

MAGMA

Leverage Stress Simulation to Determine Allowances & Crack Initiation's

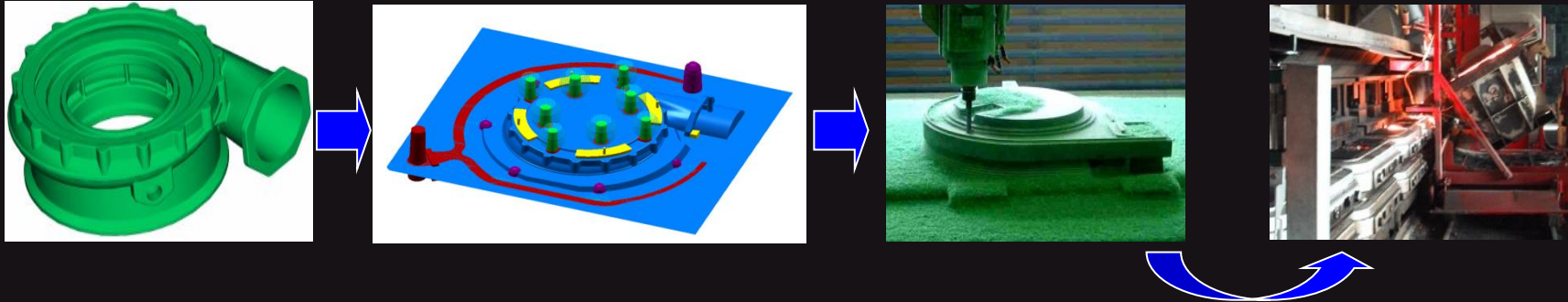
KEDAR JUGDAR

FERROUS APPLICATION ENGINEER



Foundry Operation

Conventional (Past)



CAD

Pattern shop/CAM

Foundry

Virtual (Today)



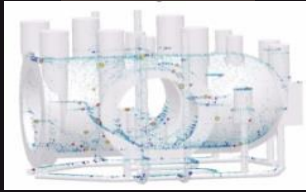
Virtual Analysis

Want Quality !!! Know Friends of Variables

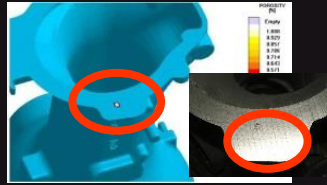
Cold Lap



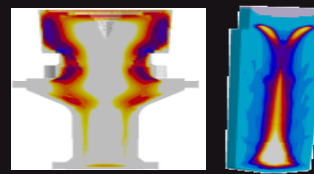
Inclusions



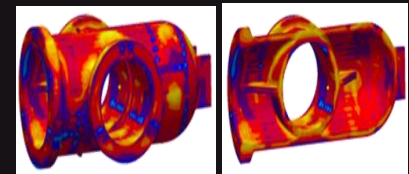
Porosity



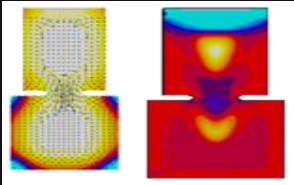
Macro_Structure



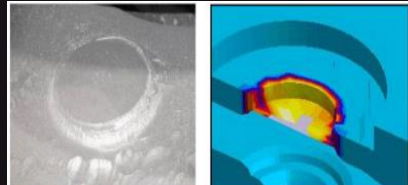
Segregation



Under Riser Defects



Mold Defects



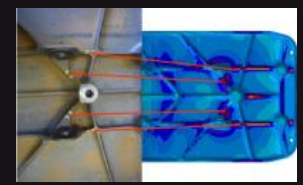
Core Gas



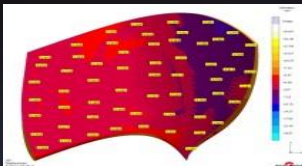
Hot Tears



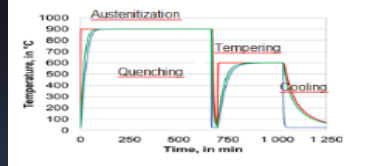
Cold Cracks



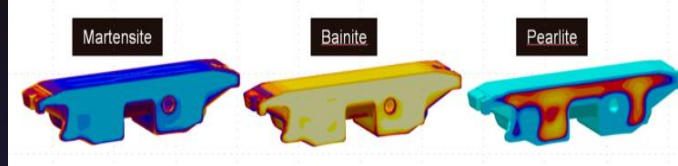
Distortion



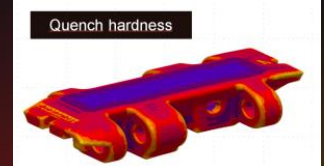
Heat Treatment



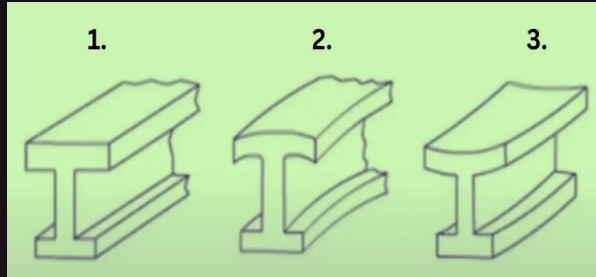
Micro_Structures



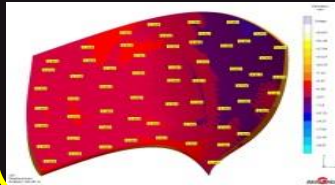
Mechanical Prop.



