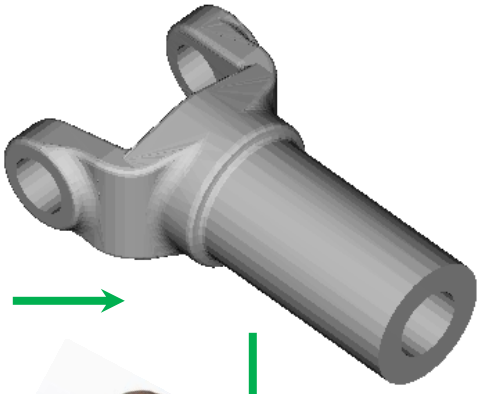
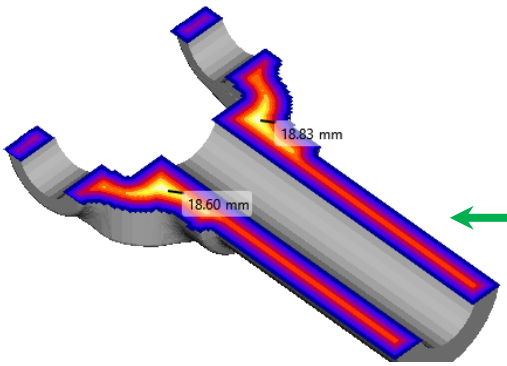
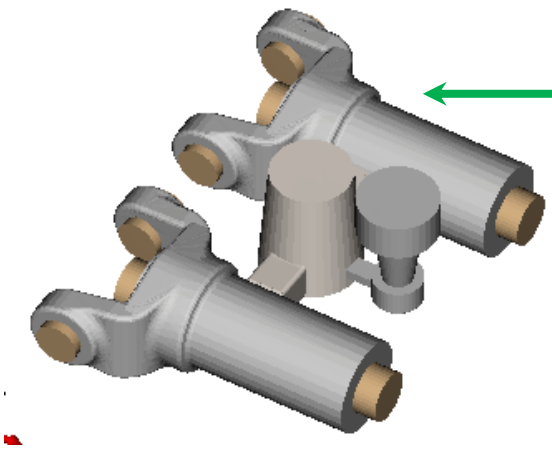
***Insight*: An under feeder-neck porosity developed at the yoke casting section, observed during fettling and finishing of the casting.**



The ductile iron yoke casting of overall size 156 mm x 91 mm x 56 mm weighing 1.48kg was produced by high pressure molding process. After fettling and machining, macro shrinkage defect was observed next to the feeder connection point.

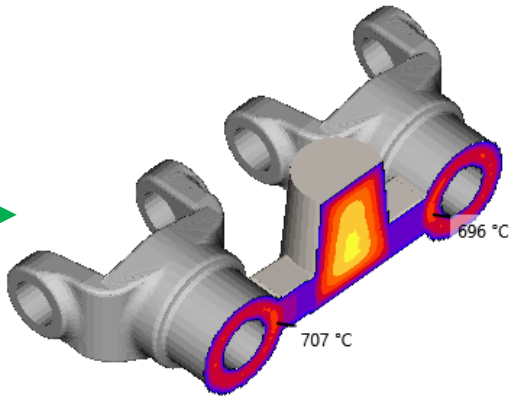


The thickness of 18.83 mm is at one end; the defect area has a smaller value of uniform thickness.

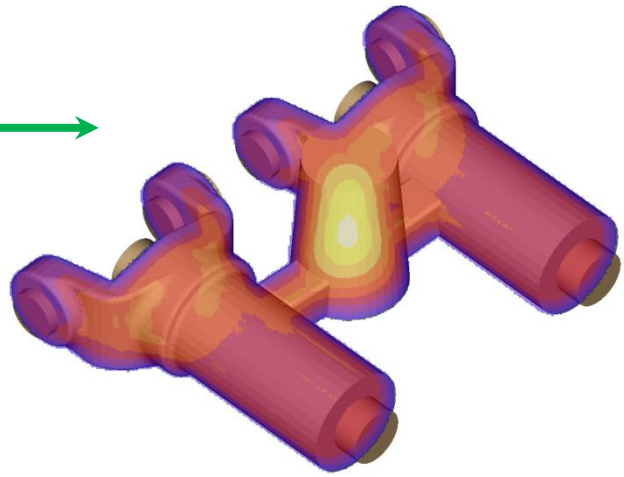


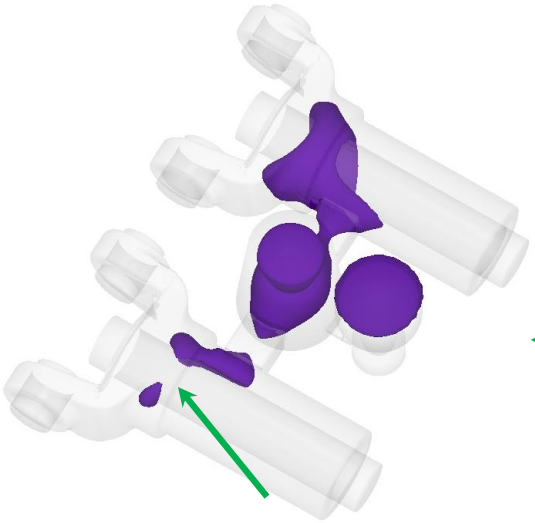
The methoding of the casting included multi cavity layout with common side feeder of top diameter 40mm, bottom diameter 50mm, and 60mm height, with a square neck of 20 mm size.

