

The Hot Runner System for Zinc Die Casting



'A Game Changing Technology'

A short but effective history....



- Ferrofacta GmbH started in 2009 as a supplier of mould components
- Global supply chains created for high quality/high precision tool components
- Development begins of prototype hot runner system for zinc die casting
- Testing of prototype system together with a leading German casting company
- Successful production tests lead to more tooling in different design concepts
- Worldwide patents registered for the hot runner technology
- The World's first 'runner free directly gated' zinc die cast parts are produced
- Other European companies selected for further production trials
- Increasing demand leads to the creation of a worldwide distribution network



So what are the cost problems....

Casting demands are greater than ever (casting complexity / thin walls / quality)

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- Pressures on margins & cost are constant (price competition / delivery demands)
- Productivity needs to be increased continually to stay ahead
- Porosity is a constant quality issue (surface finish of plated parts / strength)
- Engineering skills in short supply as process controls become more intricate
- High investment costs for new & more modern machinery
- CO² & energy cost reductions are a global environmental issue
- Constant cash flow impact of material stock as well as finished goods stock



The technology....



- Hot runner tooling in injection moulding is common and well proven
- Effective hot runner technology allows direct gating to part (100% material yield)
- Faster cycles & higher effective machine utilisation than with conventional die casting
- Multi-slide tooling is fast but has limited cavity space and high die wear
- Hot runner tools enable multi-cavity conventional tooling at multi-slide shot rates
- Carbon footprint (CO²) & energy consumption reduced by approx 30%
- Lower use of waste material creates less oxide (less remelt means less machine wear)
- No runner means less air entering the cavity (less porosity / higher quality)
- No recycled material means a guaranteed material spec as well as higher quality
- No waste material means lower initial material purchases (cashflow positive)



The solutions available....



- Hot runner technology allows multiple injection points in the tool
- Multiple nozzles can feed multiple parts of different shapes/sizes with no quality issue
- The positioning and number of nozzles is completely flexible
- No restriction on gating or positioning of sliding cores (part orientation)
- Indirect gating is still available (i.e. multiple small, complex parts on small runners)
- High volume parts can be produced from multiple nozzles with no waste at fast cycles
- Lower volume parts can be cast from standard multi-nozzle bolster systems
- Standard multi-nozzle bolster systems also allow fast prototyping of new parts
- Mono-block design allows hot runner system to be re-used for new tools



Total production flexibility....



- Total flexibility in the tool design...your choice...your methods
- Different solutions can be used for different problems
- Product can still be extracted with robots if required, similar to plastics
- A true 'net shape' casting can be achieved straight from the machine
- Gate 'scars' can be internal so that edges need not be trimmed/polished/machined
- Porosity levels achieved are less than 0.5% almost perfect integrity
- Ultimate quality levels for plated, decorative parts and/or for component strength
- System can be used for all hot chamber zinc alloys including EZAC and ACCU-Zinc





Maximise your margins....

- 30-40% saving in cycle time due to no runner or sprues
- 30-40% saving in energy usage and cost
- Less material being in circulation means less material purchased and lower cash outlay
- No matter what volumes are required...savings are calculable
- Large parts or small parts can be produced in the same tool concept if required
- Delicate parts can still be extracted with a robot
- Surface finish parts are produced without edge scarring
- Plated parts can be produced with zero rejects
- Volume parts produced at multi slide shot rates in multi cavity tooling







A few simple technical details....



- The 'Hot-Half' is of modular construction and supplied as a mono-block ready assembled
- The fixed half of the die is mounted in and around the 'Hot-Half' as in injection moulding
- The **position of the nozzles is fully flexible** although balance is important so are normally mounted in pairs
- Tools can be designed as multi-nozzle/multicavity for mass production
- Alternatively, a tool can be designed as a standard 2-drop bolster for use with your existing unit tooling
- 'Hot-Halves' can be re-used with new cavities at an end of product life scenario
- The moving half of the die is mounted as normal



A few more important details....

- The hot half concept can be designed to suit your individual needs with regard to nozzle position
- Each nozzle is independently controlled and can be turned on/off during the production
- This is useful when a cavity is damaged for example or for quality checking
- The independent nozzle allows different volumes and casting weights to be produced without the usual quality compromises – a true 'family' tool
- Nozzle life-times are now approaching one million shots and are still being improved
- The nozzles are **fully repairable** and can be exchanged by the user
- Nozzles suitable for Magnesium (AZ91) are also currently under development

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Quick to start & universal in operation

- A temperature controller is all that is required to control the nozzles in use
- The **controller is completely independent** of the machine and can be transferred to other dies.
- A normal machine operator can start and end production within minutes
- The simple user interface allows unskilled operation
- Perfect quality at rapid cycle times is easily achieved without the need for complex injection profiles
- The system can be used with ALL machine types







Multiple use solutions

As an Example:

- A simple '2-Drop hot half' gives two injection points in a standard die casting machine and can be used in multiple ways to cast different types of part (see below)
- Each nozzle is still independently controlled and can be turned on/off so part segregation can still be controlled
- Useful for part families as well as for sampling and prototyping



Standard pitch 2-Drop with opposing slides



Standard pitch 2-Drop with multiple cavities



Standard pitch 2-Drop

with opposing slides / single slide

Standard pitch 2-Drop with direct gating on large part



Standard pitch 2-Drop with family inserts / single slide





Example solutions – cosmetic parts

Conventional die casting of larger cosmetic parts produces a large amount of waste material. This is a quality constraint (air content) as well as an energy cost. These are probably the most critical cost areas of the whole process.

Conventional die casting – even with an optimised runner – would result in edge gating, trimming and polishing, all of which add subsequent costs.

Production cycle times are typically quite long due to the large material content of each shot and the cooling time required.



Hot runner technology allows gating to be placed directly on to the component face if needed and away from the split line. On an 'A-Face' for example, it can be subsequently hidden with a logo insert or label.

Even using conventional split line gating with a hot runner there is minimal runner content resulting in very low air content and requiring little or no venting. This results in a high shot yield and exceptional quality levels at much reduced production cycle times.

Example solutions – cored parts

Conventional die casting of multi cored parts with sliders, especially when high volumes are required, results in long runners and restricted cavities.

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Runners have to travel over cores and add localised heat, which can also result in soldering and core breakages.

Production cycle times are extended due to the excessive heat and material content with a necessary lubricant cycle



Hot runner technology allows gating to be placed directly on to the component face if possible and away from the split line.

Hot runner technology also allows a localised 'sub-runner' and complete flexibility of tooling design with no restriction on part orientation or number of cavities. More cavities produced at lower cycle times as multiple nozzles fill multiple parts at

he same time

Mass production becomes easy

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....just add the cavity plates





a few more examples



15g Electronic connector with direct gating

25g fencing connector cast with sub-runner

320g cover plate with twin direct gating Now cast without sprue and venting

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All parts were cast on standard hot chamber die casting machines and achieved cycle time reductions of over 30%

In summary



- 1. Lower cost die cast parts
- 2. Significant reduction in conventional machine cycle times
- 3. Quality of component is considerably higher with increased output
- 4. Increased cavity availability with flexible die design options
- 5. Net shape parts produced without any or little waste material
- 6. Secondary operations such as trimming are no longer required
- 7. Energy efficiency increased & subsequent cost of melting reduced







Sounds too good to be true?

Contact us...and let us help you to change your game!

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