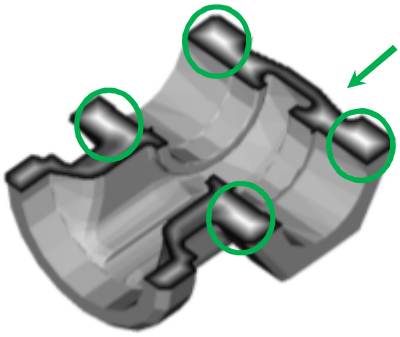
Valve Body

Copper Alloy, Green Sand Casting

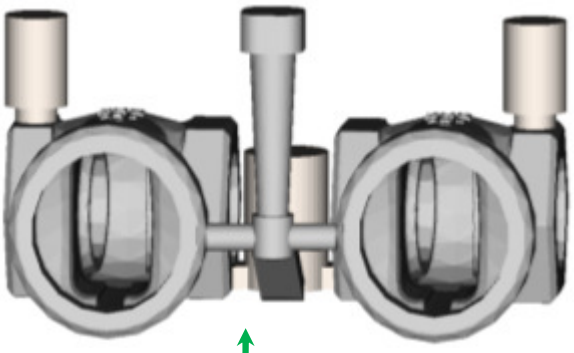
A copper alloy valve body of overall size 130 mm x 110 mm x 95 mm weighing 3.6 kg was produced in a multi-cavity sand mould. Internal porosity defect was observed during machining, causing high rejections.



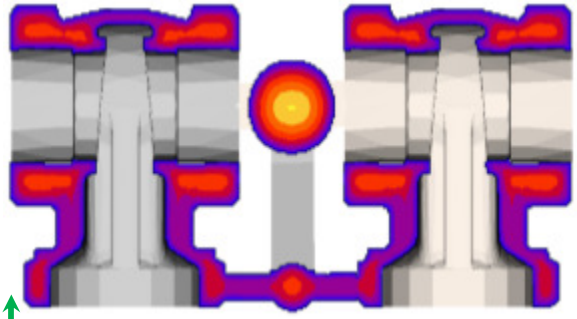
Wall thickness analysis shows a heavy section with 18 mm thickness (inscribed sphere dia).

Shrinkage porosity was observed in machining of hexagonal flange, leading to seepage problem.

Solidification simulation of the current methoding shows that necks are undersized and the feed metal is unable to reach the shrinkage locations. There is a clear isolated hot spot inside casting just opposite the neck, matching with the shrinkage porosity found in actual casting during machining.



Neck redesign was not possible due to geometry constraint. Hence an alternate two-cavity layout feeding system was evolved. This had a common feeder of diameter 40 mm and height 60 mm, along with top feeders of diameter 30 mm and height 40 mm in each cavity.



Simulation of the new layout showed that the hot spot is limited to feeder only, and the casting is defect-free. The yield also improved from 75% to 82%.