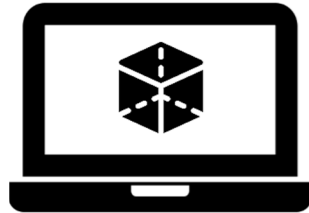
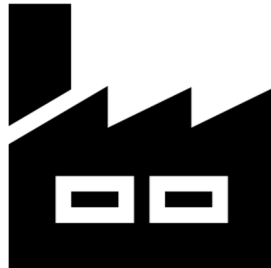


**FOR DIE
MAKERS AND PART
DESIGNERS**



**FOR THE
FOUNDRYMEN**



CastleMIND and
CastleKEY provide the
ability to:

**Optimize area and
thickness of the ingates**
according to the expected
quality specifications for the
casting, its geometry, type
of alloy and the
performances of the die
casting equipment.

**Predict and evaluate the air
venting performance** both
for passive (chill vent) or

CastleMIND and
CastleKEY provide the
ability to:

Optimize production by
providing optimal injection
parameters, slow and fast
shot speeds and strokes,
shot sleeve diameter,
furnace and die
temperature in order to
maximize part quality and
reduce setup time

**Easily identify the defect
root cause** due to the
mould, the machinery or the
process,

active (vacuum)
configurations and suggest
the optimal size for a given
setup.

Supply information on how
to make the mould perform
to its maximum potential
(through PQ² diagram
analysis) according to the
casting equipment and the
operating conditions faced.
It helps to decide whether it
is necessary to modify the
temperature of the die.

and advise on solutions and
improvements.

**Increase overall casting
quality** (in terms of porosity,
surface finishing and other
defects)

**Reduce scrap rate by
increasing process
reliability over time** while
reducing the harmful effects
of alloy and mould
temperature fluctuations, as
well as injection
performance instability.

Reduce die wear and

**Optimize the plunger
diameter and suggest the
best process parameters**
for the given
mould/machine
combination.

**Compile the machine
parameters datasheet**
(injection strokes, plunger
speed and pressure) as a
guideline to be sent to the
foundry or used for realistic
filling simulations.

soldering phenomena,
frequently caused by
poorly calculated and
inadequate gating areas.

Reduce setup costs related
to casting shape reviews
needed to improve mould
performances after the first
sampling process.

Extend mould cycle life by
optimizing both die
geometry and process
injection parameters in
order to avoid washout,
erosion and die wear
phenomena.

