

PROJECT FACTS

UNIVERSITY OF KENTUCKY CENTER FOR APPLIED ENERGY RESEARCH

PARTICIPANTS

University of Kentucky
CAER,
Consol energy, Peabody
Energy, and Horizon
Natural Resources

SPONSORS

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COST SHARING

DOE Cost \$197,617
Industry Cost \$ 30,250
UK Cost \$ 40,718

CONTACT

B.K. Parekh
Center for Applied Energy
Research
2540 Research Park Dr.
Lexington, KY- 40514
859-257-0239
Parekh@caer.uky.edu



POWER GENERATION & UTILITY FUELS

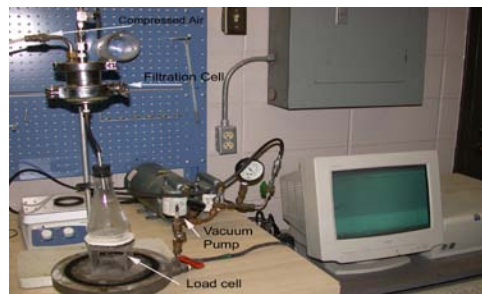
DEVELOPMENT OF AN ADVANCED FINE COAL SUSPENSION DEWATERING PROCESS

Advanced fine coal cleaning technologies such as column flotation produces a slurry containing 25% fine coal (~35 microns). Vacuum drying can reduce the water content to only 25-30%. A second thermal drying stage is needed to extract water in capillaries within the filter cake to make a usable product containing less than 20% moisture. This drying stage is energy intensive. Dewatering of fine coal slurry constitutes a significant portion of the total cost of cleaning fine coal. When fine coal cannot be successfully dewatered, it is often discarded, representing a substantial loss of energy.

Both vacuum and pressure treatment for dewatering fine coal have been used previously in industry. However, the two processes have not yet been successfully combined. Current research at the University of Kentucky indicates that a two-stage process combining both vacuum and high pressure treatment can produce usable fine coal with less than 20% moisture.

Researchers have found that filter cakes formed under vacuum have a porous structure, and that when high pressure is applied, up to half the contained water is released from capillaries within the cake. They have also demonstrated that the process is even more efficient when the cake is broken up mechanically before being pressure treated.

A two-stage vacuum-pressure treatment process offers a promising pathway for producing fine coal containing less than 20% moisture. This process will increase recovery of fine coal, thus saving the energy that would be lost if fines were discarded. Also a major energy and environmental savings comes from the elimination of coal drying, which is energy intensive and contributes fine particles to air pollution resulting in a safety hazard. Lower moisture content of fine coal will also lower the transportation cost per ton by moving more coal, and less water, from mines to power plants.



A laboratory-scale hybrid
pressure - vacuum filtration
set up