



Report of simulation & experiment result for Ice Lake Heat Sink

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Outline

- Experiment thermal test
- Simulation setting
- Result
- Customer experience
- Conclusion

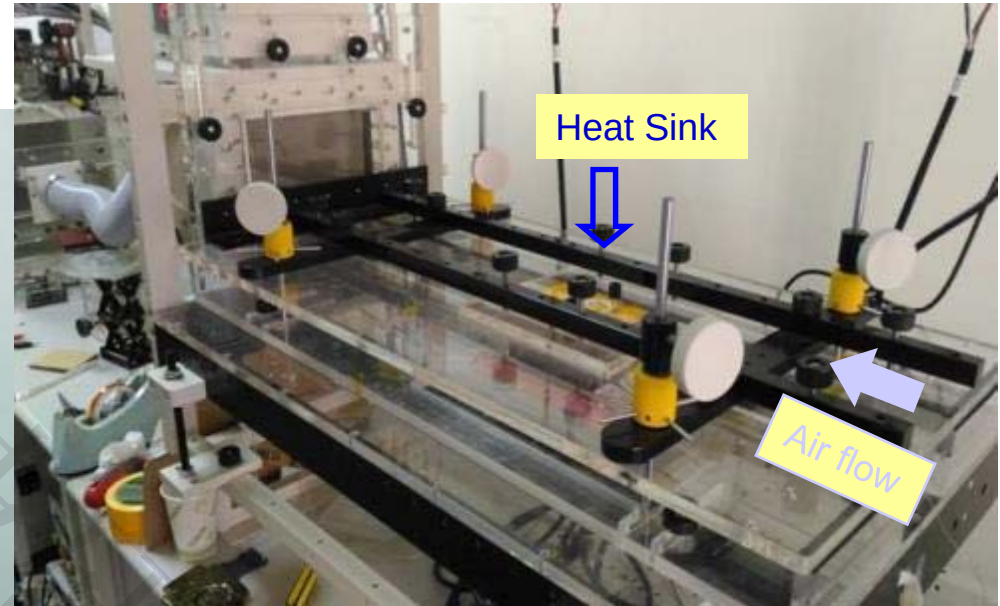




Experiment thermal test

Thermal Test

