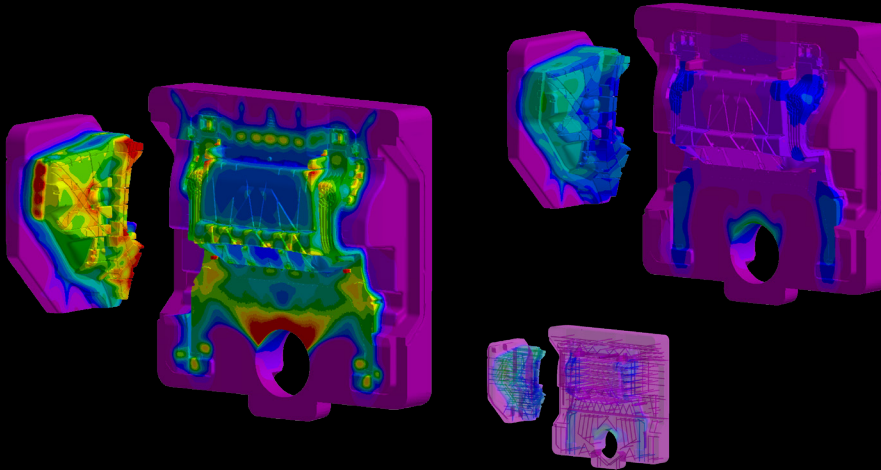


Achieve Sound Quality Castings in Body & Chassis Manufacturing

Through Upfront Virtual Engineering of the (High Pressure) Die Casting Process

In manufacturing, precision and cost efficiency are paramount.



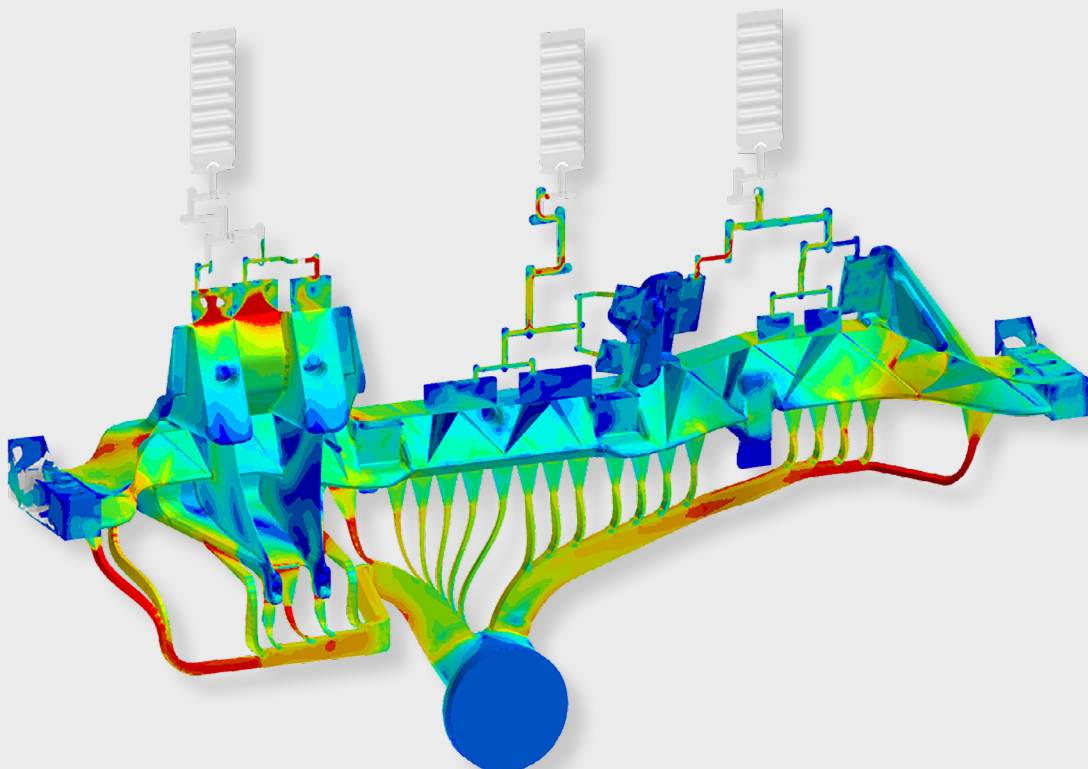
During the casting process, defects can occur at any stage. Physical try-outs of the engineered process, without prior simulation, can result in unexpected issues, producing unusable parts. In worst-case scenarios, where process adjustments fail to achieve the desired quality, new tool and cooling channel designs become necessary, incurring significant costs and delays.

Engineer and Optimize the (High Pressure) Die Casting Process with Accurate Simulation Software

As defects can occur at any stage, it is not only key to accurately model all the physics involved in the process, like the characterization of the cast alloy during the different phases and the heat transfer between alloy and tool, but also model the entire process from beginning to end.

This modeling starts with pre-heating the tools to get a repeatable temperature cycle, the filling of the molds with real-time piston control, the in-mold solidification, opening of the tools, part ejection, trimming and final cooling on air, optionally followed by a post-cast heat treatment process.

Modeling the die casting process from beginning-to-end ensures **precise defect prediction** and therefore allows optimal tool and process design, reducing reliance on costly and time-consuming physical prototypes and try-out.



Key Applications

Evaluate **unlimited design alternatives** at an early stage.

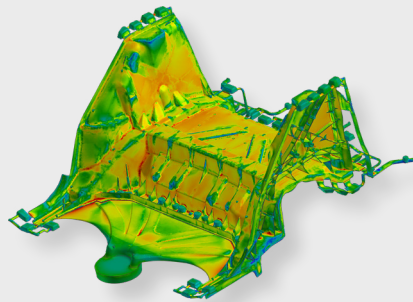
Deliver almost **immediate castability feedback** to part designers.

