



Wood Polymer Composites: A Great Fit for West Virginia? by William Johnson

Wood-filled plastics go back more than 3 decades to a proprietary process, called Woodstock, for mixing 50% wood flour in polypropylene. The process went into production in 1971 for use in door panels and other interior parts for Fiat cars.

The modern growth era for wood-filled thermoplastic materials, more commonly known as wood-plastic composites (or WPCs for short) began with a search for a use for recycled plastic materials such as grocery bags. The result was a novel deck board material called Trex®. Decking turned out to be a “killer application” for WPCs, and Trex® launch in the mid 1990’s triggered a decade of explosive growth. The perception of WPC decking as more durable and lower maintenance than wood drove rapid market acceptance, and compound annual growth of 25% + was achieved despite the material’s higher initial cost. Today there are approximately 30 producers of WPC decking and railing materials in North America, representing 80% of the \$1.3 billion WPC market.

The WPC market is one of the fastest growing outlets for forest products, with a typical extruded WPC deck board containing 50% wood flour. While decking is expected to remain dominant over the next decade, other applications such as siding, shingles and interior trim are emerging. The U.S. represents over 80% of the world market for WPCs. Principia Partners estimates that the market will continue to grow at more than 15% annually through 2010. Niche applications such as injection-molded products are expected to grow even faster.

Why should the WPC industry be of interest to West Virginia? At least two key reasons: the raw materials are already here, and we’re within a day’s shipping distance of 60% of the U.S. population. Large amounts of underutilized Appalachian hardwood residue materials are available from primary processing, as evidenced by the database of available residues in West Virginia compiled and maintained by the Appalachian Hardwood Center at WVU. Transportation of wood flour is expensive, so locating WPC production facilities near wood residue sources makes sense. West Virginia is also home to several major polymer producers. MARCEE, an initiative to recycle polymers from end-of-life electronic products such as computer housings, may provide a low-cost source of polymer raw material.

WVU is well equipped to support development of a WPC industry in West Virginia. A collaborative WPC research program involving the Center for Extrusion-Compounding of Additives for Superior Plastics Performance, the Division of Forestry, and IOF-WV was

established in 2004. The Center for Extrusion-Compounding, under the direction of Dr. Rakesh Gupta, George and Marion Berry Chair of Chemical Engineering, is applying its comprehensive capabilities in polymer processing and characterization to WPC research. These capabilities center around a versatile Leistritz 27-mm co- and counter-rotating twin-screw extruder. Ben Dawson-Andoh, Associate Professor in the Division of Forestry, is studying biological degradation of WPC materials – a critical problem currently facing the WPC industry. Dr. Andoh’s background in wood chemistry and interphase characterization is highly applicable to improving WPC durability.

To ensure that this collaborative initiative will make a meaningful contribution to the industry’s need for a next generation of value-added products, we have actively sought both academic and industrial input into our research program. We have confirmed that the need for a second generation of WPC materials that are stiffer, lighter, and more durable is a major industry priority. Researchers and business executives from companies such as American Wood Fibers, a leading wood flour supplier to the WPC industry; Crompton Chemicals, a major additive producer; and Colortronic, a supplier of feeding equipment, have visited our research facilities, met with the WVU research team, and provided raw materials and input on our initial research program.

Initial research results in the areas of 1) WPC durability and 2) the mechanical and thermal properties of WPCs containing nano-clay have been presented recently at major industry conferences: the 8th International Woodfiber-Plastic Composites Conference, in Madison, WI, and the 3rd International Conference on Advanced Engineered Wood Composites in Bar Harbor, Maine. Participation in these conferences also provided opportunities to interact with other researchers and industry leaders, and to get new insights into future research needs. Funding for much of the equipment and the initial exploratory studies has been provided by the State of West Virginia and the WVU Research Corporation through the competitively awarded Research Challenge Grant and Program to Stimulate Competitive Research Programs.

We’ve come a long way in the past year in understanding the WPC industry and initiating a multidisciplinary research program. If you’re interested in participating in one of the fastest growing segments of the materials industry, we’re ready to support your process and/or product technology development efforts! Contact Bill Johnson in the IOF-WV office to get started.

EVENTS

2005 WV Manufacturing Association Business Summit and West Virginia Chamber of Commerce Annual Meeting will be held August 31 to September 2, 2005 at the Greenbrier. For further information, contact the West Virginia Chamber of Commerce at (304) 342-1060 or visit www.wvchamber.com.

Ohio Technology Showcase sponsored by the U.S. Department of Energy, Energy Industries of Ohio, and the Ohio Department of Development will be held September 27-29, 2005 at the Sheraton Cleveland City Centre, Cleveland, Ohio. For further information visit www.ohioshowcase.org or call (800) 608-7141.

2005 IOF-WV Symposium will be held November 8-9, 2005 at the Charleston Town Centre Marriott, Charleston, WV. Detailed information will be coming out soon. For further information contact Kathleen Cullen at (304) 293-2867 ext. 5426 or Kathleen.Cullen@mail.wvu.edu.

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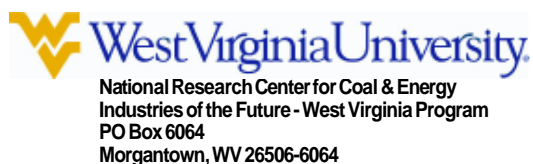
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Co-Funding Opportunities for IOF-WV Research Teams

Announcement	Due Dates	Funding
U.S. DOE Co-Production Advanced Technology/Process Concepts http://e-center.doe.gov	Now Open (Request for Proposals) July 29, 2005 (Proposals Due)	\$6 million in total funding
U.S DOE - EERE - Forest Products fedbizopps.gov	Now Open (Request for Proposals) August 2, 2005 (Proposals Due)	\$2 million in total funding
High Temperature, Low Relative Humidity Polymer-Type Membranes http://e-center.doe.gov	Now Open (Request for Proposals) August 4, 2005 (Proposals Due)	Approximately \$7,500,000
NASA SBIR and STTR http://www.SBIR.NASA.gov/	Now Open (request for Proposals) September 7, 2005 (Proposals Due)	Phase I \$ up to \$100,000 Phase II up to \$750,000
U.S. DOE Experimental Program to Stimulate Competitive Research (DOE EPSCoR) Implementation Awards http://e-center.doe.gov	Now Open (Request for Proposals) September 21, 2005 (Proposals Due)	TBD
U.S. DOE EERE Materials for Energy Efficient Industrial Processing http://www.eere.energy.gov/industry/financial/solicitations_future.html	Now Open (Request for Proposals) October 17, 2005 (Proposals Due)	\$7,600,000
U.S. DOE EERE Chemicals Industry of the Future http://www.eere.energy.gov/industry/financial/solicitations_future.html	July 29, 2005 (Request for Proposals) TBD (Proposals Due)	TBD
Homeland Security SBIR 2005 http://www.hsarpasbir.com/	Now Open (Request for Proposals) August 29, 2005 (Proposals Due)	Phase I up to \$100,000 Phase II up to \$750,000
USDA SBIR 2006 www.csrees.usda.gov/fo/sbir	Phase I Proposals Due September 1, 2005 Phase II Proposals Due February 2, 2006	Phase I up to \$80,000 Phase II up to \$300,000

MARK YOUR CALENDAR FOR THE 2005 Industries of the Future-West Virginia Symposium to be held November 8-9, 2005 at the Charleston Marriott.



West Virginia Development Office

**Industrial Technologies Program
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