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DEPARTMENTS

COVER

Each May, MINING ENGINEERING reviews what has happened in the minerals industry the previous year. This year, that review begins on page 325 with the exploration section. In the June issue, we will finish profiling the industrial minerals commodities.

THANK YOU

ME editors thank the authors and contributors who made possible this annual review issue. We appreciate your help. **ME** readers should benefit from your efforts.

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BPA

SPECIAL ISSUE: 1986 ANNUAL REVIEW

Habenicht discussed the development of a mobile roof-support device, to improve full seam extraction. And Neilan proposed design considerations for choosing mine monitoring systems.

Mine monitoring systems, along with remote controlled continuous miners, are receiving the most widespread acceptance of the recent developments in equipment technology. Automation of mining systems is receiving much interest. Witness the 2nd Annual Conference on Innovative Mining Systems and the establishment of the Center for Robotics and Manufacturing Systems at the University of Kentucky.

Computers are becoming more commonplace in the coal industry, especially in the area of engineering. This is primarily due to the availability of microcomputer software, which is flexible and cost-effective for mine site use. Mine planning systems, which previously required engineering workstations, are becoming increasingly available for microcomputers.

Ramani and Weiss discussed the analysis of longwall mining systems using interactive computer graphics. Also, note the continued success of the Annual Conferences on Computers in the Coal industries and the APCOM conferences. This suggests the power that microcomputers hold as engineering tools in the coal industry.

Computers are also becoming increasingly important operational tools. They are used in mine monitoring systems and as a means of monitoring and controlling mining equipment.

In general, the US coal mining industry is suffering from intense economic pressures. These inhibit the availability of capital for research and development efforts.

At the same time, these pressures necessitate the development of technology to compete in the world coal market. So development of new technologies and improved engineering and mine design techniques are receiving interest. But widespread implementation is slow. It appears, however, that progress will be made as we struggle to compete. ■

Research and development

F. N. Kissell,
US Bureau of Mines

The computerized niche in mining research continues to grow. Computer modeling in mining began with ventilation and quickly expanded into pillar design, subsidence, and hydrology.

One interesting program is MULSIM/BM from the US Bureau of Mines. It is a rock stress program designed to assist engineers in the layout of mine plans.

The program calculates stresses and ground deformations resulting from mining. Special features include the ability to include up to 26 material property sets, subdivide to "fine mesh" portions, and to specify extraction ratios.

The designers say the program should be "used discriminately in combination with field verification data." That is an honest caution statement that every promoter of a computer model should be using. Another Bureau program that has ready application is one that forecasts subsidence over longwall panels.

In some areas, enough modeling has been done for someone to undertake the task of comparing programs. Predicting water inflows into operating coal mines is an active CONOCO research area. And researchers in the Library, PA coal research division have undertaken this difficult task with positive results.

Computer applications dominated the second conference on innovative mining systems, held in October at Pennsylvania State University. Here, the emphasis was more on computer control of mining equipment. Drilling is the most down-to-earth application discussed, and computerized drills have just recently come into use.

Another recent mining application is control of longwall shearers. However, it is unlikely that these rather straightforward uses mean that widespread computer control of mining equipment is just over the horizon. Future advances may be in better-funded areas related to mining, such as emplacement of nuclear waste.

So-called "expert systems" represent another interesting computer application, where the computer is proported to have some characteristics of human thinking. Applications are visualized in mine ventilation, equipment control, and problem diagnosis. But, aside from a system called Prospector developed a decade ago at Stanford, virtually every mining application remains in the talking stage.

One interesting system that may soon see application is called MICA, a joint development of the Bureau and the University of Missouri. It acts as a consultant to provide advice on mica beneficiation.

In the area of coal use, there were some interesting developments in microbubble flotation, which offers better selectivity for smaller particle sizes. Research has demonstrated that, in addition to coal mineral characteristics and the reagents used, air bubble size plays a vital role in flotation.

Bechtel National has teamed up with Energy International to use a unique flotation cell developed by Bergbau Forshung in Germany. The Bergbau flotation cell is a conical vessel using a pre-aerated microbubble slurry. It has maximum bubble loading with even the finest particles.

Also, Lurgi Corp. reported on its operating experience on its dry/semi-dry circulating fluid bed process for flue gas desulfurization. Some advantages claimed are dry reagent feeding, no slurry atomizer, higher solid residence time, and ability to reduce any SO2 amount from very high sulfur coals to legislated levels. ■

Coal mining equipment

T. W. Martin and G. R. Bockosh,
US Bureau of Mines

Underground mining equipment

Underground coal mining has seen some subtle but dramatic innovations over the last few years. Much of the innovation has been sparked by ever increasing competition throughout the United States and in world coal markets. Individual productivity has climbed steadily from nearly 9 t