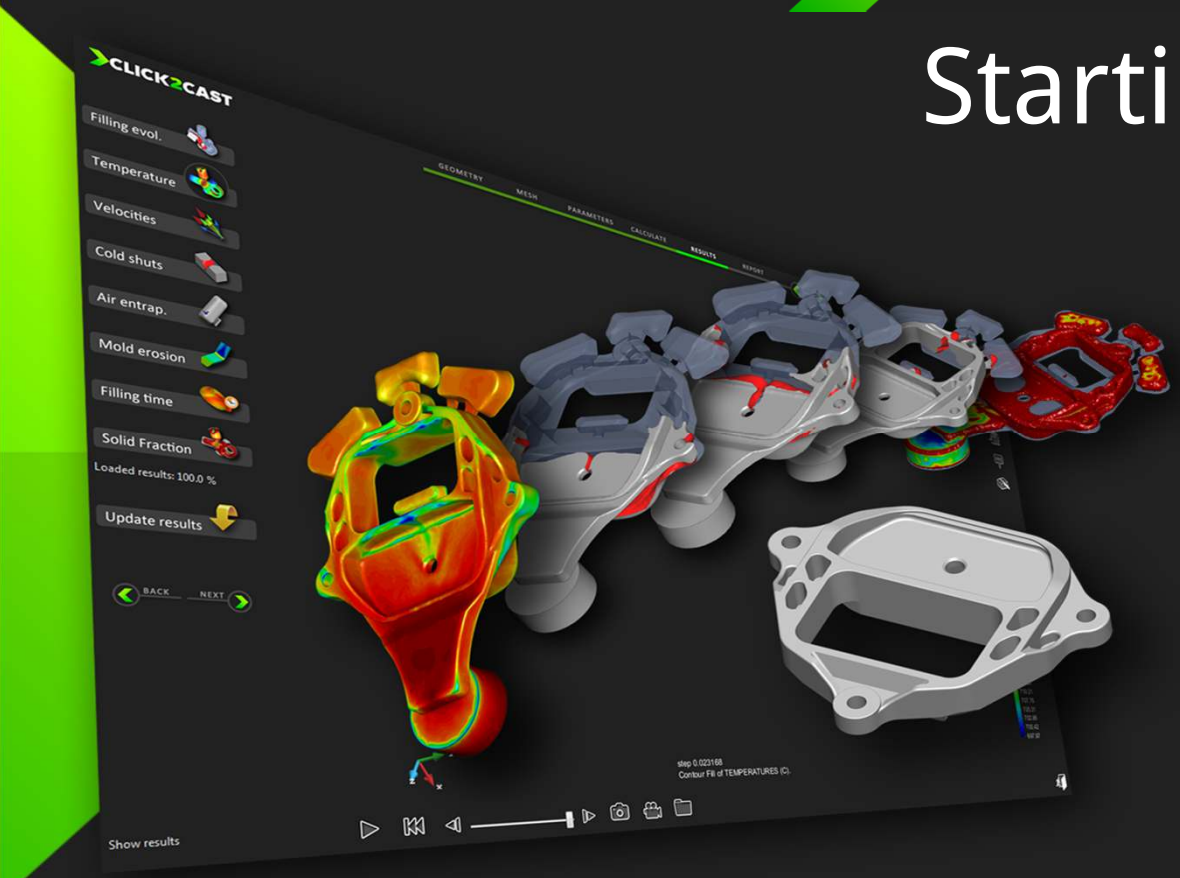
CLICK2CAST

Starting EASYmulation



QUANTECH ATZ
www.quantech.es

CLICK2CAST
The EASYMulation

Contents

- Company Overview
- What's C2C?
- Concept
- The technology
- A deep dive on key features
- Live Demo
- Q&A Session

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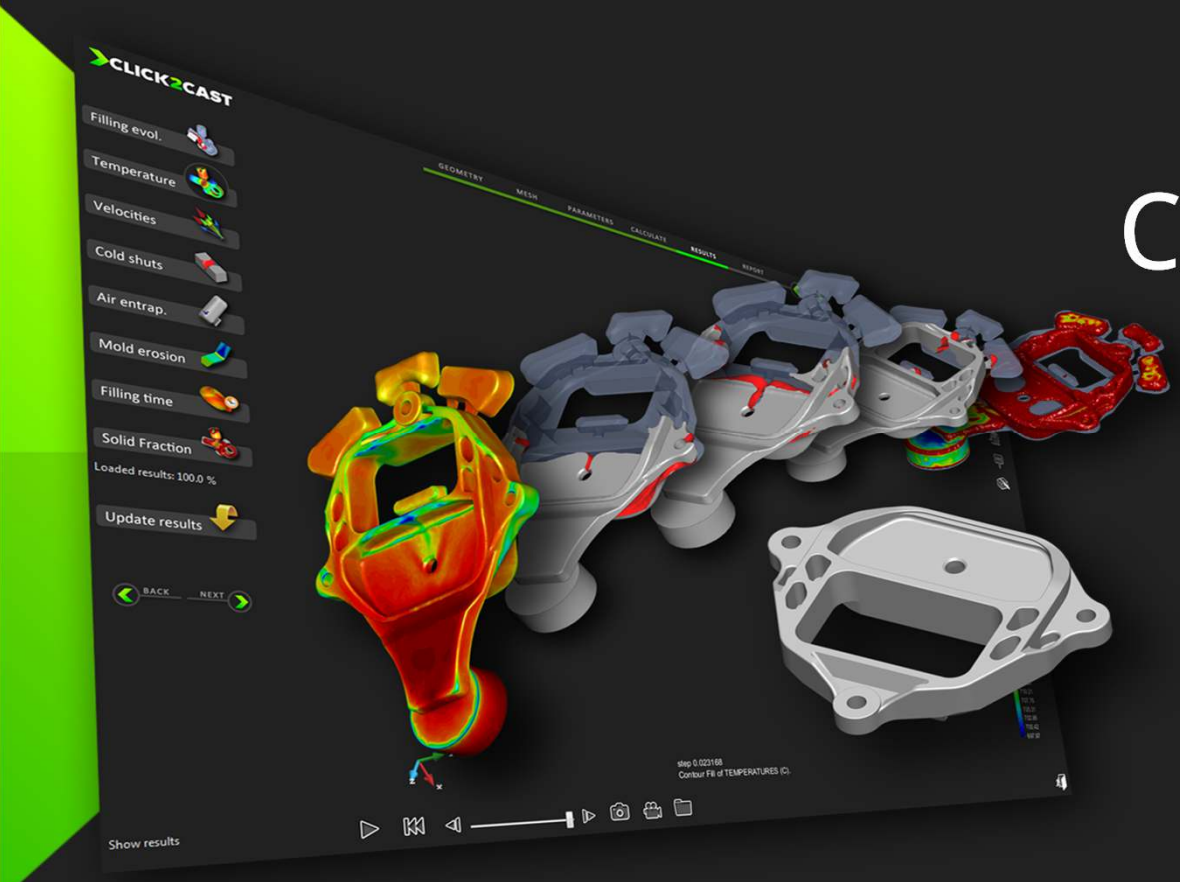
The EASYMulation

Company Overview



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Company Overview

Quantech is Stablished on Barcelona in 1996 by a group of professors of the UPC and researchers of CIMNE.
THE MISSION of this new company is Impulse, develop and distribute simulation software solutions to manufacturing industrial processes.

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Universidad Poitecnica de Catalunya

UPC

+

CIMNE

International Centre for Numerical Methods in Engineering

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Company Overview

Needs, Ideas and Concepts

Products and services

Technology Innovation

Results and publications

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Technology and prototypes

CIMNE

Technology transfer agreement

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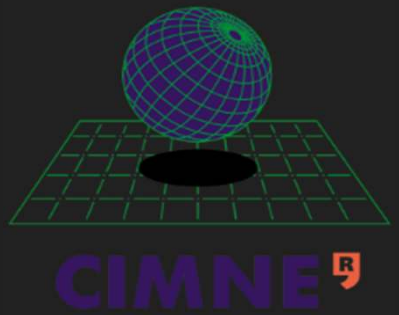
Company Overview



International Center for Numerical Methods in Engineering

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The EASYMulation

Company Overview

25 YEARS

EXPERIENCE IN Numerical METHODS

10 YEARS

EXPERIENCE IN CASTING SIMULATION

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The EASYMulation

Company Overview

Scientific Societies

CIMNE

International Center for Numerical Methods in Engineering

Sociedad Española de Métodos Numéricos en Ingeniería

SEMNI was created in 1989 with the objectives of promoting the development, application and dissemination of numerical methods in engineering and applied sciences in Spain. The Secretariat of SEMNI is located at CIMNE premises in Barcelona.

International Association For Computational Mechanics

CIMNE holds the General Secretariat of the Spanish Association for Numerical Methods in Engineering.

Unesco Chair of Numerical Methods in Engineering

CIMNE holds the General Secretariat of the International Association for Computational Mechanics.

European Community on Computational Methods in Applied Sciences

CIMNE holds the Secretariat of the European Community on Computational Methods in Applied Sciences.

European Research Community On Flow, Turbulence And Combustion

CIMNE is a Pilot Centre for the European Research Community in Flow, Turbulence and Combustion.
ERCOFTAC Spanish Pilot Centre

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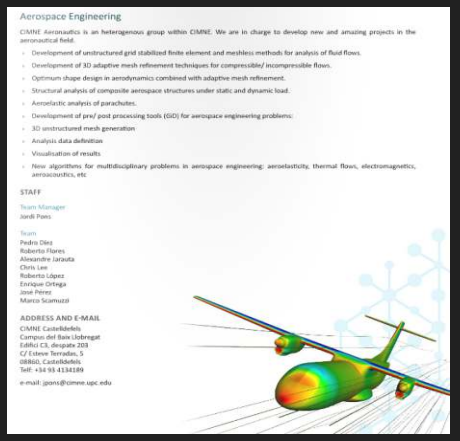
Company Overview

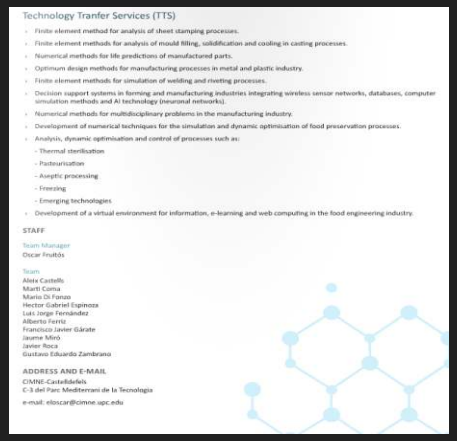
R+D Projects

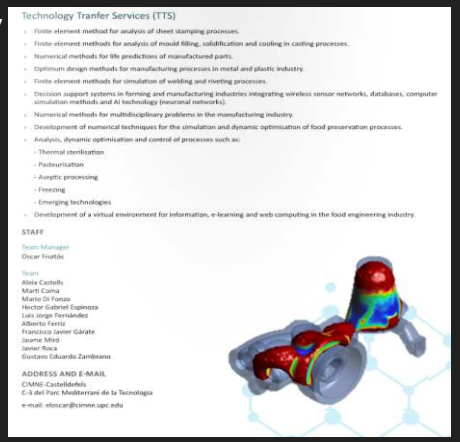
CIMNE

International Center for Numerical Methods in Engineering

- AeroSpace
- Biomedical eng.
- Civil Eng.
- Naval and Marine eng
- Tech. for Industry
- Building and Energy
- Environment
- Social and Economical
- Information and Communication







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Company Overview

Quantech Activities

1.- Impulse, develop and distribute standard software

Stampack® Vulcan® CLICK2CAST

2.- Development of customized industrial simulation software

3.- High level simulation consultancy and training

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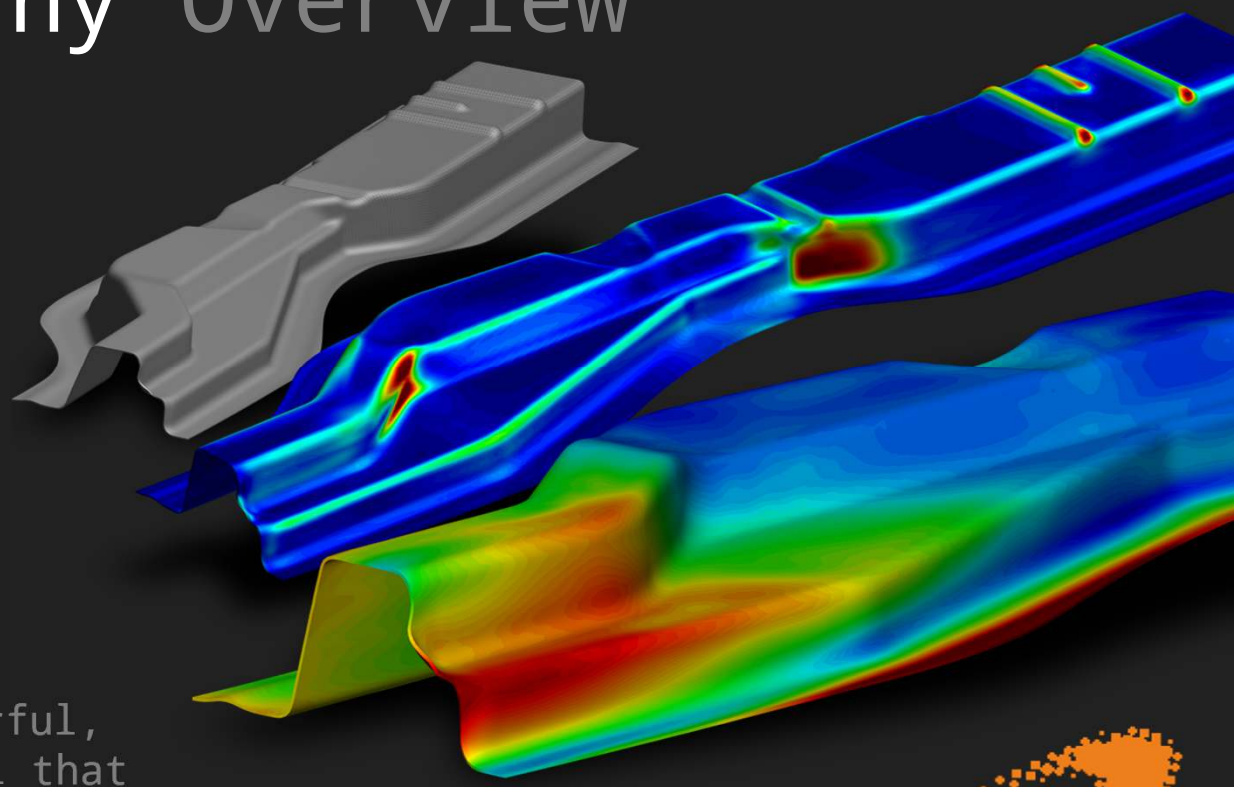
Company Overview

Stampack

Stampack is a FEM software for the simulation of the sheet metal and tube metal forming processes found in the automotive, aeronautics/aerospace, metal packaging, home appliance, electronic instruments and other sectors.

