

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
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AN OVERVIEW OF THE MICROGRAVITY SCIENCE GLOVEBOX (MSG) FACILITY AND THE
RESEARCH PERFORMED IN THE MSG ON THE INTERNATIONAL SPACE STATION (ISS)

Abstract

The Microgravity Science Glovebox (MSG) is a double rack facility aboard the International Space Station (ISS) designed for investigation handling. The MSG has been operating on the ISS since July 2002 and is currently located in the Columbus Laboratory Module. The unique design of the facility allows it to accommodate science and technology investigations in a “workbench” type environment. The facility has an enclosed working volume that is held at a negative pressure with respect to the crew living area. This allows the facility to provide two levels of containment for small parts, particulates, fluids, and gases. This containment approach protects the crew from possible hazardous operations that take place inside the MSG work volume. Research investigations operating inside the MSG are provided a large 255 liter enclosed work space, 1000 watts of dc power via a versatile supply interface (120, 28, + 12, and 5 Vdc), 1000 watts of cooling capability, video and data recording and real time downlink, ground commanding capabilities, access to ISS Vacuum Exhaust and Vacuum Resource Systems, and gaseous nitrogen supply. These capabilities make the MSG one of the most utilized facilities on ISS. In fact, the MSG has been used for over 5000 hours of scientific payload operations. MSG investigations involve research in cryogenic fluid management, fluid physics, spacecraft fire safety, materials science, combustion, plant growth, and life support technologies. MSG is an ideal platform for science investigations and research required to advance the technology readiness levels (TRLs) applicable to the Constellation Program. This paper will provide an overview of the MSG facility, a synopsis of the research that has already been accomplished in the MSG, an overview of future investigations currently planned for operation in the MSG, and potential applications of MSG investigations that can provide useful data to the Constellation Program. In addition, this paper will address the role of the MSG facility in the ISS National Lab.