AMCA Wind Tunnel



Test Section

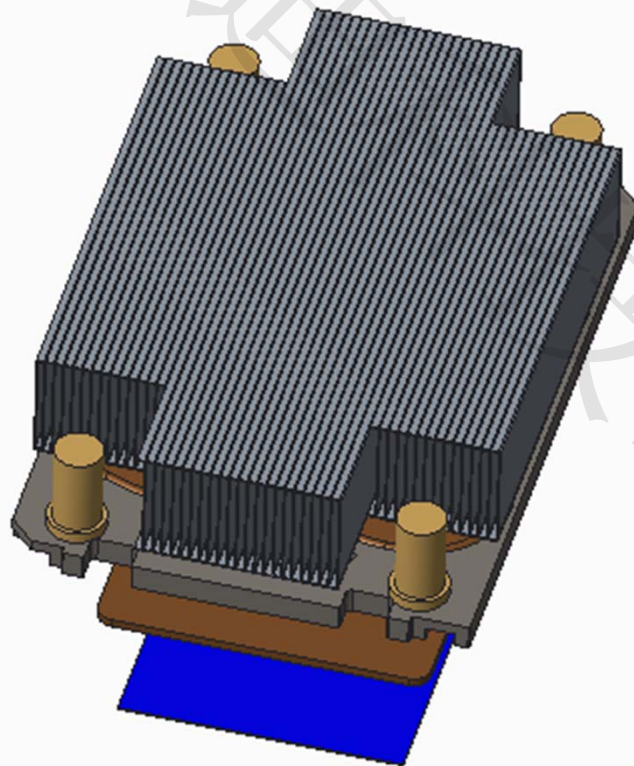
Whitley TTV



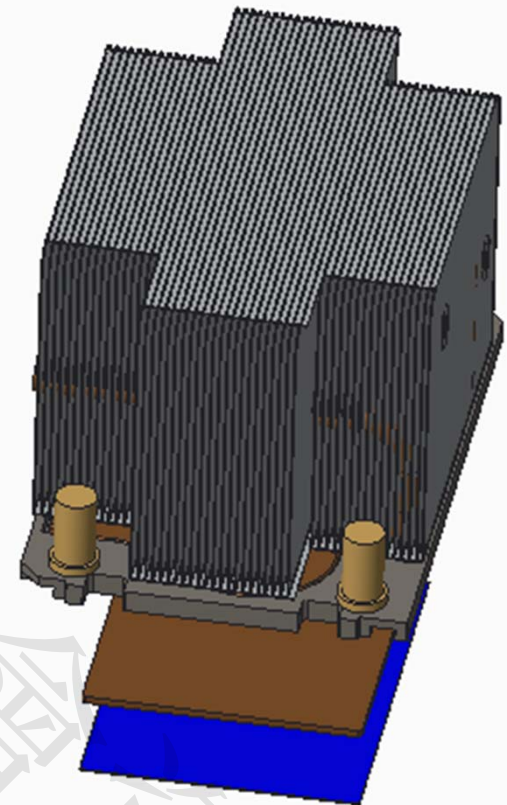


Simulation setting

Material



AL1050
Heat pipe
Plastic
ADC12
Cu1100
TIM



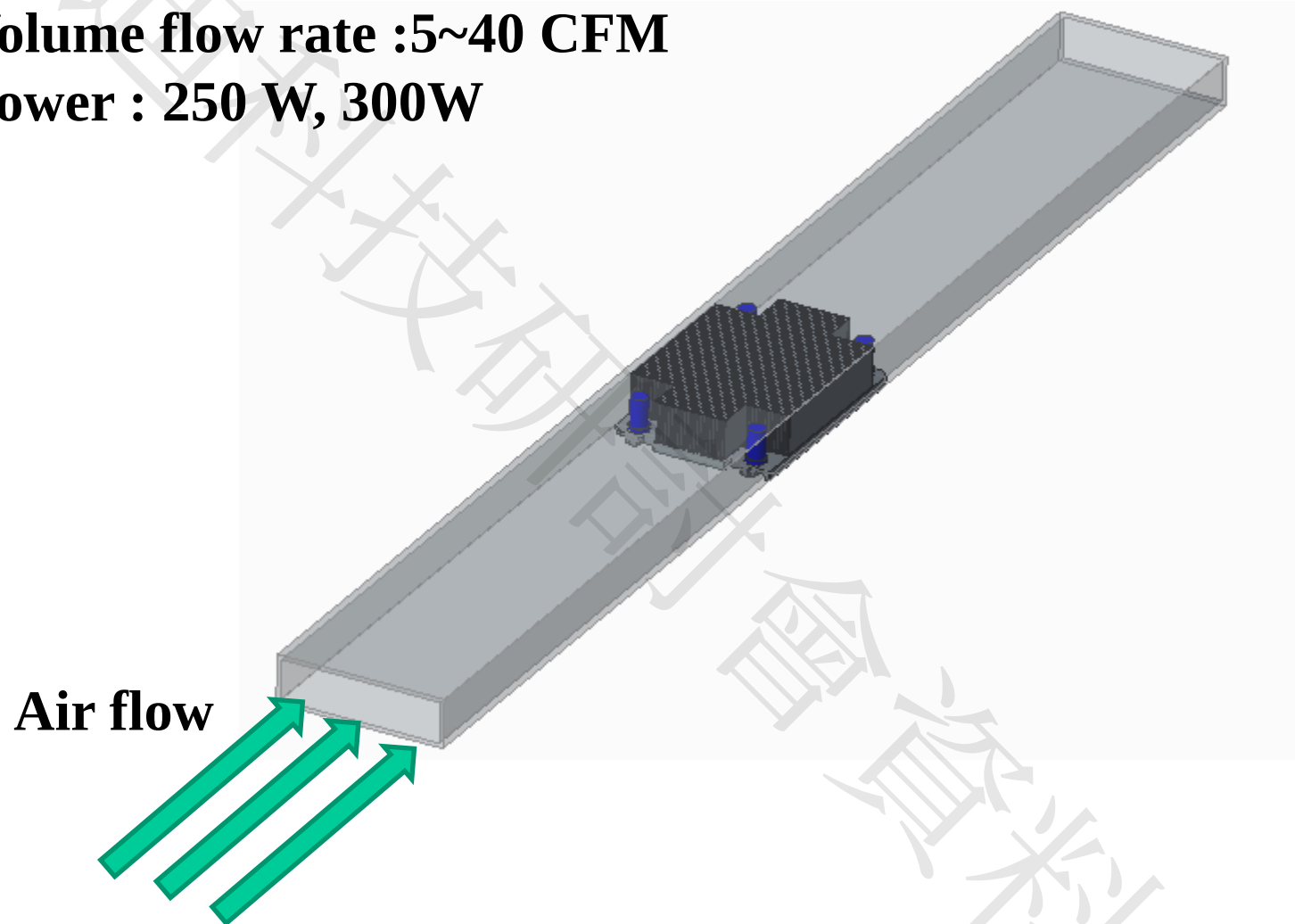
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Boundary condition

