AUTOMOTIVE FABRICS

powered by *The Nylon Advantage®*

CEREX
ADVANCED FABRICS, INC.

AUTOMOTIVE FABRICS

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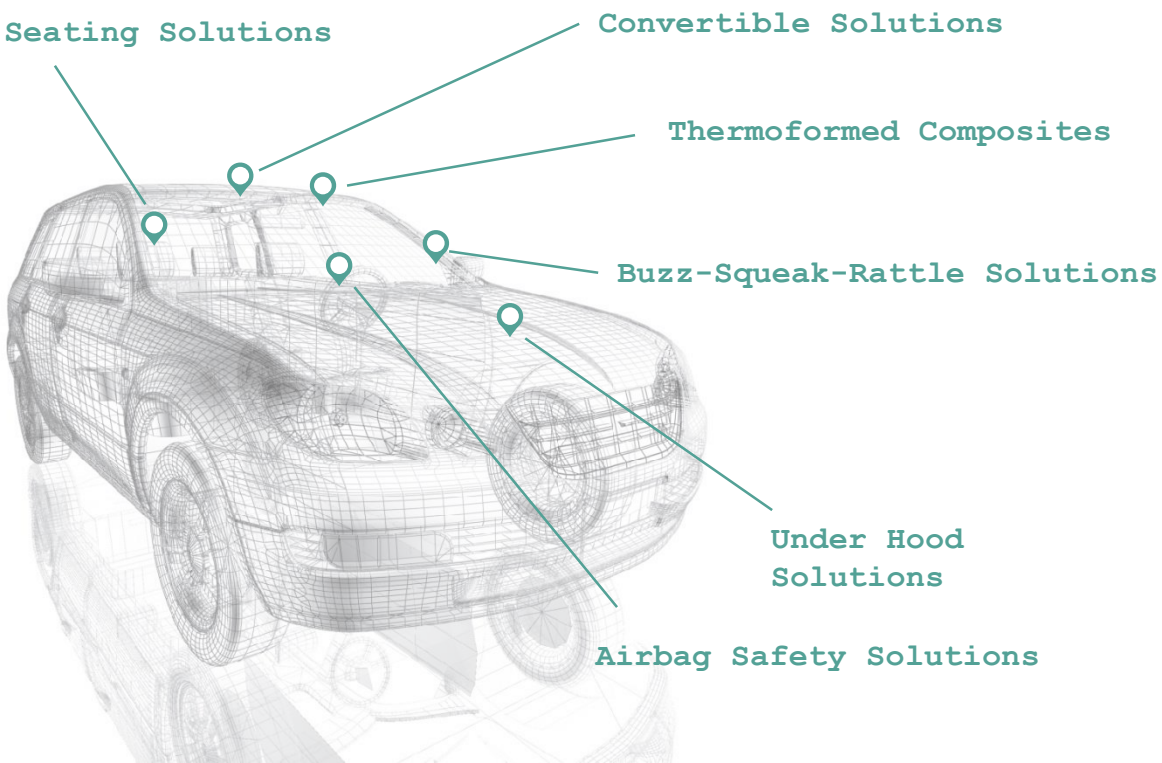


Seating *component manufacturers use our materials for strength reinforcement and superior abrasion resistance.*

Thermoformed Composites *utilize our unique materials to improve overall strength while reducing weight in the vehicle.*

Under Hood *Solutions* *include shielding, insulation, and cable wrap applications.*

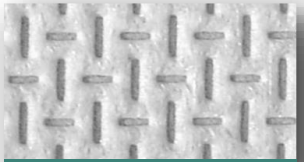
Airbag Safety *applications include dust covers, protective sleeves, hanger applications, and anti-shatter shields for blow-out panels.*

Convertible Top *applications employ our materials in hidden areas where strength and abrasion resistance are critical.*

Buzz-Squeak-Rattle *solutions are found where a thin, strong, quiet, and abrasion resistance material is needed.*

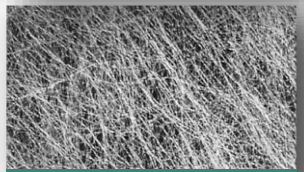
We build great products.....

powered by The Nylon Advantage®



PBN-II® Thermal Bond

Orion® Thermal Bond



Cerex® Flat Bond

Solution Dyed Colors

Our fabrics are made of nylon (PA66), one of the **toughest and most durable man-made polymers**, creating products with **high tensile and tear strength** even at low fabric weights.

The **thermal stability** of nylon is outstanding. All fabrics have a melt point of approximately 500°F (260°C), with dimensional stability up to 400°F (200°C). They can even be processed at temperatures as high as 425°F (215°C) for limited periods of time. **Chemical resistance** is outstanding, as these fabrics effectively resist attack from many solvents, alkalis, and acids.

Cerex fabrics exhibit **excellent uniformity** and work well in applications that demand high quality**.** In addition, nylon bonds well with adhesive and resin systems, making our fabrics excellent components for laminate and composite systems.