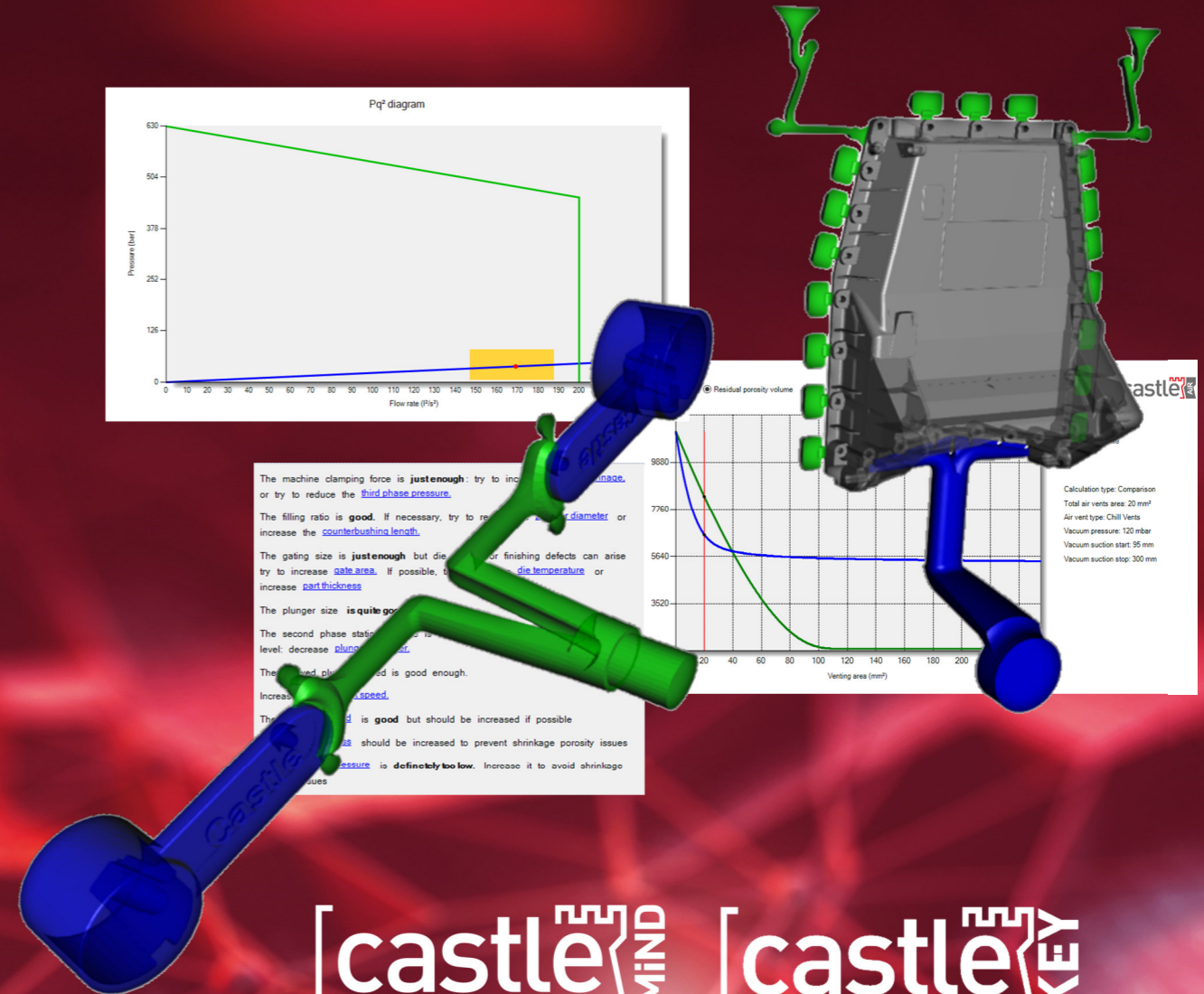
powered by

[PiQ²]
Developing Expertise

PiQ² srl

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[castle²] **MiND** **[castle²]** **KEY**

KEY

SMART OPTIMIZATION

MiND

The machine clamping force is **just enough**: try to increase [machine tonnage](#), or try to reduce the [third phase pressure](#).

The filling ratio is **good**. If necessary, try to reduce the [plunger diameter](#) or increase the [counterbushing length](#).

The gating size is **just enough** but die erosion or finishing defects can arise try to increase [gate area](#). If possible, try to increase [die temperature](#) or increase [part thickness](#).

The plunger size **is quite good**.

The second phase static pressure is **too low** to ensure the required porosity level: decrease [plunger diameter](#).