Ta : 40°C

Volume flow rate : 5~40 CFM

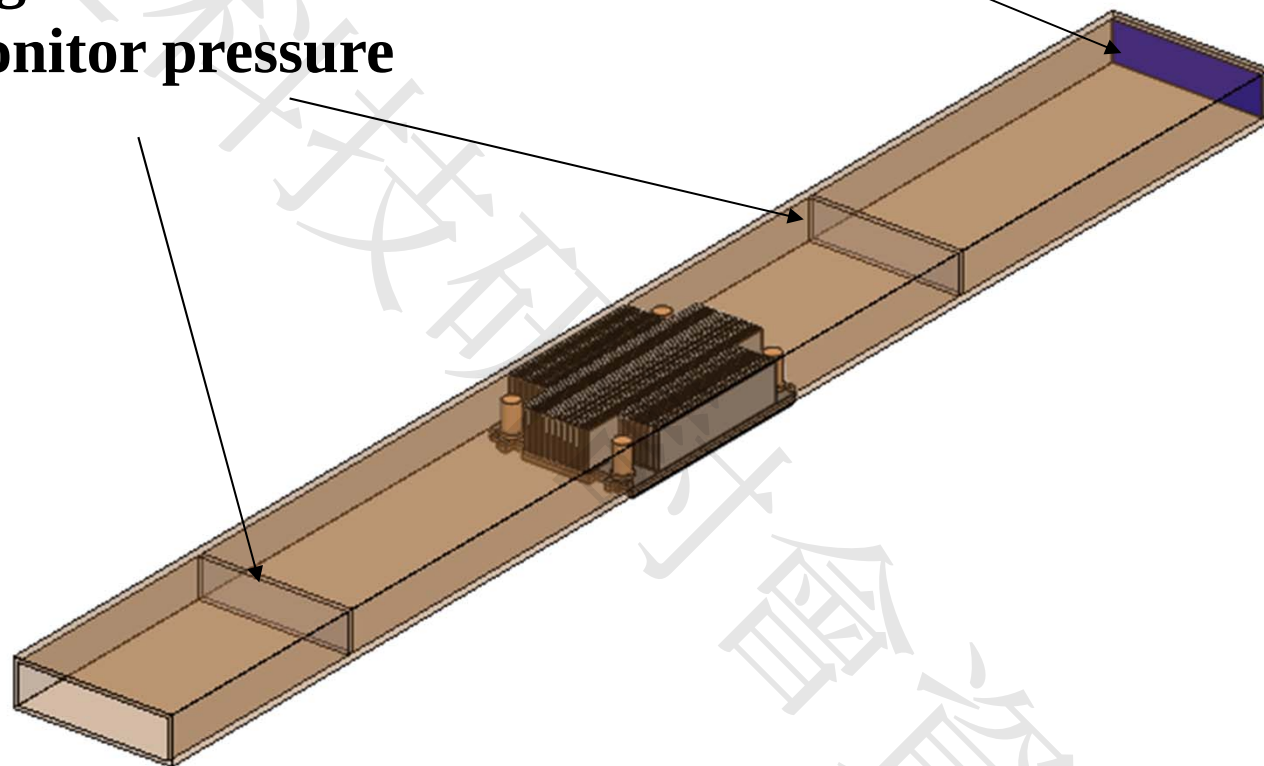
Power : 250 W, 300W



Model setting

Region :
Monitor pressure

Outlet
:Fix flow

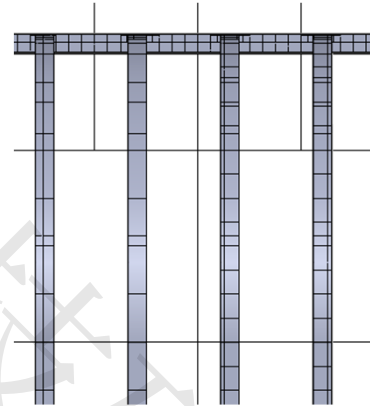
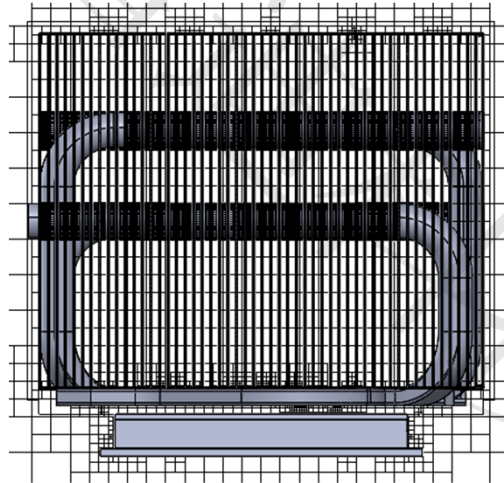


Result



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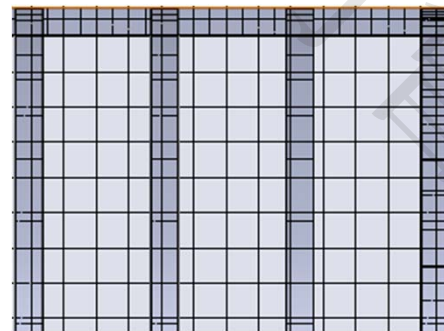
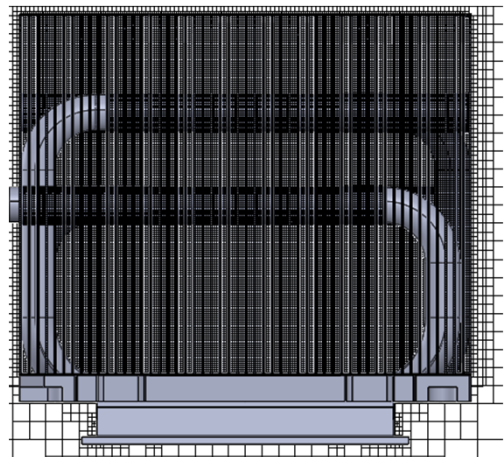
Grid Independence



