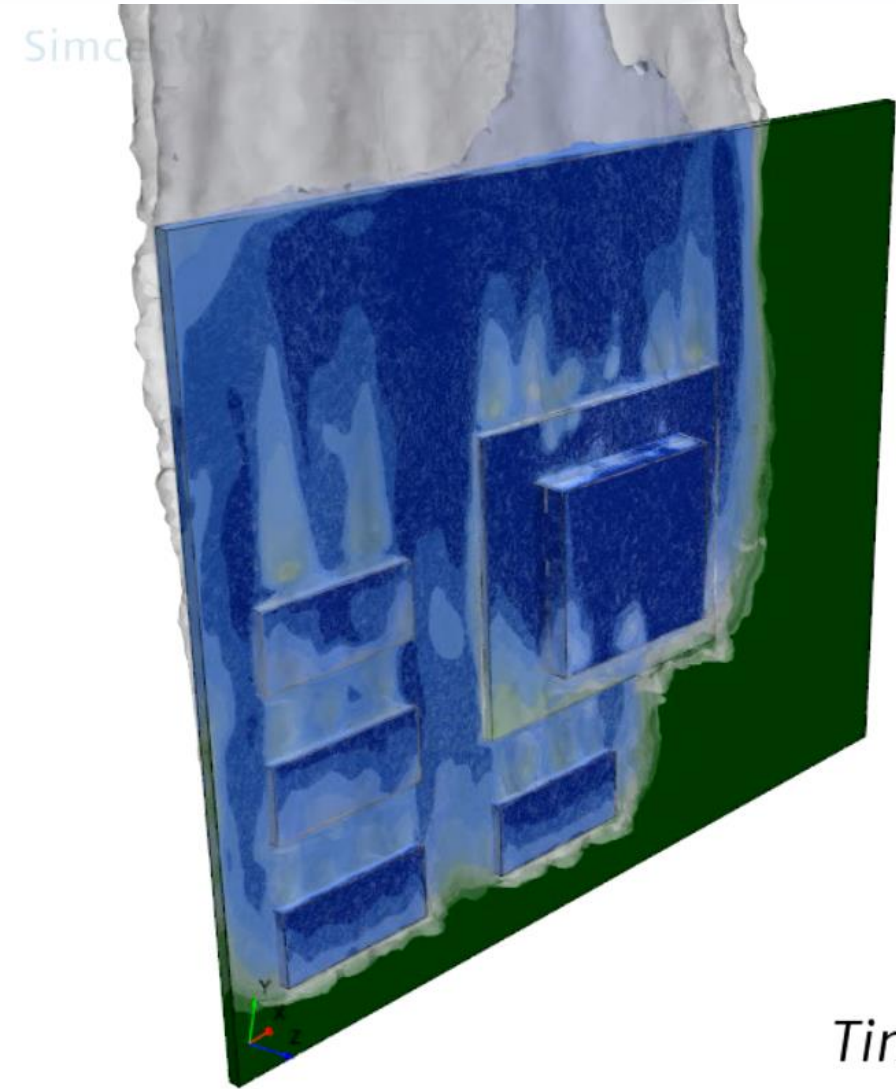
Velocity Magnitude



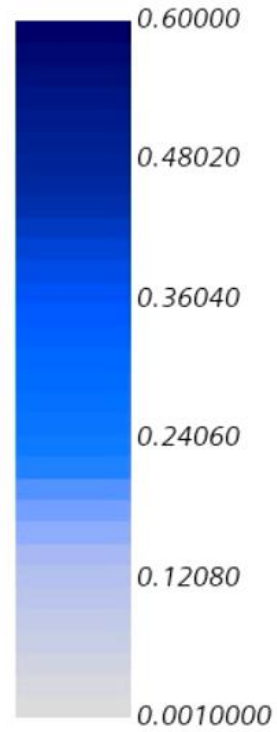
Temperature



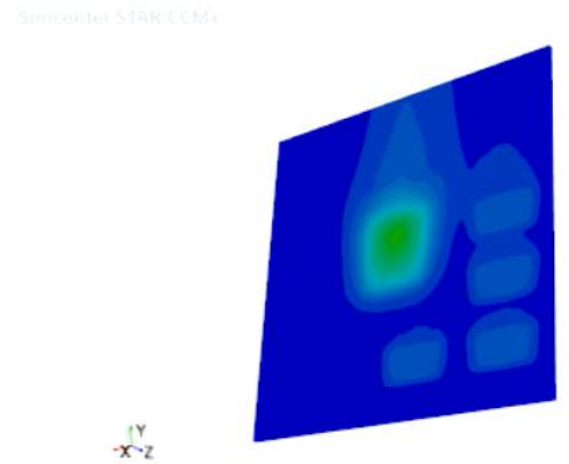
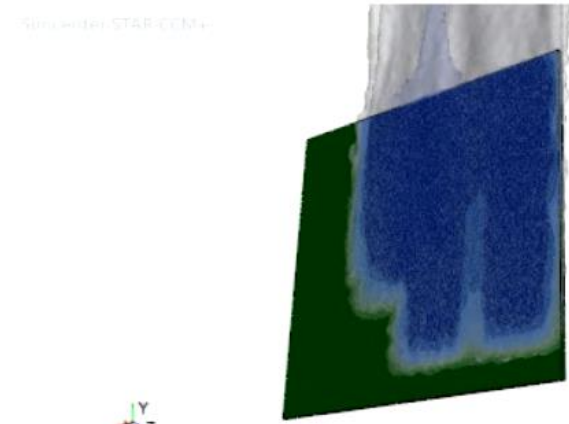
3D詳細模型測試



