

Lookout Controls Thin-Film Plastic Web Calendaring

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The Challenge: Monitoring and controlling the technical parameters in a thin-film plastics manufacturing environment and managing the data.
The Solution: Using Lookout software from National Instruments for automation control and information management.

Introduction

A large Mexican plastics company badly needed to automate their manufacturing process; specifically, they needed to monitor and control about 80 machine parameters. So, they called on us, MAS Associates, as a systems integrator to outfit the plant with Lookout software from National Instruments.

The Old Way

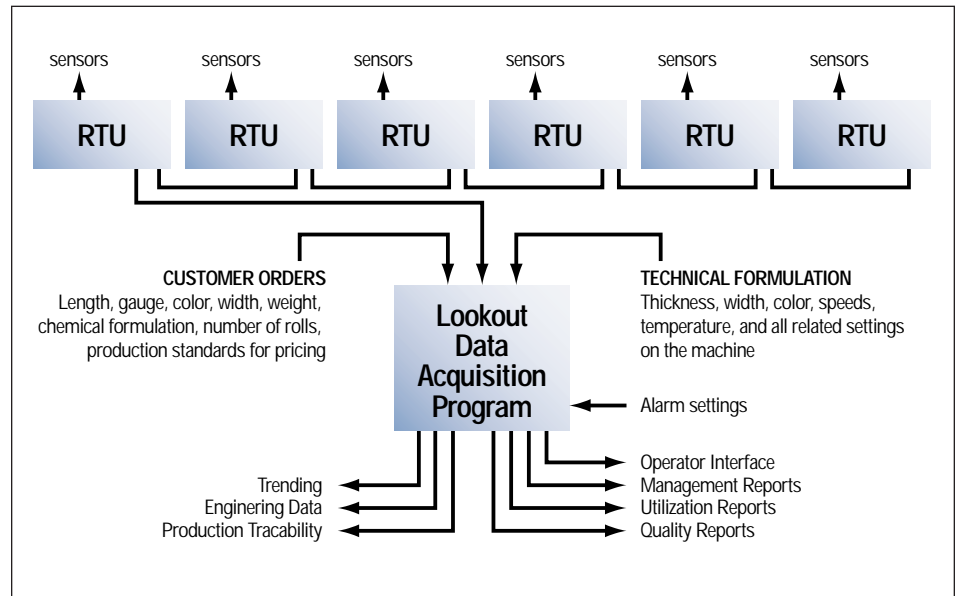
The company accepts international orders for products ranging from shower curtain to credit card material. Variations in customer orders account for more than 1,000 different combinations of technical parameters. The manufacture of thin-film plastics involves the following processes:

- formulation
- blending
- mixing
- kokneading (stabilization)
- extrusion
- calendaring
- drawing and tempering
- embossing (imprinting)
- cooling
- roll windup

In thin-film calendaring, all of the sub-processes work must be done at the same time, and each must be within a narrow range of acceptability to achieve the desired final products.

In the old manufacturing process, the production department received an order that listed the customer, the product, the chemical recipe, the process recipe, the thickness, the length of the run, the width, and the number of rolls. Naturally, each order was different.

During the typical three-shift operation of the machine, the operators (two to four) had to keep track of the order being



Block Diagram of Lookout Thin-Film Automation System

produced, the technical settings for the machine, and product quality. Because the controls and gauges on the machine are not centrally located, the operators had to constantly patrol the machine to ensure proper operation, and manually set and monitor the following:

- motor and web speeds
- motor power consumption
- temperatures
- flows
- hydraulic pressures
- dimensional characteristics

All of the settings were then manually logged in a notebook and analyzed for trends and consistency. Because of the interrelationship of the operating parameters, particularly in the flow/temperature controls, the operators were constantly adjusting the flows and heater/cooler settings.

The Lookout Way

With the high quality required for international distribution, the plant desperately needed process centralization and data coordination to improve quality and productivity. The company realized that the process had to be updated to achieve this new level of quality.

We realized that the client must have an open architecture in the automation system. In a world where PCs are common and the

Windows environment is prevalent, the need to input and output data quickly and easily is very important. After surveying the marketplace, we chose Lookout because it had all the necessary characteristics to accomplish the task at hand. Lookout stood

The outstanding characteristics of Lookout are its event-driven manner of control and its condensed history and trending capabilities.

out over other products because of its event-driven manner of control and its condensed history and trending capabilities.