Normal	
Mesh	2,432,221
Time	1 hr
Tc	80.07 °C
ΔP	0.297 inH2O

Error

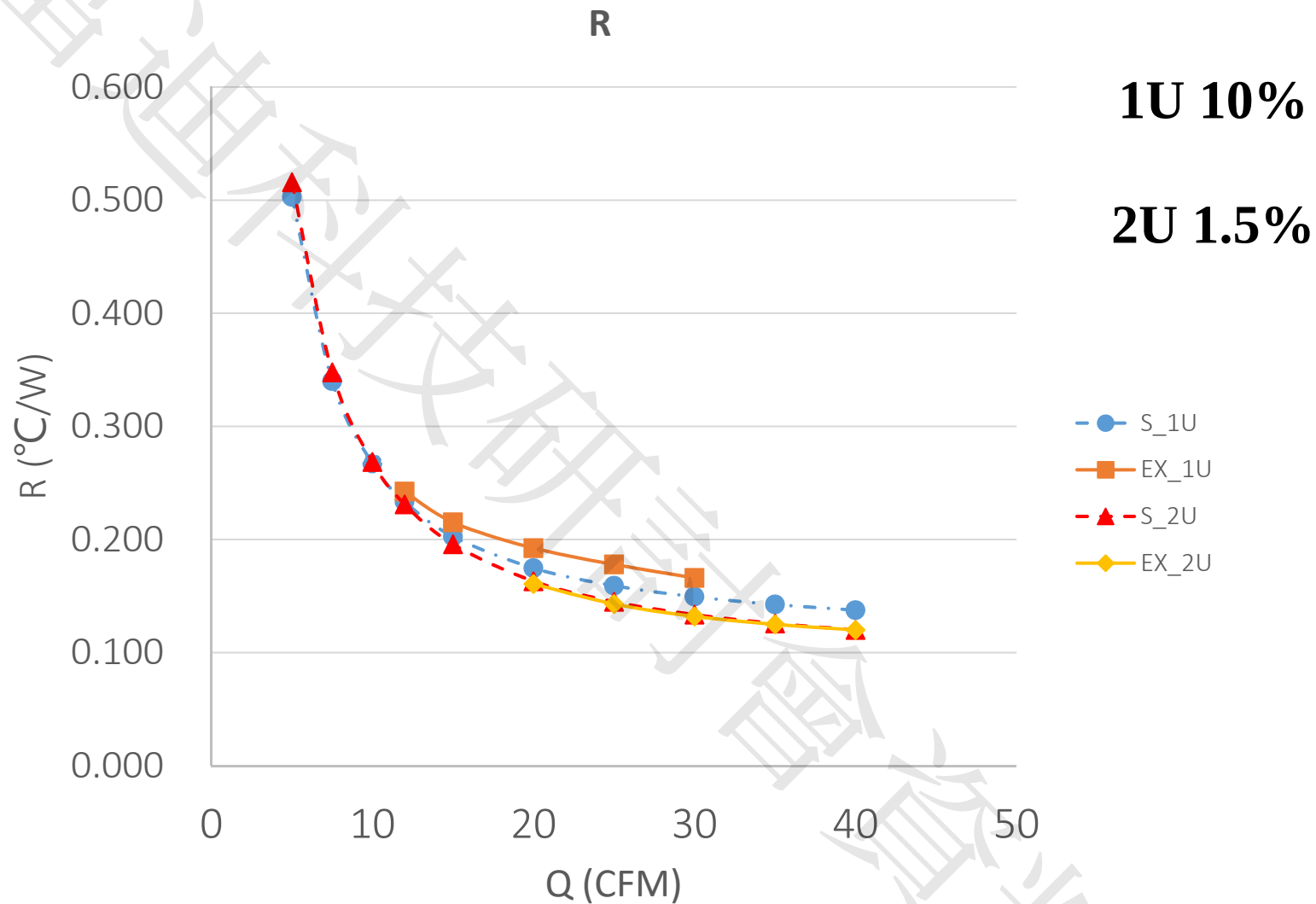
$\updownarrow$ T : 1.1%
 ΔP : 3.8%



