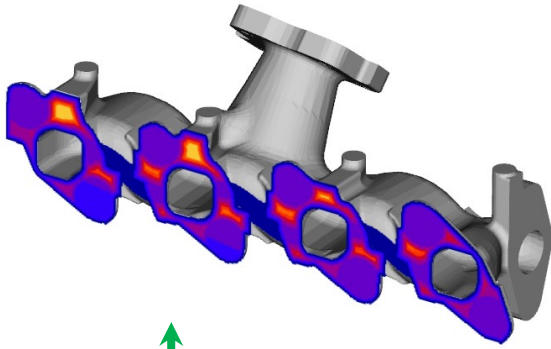
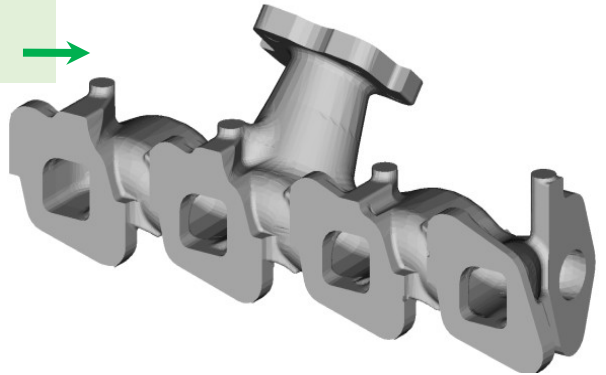


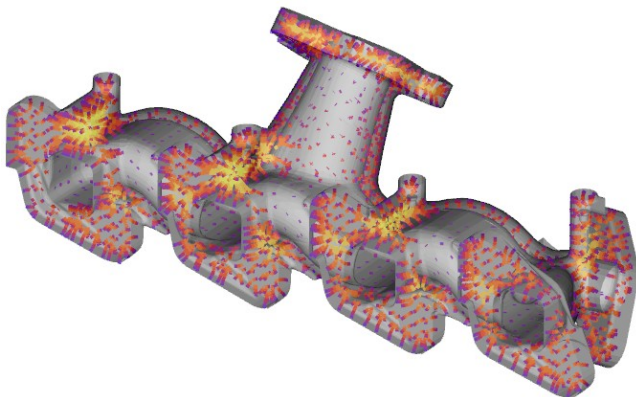
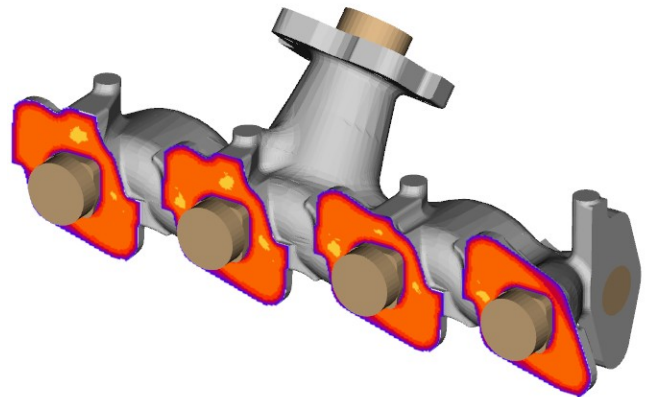
Case: The ductile iron manifold casting of overall size 377 mm x 140 mm x 156 mm weighing 2.45 kg has a fairly complex geometry with sharp junctions and is prone to internal defects.



Thickness contour analysis of the cast part shows maximum thickness of 22 mm inscribed sphere diameter.

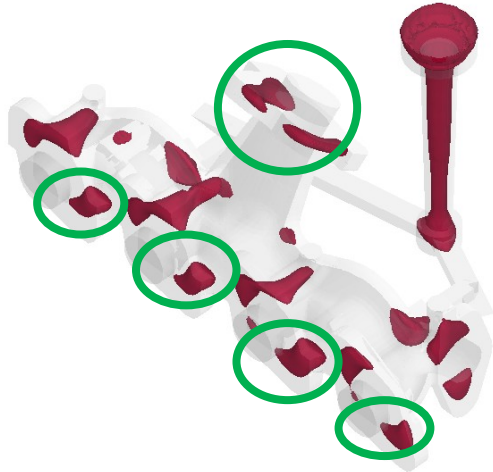
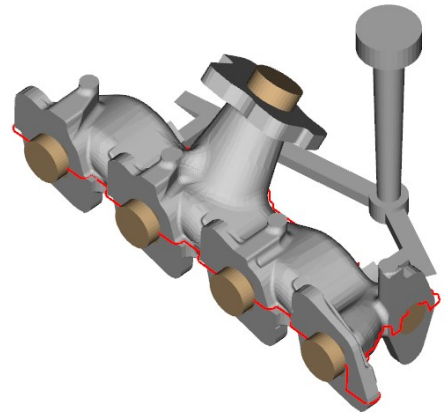


Solidification simulation shows isolated hotspots (yellow colour) at the thickest sections, which match the shrinkage defect observed in the actual casting.