Stampack is an economical, powerful, specialized and a versatile tool that quickly and accurately optimizes your metal forming processes to improve the productivity and reduce cost.



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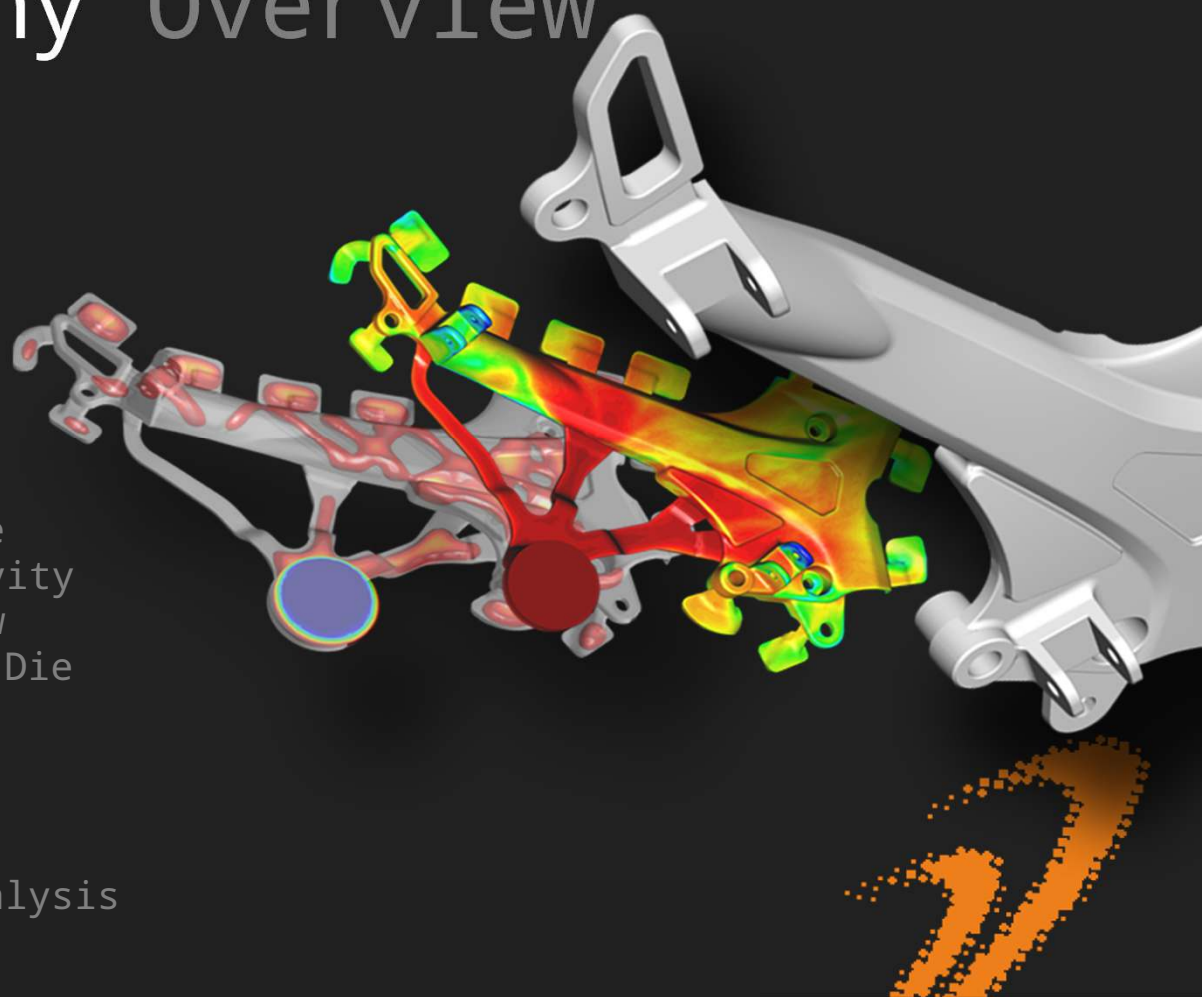
Company Overview

Vulcan

Vulcan is a Finite Element software designed as a defect-prediction tool for the foundry engineer, in order to correct and/or improve the entire casting process, even before prototype trials are produced.

Every pouring technology used in the foundry industry is considered: Gravity sand and permanent mold Casting, Low Pressure Die Casting, High Pressure Die Casting, as well as every working processes: filling of the mold, temperature field analysis, flow turbulences, evolution of the solidification. Thermomechanical analysis modules are also available.

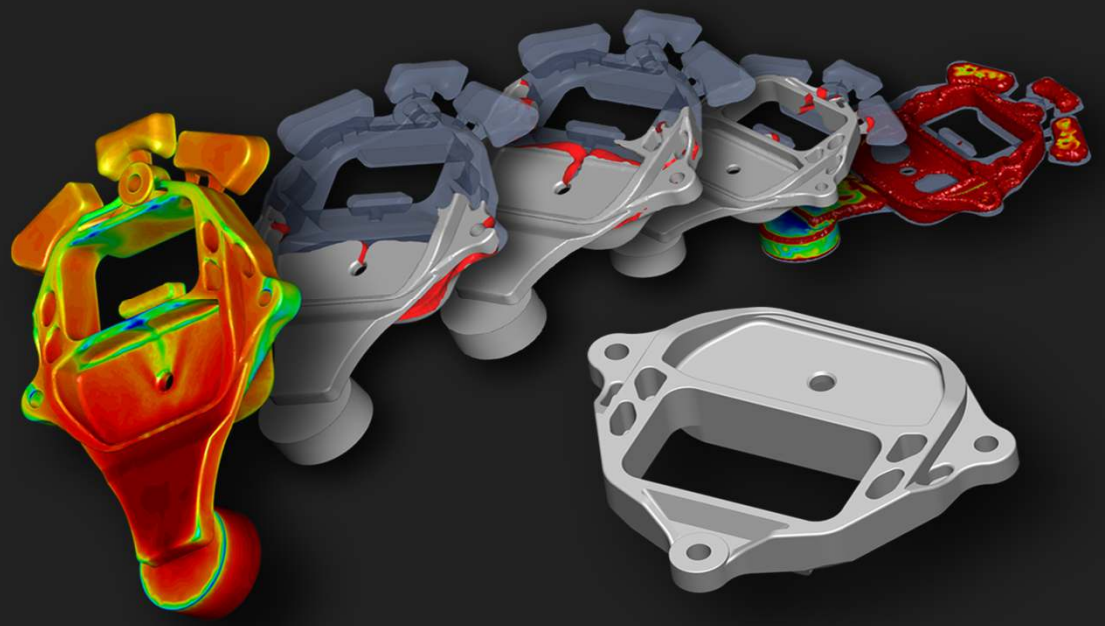


CLICK2CAST
The EASYMulation

Company Overview

CLICK2CAST

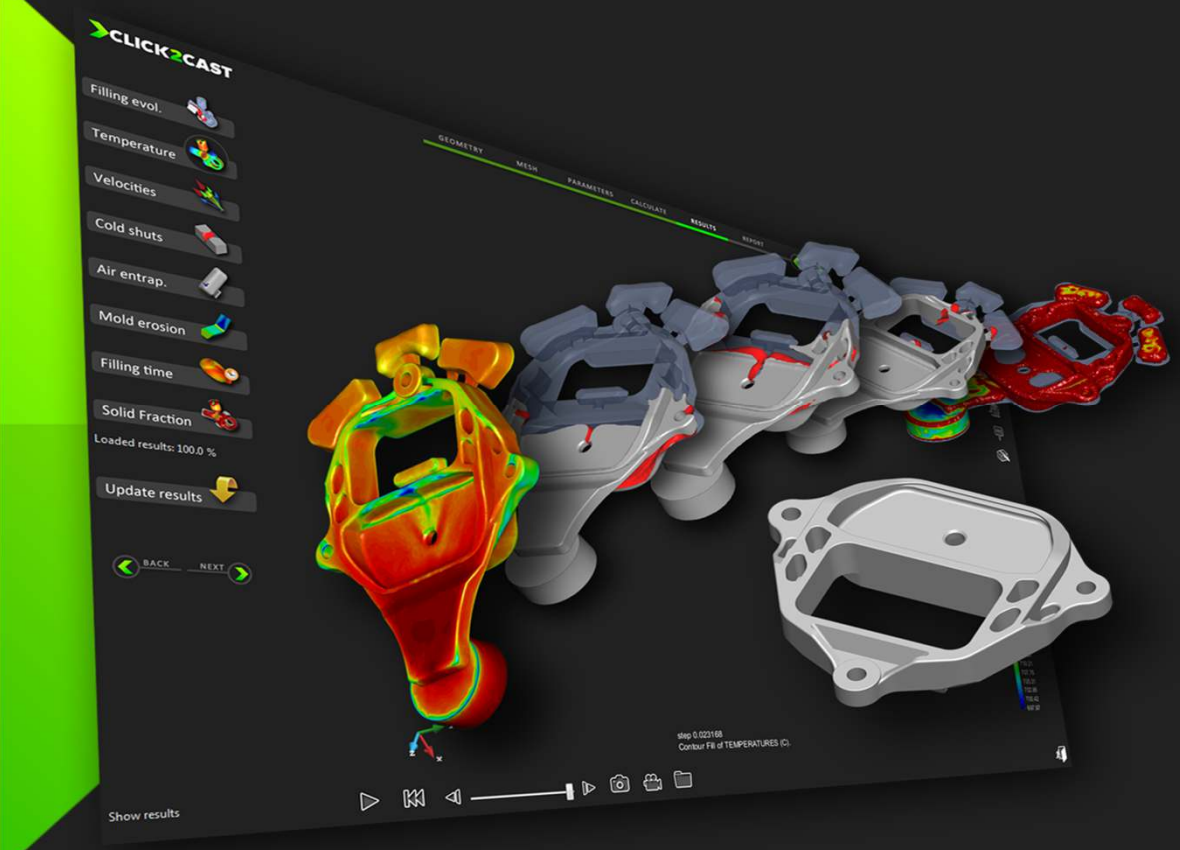
Click2Cast is a casting process simulation software developed around the concept of EASYmulation that allows the user to enhance and optimize their manufactured components avoiding typical casting defects such as air entrapment, porosity, cold shots, etc. thanks to the simple and quick mould filling simulation.



Click2Cast offers an innovative user experience allowing the complete simulation to be done in 5 simple steps and through a completely new and user-friendly interface.

The

CLICK2CAST
The EASYMulation

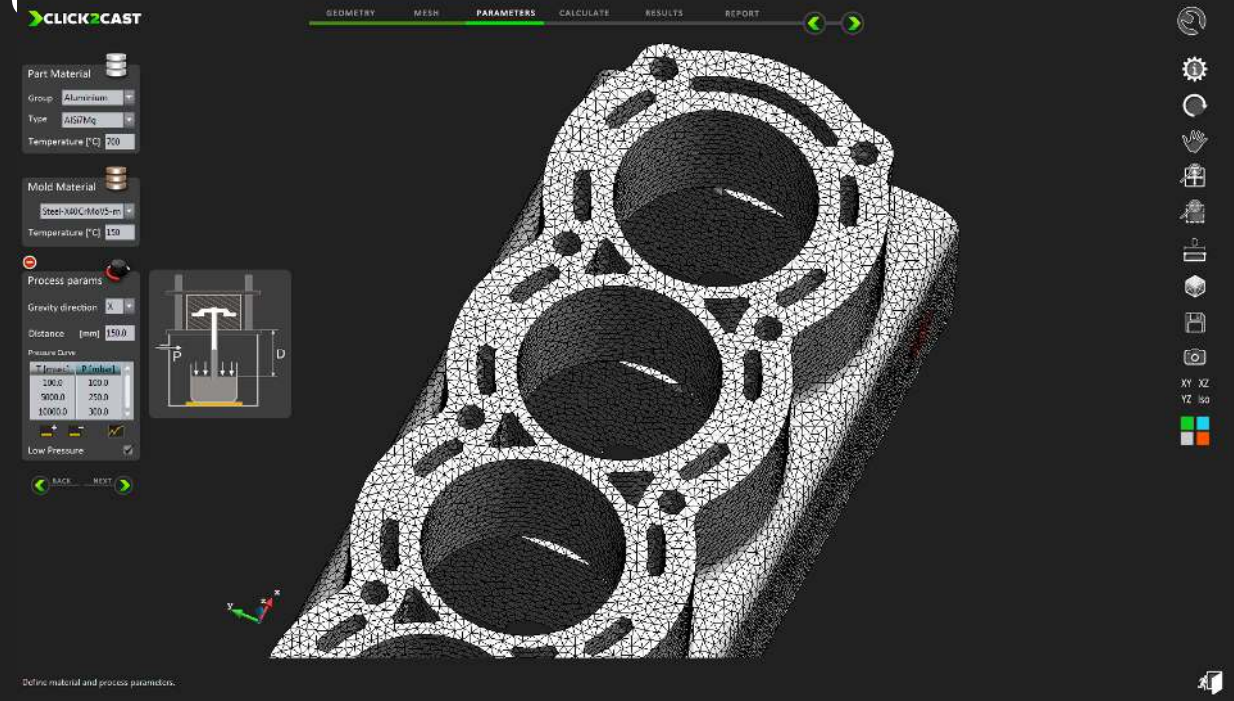


What is C2C

CLICK2CAST
The EASYMulation

What is C2C

SIMULATION-Driven Design software for casting



HPDC – LPDC

GRAVITY SAND

PERMANENT MOLD CASTING

CLICK2CAST
The EASYMulation

What is C2C

What's new?