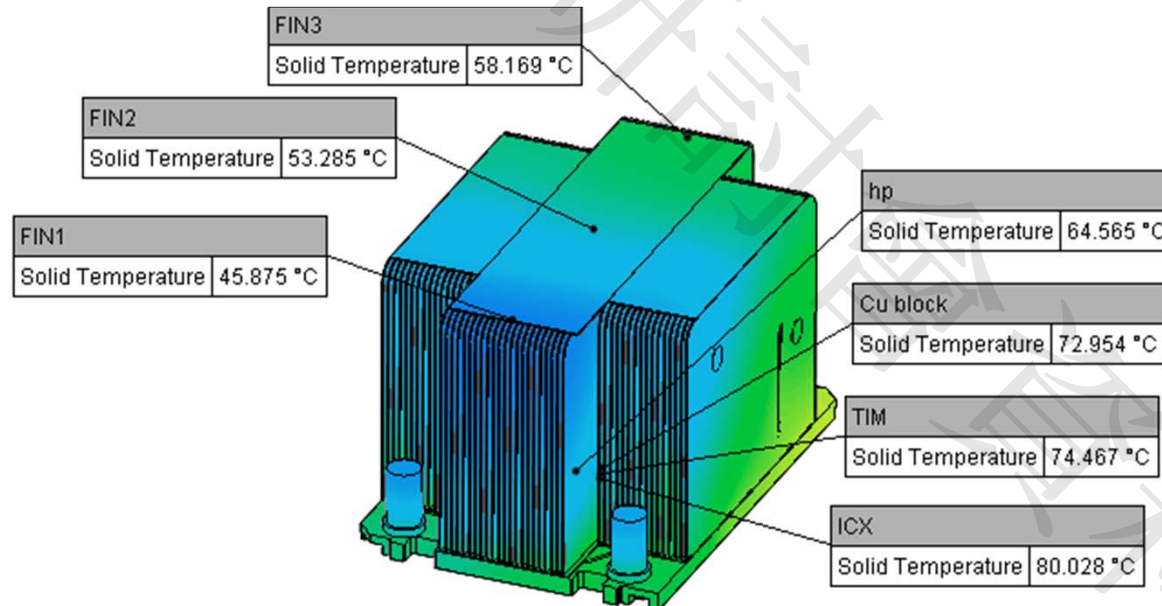
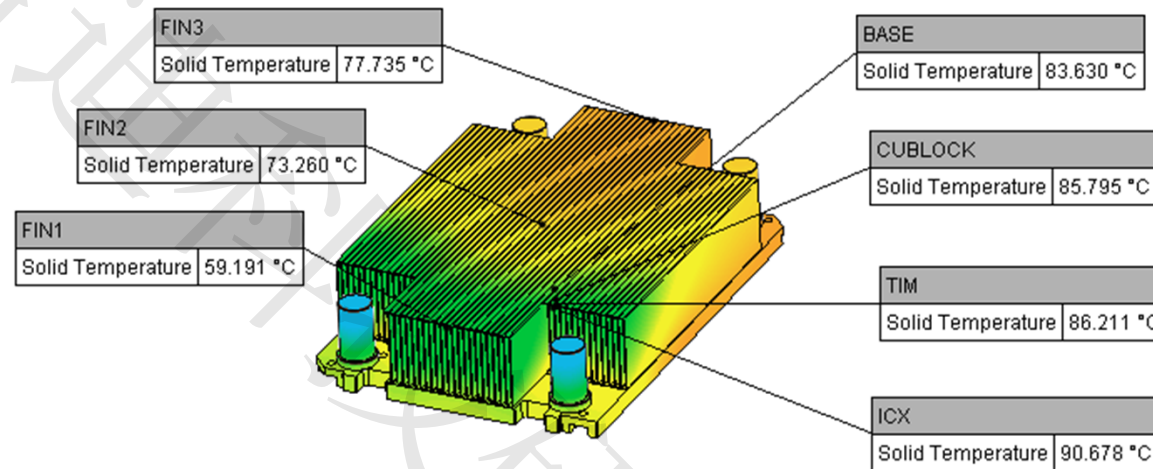
Fine	
Mesh	14,739,246
Time	26 hr
Tc	80.917 °C
ΔP	0.286 inH2O



