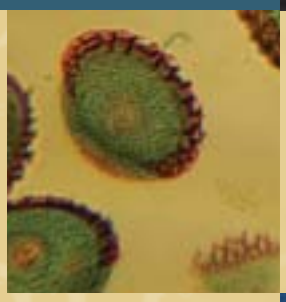
COLLABORATING WITH INDUSTRY FOR INNOVATION



Laboratory Coordinating Council

www.oit.doe.gov/lcc

results

COLLABORATING FOR RESULTS

By teaming with DOE laboratories and facilities, the nine industries that consume the most energy have made unprecedented strides in achieving greater energy efficiency, waste reduction, and pollution prevention.

"Secat is working with the DOE labs to bring the national intellectual treasures to small and large U.S. aluminum companies so that we can compete in the global market. The cost-shared funding has made it all possible."

Subodh K. Das
Secat, Inc.

"The collaboration to study refinery process heating enabled public policy intervention to avoid unnecessary expenditures and increased energy costs to the American people."

James G. Seebold
Chevron Research and Technology Company

INDUSTRY	PROJECT
AGRICULTURE	**Succinic Acid from Wood Wastes and Plants**
ALUMINUM	**Reduction of Oxidative Melt Loss for Aluminum and Its Alloys**
CHEMICALS	**Multi-Phase Fluid Dynamics Research Consortium**
FOREST PRODUCTS	**Low-Temperature Plasma Technologies to Eliminate VOC Emissions from Pulp Mills and Wood Products Plants**
GLASS	**Integrated Model of Glass Furnaces**
METAL CASTING	**Advanced Intelligent Control of Cupola Furnaces**
MINING	**3D Simulation of Grinding Mills**
PETROLEUM	**Quantifying Emissions from Process Heating**
STEEL	**A Better Process to Make Tubes and Pipes**

DESCRIPTION	PARTNERS
A new bacterium (AFP111) can ferment sugars derived from wood wastes and plant crop residues to make succinic acid, which is lower-cost than other chemicals used in manufacture.	Argonne National Laboratory, Oak Ridge National Laboratory, Arkenol, Applied CarboChemicals
When aluminum is melted, an average of 4% of it is lost to oxidation at the surface, from inclusions in the molten metal, and sludge at the bottom of the melt. The project is identifying ways to control exposure to the furnace atmosphere, add alloying elements to reduce oxide growth, and use barriers to decrease the melt-atmosphere interface.	Albany Research Center, Argonne National Laboratory, Oak Ridge National Laboratory, Secat, Inc., University of Kentucky, eight industrial firms
Processes that use gas-solid flows can operate as low as 60% capacity, compared to 95% for all other processes. This broad-based research consortium is using next-generation modeling to help industry predict dense flow properties and improve operating efficiencies.	Seven DOE laboratories, 10 industrial firms and organizations, eight universities, National Science Foundation
Four new plasma technologies are being evaluated for effectiveness and low cost to replace today's energy-intensive and heat-wasting technology for controlling volatile organic compound (VOC) emissions.	Argonne National Laboratory, Pacific Northwest National Laboratory, University of Illinois, Chicago, four forest products and environmental firms
A laboratory-university partnership has coupled combustion space and glass bath simulation through a radiation model to create a more accurate, integrated model for optimizing melter operations.	Argonne National Laboratory, four glass manufacturers, Mississippi State University, Purdue University
Neural network controls have been successfully demonstrated. These controls maintain iron composition, temperature and melt rate at desired set points by varying the percent of coke, oxygen, enrichment and blast rate.	Albany Research Center, Idaho National Engineering & Environmental Laboratory, Utah State University, American Foundrymen's Society, seven industrial firms
Balls within a semiautogenous grinding (SAG) mill strike the ore to grind it. This project aims to reduce energy use and wear caused by balls striking the shell of the mill rather than the material to be ground. Through simulations and testing, researchers can optimize the lifters located on the shell and mill speed, and, consequently, the motion of charge within the mill.	Idaho National Engineering & Environmental Laboratory, two mining concerns, one process engineering firm, University of Utah
A 20-participant, multi-sector team has combined credible data and theory to show that refinery furnaces burning fuel gas over a broad range of operating conditions are not a significant source of air toxics.	Sandia National Laboratory, Lawrence Livermore National Laboratory, Chevron, UCLA, Stanford University, others
Using metallurgical studies, thermal and deformation process models, and microstructural evolution, this partnership is developing a controlled thermo-mechanical processing (CTMP) technology.	Idaho National Engineering & Environmental Laboratory, Oak Ridge National Laboratory, Timken Company and other industrial firms, National Research Council of Canada

"By partnering with the National Laboratories in the Industries of the Future program, the forest products industry has gained access to a group of highly talented scientists and engineers who bring fresh perspectives and new tools for attacking the technology challenges facing the industry."

