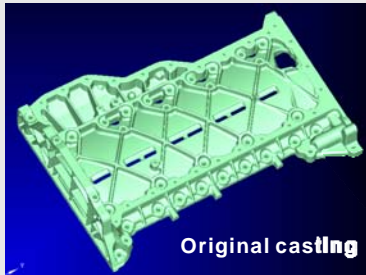


# CAST-DESIGNER

## Upfront design & analysis system for die casting



30 min



30 minuts *to design one gating system*

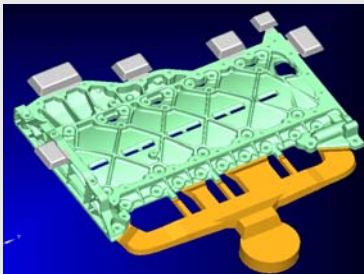
1 hour *to validate a design solution*

1 day *to compare 4 to 5 solutions*

Integration of expert system and CAE technology

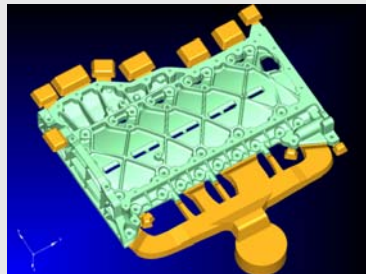
A tailor-designed mould planning & simulation system for die casting industry

Gating System



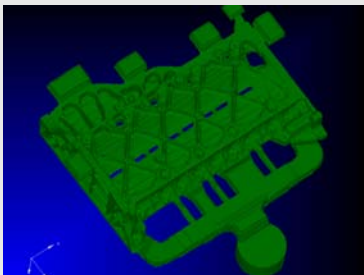
5 min

15 min

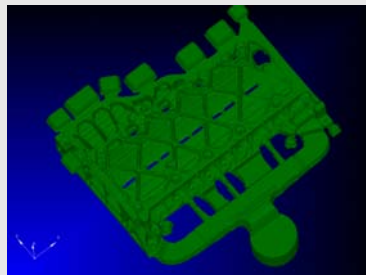


5 min

Model Setup

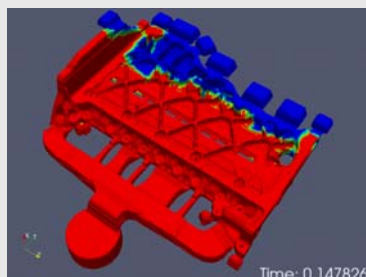
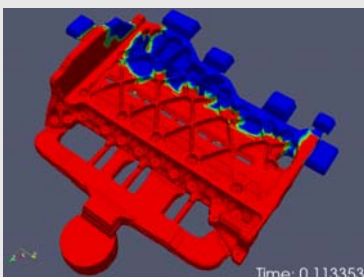


60 min



60 min

CPI Simulation

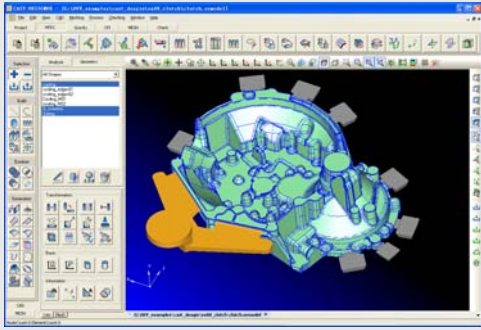


Cast-Designer is a quick casting design and analysis tool based on upfront design & analysis technology. The core of the "upfront design & analysis technology" is to allow engineers to conduct fluid flow, heat transfer and solidification analysis by the assistance of combination of expert system and CAE technology, it helps engineers to make a "Right" engineering decision in the early design stage of a project. Upfront design & analysis technology has already been becoming a very important role in main stream design process.

With Cast-Designer, users can optimize a casting design by detecting the part features with potential flow and solidification problems, evaluating gate system and overflow design alternatives in the early design stage. Even a novel with limited experience in simulation who can easier to undertake the design setup in very short period of time. In other word, Cast-Designer can help the industry to achieve the target of 'Time to Market'.