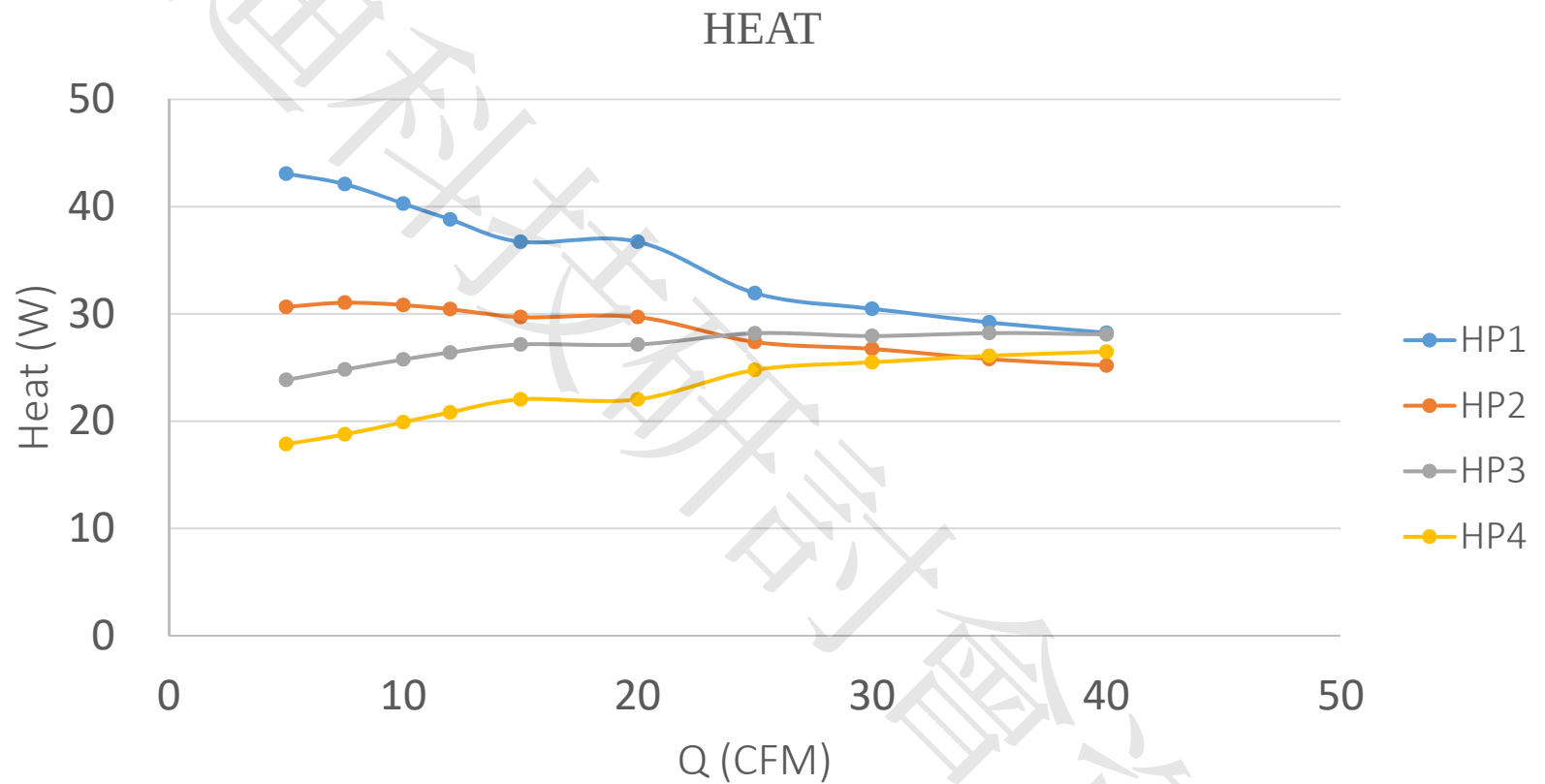
Thermal resistant



Temperature field

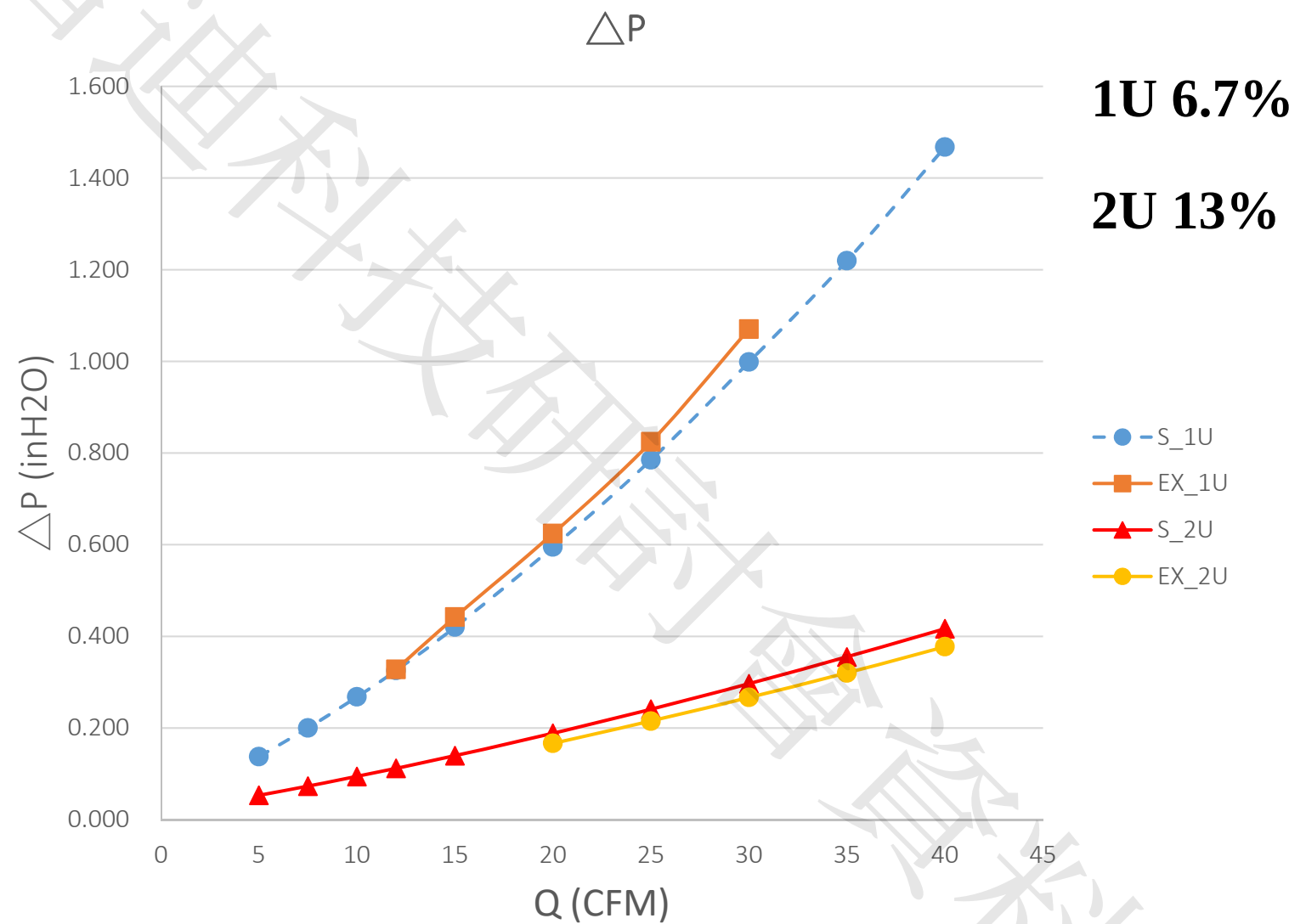


Heat flux





Pressure drop

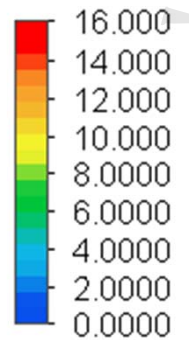


Velocity field

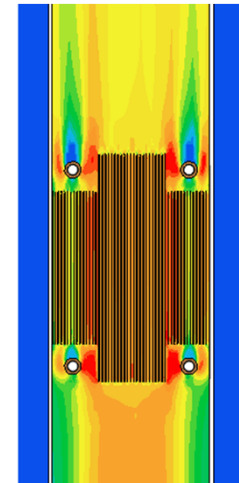
