



## IOF-WV Projects Lead to Potential Commercial Opportunities

By Xingbo Liu<sup>1</sup>, Bhaskaran Gopalakrishnan<sup>2</sup>, Rakesh Gupta<sup>3</sup>, WVU College of Engineering & Mineral Resources

Several IOF-WV projects have reached the stage where they could transition from the research laboratory to real world implementation. Four such examples follow:

**1. Weld overlay of MSA 2020 alloy:**<sup>1</sup> MSA 2020 is a novel alloy that combines high-temperature corrosion resistance with exceptional hardness. It can be used as a “wear layer” to substantially increase the lifetime of rollers, bearings, and other submerged hardware in galvanizing line operations. MSA 2020 is applied with a weld overlay process. It shows strong market potential not only in the galvanizing industry, but also in other industries such as chemical processing.

The effectiveness of MSA 2020 has been demonstrated in a research project co-funded by the U.S. DOE Industrial Technologies Program (ITP). The patent on MSA 2020 is held by the Metallurgical Co., a partner on the DOE project along with WVU, Oak Ridge National Laboratory, and 16 other industrial partners.

Welding techniques that can reliably be used in an industrial setting need to be developed to enable broad commercial application of this technology.

**2. A process for continuous optimization of manufacturing/utility systems:**<sup>2</sup> An expert system that couples advanced sensor and control technologies with data mining techniques and industrial best practices can result in significant energy savings and productivity improvements for manufacturing operations. Relationships that are determined between key plant operational parameters and energy utility system parameters are the key to applying best practices rules.

This process incorporates data and experience from hundreds of industrial energy assessments done by the WVU Industrial Assessment Center, a program funded by the U.S. DOE. In a separate IOF-WV project co-funded by DOE, WVU researchers teamed with Century Aluminum, and other partners to apply the principles of innovative sensor and control technologies to the aluminum reduction process. This project resulted in key innovations that are applicable to the process for continuous optimization of manufacturing/utility systems.

The relationships derived through the use of data mining are highly complex. Development of a simulation model to illustrate, analyze, and further refine this technology would promote its commercial application.

**3. Argonne jet-mill process:**<sup>3</sup> The Argonne jet-mill process produces micron-sized particles of polymeric materials such as

hydrocarbon resins. Aqueous dispersions of these particles are useful in a variety of applications, including tackifier resin dispersions used in production of pressure-sensitive adhesives, pigments for paints and coatings, and food products. Currently such dispersions are produced in a phase inversion process that is energy intensive, difficult to control, and is limited to polymers with low softening points.

The potential of the jet-mill process was demonstrated in a research project co-funded by the U.S. DOE ITP. Intellectual property rights to application of the process in the adhesives industry are held by Argonne National Laboratory (ANL), a partner in the project along with WVU, Dyna-Tech Adhesives of Grafton, WV, Tulane University, and several other industrial partners.

Additional research to optimize the process conditions for tackifier resin dispersions and to demonstrate other applications would enhance the potential for wide spread use of this process.

**4. Polymer technology incubator:**<sup>3</sup> The WVU Center for Extrusion-Compounding of Additives for Superior Plastics Performance serves as a “technology incubator” in emerging areas such as bio- and nano-polymers. The Center has assembled polymer processing and characterization capabilities that are matched by only a small number of other universities. Processing capabilities include a 27-mm Leistritz twin-screw extruder. Extensive characterization capabilities including advanced microscopy, and a full suite of rheological and physical property characterization equipment. Novel research into the effect of nano-clay additives on the mechanical properties of wood-polymer composite materials has recently been published and this work is ongoing.

In 2002, the West Virginia Legislature created the Research Challenge Grant (RCG) Program to support research closely linked to economic development in the State. The Center for Extrusion-Compounding received initial RCG funding in FY2003 and has also received funding through the Mid-Atlantic Research Center for End-of-Life Electronics (MARCEE) program and the U.S. DOE. The Center is an important part of the newly-created WVU Polymer Research Center and is available for industrial materials development. Early-stage, research-based companies are especially invited to use the Center as a product development/technology incubator.

## EVENTS

**BTU's from the Forest: Educational Conference on the Use of Wood Fiber as an Energy Source** will be held **June 29-30, 2005** at the Radisson Hotel and Conference Center, Morgantown, WV. For further information visit <http://ahc.caf.wvu.edu/woodconf/> or contact Shawn Grushecky at (304) 293-2941 ext. 2413 or [sgrushec@wvu.edu](mailto:sgrushec@wvu.edu).

**WV Forestry Association Annual Meeting** will be held **July 15 -16** at the Lakeview Golf Resort, Morgantown, WV. For further information visit [wvfa.org](http://wvfa.org) or contact the WV Forestry Association at (304) 372-1955 or [wvfa@wvadventures.net](mailto:wvfa@wvadventures.net).