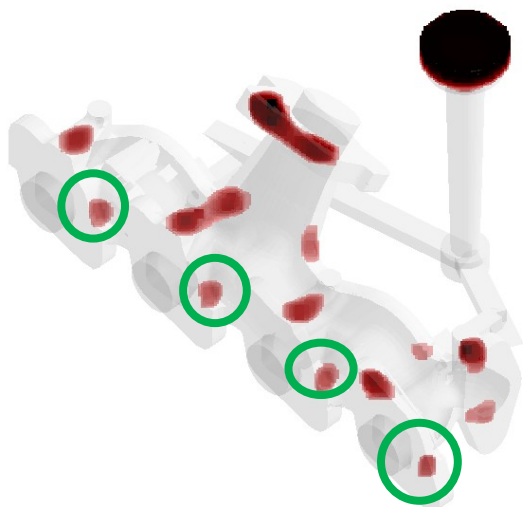
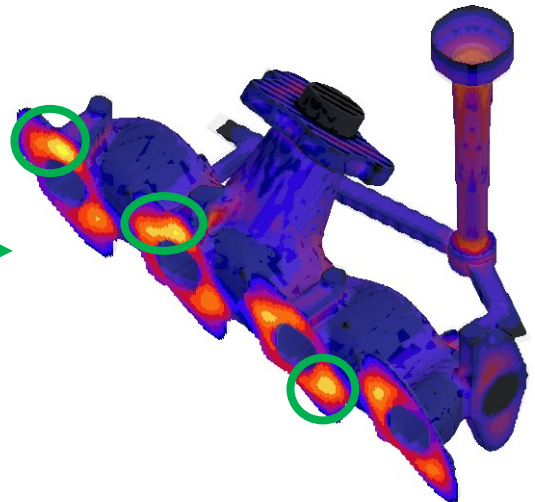
Feed path analysis confirms the defect locations, indicating that these regions need proper feed.

Initial gating system includes two runners and two ingates. The ingates are connected to bosses.



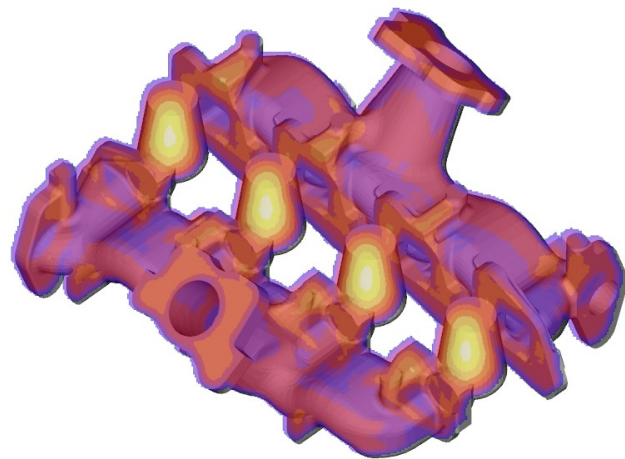
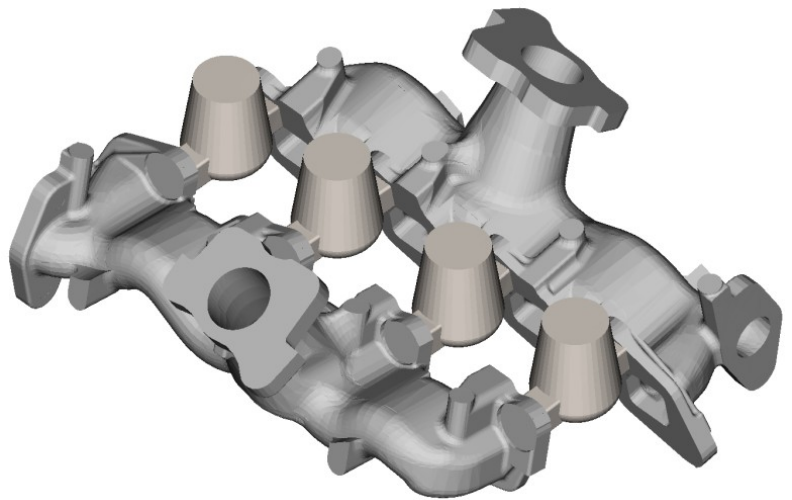
Liquid fraction analysis shows presence of isolated liquid metal in multiple locations inside the part.

Sectional Solidification time analysis displays last solidifying regions inside the part. Shrinkage porosity can appear in these locations.