Design and optimize the dosing and injection system.

Analyze the mold design considering thermal cycling, dosing, shot piston and third stage effects.

Align **die temperatures** with reality.

Minimize the process cycle time for **optimal productivity**.



Accurately determine the minimum required locking force.

Spot, measure and take effective actions to **avoid shrinkage porosity** in the part.

Predict the geometrical distortions and overlay with the nominal shape for **virtual dimensional control**.

Verify the **stress cycles** in the die for estimation of the die fatigue life.

Analyze the **final part performance** with as-cast or post-cast heat treatment conditions.

Determine in-depth the **cooling channel effectiveness** through coupling to accurate flow conditions considering local heat transfer coefficients.

Select the right die casting machine by **linking the simulation to real-casting machine behavior** allowing accurate piston control.

Unlock Manufacturing Potential:

Key Values of ESI's Casting Simulation Software (ProCAST)

Improve Design Efficiency:

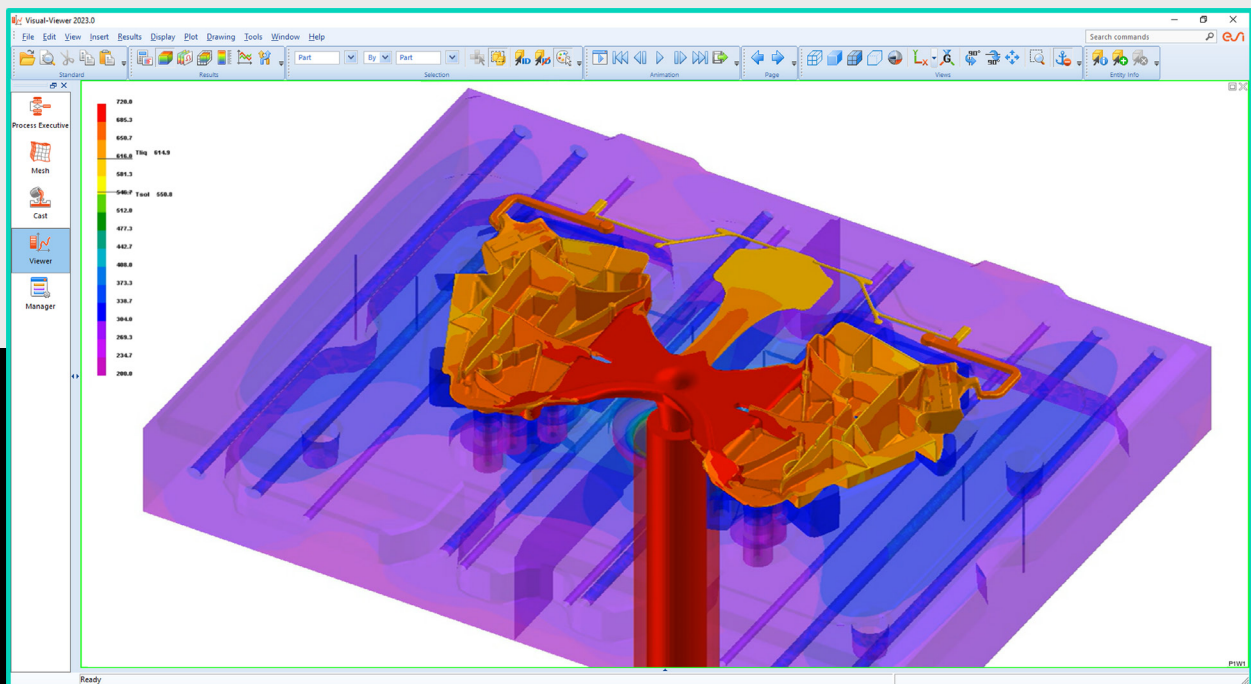
Reduce lead time by giving **early design feedback** resulting from full process cycle analysis to understand the impact of each stage on the final part quality. Evaluate numerous design alternatives, align die temperatures with reality, optimize injection & cooling systems, prevent shrinkage porosity inside the part, and forecast mechanical properties and die fatigue life.

Drive Profitability & Obtain

Time Savings: Increase margins by avoiding costly and late mold design modifications and **minimizing physical try-out** iterations, reducing waste by optimizing the yield and improving production rates.

Deliver Sound Quality

Castings: Predict and **eliminate manufacturing defects** like misrun, inclusion, air entrainment, shrinkage porosity, cracks, hot tear and excessive distortion well before physical try-out.



Optimize Equipment and

Process Settings: Select the right die casting machine by accurately predicting the minimum required locking force by including the air back-pressure, conduct unlimited virtual try-outs, and engineer the **optimal process route**.

Improve Innovation Power

for Mega Castings: For these extremely high-cost components and molds, **prevent expensive errors** and modifications by ensuring perfect design from the beginning and minimize risk of delaying the start of production by not being able to deliver the parts.

Discover how ESI's Casting Simulation (ProCAST) can revolutionize casting processes.

Casting Simulation Software:



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© ESI Group, a part of Keysight Technologies, provides reliable and customized solutions anchored on predictive physics modeling and virtual prototyping expertise. Acting principally in automotive, land transportation, aerospace and defense, and heavy industry, ESI software enables engineers to simulate mechanical designs, smart manufacturing processes, and human-centric workflows to make better decisions earlier in the product lifecycle.

Keysight is an S&P 500 company delivering market-leading design, emulation, and test solutions to help engineers develop and deploy faster, with less risk, throughout the entire product lifecycle.

For further information, go to: www.esi-group.com