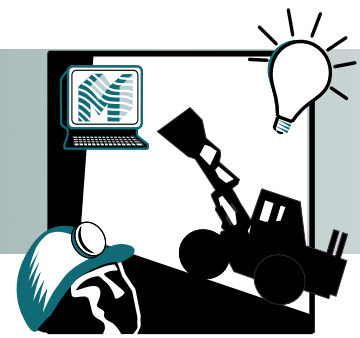


MINING

Project Summary Sheet



MINING INDUSTRY OF THE FUTURE AWARDS ROUND TWO RESEARCH

BENEFITS

- Increases health and safety
- Decreases environmental impacts
- Advances technology for resource identification
- Advances technology for mineral processing
- Improves mining productivity

APPLICATION

These research projects apply across the exploration, extraction, and processing phases of mining. The results of these research activities will help the mining industry save energy, increase productivity, reduce waste and pollution, and increase worker safety and health. Research results are disseminated through industry conferences, final reports, and other media.

The US Department of Energy, Office of Industrial Technologies, Mining Industry of the Future recently awarded 16 projects that address industry research priorities as defined in the *Mining Industry Roadmap for Crosscutting Technologies*. This cost-shared research will benefit the metal, coal, and industrial mineral mining industries through improved safety, enhanced economic competitiveness, reduced energy consumption, and reduced environmental impacts.

The following briefly describes the proposals selected for funding.

Advanced Abrasion Resistant Materials

Objective: To develop and test advanced abrasion-resistant materials for mining equipment using two methods: (1) a hybrid pressure casting process for parts made out of steel metal matrix composites, and (2) a novel heat treatment of parts that have been spray coated. These abrasion-resistant materials will reduce operating costs and increase production by reducing machinery downtime.

Partners: Caterpillar Inc.; Oak Ridge National Laboratory; St. Louis Metallizing; State University of New York at Stony Brook; University of California at Santa Barbara

Advanced Materials and New Manufacturing Techniques

Objective: To develop an efficient means for producing rock drill bits and rock disc cutters that last longer, increase energy efficiency and penetration rates, and lower overall production costs.

Partners: Michigan Technological University; Zeni Drilling Company; The Robbins Group; Superior Rock Bit Company

Advanced Underground Vehicle Power and Control

Objective: To lay the foundation for the development of underground vehicles powered by fuel cells, and advanced collision-avoidance control technologies which will increase mine safety and productivity.

Partners: Fuelcell Propulsion Institute; Atlas Copco Wagner; Barrick Gold Corporation, Bituminous Coal Operator's Association; H Power Corporation; ISI Group; Long-Airdox Company; Stolar Horizon; SVS Inc.; Inco Ltd.; Mining Technologies International; Warren Equipment; CANMET; National Institute of Occupational Safety and Health; Sandia National Laboratories

Calibration Methods for On-line Analyzers

Objective: To develop artificial neural networks to improve the calibration of on-line analyzers that monitor ore quality in real time. This will reduce the amount of waste material that must be processed.

Partners: University of Alaska at Fairbanks; Usibelli Coal Mine Inc.; Golden Valley Electric Association



PARTNERS:

Advanced Ceramics Research Inc.
Advanced Power Technologies, Inc.
AdvR, Inc.
Argonne National Laboratory
Atlas Copco Wagner
Badger Mining Corporation
Baker Hughes Mining Tools
Barrick Gold Corporation
The Ben Franklin Technology Center
of Southwestern Pennsylvania
Big Sky Geophysics
Bituminous Coal Operator's
Association
CANMET
Caterpillar Inc.
Cleveland-Cliffs Inc.
Colorado School of Mines
Commercial Stone Company, Inc.
CONSOL Inc.
Doug Hable (Consultant)
Electromagnetic Instruments, Inc.
Electric Power Research Institute
FMC Corporation
Franco Nevada Mining
Corporation Ltd.
Fuelcell Propulsion Institute
Geophex, Ltd.
Global Stone James River
Golden Valley Electric Association
H Power Corporation
Inco, Ltd.
ISI Group
J.M. Huber Corporation
J.H. Fletcher & Company
Kennecott Exploration Company
Lee Ranch Coal Company
Long-Airtox Company
Los Alamos National Laboratory
Krebs Engineers
Massey Coal Services
Michigan Technological University
Minerals and Coal Technologies, Inc.
Mining Technologies International
Montana Tech
NSA Engineering, Inc.
National Institute of Occupational
Safety and Health
Newmont Mining Corporation
NIOSH/Lake Lynn Laboratory
Oak Ridge National Laboratory
The Ohio Valley Coal Company
Partition Enterprises Ltd.
Phelps Dodge Inc.
Place Dome Exploration Inc.
Precision Testing Proprietary
Quantech Consultants Inc.
RAG American Coal
Riverton Production Company
The Robbins Group
Sandia National Laboratories
Smith Tool

Cellular Composite Wear Resistant Components

Objective: To design and test advanced components for drilling, earth moving and crushing equipment made out of cellular composite materials. The use of these wear components will prolong the life of equipment and result in large energy savings as well as increase the amount of material produced at mines that adopt these components.

Partners: Advanced Ceramics Research Inc.; Smith Tool; Krebs Engineers; Inco Mines Research; Phelps Dodge Inc.; Argonne National Laboratory; University of Missouri at Rolla; University of California at Santa Barbara

Comminution Circuit Optimization

Objective: To develop mathematical models which will help save large amounts of energy by optimizing the operation of grinding mills so excessive amounts of fine material can be reduced.

Partners: Michigan Technology University; Badger Mining Corporation; Svedala Industries Inc.; Cleveland-Cliffs, Inc., J.M. Huber Corporation; Electric Power Research Institute

Dense-Medium Cyclone Optimization

Objective: To develop a set of engineering tools that will improve the efficiency of their dense-medium cyclones used to separate coal or minerals from ore. Improvements in how coal minerals are separated will reduce the energy costs associated with the process and increase the amount of valuable materials that are recovered as product.

Partners: Virginia Polytechnic Institute; Massey Coal Services; Partition Enterprises Ltd.; Precision Testing Proprietary

Mapping Induced Polarization

Objective: To develop and demonstrate the use of a new geophysical system to collect economically competitive induced polarization data using natural electromagnetic fields as the source. Applications of this method should reduce the need for drilling in resource exploration and characterization activities.

Partners: Electromagnetic Instruments, Inc.; Place Dome Exploration, Inc.; Kennecott Exploration Company; Quantech Consultants, Inc.

Novel Dewatering Aids for Mineral and Coal Fines

Objective: To develop novel chemicals that can facilitate the removal of water from mineral and coal fines using conventional mechanical dewatering equipment such as vacuum filters. This will help reduce the amount of fine material going into waste streams as well as recover valuable metal or coal from current waste streams.

Partners: Minerals and Coal Technologies, Inc.; Virginia Polytechnic Institute; Geophex, Ltd.

Projectile Based Excavation

Objective: To develop a novel, low cost projectile system for the rapid, efficient, excavation of rocks and ore in both surface and underground mines by using projectiles launched by electrical energy rather than conventional drilling and blasting. Since drilling is not required and the ore is more selectively excavated and broken up into smaller sizes, the result is large energy savings.

Partners: Advanced Power Technologies, Inc.; Baker Hughes Mining Tools; University of Utah

Real-Time Coal Content/Ore Grade Sensor

Objective: To develop a real-time coal content/ore grade sensor that uses digital imaging techniques for use in exploration, mining, and processing operations. The sensor will increase safety, decrease environmental impacts, and decrease energy requirements for exploration, mining, and processing activities.