Simulation of current methoding and solidification simulation indicates a hot spot at the defect location in the actual casting. This is due to incorrectly sized feeder and its neck.



Solidification simulation reveals that isolated hotspots are observed in feeders.

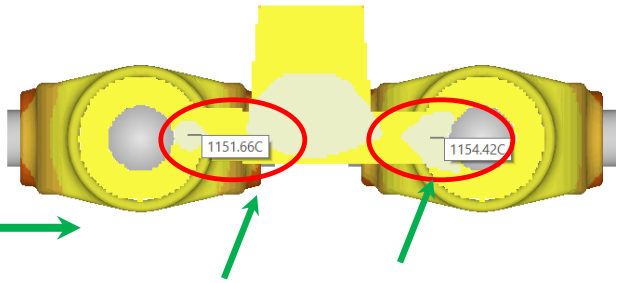




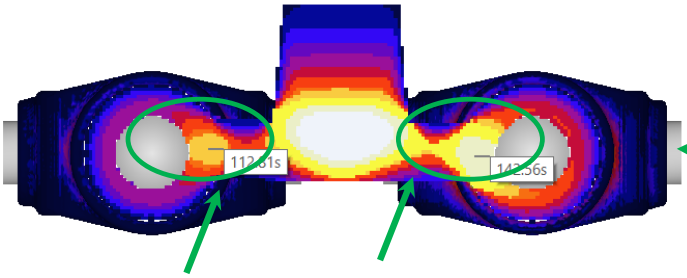
Shrinkage Porosity

Liquid fraction analysis displays liquid metal remains inside the casting till the end of solidification. The isolated liquid metal is present in front of feeder neck.

Solidification temperature analysis predicts isolated section in front of the feeder neck inside the part. This location can lead to shrinkage porosity.