Cerex materials are made with continuous filaments and can utilize various filament geometries, bonding technologies, and polymer additives to achieve the desired performance in your application.

SEATING SOLUTIONS

powered by *The Nylon Advantage®*

Drivers spend more and more time each year in their automobiles, meaning seat designs have to be more comfortable! Seating design has become more complex through the years, and technology has been forced to keep pace.

Nylon nonwovens offer you options when you think about your next seat design. Small, thin strips of nylon nonwoven can be used to reinforce critical areas within the seat, like you find around the J-hook attachment.

Lightweight nylon materials can be used to reinforce leather and other “A” surface fabrics to give them integrity without sacrificing comfort or functionality.

When foam buns and cushions are utilized, look to incorporate nylon nonwovens into your next design. They will not only help improve your manufacturing process, but they add value to the design through formability, good air permeability to allow foam to fill tight spaces, and added abrasion resistance, especially to the bottom of the bun where it is needed.

CEREX
ADVANCED FABRICS, INC.

AIRBAG SAFETY SOLUTIONS

powered by The Nylon Advantage®

Airbag dust covers are designed for the protection of the airbag system once folded and placed into a module. With a predetermined breaking point, the function of the airbag sleeve guarantees your safety 100%. For more than 15 years, CEREX has supplied this market segment and is established as one of the leading manufacturers of airbag protective cover fabrics for frontal, head and side airbag systems.

With the evolution of different airbag hanger systems, CEREX products provide the strongest nonwoven materials that can found, meaning you can lower overall weight, reduce noise levels and still have the dependability of nylon.

Our materials can also be used as structural reinforcement in airbag systems to add strength at critical points during deployment. Use as a fabric or consider lamination as a solution in your composite.

CEREX
ADVANCED FABRICS, INC.

UNDER HOOD SOLUTIONS

powered by The Nylon Advantage®

Look under any car hood and you'll find one of the toughest environments for any material. Our nonwoven fabrics are made from Nylon (PA66), the same plastic used to manufacture most under-hood plastic performance parts.

Exhibiting excellent chemical and thermal resistance, our nylon based nonwoven fabrics are durable, abrasion resistant, and can be found in many applications in the engine compartment.

Cable wrap composites utilize our materials for structural reinforcement and abrasion resistance.

Insulation and shielding composites can use nylon as part of the overall design to improve strength, durability, and noise reduction. The biggest benefit for using stronger materials?: You can use lighter materials to lessen the weight of the vehicle and still achieve superior performance.

CEREX
ADVANCED FABRICS, INC.

THERMOFORMED COMPOSITES

powered by The Nylon Advantage®

From headliner system to package trays, from trunk liners to load floor pans, interior composites play an important role in today's automobiles. Make sure nylon is part of your design. Pound-for-pound stronger than steel, our nylon nonwovens allow you to add strength and other functionality to your composite while **decreasing** weight.

Use lightweight nonwovens as barriers to resin migration and for improved mold release. Also include our materials as structural reinforcement and drop the overall weight of the composite.

Incorporate these fabrics where quietness is a factor or where abrasion resistance is critical. CEREX even offers products for deep-draw applications where other nonwovens fail.

Where aesthetics are important, our full line of custom colors allow you to mask areas with our low visibility color-keyed (LVCK) backing materials.

CEREX
ADVANCED FABRICS, INC.

BUZZ-SQUEAK-RATTLE SOLUTIONS

powered by The Nylon Advantage®

Buzz, squeak, and rattle problems give a car owner the perception that there are quality issues with their new vehicle. Minimizing BSR is of paramount importance when designing vehicle components and vehicle assemblies.

