

MINING

Project Fact Sheet



VARIABLE WALL MINING MACHINE WITH DUAL DUCT VENTILATION SYSTEM

BENEFITS

- Requires less energy than similar machines such as entry-driving mining machines
- Improves safety by isolating methane and dust from worker ventilation with a dual duct system
- Reduces danger of mine collapse by using a moving roof support system
- Features a highly automated system: just one worker is needed to operate the cutting, conveying, and support systems that are combined in the machine
- Can be used in areas with less structural strength; does not leave pillars
- Mines all the coal; pillars account for up to one-fourth of the available coal and are usually left unmined.
- Could displace up to 1.5 million barrels of oil annually for each machine in use because of the additional coal mined
- Costs less to operate and more productive than current machines

APPLICATIONS

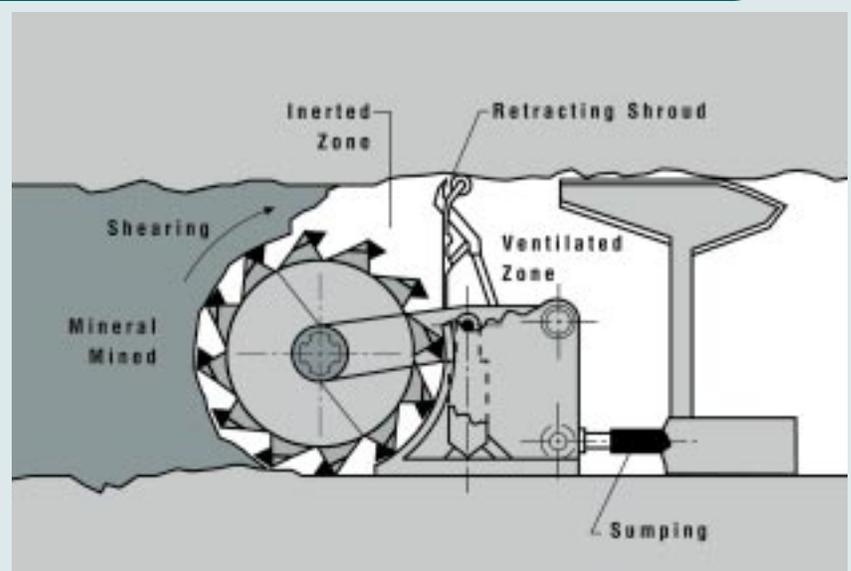
The Variable Wall Mining Machine is suitable for use in coal mining and other underground soft substance mining and excavation applications.

MINING AND TRANSPORTING COAL IS ACHIEVED MORE EFFICIENTLY USING THE VARIABLE-WALL MINING MACHINE

Current methods of longwall mining are improved by the longwall version of the Variable Wall Mining Machine (VWMM) that uses cutting heads advancing (sumping) and radial arc shearing (moving vertically) in a sequential sweep across the coal face to cut and transport the most coal with the least effort.

The machine's cutting assembly is attached to the normal longwall roof support system. Since the system supports the roof of the mine in the immediate vicinity of the cutting assembly, the roof behind the roof support system is allowed to cave, thus establishing its own ground support. Pillars of coal or other resources would otherwise be left to support the roof. These pillars might contain 25% to 50% of the available coal of the mine.

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This illustration of the Variable Wall Mining Machine shows the variable cutting heads equipped with helical vanes to move the cut coal through the center of the machine toward stage loaders.



Project Description

Goal: The goals of this project are to implement the dust and methane handling and exhaust system with a dual duct isolation feature, improve the roof support system, design an automatic control system, develop mining technique and mine design criteria to be used in testing and demonstration, and develop a full-scale machine for demonstration of this technology.

The VWMM is a horizontally oriented side cutting auger. Several auger sections are joined together with universal joints. The augers are moved in a wavelike motion into the coal face. Since the auger flights have a spiral structure, they convey the cut coal away and towards stage loaders. The augers can move both vertically in a radial arc shearing motion and horizontally in a sumping motion, driven by hydraulic cylinder controls that react against a supporting system. A shroud separates the cutting assembly from the rest of the equipment for safety.

Kelastic Mine Beam Co. is developing this new technology with the help of a grant funded by the Inventions and Innovation Program through the Department of Energy's Office of Industrial Technologies.

Progress and Milestones

- Operation of the VWMM was demonstrated to mine safety and health officials and the industry through a television display film of the computer simulation.
- A computer simulation was developed to illustrate the benefits of the dual duct isolation feature.
- Quarter-scale and half-scale versions of the machine have been designed and tested in both laboratory and underground environments.
- Patents have been obtained.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and conduct early development. Ideas that have significant energy savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

PROJECT PARTNERS

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INDUSTRY OF THE FUTURE—MINING

In mid-1998, the National Mining Association reached an agreement with the U.S. Department of Energy's Industries of the Future Program to join in creating research and development partnerships to develop and deploy new technologies that will improve environmental performance and enable the industry to meet increased global competition. The mining industry supplies the minerals and coal essential to the infrastructure of virtually the entire U.S. economy: glass, ceramics, metals, and cement for buildings, bridges, roads, and equipment, and coal or uranium to generate more than 70% of the nation's electricity.

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