Nonconfidential Summary Disclosure

UM 3560: Particle Feeding Device

THE TECHNOLOGY

Researchers at the University of Mississippi have designed and fabricated a device that feeds particles at a regulated, steady rate. The device is scalable to accommodate different ranges of size and feed rate for different particle types and has been verified by testing pulverized coal particles. The device is gravity driven, so it requires no aspirating gas. Further the device has no moving parts at its periphery, and is much less susceptible to flow disturbance in the downstream and air leakage into the injection port. The feeder can be operated at near continuous or batch injection modes.

Laboratory experiments and instruments often require devices that feed particles at low and steady rates. Traditional devices utilize an aspirating gas to maintain a low and steady feed rate. However, use of an aspirating gas often causes a pressure gradient through the injection nozzle. This pressure gradient can disturb the flow pattern and can cause air leakage into the feeder, which spoils data integrity. To overcome these drawbacks, the UM 3560 technology uses gravity to feed particles a steady rate, therefore eliminating any potential issues caused by an aspirating gas.

The UM 3560 technology has been adopted in combustion experiments where dried pulverized coal particles of about 100 μm are fed over a wide range of feed rates. It is expected that the device is capable of feeding particles of different sizes and at either batch or near continuous mode.

The device can also be easily modified for injecting liquids or particles that have been suspended in liquids.

COMPETITIVE ADVANTAGE

Traditional particle feeders utilizing an aspirating gas can suffer from lack of data integrity casued from flow disturbances in the downstream and air leakage into the injection port.

The UM 3560 technology is desirable for instruments and laboratories where particles have to be fed at steady rates with minimum flow disturbances such as spray coating for particle encapsulation. The device also has development potential in processing nano-particles, such as nanocatalysts, where particles in a volatile liquid surfactant are sprayed onto solid surfaces.

DEVELOPMENT POTENTIAL

The technology has been successfully implemented at the industrial scale and we are seeking additional non-exclusive licensing partners.

PATENT STATUS

U.S. Patent - 8,393,281

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KEYWORDS

Gravity-driven, Particle Feeder, Solenoid, Digital Timer

PUBLICATIONS

Chen, W.Y., G.C. Gowan, G. Shi, and S. Wan, "A Gravity-Driven Low-Rate Particle Feeder," Review of Scientific Instruments, 79, 083904-1 to 083904-5 (2008).

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