- Move the simulation process closer to design stage.
  - Avoid iterations between Design and Production
  - Limited investment High ROI
  - Easy-to-use: Starting simulations avoiding complex trainings

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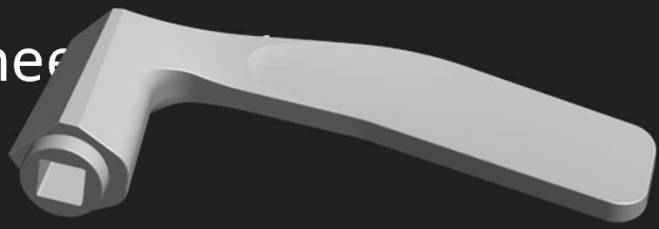
The EASYMulation

What is C2C

Traditional:

– How good is my shot design?

It's when I'm start designing that I nee



…where: Ingate positioning.

…where: Feed and Risers and wich size?

…how large: Continuous ingate or fan ingate

…where it vents: Overflows

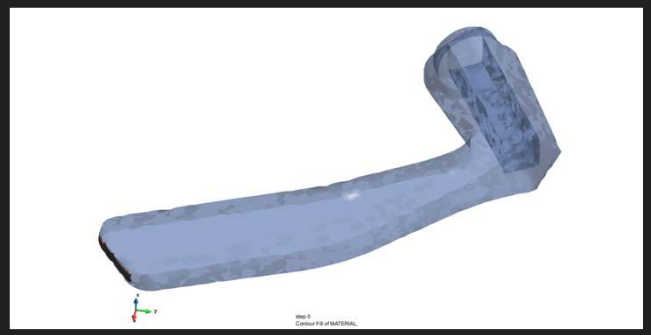
…balance: multicavity mold

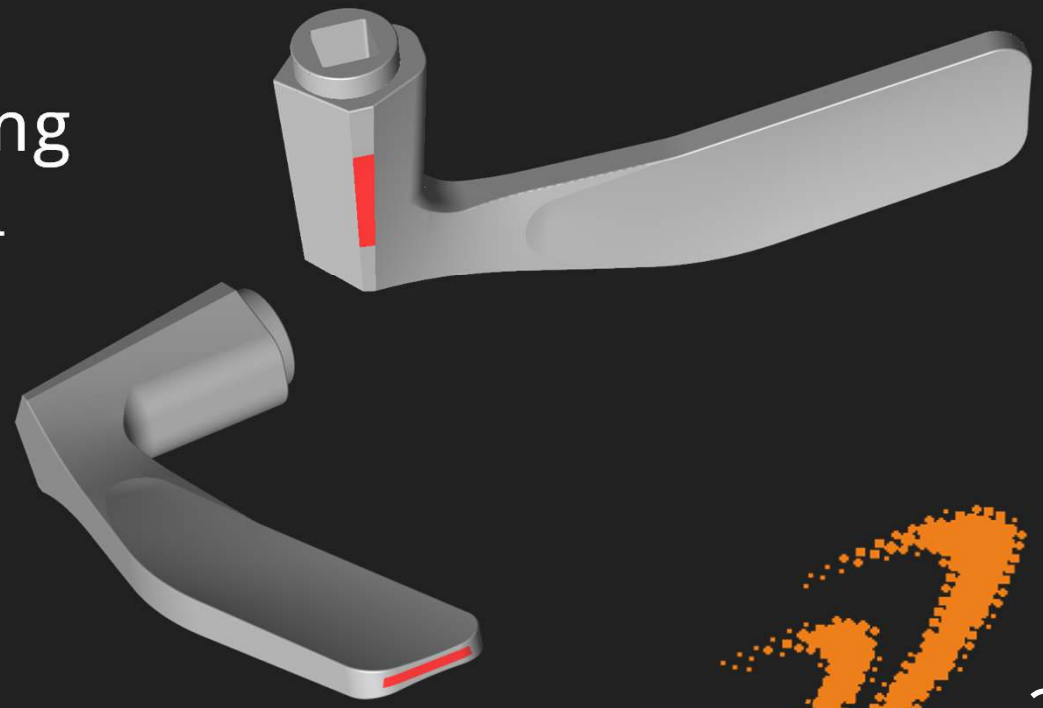
CLICK2CAST
The EASYMulation

C2C Concept

A different approach to simulation

InGate Position testing based on the initial component.



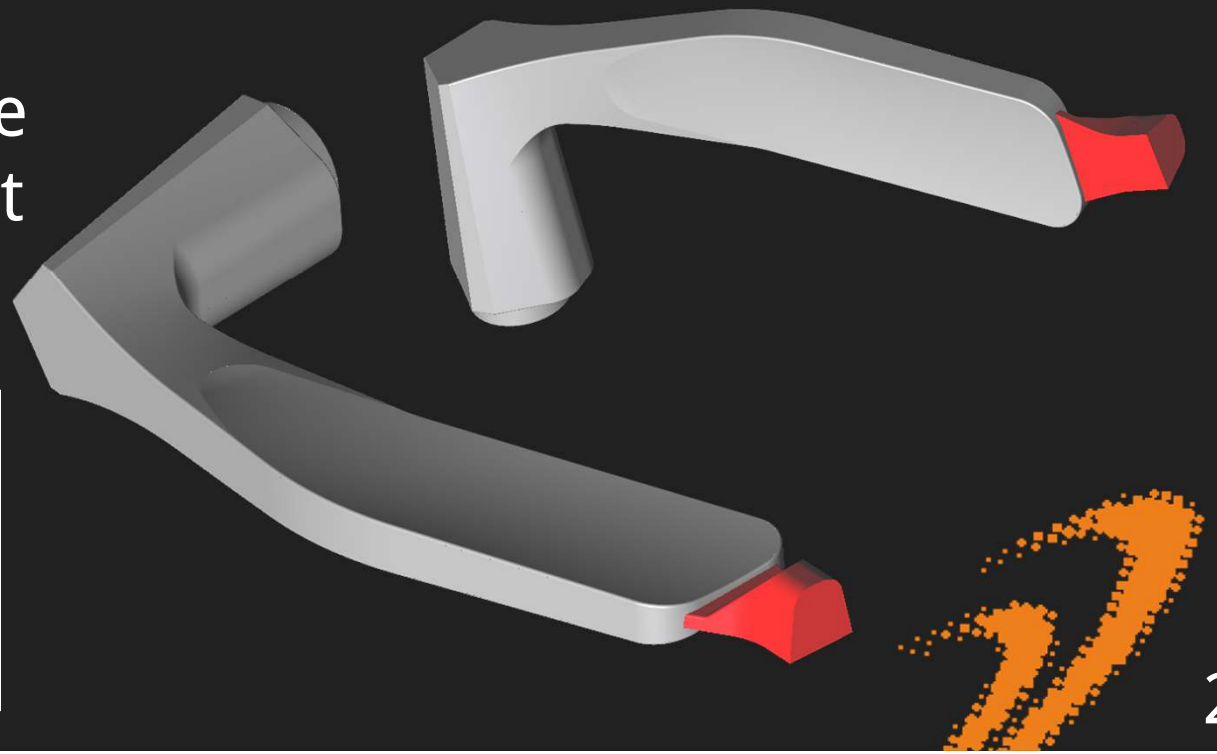


CLICK2CAST
The EASYMulation

C2C Concept

A different approach to simulation

Validation of the InGate position by using a part of the runner

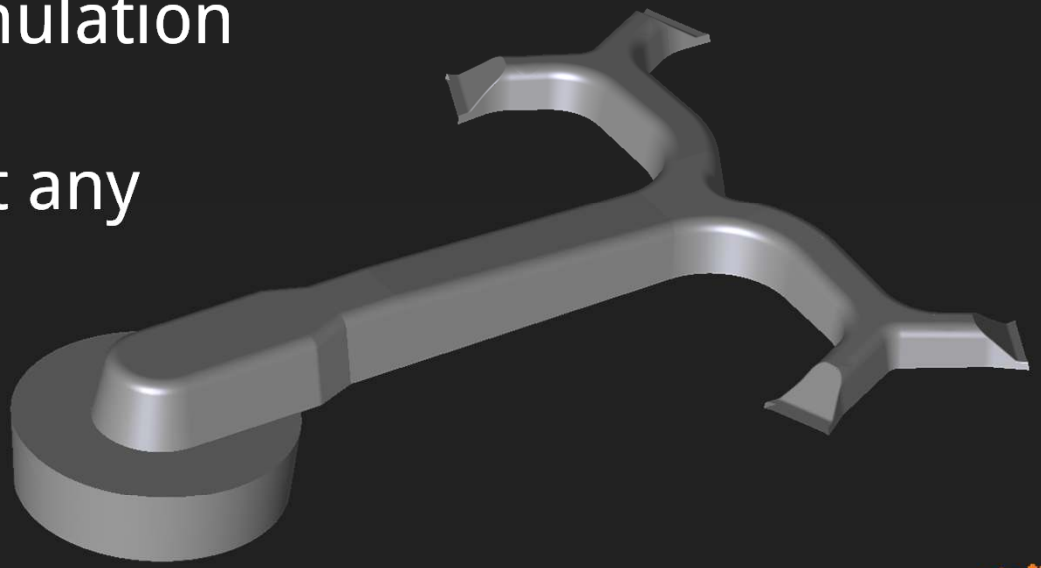


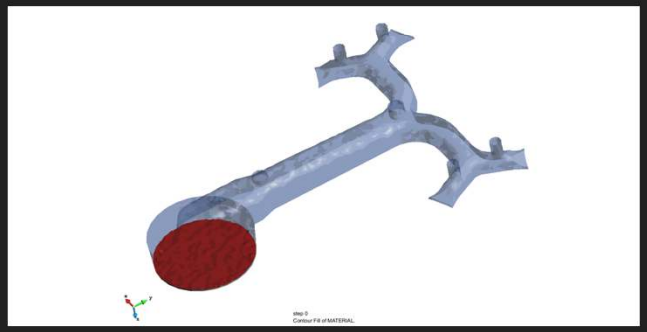
CLICK2CAST
The EASYMulation

C2C Concept

A different approach to simulation

Testing the Runner without any component.