Reid Miner
National Council of the Paper Industry for Air and Stream Improvement, Inc. (NCASI)

"The National Laboratories have provided the expertise required to design a technically challenging process control system to implement Controlled Thermal-Mechanical Processes for the efficient manufacture of steel tubing with consistent, targeted microstructures leading to our ultimate project goals of energy savings and cost reduction."

Robert V. Kolarik II
The Timken Company

"Through DOE cost-shared funding, leading scientists and engineers from the national labs, universities, and industry are collaborating to develop a Coupled Glass Furnace Model that will facilitate improved energy efficiency and worldwide competitiveness. This critical technology would be difficult or impossible to develop individually."

W. H. Anderson
OSRAM SYLVANIA

"The Multi-Phase Fluid Dynamics Research Consortium brings together leading engineers and scientists from manufacturing companies, universities, national laboratories, and software vendors to work toward the same goals."

Tyler B. Thompson
The Dow Chemical Company

"Without collaboration with these laboratories, we would not be able to carry out the research needed to ensure the solid economic future of our industry."

Tom Burgess
Georgia-Pacific Corporation

BENEFIT

~9.8 trillion Btu savings annually, elimination of 252,000 tons waste annually, lower carbon dioxide emissions, expansion of market for biomass crops

Estimated 58 trillion Btu saved annually, lower cost of aluminum products, reduction of emissions, significantly increased recycling capability

Improved operating capacity (up to 90%), increased yield of desirable products

Efficient energy use, ~$500K annual costs savings per unit, reductions in capital costs, elimination of two million tons of carbon dioxide emissions

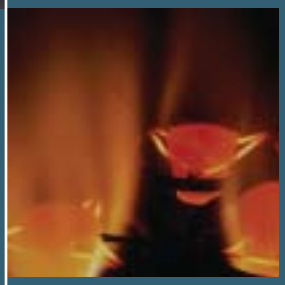
Improved productivity and reduced energy use and emissions, aid in problem solving and product design

400 million Btu savings per unit annually, decrease in coke requirements and elimination of associated emissions, reduced carbon, sulfur and manganese losses

~30% energy savings, reduced wear and abrasion, nearly $4M cost savings

Quantification of emissions, scientific basis has been established as input to the EPA rulemaking process

Reduced scrap, rework, alloy content and post-processing; lower tooling and machining costs with increased performance; decreased toxic wastes, greenhouse gas emissions, and energy consumption



harnessing resources

HARNESSING NATIONWIDE RESOURCES

Every day, U.S. industries seek innovative ways to transform the manufacturing process – to improve energy efficiency and reduce waste through new technologies. The scarcity of resources often hinders these industry efforts. To meet this need, the Department of Energy's (DOE) Office of Industrial Technologies established the Industries of the Future initiative to facilitate collaborations among the materials and process industries.

The Laboratory Coordinating Council (LCC) network of 16 DOE laboratories and facilities offers specific areas of expertise, resources, and competencies that can help meet any industry challenge. This "virtual" laboratory can be tailored to specific research projects, whether you're looking for new technology to build steel tubes and pipes or to develop bacteria to ferment sugars from wood wastes.

A matrix of R&D competencies helps you connect with the right experts at the right facilities for the maximum results. And companies can easily access this scientific expertise and specialized equipment. Working cooperatively, the DOE laboratories can extend uniform terms and conditions and user-friendly approaches to intellectual property rights to their technology partners.

The LCC partners with industry and academia to:

- **Stimulate and foster collaborations**
- **Simplify access to laboratories and facilities**
- **Help industries meet goals of reducing energy use and waste**

These partnerships use science and technology to create a more competitive, energy-efficient future for American companies.

LABORATORY COORDINATING COUNCIL

Established in 1995, the Laboratory Coordinating Council networks the expertise and capabilities of U.S. Department of Energy national laboratories and facilities to help create highly effective partnerships with the Industries of the Future.

Collaborating with the most energy- and waste-intensive industries – agriculture, aluminum, chemicals, forest products, glass, metal casting, mining, petroleum, and steel – provides each member opportunities to bring specific expertise to bear on priority R&D needs, helping address the most important technological challenges of an industry's vision of the future.

Visit www.oit.doe.gov/lcc to access this network of knowledge and expertise.

Several photos in this brochure illustrate Laboratory Coordinating Council partnerships with industry. For example, the laboratory melting unit, page 2, at the Albany Research Center is being used to study oxide formation during the melting of aluminum alloys. The laser ultrasonic sensor, page 4, developed by Lawrence Berkeley National Laboratory and the Institute for Paper Science and Technology, is measuring stiffness and shear rigidity during papermaking at Mead Paper Company.

Office of Industrial Technologies
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy
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