



TECH TO BUSINESS

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A High Efficiency Simple Structure Uniflow Cyclone with Tangential Inlet

TECH ID #: 765.1

Background

Researchers at the University of Calgary, in partnership with industry, have developed, tested and implemented a heated, uniflow cyclone designed to more efficiently remove particulate matter from emissions or collect particulate material from a gas carrier.

Cyclonic separation is a method of removing particulates from air (or gas) using centrifugal forces. Rotational effects are used to separate mixtures of solids and gases. The performance (efficiency and energy cost) of cyclone separators is dependent upon the diameter of gas-borne particles and the pressure drop between the inlet and outlet of the cyclone.

This improved uniflow cyclone was designed and optimized for capacities of 600, 3000 and 10000 cubic meters per hour. It can operate at 90 – 95% efficiency, which is 10% more efficient than current models being developed and extract particulate less than 10 micrometers using standardized ISO samples. This design can be used in a horizontal, vertical, or inclined orientation and the new features make it simpler to build.

Areas of Application

This technology would be useful for any plant with gas emissions to capture solid matter particles.

- Agriculture
- gas power stations
- pharmaceutical
- air intake for internal combustion engines
- incineration
- polymer
- cement
- indoor air recirculation
- power plant
- coal
- indoor animal care (chicken house, zoo, cattle building)



- product collection
- compressors
- industries using cyclones include
 - saw mills
 - dairy
 - mineral
 - street sweeping
 - engine emissions
 - oil refinery
 - vacuum cleaner
 - material processing

Competitive Advantages

This cyclone design has several advantages that make it a good opportunity over current technology namely:

- Improved outlet design traps particles more efficiently reducing reentrainment
- Optimized geometry and airflow capacity at 600, 3000 and 10,000 m³/hr or higher
- Simplified air intake with quicker particle separation
- Incorporation of a new heating system design for improved product recovery
- Operates at 90 – 95% efficiency
- Extracts particulate less than 10 micrometers using standardized ISO samples
- Can be used in a horizontal, vertical or inclined orientation
- New features make it simpler to build.

Intellectual Property Status

- [US 8,034,143](#) – issued Oct 11, 2011

Publications

[PCT WO2009114927](#)

[Z. Tan, Y. Zhang, and X. Wang, “Mechanism Study of Particle Separation in an Aerodynamic Air Cleaner”, Transactions of the ASAE, 2005 Vol. 48\(4\), pp. 1553-1560.](#)

[Z. Tan, Y. Zhang, and S. Ford, “Rotational Airflow in Round Duct and its Conditioning for Particle Sampling Purpose”, 2003 ASAE Annual Meeting, 2003, Paper number 034120.](#)