AutoDynamic Technologies & Solutions Pvt Ltd

“Delivering Ideas to Products”

Date: Jan 2020
Our Value Proposition – Material to Part
Injection Molded Composites (IMC)

Technology & References
IMC Machine @ AutoD

Continuous Glass Fiber being fed into the machine
IMC PRINCIPLE

Get the Benefit together
Injection Molded Composite Process - Principle

Injection Molding:
• Single screw
• Material processing
• Discontinuous process

Extrusion:
• Twin screw
• Material compounding
• Continuous process

Continuous and discontinuous – Two in One
What makes an IMC suitable for long glass fiber applications?

IMC with platform scale

- Rovings
- Plastic matrix
- Platform scale
Material Properties

Influence of fiber length on mechanical properties
Long glass fiber – PP/GF (qualitative)

Source: FH Rosenheim, Prof. Schemm, based on Thomason & Vlug
## Filler Contain Results for the plate molded with 40 % Glass filled PP

<table>
<thead>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>Avg.</th>
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<td>39.90</td>
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<td>40.65</td>
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<td>40.38</td>
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ACTUAL FIBER LENGTH

Note - Testing done on part level, test specimens cut from the actual molded part.
Part thickness was in the range of 2.5 to 2.7 mm.

Fiber length - GF Injection molding = < 0.5 mm
- LFT / LGF Injection Molding = < 1mm
- IMC = minimum 5mm & even more than 30mm in MANY areas
Glass / Carbon / Aramid Fabric Laminate

*Enhancing IMC Capability*

Technology & References
Enhancing IMC Capability

1. Fiber cloth infiltrate
2. Mould pressing
3. Fiber sheet
4. Fiber sheet cutting
5. Semi-finished product
6. Semi-finished product pick-up
Enhancing IMC Capability

**Table:**

<table>
<thead>
<tr>
<th>Items</th>
<th>unit</th>
<th>According to Standard</th>
<th>Value</th>
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<tr>
<td>Polymer</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Fiber</td>
<td>-</td>
<td>-</td>
<td>E-glass</td>
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<td>Density</td>
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<tr>
<td>Thickness per layer</td>
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<td>Charpy notched impact</td>
<td>kJ/m²</td>
<td>ISO 179</td>
<td>118</td>
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</table>
In-Mold Forming & Over Molding

mold closing side  IR heater  laminate in open mold  mold injection side

Laminate  Laminate heating  Injection Molding  FG Part

Integrity | Excellence | Customer Focus | Technology Edge | Responsibility
Drop Test

Test Temperature 23°C

- PP
- PP GF30
- PP GF30 + Laminate Sheet

Time [ms]
MOLD DESIGN

- Wear resistant gate mould Inserts (gating)
- Venting
- Large flow channels
- Smooth crossings
- No sharp edges

\[ R = \frac{1}{2}D \]

\[ \text{Gate } \varnothing 7 \]

\[ \text{\(\varnothing\) 8 / valve pin} \]
References

Gear Box Shell  Seat Pan  Brake Pedal

Anti Collision Beam
Sustainable Long Term Benefits - IMC

Weight reduction of 30% to 50% - Impact due to

- Specific gravity difference between metal & plastics.

Cost reduction of 10% to 20% - Impact due to

- Process cost - Combination of 2 process of extrusion & injection molding to 1 process of IMC.
- Raw Material Cost - Elimination of RM cooling, drying, packing, transport and then re-melting granules in injection molding to make parts. Can select RM ingredients and compound & injection in 1 shot.
- Quality improvement – Better Retention of Polymer properties by reducing one melting cycle
Thank You