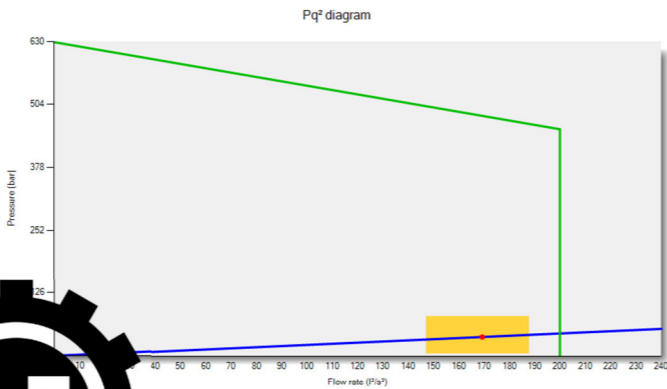
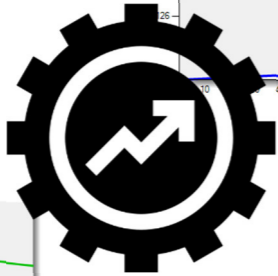
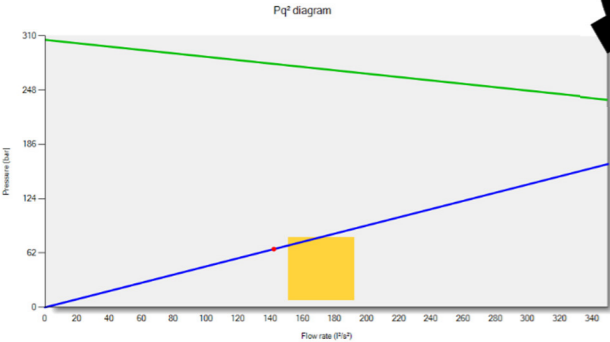
The allowed plunger speed is good enough.

Increase the [fast shot speed](#).

The [slow shot speed](#) is **good** but should be increased if possible.

The [gating thickness](#) should be increased to prevent shrinkage porosity issues.

The [third phase pressure](#) is **definitely too low**. Increase it to avoid shrinkage.



The machine clamping force is **optimal**.

The filling ratio is **optimal**.

The gating size is **optimal**.

The plunger size **is quite good**.

The second phase static pressure is **optimal**.

The allowed plunger speed is good enough.

Fast shot speed is **optimal**.

Venting area is optimal.

The slow shot speed is **optimal**.

The gating thickness is **optimal**.

The third phase pressure is **optimal**. Increase it only if necessary.

PRACTICAL INTELLIGENCE FOR DIE CASTING

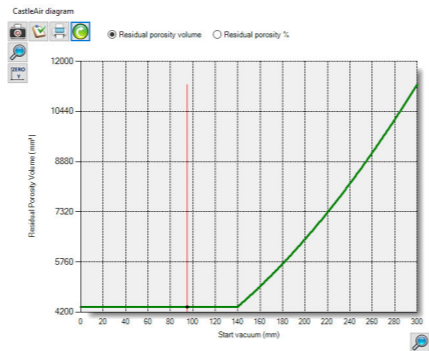
CastleMIND and **CastleKEY** are innovative software solutions that present advanced mathematical concepts within an interface designed to make the **software very user friendly**.

The software technical advantage arises from the use of mathematical rules, derived from **fluid dynamic principles**, beside **foundry or moulding experience** that evaluates and supplements the theoretical formulae.

The calculation output is expressed to make the **results comprehensible and useful** even for operators with no specific technical background.

The software is able to **identify both critical die design features and wrong process parameters**. It suggests how to optimize them to avoid or reduce quality issues during production.

All the hint and tips are provided in **common foundry language** rather than by numbers.



