

NOVAFLOW &SOLID

SIMULATE YOUR CASTINGS
FASTER, EASIER AND MORE ACCURATE

A NOVACAST SYSTEMS PRODUCT



NOVAFLOW &SOLID

NovaFlow&Solid is an innovative casting process simulation tool that helps you work faster, easier and achieve more accurate castings.

NovaFlow&Solid is an innovative casting process simulation tool that basically simulates mold filling and solidification. It also contains much more than that and it really gives you the possibility to simulate the casting production that you dream of having. We think that you should be able to find solutions faster and more accurate than before and it should be easy to learn to use the program. NovaFlow&Solid can make your casting production greener by letting you investigate and be guided how to increase your yield and optimize your production process. This will help you save energy, material and eventually use less of the resources on our planet. We believe that every casting counts which means that we should work together for a future where casting defects do not exist and you do good business with a good conscience.

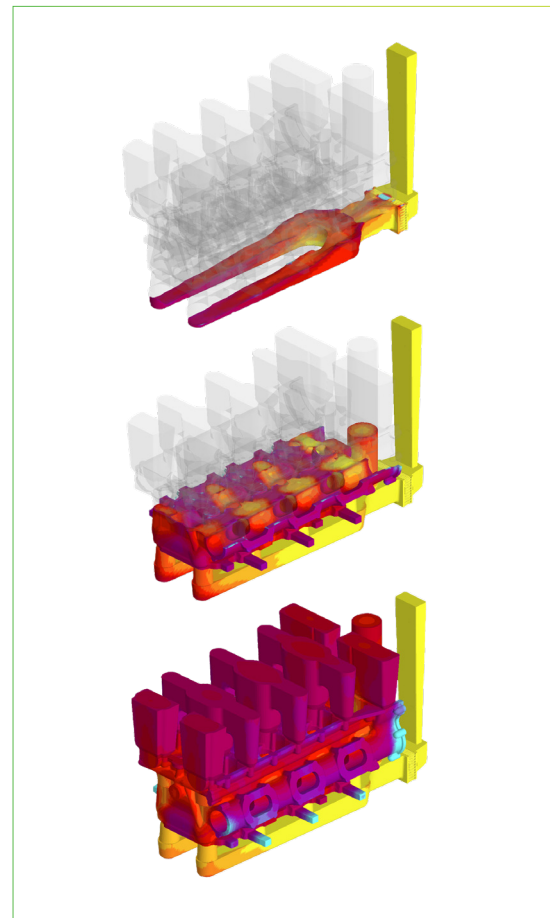
Simulations

NovaFlow&Solid can simulate most commercial casting methods, such as gravity sand casting, gravity permanent mold, low pressure die casting, high pressure die casting, lost wax method, tilt pouring, counter gravity casting, centrifugal casting and lost foam process. Casting materials possible to simulate are (provided that data exists or can be retrieved): gray- and ductile iron, steel alloys, aluminum alloys, copper-, zinc- and magnesium-based alloys, super alloys like nickel or chrome-based and titanium. The system can use all types of mold and core materials that are commercial on the market and also exothermic materials, chills and both foam and extruded filters. The meshing method enables the simulation of real extruded filters and would also with foam filters if the 3D models existed. One can also simulate re-melttable materials (Chills or inserts) as well as pouring of two different

materials (like steel and cast iron) in the same mold enabling a number of possibilities. NovaFlow&Solid visualizes the consequences of a specific gating and feeding system. Casting defects, such as oxide inclusions due to excessive turbulence, cold-flows, shrinkage porosities and slag inclusions, can be avoided by optimizing the design of the gating and feeding system. Commercial alloys can be simulated such as grey- and ductile iron, steel, aluminum alloys, copper-, zinc- and magnesium-based alloys, super alloys, all types of mold and core materials that exist on the market and exothermic materials as well as chills.

Simulations visualize the consequences of a specific design of gating systems and molds. Casting defects, such as oxide inclusions due to excessive turbulence, cold-shuts, shrinkage cavities and slag inclusions, can be avoided by optimizing the design of the gating and venting system.

