Using LabVIEW to Enhance UV/Visible Spot Curing Systems

By Ben Zimmer, EXFO Photonic Solutions, Inc.

The Challenge: Enhancing the ease of use and automation capabilities of UV/Visible Spot Curing Systems by providing an interface module and a PC-based software solution to allow RS232 and Ethernet-based control and diagnostics.

The Solution: Using LabVIEW to develop a sophisticated interface software that monitors and controls, as well as enhances the capabilities of field-installed units without hardware or embedded code changes.

A Turnkey Solution for Real-Time Monitoring

EXFO Photonic Solutions, Inc. manufactures industry-leading UV/Visible Spot Curing Systems for the precise and repeatable curing of photo-activated adhesives and epoxies. Thousands of EXFO Novacure and Acticure curing systems are in daily use around the world. Both units have considerable control and monitoring capabilities, but at a PLC level.

We created a user-friendly and extremely powerful interface program using the latest features in LabVIEW.

The ACS 1000 Automated Control System provides a turnkey solution for real-time monitoring of our curing systems. The Opto Link® UV software included with the ACS 1000 makes it simple to program and control. In developing the ACS 1000 and Opto Link UV, we wanted to enhance the automation capabilities of our products by providing an interface module and a PC-based software solution for RS-232 and Ethernet-based control and monitoring. We needed to provide our Novacure® 2100 system with unmatched programming and control capabilities as well as retrofit and enhance it to work with the thousands of units already in daily use.

Simple Access Functions and Calibration

Using LabVIEW, we rapidly developed sophisticated interface software, which not only monitors and controls, but also enhances the capabilities of field-installed units without upgrading. We created a user-friendly and extremely powerful interface program using the latest features in LabVIEW. Taking advantage of the application builder, we deployed the LabVIEW-built application with ease.

The 3D-enhanced controls and indicators available in LabVIEW provide a user-friendly and attractive interface for control and monitoring of the curing system. With the easy setup of the ACS 1000 system, the user can name the unit under control, select the unit type, and easily configure the communication settings. Context-sensitive Help screens are available from every window within Opto Link UV.

The DrawCure feature is a product enhancement made possible by the PC-control and made user friendly by LabVIEW’s graphical control capabilities. With DrawCure, the user defines an arbitrary intensity profile by dragging the mouse. The simple file access functions in LabVIEW simplified the tasks of storing multiple profiles, and importing and exporting profiles.

The ACS 1000 and Opto Link UV software, along with the EXFO handheld radiometer, added a precise calibration feature to the Acticure system. A series of windows guide the user through the one minute calibration process. Once the calibration is complete, the Opto Link UV displays the current intensity in real-time irradiance units.

The comprehensive reporting system in the ACS 1000 delivers complete process validation. Using Opto Link UV, you can compile key information such as intensity, lamp status, shutter state, and alarm status. Using this information, you create quality assurance reports that you can download to your PC and print. Through the Opto Link UV, the user can easily select which events to log to the internal history. An internal battery...
backs up the history and all settings, ensuring data integrity.

The ACS 1000 and Opto Link UV includes the additional enhancements such as the ability to set up to 21 timed events, similar to a VCR. Using this feature, a customer can setup their curing unit to automatically turn on 30 minutes prior to the start of a shift. This feature, combined with the data logging and reporting system, make ACS 1000 a valuable addition to a curing bench even in the absence of constant monitoring by a PC.

The modular nature of LabVIEW programming made it easy to handle singular control of multiple ACS 1000 units from one PC. Users can control and monitor curing units located anywhere from any PC running Opto Link UV using ethernet communications. The communication toolsets included with LabVIEW made adding this functionality, as well as switching between ACS 1000 units connected via Ethernet or RS-232 very easy to accomplish.

A set of LabVIEW-generated dynamic link libraries (DLL) meet the needs of system integrators and automators, which provide the building blocks to create custom curing applications. LabVIEW easily generated neatly packaged applications operating under a variety of other development systems. This allowed us to develop of a very robust set of tools to satisfy the varied needs of our customers.

We realized many benefits from the modular nature of LabVIEW programming. By developing the ACS 1000 with a generic interface unit, we can easily handle new curing systems with only minor changes to the Opto Link UV software. any modifications or redesigns to the graphical user interface are much simpler with LabVIEW, compared to any other development systems. Reusable code makes the development process extremely simple, as we complete the addition of our newest curing unit, the Novacure 2100 to Opto Link UV. The Novacure 2100 combined with the ACS 1000 and Opto Link UV provide a solution with unmatched process control and monitoring capabilities.

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