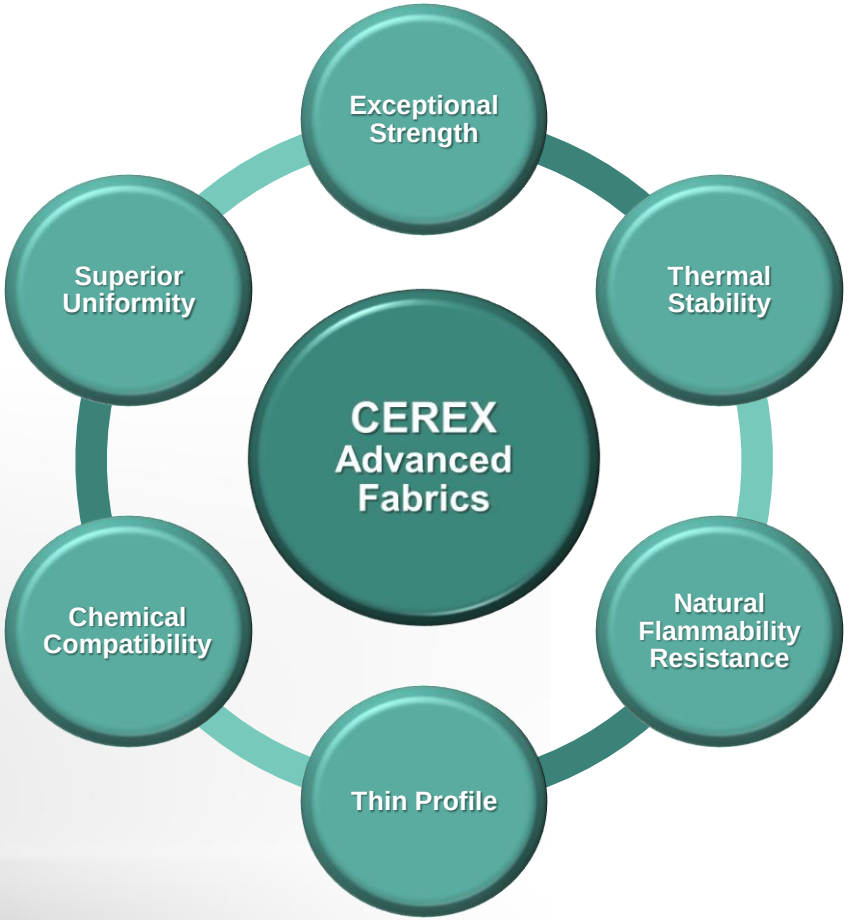
With innumerable causes of BSR, one must be armed with a number of solutions to combat these issues.

Our nylon nonwoven materials are thin, flexible, quiet, and provide moderate abrasion resistance. Because of their structure, they are also very conformable to most any surface within the vehicle.

By applying pressure sensitive adhesives, our materials can be placed between components to eliminate problem areas, whether inside the vehicle or under the hood.

CEREX
ADVANCED FABRICS, INC.

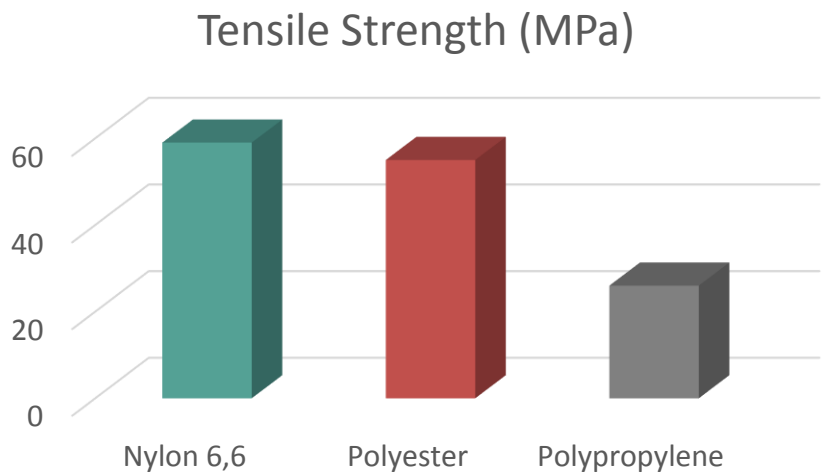
SO WHAT IS *The Nylon Advantage®*?

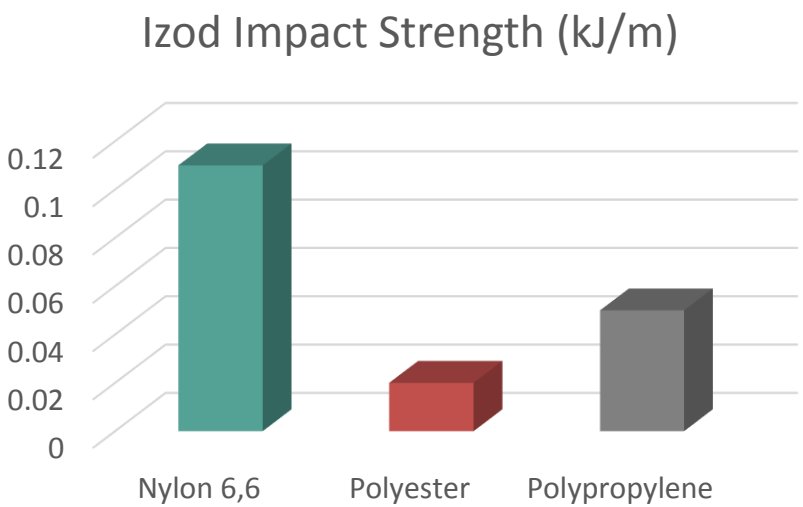


SUPERIOR STRENGTH

powered by *The Nylon Advantage®*

- As a base plastic, the tensile strength of nylon 6,6 is more than **double** polypropylene and 7% greater than polyester.
  - *Co-polyesters that are used in many spunbond products have an even lower tensile strength.*