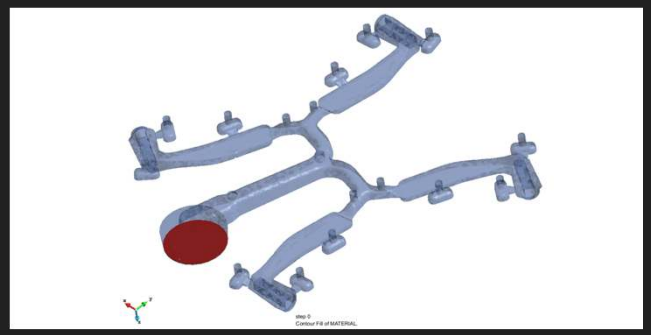


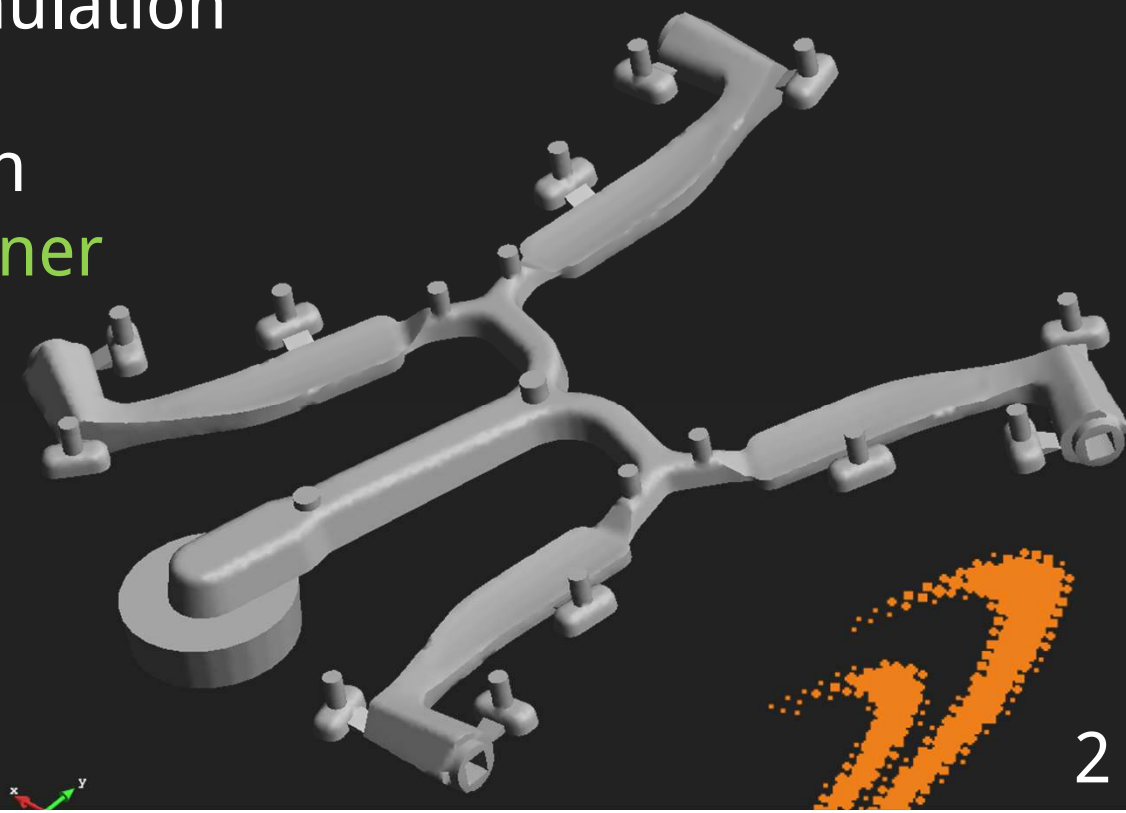
CLICK2CAST
The EASYMulation

C2C Concept

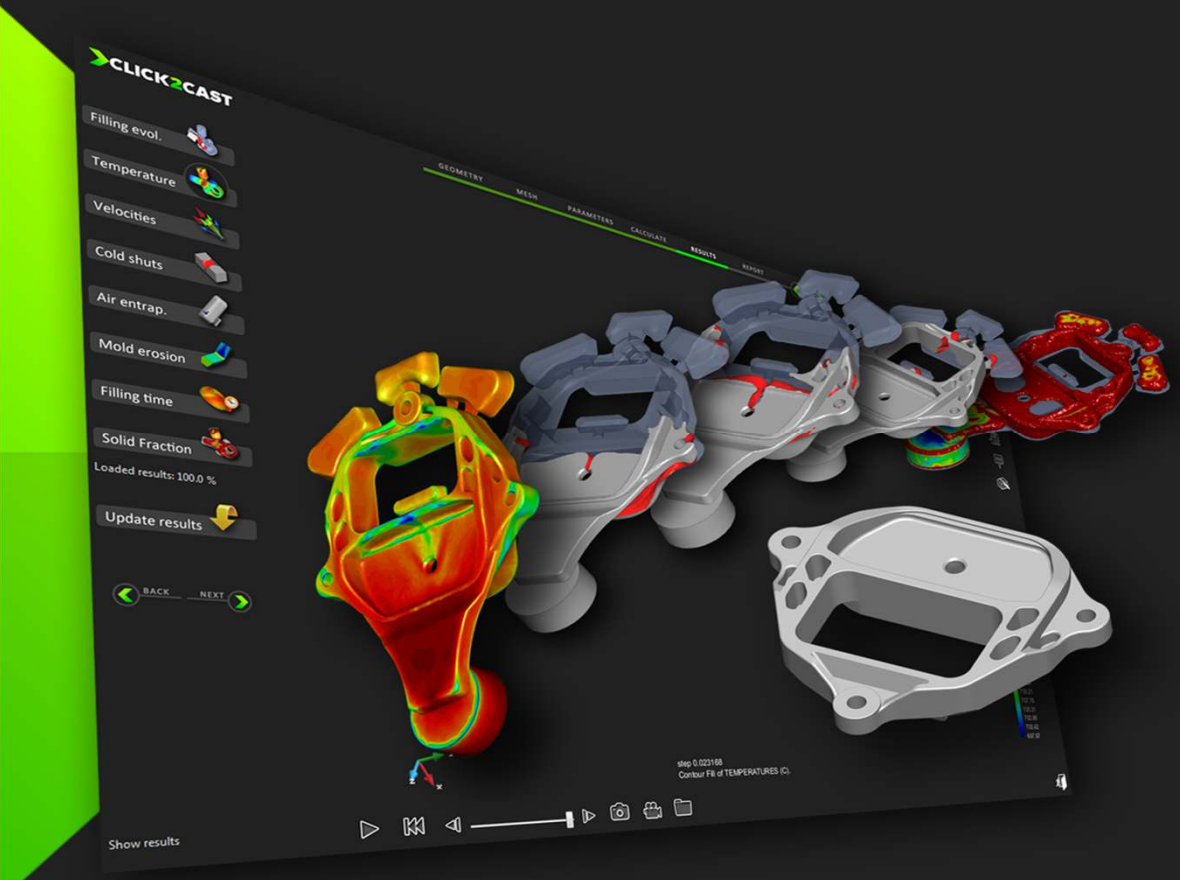
A different approach to simulation

Validating the full design considering 4 cavities, runner and overflows.





CLICK2CAST
The EASYMulation



C2C Technology

CLICK2CAST
The EASYMulation

C2C Technology

What is EASYmulation?

EASYmulation is a new concept developed to increase the usability of simulation software in this case, apply to casting industry

EASYmulation means easy to use simulation, with no training needed, no high technical complexity and no needs of qualified staff.

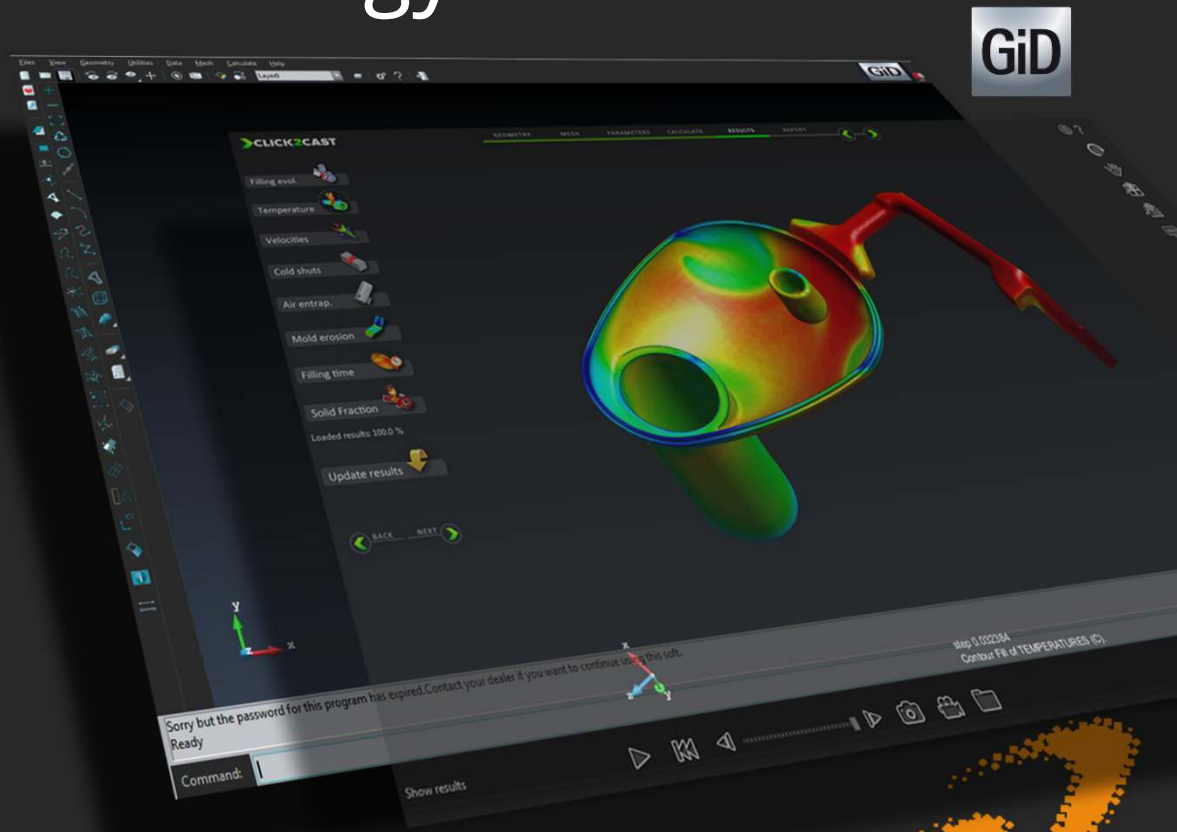
EASYmulation allows saving time and money, moving the current complex simulation processes to only 5 simple steps from opening the model to analyze the results

CLICK2CAST
The EASYMulation

C2C Technology

What isunderClick2Cast?

Click2Cast interface was developed over the Pre and Post processor GID v11, taking profit of all the possibilities that GID provides in the very last version.
Solvers inside click2cast are the most advanced technology developed in CIMNE for Fluid Dynamics and Thermal simulation by using FE methods.



CLICK2CAST
The EASYMulation

C2C Technology

What is On Top Of Click2Cast?

Click2Cast interface was created for the industry.
It is not developed in Fortran or C++… it was developed in “Casting language”.

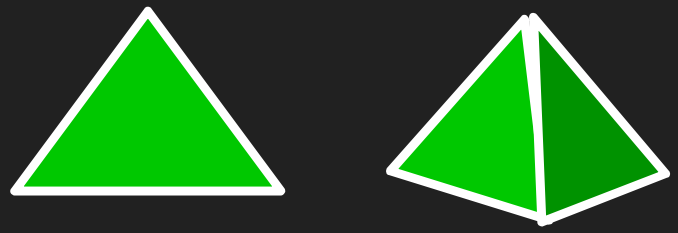
Even this is a High-tech FE software simulation, in any stage the user needs to interact with unknown parameters such us Courant number or Convergence tolerances.

Every word in the interface comes from the casting process world.

C2C Technology

Why FEM…?

- Click2Cast is based on Finite Element technology (FE)
  - Geometry approximation is done by using 3 nodes triangles and 4 nodes tetrahedral elements

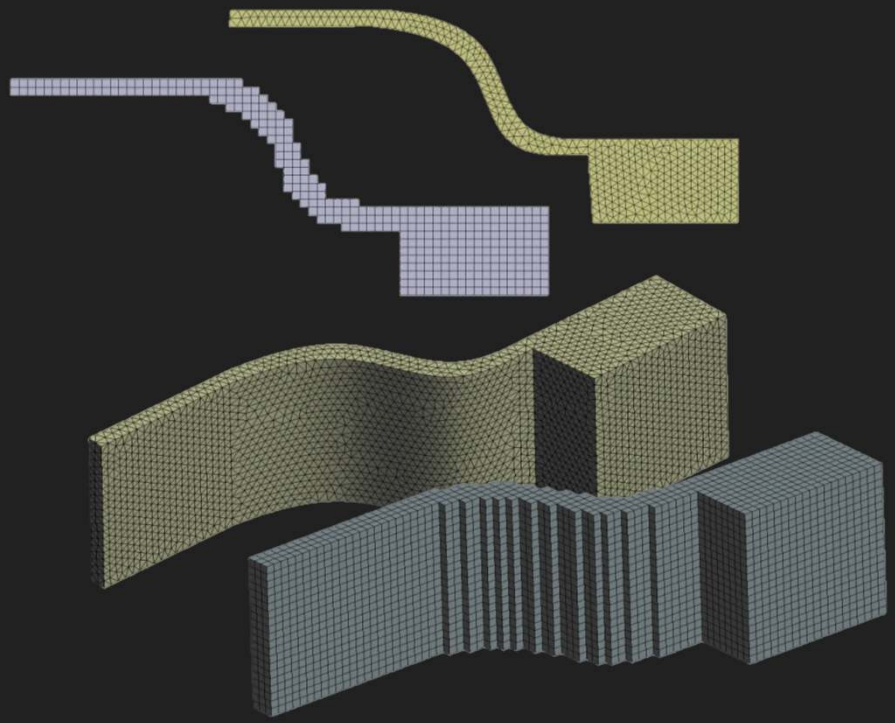


Accurate for any kind of geometry, allowing local refinement

CLICK2CAST
The EASYMulation

C2C Technology

Why FEM…?



- FE allows local Refinement
- FE Mesh allows the contact simulation (Thermo-mechanical Analysis)
- FE mesh gives better accuracy by using the same element size
- FD Mesh generation is faster and easier. No need to repair Geometry

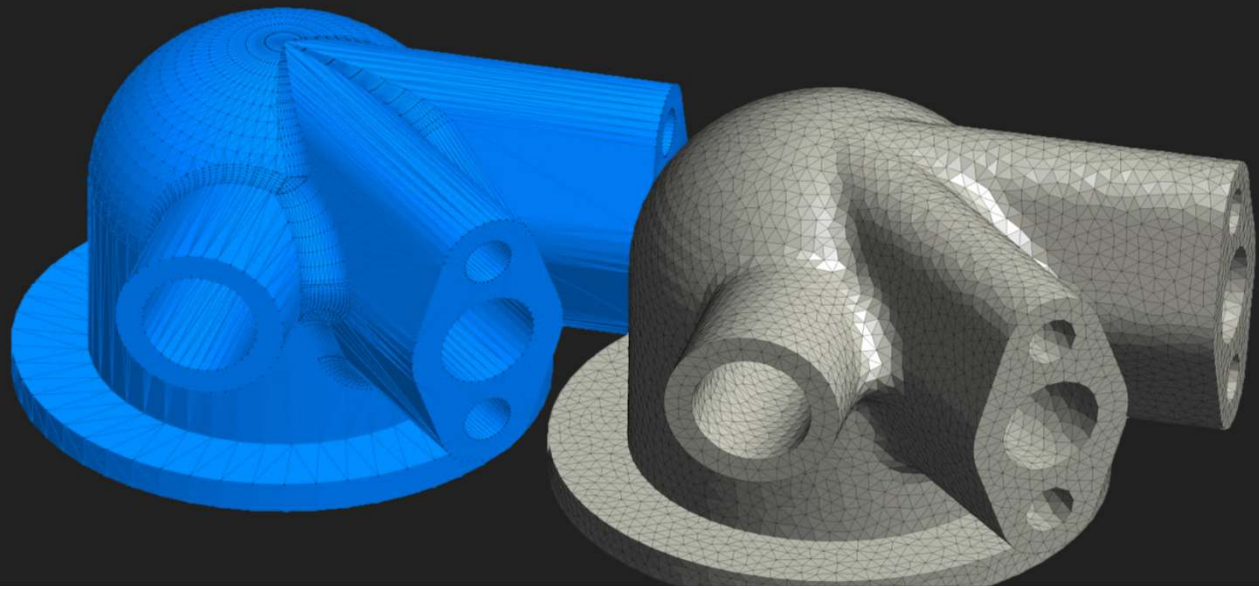
If C2C is using FE,
It is necessary to prepare/repair the Geometry?