Partners: AdvR, Inc.; Montana Tech; Big Sky Geophysics; Western Syncoal Company; Stillwater Mining Company

Remote Sensing and Imaging at the Cutting Edges of Mining Equipment

Objective: To use remote sensing and imaging technology to make real-time measurements of mining conditions tested on the cutting edges of mining equipment. The researchers hope to develop a cutting-edge sensor that will improve worker safety, by preventing worker exposure to rock outbursts in deep mines and allowing greater remote control of equipment, while at the same time improving the efficiency of mining operations.

Partners: Stolar Horizon, Inc.; Colorado School of Mines; Los Alamos National Laboratory; U.S. Mining Safety and Health Administration; CONSOL Inc.; RAG American Coal; FMC Corporation; Lee Ranch Coal Company

Roof Bolt System Design

Objective: To improve roof-bolting techniques, the most popular method for supporting roofs in underground mines. A computerized roof-bolting control system that can evaluate the geologic conditions of a roof in real-time will be developed to determine suitable roof bolt system design requirements. Improvements in roof-bolting systems will lead to increased worker protection and mining production.

Partners: West Virginia University; J.H. Fletcher & Company; CONSOL Inc.; The Ohio Valley Coal Company; Riverton Production Company; Commercial Stone Company Inc.; Newmont Mining Corporation

Treatment of Cyanide Solutions and Slurries Using ASH Technology

Objective: To adapt and field test a low cost recovery or destruction of cyanide used in certain mining operations with air-sparged hydrocyclone (ASH) technology that is currently used to remove oil from contaminated soil and treat industrial waste water.

Partners: University of Utah; Unifield Engineering, Inc.; ZPM Inc.; Solvay Minerals; Baker Hughes; Franco Nevada Mining Corporation Ltd.; Utah Engineering Experiment Station; Doug Hable (Consultant)

PARTNERS CONTINUED:

Stillwater Mining Company
State University of New York at
Stony Brook
St. Louis Metallizing Solvay
Minerals
Stolar Horizon, Inc.
Superior Rock Bit Company
Svedala Industries, Inc.
SVS, Inc.
Transtek, Inc.
Unifield Engineering, Inc.
University of Alaska at Fairbanks
University of California at Santa
Barbara
University of Missouri at Rolla
University of Pittsburgh
University of Utah
Usibelli Coal Mine, Inc.
U.S. Mining Safety and Health
Administration
Utah Engineering Experiment
Station
Victor Products USA
Virginia Polytechnic Institute
Warren Equipment
Western Syncoal Company
West Virginia University;
Zeni Drilling Company
ZPM, Inc.

STATES FOR MINING INDUSTRY OF THE FUTURE PARTNERS:

Alaska
Arizona
California
Colorado
District of Columbia
Georgia
Illinois
Michigan
Minnesota
Missouri
Montana
New Mexico
Nevada
New Jersey
New York
North Carolina
Ohio
Oregon
Pennsylvania
Tennessee
Texas
Utah
Virginia
Washington
West Virginia
Wisconsin
Wyoming

Wireless Mine-Wide Telecommunications Technology

Objective: To develop a two-way, real-time, wireless communications system for use in underground mines. This technology will lower the cost of mining by increasing productivity as well as the safety of miners.

Partners: Transtek, Inc.; University of Pittsburgh; Victor Products USA; NIOSH/Lake Lynn Laboratory; CONSOL Inc.; The Ben Franklin Technology Center of Southwestern Pennsylvania



24-Channel Geophone Array for Horizontal or Vertical Boreholes

Objective: To develop an array of 24 seismic sensors capable of being mounted in either vertical or horizontal boreholes to improve ground-imaging techniques. This will reduce energy usage in mining operations because there will be fewer interruptions and less waste material mined.

Partners: Virginia Polytechnic Institute; CONSOL Inc.; Global Stone James River; NSA Engineering Inc.

FOR ADDITIONAL INFORMATION,
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