

## Laboratory automation

## A conductor for your workflow orchestra

### Using a workflow scheduler to organize and execute your lab's automation workflows



#### Keywords

Laboratory automation, scheduling, software, machine learning, artificial intelligence

Once limited to science fiction, robots and machine learning/artificial intelligence (ML/AI) tools now exist in labs improving scientists' lives. Physical and digital automation facilitates reproducibility of data, which not only improves its quality, but also helps laboratories meet validation or regulatory requirements. For the users, workflow scheduling software enables consistency in their application. These processes, when automated, also provide unattended 24 x 7 capability (as robots don't need coffee breaks), reduce user-error, and free up valuable, highly-trained scientists to walk away and put their time to better use than repetitive tasks.

#### Features to look for in a workflow scheduler

##### Capable

Many labs don't have the luxury to purchase a pre-configured fully integrated automation set up for their applications. This means the automated system was incrementally added to over time and likely from a variety of manufacturers. A workflow scheduler needs to talk to the different components so they work in a cohesive and harmonious manner. A comprehensive interface library (a library of code that enables the scheduler to "talk" to automation-friendly devices) enables users to integrate the scheduler with the different devices in their laboratory. This library also serves to future-proof the system, as devices are easily added or removed as workflows change. The scheduler also needs to communicate with a Laboratory Information Management System (LIMS)

or other external applications to aid the lab manager with their compliance or reporting. Modules that offer different user-permission profiles—such as administrator, expert, or operator—help to secure data and enable 21 CFR part 11 compliance. The latest version of Thermo Scientific™ Momentum™ Workflow Scheduling software, version 7.2, also offers the ability to create automatically-generated audit trails, user and system logs, and provides the ability for the user to append digital comments to various logs.

Your scheduler should also offer data persistence. This is especially important when processes like cell culture handling are automated. In this case, user defined and system generated data can be assigned to all future generations so that the lineage information is retained during passages.

### Dynamic

Automation comes in all shapes and sizes. Most manufacturers now offer a range of options, from dedicated workstations for single assay or process all the way up to integrated solutions with one or more robots interacting with multiple different types of scientific devices and capable of running multiple different assays in parallel. When complex workflows are undertaken by automated equipment, a deadlock situation may occur if an instrument(s) is needed at same time by two or more process steps. New software is now available to handle errors on-the-fly, or better yet to be proactive during process design to prevent deadlocks in the first place. A good scheduler will have options to simulate a process to identify the deadlocks, and then have programming options so the component blocking the workflow can be parked until the user can intervene. This means the problem component won't interfere with the queued steps coming down the pipeline.

A workflow scheduler needs to be dynamic to maximize instrument usage to increase overall productivity while minimizing periods of inactivity. The best way to manage issues is to have a system in which the user builds their own dynamic processes. Processes can be programmed to begin working, even if a particular device isn't yet available, and the system will alert the user when the system is available.

### Easy to use

Many laboratory staff do not have the time or programming knowledge to work with a complex scheduler interface. As such, a workflow scheduler needs to be designed for ease-of-use. Touchscreens with drag and drop options make it easy for users to select (or create) and execute a process, and the visual interface makes it easy to see the status and workflow at a glance.

### Support

Any workflow scheduler that integrates many components is sophisticated software, and even with the most intuitive interface users may have difficulty troubleshooting when their processes don't work as expected. This means that the software supplier must be available for support, and not just training—although that is important, too.

Right from the first contact with your supplier, you should receive support. The sales team should understand your needs. Your supplier should also have an applications team that can help with your specific applications. Finally, they should also offer fully-custom engineering options for your specific lab. For systems integrating multiple different components, make sure your support contract helps you with third party integration.

Other support features to consider in your automation system includes how the manufacturer manages problems. Look for a company that offers preventative maintenance in their service contract. Also consider what happens if your system does go down and ask if they have temporary replacements, so you minimize downtime. Finally, ask if your supplier offers any sort of user-community forum—these communities are invaluable to troubleshooting, sharing pointers or even new ideas.

### Momentum workflow scheduling software is the solution to workflow scheduling

All of these features and more are available through Momentum Workflow Scheduling software. This dynamic system offers depth and breadth of connectivity to improve your data integration. The software has a proven track record with the ability to integrate over 450 different instruments, and that number is growing. If Thermo Fisher Scientific hasn't already worked out how to integrate your device, they will work with you to get your system working together. When you are searching for a workflow scheduler, consider Momentum software to be the conductor to help make your scientific symphony a harmonious success.

Learn more at [thermofisher.com/momentum](https://thermofisher.com/momentum)