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DRY SOLIDS PUMP & FEEDING SYSTEMS

GTI is a leading research, development, and training organization addressing global energy and environmental challenges. We're applying energy and aerospace experience to lower energy costs and provide cleaner sources of fuel and power.

DRY SOLIDS PUMP

Revolutionary feed system that dramatically reduces plant costs and footprint

GTI is developing a high-pressure solids feeder for use in gasification, steelmaking, and other injection into pressure applications. Primarily funded by the U.S. Department of Energy (DOE) with support from Exxon Mobil and Aerojet Rocketdyne, the Dry Solids Pump (DSP) feeder can inject particulate solids such as coal, biomass and coal-biomass blends into pressures up to 1,000 pounds per square inch (PSI). The feeder has the ability to inject a wide range of particle size distributions as well as multiple particle sizes for a given injection process.

The DSP technology has a feed rate capacity of 25 to 35 tons per hour, which is equivalent to 400 to 600 tons per day. The feeding principal has an accuracy of 1% or greater variability by mass; an accuracy that offers significant improvements in stability and control compared to conventional lockhopper feed systems. The technology also does not require gas for injection, thereby eliminating the need for compressed gas for charging the feed system.

As part of the development process, a sub-scale DSP feeder was built and tested that has proven capable of feeding pulverized coal into pressures exceeding 150 PSI. The sub-scale feeder will also be used to prove the capability of delivering a wide variety of fuel materials including Powder River Basin sub-bituminous coals, lignites and biomass-blended materials into pressure.

As part of the DOE funded program, a techno-economic analysis has been performed with assistance from major gasifier manufacturers and operators. This study has been undertaken by a world-renowned gasification specialist and has shown that a dry solids feeder offers significant economic benefits to integrated gasification combined cycle systems (IGCC) and coal-to-liquids process applications.

The DSP system has been proven to feed into gas pressure levels required for blast furnace applications. In addition, GTI has proven technology, at commercial-scale, that allows coal flow at high-pressure to be split for accurate delivery into

multiple points. The splitter system uses a GTI proprietary ultra-dense pneumatic conveying system that has been developed to minimize gas requirements for transport.

STATUS: GTI now offers commercial-scale ultra-dense transport and splitting technology for coal applications. The DSP is anticipated to be available for large-capacity commercial use in 2018. At smaller scales, DSP feeders can be developed and supplied immediately.

KEY FEATURES

- Highly accurate feed of particulate solids into gas pressures up to 1,000 PSI
- Ultra-dense transport system with low gas requirements for reliable transport over long distances
- Highly accurate splitter system for multiple point injection of bulk solids

APPLICATIONS

- Coal-to-liquid fuels and chemical plants
- Coal injection for steel blast furnace applications
- Particulate solids injection for chemicals, pharmaceuticals, concrete and other manufacturing applications
- Electric power generation

BENEFITS

- Highly efficient compared to alternative feed systems
- Stable and close control of downstream systems
- No gas requirements for direct injection into pressure
- Reliable and stable injection

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