

POSTER ABSTRACT

Magnetic Sector Mass Spectrometers for Use in Harsh Environment

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One of the most important practical factors in operating mass spectrometers in a harsh environment is long-term stability, which is greatly effected by environmental parameters such as temperature, pressure, shock and vibration. Each of these has a potential adverse impact on mass spectrometer analytical performance, and thus each must be considered in mass spectrometer design and engineering. Of the various mass spectrometer technologies, the magnetic sector instrument has been deployed for many harsh environment applications due to its simplicity, stability and suitability to rugged environments.

Hamilton Sundstrand has developed magnetic sector mass spectrometers in a broad spectrum of applications ranging from deep sea to space. The mass spectrometer in nuclear submarines continuously monitors the cabin atmosphere and only requires maintenance action every two to three years to replace filaments and pump components. Magnetic sector instruments have been critical equipment to a number of space missions including Skylab, Space Shuttle, Viking Mars Lander and International Space Station, where opportunity for service or repair are limited or non-existent. Currently, we are developing a sensor-class, small magnetic mass spectrometer for the Crew Exploration Vehicle. All these applications require continuous operation with high accuracy and stability. This paper will examine the attributes and design considerations of the magnetic sector mass spectrometer for deployment in submarine and space applications.