Honeywell-Measurex Develops Large Industrial Control Applications Using National Instruments LabVIEW Software

by Dirk De Mol, Manager, Applications Development, Industrial Systems Business Unit, Honeywell-Measurex

The Challenge: Developing a new-generation measurement and control system using an industry-standard environment and third-party tools with shortened time to market.

The Solution: Using National Instruments LabVIEW and Windows NT to create the MXProLine production-quality control system for flat-sheet processes.

Introduction

Because production costs for sheet process products are rising and users are under pressure to deliver high-quality merchandise, Honeywell-Measurex has created an easy-to-use, on-line measurement and control system – the MXProLine. It is designed specifically for flat sheet producers who need fast, precise sheet measurement and a way to spot variations, make corrections, and keep the product on target, so plastics or sheet processors save money. MXProline is based on LabVIEW running under Windows NT.

The robustness of LabVIEW, combined with its graphical programming environment, ensure that we can quickly complete the application and adapt it to unique customer requirements.

The Need

We needed an efficient, very robust environment in which to create very complex applications with extensive array manipulations. The system also needed on-line debugging tools, a modern user interface, the ability to handle multiple priorities and parallel tasks, "soft" real-time (1 second), and an open architecture.

Because we wanted control and applications engineers knowledgeable in the end-use of our systems to develop the software, we ruled out C, C++, and other conventional languages. In addition, we excluded interpreted languages

Honeywell-Measurex MXProLine On-Line Measurement and Control System with the 2080 Scanner/Sensor

and Windows 95 because of our need for efficiency and soft real-time behavior. Therefore, we chose to use National Instruments LabVIEW in combination with Windows NT as our development environment.

The Result – MXProLine System Configuration

The MXProLine application runs on a Windows NT workstation with real-time database drivers. The touchscreen-driven operator interface with multiple levels of security can switch between languages without system interruption. All configuration and setup changes are stored in a relational database (Microsoft Access), so the system can go through a powerfail/reboot without loss of data or configuration information. A recipe system handles product changes. A user-configurable report generator computes product quality statistics and production data for each roll of product, each shift, and each recipe. Both the recipe system and the report generator are built around a relational database. The MXProLine handles multiple operator stations with transparent data access across the network. Operator-initiated changes to the process are logged, as are all alarms. We can monitor and modify

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the application, regardless of complexity, locally or remotely over a modem line, providing fast troubleshooting and problem resolution.

National Instruments LabVIEW handles the operator interface, access to the different databases, the measurement calculations, control functions, alarms, trending and analysis functions, and report generation – a total of more than 3,000 virtual instruments (VIs). LabVIEW does not perform data acquisition directly, but instead interfaces to the real-time database – with about 30,000 to 50,000 variables – using dynamic link libraries (DLLs). Process I/O is received from programmable logic controllers (PLCs) and proprietary sensors. Because of an extensive event mechanism, LabVIEW can respond to external interrupts. The customer
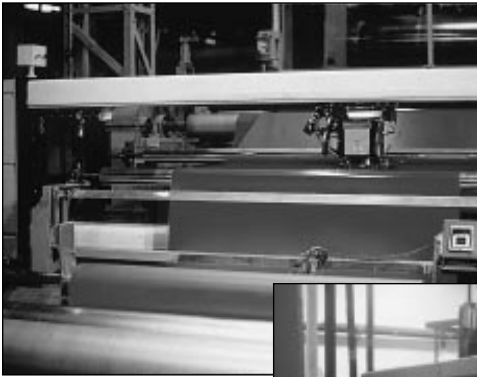
quickly complete the application and adapt it to unique customer requirements.

Benefits of Graphical Programming

Five years ago, we evaluated the market for a graphical programming language that would handle all our needs and found LabVIEW to be the most advanced tool on the market. We used LabVIEW purely as a development language to create this first major process control application. We created an efficient, user-friendly application with built-in flexibility and the configurability to adapt to a variety of manufacturing applications.

One major advantage of a graphical programming language versus the more "traditional" languages is that programming can be done by the application experts, physicists, control engineers, and process experts. All phases of product development, design specification, implementation, and debugging can stay in the same group, greatly improving turnaround time.

can access all system data through open database connectivity (ODBC), dynamic data exchange (DDE), or OLE for process control (OPC).

We created this program specifically for continuous flat-sheet production applications with measurement only, or measurement and closed-loop feedback control, not just supervisory control and data acquisition (SCADA). With unique measurement technologies and complete application-specific control packages, customers can optimize control of the process and tighten product targets to increase quality and save material costs. The robustness of LabVIEW, combined with its graphical programming environment, ensure that we can

With LabVIEW, the development of this process-critical application went smoothly because of the built-in debugging and documentation capabilities. The ability to debug and graphically document the application in real time lent itself to rapid prototyping, which is crucial in a spiral development process. When combined with the high-performance, standard Windows NT operating system, we provided an application

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that is stable, robust, and runs continuously 24 hours a day, 365 days a year. The LabVIEW and Windows NT combination has proven to be a very stable environment for real-time process applications. ❧

About Honeywell-Measurex

Honeywell-Measurex creates measurement and control systems for the continuous flat-sheet process industry. Flat-sheet products include many types of:

- Biaxially oriented films
- Calendered sheets
- Coated sheets
- Fiberglass
- Films
- Magnetic films
- Milk cartons
- Nonwoven products
- Packaging films
- Paper
- Photographic films
- Roofing
- Rubber tires
- Safety glass
- Thermoformed sheets
- And many more

Our systems increase productivity, improve product quality, and lower production costs.

For more information on MXProLine and its use of LabVIEW, contact Dirk De Mol, Applications Development Manager (dirk.demol@hmx.honeywell.com). For application queries, contact Bill Embleton, Business Director. Industrial Systems Business Unit, Honeywell-Measurex, One Results Way M/S 2120, Cupertino, CA 95014 tel (408) 255-1500, fax (408) 864-7506.

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