

SECTOR:
HI-TECH

OFFERINGS:
CUSTOM ENGINEERING
SOFTWARE

TECHNOLOGY:
CLOUD APPLICATIONS

CLOUD APPLICATION FOR MOLD FILLING SIMULATION

Our customer provides technology solutions to the metal foundries towards realizing defect free castings. These solutions are based on volumetric shrinkage of metal during solidification. The customer had wanted to address the defects that are caused mainly during metal filling process due to flow effects like impact pressure, high turbulence, and long filling times. Since such CFD based simulations take significant computing resources, it was decided to develop an on-demand cloud application for metal foundry customers.

Zeus Numerix developed the mold filling application that is now available on AWS server. The application is a browser-based, online simulation platform based on the principles of Smoothed Particle Hydrodynamics (SPH). The application integrates pre-processor, solver, and post-processor. The application reads the STL format geometry of mold cavity by adding gating system like runners and pouring cup. Flow properties are generated as XML input files through a user input interface. Finally, the setup is submitted to AWS for simulation. User can select the number of cores for solver execution. Execution time of the cavity filling depends on geometrical complexity of the cavity that can be quantified by minimum section thickness and variation of section profile along the geometry.

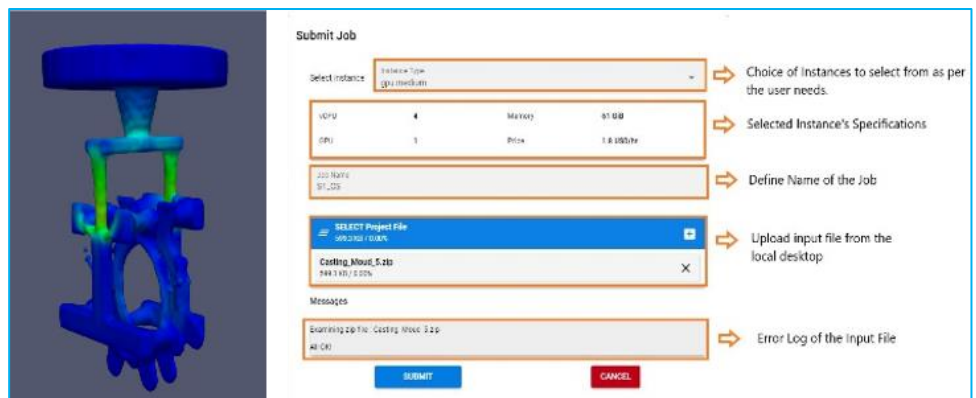
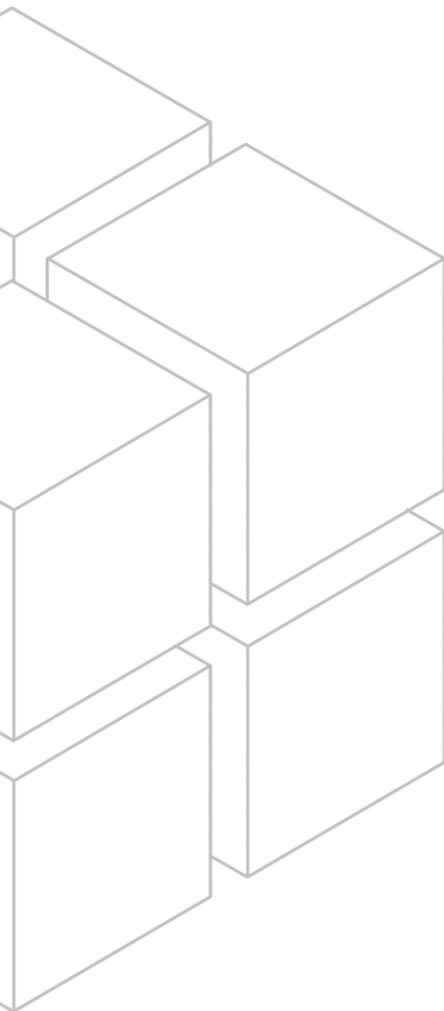


Figure 1: Outputs of Mold Filling Software (a) 3D Visualization of Mold Filling (b) Input Window of MFS

The output is available as volumetric solution files and cavity filling animations. Both type of data visualization happens on ParaView, an open-source post-processing software. Critical flow parameters like velocities, pressure, turbulence, and Reynolds number can be extracted from the solution files to indicate possible defect areas. The pay-per-use cloud service allowed the small foundries to remove defects from their casting without upfront investment on software or computing hardware.