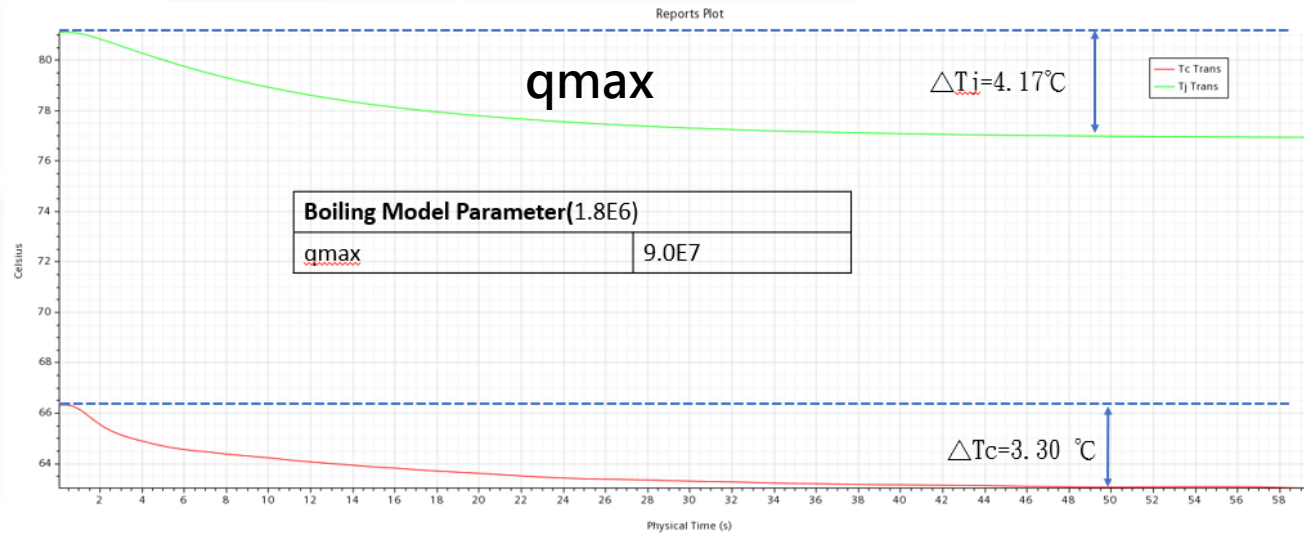
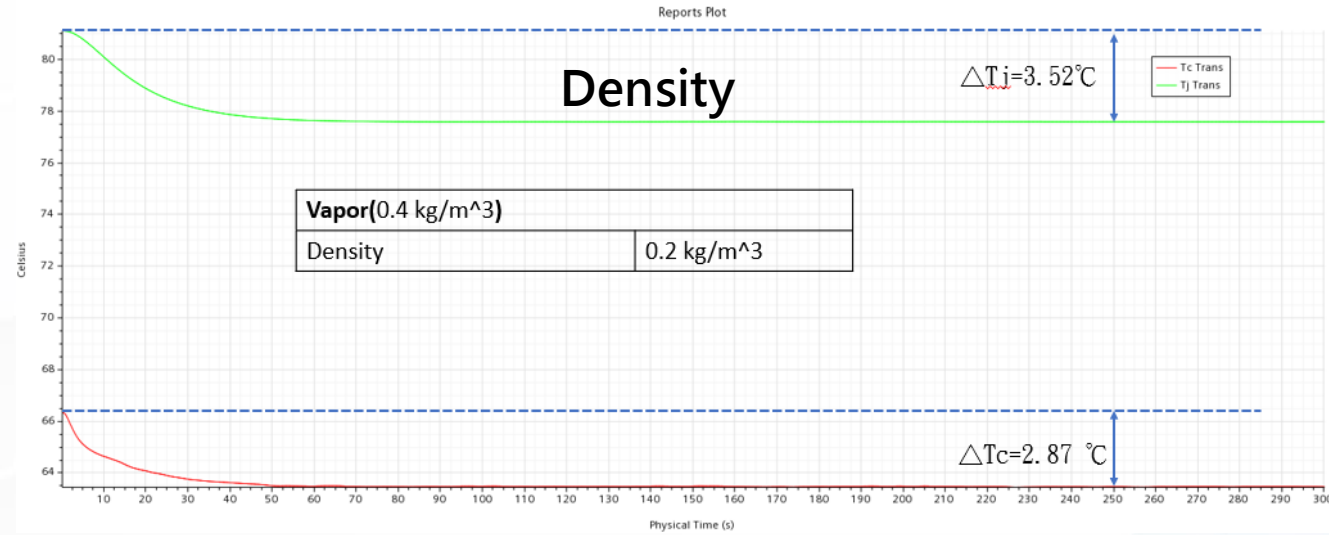
