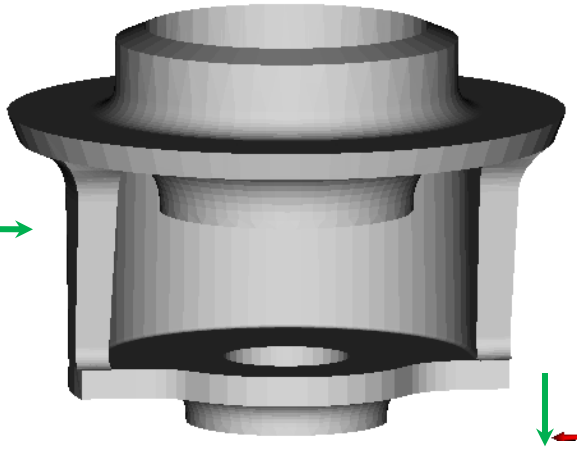
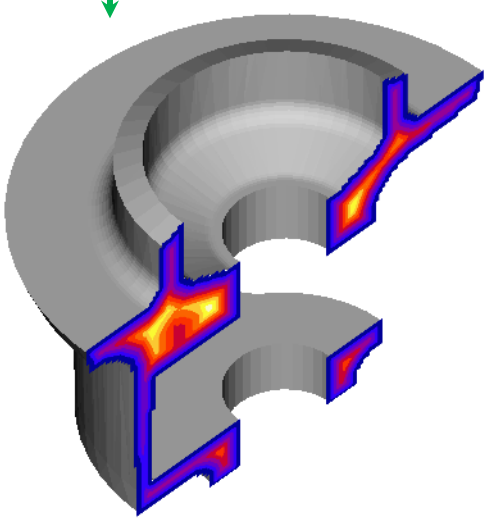
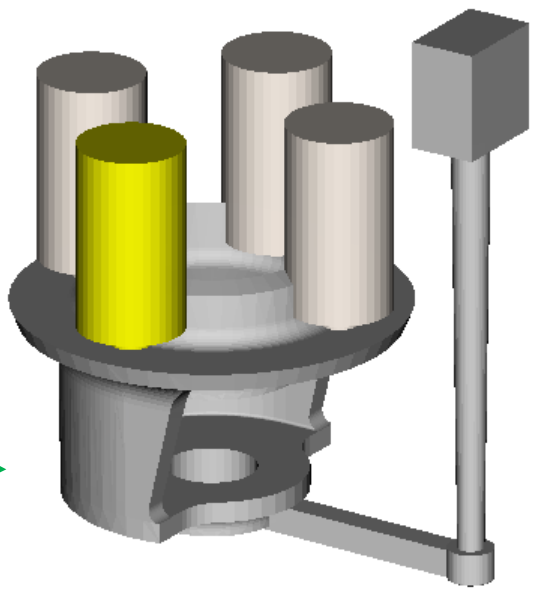
***Case*: A steel cast part of construction equipment is produced in resin bonded sand mold in a medium capacity foundry. Its overall size is 660 mm diameter and 470 mm height, and weight is 276 kg. The foundry faced high level of rejections (25%), low yield (58%), and considerable rework.**



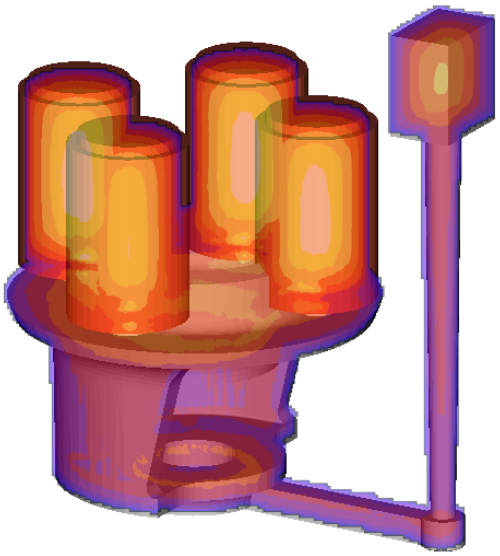
Thickness analysis of the part shows high mass concentration of 97.38 mm inscribed sphere diameter. It also reveals thick junctions connected to thin sections, resulting in high thickness gradients.

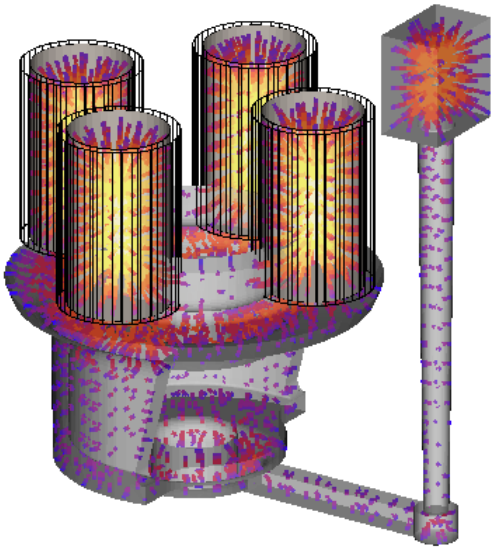


Current methoding includes four top feeders of 180 mm diameter and 320 mm height, all with 18 mm thick exothermic sleeves.