CLICK2CAST
The EASYMulation

C2C Technology

Why FEM…?

Click2Cast integrates a new and innovative mesher that allows the user to forget about complex operations to mesh the model using FE. The user only needs the geometry in STL format and Click2Cast will do the FE mesh automatically.



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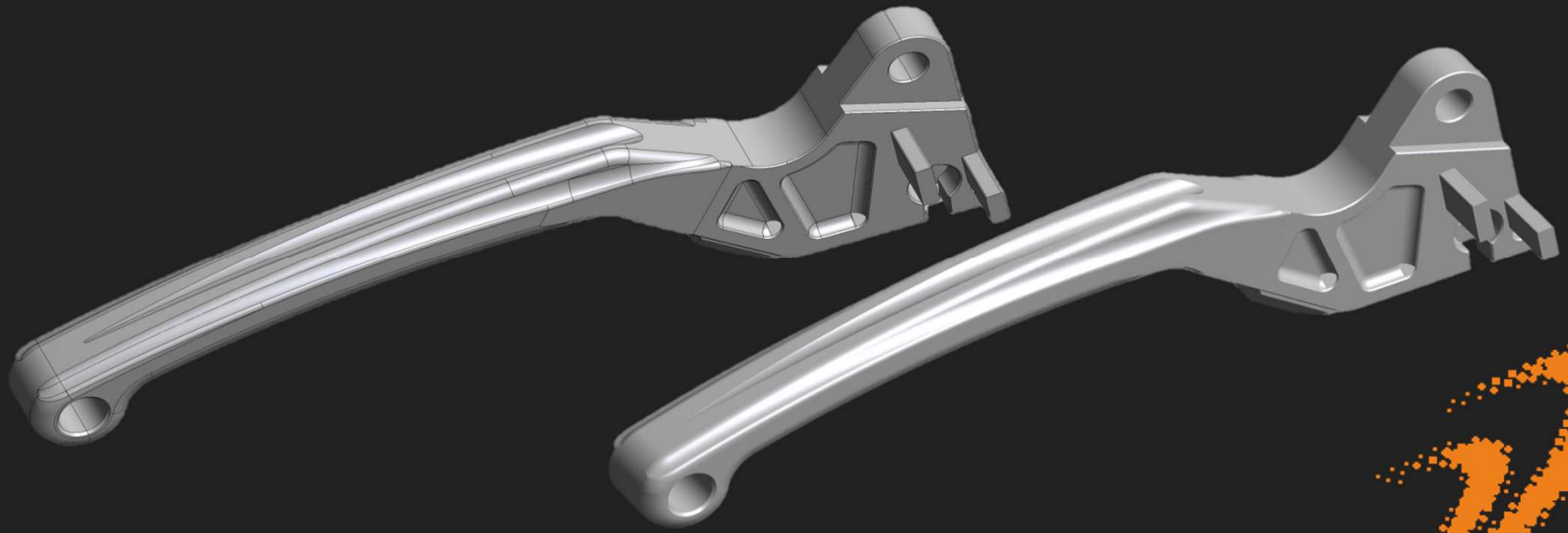
C2C Technology

The meshing tool.

Comparing C2C meshing tool vs. typical meshers.



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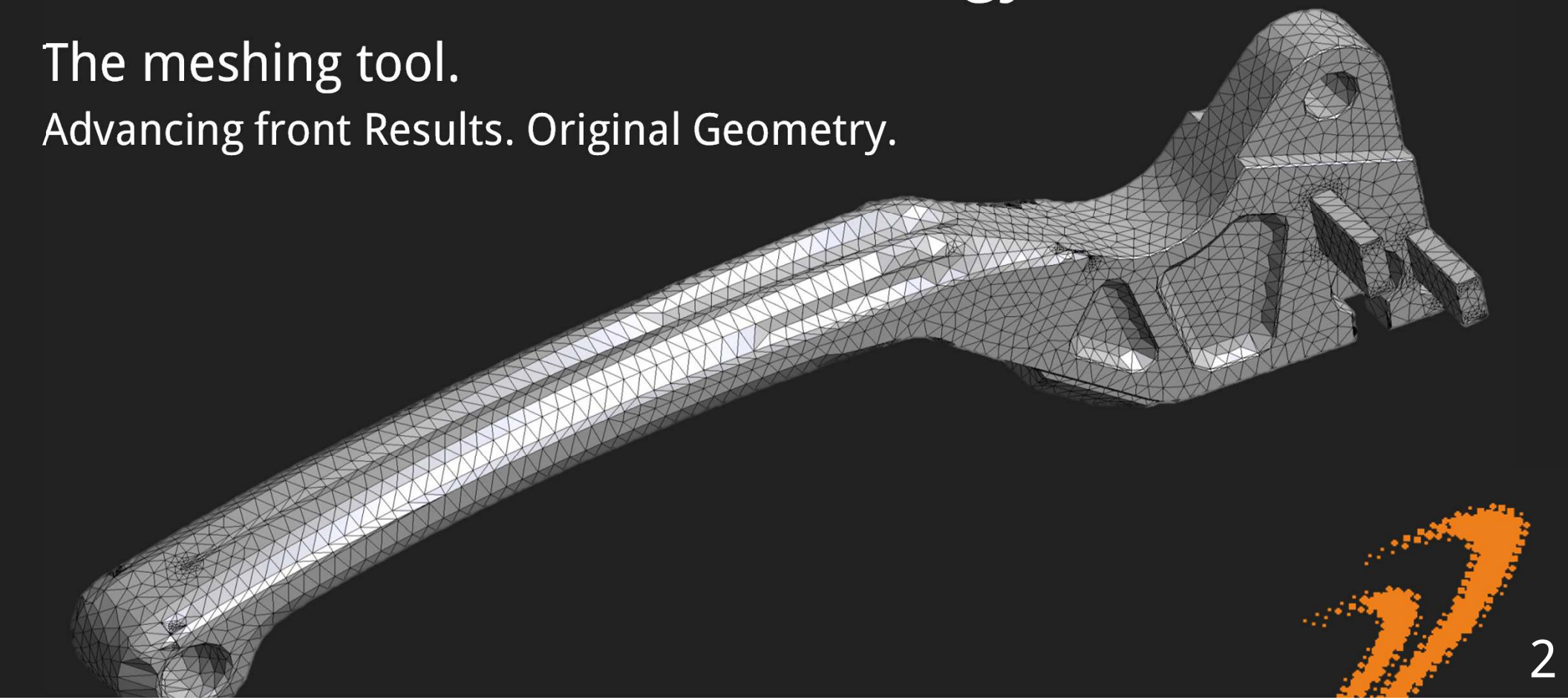
The EASYMulation

C2C Technology

The meshing tool.

Advancing front Results. Original Geometry.



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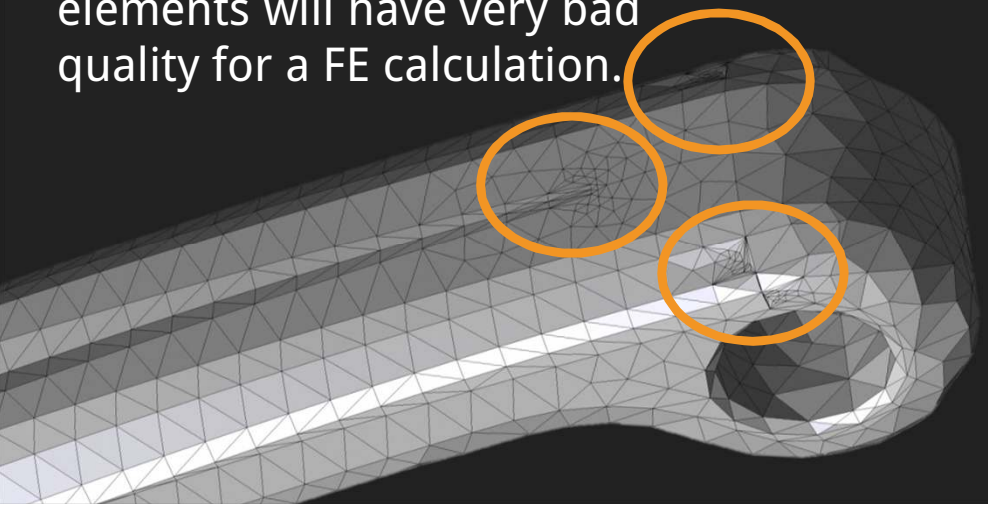
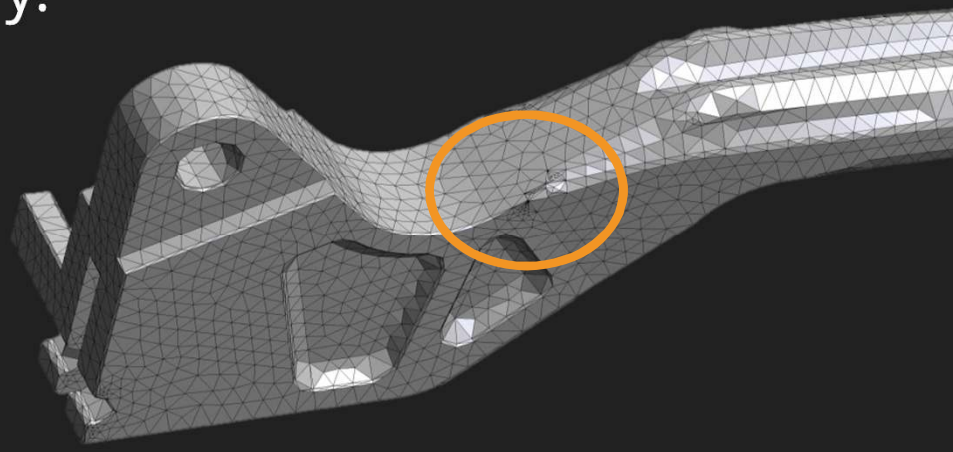
C2C Technology

The meshing tool.

Advancing front Results. Original Geometry.

In all this critical areas, the volume mesh generation will be difficult and the generated elements will have very bad quality for a FE calculation.





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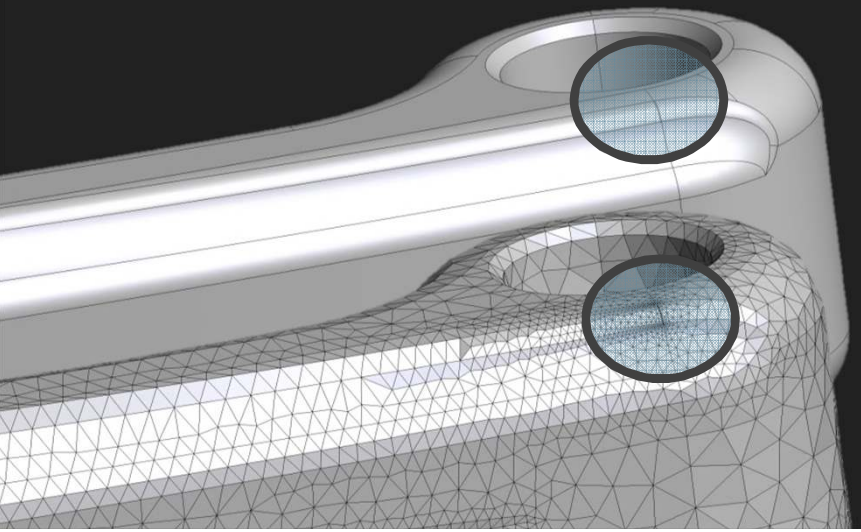
The EASYMulation

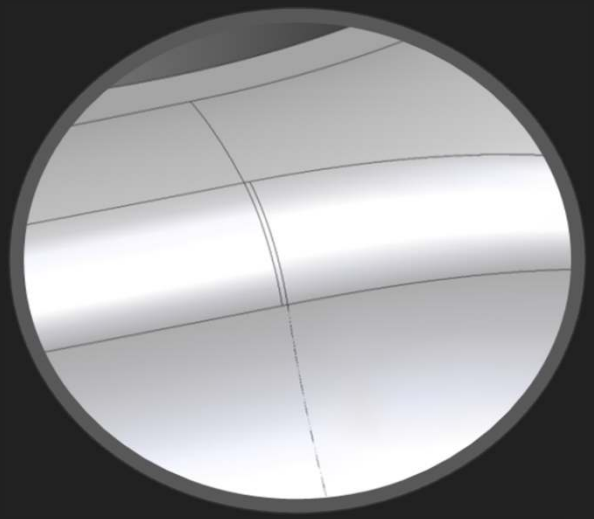
C2C Technology

The meshing tool.

Advancing front Results. Original Geometry.

Advancing front creates the mesh based on the geometry entities.





