



Under Pressure

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Pressure in Process

Henry Kissinger once said, “A diamond is a chunk of coal made under good pressure.” Maybe if we’d have known that a young age we could have done something with those lumps of coal Santa brought! Pressure is simply a measure of force per unit area, but what does that even mean? Everyone knows what “area” is. Houses are generally described in square footage and the land they sit on is expressed in acres. Both are units of area. Subsequently, everyone knows what force is. It’s simply a matter of how hard something is pushed or pulled. When you combine the two together, you get pressure. The force that you push or pull on an area is pressure. On your drive in to work today, your vehicle probably sat on four wheels. Did you ride on the rims the whole way in or did your tires have enough pressure in them to keep the weight of the car off the rims? A typical pressure for tires is around 30 psi. Most of us know the acronym ‘psi’ stands for pounds per square inch. Does that mean that 30 pounds of force in each tire is keeping 2000 lbs of car off the rims? Of course not! What it means is that every square inch of those tires has 30 pounds of force pushing out at all times. When the car is overloaded, the pressure in the tire becomes greater, which is how a tire can blow out.

We could go even simpler and talk about the constant atmospheric pressure that is exerted on your body as you sit reading this. About 14.7 psi is pushing on your body at all times. This is important because in a vacuum such as space, there is no pressure at all and if we were to float in space without a space suit, our bodies would explode instantly because of the lack of pressure. No wonder modern space suits run about \$15 million!

Measuring Pressure

Measuring pressure can be done with a couple of different kinds of gages.

Depending on the job a simple dial pressure gauge may be okay, or if accuracy is a big factor, then one might use a digital test gauge. Sometimes monitoring pressure is done thru a computer system and in which case a pressure transmitter might be in order. Whatever the job calls for there is one thing for certain...not all pressure gauges are created equally.

Read or Transmit

Pressure gauges are used in all industries. There isn't one industry that uses them more than others. Since that is the case, there has to be a wide variety of ways to measure it. With pressure, accuracy is relative when talking about the different kinds of gages. It's mostly driven by the resolution, which is how many digits you can see or how many counts are between each measuring line. A facility that is running 10,000 psi through their lines doesn't need to see the pressure down to the 0.001 psi, but maybe they need to see to the closest 100 psi. Conversely, a more sensitive measurement might need to see 0.001 psi. It all depends on the requirements of the process measured or monitored. Two ways these are monitored are by someone walking around and reading the gauges, another is to transmit the signal to a computer system where multiple gauges can be monitored in one location.

Dial Pressure Gauge

This is the most common pressure gauge by far. They are mechanical, typically the cheapest made, and also the most inaccurate. However, if they are just references in a process,

they serve their purpose just fine. These have a dial face like a speedometer. They are generally uneconomical to repair if they fail calibration, although some actual have an adjustment on them.

Digital Pressure Gauge

These gauges usually cover a wider range in one gauge than mechanical gauges and typically have better resolution. If you needed to measure 15.05 psi and 100.02 psi on the same line which would normally require two mechanical pressure gauges, a digital pressure gauge can measure both test points with one gauge. They also stabilize quicker than any mechanical gauges. Whereas mechanical gauges are typically disposed of when they fail calibration, digital gauges can usually be recalibrated saving money over the long haul. They can also be turned down in some cases to change the full scale range.

Transmitter/Transducer

Pressure transducers convert a pressure into an electric signal. This electric signal can then be put into a display to be read, or it can be transmitted to a computer system to be monitored by a computer program. This enables the user to set limits in the program which trigger alarms to alert someone when a line becomes over-pressurized or when pressure falls too low. It can also shut down a machine that is being monitored for pressure as well. This can help the monitoring process by catching a problem before the problem becomes a disaster. It should be noted that some digital pressure gauges can be transmitters as well. The creation of this technology has allowed plant and facilities managers the ability to monitor many different processes from one central location, reducing overhead and also allowing them to keep automatic digital records of the data they take.