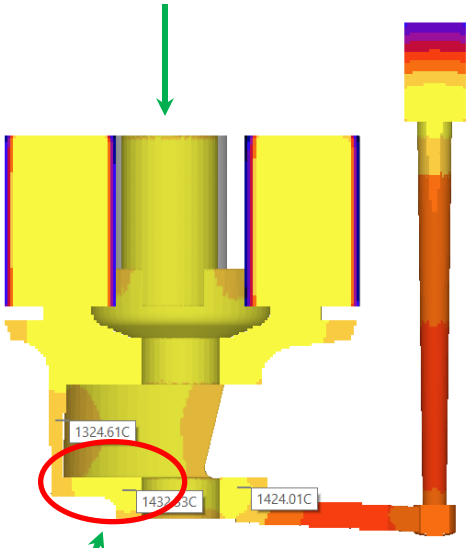
Solidification simulation reveals that isolated hotspots are observed in feeders.



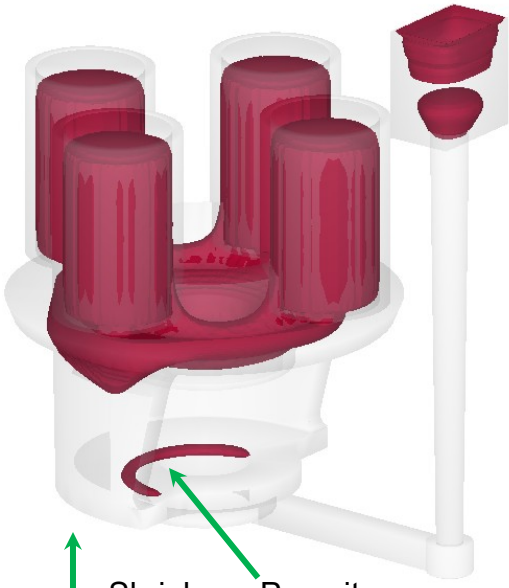


Feedpaths are also converging to hotter region in the feeder ,exactly matches with hot spot shown by solidification simulator.

Solidification temperature analysis predicts isolated section at the bottom of the part. This location can lead to shrinkage porosity.



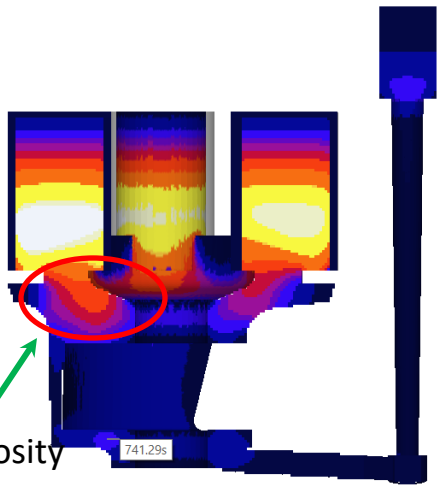
Shrinkage Porosity



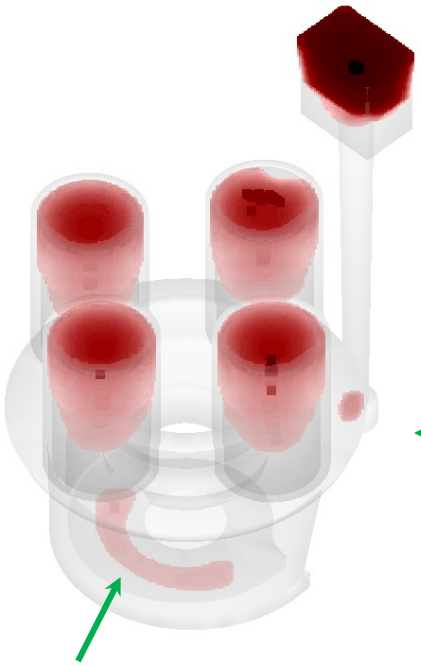
Shrinkage Porosity

Liquid fraction analysis displays liquid metal remains inside the casting till the end of solidification. This location can lead to shrinkage porosity.

Sectional Solidification time analysis displays one isolations in the casting. Shrinkage porosity can appear in this location.