CAST-DESIGNER helps engineers to quickly convert ideas into 3D CAD solid model, and subsequently evaluate the casting design. According to the result of the CPI analysis, engineers can make critical modifications and easily achieve a satisfactory design solution

## System module



CAST-DESIGNER users interface, with OpenCASCADE CAD technology

## CAST-DESIGNER Basic

As a core component of CAST-DESIGNER system, CAST-DESIGNER Basic is an efficient and flexible design tool which assists designers to develop gating system for die casting in very short time. With the help of CAST-DESIGNER, engineer can quickly convert a gating system design idea becoming a 3D model for design evaluation. CAST-DESIGNER enable user easily to manage and alter parameter for different stage whatever for initial concept design stage, intermediate embodiment design stage, or final design stage. It is possible to create the full gating system including inner gates, gate runners, runners, overflows as well as cooling and venting systems within **tens minute to one hour** for a typical casting part.

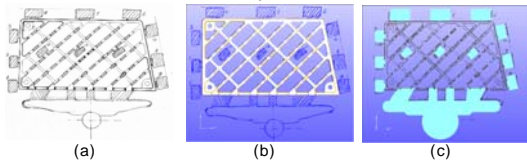
## CAST-DESIGNER CPI

Based on its unique innovative technology, Cast-Designer CPI (Casting Process Insight) is the sole really practical tool on the marketing today to support designer and engineer to make fast decision for casting part and mould design. It is capable to reflect varieties of dynamics and physical behaviors of fluid flow, heat transfer and solidification in details. Comparing with traditional numerical simulation, CPI is solely based on CAD environment, and provides nearly real-time analysis results. The beauty of CPI is the full couple with the design functions of Cast-Designer and quickness to obtain the analysis results at the conceptual design stage. There may be many alternative designs, a quick tool is important to run all designs and remove the poor designs. Thus at this stage, the traditional numerical simulation is not applicable.

# Operation and Flow Chart of Gate System Design

## 1 Humane Draft Design

- Start design from draft paper and import to Cast-Designer in any image format
- Support BMP, TIF or JPG format
- Support both bitmap and vector formats, convert bitmap to vector data automatically
- Support DXF, IGES as input
- Special designed tools for draft location and size adjustment



Example of draft design for gating system (a) original draft design (b) Working environment after load draft design and convert to vector data (c) The final gating system designed as draft idea.

## 2 Gating System Design

### Design Advisor

Guiding designer carries out the gating system design process in a simple way. Basing on the mass or volume of casting as well as geometry dimension and material type, the system can estimate the filling time automatically, and guide to select the casting machine correctly to meet a reasonable filling ratio of chamber. It also can predict the 1st and 2nd speed, critical shift point and calculate the final section areas for ingate, gate-runner, runner and sprue runner. All the number of gates and runners could be evaluated and adjusted in real time.

### Inner Gate Design

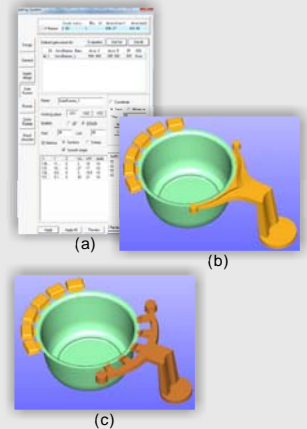
- Calculate the inner gate area with Design Advisor
- Inner gate area comparison in real time
- Online tips and wizards with industrial know-how and experience
- Online evaluation tools
- Suitable to ingate with complex geometry