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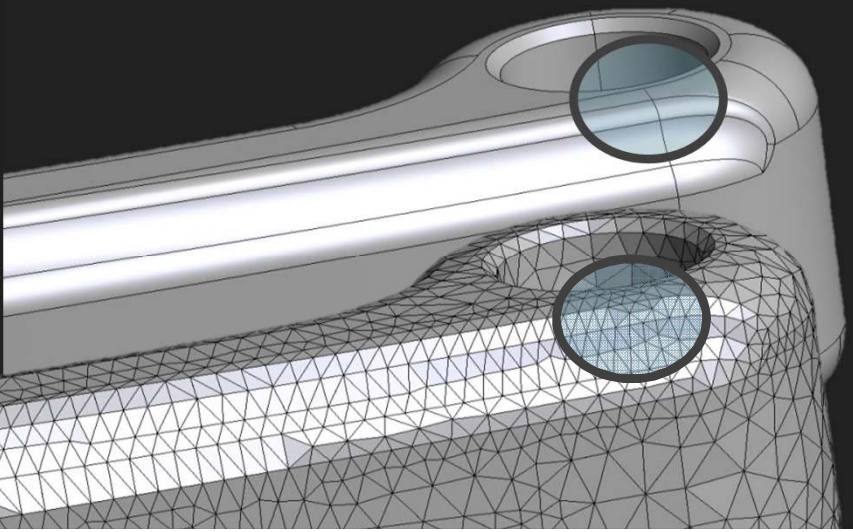
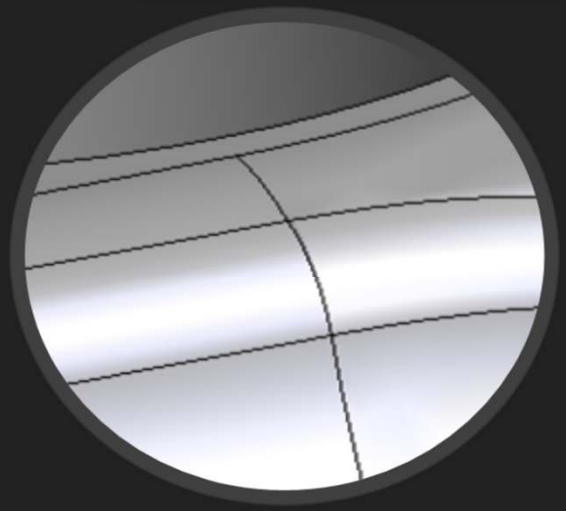
C2C Technology

The meshing tool.

Advancing front Results. Original Geometry.

To avoid this problems the user must repair the geometry modifying the surfaces and lines.
This is a difficult and time consuming operation.





Reparation time.: 30 Min

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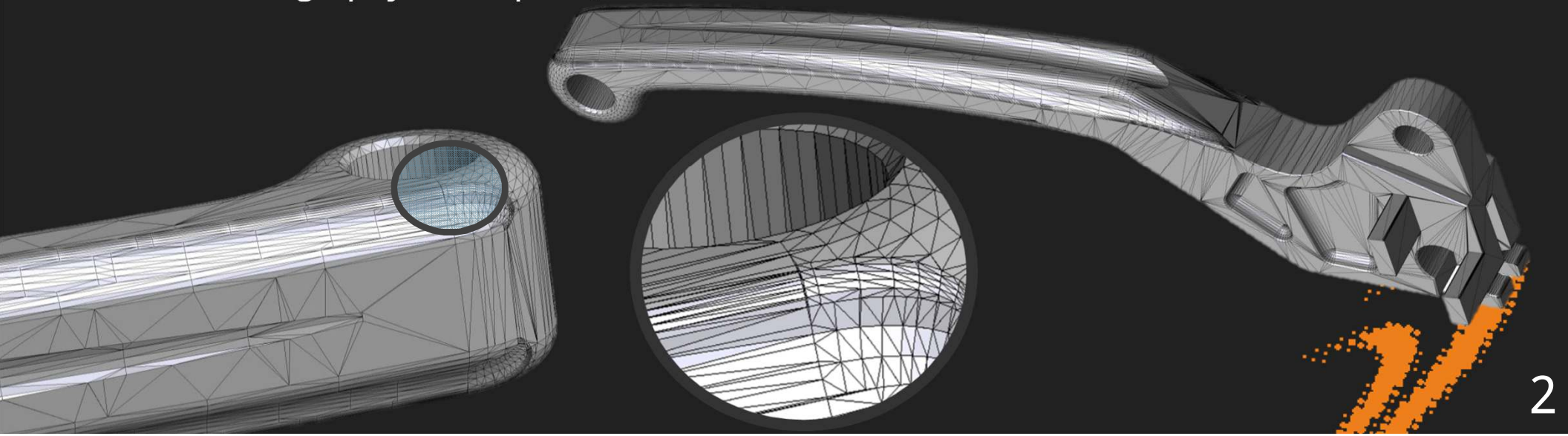
The EASYMulation

C2C Technology

The meshing tool.

Meshing from STL files.

This new meshing technology creates the mesh based on the contour geometry defined by the STereo Lithography of the part (STL)



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C2C Technology

The meshing tool.

Meshing from STL files.

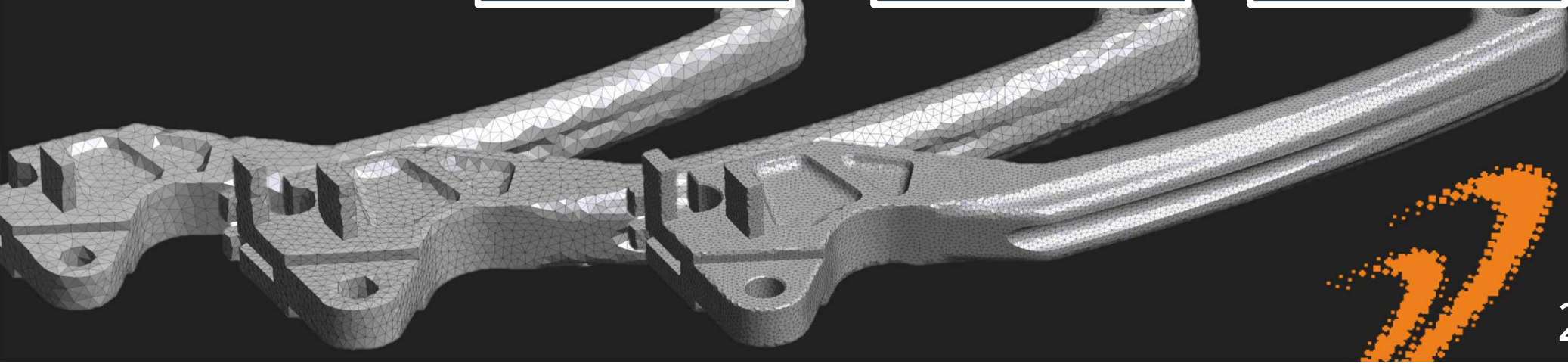
Reparation time.: 0 Min

Mesh Generated by using our new technology.

Element Size = 3

Element Size = 2

Element Size = 1



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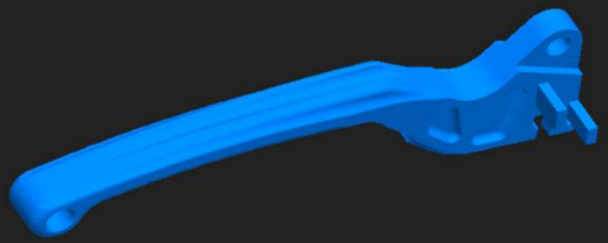
The EASYMulation

C2C Technology

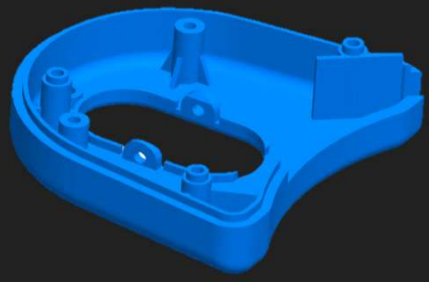
The meshing tool.

Meshing from STL files.



Open Demo

Open Demo

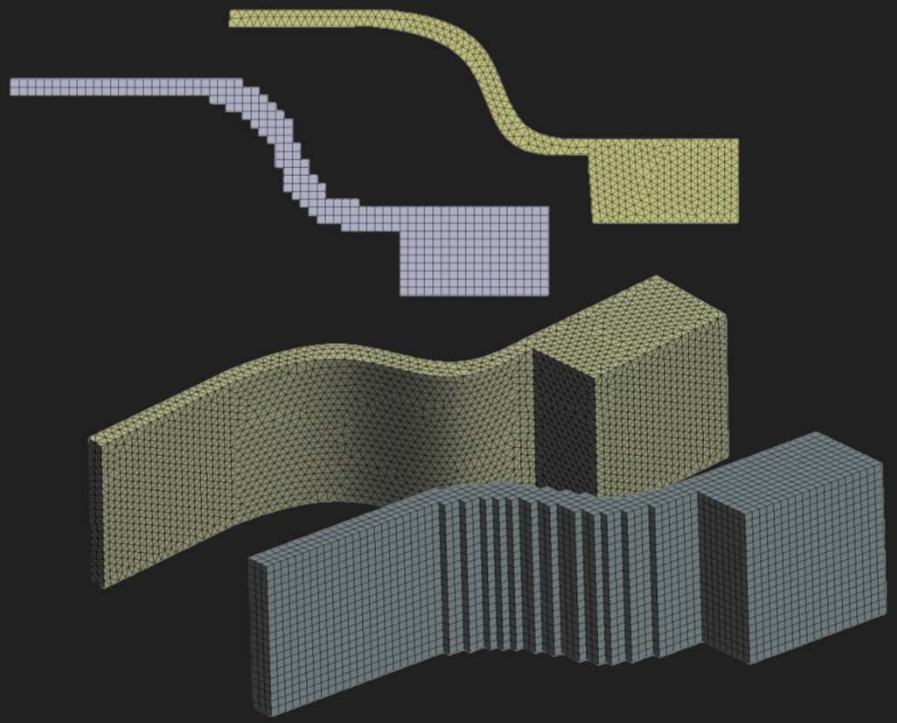


Open Demo

CLICK2CAST
The EASYMulation

C2C Technology

Why FEM…?



FE allows local Refinement

FE Mesh allows the contact simulation (Thermo-mechanical Analysis)

FE mesh gives better accuracy by using the same element size

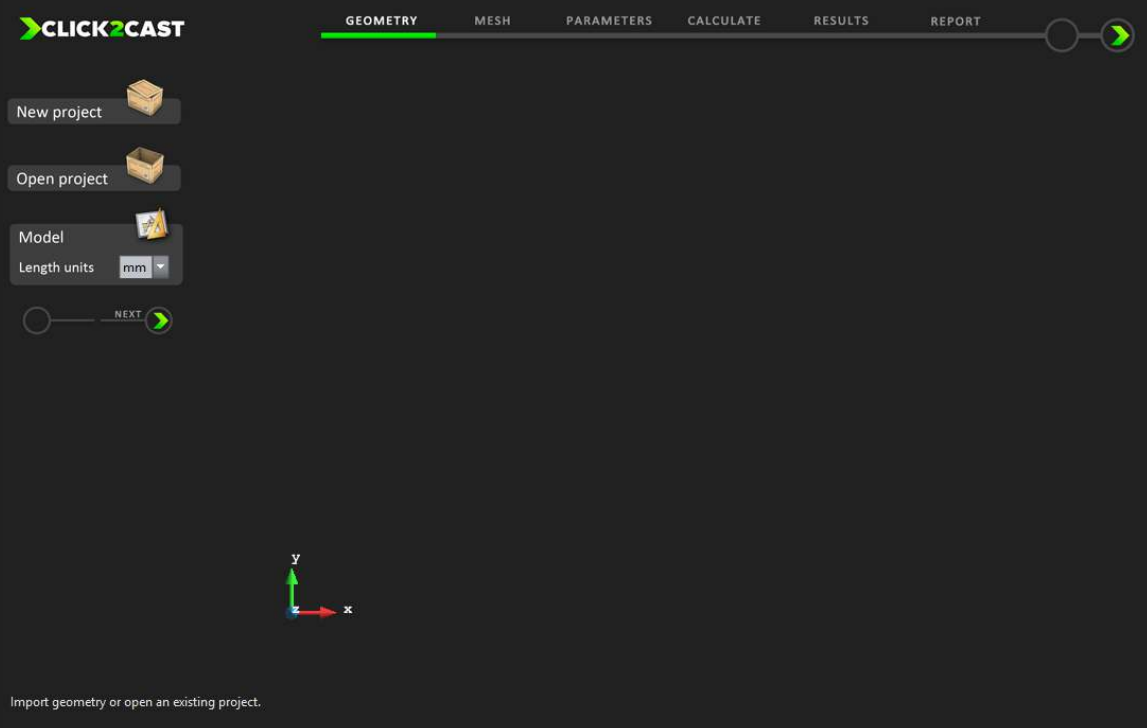
FD Mesh generation is

FE Mesh generation is fast and easy

No need to repair Geometry

CLICK2CAST
The EASYMulation

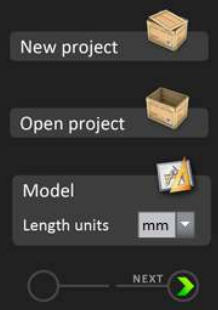
Five simple steps



CLICK2CAST
The EASYMulation

Five simple steps

1. Geometry
2. Mesh
3. Parameters
4. Calculate
5. Results



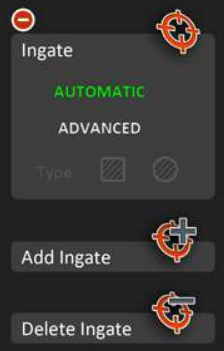
Open file (as *.STL)
or
Open existing project (as GID project/folder)

Define geometry length units.