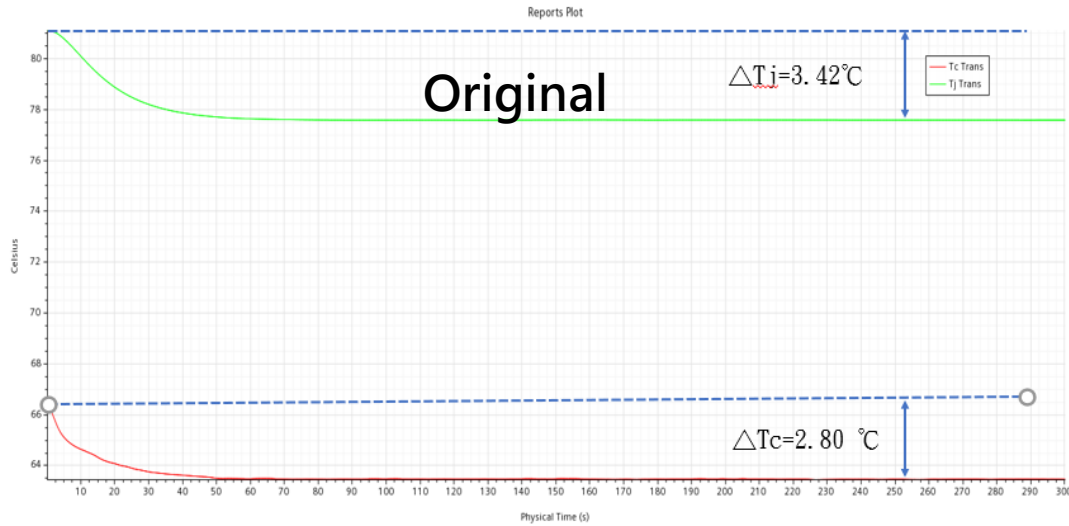
Volume Fraction of Vapor