Topic of Discussion



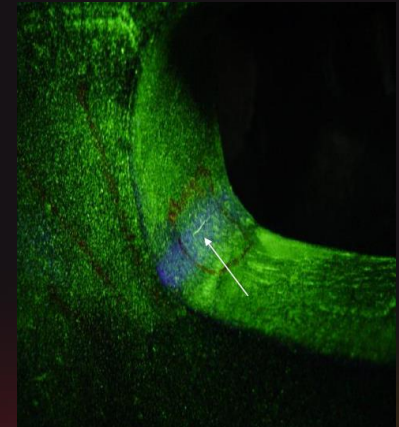
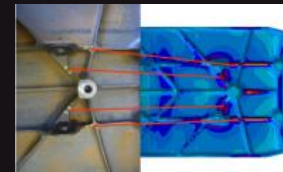
Distortion



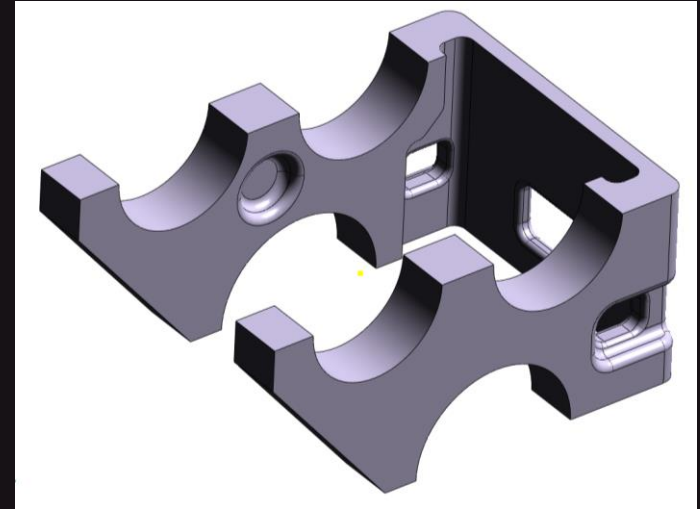
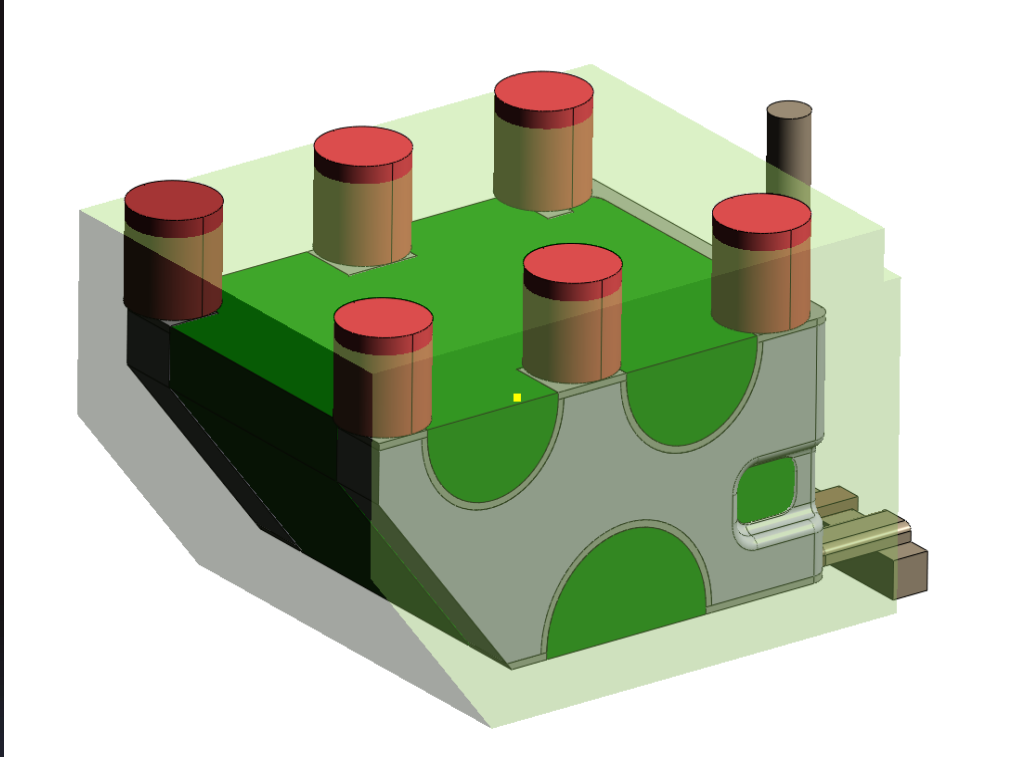
Hot Tears



