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## **Gas Pressure Meter (Engineering World Health)**

### **Problem Statement**

Our project goal is to develop a device that can measure the pressure of a gas (either oxygen, medical air or CO<sub>2</sub>) in medically useful ranges. This device must be mass producible within the specified cost range, and will be used in third-world countries.

### **Engineering World Health Requirements**

- Final cost of <\$5 in quantities of 5
- Size: for continuous readout – 4x4x1 or for single readout – 1x4x1
- Measurement of medically useful ranges (post-regulation, such as in ventilators, anesthesia machines, etc.) to within 10% of the measured value
- Measurements of CO<sub>2</sub>, oxygen, and medical air
- Digital readout
- Various connections (such as hose barb, locking ring, quick release, etc.)

### **Design Requirements**

#### **1. Physical and Operational Characteristics**

- a. *Performance requirements:* This device must be able to measure gas pressures as they are about to enter the patient. The range in pressures should be medically useful. These gasses will include Oxygen, Carbon Dioxide, as well as other types of medical gasses.
  
- b. *Safety:* The device should be made out of non-toxic material. Any electronics used should be properly insulated.
  
- c. *Accuracy and Reliability:* Minimum performance should be able to measure within 10% of actual value. Superior performance should allow for measurements within 1% of actual values.
  
- d. *Life in Service:* The device should be autoclavable. It is not disposable.
  
- e. *Shelf Life:* It should last through several uses.

f. *Operating Environment*: The device will be used in the hospitals of third-world countries. The hospital technology may be out-dated so the device must function in a variety of environments and support the greatest range of connection flexibility possible. The device should not depend on other, potentially unavailable tools.

g. *Ergonomics*: Function and reliability are most important. Look and feel of this device is a secondary consideration.

h. *Size*: A continuous readout must stay within 4x4x1in, while a single readout device must stay within 1x4x1in. These dimensions may apply to a device in parts or a fully constructed one.

i. *Weight*: Weight was not specified, but given the dimensions the device will stay under 12oz.

j. *Materials*: Materials should be non-corrosive, non-toxic, inexpensive and sturdy.

k. *Aesthetics, Appearance, and Finish*: The readout must be digital.

## **2. Production Characteristics**

a. *Quantity*: Price specifications were provided for quantities between 5 and 500.

b. *Target Product Cost*: For a quantity of 5 the price should be less than \$5 and for a quantity of 500, it should be less than \$2.