Time Step 371
Solution Time 18.55 (s)

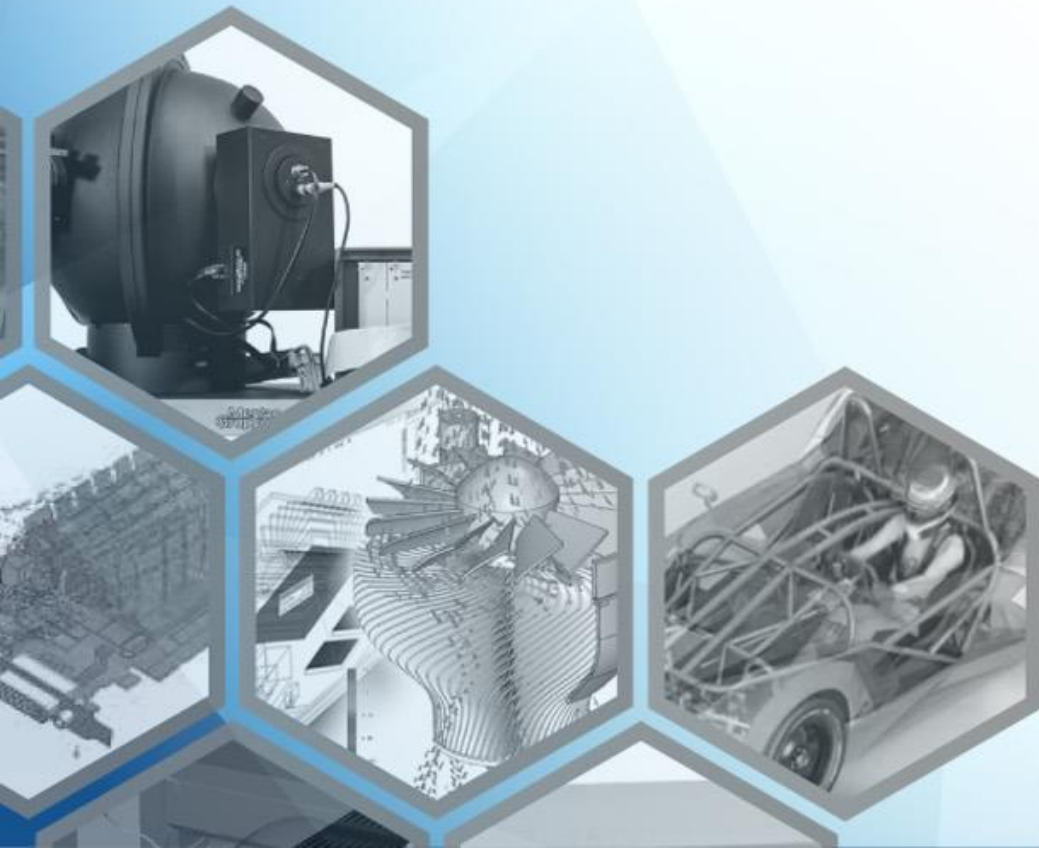



3D詳細模型測試-相關結果



欲知詳情請與我們聯繫

謝謝



-  Gary Lai PhD
-  gary.lai@flotrend.com.tw
-  02-2726-6269 Ext. 23
-  CFD Division/ CFD Engineer
-  北市信義區忠孝東路五段550號13樓

