Slide 1

Gas Assist Injection Molding
PL ET 370
Modified MAR-02

Slide 2

Gas-Assist Injection Molding
- Basic Technology - Injection Molding
- Sometimes Confused with Blow Molding
- Process
  - Short Shot
  - Nitrogen Gas
    - Finish Filling
    - Packing

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Gas-Assist Injection Molding
- Applications
  - Handles
  - Automotive
    - Bumper Fascia
    - Grille
  - CD ROM Trays
  - Shower Bases
  - Toilet Seats
  - Window Frames
Slide 4

**Gas-Assist Injection Molding**
- Introduction of Gas

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**Gas-Assist Injection Molding**
- Basic Types
  - Constant Volume
    - Predetermined Volume Stored
  - Constant Pressure
    - Reservoir-like Air Compressor

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**Gas-Assist Injection Molding**
- Advantages
  - More Uniform Packing of the Part
  - Lower Clamp Tonnage
  - Lower Injection Pressures
  - Reduction in Part Weight
    - 10% - 40%
  - Reduction of Sink Marks
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Gas-Assist Injection Molding

- Disadvantages
  - Race Tracking of Polymer Through Gas Channels
  - Fingering
  - Gas Blow-Through
  - No fully being able to Control where the Gas goes
  - More Expensive than Standard Injection Molding

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Gas-Assist Injection Molding

- Common Problems Associated with Processing
  - Fingering
  - Gas Blow-Through

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Gas-Assist Injection Molding

- Gas Channels
  - Should Extend in the Direction of Polymer Flow
  - Should Extend to the Last Place to Fill
  - 2-3 times the Nominal Wall - Tapering down at the Last Place to Fill
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Gas-Assist Injection Molding
- Balanced Polymer Flow
  - Needed to be Balanced because Gas pushes the Polymer to the Last Place to Fill
  - Unbalanced Fill could produce Gas Traps (not Gas Assist's Gas)

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Gas-Assist Injection Molding
- Gas Channel
- Solid Layer
- Molten Layer

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Gas-Assist Injection Molding
- Reduction of Solid Layer Thickness
  - Decrease Gas Delay Time
  - Increase Melt Temperature
  - Increase Mold Temperature
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Gas-Assist Injection Molding

- Reduction of Molten Layer Thickness
- Increasing Gas Pressure
- Increase Melt Temperature
- Decreasing Short Shot Size

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Gas-Assist Injection Molding

- Effect of Gas Pressure
  - Increases Gas Velocity
  - Reduction in Wall Thicknesses
  - Adequate Packing
  - Fingering

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Gas-Assist Injection Molding

- Effect of Viscosity
  - Higher Viscosity
  - Thicker Wall Sections
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Gas-Assist Injection Molding
- Mold Materials
- Same as Injection Molding
- More Use of Aluminum
  * Lower Pressures

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MuCell

Slide 18

MuCell
- Foaming Process with High Pressure Gas
- Like Structural Foam
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MuCell

- Process
  - Supercritical Fluid Injected into Barrel
  - CO₂ & N₂
  - Nucleation
  - Cell Growth & Shaping

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MuCell

- Advantages
  - Reduction in Material Viscosity
  - Reduction in Cycle Time
  - Reduction in Clamp Tonnage
  - Lower Part Weight

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Slide 21

MuCell

- Injection Molding
- Extrusion Blow Molding
- Extrusion