CLICK2CAST
The EASYMulation

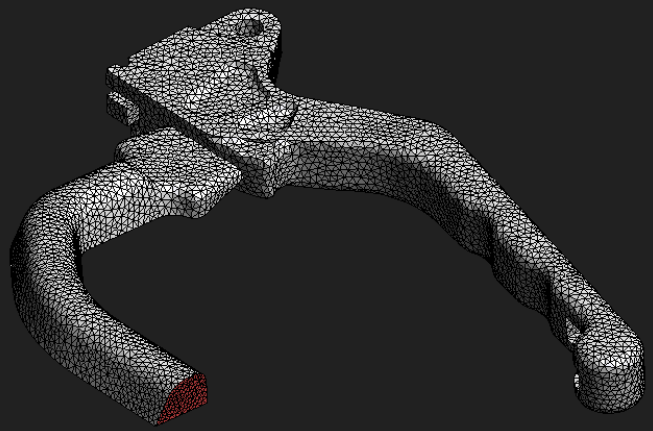
Five simple steps

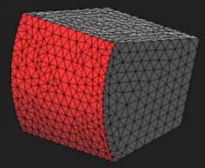
1. Geometry
2. Mesh
3. Parameters
4. Calculate
5. Results



InGate definition.

Automatic option works with a pre-designed geometry ingate, either the runner or part.





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The EASYMulation

Five simple steps

1. Geometry
2. Mesh
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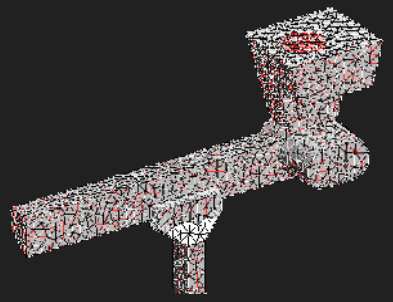
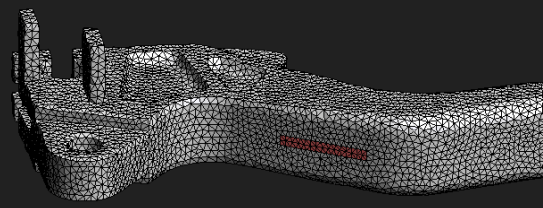
5. Results

- Selecting the *advanced* ingate definition the user can choose a virtual ingate introducing the height and width dimension or the radius.





- Positioning the ingate in a curved surface the ingate will be projected over the surface..
-The ingate can not overstep the limits of geometry and can not overlap to a sharp edge.

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GEOMETRY | MESH | PARAMETERS | CALCULATE | RESULTS | REPORT

1. Geometry
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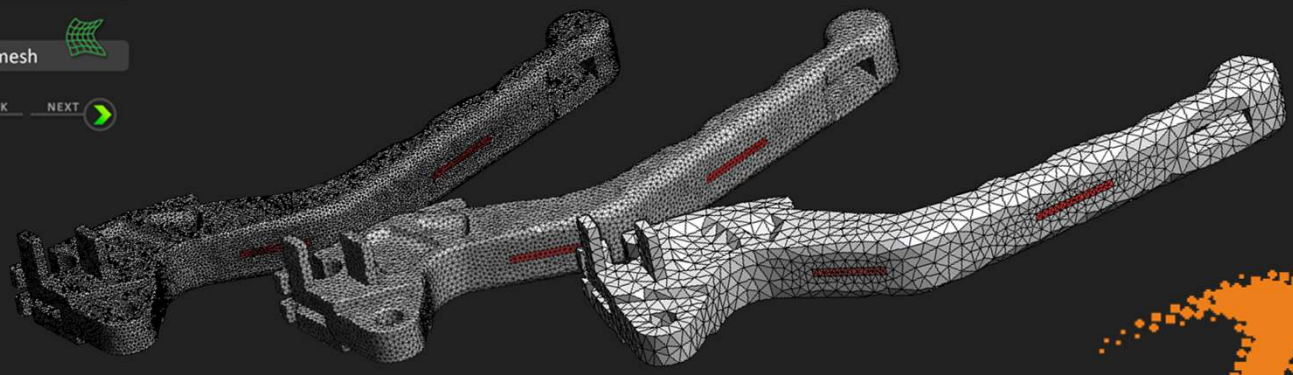
Mesh Generation.

Depending the element size value selected, the mesh will be more accurate.



If the element size is higher than the thickness of the part, the geometry will be distorted, even to not be able to generate the mesh. In this case, reduce the element size and mesh again.

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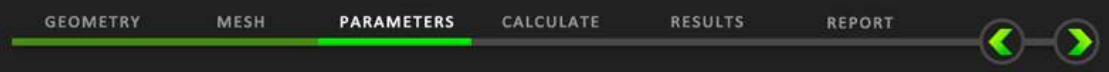

1. Geometry
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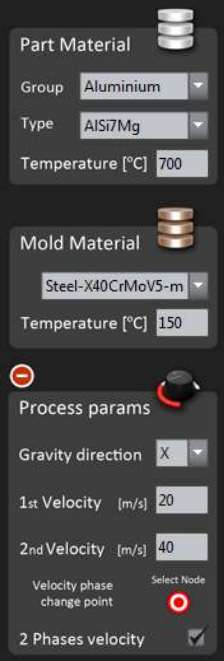
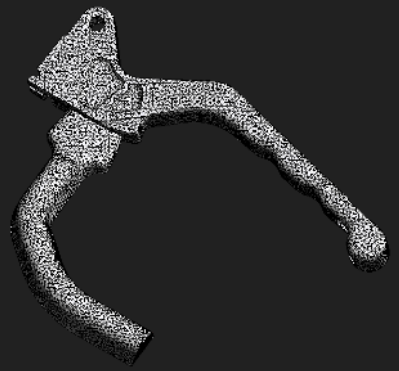
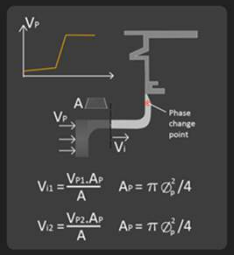
5. Results



Once the mesh was done, set the process parameters. Select the part material, alloy and temperature for the part and mold.





In case of HP-DC process, set first and second phase velocity and select a node to change phase.

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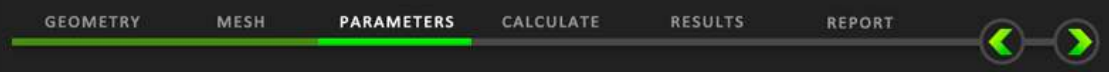
The EASYMulation

Five simple steps



1. Geometry
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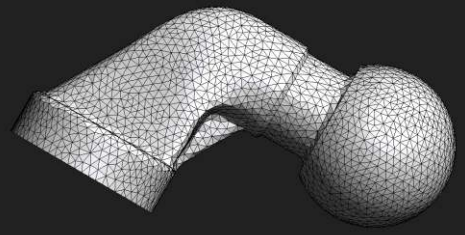
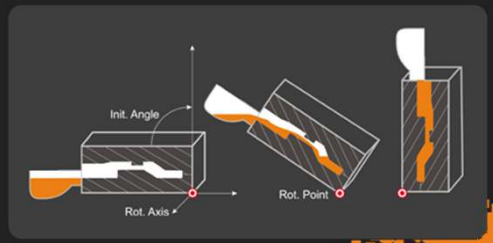
Once the mesh was done, set the process parameters. Select the part material, alloy and temperature for the part and mold.





In case of TiltPouring process, set Initial Angle, Rotation time and rotation axis.

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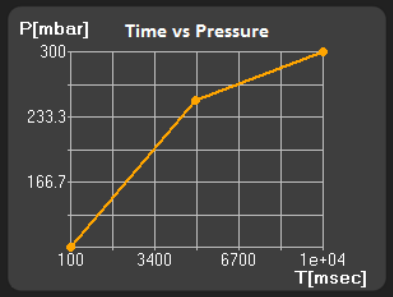
The EASYMulation

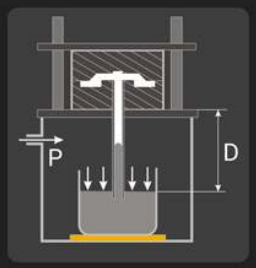
Five simple steps

GEOMETRY MESH **PARAMETERS** CALCULATE RESULTS REPORT

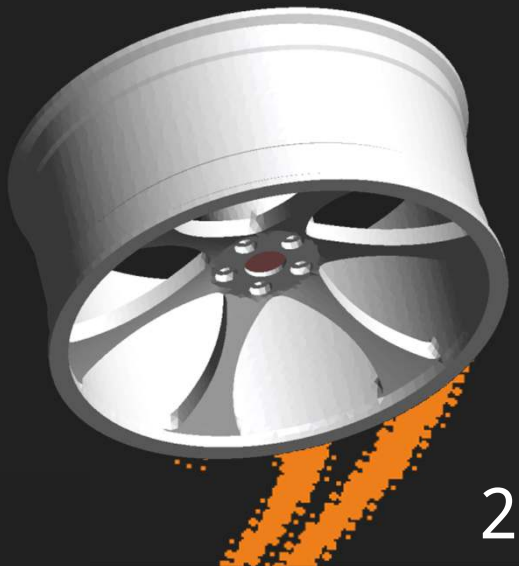
1. Geometry
2. Mesh
3. Parameters
4. Calculate
5. Results

Once the mesh was done, set the process parameters. Select the part material, alloy and temperature for the part and mold.





In case of LPDC Define the pressure curve and other parameters that concern the process.



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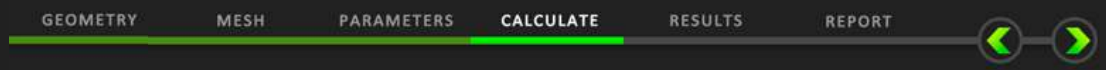
The EASYMulation

Five simple steps



1. Geometry
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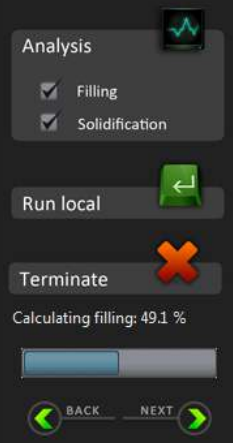

The filling and solidification calculation can be done both together.

Ones the calculation reaches 1% it´s possible to go to next step and check the results.

If only solidification calculation has been done the starting temperature will be equal in all the part.
If the filling calculation was performed previusly, the temperature distribution at the end of the filling will be used as starting point for solidification analysis.

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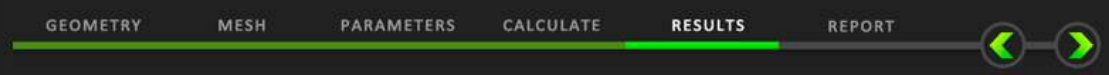
The EASYMulation

Five simple steps



1. Geometry
2. Mesh
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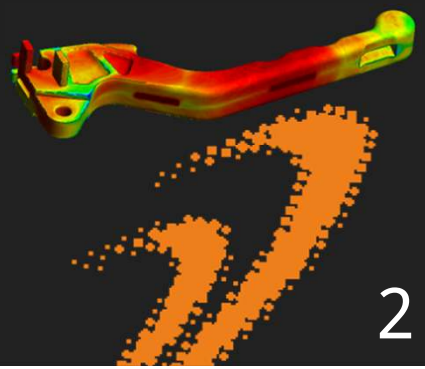
Front flow shows the filling material evolution. This visualization gives a preliminary idea of the filling time, and the way the part is filled..

Temperature evolution results shows the evolution of temperatures during filling. This animations helps to better understand the heat lost during the filling.



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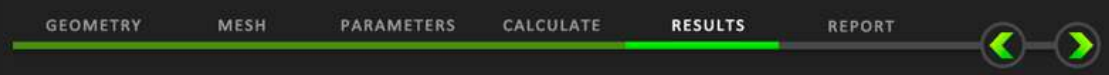
The EASYMulation

Five simple steps



1. Geometry
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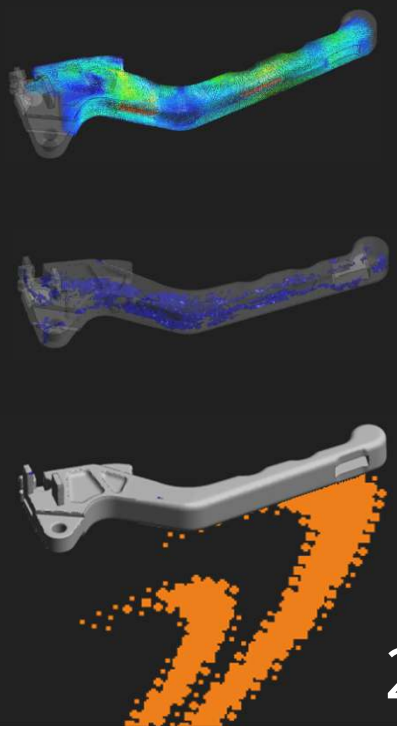
Shows the vectors representation of the velocities.

Shows the front encounter of material during the filling evolution. Blue color shows the areas where exists the front encounter of material.

Shows the last areas to fill the part and his air entrapment during the evolution of filling.



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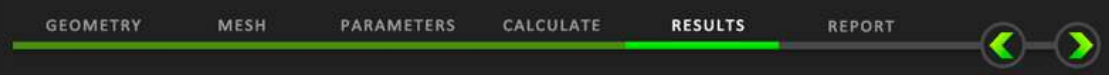
The EASYMulation

Five simple steps



1. Geometry
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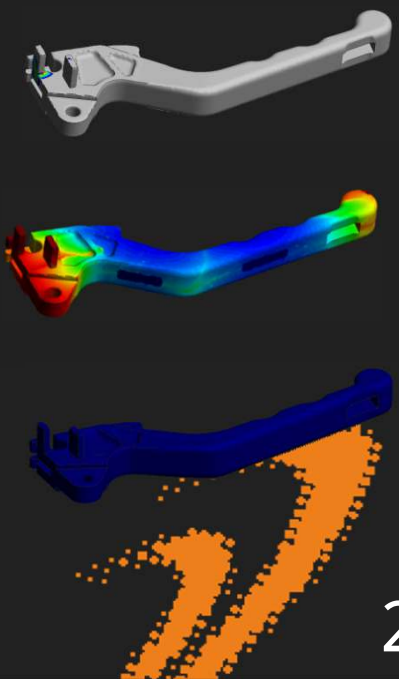
Mold erosion shows the areas with velocities exceeding 35 m/s, and with high probability of mold erosion problems during the evolution of filling.