Cold Cracks

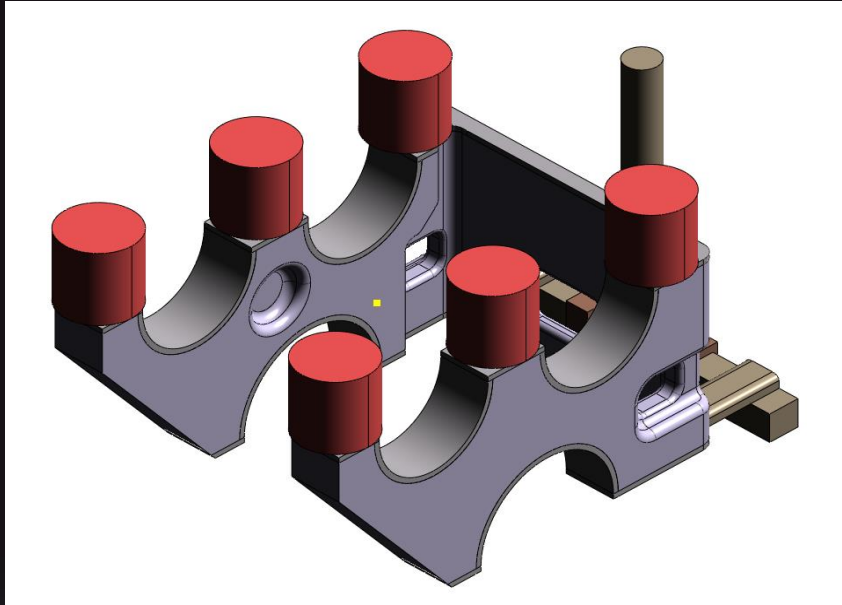


Prediction of Distortion & Crack Potential

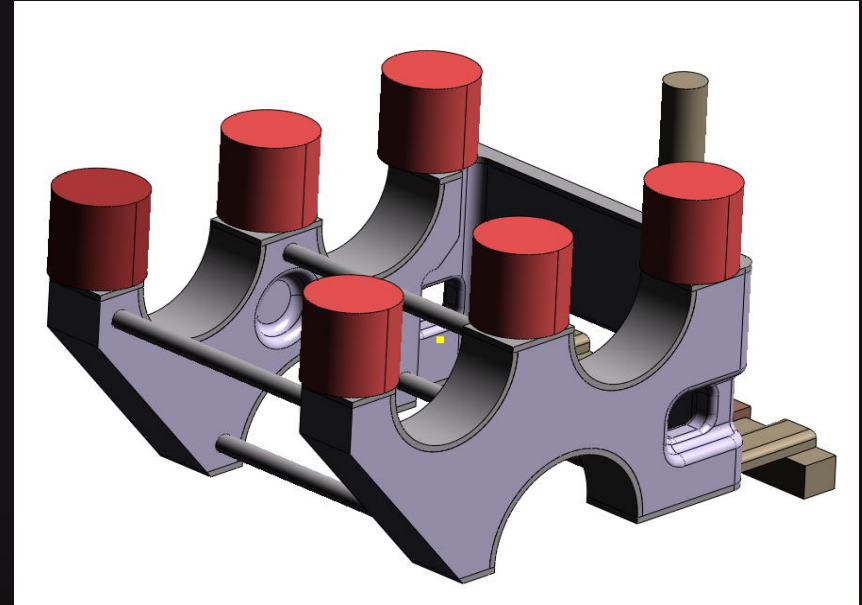


- Weight 6.5 Ton
- Low Alloy Steel

Designs with different Distortion



