Evolution of the Integrated Valve Began 15 Years Ago

For nearly 100 years — and until fairly recently — gas suppliers through the decades have relied on the use of simple valves to discharge their products from the gas cylinders in which they are supplied and to ensure these gases remain firmly sealed within the cylinder.

Gas is stored in cylinders under high pressures that can go as high as 300 bar. Although this pressure drops as the gas is released from the cylinder, traditional valves do not control or have any effect on the pressure. Since most gas users require gas at pressures only up to about 3 bar, regulators had to be introduced as an additional component of the supply system to adjust the pressure. It had come to be accepted that gas customers needed to buy a pressure regulator in order to be able to use the gas they purchased.

"This mandatory valve/regulator set-up did unfortunately create the opportunity for bad connections that produced leaks and for impurities from the outside air to enter the cylinder and contaminate the gas," says Stephen Harrison, Head of Specialty Gases and Specialty Equipment, Linde Gases Division. "A gas supply system is only as good as its weakest component, and a cumbersome supply system like this inevitably created the risk for something to go wrong, with all the associated cost implications."

The evolution of the integrated valve began about 10 to 15 years ago as gas suppliers acknowledged a need to make this process more efficient and productive. Pressure regulators were designed to be integrated into the valve, making it a simple procedure to discharge the cylinder contents at a usable pressure.

This type of integration presented quite a complex engineering challenge. Apart from having to combine two different operations in a single unit robust enough to withstand the rigours of road transport, the integrated valve had to be sufficiently compact to fit on the top of cylinders of all sizes, right down to a miniature cylinder with a 10 cm diameter top.

A significant challenge was to miniaturize an integrated valve for these small cylinders. Linde Gases' R&D and engineering teams initially designed them to supply the gas coming out of the cylinder at pressures up to 4 bar to suit the most common requirements of our customer base in this arena.

The result, the ECOCYL®, is small, portable and a refillable cylinder. The cylinder features an integrated cylinder valve, pressure regulator and flow control all within the cylinder, which are permanently protected by a specially designed protective cowling. This reduces the risk associated with connecting hoses and makes them safer and easier to handle than cylinders requiring connections and other associated gas handling equipment. The result is an easy, ready for use system. The end user needs only open the cylinder valve and connect it to a system.

With the advent of cylinder miniaturization, a corresponding challenge was to develop a sufficiently compact integrated valve.

However, compact, highly portable cylinders are also needed to calibrate gas detectors or gas sensors, which are often small portable devices affixed to the clothing of operators and technicians who work in hazardous environments and monitor the safety of the ambient air. The latest generation of gas detectors launched onto the market are very simple to use. At the end of each day, the operator only has to put the gas detector into a docking station that not only recharges its battery, but is also pre-programmed to check that the sensors are correctly responding to the gas.

A demand valve regulator version of ECOYCL, the ECOCYL OSQ is a refillable cylinder for portable calibration and testing of highly sensitive environmental monitoring devices. The cylinder employs a negative pressure technology, guaranteeing precision in the calibration gas delivery requirements for ultra-sensitive instruments, which can be susceptible to damage from the positive gas pressure usually applied by other gas cylinders.