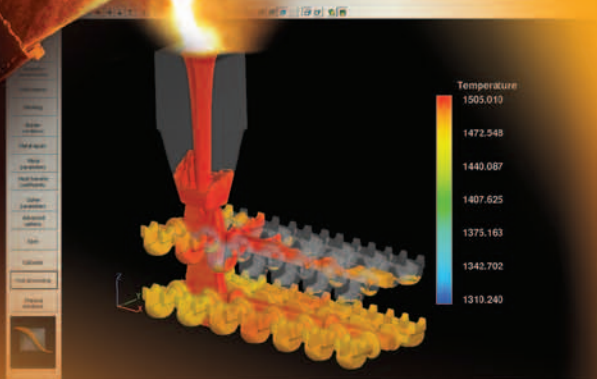


FLOW-3D CAST

*Powerful computational
fluid dynamics software for
accurate casting simulations*



FOUNDRY

Easy-to-use simulation software designed to enhance the productivity and profitability of your foundry

- **Accurately** simulate filling and solidification processes
- **Pinpoint** probable defects and problems – before casting
- **Identify** viable designs more quickly
- **Decrease** the number of design iterations
- **Improve** scrap rates
- **Reduce** overall casting costs

www.flow3d.com/cast

Defect Prediction

With **FLOW-3D Cast**'s powerful defect prediction tools, casting designers can quickly and accurately identify and locate defects allowing parts to be produced with higher quality in a shorter amount of time.

Oxide Formation and Air Entrainment

FLOW-3D Cast predicts where casting defects are most likely to occur, enabling users to improve designs rapidly before production begins. During filling, both defects related to oxidation and defects related to air entrainment can be tracked.

Shrinkage and Interdendritic Feeding

FLOW-3D Cast captures shrinkage due to gravity and shrinkage in the direction of temperature gradients from hot to cold regions to accurately predict the formation of shrinkage porosity.

Dynamic Shrinkage

The recirculation of fluid in thick sections of casting due to temperature variations (natural convection) is important to correctly predict shrinkage.

FLOW-3D Cast simulates the fluid motion in molten locations and transfers the thermal energy with the fluid to accurately capture cooling patterns and porosity formation.

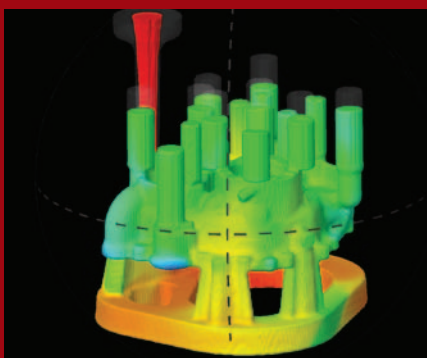
Iron Solidification

The iron solidification model describes the eutectic and near-eutectic solidification of cast irons capturing the formation of austenite, graphite and carbide and the density variations that occur during the cooling process as these different phases form.

Microporosity

Microporosity is the formation of small internal pores that form late in the cooling stage, but before a final solid temperature is reached. **FLOW-3D Cast**'s microporosity model captures the pores that form as pressure drops below saturation.

Accurate Filling Means Accurate Solidification



Precisely simulate the filling pattern using foundry fill curve or ladle pour along with the advection of metal temperature. An accurate filling pattern is essential in obtaining accurate thermal solidification results by computing the correct temperature profile at the end of fill. This is the starting point to further cooling and solidification analysis.

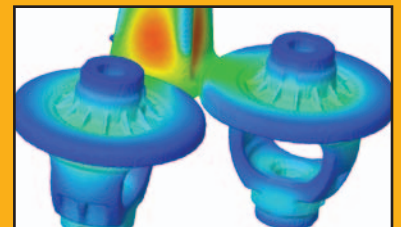
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Gravity pour of a Ball Valve casting of ductile iron. Cutaway view shows defect concentration.



Solidification of ductile iron Ball Valve casting. Shrinkage locations are shown.



Casting colored by local solidification time where the blue regions cooled the most rapidly and the red, the slowest.



A slice view shows internal microporosity in a section. Blue represents no porosity; red indicates higher concentrations.

FLOW Science



BASIC, EXTENDED, ADVANCED

FLOW-3D Cast is available in three versions: **BASIC**, **EXTENDED** and **ADVANCED** and has been translated into multiple languages. Read the features list to find out which version of **FLOW-3D Cast** is right for you.

Dedicated Support

The professionals at Flow Science work closely with end users to understand their needs and ensure that the software continuously meets their real-world challenges. Flow Science offers valuable training to help customers maximize their use of **FLOW-3D Cast**. Most importantly, Flow Science provides accessible, responsive technical support when the need arises.

Flow Science, Inc.

For over 30 years, Flow Science has been an innovator in flow modeling software, serving a global clientele of business, government and academic institutions.

Call **505-982-0088** or email **sales@flow3d.com** for more information about how

FLOW-3D Cast can enhance the reliability and quality of your casting designs and help you reduce overall costs.

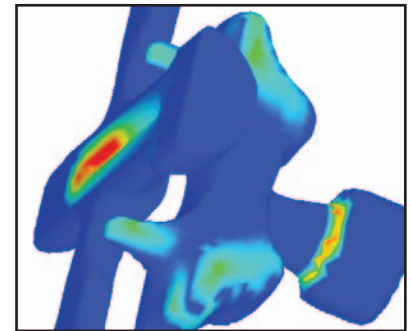
FLOWScience
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Sand Core Modeling Suite

Shooting, Drying & Core Gas Defect Prediction

Core Gas Generation

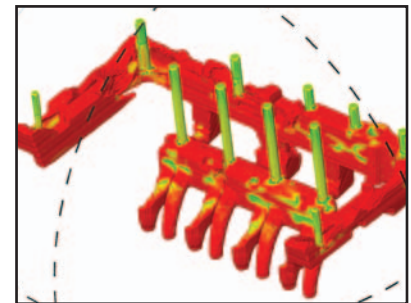
The core gas model predicts the effects of gas generation during the pouring and solidification process for resin-bonded cores. Chemical binders in sand can produce gas when heated by the molten metal and if not vented adequately, the gas may flow into the casting resulting in porosity defects. The core gas model predicts the location and quantity of these gas defects and helps to design core venting that will effectively evacuate all the binder product gas from the cores.



T and Saddle Cores colored by core gas surface flux. Courtesy of Graham-White Manufacturing Co.

Sand Core Blowing

The sand core blowing model describes the behavior of granular media. In particular, it allows users to model the sand core shooting process to help achieve a design that creates a consistent sand distribution with sufficient packing. This model detects incomplete filling and density variations.



Core blowing simulation colored by density.

Moisture Drying Model

The core drying model computes the time change of moisture content remaining in sand after it has been blown into a core die by simulating the blowing of hot air through the core. By simulating heating, evaporation and temporary condensation of moisture in colder parts of the core, the drying process can be optimized to help ensure complete drying while minimizing energy costs.



Defect locations due to incomplete drying. Courtesy of BMW.

*We have had a great deal of success using **FLOW-3D** to predict casting performance, to optimize quality, and to reduce cost by reducing rework, scrap, and lead-time.*

—**Richard Emmerich**, Senior Metallurgical Development Engineer
MetalTek International/Wisconsin Centrifugal Division

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