### Gate-Runner and Runner Design

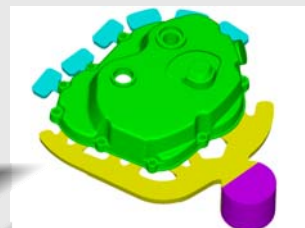
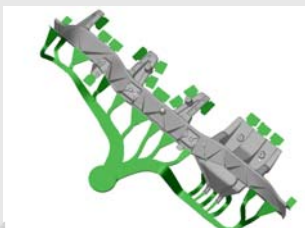
- Build in wizard to define flow path and section parameters quickly
- Support runner with fan, curve and tangent
- Generate feature sections in pre-defined curve or wire directly
- Various styles in solid model generation
- Take account of the efficiency of metal flow in runner design
- Real time WYS/WYG visualization for both 2D and 3D

### Sprue runner designer

- Support Cold and hot chamber machine as well as no sprue runner design
- Full parameterized and standard design
- Help select casting machine and estimate machine parameters
- Easily to customize



(a) User interface of gating system designer, with full parametric and streamline design (b) (c) Difference design plans can be applied to the same casting for plan comparison.



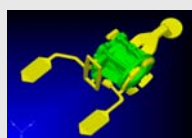
## 4 Checking and evaluation

### Design revise and data management

- Shift design from fix dies to movable dies side
- objects translation, rotation, mirror and extrusion
- Save/load and export/import full design parameters
- quick comparison of same casting with multi-designs
- help company generate own database. For the similar part, load the past template and make some necessary modification can save at least 80% workload.

### Checking and evaluation

- Sections and area of gating system
- Filling ratio and yield ratio evaluation
- Locking force and working parameters of casting machine



Gating system, cooling system and venting system design

## 3 Overflow

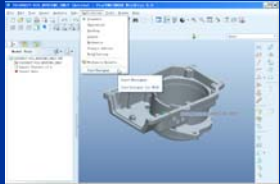
### Overflow

#### Overflow, cooling and venting system

- Creates rectangular, orbicular and wedge overflows. Locations specified by designer and pre-defined template to speed up dimension define
- Support multi-overflow sets. Overflows could be translated, rotated, mirrored to a new design
- Support non-standard overflow design
- Cooling and venting channel can be generated basing on the pre-defined path line or curve with a flexible sections define.
- Build in wizard to calculate the total length and section area of cooling line to achieve heat transfer balance
- Support cooling block design

## CAST-DESIGNER Basic for MCAD

Cast-Designer for MCAD is used as a plug-in to fully integrate to the existing MCAD system for better integration and data sharing. User can use their normally used CAD system to create a part model and then input the model to Cast-Designer through the MCAD bundle. While the gating design is completed, user can input back the complete gating design setup to the MCAD system for fine-tuning the design. In this process, as long as operating in accordance with MCAD regulations, there should be no any data loss, and some advanced features of MCAD system could be used for final CAD assembly, such as Boolean operations, surface cleaning and filleting, etc.

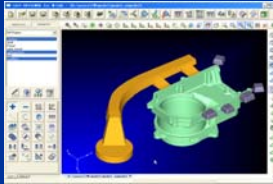


Cast-Designer for MCAD was fully integrated into the Pro-E system, after the casting design, one button can shift to Cast-Designer working environment for gating system design as well as the 3D casting data could be transferred automatically.

## CAST-DESIGNER CPI for MCAD

With its unique technology, Cast-Designer CPI can fully integrate CAE spectrum fluid flow analysis, heat transfer and solidification with the customer's existing MCAD user environment, which enable product and mould designers involving to the design process together and making engineering decision promptly and simultaneously.

**Simulation driven by CAD data:** With the CPI in MCAD, your CAD geometry can drive the simulation process. When you make a design change in CAD system (such as Pro/E, UG NX or Solidworks), you see the change in CPI in just a few seconds. It's as simple as that.

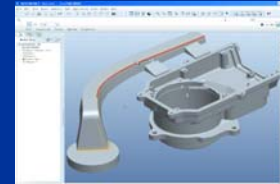


Same as the standalone version, Cast-Designer for MCAD has full functions for casting system design (gating system, overflow, cooling and venting system), as well as better data integration.