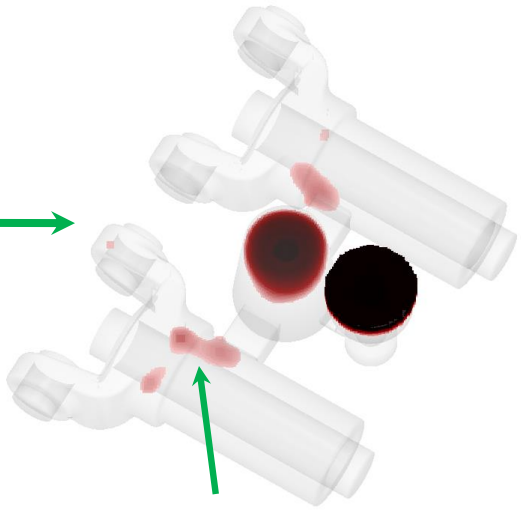
Shrinkage Porosity



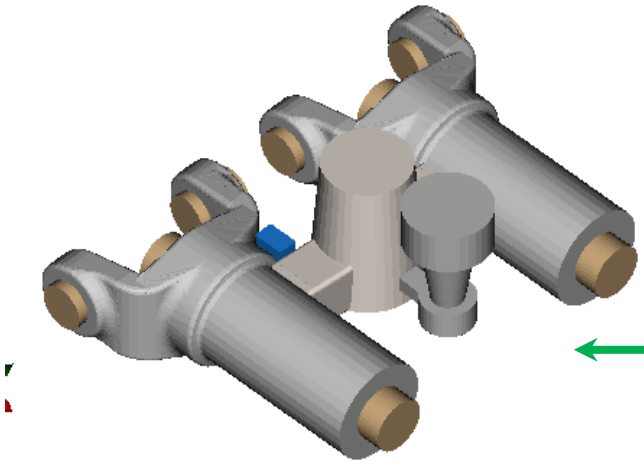
Shrinkage Porosity

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

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

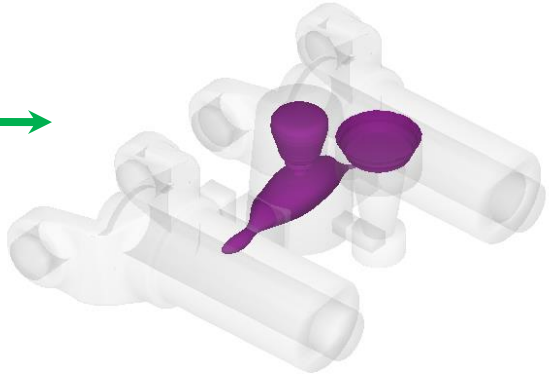


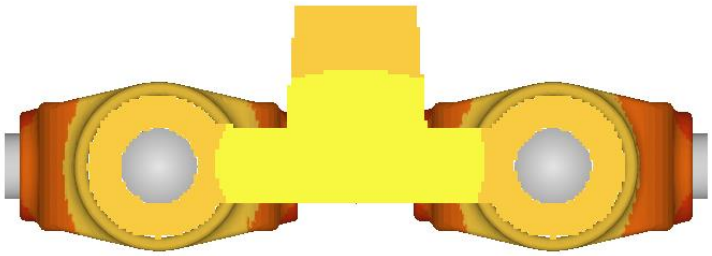
Shrinkage Porosity



The methods design was revised by increasing feeder height to 65mm and changing the neck connection to parts. Also two chills are placed near by to defect locations.

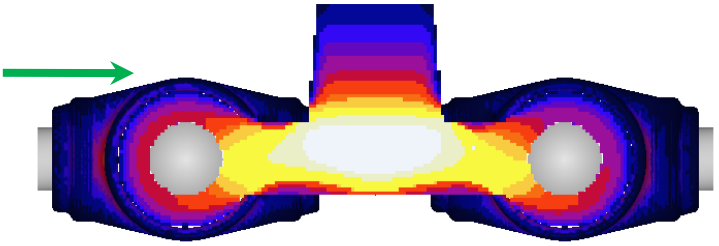
Liquid fraction analysis displays all liquid metal inside the feeder and sprue at the end of casting. Indicating improving in casting.

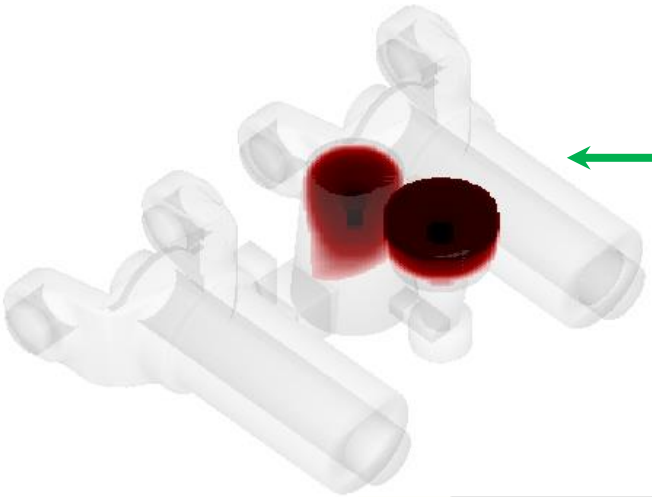




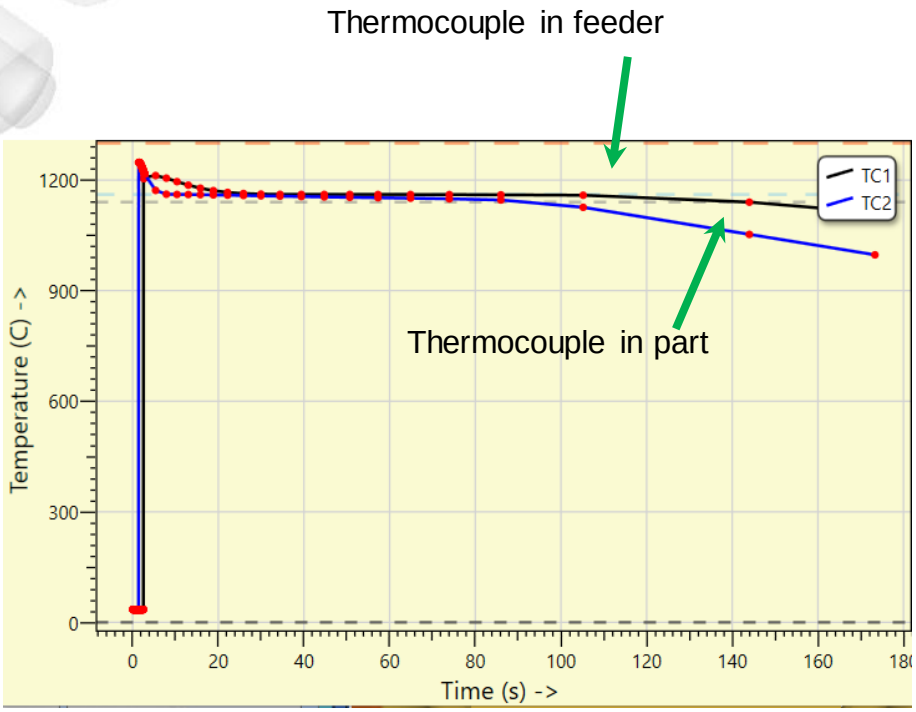
Solidification temperature analysis predicts no isolations in front of neck. Feeders have highest temperatures than casting.

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: **Modifying the feeder and neck dimension to ensure proper feeding to the casting completely solved the problem, also revised methoding resulted in better overall yield .**