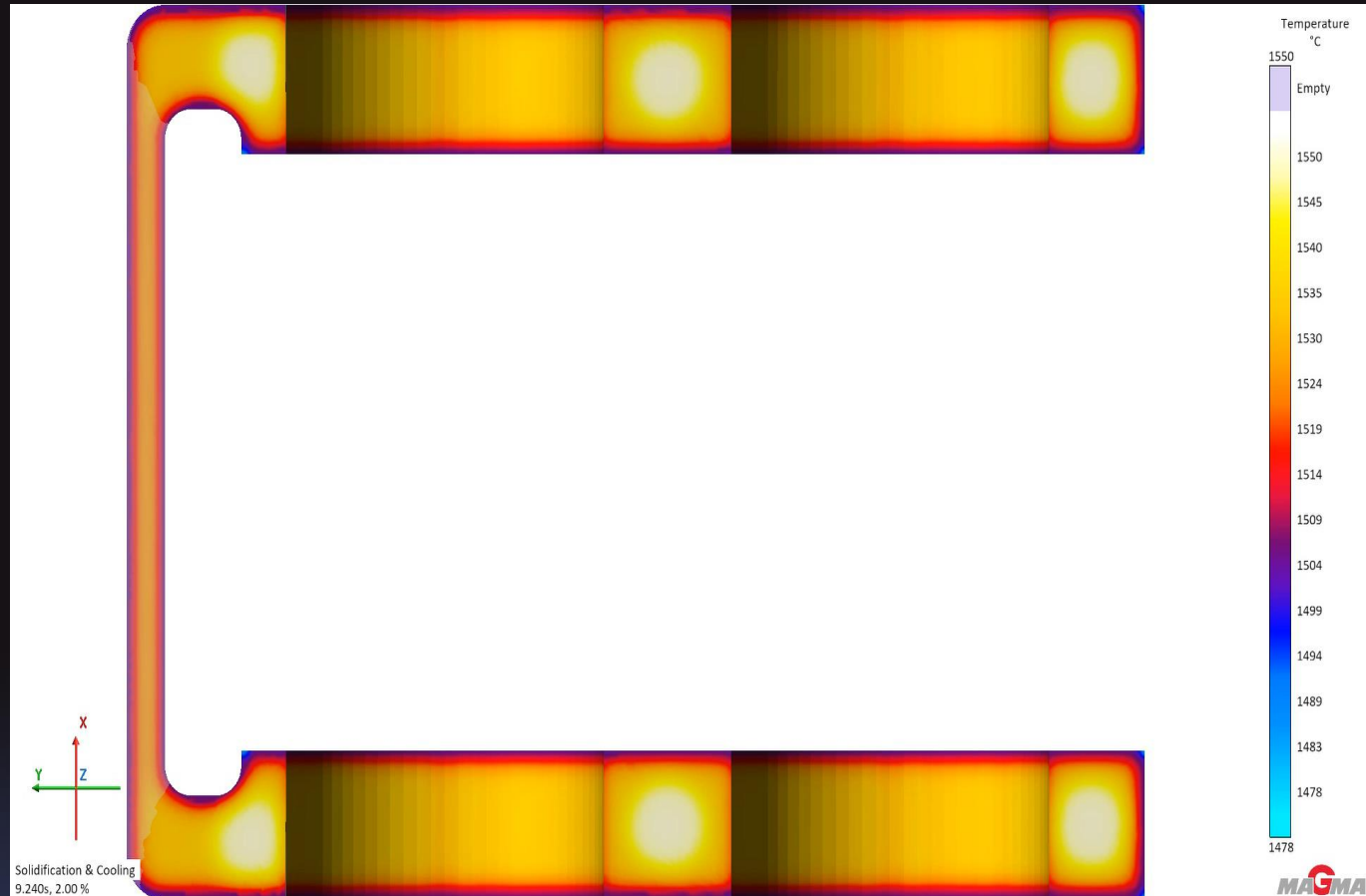
Design 1



Design 2

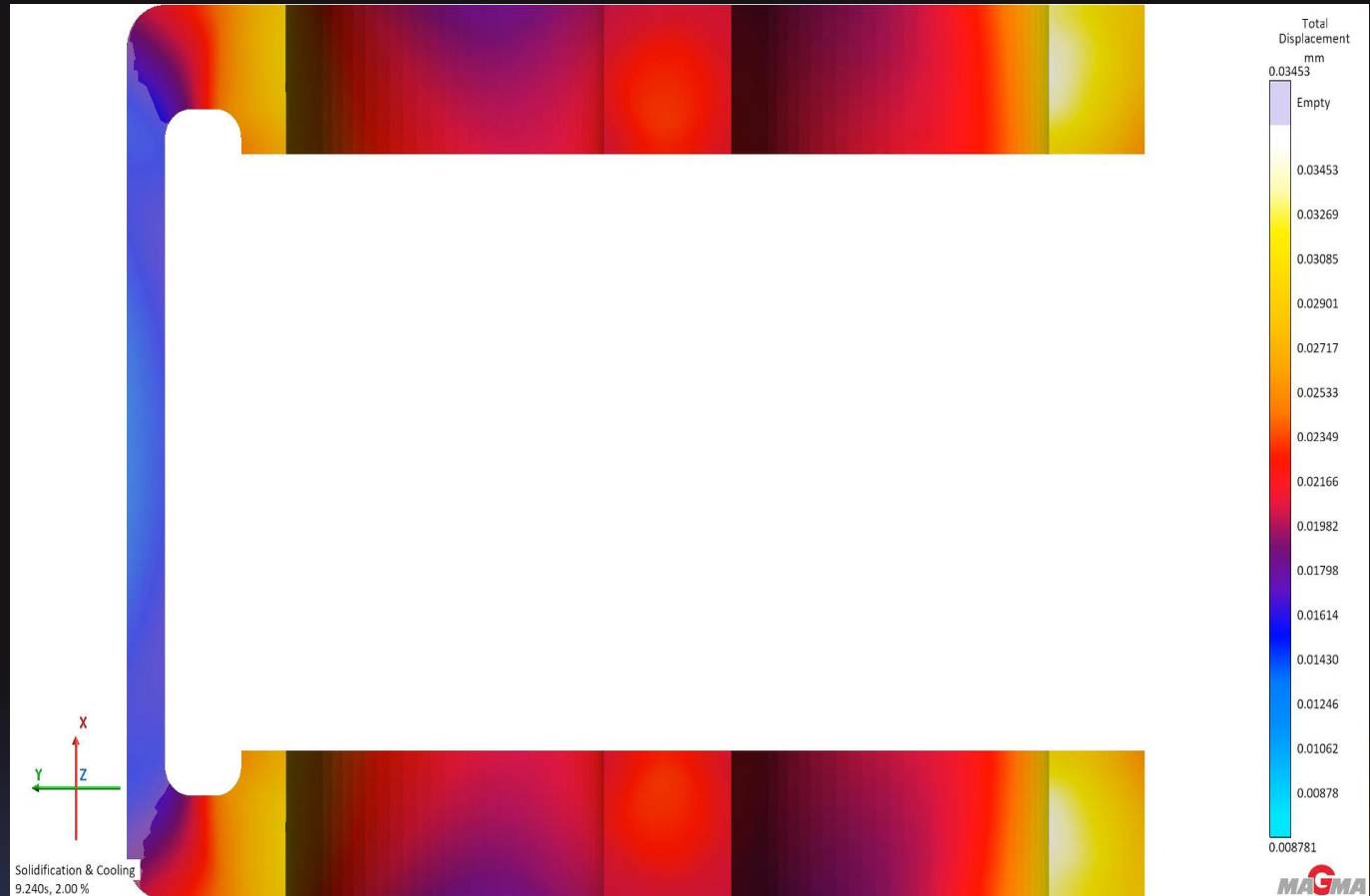
Stress Temperature

Design 1



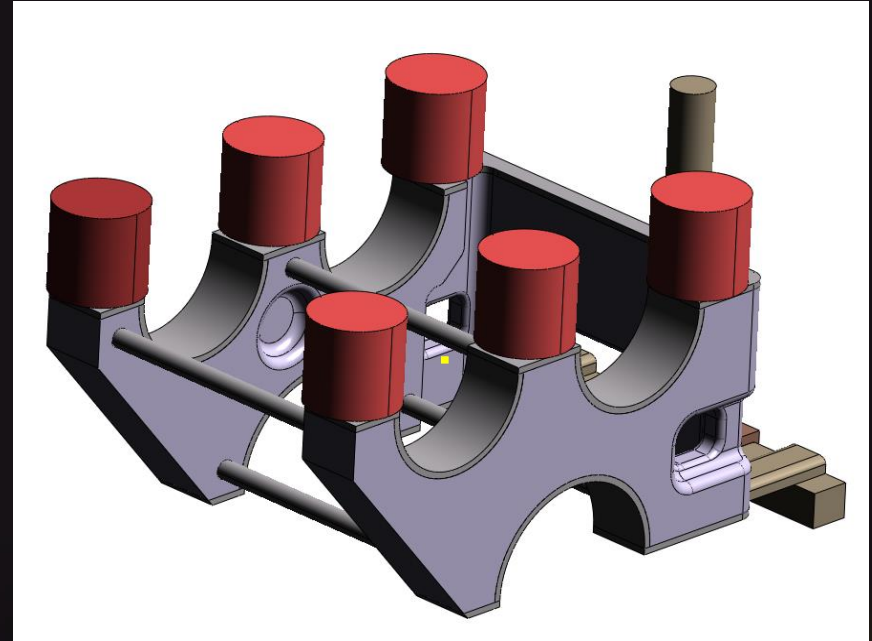
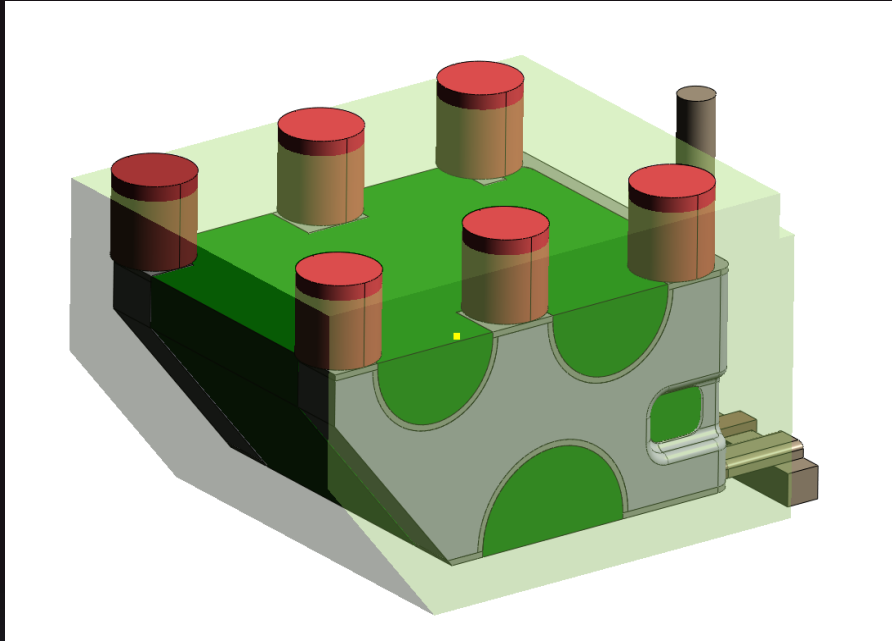
Total Displacement