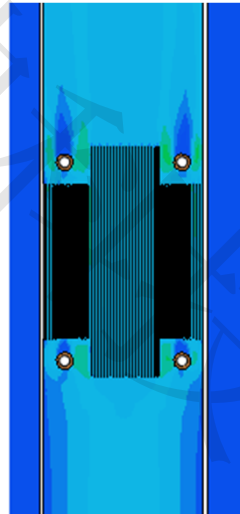
1U

Q=10 CFM

Q=30 CFM



Speed (m/s)

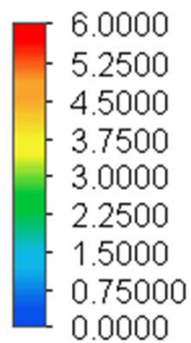


Re 3000-18000

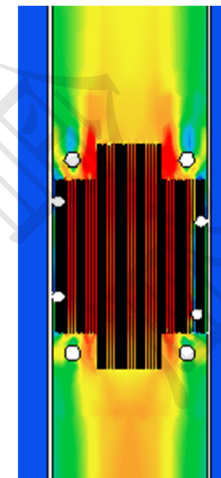
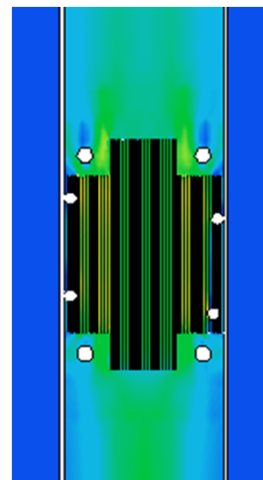
2U

Q=20 CFM

Q=40 CFM



Speed (m/s)



