Challenges in multi-component injection molding

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Challenges in multi-component injection molding

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• Factors of influence

• Examples
  – Arielle Housing
  – Waterfall
Injection molding

Schematic figure

ejector

cavity

sprue

nozzle

heating elements

barrel

ejector

mold

hopper

drive

screw

mold
Injection molding

Screw rotates and fills the barrel
Injection molding

Screw rotates and fills the barrel
Injection molding

Screw rotates and fills the barrel
Injection molding

Barrel is filled and ready for injection
Injection molding

injection
Injection molding
Injection molding
Injection molding

Cavity is full $\rightarrow$ switch over to holding pressure
Injection molding

holding pressure
Injection molding

Cooling and shrinking
Injection molding

Cooling and shrinking
Injection molding

Cooling and dosing
Injection molding

Cooling and dosing
Injection molding

Mold opens and throws the part out of the cavity.
Injection molding

Mold opens and throws the part out of the cavity.
Injection molding

Mold opens and throws the part out of the cavity.
Injection molding
Injection molding
Injection molding
Injection molding
Injection molding

Mold closes and process start again
Injection molding

Mold closes and process start again
Injection molding

Mold closes and process start again
Multi component injection molding

Definition

• A process of making a part from more than one material in the same production process.

• Different multi-component injection processes:
  – two-component
  – co-injection
  – over-molded
  – multi-material
Multi component injection molding process

Mold is open, plasticization begins

Injection of component A, holding pressure and cooling time

Ejection finished 2 K part after holding pressure and cooling

Opening of next cavity, injection component B
Factors of influence

- material
- warpage
- de-molding
- tempering
- ventilation
- Injection possibilities
Examples

Arielle Housing
Arielle Housing

Requirements

– Part for water tight epilator
– High gloss surface
– Switching function included
– No injection point(s) visible
– No Parting Lines visible
– Molded 3D deep-view effects
– Hidden LED
Arielle Housing
Challenges: Technology choice

1. 2 x 2 k + Pins
2. 4 k + Pins
3. ..... 

Step 1: 3 k Panel
Step 2: 1 k Housing + Pins
Arielle Panel
Challenges: Out-washing effects of design-layer

1. DOE with 32 materials to get best performance

2. Injection situation

Build a kind of jump for 2nd component
Arielle Panel

Challenges: Molding 3rd component for switch
Arielle Housing
Challenges: Seal the 3D contour of Panel

- Pin slider
- die (ejector side side)
- Panel
- core
- Housing
- die (nozzle side)
Examples

Waterfall
Main Cover Overmold
Waterfall Main Cover Overmold

Requirements

- Water tight
- Deep view effect
- Switching function included
- No parting lines visible
- Hidden LED
Waterfall Main Cover Overmold challenges

3rd Component without additional injection unit

Additional 2-component insert part
Waterfall Main Cover Overmold

Challenges: out washing effects

no other possibilities to inject
(thick wall <7mm high gloss)
Thank you