Ford Using Straw-Reinforced Plastic In 2010 Flex

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Ford Motor Company (NYSE: F [1]), working with academic researchers and one of its suppliers, is the first automaker to develop and use environmentally friendly wheat straw-reinforced plastic in a vehicle.

The first application of the natural fiber-based plastic that contains 20 percent wheat straw bio-filler is on the 2010 Ford Flex's third-row interior storage bins. This application alone reduces petroleum usage by some 20,000 pounds per year, reduces CO2 emissions by 30,000 pounds per year, and represents a smart, sustainable usage for wheat straw, the waste byproduct of wheat.

"Ford continues to explore and open doors for greener materials that positively impact the environment and work well for customers," said Patrick Berryman, a Ford engineering manager who develops interior trim. "We seized the opportunity to add wheat straw-reinforced plastic as our next sustainable material on the production line, and the storage bin for the Flex was the ideal first application."

Collaborative Effort Ford researchers were approached with the wheat straw-based plastics formulation by the University of Waterloo in Ontario, Canada, as part of the Ontario BioCar Initiative - a multi-university effort between Waterloo, the University of Guelph, University of Toronto and University of Windsor. Ford works closely with the Ontario government-funded project, which is seeking to advance the use of more plant-based materials in the auto and agricultural industries.

The University of Waterloo already had been working with plastics supplier A. Schulman of Akron, Ohio, to perfect the lab formula for use in auto parts, ensuring the material is not only odorless, but also meets industry standards for thermal expansion and degradation, rigidity, moisture absorption and fogging. Less than 18 months after the initial presentation was made to Ford's Biomaterials Group, the wheat straw-reinforced plastic was refined and approved for Flex, which is produced at Ford's Oakville (Ontario) Assembly Complex.

The wheat straw-reinforced resin is the BioCar Initiative's first production-ready application. It demonstrates better dimensional integrity than a non-reinforced plastic and weighs up to 10 percent less than a plastic reinforced with talc or glass. "Without Ford's driving force and contribution, we would have never been able to move from academia to industry in such lightning speed," said Leonardo Simon, associate professor of chemical engineering at the University of Waterloo. "Seeing this go into production on the Ford Flex is a major accomplishment for the University of Waterloo and the BioCar Initiative."

An interior storage bin may seem like a small start, but it opens the door for more applications, said Dr. Ellen Lee, technical expert, Ford's Plastics Research. "We see

a great deal of potential for other applications since wheat straw has good mechanical properties, can meet our performance and durability specifications, and can further reduce our carbon footprint - all without compromise to the customer."

Already under consideration by the Ford team: center console bins and trays, interior air register and door trim panel components, and armrest liners.

Abundant Waste Material Put To Good Use The case for using wheat straw to reinforce plastics in higher-volume, higher-content applications is strong across many industries. In Ontario alone, where Flex is built, more than 28,000 farmers grow wheat, along with corn and soybeans. Typically, wheat straw, the byproduct of growing and processing wheat, is discarded. Ontario, for example, has some 30 million metric tons of available wheat straw waste at any given time.

"Wheat is everywhere and the straw is in excess," said Lee. "We have found a practical automotive usage for a renewable resource that helps reduce our dependence on petroleum, uses less energy to manufacture, and reduces our carbon footprint. More importantly, it doesn't jeopardize an essential food source."

To date, Ford and its suppliers are working with four southern Ontario farmers for the wheat straw needed to mold the Flex's two interior storage bins.

History In The Making Ford's interest in wheat dates back to the 1920s, when company founder Henry Ford developed a product called Fordite - a mixture of wheat straw, rubber, sulphur, silica and other ingredients -that was used to make steering wheels for Ford cars and trucks. Much of the straw used to produce Fordite came from Henry Ford's Dearborn-area farm.

The company's new-age application for wheat straw joins other bio-based, reclaimed and recycled materials that are in Ford, Lincoln and Mercury vehicles today, including:

- Soy-based polyurethane foams on the seat cushions and seatbacks, now in production on the Ford Mustang, Expedition, F-150, Focus, Escape, Escape Hybrid, Mercury Mariner and Lincoln Navigator and Lincoln MKS. More than 1.5 million Ford, Lincoln and Mercury vehicles on the road today have soy-foam seats, which equates to a reduction in petroleum oil usage of approximately 1.5 million pounds. This year, Ford has expanded its soy-foam portfolio to include the industry's first application of a soy-foam headliner on the 2010 Ford Escape and Mercury Mariner for a 25 percent weight savings over a traditional glass-mat headliner.
- Underbody systems, such as aerodynamic shields, splash shields and radiator air deflector shields, made from post-consumer recycled resins such as detergent bottles, tires and battery casings, diverting between 25 and 30 million pounds of plastic from landfills. The newest addition is the engine cam cover on the 3.0-liter V-6 2010 Ford Escape.
- 100 percent post-industrial recycled yarns in seat fabrics on vehicles such as the Ford Escape. The 2010 Ford Fusion and Mercury Milan Hybrids feature

85 percent post-industrial yarns and 15 percent solution-dyed yarns. The 100 percent usage represents a 64 percent reduction in energy consumption and a 60 percent reduction in CO_2 emissions.

- Repurposed nylon carpeting made into nylon resin and molded into cylinder head covers for Ford's 3.0L Duratec engine. The industry's first eco-friendly cylinder head cover is currently found in the 2010 Ford Fusion and Escape vehicles.

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