

Automation of laboratory sample preparation

Handling viscose substances with precision

Laboratories in the chemical, petrochemical, pharmaceutical and food technology industries are increasingly relying on automation for sample preparation. The Modular Sample Processor, a development from the global laboratory equipment manufacturer Anton Paar, is one such solution – and uses electric axes and control systems from Festo.



Festo technology: After a pipetting procedure has been completed, a pneumatic cylinder AEN ensures that the used pipette is ejected.



Precise pipetting processes: thanks to compact handling gantries with electric axes from Festo.



The advantages of laboratory automation are plain to see: it frees up laboratory technicians from monotonous, repetitive tasks, and eliminates the need for them to handle hazardous substances. It permits 24-hour operation seven days a week, and increases the quality, reproducibility and traceability of samples. But the most important advantage for the majority of laboratories is that automation not only saves time and money, but also guarantees an error-free analyses and therefore accurate results.

Compact bench-top platform

The Modular Sample Processor is a system for preparing samples, such as for chromatographic analysis with high-pressure throughput for samples within a range from a few up to 100 millilitres – as required in the petrochemical, food or fragrance industries. The compact bench-top platform prepares samples which are then tested, for example, for their water content, density, viscosity, suspended particles or pH value. “We use it for automating time-consuming manual work such as pipetting, sampling, dosing and weighing across a wide range of volumes and for many different types of samples,” explains project manager Markus Schöllauf from the Automation and Robotics division of Anton Paar. This ensures the volumes, concentrations and

mixtures are correct. The Modular Sample Processor can be used as a bench-top unit for liquid media and solids, or integrated into complete automation solutions.

Precise pipetting procedures

Compact handling gantries with electric axes from Festo – the DGEA axis in the X-direction and the EGSK axis in the Y-direction, equipped with motors of the type EMMS-ST – ensure precise pipetting procedures. Once a pipetting procedure has finished, a pneumatic AEN cylinder from Festo ensures that the used pipette is ejected into a waste chute.

Another handling system equipped with the same axes takes the sample holders from the output trays and places them on the weighing unit. There, a pipette provides the sample holders with the exact amount and volume of the substance to be tested. The sample holder is then held by the handling gantry over a scanner so that the sample can be allocated using a data matrix code. This integrated barcode reader enables the samples to be traced throughout the entire specimen preparation process. At the end of this process, the sample is placed on the output tray.



“Right from the initial CAD concept we worked closely with our system partner Festo to create the platform.”

Project manager Dipl.-Ing. Markus Schöllauf from the Automation and Robotics division of Anton Paar

Compact bench-top platform: the Modular Sample Processor can be used as a bench-top unit for liquid media and solids, or integrated into complete automation solutions.



Tested complete solution

“Festo didn’t just supply us with the axes, but also a complete system solution including a CECC CODESYS controller,” says project manager Schöllauf, reporting on the cooperation with Festo. He continues by adding, “Without that, it would not have been possible for us to meet the extremely short development deadline of four months.” This also made it possible to program the two handling gantries so they would never collide despite the fact that they move within the same working space. This was checked and tested by Festo before delivery.

Developing the dispensing head was no minor task either. This is where VODA valves come in. These media valves are directly actuated diaphragm valves. Depending on how the pressure is defined, the metering of the fluid to be transported is higher or lower. The opening pressure of the valve is therefore defined by the pretension and flexibility of the diaphragm. This enables the medium used to be dispensed extremely accurately. With the Modular Sample Processor the samples are precisely assigned to the correct container – to the last millimeter.

Reliability worldwide

“In this sub-project, the engineers from the Medical Technology and Laboratory Automation division of Festo demonstrated their level of expertise combined with high commitment,” continues Schöllauf. This provides reliability for follow-on projects, adds the project manager – as does the fact that products, solutions and services from Festo can be supplied quickly almost anywhere in the world. This is also important for companies like Anton Paar, so that the Modular Sample Processor can be marketed on a world-wide basis.

About Anton Paar:

Anton Paar develops and produces precision laboratory devices as well as highly accurate process measuring technology, and delivers tailor-made automation and robotics solutions. Anton Paar is the world market leader for devices in the areas of density and concentration measurement as well as rheometry and CO₂ measurement. Worldwide the company has 2100 employees.

www.anton-paar.com

**About Festo:**

Festo AG is a global player and an independent family-owned company with headquarters in Esslingen, Germany. The company supplies pneumatic and electric automation technology to 300,000 customers in the fields of factory and process automation in over 200 industry segments. Products and services are available in 176 countries around the world.

The company has around 17,800 employees in 61 national companies worldwide and generated a turnover of some €2.45 billion in 2014. More than 7% of this turnover is invested each year in research and development. 1.5% of this learning company's turnover is invested in basic and further training. However, training services are not only provided for Festo's own staff – Festo Didactic SE also supplies basic and further training programmes in the field of automation technology for customers, students and trainees.

www.festo.com/lab

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