SUBSCRIBE | E-NEWSLETTER
Fast Reliable Composites News.

ZONES | ARTICLES | SOURCEBOOK | PRODUCTS | NEWS | BLOG | WEBINARS | CALENDAR | CONFERENCES

Sidebar

# Green resins: Automotive research on the rise

**In the automotive industry, R&D activities are increasing in the area of bio-based resin systems as the pressure to lightweight auto parts and participate in sustainability and recyclability programs mounts.**

Author: Sara Black

Posted on: 11/27/2015
Source: CompositesWorld

Deborah Mielewski, senior technical leader of plastics and materials sustainability at Ford Motor Co.'s Materials and Manufacturing research department (Dearborn, MI, US), says the company's executive chairman William Clay Ford Jr. (founder Henry Ford's great-grandson) has offered the highest level of support for her group's work on green materials for Ford cars: "Henry Ford had a vision that the farmer and the automaker each produced what the other needed." Accordingly, Mielewski oversees a team investigating a range of bio-based and sustainable soy foams, natural fibers for reinforcement of composite materials, bio-based resins and recycled materials.

As one facet of that work, her group is working with Weyerhaeuser (Federal Way, WA, US) on injection molded cellulose-reinforced soy resin for interior automotive parts, including a center console cover for the Lincoln *MKX*, which meets "all performance requirements." Much more is in the works, including use of recyclate streams from plastic bottles, tires, carpet and cotton. One notable project is a 2012 collaboration, called the Plant PET Technology Collaborative (including Coca-Cola, H.J. Heinz Co., Nike Inc., and Procter & Gamble, and Ford), which is looking at 100% bio-based PET. A spinoff project with Ford and Heinz looked at automotive applications for tomato processing waste from Heinz ketchup products, including tomato skins, stems and pomace.

"Do sustainable materials sell cars? Not yet. But we're protecting our business for future unknowns, and providing ourselves with a host of green material choices," asserts Mielewski. "Our soy foam seats are now in every North American-built Ford vehicle, saving over 5 million lb [2,268 MT] of petroleum and 30 million lb [13,608 MT] of carbon dioxide emissions annually."

In Canada, the National Research Council's (Boucherville, QC, Canada) Automotive and Surface Transportation division, with 275 employees in five research facilities and more than 200 partners and OEM/Tier partners, is deeply involved in bio-polymer research through its program on Industrial Biomaterials, says team leader Dr. Karen Stoeffler. Magna International Inc. (Aurora, ON, Canada), one of the largest Tier 1 auto suppliers in the world, is a major program participant. "About 5% of the total amount of bio-plastics produced worldwide goes into the automotive market today, mostly in interiors," she states.

NRC's teams develop new bio-plastics and bio-composites to replace conventional materials, and determine how they will perform under the harsh auto environment. Tests include mechanical and thermal characterization, immersion to measure moisture absorption, accelerated weathering (using standardized SAE tests), flammability resistance, and semi-industrial scale prototyping. "We're playing with composition of potential composites to adjust the properties, like thermal performance," explains Stoeffler. For example, her group has formulated a "perfect" blend of petroleum-based polypropylene (PP) with a plant-based polylactide (PLA), essentially "hiding" the PLA within the PP to limit PLA's moisture absorption. Use of an adequate coupling agent ensures good interaction between the two polymers. This blend can be combined with

**LEARN MORE** Editor's Picks

Green resins: Closer to maturity
As more players approach the market, R&D expands, but overall market growth in the composites arena ...

**Related Suppliers**
National Research Council Canada

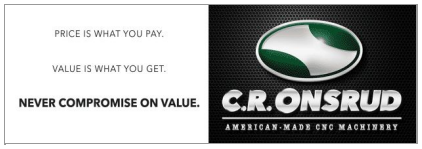
**Zones**
Automotive Composites

**Supplier Categories**
Composite Structures & Components
Materials
Primary manufacturing equipment
Testing, gauging, monitoring, analytical equipment and software
Tools/tooling materials









natural fillers, she says: “We can achieve neutral cost compared to traditional mineral-filled PP compounds used in auto interiors by tailoring the formulation, and have obtained up to 50% renewable content.” Other projects include bio-polyamide composites for structural applications, obtained by combining fiberglass and flax rovings in a direct long fiber thermoplastic (D-LFT) process, and bio-based polyurethane foams for automotive seating integrating up to 20% lignin-based bio-polyols.

“We’ve shown that at equivalent performance, natural fillers can significantly reduce part weight and actually *reduce* material cost in auto interiors,” asserts Stoeffler. NRC works with partners and clients to develop tailored bio-materials, using non-food renewable sources, for not only automotive, but construction and many other many applications.

More Canadian bio-composites research is ongoing at the Bioproducts Discovery and Development Centre (BDDC), University of Guelph (Guelph, Ontario, Canada), says Professor Amar Mohanty: “The technology currently exists to turn plant materials into resins, polymers and tough reinforcing fibers for the production of petroleum-free composites.” He and other researchers at the University, including Professor Manjusri Misra, are involved in a number of bio-based materials projects that aim to develop new products and technologies from agricultural crops. For example, over the past few years, Mohanty has been actively working on the advanced multiproduct biorefinery concept, where the co-products can be effectively utilized for the fabrication of value-added materials and energy. Interest from private sector partners has led to a number of commercial applications: A recent technology spinoff, Competitive Green Technologies (Leamington, ON, Canada), has found commercial success using recycled petrochemical-based plastics combined with agricultural bio-mass (e.g., miscanthus grass) for consumer products and is actively engaged with auto OEMs to explore injection molded biocomposite auto interior parts.

*See an online video that features Ford’s Deborah Mielewski discussing the soy foam development here.*

*This article is a Side Story to a feature article titled, "Green resins, Closer to maturity." To read the main article, click on its title under "Editor's Picks" at top right.*

**You might also like:**



Wet compression molding



Carbon Fiber: Refiguring the supply/demand equation



New Year’s resolutions



Turnkey manufacturing systems: Materials, markets and maturation

CW COMPOSITESWORLD.COM

1

Zones
Articles
SOURCEBOOK
News
Products
White Papers
Webinars
Calendar
Conferences
Industry Links
Suppliers
Subscribe
Contact Us

Featured Zones:

Materials
Aramids
Carbon Fiber
Core
Epoxy
Glass Fiber
High-Temperature Resins
Nanomaterials
Natural Fibers
Polyesters
Prepreg
Thermoplastics
Vinyl Esters

Processes
ATL/AFP
Compression Molding
Curing Technology
Filament Winding
Infusion
Injection Molding
Kitting/Cutting
Machining/Drilling
Pultrusion
RTM
Sprayup

Special Zone
IMTS

Design & Tooling
CAD/CAM/FEA/Simulation
Tooling Technology
Testing

Markets
Aerospace
Automotive
Construction/Infrastructure
Defense
Marine
Mass Transit
Sports and Recreation
Wind/Energy

Copyright © Gardner Business Media, Inc. 2015 All rights reserved. | Contact Us | About Us | Advertise