

KNOW-HOW FOR GAS ASSISTED INJECTION MOULDING TECHNOLOGY



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ABSTRACT

In Gas-Assisted Injection Moulding (GAIM), gas is injected into a mould that has been partially filled with polymer. The gas drives the molten polymer core further into the mould, until it is filled completely. The penetrating gas leaves behind a polymer layer at the mould walls, yielding a product with a polymer skin and an inner gas channel. GAIM offers a number of advantages over conventional injection moulding. They mainly originate from the negligible pressure drop in the gas core: reduced clamp force, reduced sink marks, reduced residual stresses and shorter cycle times. The Chemical Engineering Department of the University of Alicante has applied successfully a complete CAE software package in order to give mould design guidelines and select the optimum process conditions. We are seeking companies to provide us our high experience, expertise and know-how to produce parts that demands the best quality.

TECHNOLOGY ADVANTAGES AND INNOVATIVE ASPECTS

ADVANTAGES

Some of the potential benefits of gas-assist injection moulding are:

- Use of lower tonnage machines
- Lower injection pressures
- Improved part quality
- Reduced cycle time vs solid sections
- High strength to weight ratio
- Reduced/eliminated sink
- Less warpage
- Low moulded-in stress provides excellent dimensional stability
- Design flexibility
- Reduced tooling costs as a result of replacing hot runner systems with gas channels.

INNOVATION ASPECTS

Nowadays, commercial packages of Computer Simulation of Gas-Assisted Injection Moulding are available only for thin-walled moulded parts, which are simulated using a midplane model (2½D Hele-Shaw approach). Consequently, it is necessary to create a midplane representation of the complex thick mould cavity. However, for thick parts a midplane representation involves a considerable geometric simplification. Moreover, in some areas of the part it does not exist a unique midplane representation.

A methodology to choose the midplane representation which best fit with the results provided by a three-dimensional computer analysis of the filling stage (conventional moulding) performed with a 3D CAD model of the complex part has been developed and tested.

MARKET APPLICATIONS

Initial applications in gas-assist injection moulding were primarily closed channel parts such as automobile grab handles and lawn and garden furniture handles. As the technology has sophisticated, design techniques were applied to gas-assist injection moulding, the variety and complexity of applications increased. Next table list examples of these products

Table 1. Gas-Assist Injection Moulding

- Appliance handles
 - Toy industry
 - Automotive
 - accelerator pedal arms
 - air filter housings
 - door handles
 - mirror housings
 - oil filler duct
 - Business machine chassis / housings
 - Furniture: chairs, tables
 - Television housings
 - Golf club shafts
 - Basketball backboards
 - CD-ROM trays
 - Bottle crates
 - Copier panels
 - Shower heads
 - Washing machine agitators
 - Window frames
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COLLABORATION SOUGHT

Two types of cooperation are sought by the Department of Chemical Engineering of the University of Alicante:

- Consulting services for companies which are working or expect to work with GAIM.
 - Instruct people interested in perform the tasks involved in gas assisted injection moulding.
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