

From the landfill to the future

OSU-Tulsa researcher's recycling process finds use for discarded carpet

As America searches for innovative ways to conserve resources and save energy, researchers at Oklahoma State University-Tulsa are giving old carpet bound for landfills a second life.

Dr. Raman P. Singh, professor of mechanical and aerospace engineering and C.F. Colcord endowed chair, is leading a research team of two graduate students at the OSU-Tulsa Helmerich Research Center developing methods to recycle discarded carpet into a composite for other uses. The composite can then be molded in any way a manufacturer desires and used to replace less durable or more expensive materials, such as wood. The new material has promising environmental impact as the United States alone discards approximately 6 billion pounds of carpet each year, of which only 4 percent is currently recycled in some fashion.

"We don't think of carpet as being a major pollutant," Singh says, "but it is one

of the single largest components by volume that U.S. consumers send to landfills."

Because carpet is engineered to be durable, it remains in landfills for a very long time and does not degrade easily. While some carpet is disposed of by incineration, certain states are beginning to ban the process due to concerns about hazardous pollutants.

According to Singh, interest in carpet recycling is high both in the United States and abroad. Most recycling techniques in development involve breaking carpet down into components and then recycling those in some way. This can be an expensive and time-consuming process, as the carpet must first be sorted by fiber type and then taken apart.

OSU's process uses the whole carpet as-is, regardless of fiber, color, age or condition. The carpet is infused with a polymer resin to form a hard composite that is then molded into components for manufacture. Singh's research group is

focusing on testing panels created from the composite for strength, durability, resistance to moisture and sunlight and acoustic absorption.

While Singh focuses on the development of the composite itself, colleague Dr. Ranji Vaidyanathan, Carl G. and Gladys L. Herrington Professor in Advanced Materials, is collaborating with industry and governmental agencies to perform the composite molding process on a larger scale and find commercial applications for it.

With funding from the Oklahoma Center for the Advancement of Science and Technology, OSU partnered with manufacturer KT Plastics, Inc. of Calera, Okla. to investigate potential uses, such as shipping pallets and home construction materials. A grant from the Oklahoma Transportation Commission is also funding a study of the feasibility of using the composite for highway sound insulation barriers.

Singh says the recycled carpet composite has the potential to significantly impact not only on the environment, but the economy. "Not only is the process cost effective and helpful to the environment, but there is also a business opportunity here. Companies that collect carpet will pay you to take it so they don't have to dispose of it in a landfill. So, not only is the raw material free, but people will actually pay to have it taken off their hands." That kind of incentive can spur investment and subsequently create manufacturing jobs, he notes.

Howard Barnett, president of OSU-Tulsa and OSU Center for Health Sciences, said the practical application of the Helmerich Center research will make a lasting impact on the environment.

"Through cutting-edge research and collaborating with local industry, Dr. Singh

"The possible applications for carpet recycled using this process are endless."

— Howard Barnett, president, OSU-Tulsa

and Dr. Vaidyanathan embody our mission to bring research from the lab into the marketplace," Barnett said. "The possible applications for carpet recycled using this process are endless, which is promising for manufacturers and those workers who will benefit from the jobs created."

While it might be five to 10 years before recycled carpet composites are

used in everyday applications, Singh is enthusiastic about OSU's potential. "If you look at the maturation cycles of technology, especially a disruptive technology as this, you never know where it will end up," Singh says. "But of all the projects I have worked on, this is the one that has the most immediate near-term, practical implication."

JAMIE MARIE EDFORD



Dr. Raman Singh (right) describes a sample panel created using his carpet recycling process while graduate student researcher Abhishek Jain looks on.