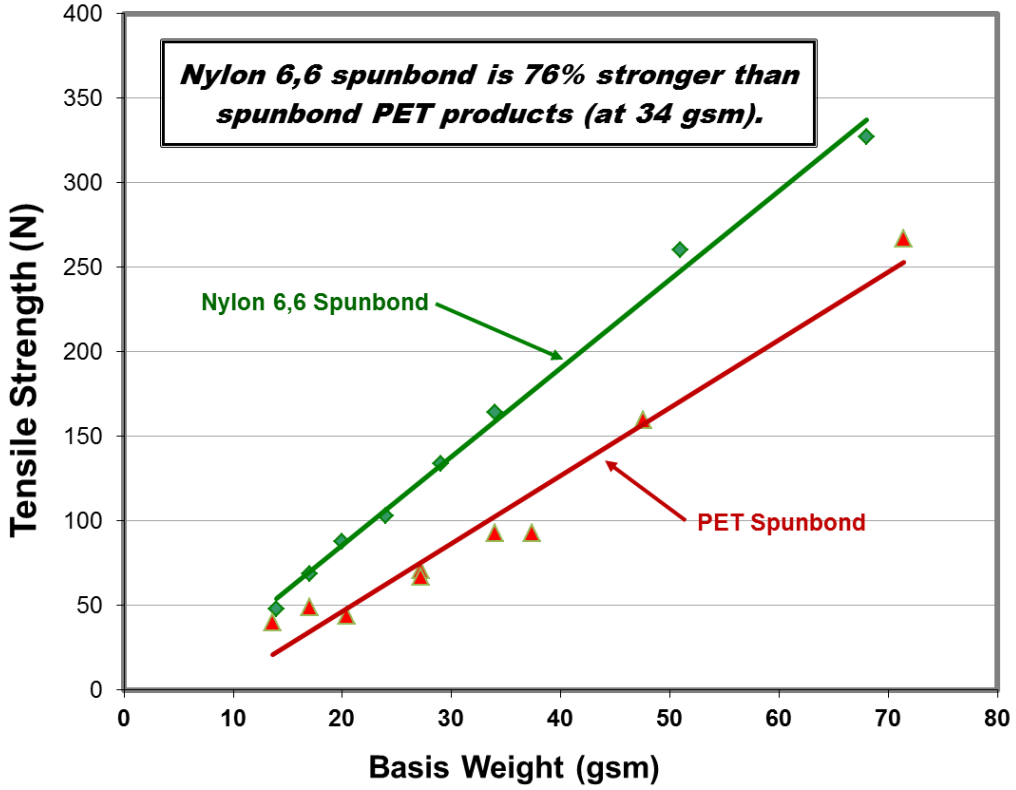
- Nylon 6,6's izod impact strength is more than **double** polypropylene and more than **5 times greater** than polyester.

Reference: Physical Testing of Plastics, T.R. Compton Smithers Rapa Publishing 2011

GREATER TENSILE STRENGTH vs. PET

powered by *The Nylon Advantage®*

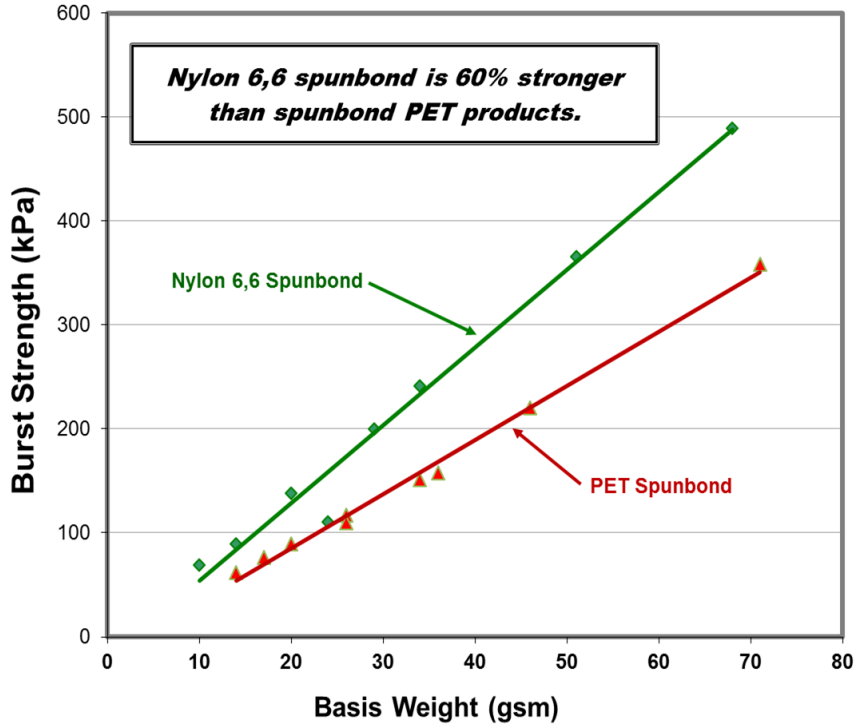
- In **fabric form,** the strength differential becomes **even higher.**
- **High strength** means that you can use a **lower weight** material in your designs, offering the opportunity to **lower weight in the vehicle**
- **Thin profiles** allow designers to integrate these fabrics into composite design for reinforcement allowing removal of other heavier components



SUPERIOR BURST STRENGTH vs. PET

powered by *The Nylon Advantage®*

- Able to withstand **high pressure applications** including difficult processing and system pulsations
- Improves **durability** and **service life**
- Offers lower basis weight options that can **reduce weight, cost and waste**.



