

Science.

Technology.

Innovation.

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**PNNL is teaming with U.S. companies, the Department of Energy, and other national laboratories and organizations to help the most energy-intensive industries find ways to increase resource efficiency and boost their bottom-line performance.**

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# Industries of the Future

The Pacific Northwest National Laboratory (PNNL) is helping the U.S. Department of Energy Office of Industrial Technologies (OIT), to develop and deliver advanced energy efficiency, renewable energy and pollution prevention technologies for industrial applications through partnerships with industry, government and other organizations. Industries of the Future (IOF) forms the framework for OIT to partner with the most energy- and resource-intensive industries – agriculture, aluminum, chemicals, forest products, glass, metal casting, mining, petroleum, and steel. To achieve their visions of the future, these industries identify critical technology needs, and work collaboratively on technology roadmaps, program implementation plans, and project portfolios.

PNNL is contributing to a broad range of IOF activities. Technology development programs use our capabilities in

- chemical conversion and advanced separations
- design and manufacturing engineering
- materials science and technology
- advanced sensing and measurement technology.

For example, through innovative chemical and biological processing technologies, PNNL is transforming low-value biomass and wastes into high-value chemical products. Characterization of multiphase fluid dynamic behavior in chemical plants is one of the key issues addressed through an industry, university, and national laboratory collaboration to develop advanced computational techniques of broad application. Separations technology utilizing novel materials has the potential to enhance pulp mill process efficiencies for the forest products industry.

Chemical catalysis, separation processes, and biotechnology are among the capabilities PNNL researchers are applying to develop value-added chemical products from plant and crop-based feedstocks. Developed in partnership with industry, these innovative technologies have received such honors as the Presidential Green Chemistry Challenge Award and an R&D 100 Award.



**Pacific Northwest  
National Laboratory**

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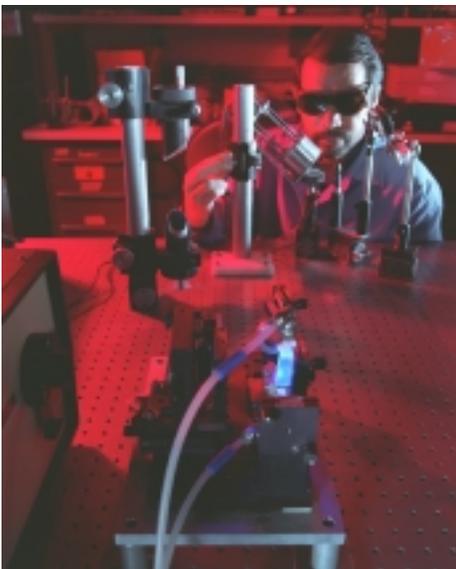


Fiber optic scintillators are a key component of PNNL's work with the paper industry to develop real-time monitoring of the entire moving paper web. Developers aim to achieve on-time measurements at production speeds of up to 4,000 feet per minute.



PNNL researchers are working to improve the yield of extruded aluminum products by understanding the extrusion process and parameters. An operator prepares for a run by lubing the extrusion press container.

Capabilities in sensors and advanced manufacturing technologies are applied to glass fabrication through the use of non-contact stress measurement techniques and new process control methodologies. Other novel sensor techniques are applied to pulp and paper industry needs for measuring pulp slurry characteristics and paper web properties.



To improve the fabrication process and quality control of automotive glass, fluorescence emission from ultraviolet light determines glass temperature. Researchers are also using on-line non-contact sensors for glass thickness and uniformity measurements.

The IOF activities cover a wide range of technology demonstration and analysis programs. For example, PNNL provides planning and implementation expertise for several OIT financial assistance programs. One is the Inventions and Innovations program for individual inventors and small businesses; another is the National Industrial Competitiveness through Energy, Environment, and Economics program focused on state/industry partnerships for technology demonstrations. Technology-based analysis provides OIT with key input for its IOF initiatives. PNNL collaborates to develop methodologies and assess the benefits – energy, environmental, productivity, and safety and health – of commercialized technologies developed through OIT funding.

In support of the OIT focus on these industries, PNNL is taking a leadership role with 15 other DOE national laboratories and facilities and chairs the Laboratory Coordinating Council. Under a memorandum of cooperation, this group helps facilitate access to capabilities that can be applied to solve industrial technology challenges in each vision of the future.

Collaborative efforts in the IOF initiative are bringing broad national benefits to efficient energy and resource use, economic competitiveness, and enhanced environmental quality. The intent of PNNL is to apply our special technology expertise, cutting-edge equipment, and user facilities to those collaborations that will achieve the industry visions of the future.

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