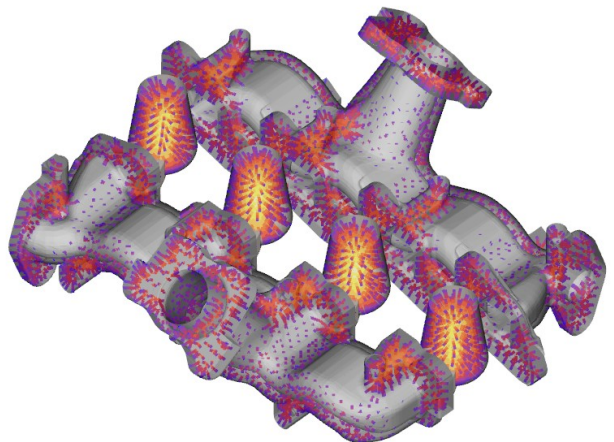
Shrinkage porosity is seen inside the part and matches with the defect seen in the part. The lighter colour shows micro shrinkages and darker colour shows macro shrinkages. Shrinkage porosity in other areas of the casting is also seen.

The suggested methoding includes two parts per mold, with four common spherical bottom side feeders of dimension 50 mm diameter and 75 mm height.



Solidification simulation of the methoding shows no isolated hot spot inside the casting.

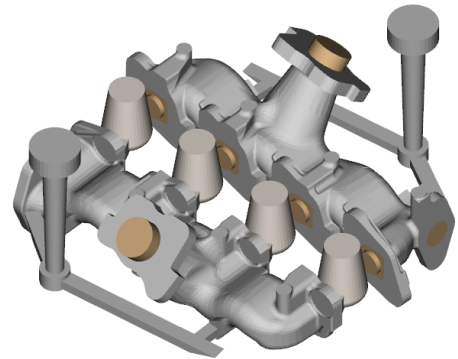
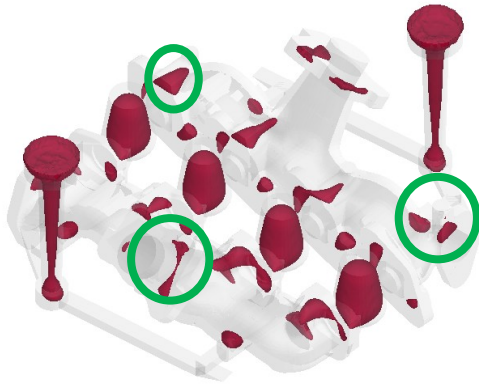
Feed path simulation indicates good directional solidification. Further, the combined methoding gives a yield of 72%.



Manifold Pipe

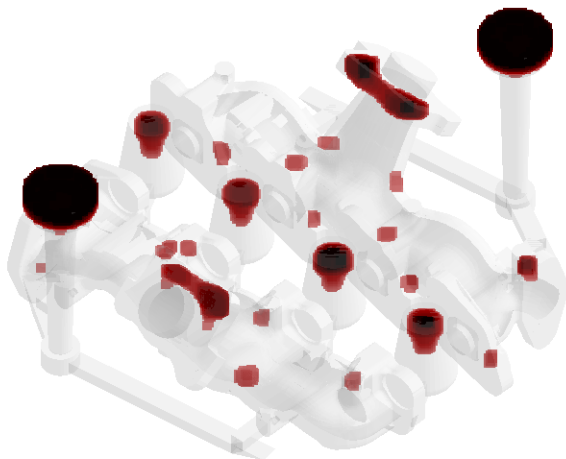
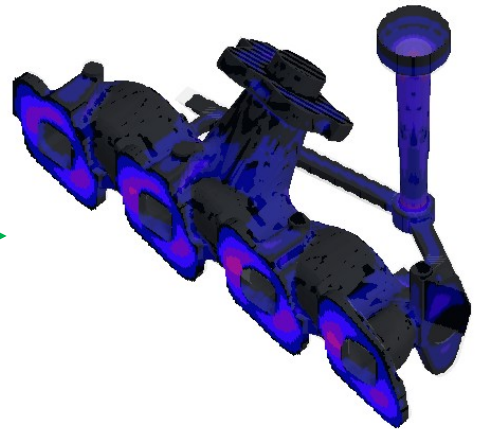
Ductile Iron, Green Sand Casting

Gating system is modified to have two sprues to get sound casting without defects like cold shut and misrun.



Liquid fraction analysis displays presence of isolated liquid metal inside the part indicating possibility of shrinkage porosity in these locations.

Feeders helped in feeding the casting and reduce defects. As sectional solidification analysis suggests last solidifying regions are not inside the part and this reduce the possibility of shrinkage porosity occurring inside the part.



Shrinkage porosity have reduced after new methoding but it is still observed inside the part at several locations.

Summary: The methods layout with two cavities connected to four common feeders results in the desired quality with high yield.