Design 1



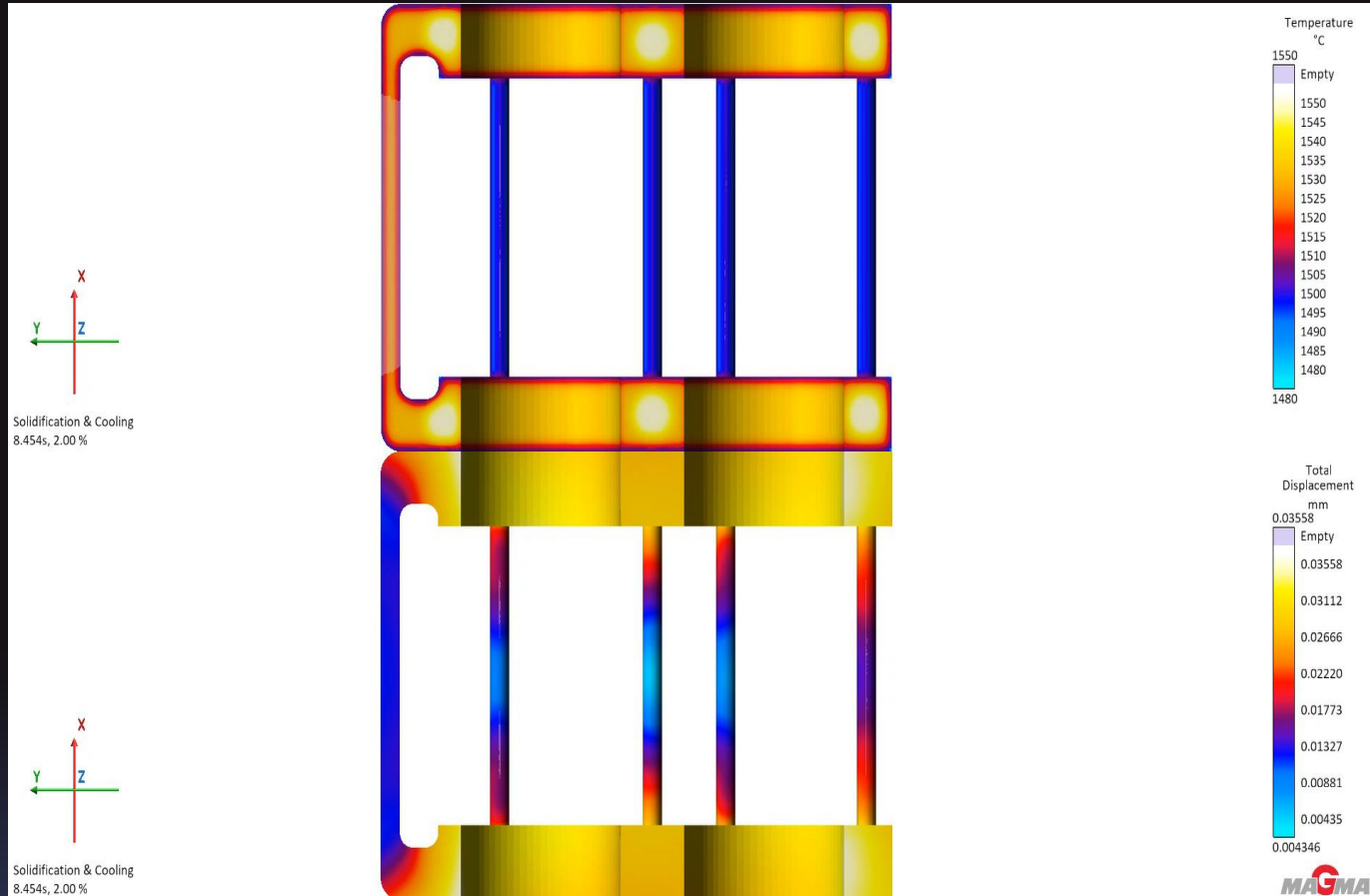


Design 2 - With External Constrain



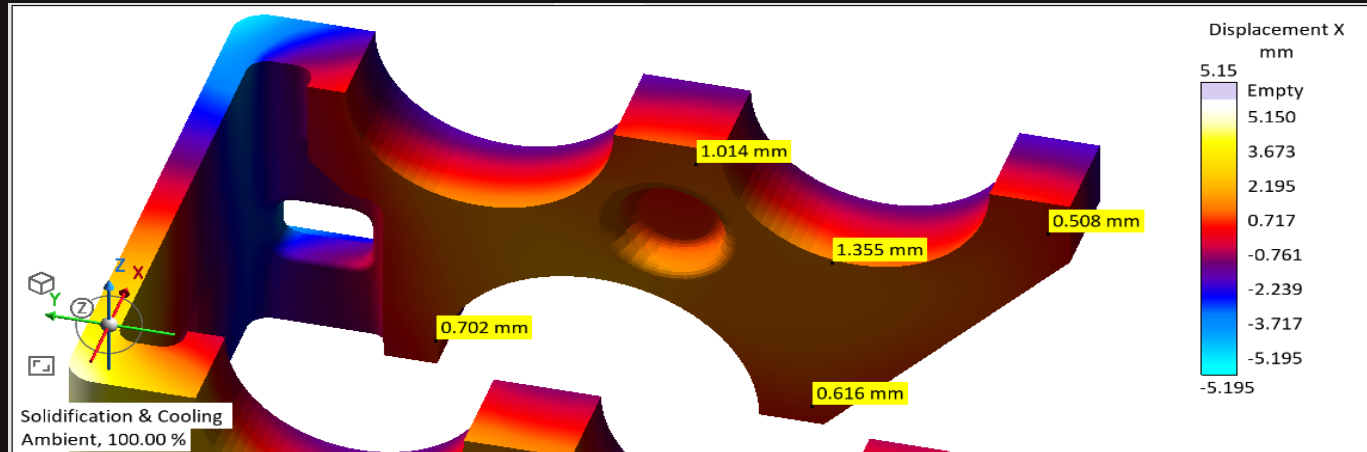
Temperature & Total Displacement Comparison

