Luran® S - ASA
Properties & Applications

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Outline

- Thermoplastics use in B & C
- Outline of styrenic polymers
- Standard & Specialty styrenic polymers
- ASA - Properties & Applications
- Existing and potential B & C Applications
- Conclusions
Material Use in B & C Western Europe:
APME. Total 730M tonnes

Concrete
Precast concrete
Brick & Tile
Wood
Iron & Steel
Stone
Asphalt & Bitumen
Plastics
Flat Glass
Mineral Wool
Aluminium
Standard Styrenic Polymers

- **General Purpose Polystyrene - GPPS**
  - + butadiene rubber

- **High Impact Polystyrene - HIPS**
  - + butadiene rubber

- **SAN**
  - + acrylonitrile

- **ABS**
  - + butadiene rubber
Specialty Styrenic Polymers

**SAN**
- Chemical resistance
- High modulus
- Low impact strength

**ABS**
- Excellent impact strength
- No squeak
- Excellent UV / Heat stability

**ASA**
- Excellent UV / Heat stability

**MABS**
- Excellent transparency impact strength

**ABS/PA**
- Special compatibilizer

**+ nylon 6**

**SAN + (P)MMA**

**SAN + acrylate rubber**

**ABS + butadiene rubber**

**Specialty Styrenics**

22.03.2004
ASA – Property Profile
Acrylonitrile / Styrene / Acrylate

- Excellent UV-resistance, excellent colour stability
- No painting necessary – cost saving
- Good impact strength even after weathering
- Excellent chemical resistance
- Resistance against various cleaning agents
- High dimensional stability (amorphous material)
- Superior long term performance
- Good adhesion to soft components
- Outstanding heat aging resistance
Comparison of ASA & other styrenic polymers after outdoor weathering

Yellowing of ABS, Luran S and blends on outdoor weathering (white pigmentation)
Comparison of the greying of ASA & UV-stabilized ABS after outdoor weathering

ASA Grade
(Luran® S 778T)

ASA

ABS-UV
ASA in Automotive Industry

1. Radiator grills
2. Cowl vent grills
3. Spoilers
4. Rear trim panels
5. Rear lamp housings
6. Window frames
7. B-pillar appliqué
8. Exterior mirror housings
9. Indicator lamp housings

(Specific examples are Luran® S)
ASA in E/E Sector

Advantages:
- Colour stability and resistance to yellowing
- Impact resistance and stiffness
- High scratch resistance
- High gloss
- Good chemical resistance (e.g. against cleaning agents)
- Heat aging resistance
Thermoplastics Use in B & C Western Europe: APME. Total 5M tonnes
ASA compared to PVC in B & C

- 30% Lower density
- Non-corrosive melt
- Higher weatherability in dark colors
- Higher heat deflection temperature
- Easy processability:
  - Extrusion - single and twin screw extruders
  - Injection Molding - universal screws, broad processing window
ASA & PVC working together:
Applications: Doors, window frames, shutters, siding & fencing

- ASA on PVC
  Improved colour stability, less fading

- ASA in PVC
  Adds increased Vicat / HDT for hot outdoor conditions & dark colours

- ASA instead of PVC
  For applications needing stiffness at even higher temperature
Comparison of ASA & PVC after outdoor weathering - Ohio USA

Delta E

Outdoor Exposure Time (months)

Luran S ASA Light Blue
Luran S ASA Light Brown
Luran S ASA Light Gray
PVC Light Blue
PVC Light Brown
PVC Light Gray
Luran S field color retention - light blue

Field Location
- Florida (wet sunny)
- Ohio (Industrial)
- Arizona (dry, sunny)

Measurements:
- Spectrophotometer 45°/0°

Exposure Time (months):
- 6
- 12
- 18
- 24

Delta E
### ASA Property Comparison

<table>
<thead>
<tr>
<th>Property</th>
<th>PMMA</th>
<th>PVC</th>
<th>PP</th>
<th>ASA</th>
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</thead>
<tbody>
<tr>
<td>Toughness-Stiffness ratio</td>
<td>-</td>
<td>+</td>
<td>0</td>
<td>++</td>
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<tr>
<td>Weathering resistance</td>
<td>++</td>
<td>+</td>
<td>0</td>
<td>++</td>
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<tr>
<td>Dimensional heat resistance HDT/Vicat</td>
<td>+</td>
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<td>+</td>
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<tr>
<td>Chemical resistance</td>
<td>0</td>
<td>+</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Dimensional stability/ Low warpage</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
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<tr>
<td>Gloss – Long-term</td>
<td>++</td>
<td>0</td>
<td>-</td>
<td>+</td>
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</table>
ASA in PVC

Vicat B50 (°C)

Weight % ASA

105°C

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ASA Applications in B & C

- ASA offers much higher Vicat than PVC, enabling use in hot countries and darker colours
- Doors made of ASA
- Solar panel housings that must withstand intense UV and remain rigid under high temperature
- As a cap layer for PVC and other less stable polymers (fencing, siding, decking, roof-tiles etc.)
- Storm doors, exterior trim, garage doors
Applications of ASA on PVC or ABS
Conclusions

- Plastics are used in B & C due to their versatility, attractive properties and cost
- Styrenics are used for insulation, pipes, ducts and fitted furniture
- ASA offers excellent mechanical properties like those of ABS with the bonus of superb heat and UV resistance
- ASA is well proven in the automotive and E&E sectors
- The qualities lend themselves very well to adoption in B & C
- Existing applications are window profiles, siding, roof tiles, electrical switch covers and more
- Let your imagination find the rest!