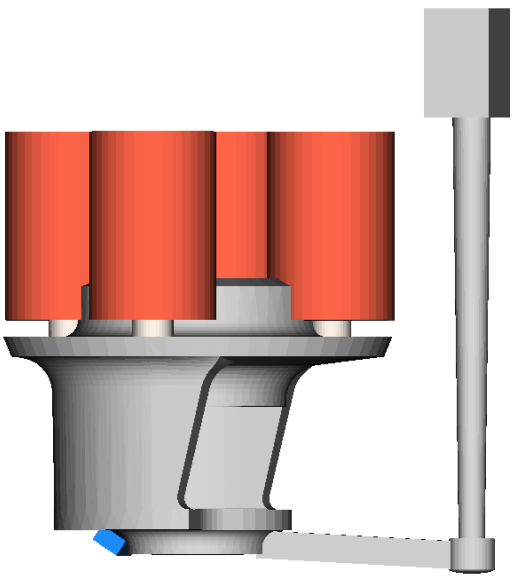
Shrinkage Porosity

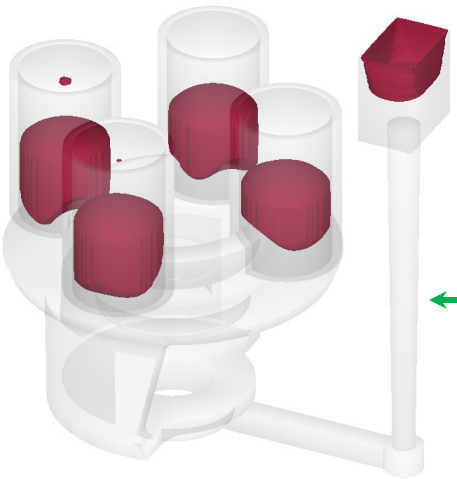


Shrinkage Porosity

Shrinkage porosity is seen at the bottom section of the part and matches with the defect seen in the part. The lighter colour shows micro shrinkages and darker colour shows macro shrinkages..

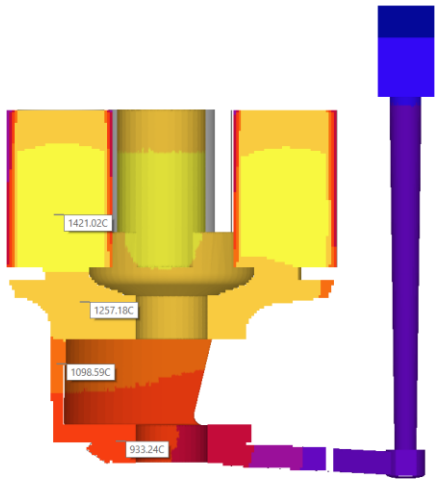
The methods design was revised by placing a chill at bottom of part where defect is observed.

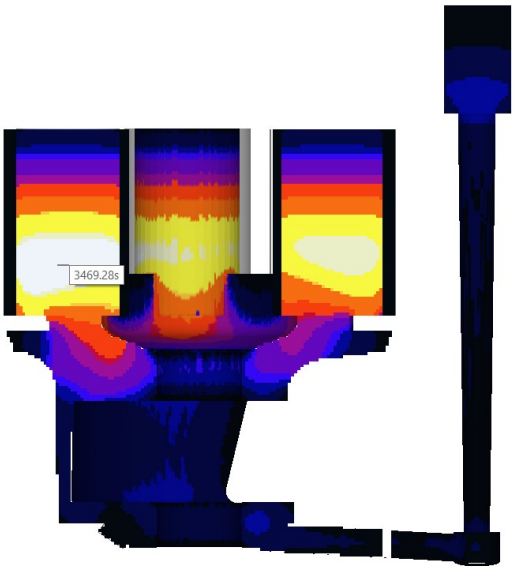




Liquid fraction analysis displays all liquid metal inside the feeder and sprue at the end of casting. Indicating improving in casting

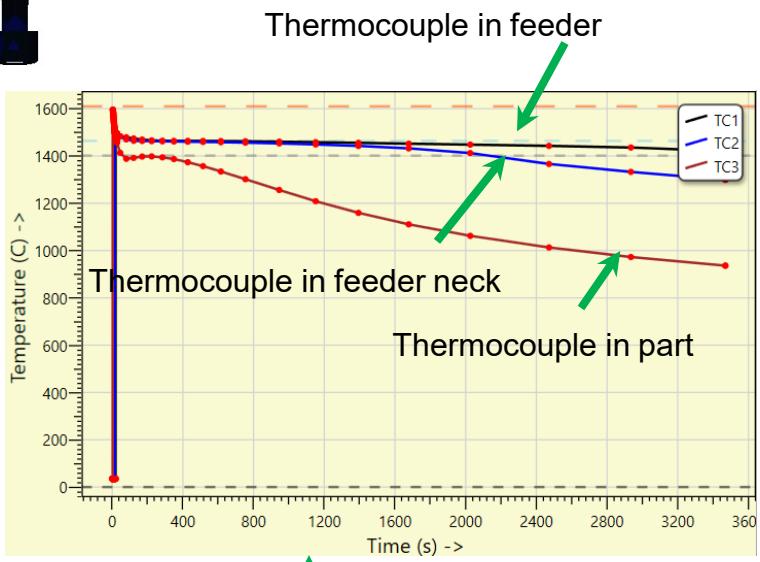
Solidification temperature analysis predicts no isolations at the bottom of the part. Feeders have highest temperatures than casting.





Solidification time analysis gives locations where metal solidifies last. Last solidifying metal is inside feeders.

Shrinkage porosity is observed in the feeders. Shrinkage porosity from casting is completely eliminated.



Thermocouple analysis supports the shrinkage porosity results. Defect location takes less time to solidify than the feeders.

Summary: **The use of four feeder with insulating sleeve and a chill below the defect zone resulted in elimination of the internal shrinkage.**