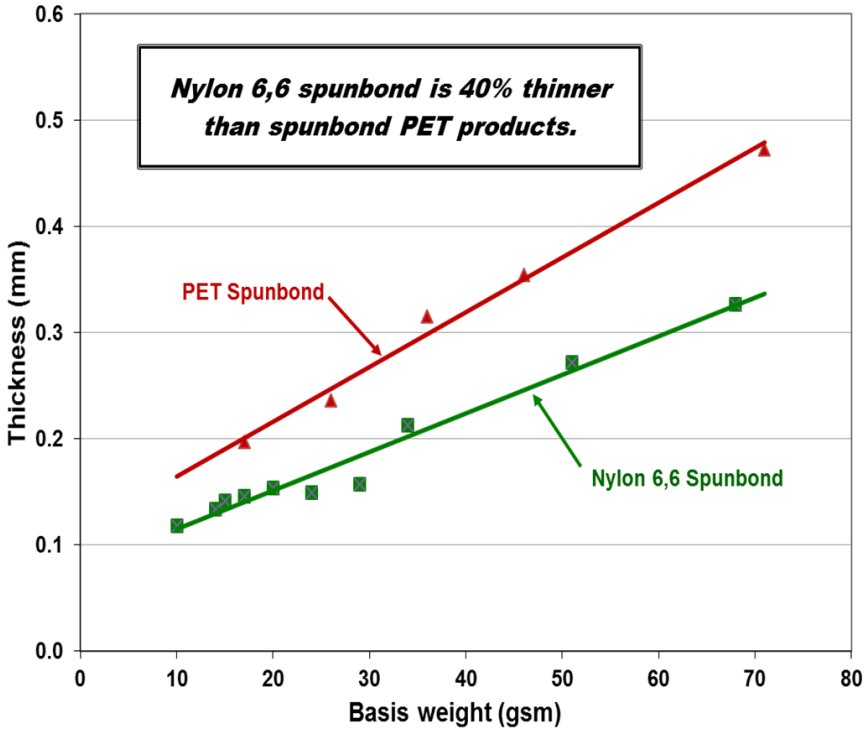
THINNER PROFILE THAN PET

powered by *The Nylon Advantage®*

Allows designs to be

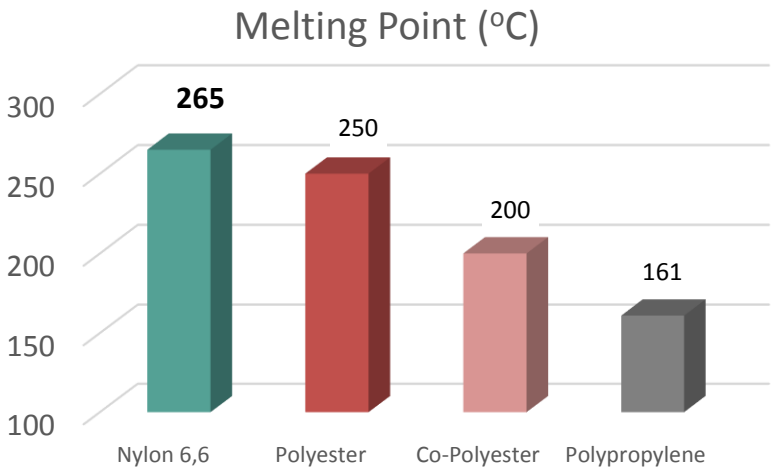
- **Smaller**,
- **More cost effective,** and
- **Lighter weight**

without sacrificing performance or strength.



EXCELLENT TEMPERATURE RESISTANCE

powered by *The Nylon Advantage®*

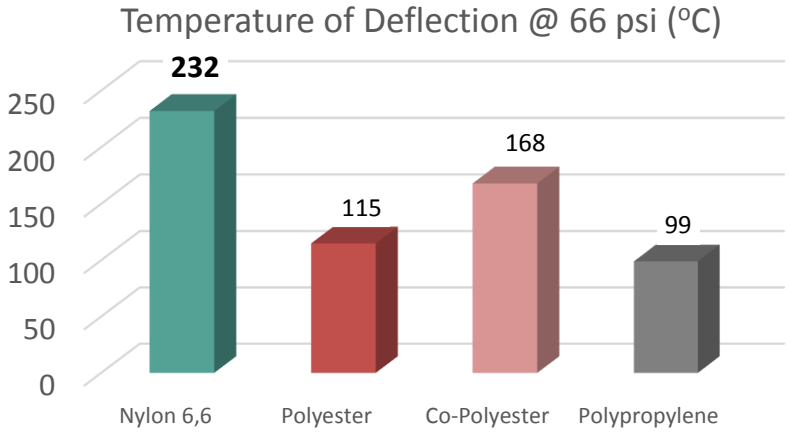


- Nylon 6,6 melts at 265°C which is **24% higher** than the Co-PET bonding polymer used in most PET spunbonds..
  - *It also has a 30% higher heat capacity (1.47 J/g*K) than Polyester.*

