WHITE PAPER

FlowCam®

Five Key Benefits of Automating Flow Imaging Microscopy

Data collection is a critical but often tedious task for researchers in analytical laboratories. Analytical measurements are not only time-consuming for analysts but can involve additional sample handling steps that introduce inconsistencies to the final measurements. Automation is a natural solution to these issues. Automated liquid handlers (ALH) use robotics to perform sample processing and enable analysis with minimal human intervention. Automation not only vastly reduces the time and effort required from operators to perform experiments but, in the context of analytical instruments, helps users collect more reproducible and overall higher quality data.

ALH for FlowCam™ enables **FlowCam 8000 Series** instruments, including **FlowCam 8100, FlowCam 8400**, **FlowCam LO**, and **FlowCam Cyano**, to be operated without user intervention. Automated liquid handling streamlines data acquisition as well as many sample preparation steps such as mixing and dilutions, resulting in high-quality, automated flow-imaging microscopy measurements. Additionally, the flexibility and ease-of-use of ALH for FlowCam make it straightforward for users to add automation to an existing FlowCam instrument and to tailor the automation to the user's existing workflow.

Learn about the key benefits of adding automation to flow imaging microscopy and how these are implemented in ALH for FlowCam below.

1. AUTOMATION INCREASES PRODUCTIVITY

Analysts are responsible for a variety of laboratory tasks beyond data collection and sample preparation, such as experiment design, data analysis, collaboration with other researchers, etc. Relative to these "higher-level" tasks, researchers can find data collection and sample preparation time-consuming and highly repetitive.

ALH for FlowCam automates both FlowCam data collection and most sample preprocessing steps. Robotic handling allows for unattended FlowCam operation – even when out-of-office; analysis protocols can be developed that automatically preprocess and analyze multiple samples while the researcher pursues other tasks. Automating FlowCam operation, especially over multiple samples, thus greatly improves the lab's overall productivity.

The flexible deck layout with up to 10 configurable positions, combined with scheduling software, allows analysts to run FlowCam completely unattended. The software can also be programmed to alert the analyst by email when the protocol is complete or if errors are incurred during the analysis, ensuring they can stay updated on the status of their experiments.

2. AUTOMATED OPERATION IMPROVES REPEATABILITY

Analytical instrument measurements often involve several sample handling steps such as mixing, heating, cooling, and injecting samples into the instrument. Each manual operation may introduce inconsistencies to the analysis that can influence the results. These variabilities can mask the underlying differences between samples. Biotherapeutics are especially prone to this effect as common sample handling steps like mixing and dilution can influence factors like particle content if not performed carefully. Automating sample handling steps can result in more reproducible and overall higher-quality data from the instrument that can be invaluable in many research contexts and applications.

ALH for FlowCam streamlines sample handling, including frequent sample preprocessing steps such as mixing and heating. Every step from pipetting to instrument cleaning is performed consistently, resulting in high-quality particle data which is easy to compare between samples.

3. FLEXIBLE HARDWARE AND SOFTWARE ADAPT TO USERS' NEEDS

Successful integration into an existing workflow depends primarily on the flexibility of the automation hardware and software. Factors such as the size and options of the sample deck layout will determine the number of samples and the types of processing steps that can be automated. Similarly, automation software should allow users to develop automated protocols that utilize all of the functionality of the liquid handler.

ALH for FlowCam offers users a variety of hardware and software tools to implement a user's sample analysis scheme. The configurable ALH deck can accommodate up to ten well plates and reservoirs, ensuring that multiple samples can be analyzed in a single run while also having access to the necessary reagents for instrument cleaning and any necessary dilutions. 8-, 24-, and 96- shallow- or deep-well microplates can be configured. A wide variety of vials and test tubes can also be accommodated, allowing samples in these containers to be analyzed without an additional sample transfer step. The onboard sample heater/cooler and sample shaker further enhance flexibility for sample preparation.

Powerful software complements hardware that allows precise control of each liquid handling step with less than 3% CV dispensed volume variability. While the built-in automation routines are sufficient for most use cases, the programmable interface adjusts to almost every facet of the automation to accommodate a researcher's needs. Customization options range from the well plate layout to sophisticated sampling parameters such as the height in each well from which the liquid is sampled. This flexibility allows users to automate analysis for advanced research applications in flow imaging microscopy.

4. INTEGRATED SOFTWARE PROVIDES EASE-OF-USE

Operators can readily integrate automation into their protocols if the automation hardware and software are easy to learn and use. While researchers developing analytical protocols benefit from a powerful interface with access to all functions on the instrument, users performing routine analysis may prefer a streamlined user interface that lets them analyze samples with a single click of a button. Ideally, liquid handling software will accommodate all user preferences.

ALH for FlowCam is configured to provide easy-to-use software integration regardless of a user's experience and requirements. The software allows for several possible workflows ranging in complexity from push-button operation to full customization of sample analysis. This balance is achieved using a simple, easy-to-use, flow-chart style graphical interface for developing and executing protocols.

5. A COMPLETE SOLUTION ENABLES MAXIMUM PRODUCTIVITY

Long-term success with automated analytical measurements depends not only on the automation instrument setup and integration but also on system maintenance and service. It is therefore important that the vendor of an integrated solution can provide comprehensive after-sales service and support for the entire setup. These services can help maximize uptime and overall productivity.

Yokogawa Fluid Imaging Technologies offers a complete solution for automated flow imaging microscopy systems that includes installation, IQ/OQ validation, and documentation. Annually renewable Gold Service Packages ensure all-inclusive onsite preventative maintenance and repair services – and are available for both ALH for FlowCam and FlowCam itself.

CONCLUSIONS

Automating sample analysis with automated liquid handling enables significant productivity and quality improvements that benefit both users and lab operations. ALH for FlowCam is designed to help laboratories to meet their needs for automation, analysis, and flexibility in flow imaging microscopy and beyond.

Automated Liquid Handling System by Yokogawa Fluid Imaging Technologies. ALH for FlowCam shown here with integrated FlowCam 8000 instrument.