Dimensions of air vent n° 1

Length (L) 0 14.00 mm

Thickness (H) 0 10.00 mm

Air vent area 0 140.0000 mm²

Air vent type NODEF VacuumValve

✓ ✗

Model

Name ITALPRESSE I ITALPRESSE IP1350SC

Suggested line press. 150

Dry shot speed 9.6

Max injection force 973.6

Max injection pressure 516

Locking Force 1100

Typical second phase speed 3

Typical first phase speed 0.2

Plunger

Shot sleeve

Loader

Calculation type: Vacuum Venting

Total air vents area: 20 mm²

Air vent type: Vacuum/Valve

Vacuum pressure: 120 mbar

Vacuum suction start: 95 mm

Vacuum suction stop: 300 mm

Project Machine Part Materials Process parameters

Cavities number

Volumes and weights

Frontal areas

Gating

Thicknesses

CastleAir

Calculation type Venting Compare

Diagram type Venting area Venting area

Vacuum

Start vacuum 150 150 mm

Stop vacuum 616 616 mm

Vacuum pressure 300 300 mbar

Venting

Air vents type 1 1

Total air vents area 192 140.00 mm²

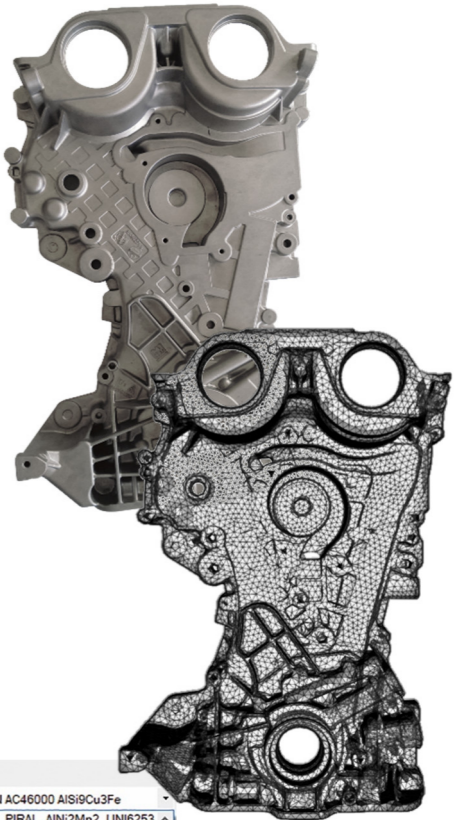
1 (L) x (H) 14 x 10 192 140.00 mm²

- 3D CAD modelling capabilities
- Geometry import format
- 3D Model healing and editing functions
- Boolean operations on solids
- Run simulation without CAD model
- Direct data input from 3D model
- HPDC Cold/Hot Chamber optimization
- Presses, alloys and die materials database
- Vacuum and ventings size optimization
- Interactive practical optimization suggestions
- Typical model preparation time
- Typical simulation time
- Typical training time
- On-request customized databases/profiles
- Automatic generation of simulation report
- Data export for CastleBODY filling simulation

CastleMIND

CastleKEY

Step, Parasolid, STL, Iges, ...	-
	-
	-
	✓
	✓
	✓
	✓
	✓
	✓
	✓
5 min	2 min
1 sec	1 sec
4 hours	2 hours
✓	✓
✓	✓
✓	-



Part material

Alloy grade EN AC46000 A EN AC46000 AISi9Cu3Fe

Solid state density 2.74

Solid state temperature 525

Liquid state density 2.46

Liquid state temperature 590

Suggested furnace temperature 670

Suggested die temperature 280

Tool material

EN AC46000 A EN AC46000 AISi9Cu3Fe

AL_PIRAL_AIN2Mn2_UNI6253 A

EN AC43400 AISi10MgFe

EN AC43500 AISi10MnMg

EN AC44100 AISi12

EN AC44300 AISi12Fe

EN AC44400 AISi9Mg

EN AC44500 AISi12Fe

EN AC46000 AISi9Cu3Fe

EN AC46100 AISi11Cu2Fe

EN AC46200 AISi8Cu3

EN AC46500 AISi9Cu3(Fe)

EN AC47100 AISi12Cu1Fe

EN AC51200 AlMg9

EN AC51500 AlMg5Si2Mn

MN4 AlMn4Si1

SILAFONT36 AISi9MgMn

CASTASIL37 AISi9Mn

MAGSIMAL59 AlMg5Si2Mn

Required performances

Metal specific pressure 865 865 bar

Static safety factor 1.5 1.50

Dynamic safety factor 1.6 1.60

Discharge coefficient 0.6 0.60

Surface finishing Medium Medium-high

Allowed porosity Medium NOT DEFINED Low Medium-low Medium Medium-high High

Process parameters

