# LOW PRESSURE DIE CASTING TECHNICAL SPECIFICATION

NOVACastCAD is a powerful simulation software tailored for low-pressure diecasting, offering a group of advanced tools to improve casting quality and efficiency. It allows users to accurately model and analyze the entire casting process—from designing mold concepts, including parting surfaces, cooling systems, inserts, creating and optimizing gating/feeding systems, using advanced algorithms. The software also helps manage filling and solidification to minimize defects, guaranteeing a more reliable and efficient production process.

## 3D Import/solid (STL) viewer

- Import of binary and ASCII STL files and STEP files (Single and assembly)
- Boolean functions for considering the interactions between solids
- Transformation Functions: Includes positioning functions, for manipulation and alignment of 3D models.
- Draft analyzing
- Image Overlay: Allows for the import of images directly into the viewport
- Measurement tools
- Reference Geometry: Supports the creation of reference shapes, including planes, axes, and points
- Parametric primitives: rapid generation of standard geometric shapes
- Gating system design: Easy to use tool to generate gating by drawing the path

## Meshing

- Finite Difference Mesh: Utilizes Finite Difference Mesh with the capability to apply variable mesh sizes, adapting to casting thickness for optimal simulation accuracy
- · Automatic meshing that takes seconds

## Comprehensive mesh editor

Provides precise tools for modifying the geometry within the meshing domain and add/change objects.

- Change each cell property
- $\cdot$  Add or remove cell layers
- $\cdot$  Automatic Remove singular meshes
- Extrude and trim functions
- Smart cell selection tools
- Add solid to the mesh: Easily incorporate STLs and parameterized 3D shapes, such as sprues, fill tubes, ingates, and cooling channels, into the mesh model and prevent remeshing the model
- Mold Concept Design: Enables the creation of a parting surface between the top and bottom molds, with an automated process for generating a shell mold.
- · Ability to import a parting surface 3d model and

apply it into the mesh model.

Editing tools to modify parting line/surface
position

#### Process input (Pre-processor)

- Thermal cycling setup
- Material setup with initial temperatures
- Sensor setup
- Automatic Interface Detection: Identifies and determines interfaces between objects seamlessly, ensuring accurate interactions within the simulation model.
- Inlet setup with filling conditions
- Inlet Pressure-Time curve wizard
- Cooling channel setup with automatic calculation of HTC
- Coating Function: Supports the implementation of a coating map, accounting for coating wear-off on low-draft surfaces in the pulling direction.
- Internal Boundary Condition: Supports the implementation of various mold surface types and evaluates their impact on the filling process
- Opening Stage Boundary Conditions: Enables the implementation of different heat transfer coefficients (HTC) and media temperatures at cavity and mold interfaces when exposed to air.
- Automatic Venting Setup: Automatically identifies all possible venting paths within the cavity, including parting surfaces, insert gaps, ejector gaps, and dedicated venting channels, ensuring optimal airflow and pressure management.
- Particle/Bubble Tracking and Oxide Formation Setup: Enables the tracking of inclusions/gas bubbles while detecting and monitoring the formation of fresh oxides on the surface
- External boundary conditions: Defines heat transfer conditions on the outer surfaces, representing interactions between the mold, and surrounding environment while setting thermal boundaries for the simulation box.
- Autosaving results Solver
- GPU/CPU calculation
- Full filling calculation: Captures detailed fluid behavior using full Naiver-Stokes, continuity, and free surface calculations.

- Quick filling calculation: Utilizes data from the initial solver run to streamline simulation, optimizing speed and efficiency.
- Solidification calculation
- Steady state mold temperature calculation
- $\cdot$  Results viewing during simulation

## Optimization function

#### Automatic calculation of feeding path:

- Manual selection which paths should be used for optimization and grouped together
- Thermal optimization to create directional solidification
- Automatic optimization cycle running
- System adds material for each cycle
- · Tool for editing added material
- Tool for preventing custom cells and zones from adding material

## Simulation results filling

- Velocity in XYZ
- Velocity vectors
- Streamline detection
- Temperatures in all solids
- Pressure
- Fluid fraction
- Air Pressure
- Air entrapment
- Particles and oxide
- Flow tracking

#### Simulation results solidification

- Isotherm
- Temperature
- $\cdot$  Solid fraction
- Fluid fraction
- Macro shrinkage
- $\cdot$  Micro shrinkage
- Niyama
- $\cdot$  Feed paths
- $\cdot$  Isolated zones with separation time analysis

#### Hardware Requirement

- Operating system Windows 11 (64-bit)
- RAM Minimum 16 GB
- Hard drive: 500 GB (SSD recommended)
- GPU: Optional, NVidia 3070 and higher is essential for performance gains
- CPU: Intel Core I7 or higher recommended
- Support for parallel CPU/GPU processing