We took the following steps to automate the factory with Lookout:

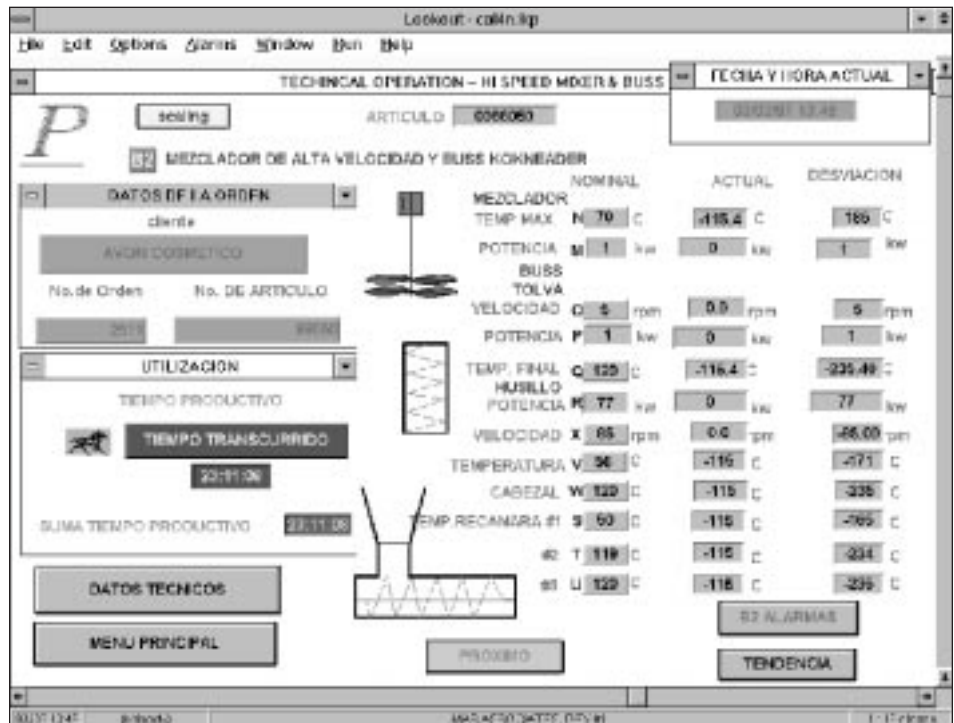
- We used an industrial-quality Pentium PC for data acquisition with a touch-screen operator interface. The console is semipressurized using a blower with cleanable filters so that the console components have clean air rather than dust over them during system operation on the factory floor.
- We strategically located six remote terminal units (RTUs) adjacent to the machine to minimize the wiring lengths to the sensors and to provide for sensor calibration and expansion, if necessary.

- We ran data and power cables around the machine to each of the RTUs. We located an RS-232 to an RS-422 converter in the console. The console also contains two 24 VDC supplies, which are remotely sensed to ensure that voltage levels are correct at the remote locations.
- Each of the RTUs is wired to sensing devices in 4 to 20 mA, 0 to 10 V, or direct thermocouple categories. Within Lookout, we scale the digitized signals to generate the correct engineering units for the operators.

Lookout Goes to Work

The block diagram depicts the way Lookout obtains its information and creates various reports. The Lookout reports are all Windows compatible; they can easily be ported into spreadsheets, bar charts, or databases for further analysis.

The operator screens available are Order Entry, Technical Review, Web Tension Characteristics, Output, Scrap, Quality



Lookout Control Screen

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Report, and Time Utilization. Short and long-term trending of all of these characteristics is logged to memory very efficiently. In addition, several management and technical reports are generated by Lookout.

The system is calibrated by means of various scaling techniques. The raw signals from the RTUs are offset, multiplied, or directly transferred to the program operator

interface. The plant maintenance personal can check calibration on the machine without requiring downtime.

Results

Lookout has provided a new look for the instrumentation of the calendaring system. All of the data comes into one central location; the operator can monitor the entire system. The new system also records the data for future reference and is used for product development. The goal of the firm is to seek ISO certification for international shipments and become a world leader in thin plastic manufacturing. The Lookout software is a big step in that direction. The

system provides an integral operator control, management, and quality control systems with complete traceability for the product manufacturing by date and product. Because the data outputs are in spreadsheet format, the firm expects to include cost accounting into the system in the future. ♣

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