References: Nylon Plastic Handbook, Melvin I Kohan, Hanser Publishers, 1995
Properties of Polymers, D.W. Krevelen Elsevier, Amesterdan, 1992

- Nylon 6,6 **absorbs more energy** and **does not deform** as easily as other polymers even at elevated temperatures.

Reference: www.curbellplastics.com/technical-resources/plastic-properties-table.asp



EXCELLENT CHEMICAL PROPERTIES

powered by *The Nylon Advantage®*

Nylon's chemical make-up, stable resonance structure (the electrons within the polyamide linkage) and strong affinity for hydrogen bonding make it uniquely compatible with a wide range of other chemicals, including:

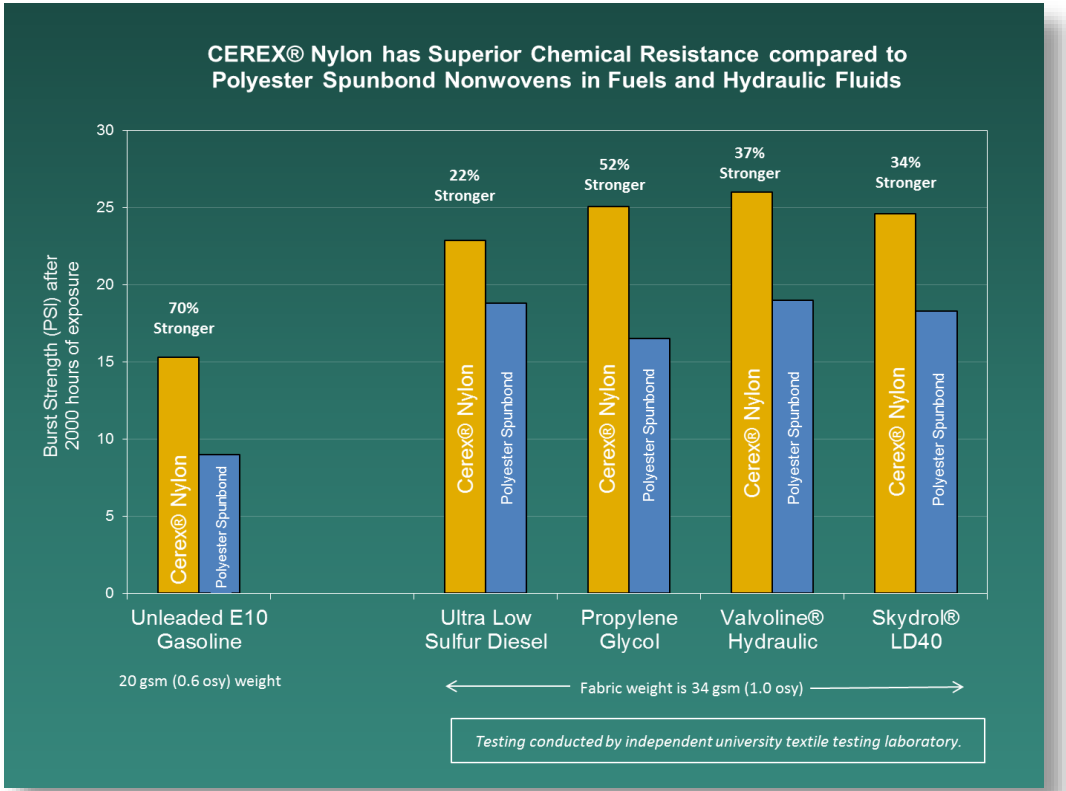
- Alcohols and Glycols
- Acetate solvents
- Ketones
- Aromatic hydrocarbons
- Hydrocarbon fuels and oils
- Epoxy and Urethane resins
- Organophosphate esters and Phosphates, and
- Alkaline environments

HYDROCARBON RESISTANCE

powered by *The Nylon Advantage®*

Nylon's amide groups help protect the aliphatic carbonyl chains from solvent attack.

- Alcohols like methanol and ethanol (unleaded gasoline) and Propylene Glycol (hydraulic fluids) attack PET.
- Additives used for flame retardants, lubricity aids, and freeze protection compounds can also attack PET.



