Isaac

Multi-Function Leak Tester

The Problem

Test and Production Engineers are often faced with the task of detecting leaks in products quickly, accurately and inexpensively.

Mechanical pressure measuring devices such as tube and bellows pressure gauges are insensitive, slow, subject to operator errors. Dunk testing (looking for bubbles under liquid) is time consuming, cumbersome and does not quantify any leaks.

On the other hand, overly complicated leak testing equipment is probably too elaborate for the task. Custom designed PLC based test equipment is frequently expensive and difficult to program. Furthermore long-term engineering support becomes more difficult.

The Zaxis Solution

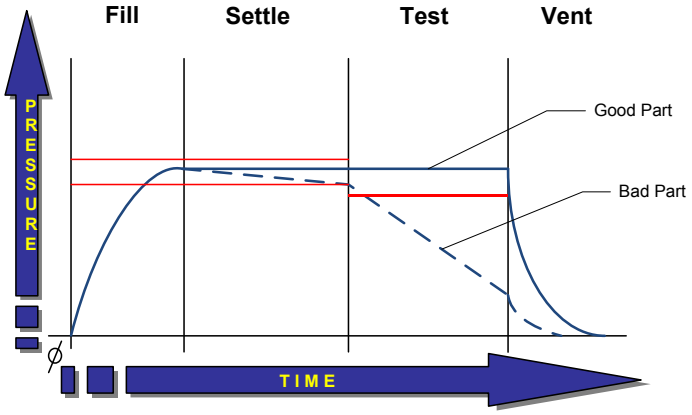
The off the shelf solution of Isaac of leak testers work like a pressure gauge, except the Isaac has the advantage of a high resolution (24bit) digital readout with timers and limit settings. Imagine an analog gauge with a resolution of 1/100,000 psi, and set-points to determine an allowable drop in pressure. If the pressure drops below the reject set point, the product is considered bad. If the pressure remains above the reject level the product is considered good.

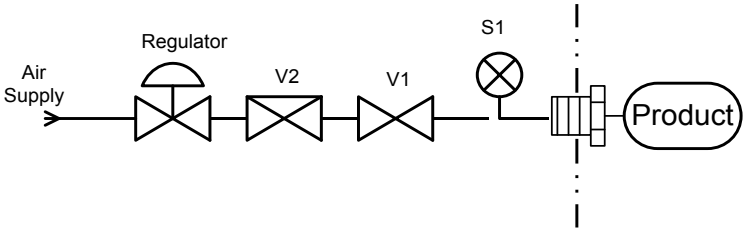
Although the Isaac is more elaborate than this example, it illustrates the concept of pressure drop testing.

How the Isaac Works

The Isaac pressure decay tester works like this:

1. The product is attached to the test port and the test sequence is initiated.
2. The **Fill** step, pressurizes the part with regulated air through [V2] and [V1].
3. The valves are closed and the part is allowed to **Settle**. Trapping air between [V1] and the product.
4. During the **Test** step the decay of pressure is measured by the Isaac's pressure sensor[S1].
5. If a product exceeds the programmed reject value a reject indicator will be given along with the decay value.
6. A part that does not decay past the reject value is a good part.
7. The remaining pressure is **Vented** for safety. [V1] opens to allow the pressure to vent back through [V2].





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Leak Rate Calculation

To calculate leak rate, the total volume of both the products under test and the instrument test circuit must be included in the formula. The leak rate formula below excludes minor variables such as temperature change and part compliance.

$$\text{Leak rate (sccm)} = \Delta p/\Delta t * V/atm$$

atm = Atmospheric pressure (psia)
V = Test volume (cm^3)
Δp = The decay in pressure during test time (psig)
Δt = The amount of decay time (min.)

For example:

Leak rate = .02psi/0.05min * $50cm^3$/14.7psia

Leak rate = 0.4 * 3.401

Leak rate = 1.36 sccm

Applications

Isaac pressure decay testers are used frequently to test parts that were tested using simple analog pressure gauges or tested by looking for bubbles in a dunk tank.

The Isaac can be used to test both small and large volume parts. For small parts the extremely small internal volume will allow for very low test times allowing a high throughput of production. If a large part is to be tested, the pneumatics can be adjusted to maximize the potential of the tester.

Both rigid and flexible parts can be tested, making the Isaac the most flexible platform available.

Features

- High Sensitivity
- Extremely low internal volume (0.8cm^3)
- Small footprint.
- Available in a wide range of test pressures.
- Off the shelf delivery.
- Custom testing capabilities..
- Easily adapted to automation.
- Intuitive user interface.
- Simple calibration procedures.

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