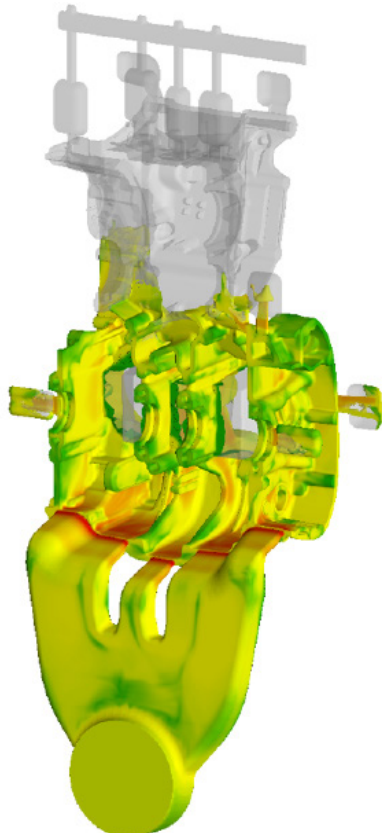
NOVAFLOW&SOLID GRAVITY CASTINGS (COURTESY OF FINECAST)



Finite Volume Method (FVM)

Finite Volume Method allows the surface of the 3D model to control the shape of the mesh elements on the border of the casting. This creates cubic elements inside the casting and border cells on the boundary of the casting, which generates much faster and more accurate results. FVM also works all the time during the simulation. It is especially important during filling when it is possible to calculate height/width of a metal front. It fills only the necessary fraction of a cell instead of cell by cell which is the case with FDM (Finite Difference Method). It is also possible to use FVM combined with an irregular mesh in the mold. With an irregular mesh in the mold, solidification calculation times can be reduced by up to 50%. NovaFlow&Solid can also use multi-mesh technology in combination with FVM and irregular mesh in the mold, resulting in very efficient simulations with accurate results. With multi-mesh, calculation time is reduced because fewer elements can be used during certain stages of the simulation. This also applies during the filling phase.

HIGH PRESSURE DIE CASTING SIMULATION (COURTESY OF JERG ENGINEERING)



Advantages

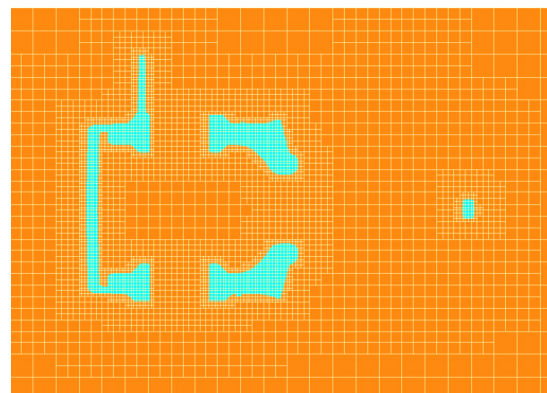
FVM technology has the following advantages in comparison with FDM/FEM methods:

- For most castings, simulation time is reduced to around 10 percent with the same or improved accuracy (FDM).
- You receive a higher accuracy in simulation, due to perfect description of the 3D model, since all sections are correct in size. FDM is always an approximation where CVM technology is as the 3D model dimensions.
- Less cells are needed to define the casting geometry which ensures faster simulations and smaller result files (FDM).
- The meshing process is completely automatic and only takes seconds.
- Advanced calculations are enabled, such as gas flow, full contact task (stress) or full mold process (FDM).

Other special functionalities

- Maximum pressure field in order to easier detect gas porosities.
- Parameter optimization in order to optimize process parameters.
- Mold erosion criteria
- ATAS MetStar import function for calibration of material data with import of liquid phase fraction and latent heat curve.

IRREGULAR MESH



NovaCast Systems AB
Soft Center
372 25 Ronneby, Sweden
Tel: +46 457 465 800
info@novacast.se
novacast.se