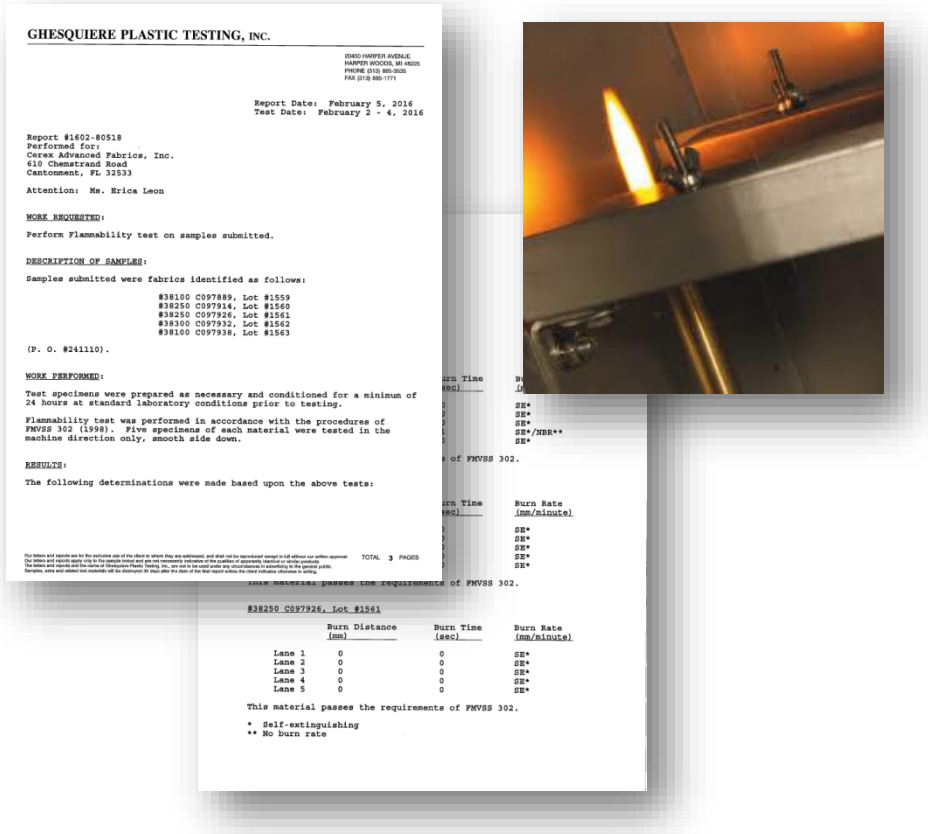
Valvoline® is a Registered Trademark of Ashland Oil Co.
Skydrol® is a Registered Trademark of Solutia, Inc.

FLAMMABILITY PERFORMANCE

powered by The Nylon Advantage®

- Naturally **FMVSS 302** compliant without the use of additive, coatings, or other treatments that may interfere with design or application requirements

- **“Burn rate”** for all automotive products is defined as SE/NBR**:**
  - **No burn rate**
  - **Self Extinguishing**



GHESQUIERE PLASTIC TESTING, INC.

20450 HARPER AVENUE
HARPER WOODS, MI 48225
PHONE (313) 885-3535
FAX (313) 885-1771

Report Date: February 5, 2016
Test Date: February 2 - 4, 2016

Report #1602-80518
Performed for:
Cerex Advanced Fabrics, Inc.
610 Chemstrand Road
Cantonment, FL 32533

Attention: Ms. Erica Leon

WORK REQUESTED:

Perform Flammability test on samples submitted.

DESCRIPTION OF SAMPLES:

Samples submitted were fabrics identified as follows:

#38100 C097889, Lot #1559
#38250 C097914, Lot #1560
#38250 C097926, Lot #1561
#38300 C097932, Lot #1562
#38100 C097938, Lot #1563

(P. O. #241110).

WORK PERFORMED:

Test specimens were prepared as necessary and conditioned for a minimum of 24 hours at standard laboratory conditions prior to testing.

Flammability test was performed in accordance with the procedures of FMVSS 302 (1998). Five specimens of each material were tested in the machine direction only, smooth side down.

RESULTS:

The following determinations were made based upon the above tests:

TOTAL 3 PAGES

#38250 C097926, Lot #1561

	Burn Distance (mm)	Burn Time (sec)	Burn Rate (mm/minute)
Lane 1	0	0	SE*
Lane 2	0	0	SE*
Lane 3	0	0	SE*
Lane 4	0	0	SE*
Lane 5	0	0	SE*

This material passes the requirements of FMVSS 302.

