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AIR TUBE PRESSURE SENSOR

HP INC

Air tube pressure sensor

Abstract

The invention is a device to allow a miniature commodity barometric pressure sensor to be used to remotely measure sealed chambers, including harsh environments which the sensor should not be directly exposed to. This device is implemented in a modular miniature sensor board in an 3D printer, where it allows the operation of many fans and blowers to be monitored and controlled for optimal cooling and pneumatic powder transport conditions.

Description

This idea helps solving the inability to find a cost-optimized absolute pressure sensor that is robust and accurate for particularly harsh operating conditions.

There are two traditional approaches to sense pressure in a sealed chamber. The first is an expressly manufactured device with an over-molded body, allowing the device to be remotely located from the pressure being sensed. The second approach is placing the sensor entirely within the chamber to be measured.

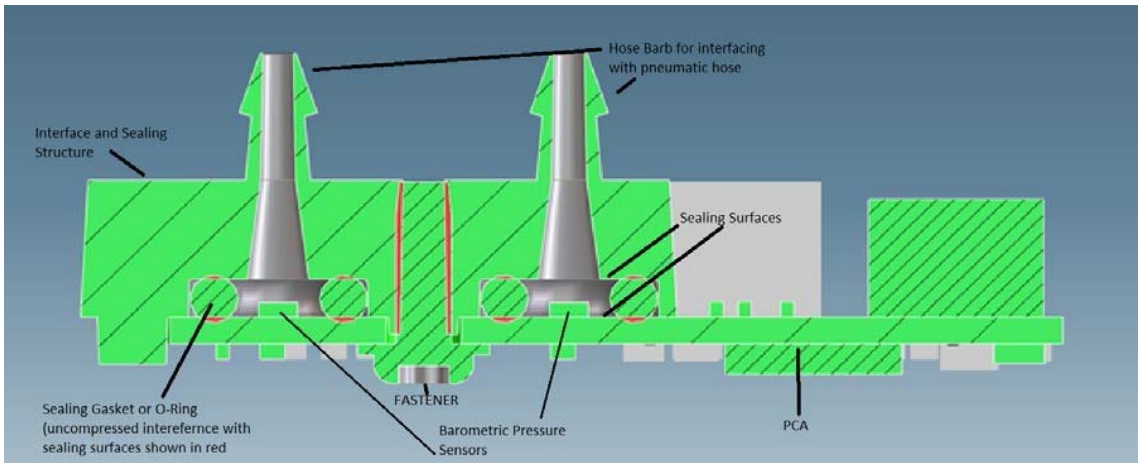

Figure 1

The invention is a mechanical interface for sealing and interfacing with a miniature air pressure sensor, as seen in Figure 1. The solution is composed of an interface and sealing structure, a sealing gasket, one or more fasteners, and a PCA with surface-mount barometric pressure sensor(s). Figure 1 shows an example where two sensors are sealed using a single sealing structure. A single fastener retains the interface structure and compresses the gaskets, with one gasket per sensor, however, the system could be implemented for any number of sensors, fasteners, and gaskets. This example provides pressure interfacing by means of a barbed hose connector but a threaded bore, push-fit connection, or Luer lock style connection could also be provided. Figure 2 shows the same example with hoses attached to the hose barbs.

This invention allows for more compact and lower-cost sensing of pressures in an airflow system than prior solutions. A specifically manufactured device with an over-molded body increases component cost significantly and limits sensor selection; a sensor within the area being measured is impractical when measuring airflow through constricted spaces such as tubes and hoses, in harsh environments such as those involving high particulate counts, high humidity, and/or high temperatures, or when electrical interference is a significant consideration. With this solution, a wider number of sensors and components are viable options when designing the system when compared to prior solutions, including more variety in cost, accuracy, size, and availability. This method also allows large numbers of SMT sensors to be deployed in a single board and provided with pressure interface sealing by small number of low-cost components, allowing for greater cost and usage optimization. The invention reduces design constraints and improves reliability when compared to sensors exposed to the sensed environment, and is significantly more cost effective when compared to over-molded sensors.

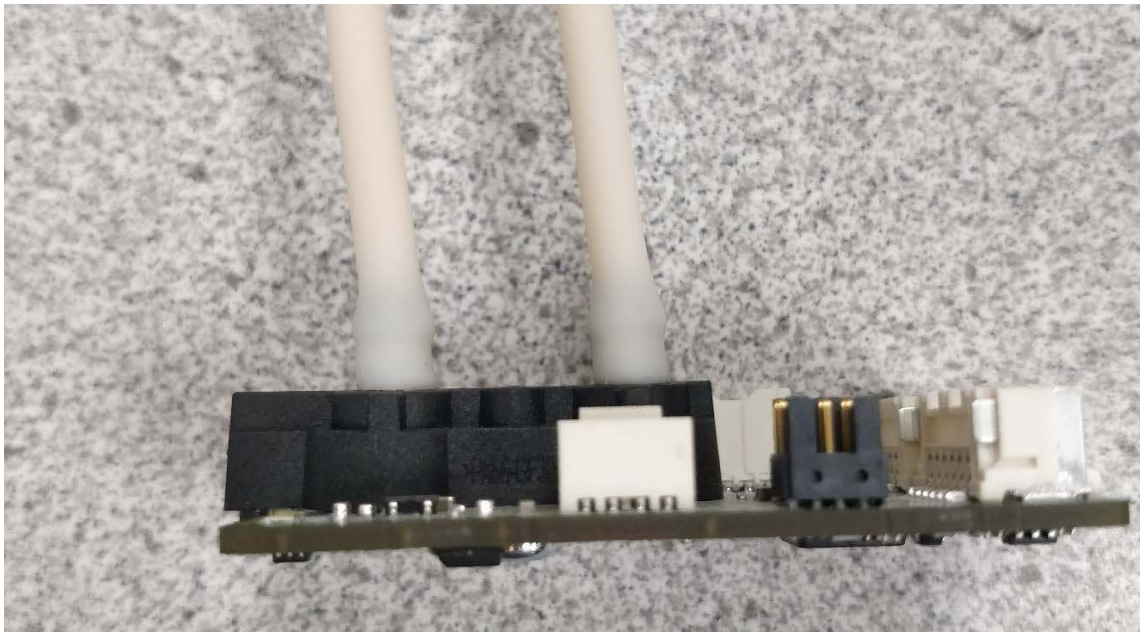

Figure 2

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