

Automation Solutions

Automated testing is changing the laboratory landscape by streamlining workflows, ensuring faster and more reliable results while improving economic feasibility.



Laboratory automation is creating a new paradigm in diagnostics and other applications, fueling widespread uptake of making molecular technologies routine in healthcare and everyday life. It Automation enables laboratories to keep pace with increasing sample volumes by significantly accelerating and simplifying the testing process, at the same time rendering it more affordable and efficient. In addition, automation dramatically increases the reliability

of molecular tests by increasing the reproducibility of results, eliminating the ‘human factor’ and the risks of sample mix-ups – further driving the dissemination of molecular technologies into a growing number of applications in diagnostics, research and applied settings such as forensics and food safety.

Changing the laboratory landscape

Research and commercial laboratories alike face unprecedented opportunities – and challenges – in this era of growing genomic knowledge. Among the pressures on labs are economic, regulatory and time constraints. As the potential of molecular diagnostics expands exponentially, new genomic tests are constantly being developed and adopted in medical practice. The amount of data being generated by next-generation sequencing is vast. Alongside advances in knowledge and technological capabilities, there are an ever-growing number of regulations. Health and safety targets also are becoming more ambitious and require results more urgently. So the value of automation in supporting molecular diagnostics is growing rapidly.

Automation helps labs cope with challenges

In the current economic environment mean, resources for research and commercial testing can be severely limited and must be used with optimum efficiency. Many research and development (R&D) programs have been restructured to align better with available resources and demands. Research facilities are under pressure to deliver results quickly, free up the time of highly qualified scientists and engage in more creative work. Commercial laboratories face stiff competition and are forced to continuously enhance efficiency, while improving their level of service to customers. In addition, there is a constant struggle to find additional ways to save healthcare costs. Payers require greater transparency and push for value-based reimbursement, instead of direct payments for procedural steps in a laboratory.

Increasing regulatory demands are particularly relevant in commercial labs. A wrong diagnosis or test result can be a matter of life and death. The accuracy of results in these situations is also

associated with serious liability risks so laboratories need to establish, maintain and monitor high quality standards and compliant processes to ensure the reliability and reproducibility of test results. This includes tracking samples throughout the entire diagnostic process and ruling out cross-contamination. They also need to eliminate the chance of human error, as far as possible, because the technologies used are so sensitive.

Due to reduced costs of testing and a constant stream of new applications, the volumes of samples that laboratories process are increasing. In addition, effective patient management often requires results within a certain time frame – for example, in exploring donor and recipient matches in organ transplantation, or in monitoring the progress of a particular disease.

Laboratory automation eases the impact of these challenges, so the majority of laboratories are already employing a variety of instruments to automate at least part of their activities. Automation enhances the efficiency of a laboratory and helps improve its economics by enabling qualified personnel to perform higher-value tasks and reducing the need to perform any manual operations from a highly-qualified academic to a skilled-worker level. It also helps laboratories adhere to regulatory requirements, by reducing the risk of human error and sample mix-ups, recording progression of a sample through the entire laboratory process and feeding this into the laboratory's information system. Automation also accelerates the diagnostic process by reducing the time needed to perform tests and report results. This sometimes enables new application areas to be introduced, for example in food testing, where control procedures need to match the fast pace of production and distribution. Wider dissemination and further evolution of new molecular technologies is, in turn, driven by these developments.



Automation options from Sample to Insight

Recognizing the challenges clients face, QIAGEN offers instrumentation systems that automate entire laboratory workflows to provide efficient solutions for a broad range of applications. Platforms range from the complete QIASymphony RGQ system, the world's leading automation solution for medium-throughput molecular testing, to special-purpose instruments automating individual tasks in laboratory workflows. QIAGEN is commercializing the GeneReader* NGS System, the world's first complete Sample to Insight next-generation sequencing (NGS) solution designed for research laboratories to deliver actionable insights.

These automation solutions enable customers to perform reliable and reproducible nucleic acid sample preparation, assay setup, target detection and other tasks, and to interpret and report actionable insights from those tests. By developing and supplying an ever-increasing content menu of innovative tests for these systems, QIAGEN aims to provide a 'one-stop shop' in molecular Sample to Insight solutions – offering precision, efficiency and affordability for customers.

QIAGEN's key automation products include:

- **Sample technologies:** QIAGEN offers a broad portfolio of instruments for the automated processing of samples geared towards different throughput requirements. It includes the QIAcube, an award-winning robotic workstation for automated purification of DNA, RNA, or proteins, the EZ1 Advanced, which is frequently used in forensic applications, or the BioRobot Universal System tailored for high-throughput applications.
- **Assay technologies:** QIAGEN customers can select from a wide range of detection platforms. QIAGEN's offering includes QIAgility, a user-friendly system for separation of nucleic acids with great sensitivity and time to results; PyroMark, a high-resolution detection platform for the real-time analysis and quantification of genetic mutations and DNA methylation patterns down to single base pair levels; and Rotor-Gene Q, the world's first rotary real-time PCR cyclers system, using real-time PCR reactions to make specific sequences of DNA and RNA visible through amplification, and also quantifiable through real-time measurement. In addition, QIAGEN markets portable instruments that allow automating molecular tests in settings without access to a laboratory infrastructure as well as Modaplex, a proprietary platform for multimodal, multi-analyte analysis. Modaplex enables customers in the fields of personalized healthcare and drug development to detect, characterize and measure up to 100 parameters simultaneously in a cost-effective and rapid manner.
- **Integrated solutions:** In addition to instruments for individual workflow steps in laboratories, QIAGEN also develops and commercializes integrated solutions that automate laboratory workflows from Sample to Insight. The QIASymphony family of instruments is a highly flexible mid-throughput platform for the automation of tests based upon real-time PCR technology. It gives customers access to a broad menu of commercially available assays while allowing them to run their own laboratory-developed tests. In 2014, QIAGEN reached an important milestone with more than 1,500 cumulative placements of the QIASymphony platform and received FDA clearance for the full QIASymphony RGQ MDx workflow for cdiff and hsv in the U.S. In addition, QIAGEN is commercializing the GeneReader NGS System, a complete workflow solution for next-generation sequencing designed to serve clinical research. The platform integrates extraction, purification and pretreatment of nucleic acids; automated NGS sample preparation; gene panel assays; the scalable GeneReader NGS sequencing platform; and powerful bioinformatics for the interpretation and reporting of results.

* The GeneReader NGS System is currently available for sale outside the United States