## CAST-DESIGNER / CPI MCAD SUPPORT VERSION

CAD SYSTEM	SUPPORT VERSION
Pro/ENGINEER	2000 - Wf5
UG NX	17 - Nx7
SolidWorks	2004 - 2010

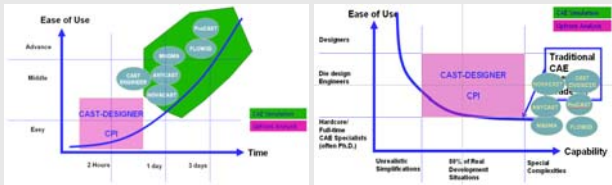
Software language: English, Japanese, Chinese



Finally, the designed casting system would be brought back to Pro-E system automatically for assembly or link to CAM for manufacturing. The advanced features of MCAD system still could be used free, such as Boolean operations, filleting and surface cleaning etc.

## Upfront Analysis vs Tradition CAE Simulation

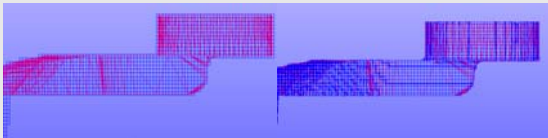
It is well known the traditional numerical simulation is not applicable or very expensive for the concept stage. The data to run a numerical simulation is usually not available yet, for example runner geometry. Due to the complexity of the equation system to be solved, numerical simulation is too time consuming, usually hours or even days. Setup the simulation model is also a heavy job. Numerical simulation provides a relatively high level accuracy, which is more than needed at conceptual design stage.



Cast-Designer do the best to make a balance on easily usage, robust and functions, the user can solve at least 80% industrial problems in an express and effective way.

## Excellent Mesh Technology

- Very fast and robust meshing, fully automatically
- Flexible to control the element size in different direction (X/Y/Z)
- Support multi solid geometries, no Boolean operation required before meshing
- CAD or mesh or mixed CAD & mesh as original data
- Special treatment for CAD defects, such as geometry gap, overlay, intersection or unclose
- Advance technology for tin dimension or complex region
- Advance mesh smoothing technology to match the geometry feature



Mesh comparison of tradition FDM mesh (left) with Cast-Designer CPI mesh (right). Thanks the advance coarse mesh and smooth mesh technology, CPI can make a best balance in mesh quality and numbers to match the casting geometry feature.

## Best in Class of CPI

### Solver Technology

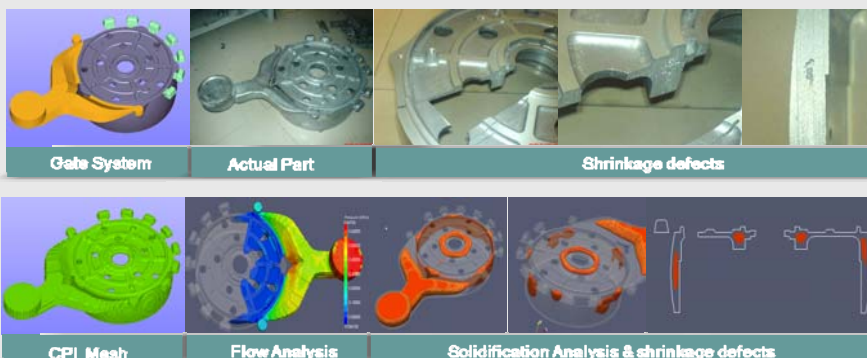
- Base on Finite Element Method (FEM) technology
- Fluid flow calculations are described by the full Navier-Stokes equation and couple to thermal analysis
- Simulate the physical phenomena and mechanical behavior of metal filling, solidification and cooling process, such as temperature, velocity, pressure, liquid/solid factors etc.
- Innovation technology to speed up simulation in express, half hour to one half hour for almost cases
- Submit job to solver in directly and batch queue mode
- Both 32 bits and 64 bits solvers, Windows and Linux
- Support parallel computing technology for big or huge model