**Cutting the High Cost of Energy: 2005 ACEEE Summer Study on Energy Efficiency in Industry** will be held **July 19-22**, at the Thayer Hotel, West Point, NY. For more information visit <http://aceee.org>.

## IOF-WV Contacts

**Bill Johnson**  
WVU NRCCE  
(304) 293-2867 ext. 5530  
[William.Johnson@mail.wvu.edu](mailto:William.Johnson@mail.wvu.edu)

**Jeff Herholdt**  
WV Development Office  
(304) 558-2234  
[jherholdt@wvdo.org](mailto:jherholdt@wvdo.org)

**Kathleen Cullen**  
WVU NRCCE  
(304) 293-2867 ext. 5426  
[Kathleen.Cullen@mail.wvu.edu](mailto:Kathleen.Cullen@mail.wvu.edu)

**Carl Irwin**  
WVU NRCCE  
(304) 293-2867 ext. 5403  
[Carl.Irwin@mail.wvu.edu](mailto:Carl.Irwin@mail.wvu.edu)

**Nadine Kelly**  
WVU NRCCE  
(304) 293-2867 ext. 5408  
[Nadine.Kelly@mail.wvu.edu](mailto:Nadine.Kelly@mail.wvu.edu)

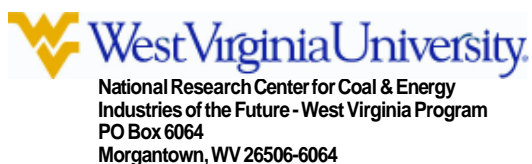
**Debi Conrad**  
WV Development Office  
(304) 558-2234  
[dconrad@wvdo.org](mailto:dconrad@wvdo.org)

## Co-Funding Opportunities for IOF-WV Research Teams

Announcement	Due Dates	Funding
<b>USDA Rural Development; Notice of Funds Availability for the Renewable Energy Systems and Energy Efficiency Improvements Grant Program</b> <a href="http://www.rurdev.usda.gov/rbs/farbill/index.html">www.rurdev.usda.gov/rbs/farbill/index.html</a>	Now Open (Request for Proposals) June 24, 2005 (Proposals Due)	\$11.4 million in total funding
<b>NSF Chemistry Research Instrumentation and Facilities: Departmental Multi-User Instrumentation</b> <a href="http://www.nsf.gov">www.nsf.gov</a>	Now Open (Request for Proposals) June 27, 2005 (Proposals Due)	Maximum of \$500,000 per request
<b>U.S. DOE NETL Support of Advanced Coal Research at U.S. Colleges and Universities</b> <a href="http://e-center.doe.gov">http://e-center.doe.gov</a>	Now Open (Request for Proposals) July 7, 2005 (Proposals Due)	\$3 million in total funding
<b>U.S. DOE Co-Production Advanced Technology/Process Concepts</b> <a href="http://e-center.doe.gov">http://e-center.doe.gov</a>	Now Open (Request for Proposals) July 15, 2005 (Proposals Due)	\$6 million in total funding
<b>U.S. DOE High Temperature Solid Oxide Technologies Research</b> <a href="http://e-center.doe.gov">http://e-center.doe.gov</a>	Now Open (Request for Proposals) July 25, 2005 (Proposals Due)	Minimum award \$400,000 Maximum award \$4,500,000 \$ 4,960,000 in total funding
<b>U.S DOE - EERE - Forest Products</b> <a href="http://fedbizopps.gov">fedbizopps.gov</a>	Now Open (Request for Proposals) August 2, 2005 (Proposals Due)	\$2 million in total funding
<b>U.S. DOE EERE Materials for Energy Efficient Industrial Processing</b> <a href="http://www.eere.energy.gov/industry/financial/solicitations_future.html">http://www.eere.energy.gov/industry/financial/solicitations_future.html</a>	June 27, 2005 (Request for Proposals) TBD (Proposals Due)	TBD
<b>U.S. DOE EERE Chemicals Industry of the Future</b> <a href="http://www.eere.energy.gov/industry/financial/solicitations_future.html">http://www.eere.energy.gov/industry/financial/solicitations_future.html</a>	July 1, 2005 (Request for Proposals) TBD (Proposals Due)	TBD

### State Technologies Advancement Collaborative (STAC) Solicitation

Proposals are due July 15, 2005. \$4.95 million in total funding is available for energy efficiency projects and \$1.35 million in total funding is available for Rebuild America projects. Areas of interest within Industrial Technologies include waste heat recovery, improved process heaters and advanced boilers, and other innovative energy system technologies. Funding is also available for Building Technologies, Transportation Technologies, Distributed Energy Resources, and the Rebuild America program. For more information, visit: <http://www.stacenergy.org/solicitations/05-STAC-01/>.



Nonprofit Organization  
 U.S. Postage  
 PAID  
 Morgantown, WV  
 Permit No.34



West Virginia Development Office

**Industrial Technologies Program**  
**Energy Efficiency & Renewable Energy**  
 U.S. Department of Energy