Film Insert Moulding and Textured Surfaces

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MacDermid at a Glance

Business Description

- We manufacture and sell a broad portfolio of specialty chemicals and provide highly technical service to our customers through our extensive global network.
- “Asset-lite, high-touch” business model part of Platform Specialty Products. Focus on technical service and innovation.
- Dynamic chemistries a small portion of customers’ costs, but performance critical.
- #1 or #2 market share in most businesses.
- Key end markets metal and plastic plating, electronics, graphic arts, and offshore oil production and drilling.
- Serving 3,500 customers in over 33 countries.
- 2,000 people in our global network of 14 low-cost manufacturing sites and 23 technical service facilities and R&D centers.

Sales Breakdown

Sales by Business

- MPS: 23%
- ASF: 77%

Sales by Geography

- Europe: 34%
- Americas: 38%
- Asia: 28%

Global, High Technology Producer of Dynamic Chemistry
FIM Process – The Basics
Film Insert Moulding Construction

Coating

Hard coat coating

Polycarbonate Film

Injection mould
Print colours and symbols
Film Insert Mouldings in Vehicles
It does not have to be black

Any colour possible – even metallic and mirror effects

No Restrictions On Colour

Several projects being developed in white
Printed Pattern

- Key strength of screen printing
- Multilayer printing with Proell
- Colour and structure – unlimited possibilities
More Surface Options than High Gloss

Textured coatings

New Developments

Printed Texture

Fototex 3D
## Surface Requirements

<table>
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<tr>
<th>CHARACTERISTIC</th>
<th>REQUIREMENT</th>
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<tr>
<td>Cosmetic</td>
<td>Should be consistent no bands</td>
</tr>
<tr>
<td>Gloss</td>
<td>Variable to Customer requirements</td>
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<tr>
<td>Haze</td>
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<td>Wear Performance</td>
<td>Abrasion Testing</td>
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<td>Sun Cream, Hand Cream etc.</td>
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<td>Complex 3D Shapes. Design Freedom.</td>
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## Technology Options

<table>
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<th>PROCESS</th>
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<td>Liquid Overprinting</td>
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<td>Matt Foils</td>
<td>Foil with Embossed Structure</td>
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<td>Foil with matted lacqueur</td>
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<td>In Mould Texturing</td>
<td>Texture on Tool Face</td>
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Formable Texturing Lacquer Systems

- Screen Print Process
- Dual cure to allow forming (3D Shapes)
- Good Chemical and Abrasion Resistance
- Excellent line and shape print definition
Formable Texturing Lacquer systems

- Deep Draw Complex Shapes
- Different Gloss levels easily managed
- Handling and printing need to be optimised
- Very flexible relatively low cost
- Haze OK
Matt Foil – Embossed Structure

- Structure applied to foil in manufacture
- Any structure – steel effect, velvet, supermatt, - any gloss
- Ready to use
- Excellent Abrasion and Chemical Resistance
- Only simple deformation possible 2D
- Low Haze possible excellent optic properties
Matt Foil - Matt Lacquer

- Matt lacquer coated on foil
- Matt effects not structure
- Dual cure system (UV cure after forming)
- Excellent Abrasion and Chemical Resistance
- 3D Shapes
- Haze similar to Screen printing lacquers
In Mould Texturing

Process Steps

- Blank Foil High Gloss
- Texture on tool face impresses structure
- Post Form part cure
- Post Mold full cure
Texture on Tool imparts structure on foil
In Mould Texturing

- Transfer any pattern from tool face
- Care needs to be taken on pitch and depth of effects
- Abrasion and Chemical Resistance
- 3D Shapes
- Haze better than matt lacquer systems
## Comparison of processes

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Measurement of gloss

The specular gloss of a test sample at illumination angle $\theta_0$, $G_i(\theta_0)$, is given by

$$G_i(\theta_0) = G_i(\theta_0) \cdot \frac{\rho_{\nu,l}(\theta_0)}{\rho_{\nu,d}(\theta_0)}.$$  (2.8)

where $G_i(\theta_0)$ is the specular gloss of the primary standard and $\rho_{\nu,l}(\theta_0)$ and $\rho_{\nu,d}(\theta_0)$ are the specular luminous reflectances of the test sample and primary standard, respectively.

- We define “Antiglare” as (100-Gloss)%
- We measure gloss at 60°
Measurement of Haze

The haze is the amount of light deflected more than 2.5 degrees divided by all the transmitted light.

Measurement Principle: Haze

\[
\text{Haze} = 100\% \cdot \frac{T_{\text{dif}}}{T_{\text{T}}}
\]
Improved Haze and Gloss relationship

XF Matt and F3D Gloss units vs %Haze

- Fine
- Supermatt
- Matt XF
Changed Haze and Gloss Performance

In Mould Texturing Gloss units vs %Haze

- IMT VDI 30
- IMT VDI 27
- Antiglare

Gloss Units vs % Haze
Tell Us What You Think

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