**Case Studies**

**GC of Cast Iron**
Improve yield rate by changing riser design

- Riser volume 1900ml
- Riser weight 11kg

Grade: RCD450, Product weight: 30kg

Local solidification time contour and macro-shrinkage (Riser analysis)

**HPDC of Al-Alloy**
Eliminate gas defects by changing injection conditions

- Low speed: 3.2m/s
- High speed: 11m/s
- Low speed: 3.2m/s
- High speed: 11m/s

Filling patterns, temperature distribution and backpressure

**Large-Sized Investment Casting Product**
Observed and predicted locations of misrun/cold shut

System Requirements

- OS: Windows 10, Windows 8.1, Windows 7 (Recommended)
- CPU: Intel Core i5-2.5GHz or higher
- RAM: 4GB or more (Recommended: 8GB or more)
- HDD: 400GB or more (Recommended: 1TB or more)
- Resolution: 1024x768 (85,000 colors or more)

【Create report using MS-Excel】

**Benefits**

- Decreased scrap rate with less trial and error
- Improved yield rate
- Improved casting design leading to increased proposal power
- Accumulated company-specific casting knowledge
- Superior product quality compared to the competitors
- Facilitates global expansion

**Qualities**

- Coupled melt and gas flow (Semi-solid melt)
- Temperature distribution

**Gravity Casting**

- Coupled melt and gas flow (Semi-solid melt)
- Temperature distribution

**Gravity Tilt Casting**

- Coupled melt and gas flow (Semi-solid melt)
- Temperature distribution

**Lost Foam Casting**

- Visualize gasification of a foamed pattern (Solid, partially or fully gasified)

**Compatible with all casting processes and casting alloys. Assists casting engineers efficiently to investigate casting defects and determine appropriate countermeasures.**

QUALICA Inc.
http://www.qualica.co.jp/
JSCAST is an integrated CAE system specialized for the field of casting. Numerous efforts have been made to make it possible to predict various types of casting defects (such as micropores, shrinkage, gas entrapment) for various casting processes, casting alloys and molding materials.

JSCAST is widely used both in Japan and abroad as it is a powerful tool that can be used for visualizing the invisible mold filling and solidification patterns, optimizing casting designs, training young engineers and creating better proposals for customers. JSCAST is composed of a basic module and various optional modules (selectable according to the casting process or purpose).

**Basic Module (Pre-/post-processors, solvers and property database are included)**

- **Property database (more than 200 materials)**
  - Casting alloys (just iron, steel, Al-Alloys, etc.), melting materials (permanent mold, green/sand, artificial sand, etc.), and others (brass, chill, etc.)
- **Pre-processor**
  - Import 3D CAD data (STL format)
  - Creat a positive 3D geometry
  - Generate mesh (layer or uneven interval)
  - check of injection speed using 7-D2 diagram
- **Mold filling & solidification solvers with high precision**
  - Consider filters, sleeves, backpressure, etc.

**Optional Modules**

1. **Filler Analysis & Macro-Shrinkage Prediction**
   - Quantitatively predicts macro-shrinkage with consideration of solidification contraction, mass feeding and liquid level drop in liquid and mushy regions.

2. **Back-Pressure**
   - Creates a back-pressure for permanent mold filling for both permanent and sand mold casting processes. Predicts gas defects caused by poor design of gas evacuation and gating systems.

3. **Gravity Tilt Casting**
   - Simulates mold filling during gravity tilt casting by setting the tilt angle as a function of time, and solubility analysis.

4. **Porosity (Bubble, Stress method)**
   - Solubility analysis
   - Predicts porosities caused by gas entrapments during mold filling. Applicable to various casting alloys.

5. **Cyclic Casting**
   - Predicts porosities caused by gas entrapments during mold filling. Applicable to various casting alloys.

6. **Mixed Metal**
   - Predicts porosities caused by gas entrapments during mold filling. Applicable to various casting alloys.

7. **Casting Deformation**
   - Predicts casting stress, strain and deformation based on output data of solidification simulation.

**System Lineup**

- **Casting Process**
  - Gravity Casting
  - Gravity Tilt Casting
  - Permanent Mold Filling
  - Slip & Slag Inclusions (Mold Filling)
  - Solidification Predictive Calculation (Mud)
  - High-Pressure Calculation Module

- **Optional modules**
  - Gravity Tilt Casting
  - Permanent Mold Filling
  - Slip & Slag Inclusions (Mold Filling)
  - Solidification Predictive Calculation (Mud)
  - High-Pressure Calculation Module

- **Thermal Deformation UF**
  - Provides interface with commercial software (Femap with Nastran), allowing users to export temperature data from JSCAST to NASTRAN for thermal deformation simulation and stress prediction with consideration of restraint of mold.

- **Surface Tension**
  - Consider the effects of surface tension and mush-mold wettability on mold filling behavior. This improves the accuracy of simulated free surface movement and position, especially for thin-walled castings.

- **Lost Foam Casting**
  - Predicts the effects of vacuum suction and permeability of sand mold and coating.