2010 CARE CONFERENCE

FROM POST CONSUMER CARPET TO A NEW LIFE IN PLASTICS
NYLON 6 & NYLON 66 IN AUTOMOTIVE PLASTICS

ONE OF THE LARGEST POTENTIAL USES FOR POST CONSUMER NYLON CARPET IS THE AUTOMOTIVE MARKET

Over 500 million pounds per year
GLOBAL END-MARKET DEMAND FOR NYLON ENGINEERING RESINS

2008 SALES TOTAL: 5.08 BILLION POUNDS

- Automotive: 36%
- Electrical: 18%
- Consumer & Appliances: 13%
- Films & Coatings: 13%
- Industrial Machinery: 13%
- Wire & Cable: 10%
- Other: 8%

2%
Nylon 6 vs. Nylon 66 - Automotive

2008 Share in Pounds

- Nylon 66: 55%
- Nylon 6: 45%
Types of uses

- INTERIOR
- EXTERIOR
- UNDERHOOD

How much Plastic is used

AUTOMOTIVE PLASTIC CONTENTS

Approx. 300 lbs per Car

- 50 pounds of Nylon
- 80 pounds of Polypropylene
- Other Plastics Comprise rest (Including Polypropylene)
Nylon 6 is used in both Interior and Exterior applications

Nylon 6 is preferred for “Appearance Parts”.

- SMOOTH SURFACE APPEARANCE
- GLOSSY SURFACE
- EASILY PAINTABLE
**Requirements**

- **SURFACE APPEARANCE**
  - Grain
  - Gloss
  - Paintable

- **PERFORMANCE REQUIREMENTS**
  - Impact Resistance – 30+ Joules @ -30°C.
  - Low Temperature Ductility – Ductile @ -30°C to -40°C
  - Scratch & Abrasion Resistance – 15 + Newton
  - Weather ability – 2500+ hrs. exposure
NYLON 6 EXTERIOR APPLICATIONS

- Exterior parts – Some examples
  - RUNNING BOARDS
  - ROOF RACKS
  - MIRROR COMPONENTS
  - WIPER COMPONENTS
  - DOOR HANDLES
NYLON 6: INTERIOR APPLICATIONS

- Requirement
  - SURFACE APPEARANCE
    - Grain
    - Gloss
    - Paintable
  - PERFORMANCE REQUIREMENTS
    - High Temp. Resistance – 80° C to 120° C
    - Impact Resistance – 30+ Joules @ -30° C.
    - Low Temperature Ductility – Ductile @ -30° C to -40°C
    - Scratch & Abrasion Resistance – 15+ Newton
    - UV Resistance – 800/1600 hrs. exposure
NYLON 6 INTERIOR APPLICATIONS

- Interior parts – Some examples
  - FLOOR CARPET
  - DOOR HANDLES
  - HEADLINER SUBCOMPONENT
  - CENTER CONSOLE
  - VISOR COMPONENTS
  - OVERHEAD CONSOLE
  - FASTENERS
  - SEAT ASSEMBLY
  - SEATBELT
  - HEAT/AC LOUVERS
NYLON 6 & 6.6
UNDERHOOD APPLICATIONS

Requirements

- TWO PRIMARY SPECIFICATIONS
  - High Temp. Stability
    - Resistance from 130° C to 180° C (266 f to 356 f)
  - Chemical Resistance
    - Oil
    - Gasoline/Diesel Fuel
    - Grease
    - Lubricants
    - Antifreeze
**NYLON 6 & 6.6 UNDERHOOD APPLICATIONS**

**Examples of Parts:**

*Almost all parts are glass filled for strength*

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<td>Air Filter Housing</td>
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<td>Fuel Valves</td>
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POST CONSUMER CARPET VALUE CHAIN

Big Boxes, Retailers, Commercial Dealers, Property Management Firms
  | Motivation | Education |

Collections
  | Sortation | Identification |

Processor (s)
  | Liberate Thermoplastics | Purify & Densify Thermoplastics |

Compounders
  | Add final Ingredients | Produce Plastics to Stringent Specs |

Parts Manufacturer(s)
  | Injection Mold | Other Molding Processes |

End User(s)
  | Ford, GM, Honda, Automotive Components Mfgs. |
CONCLUSIONS

• POST CONSUMER CARPET IS IN ABUNDANCE
• P.C. NYLON AVAILABILITY – 1+ BILLION LBS./YR.
• ROUTES TO MARKETS ARE BEING ESTABLISHED
• VARIED PROCESSES ARE RAPIDLY DEVELOPING
• NEW PRODUCTS INCORPORATING P.C. NYLONS ARE INCREASING
• COST EFFICIENCIES ALONG THE VALUE CHAIN ARE CRITICAL
• DEMAND WILL DRIVE INNOVATION AND INVESTMENT
• BRIGHT FUTURE FOR POST CONSUMER CARPET UTILIZATION
QUESTIONS