

PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Gasification
Technologies

06/2006



CONTINUOUS PRESSURE INJECTION OF SOLID FUELS INTO ADVANCED COMBUSTION SYSTEM PRESSURES

Description

Operators and designers of high-pressure combustion systems universally agree that one of the major problems inhibiting the success of this technology relates to solid materials handling at high pressures. Continuing problems feeding coal into high-pressure gas environments and the well-recognized complexity of existing handling systems has limited acceptance of advanced combustion and gasification technology. Limitations inherent in the batch process character of existing lock hopper and piston pump paste systems prevent controlled, continuous level delivery of the coal, imposing gas losses, high maintenance costs and substantial risks of downtime. This project is aimed at developing the Stamet Posimetric® High Pressure Solids Feeder to provide the simple, accurate and reliable feed system needed to maintain the lead of the U.S. in advanced combustion system design and supply. The Posimetric® feeder has only one moving part, a rotating spool which rotates within a stationary housing. Material entering the feeder becomes locked between the disks and is carried round as the spool rotates until it reaches the outlet port. This principle of lockup minimizes relative motion so the pump experiences very little wear. At the outlet a moving solids seal is continuously created, used as a seal and then dismantled as it is displaced by fresh material as the feeder operates into pressure. The solids pass through the feeder in a continuous unbroken stream, at a rate directly proportional to the speed of rotation.

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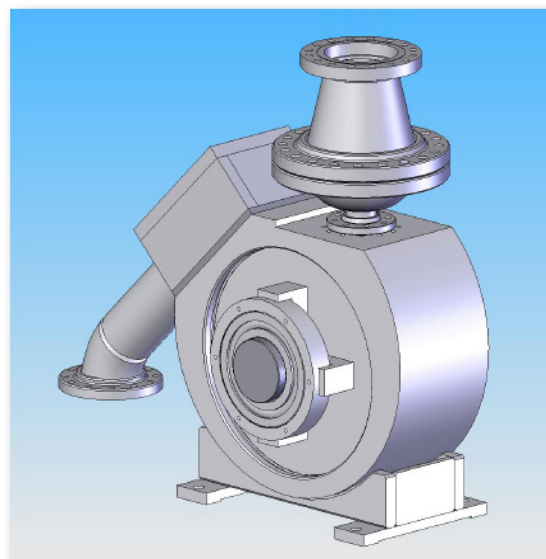
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Commercial Feeder Layout



Primary Project Goal

The overall objective of this project is the development of a mechanical rotary-disk feeder for continuously feeding dry granular coal into high-pressure environments. This type of feeder will enhance the commercial viability of high-pressure coal gasifiers and fluidized bed combustors. The current phase of the project is exploring feeding into environments at pressures of up to 1000 psi.

PARTNERS

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Marketing Technology Services

CQ Inc.

CUSTOMER SERVICE

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WEBSITE

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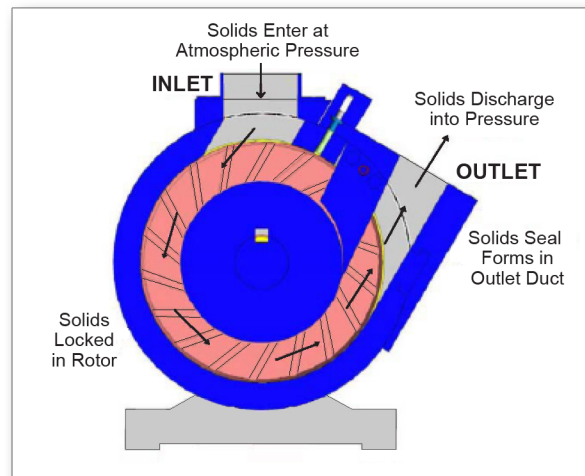
Accomplishments

- Short-term testing at the intermediate pressures of 300 and 500 psi, at feed rates of approximately 150 pounds per hour, have been accomplished. Long term testing at these pressures commenced February 2006.
- Stamet has studied the results of the test program and in conjunction with industry gasification operators developed the expected configuration for a commercial feeder.

Benefits

Major benefits of these feeders will include:

- Significant capital cost reduction with preliminary cost estimates indicating savings in the order of \$100/kW.
- Significant operation cost reduction, with the virtual elimination of make-up gas for lock hopper operation, and reduced energy cost to raise coal into plant storage bins.
- Greatly simplified control systems, combined with the ease of maintenance of a machine with one moving part, should provide for improved reliability and availability of the system.
- Stabilized operation of the combustor/gasifier from controlled feed rates and accurate turn down offering optimized performance.



Layout of Stamet Posimetric® Pressure Feeder