

## Enhancing performance with pressure sensors

Pressure transducers have become an invaluable tool for the protection and optimisation of industrial equipment, converting fluid pressure into variable electrical signals that can monitor and control a system.

Nevertheless, while existing transducers offer an impressive service, there is an ever-increasing level of accuracy in the output of these components, thanks to the new methods in which sensor elements and electronics packages are constructed.

These new methods have not only added functionality to pressure transducers, they have enabled the components to withstand particularly aggressive process conditions, extremes of temperature, mechanical shock and vibration. The latest pressure sensors from Gems Sensors and Controls combine an extremely sensitive pressure sensing



mechanism with a sophisticated electronics package.

They can respond to changes in pressure of 1msec or less, offer accuracy with almost zero drift over

time and an operating life in excess of 100 million cycles. Their resilience and sophistication are the result of some highly innovative and carefully controlled methods of construction, in particular the advanced strain gauge technologies of sputtered thin film and chemical vapour deposition (CVD).

CVD is highly effective in the manufacture of strain gauge sensors, which detect movement in a pressure diaphragm and convert the information into electrical signals.

Devices manufactured via CVD are typically compact and extremely accurate with excellent hysteresis characteristics.

The sensors are produced on wafers in large batches, using polysilicon deposited on a stainless steel substrate, with the strain gauge patterns being chemically milled.

Sputtered thin film technology has also been integral to the success of the latest fluid pressure transducers. Sputtering is



a process whereby a solid target material is bombarded by energised particles, causing it to release atoms. Sputtered thin film deposition is a method of forming a thin film from the released atoms.

The application of the sputtered thin film process during the manufacture of pressure transducers results in a sensitive, robust diaphragm that is suitable for direct contact with almost all liquids, oils and gases.

Allied to these innovations in the chemical manufacture of pressure sensors have been some equally valuable advances in electronics, which have greatly enhanced the capabilities of transducers. For example, the electronic packages that have been supplied with pressure transducers over recent years have enabled each sensor to be tuned to meet the specific requirements of each customer. These packages incorporate advanced ASIC (application specific integrated circuits) technology, which enhance performance and functionality. They can also be customised; a convenient and effective option that cuts



costs when expensive and complex control technology is not needed.

Indeed, the economic advantage of introducing ASIC has been significant; combined with improvements in volume manufacturing techniques, the introduction of ASIC has, in many instances, reduced the unit cost of transducers by a factor of 10, enabling manufacturers to sell at approximately £30 a sensor that offers a level of performance previously associated with units that sold for £300.

CVD and sputtered thin film technology, combined with ASIC electronics packaging, offer a powerful combination of accuracy and reliability to the increasing number of engineers who choose to investigate the advantages of pressure transduction technology.

The broad range of sensor products now available will enable engineers to apply transducers within ever more challenging environments, as will the modular nature of the components, which increases the number of options available in accommodating transducers. As they continue to develop and improve, pressure sensors will exercise a greater level of data acquisition and system control within the many industries that now employ them and within those that will adopt them in the future.

### The 3300 Series

Gems Sensors and Controls 3300 Series pressure transducers possess a wide range of outputs, electrical connections and pressure ports, with pressure ranges from 15 to 200psi, and are capable of operating over a temperature range of  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ . They also provide a long operating life with excellent resistance to pressure shocks and mechanical vibration, while the high temperature vacuum brazing of the stainless steel components during sensor production offers a strong and corrosion resistant structure with low hysteresis and creep.

