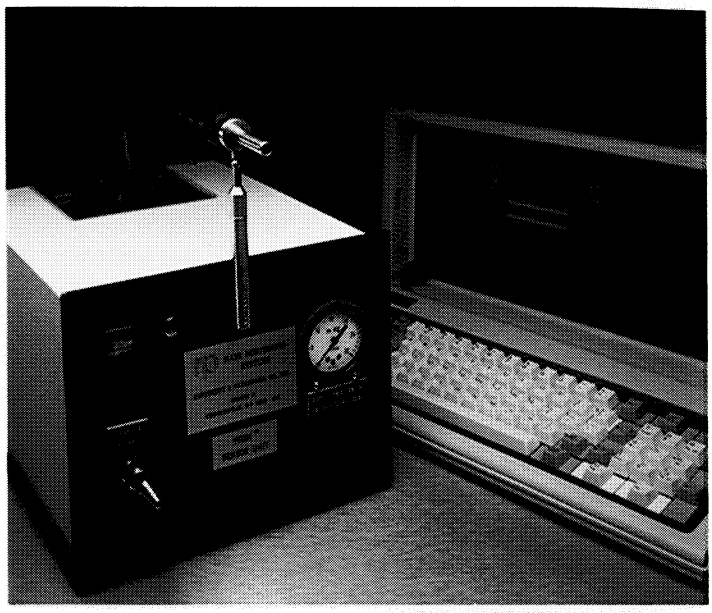
Particle Measurement

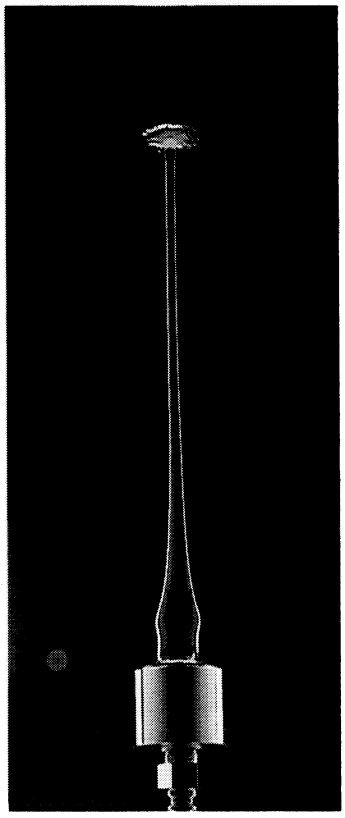
Rupprecht & Patashnick Company, Inc. (R&P), Voorheesville, New York, is a small firm whose origin stems from expertise in particle mass measurement acquired by its founders in aerospace programs. In the mid-1960s, Harvey Patashnick built a foundation for such work when he developed a method for weighing minuscule grains—"space dust"—captured in the upper stratosphere by high altitude balloons. Later, Patashnick received a contract from Martin Marietta Corporation, a NASA contractor on the Skylab orbiting laboratory project; his job was to measure the mass of ice crystals that were forming outside of Skylab and study the behavior of ice under space conditions. His contract monitor on the project was German-born scientist Dr. Georg Rupprecht. That marked the start of a collaboration in which Rupprecht and Patashnick worked together on a number of projects, including several NASA contracts, involving instrumentation for study of condensed gases under space-simulated conditions.

In the late 1970s, the two researchers formed a partnership to explore the possibilities of a supersensitive commercial instrument for direct mass measurement. The result, introduced in 1986, is the TEOM® Series 1100 Particulate Mass Monitor (right), a device that provides measurements of exceptional sensitivity and accuracy. It has applications in such areas as evaluation of diesel exhaust, dust concentration, smoke measurement and other situations wherein particulate matter in gas streams must be detected and weighed.

TEOM stands for Tapered Element Oscillating Microbalance, the most important component of which is a tapered hollow tube mounted in a protective enclosure (lower right). To measure particles in gas streams, the tapered element is set into oscillation and a microprocessor continually monitors the frequency of oscillation. A vacuum pump at the base of the tube draws the gas through a filter atop the tube. When particles become trapped in the filter, the increased mass changes the frequency of the tube's oscillation, and that frequency change enables the microprocessor to compute the mass of the particles. As additional particles collect on the filter, the TEOM measures the incremental change. The TEOM, says R&P, offers direct mass measurements of particulates that were once impossible.



R&P is applying the TEOM technology to other applications, for example, designing instrumentation for determining the coal-burning efficiency of power plants operated by New York State electric utilities. Additionally, the company is working under NASA contract on an instrument capable of weighing particles as light as a trillionth of a gram; it has potential use in comet-rendezvous spacecraft for measuring individual dust particles in a comet's tail. ▲



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