Oxygen PSA Data Acquisition Unit

Overview
Solutionwerks performs maintenance on pressure swing absorption (PSA) oxygen generation systems. These PSAs must be calibrated periodically to ensure that pressure in the system is within the design operating range. Older PSAs only have analog gauges which make taking accurate pressure readings for calibration difficult.

Objectives
The objective of the project was to design and construct a unit that was capable of acquiring and logging pressure data from three pressure vessels in a PSA system. This unit will take analog pressure data and convert this to digital data that can then be graphed and analyzed in computer software.

Approach
- The major customer needs were gathered during a site visit to Solutionwerks and a wastewater treatment plant that uses a similar system to PSA. The major needs were that the unit is portable, durable, and waterproof, and that it is able to export accurate pressure data to Microsoft Excel.
- The team researched patents and existing systems and found no products that performed the function that Solutionwerks needed.
- The team came up with several concepts and chose a unit that was packed in a small, waterproof Pelican case that housed three pressure transducers, a battery, and a data logger.
- In order to analyze the layout of the unit, the team created a solid model in SolidWorks.
- The team researched and purchased different components, including three 0.25% accuracy pressure transducers, and an 8 channel National Instruments data logger.
- Once all materials were purchased, a fully functional prototype was constructed.
- The prototype was tested and calibrated using a hand pump and precision digital pressure gauge.
- The team was able to generate calibration curves for each transducer and simulate cyclic swings in pressure similar to a PSA system.

Outcomes
- Solutionwerks will no longer have to record pressure data using a stopwatch and analog pressure gauges
- Solutionwerks will be able to acquire digital data that can be graphed in Microsoft Excel
- The unit is:
  - Waterproof
  - Durable
  - Portable
  - Functional