Design 2

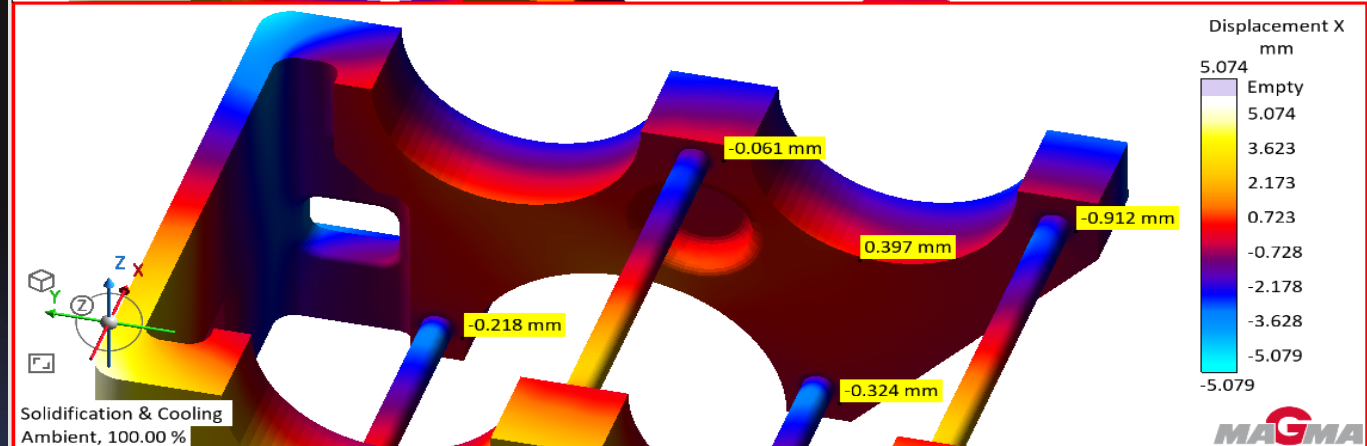


Displacement Comparison

Design 1

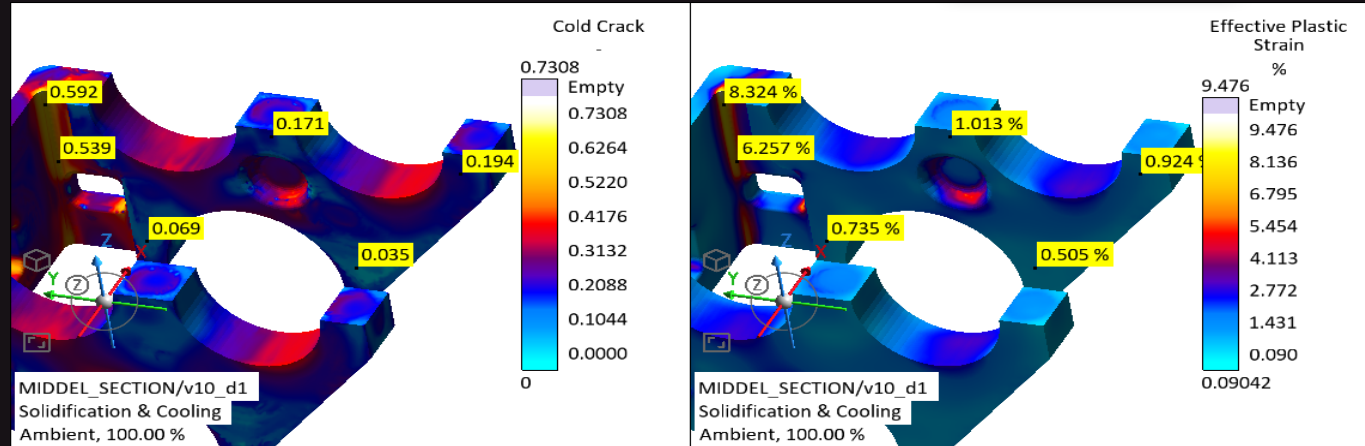


Design 2

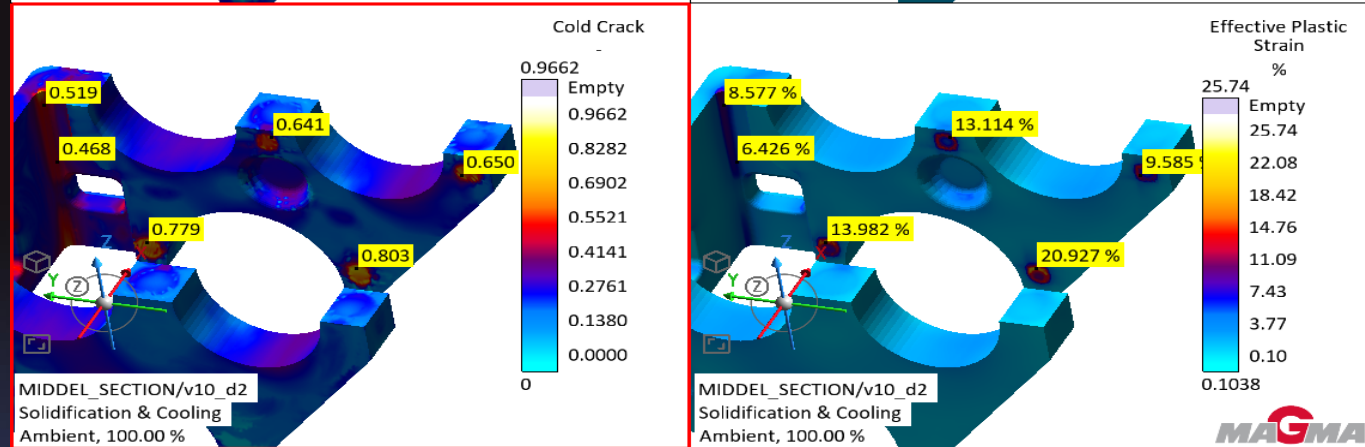


Design 1 & 2 – Comparing Strain with Crack

Design 1

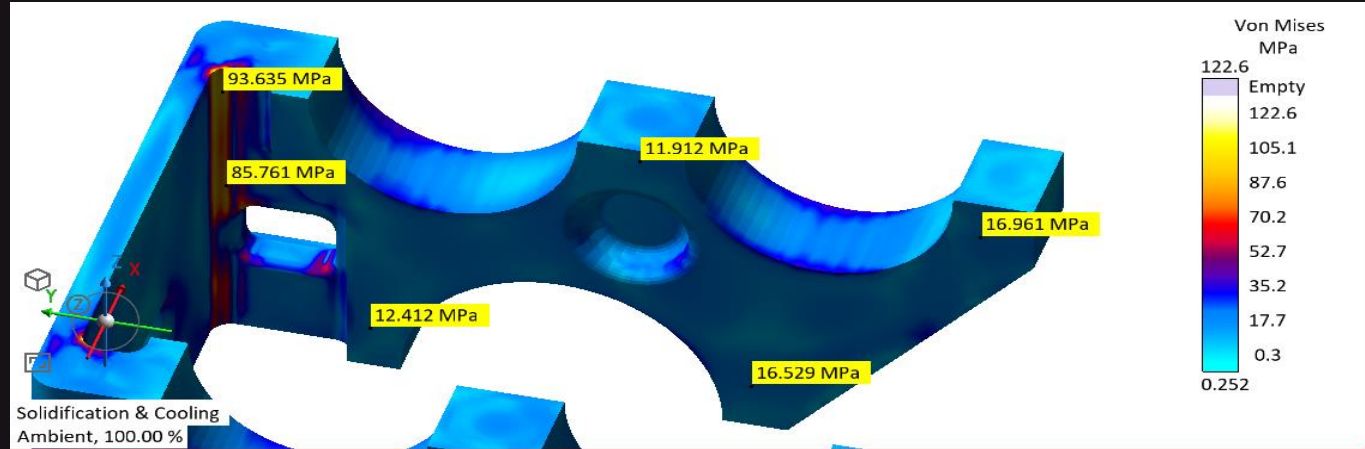


