



Manufacturing & Prototyping

Glovebox for GeoLab Subsystem in HDU1-PEM

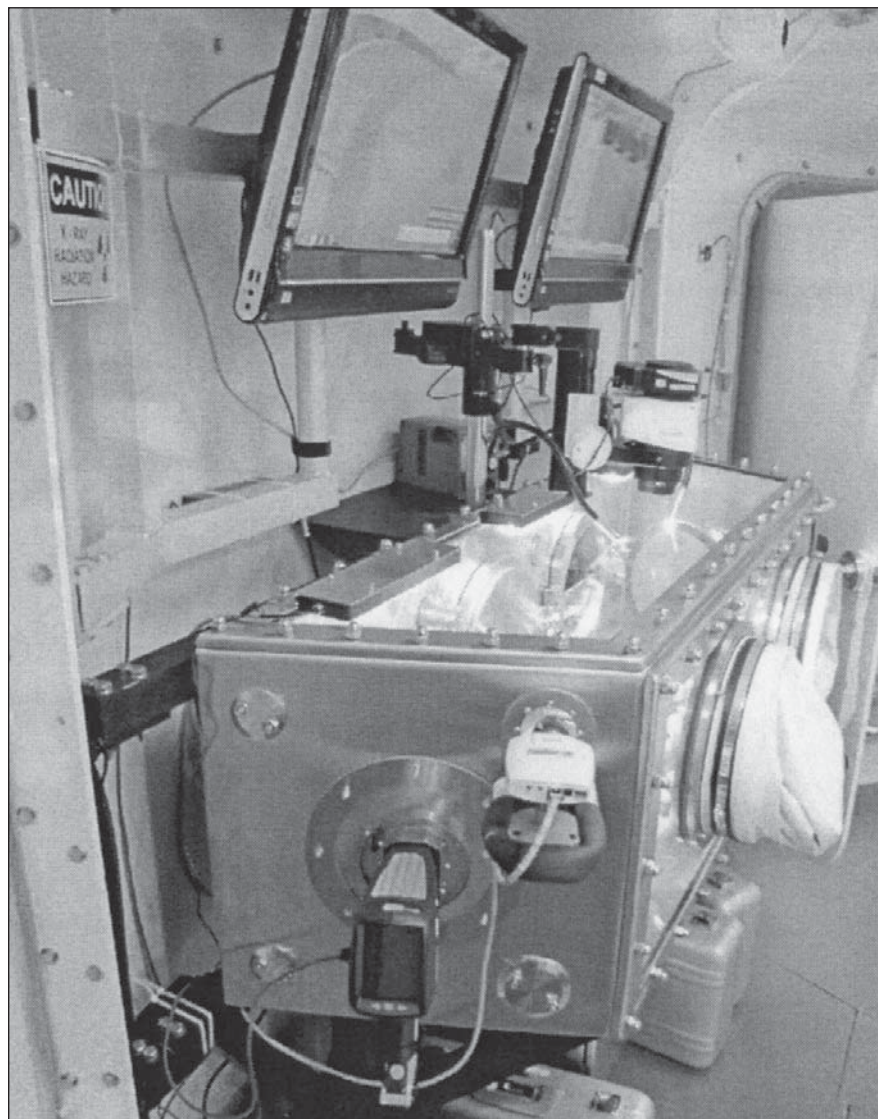
The semiconductor, biotechnology, and nuclear industries may have potential use for these gloveboxes.

Lyndon B. Johnson Space Center, Houston, Texas

The GeoLab glovebox was designed to enable the preliminary examination, by astronauts, of geological samples collected from the surface of another planetary body. The collected information would then aid scientists in making decisions about sample curation and prioritization for return to Earth for study. This innovation was designed around a positive-pressure-enriched nitrogen environment glovebox to reduce sample handling contamination. The structure was custom-designed to fit in section H of NASA's Habitat Demonstration Unit 1 Pressurized Excursion Module (HDU1-PEM). In addition, the glovebox was designed to host analytical instruments in a way that prevents sample contamination.

The trapezoidal-shaped design follows the HDU1-PEM structural rib design, and incorporates 304 stainless steel, Viton seals, and clear polycarbonate materials that are known to possess low off-gassing and particle shedding properties. Two 10-in. (≈ 25 -cm) glove ports were installed in the front polycarbonate window with long-sleeved, 32-in. (≈ 81 -cm) Hypalon gloves. The ports allow for full movement inside the glovebox, and can accommodate varying heights of crewmembers. There are clear polycarbonate top and front viewing windows, as well as three 10-in. (≈ 25 -cm) diameter, vacuum-rated, pass-through antechambers to transfer samples from the outside EVA porch area directly into the glovebox. A total of 18 glovebox ports, with varying diameters, were incorporated into the design to accommodate the need for reconfiguration of analytical instrumentation and sensors during different test scenarios. The gloveport design takes into account natural human eye/hand coordination. State-of-the-art environmental monitoring sensors, that can be remotely viewed by computers on the HDU1-PEM avionics networks, are included.

The glovebox design allows for containing and manipulating geological samples that are collected during traverses. The top of the glovebox was designed to be the main viewing window,



The GeoLab Glovebox installed in section H of the HDU1-PEM.

and is constructed with low-profile Waldmann Flat LED lighting for enhanced sample viewing. The high-visibility polycarbonate also allows cameras and microscopes to clearly view samples and inside glovebox work while remaining outside of the clean main chamber. The three 10-in. (≈ 25 -cm) diameter pass-through antechambers function as small, redundant airlocks to transfer samples from outside the habitat directly

into the glovebox to reduce the risk of sample cross-contamination inside the habitat environment. Each antechamber is also equipped with a 17-in. (≈ 43 -cm) long sliding stainless steel tray for sample transfers.

This work was done by Cynthia Evans of Johnson Space Center, and Michael J. Calaway and Mary Bell of Jacobs Technology. Further information is contained in a TSP (see page 1). MSC-25080-1