* Self-extinguishing
** No burn rate

LONG TERM THERMAL STABILITY

powered by *The Nylon Advantage®*

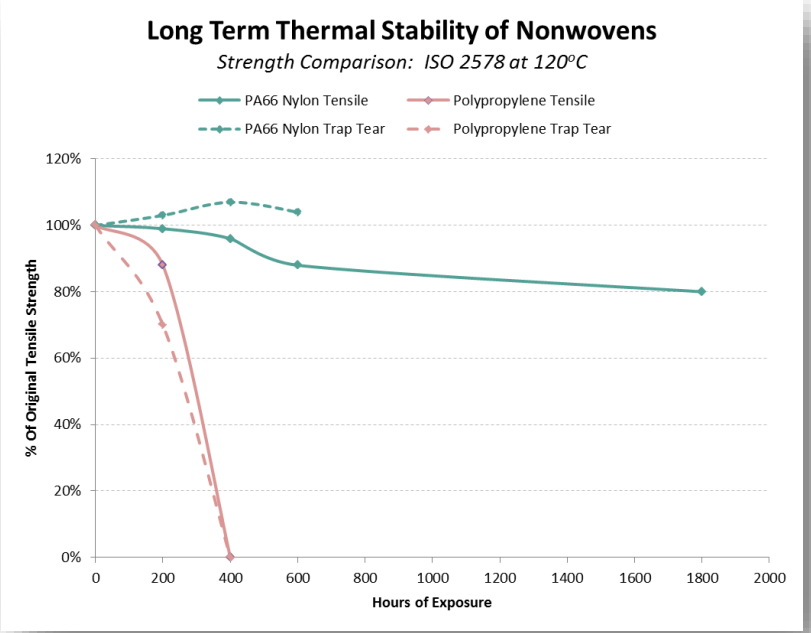
Thermal degradation must be considered in any automotive design application.

- *PA66 shows only 20% loss after 1800 hours of exposure*
- *PP shows complete loss after only 400 hours of exposure*

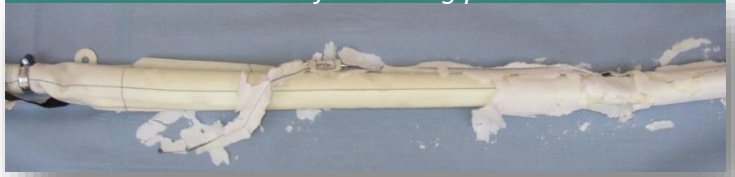
PA66 Nylon polymer formulations contain no added stabilizers and exhibit natural long term heat stability.

Polypropylene must utilize thermal stabilizer additives designed to interrupt the chain break reaction but are consumed during heat exposure.

- Phenol type stabilizers break down suddenly and produce odors
- Hindered amine stabilizers will react more slowly but still suffer the same ultimate fate

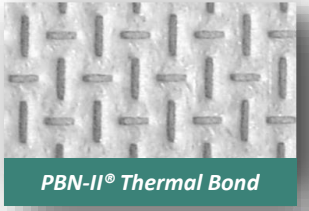


Actual Field Failure of PP airbag protective sleeve

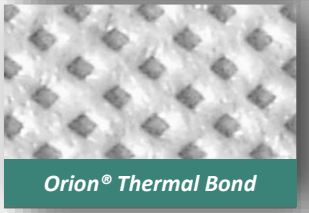


The Nylon Advantage®

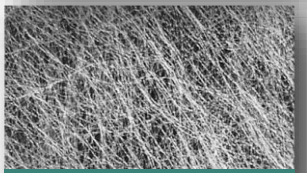
- Production Part Approval Process (PPAP)
- Advanced Product Quality Planning (APQP)
- Accredited Laboratory Services
  - *ISO/IEC 17025 (American Association of Laboratory Accreditation AL2A)*
- TS16949 Certified Lead Auditor
- Special Customer Requirements (SCR)
  - Specialized Testing Protocols by Customer/Item
  - Specialized Packaging/Labeling
- 8D Analysis
- FMVSS-302 Material Certification *(third party)*
- Automotive Industry Action Group (AIAG)



PBN-II® Thermal Bond



Orion® Thermal Bond



Cerex® Flat Bond

Solution Dyed Colors

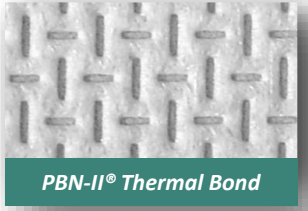
The Nylon Advantage®

DESIGN CAPABILITIES

- Polymer & Additives Technology
- Filament Technology
- Bonding Technology
- Web Formation Technology
- Coating Technology
- Nanofiber Substrate Technology

FUNCTIONAL CAPABILITIES

- Weight
- Thickness
- Strength
- Elongation / Stretch
- Permeability
- Softness / Stiffness
- Surface Texture
- Temperature Stability
- Chemical Compatibility
- Custom Colors
- Functional Additives



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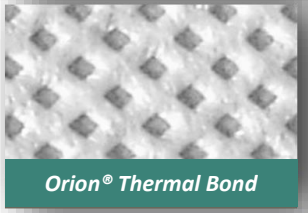

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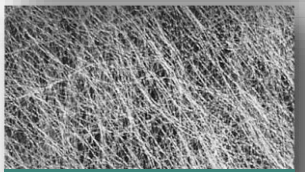

Cerex® Flat Bond

Solution Dyed Colors

Bringing **SOLUTIONS** to YOUR business

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