The next generation of multi-component moulding
SkinForm, X-Form, CoverForm

Oslo, Norway 22 - 23.06.2010
Jochen Mitzler
Your system... is out of one hand
One supplier - KraussMaffei – Simple integration
What is SkinForm?
A system solution from different areas of expertise

SkinForm®

Injection Moulding  PUR- Moulding
Scratch resistance

Soft touch

Enhancing thin-wall parts

The PUR surface makes the difference...

SkinForm potentials

No grain warpage

High-quality leather properties

The PUR surface makes the difference…
Softtouch, scratch resistance and best optic and haptic …
SkinForm applications
One shot door panel with 4 different surface materials …
Application sample automotive

Application:
• Door panel – K2007
• PC / ABS with 3 different PUR Skin materials

Innovation:
• Combination of injection moulding and PUR technology
• Part transfer with Spin-Unit
• Complex automation cell

Value:
• Part with four different surfaces
• Partial softtouch and thin overmolding
• Well directed material distribution (Skin material saving)
SkinForm - cost advantage thru one shot process
Applications for high grade surfaces, paints, flexible foam combinations, acoustic and insulating properties
The PUR surface makes the difference...

SkinForm potentials
### 10 years of innovation and technology competences …
K-Highlights of IMC technology

<table>
<thead>
<tr>
<th>Year</th>
<th>Product Type</th>
<th>Material Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>K 1998</strong></td>
<td>Armrest</td>
<td>PP + Talcum</td>
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</table>
| **K 2001** | Exterior part | ABS + glass fiber  
Foil + cleanroom |
| **K 2004** | Structural parts | PP + glass fiber |
| **K 2007** | Vibration damping element | TPU-X  
All in one |

**History of IMC (Injection Molding Compounder)**
X-Form process for new hard-soft parts
Exhibit KM 300 IMC with SP700 L-Bolt-on for TPU - X

Metal-Rubber composites:
- increase assembly costs
- small tolerances
- pretreatment of metal part (e.g. primer)
- special rubber recipe

Thermoplastic-Rubber composites:
- Multinject Technology
- Thermal separation in mold
- Inmould-Assembly of e.g. seals
- Hot-runner / cold runner technology

First time introduced by KraussMaffei at K1998

Bildquelle: Vorwerk Autotec GmbH & Co. KG, Wuppertal, Deutschland
X-Form process for new hard-soft parts
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Performance-/price relation

Thermoplastic-TPU-X composites
- cross-linking thermoplastic TPU with rubber behavior
- Multinject mold technology
- No hot-cold separation in tool
- No vulcanization or post tempering process necessary
- Thermoplastic melting and filling process

Bildquelle: Vorwerk Autotec GmbH & Co. KG, Wuppertal, Deutschland
Application: Vibration-Damping Element
Exhibit KM 300 IMC with SP700 L-Bolt-on for TPU - X

- Vibration damping: Elastollan® TPU-X
- Round seal: Elastollan® TPU-X
- Main carrier: Ultramid CR -PA 66 GF30
- Sleeve: Ultramid CR -PA 66 GF30
Mold concept: 4 station turn-table
Exhibit KM 300 IMC with SP700 L-Bolt-on for TPU - X
Special „Laser-cused“ cores with contour water channels
Exhibit KM 300 IMC with SP700 L-Bolt-on for TPU - X
X-Form process: continues and discontinues in on IMM
Exhibit KM 300 IMC with SP700 L-Bolt-on for TPU - X
All in One – IMC, Multinject, turn-table, compact automation…
X-Form solution on CX machine base
20 to 40% of space saving ... Two platen benefit
Exhibit KM 300 IMC with SP700 L-Bolt-on for TPU - X

Demolding in separate housing
- Operator side

Demolding within IMM

Demolding in separate housing
- Across machine axis
Excellent bonding behaviour to PA66 (Ultramid)
Exhibit KM 300 IMC with SP700 L-Bolt-on for TPU - X
Comparison of process and production chain for:
Exhibit KM 300 IMC with SP700 L-Bolt-on for TPU - X

Process chain: Rubber-Metal-Composites

- Production of metal part
- Transportation
- Cleaning / Priming the metal part
- Transportation
- Production of rubber blend
- Vulcanization
- Finished part

Tolerances, assembly, QA cost, logistics cost, manufacturing coordination, cross-company, etc.

- Reduced quality and increased production costs

Process chain: Thermoplast / TPU-X Composites (X-Form)

- Pretreatment of materials (e.g. drying)
- Melting / direct part production (multi-component technology)
- Finished part

Advantages of Injection molding

- increased Quality and reduced production costs
**Function integration for vibration damping – multi-component**

**Application sample automotive**

**Application:**
- Vibration damping element (PA66/GF 30 + TPU-X)

**Innovation:**
- Cross reaction process on IMC for TPU-X
- 2 Component – integrated functions and assembly process
- Cycle time reduction with 4 station turn-table

**Value:**
- Thermoplastic flow and processing of TPU-X
- TPU-X with rubber properties
- Up to 6 times fast than rubber processing
Moulding and coating in one process
Combination of different areas of expertise
Moulding and coating in one process
Combination of different areas of expertise

CoverForm
Protective coating for PMMA in one step process

Definition of CoverForm

- Applying a protective, scratch-proof layer to PMMA (Plexiglas®)
- Thin coating layers possible (< 20 µm)
- Use of acrylic-based lacquer system
- Unique development cooperation of Evonik Industries and KraussMaffei

Value:
- Cost advantage process in one step
CoverForm® Prozess

- PLEXIGLAS® cf einspritzen
- Prägen und Abkühlen
- Kavität expandieren
- Reaktivlösung einspritzen
- Prägen und Heizen
- Werkzeug öffnen / Entnahme
- UV-Härtung
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The next multi-component generation PMMA + lacquer
Application sample CoverForm

Application:
• Cover (PMMA) with foil + coating

Innovation:
• New lacquer injection unit
• Dynamic mold heating
• Clean room concept for injection moulding

Value:
• Scratch resistance surface
• Compact production system incl. automation
• Cost advantage thru one shot process
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