### Model Setup

- Only one windows page to setup casting process, boundary condition and control parameters for flow, heat transfer and solidification simulation
- With rich material data in database, casting and mould material could be selected from database directly
- Pre-defined template for die casting process, as well as user can define the process in free, such as piston velocity, pressure, mould size and HTC etc.
- All conditions and parameters could be save as template file for future usage

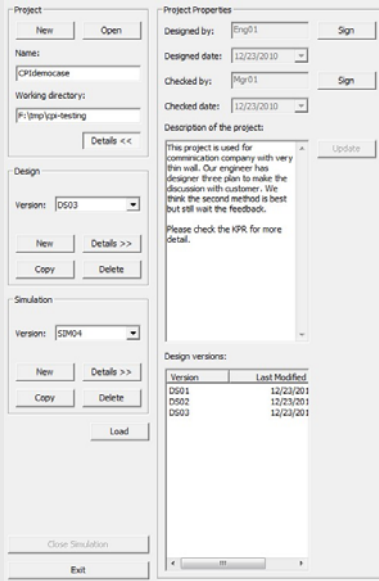
### Result & Reporting

- Introduce special customized ParaVIEW as post-processors. ParaVIEW is a famous software and used widely in HPC, it is very powerful and flexible
- Rich analysis results in various formats, such as contours, vectors, sections and curves, it is also support animation and VRML
- Support plug-in filter for post-process, similar the concept of Photoshop





# PROJECT AND DATA MANAGEMENT



Designer, Auditor and project information could be recorded and tracked in Cast-Designer for MCAD. All data were saved in XML file format and it is possible to generate customized report easily.

Cast-Designer for MCAD brings the project and data management to die casting industrial. It is absolutely important for designer and engineer.

Since so many design plans and simulations will be carried out in the practical engineering work, we can not always use the filenames to manage data and projects, it is too simple and makes confuse usually. Also, how to generate the design and simulation report is also very important.

Four level data structure was introduced in Cast-Designer for MCAD:

- **Project level**
- **Design version**  
*to manage the geometry data of design*
- **Simulation version**  
*to manage the mesh data of design*
- **Run version**  
*to manage the simulation condition and parameters.*

## Data Exchange Capability

- **CAD General:**  
STEP/IGES/BREP/STL/DXF
- **CAD Advance**  
(with additional license)  
CATIA/UG NX/PRO-E/  
SOLID-WORKS
- **CAE Mesh:**  
STL/ANSYS/IDEAS/  
CAST-ENGINEER/  
NASTRAN/PATRAN
- **CAM System:** STL

## Platform Advice

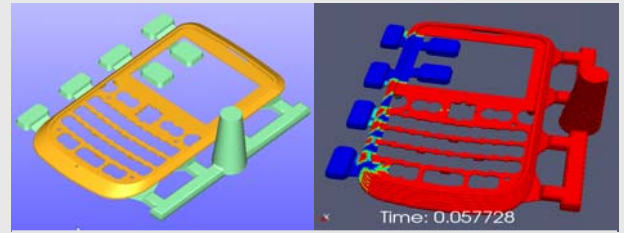
- **O.S.:** Windows XP (32bits), Vista, Windows 7 (both 32 bits & 64 bits)
- **Processor:**  
Intel Pentium IV 2.0G or AMD 2.0G and above
- **Memory:** 2GB and more memory can get a good performance
- **Display:** Support 1280\*1024 and above resolution and 128MB display memory is required.
- **Mouse:** Three-button engineer mouse is required.
- **Harddisk:** 100GB or above free hard disk space
- **DVD-ROM with writable capability for data backup is also an optional.**