Design 2

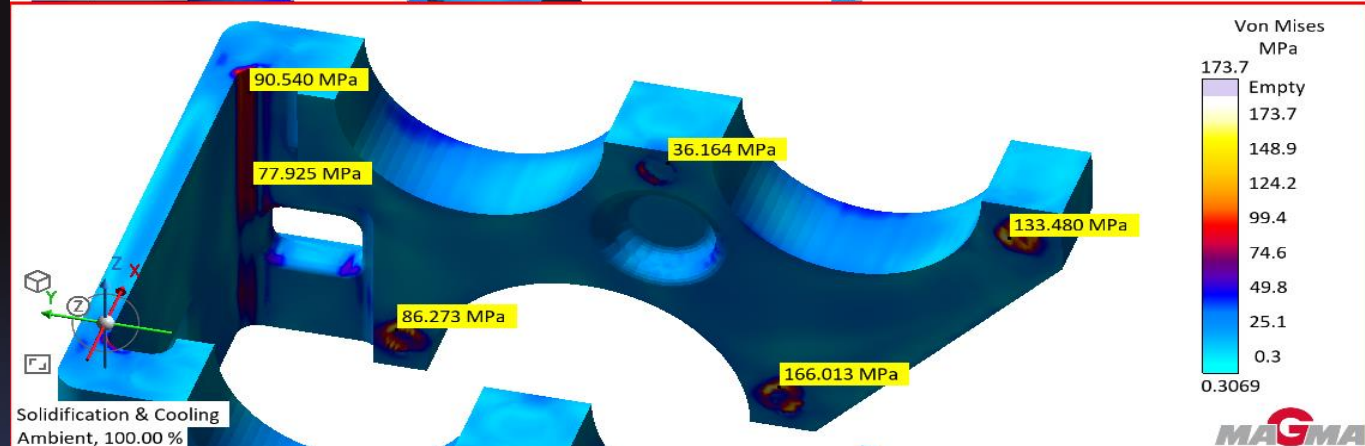


Design 1 & 2 – Residual Stresses

Design 1

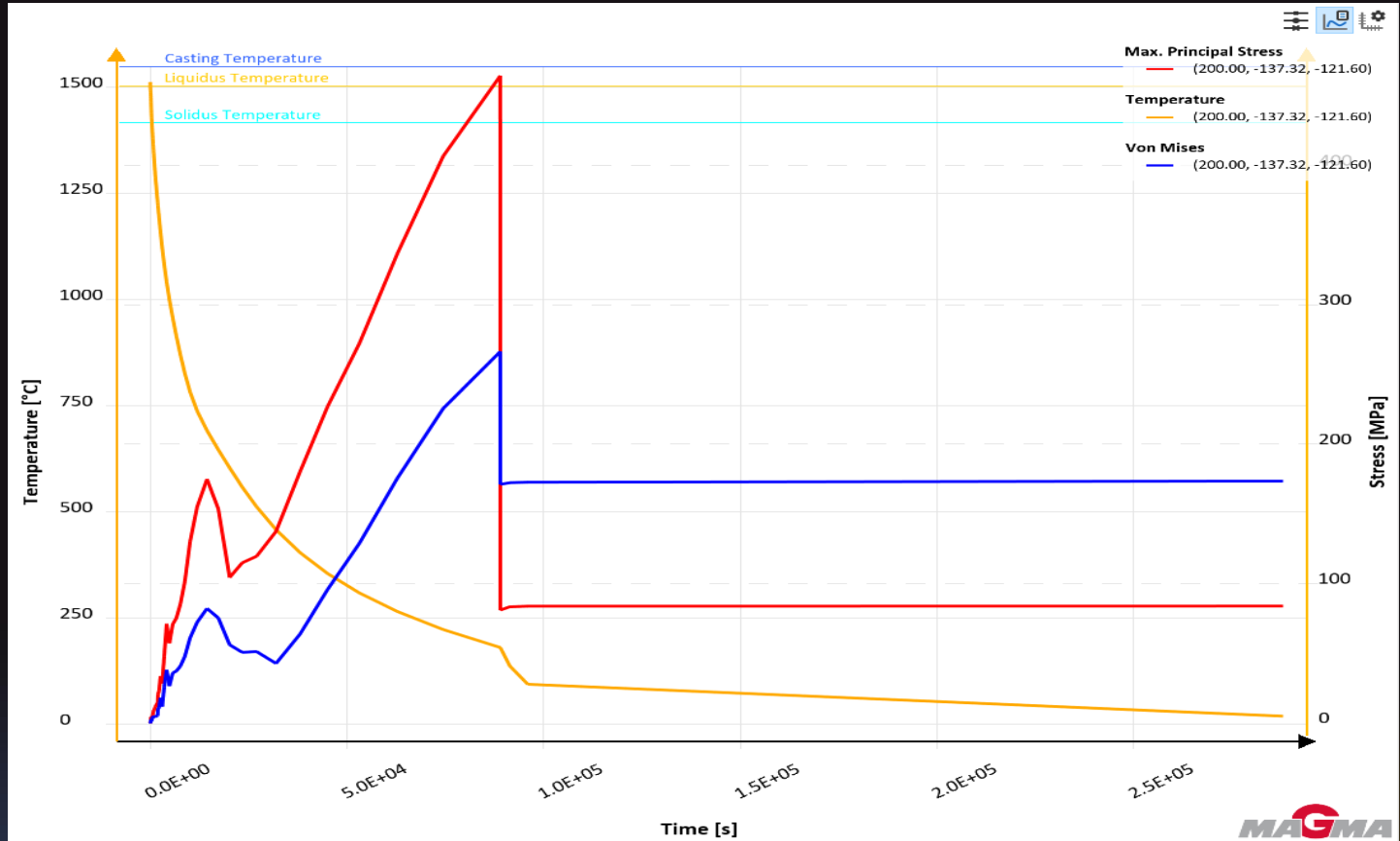


Design 2



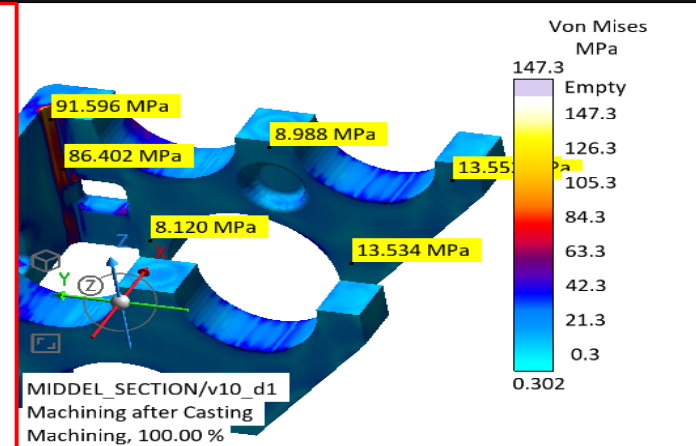
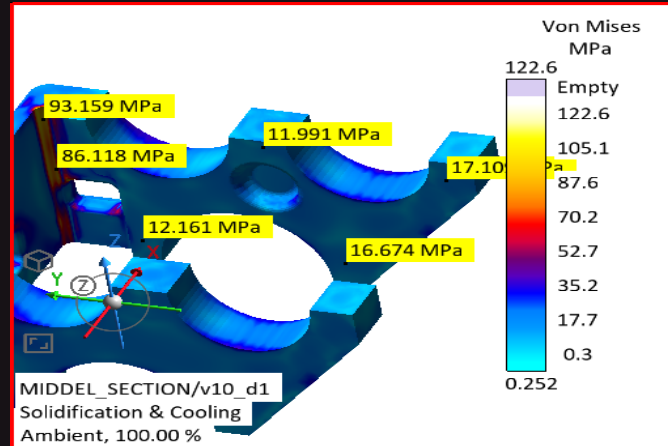
Comparison of Peak Stresses Curve