Re 2000-16000





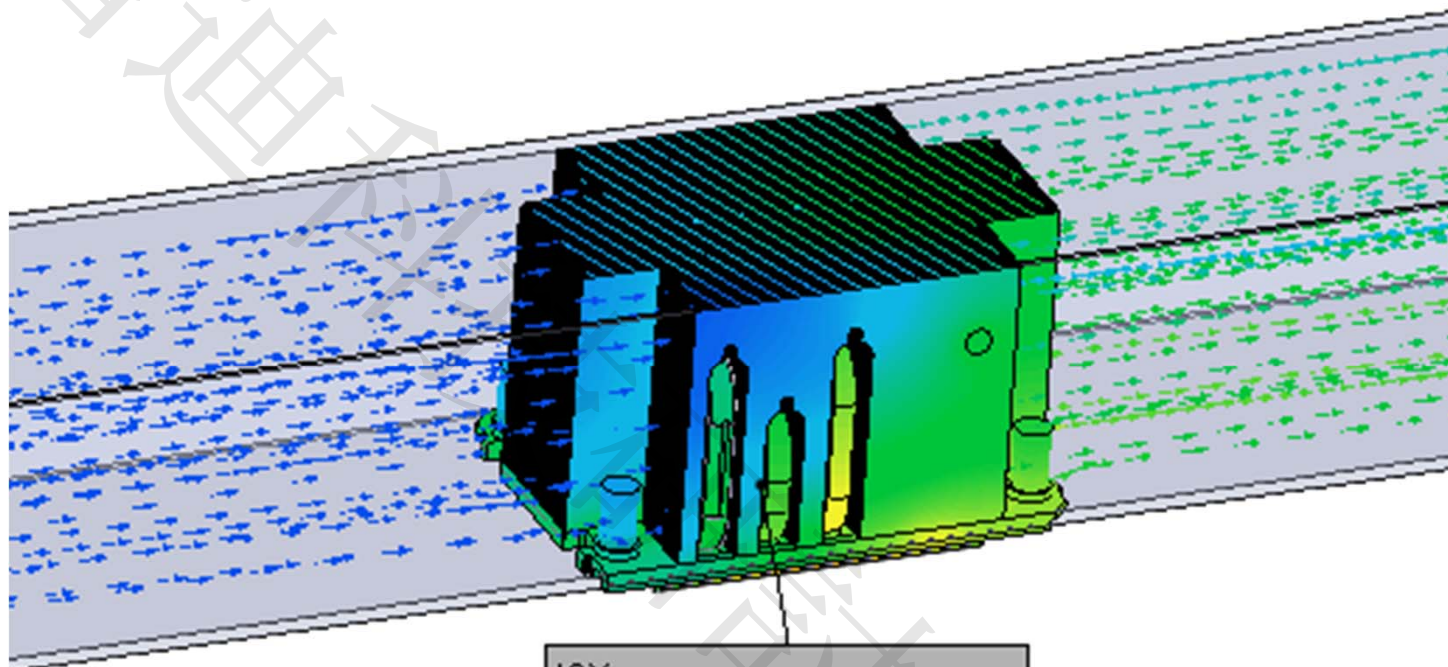
Customer experience

Specification

- Power : 300 W
- Volume flow rate : 30 CFM
- Ambient temperature : 40 °C
- SPEC. temperature : $T_c < 85\text{ °C}$



Simulation result



ICX	
Solid Temperature	81.071 °C

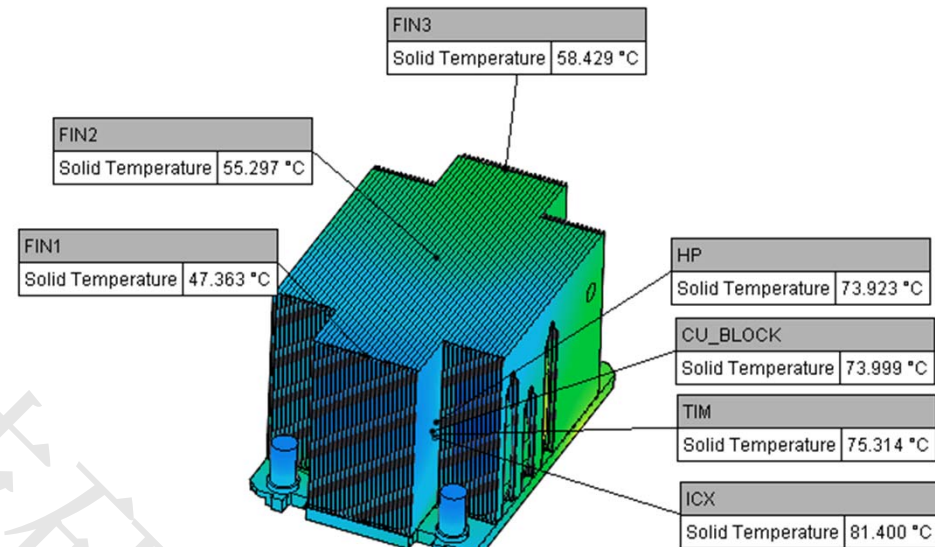


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Compare to SUNON's solution

Customer's solution

Number of HP : 5

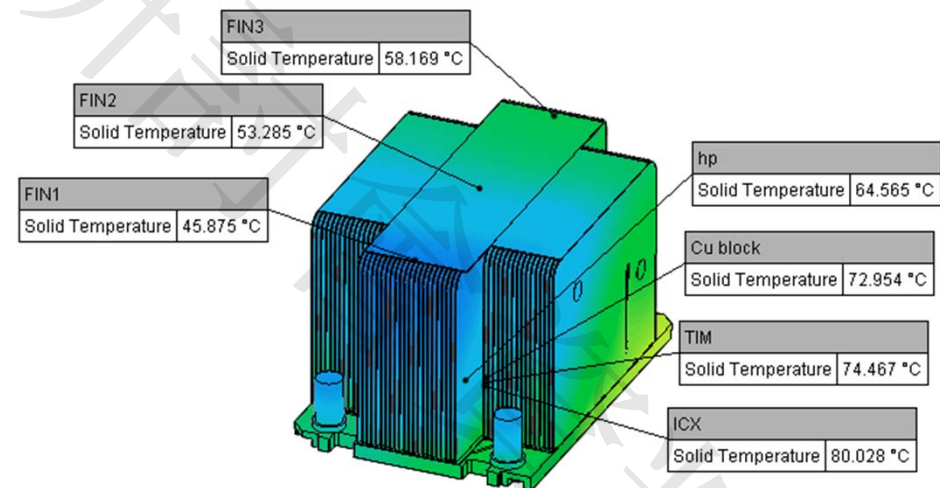


SUNON's solution

Number of HP : 4

Advantage :

- **Weight**
- **Price**



Conclusion

- Simulation of 1U & 2U in the wind tunnel testing correspond the experiment result.
- XT has a great mesher that can save a lot of time.
- Can estimated the result that can't do in the experiment (ex. flow field, heat flux).
- Compare to the Flotherm, XT is more convenient in complicated surface module.
- XT can help a lot in design the module.