## References

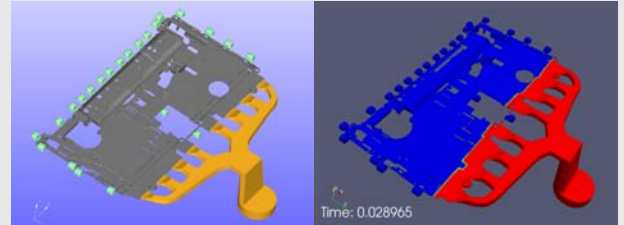
AALLIED DIE CASTING, AISIN, BLUE RIDGE PRESSURE CASTING, BUELL MOTORCYCLE, CAST PRODUCTS, CAUDLE MANUFACTURING, CHICAGO WHITE METAL CASTING, CITRON, CONTECH, CTIF, DAEWOO, FORD MOROR, GM, HITACH PLANT TECHNOLOGIES, HONDA, ISUZU, MERCURY MARINE, MERIDIAN LIGHTWEIGHT TECHNOLOGIES, MERALDYNE, NIPPON LIGHT METAL COMPANY, NISSAN INDUSTRY, PACE INDUSTRIES, PACIFIC CAST TECHNOLOGIES, RYOBI LTD, SAMKEE MACHINERY, TOKYO, TWIN CITY DIE CASTINGS, VOLVO

## About Us

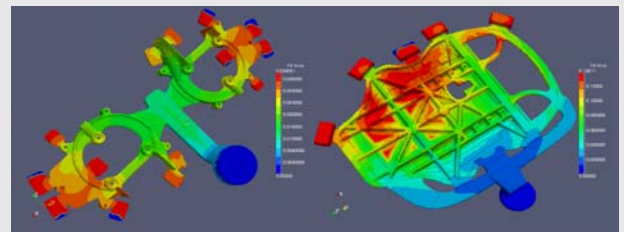
With the combination of software development, advanced analysis, extensive product development experience and cost effective local human resources, C3P Engineering Software Internationa Co., Limited provide industry and manufacturing business with comprehensive solutions and engineering services on a global basis to meet their expectation in high quality, on-schedule delivery within cost target. Our business scope covers software development, professional engineering service and application software integration. More info please visit: [www.c3p-group.com](http://www.c3p-group.com)



Mobile Phone Cover

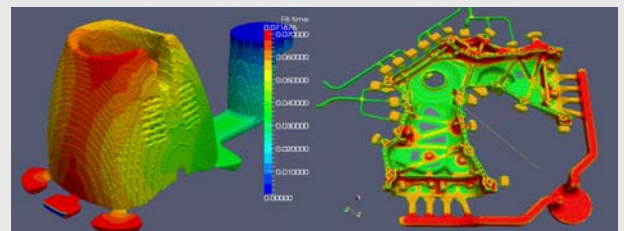


Notebook Computer Casing



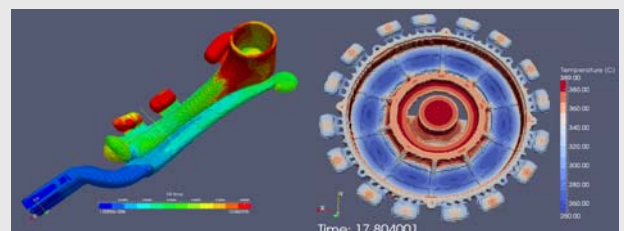
Auto Part

Auto Part



Lamp Cover

Auto Oilpanel



Bathroom Products

Machinery Gear

## Partnerships



### HONGKONG (Asia Pacific, HQ)

12/F AT Tower  
180 Electric Road  
North Point, Hong Kong

Tel: +852 2566 8109  
Fax: +852 2234 5811  
Email: C3PHK@c3p-group.com

### NEW YORK OFFICE

9631 Field Stone ct,  
Painted post, New York, 14870, USA

Tel: +1 607 330 4772  
Fax: +1 607 330 4776  
Email: C3PNY@c3p-group.com

### SAN DIEGO OFFICE

11409 Trailbrook Ln,  
Sandiego, CA92128, USA

Tel/Fax: +1 858 6793 4203  
Email: C3PSD@c3p-group.com

### SUPPORT CENTER

Unit 602-9, Info Building, No. 111  
Science Avenue GSC, GZ, 510663

Tel: +86 20 3229 3257  
Fax: +86 20 3205 3354  
Email: C3PCN@c3p-group.com