

Clinical diagnosis benefits from design collaboration

Precision and reliability are two critical requirements of testing and analysis for clinical diagnosis; a collaborative project has now combined these with efficiency and cost effectiveness by designing a new modular microfluidic solution. Integrating the design expertise of Bürkert Fluid Control Systems with the long-standing experience of Biosystems a prominent manufacturer of analysis equipment has resulted in the design of a new dosing unit that significantly reduces running costs for analysis instrumentation.

The new dosing unit forms one of the cores of the new BA400 analysis device, which is designed to carry out fully automatic analysis of up to 400 tests per hour. The operator prepares the device with the corresponding samples and reagents before starting the analysis process. The design of the new dosing unit has also reduced water and material consumption, which allows the analyser to operate continuously for eight hours without intervention to replace or refill containers.

The work of clinical analysis equipment as used in human medicine is hugely important but the pressure to reduce both capital expenditure and running costs is increasing on a daily basis. The ultimate solution then requires innovation that, at the same time, is accepted as proven technology and so is suitable for operation on a device used in a context, where a pedigree for reliability is essential.

Biosystems is a Spanish manufacturer of clinical diagnostics products that aims to streamline workflow and enhance operational efficiency and improve patient treatment. To that end, the company has developed a new analysis device that is to be used for in-vitro diagnostics (IVD), through collaboration with Bürkert, which has provided significant design and manufacturing expertise for the control and monitoring of the fluids.

The aim of the project was to develop a modular dosing unit that would be suitable not only for use on the new system, but also for existing analysis devices available from Biosystems. This posed a considerable design challenge that would need to integrate the various components such as the injection unit, two or three valves, a pressure sensor and a filter, all of which would be mounted onto a transparent, injection-moulded structure.

The solution required considerable design skill and expertise in fluid control in order to deliver very high dosing precision in an extremely compact space. The engineers at Biosystems decided to take advantage of the Bürkert Systemhaus facilities that offer bespoke design solutions that can be manufactured and assembled in-house.

One of the crucial aspects of the design was the detection and prevention of air bubbles which can substantially corrupt the analysis results. Coupled with the client's requirement for a transparent inspection window, it was essential that the Bürkert designers avoid any rough surfaces, dead zones and sharp edges while creating the new dosing unit.

The engineers developed an injection moulded component that would house the control elements and machined it in such a way that all of the internal passages had a very high quality surface finish. The control valves, based on the Type 0127 solenoid valve and the Type 6628 Twin Power rocker solenoid valve, were positioned to minimise dead zones and deliver maximum flexibility of control.

The Bürkert solenoid valves have been specifically designed to deliver complete back pressure tightness, excellent flushability and a low internal volume while offering precision switching of micro volumes. In addition, the basic design of these solenoid valves ensures complete fluid separation that enables them to be used with aggressive fluids, which is essential for applications using specific cleaning chemicals as part of the process.

The cooperative approach to the design and manufacture of the new dosing unit has brought together technological innovation and a desire to overcome the technical challenges associated with the development of a unique solution. The final design can be used in a number of analysis devices, thanks to its flexibility, which means that the overall demand for the product increases. This increases the demand for components and reduces manufacturing costs, making the new dosing unit a very cost effective project for the client.

About BÜRKERT

Bürkert Fluid Control Systems is one of the leading manufacturers of control and measuring systems for fluids and gases. The products have a wide variety of applications and are used by breweries and laboratories as well as in medical engineering and space technology. The company employs over 2,500 people and has a comprehensive network of branches in 36 countries world-wide.

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