Design 2

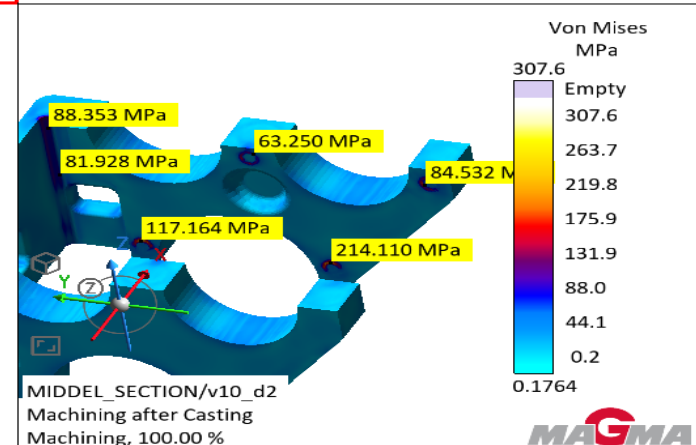
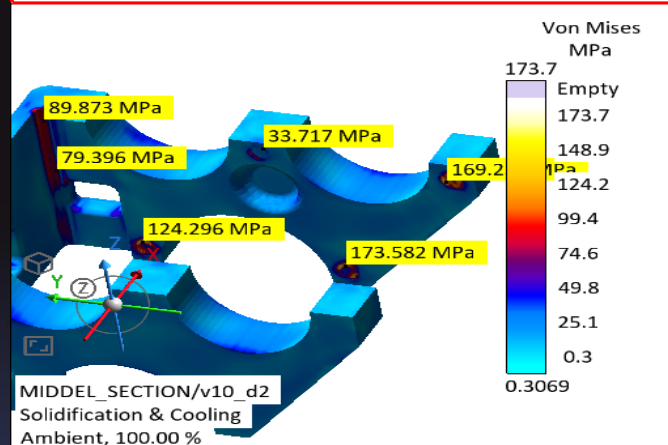


Design 1 & 2 – Before & After Machining stresses

Design 1



Design 2



Thank you for your attention.

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