



## Mechanical/Aerospace Sustainability Project

### Portable Life Support System

#### Mission Statement

To develop a portable life support system for the purpose of supporting human life during field and laboratory testing for the University of North Dakota's next generation space suit.

#### Synopsis

The University of North Dakota is now working on the second generation planetary space suit. The university invited LSSL students to help design a Portable Life Support System (PLSS) to be used in laboratory and field testing. The PLSS will replace NASA's current backpack type design.

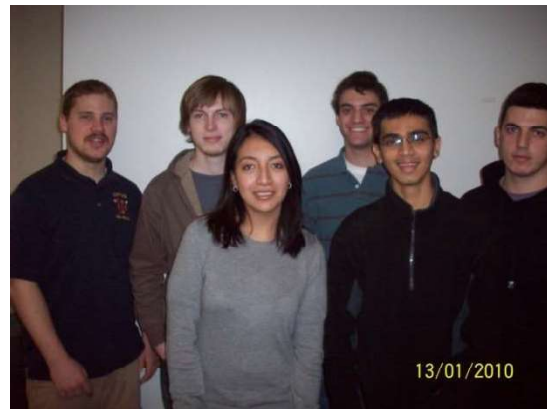
A Biomarine BioPak 240, manufactured in Exton, PA, was retrofitted for integration to the PLSS. The BioPak 240 is on demand closed circuit rebreather apparatus currently used in mine rescue, firefighting, and hazmat cleanups. Significant modifications were required to meet PLSS specifications. They were:

- Circulate oxygen-nitrogen mixture
- Extend duration to 4 hours
- Remove CO<sub>2</sub>, humidity and other trace contaminants
- Regulate and monitor pressure
- Monitor suit conditions such as temperature, O<sub>2</sub> and CO<sub>2</sub> levels through sensors.

The upgraded design uses oxygen-nitrogen mixture, enhanced CO<sub>2</sub> scrubbers and ice canisters.

Virtual CAD models of all the PLSS components were created in Autodesk Inventor software. The model included the mass flow controller, a pressure reducing regulator, a pressure retaining ring, gas cylinder mounts, battery packs, power supplies, and ventilation fans.

Fabrication and assembly of the PLSS and a scrubber test chamber will commence during the 2010-2011 academic year.



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