Shows the filling time of the different areas of the part.

Predict if there are some areas solidified during the filling.



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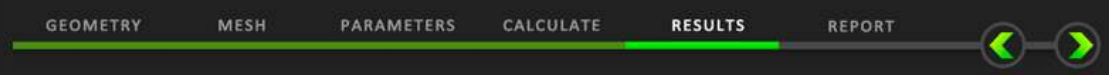
Five simple steps



1. Geometry
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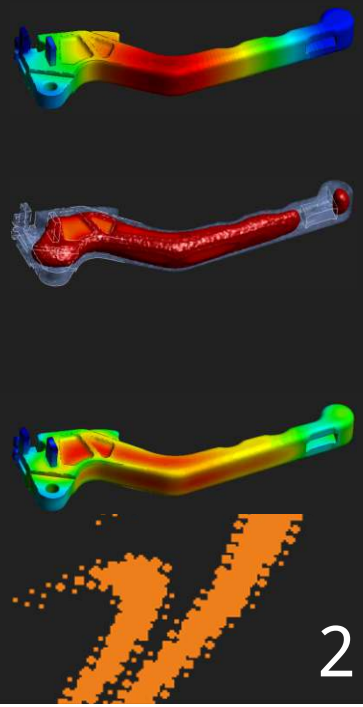
Shows the temperature evolution during the solidification.

Shows the evolution of the solidification. The material that solidifies will disappear from the animation and liquid material will be represented in red color.

Shows the time that takes any area of the part to solidify .



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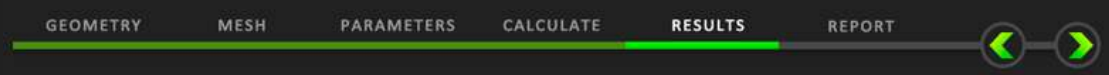
Five simple steps



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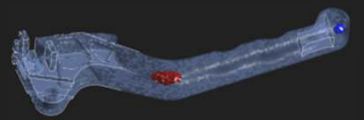
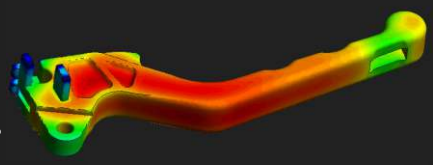
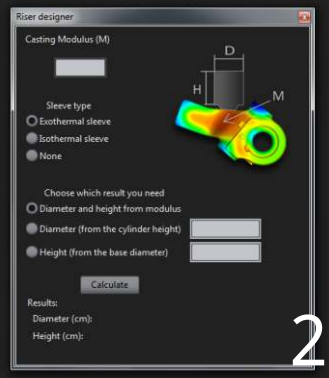
Shows the shrinkage porosity percentage in volume over the total volume of the part.

Solidification Modulus (Volume-to-area ratio. To use in the riser designer wizard.

Helps to calculate an optimal riser. Introducing the casting modulus (meters) we can calculate the required riser for the part.







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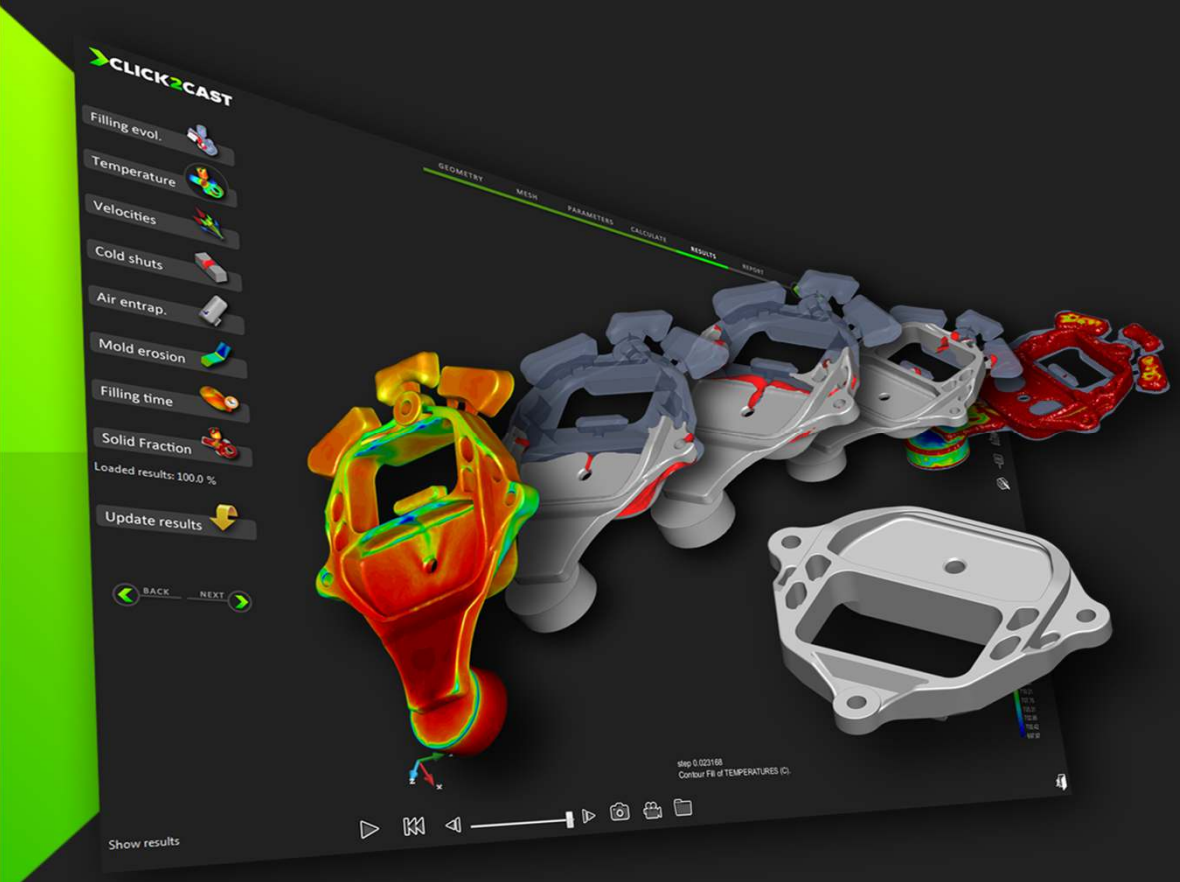

KEY Features

CLICK2CAST
The EASYMulation

KEY Features

- C2C is a truly friendly interface simulation software for Casting process

- Simplicity and ease of use.

- Accurate results due to the powerful FEM solvers.

- Allow the users to test different mold design possibilities by very few intuitive button clicks

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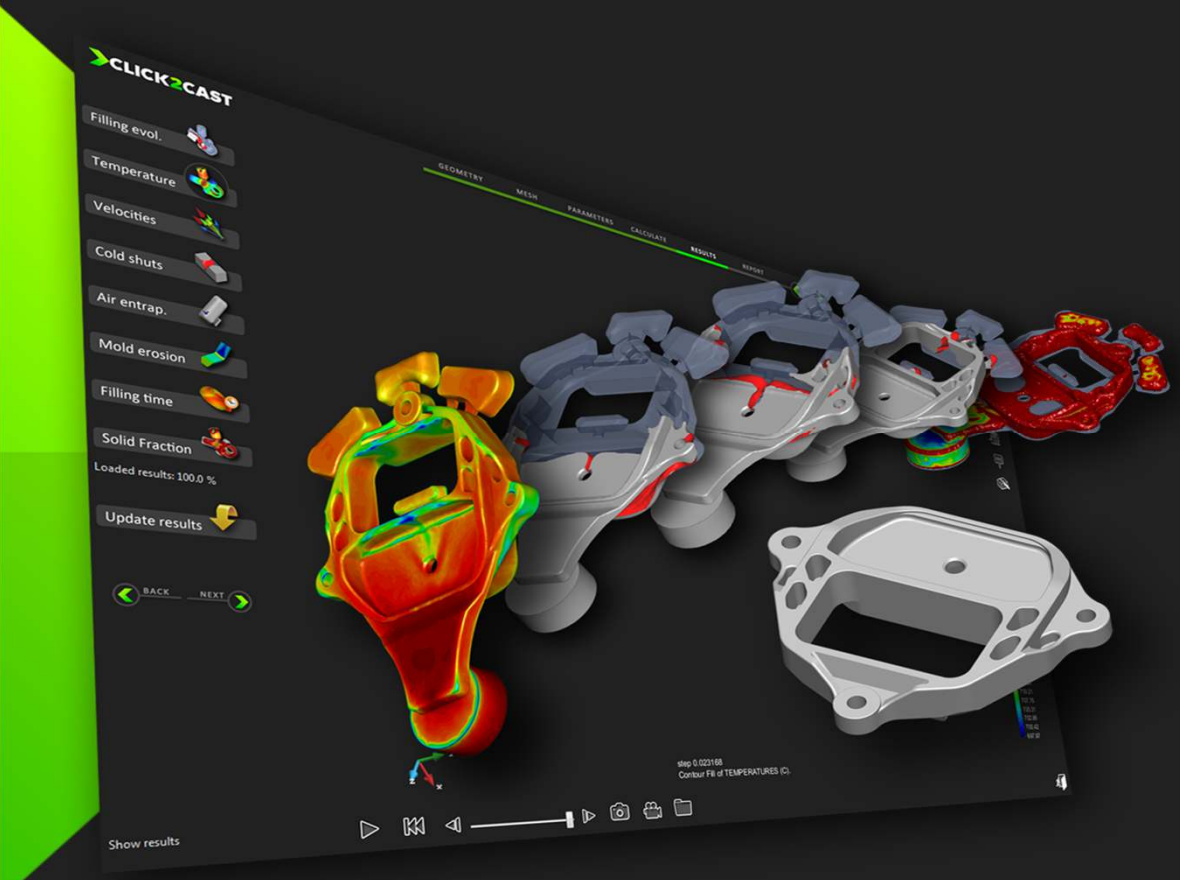

Live Demo

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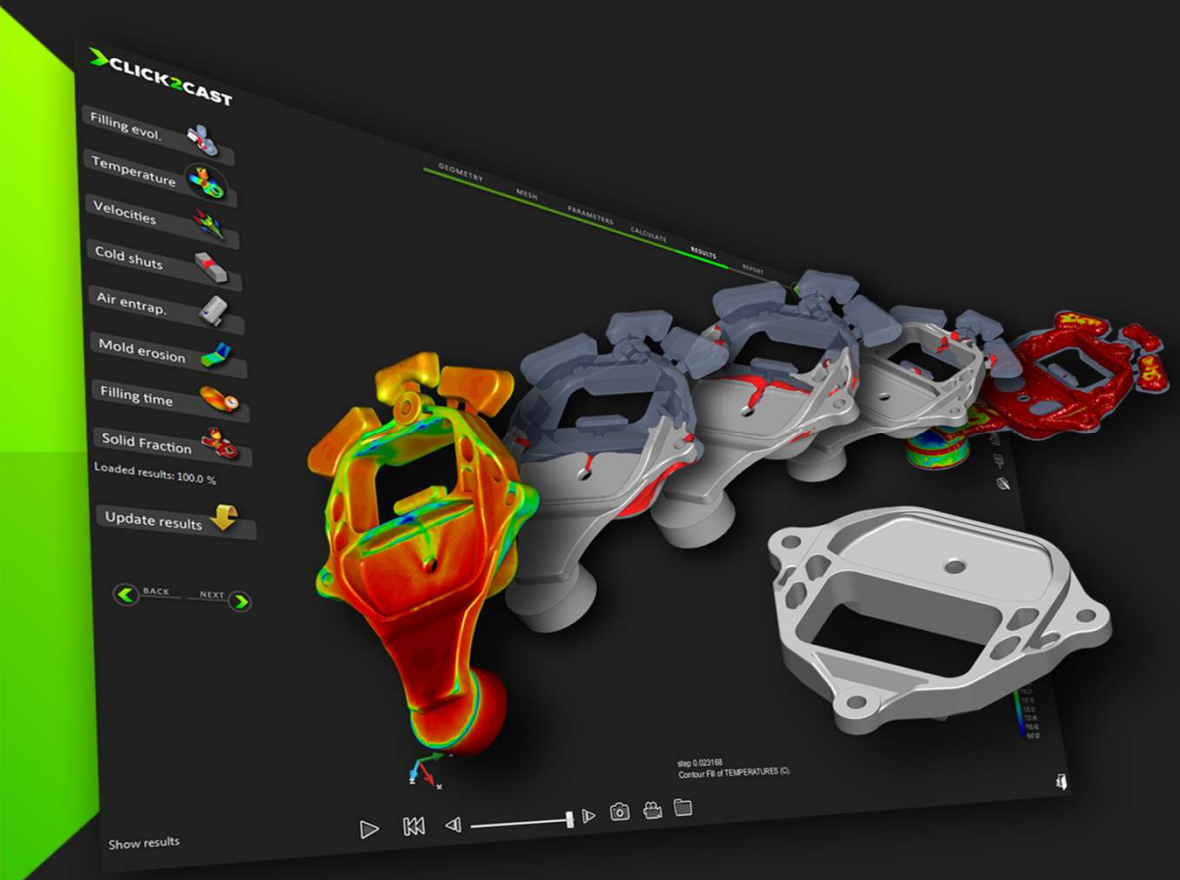

Q&A Session

For more info please visit

www.click2cast.com