

LabVIEW™ Process Controller Libraries Automate Pasta Making

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Integration of panel-mounted, process controllers with RS-485 communication and National Instruments LabVIEW™ software (<http://www.ni.com>) has allowed a small pasta manufacturer to upgrade to a SCADA-based operation at minimal cost. Deseret Pasta in Salt Lake City, Utah, owned by a non-profit entity, produces pasta products for humanitarian relief efforts. The plant has a small staff of full-time workers who are supplemented by volunteers from the community.

Cost was a strong issue in choosing a solution and the plant desired minimal changes to their current controls, but wanted the benefits of a centralized, versatile solution. LabVIEW offers a graphical environment that can be quickly programmed and customized. The addition of a cabinet-mounted, desktop PC with serial interface and wiring between controllers were the only required hardware to complete the solution.

To simplify development, the program incorporated Process Controller Communication Libraries for LabVIEW from Integrated Pro (<http://www.integratedpro.com>), supporting many commonly available DIN-sized, process controllers. Using the Process Controller Communication Libraries for LabVIEW provided for a quick development time and the ability to quickly add or change features in a drag and drop programming environment.

The plant has two production lines: one for “short goods”, such as macaroni and the other for “long goods”, such as lasagna, spaghetti, and linguini. Pasta is extruded through a die supplied by dough from a mixer hopper where Semolina flour and hot water are combined. Different dies in the extruder determine the type of product. After being extruded into the desired shape, the pasta hangs on long bars as it moves through the dryers. At the end of the drying process, the dried pasta strands are carried by a belt through a cutter, cut to packaged length and delivered in chutes to workers who place the pasta in bins until it is packaged.

The pasta dryers require control over temperature and humidity in multiple stages as the pasta cools and dries. Each dryer is controlled by two panel-mounted controllers with 4-20mA current loop sensors and voltage controlled actuators to control temperature and venting. An upgrade to the process, a panel-mounted counter, provides tracking of each bar of pasta through the dryer.

The program trends temperature, humidity and dew point values at different locations. The operator can control set points and recipes, arm and acknowledge alarms, and view both process history and product drying history for each bar of pasta. Data is saved to disk for offline analysis using custom formatted reports in MS Excel using the LabVIEW Report Generation Toolkit.

“It’s not as simple as PLAY-DOH,” commented one employee, “Pasta drying is a complex process that happens on the molecular level.” Incorrect drying conditions can lead to fractured product or undesirable texture. Having a centralized view of the drying process provides an improved picture of how the product is progressing and allows for better control. New employees can be trained more quickly because they can view the process as a whole. Ultimately the plant makes better product and reduces waste because of the program.

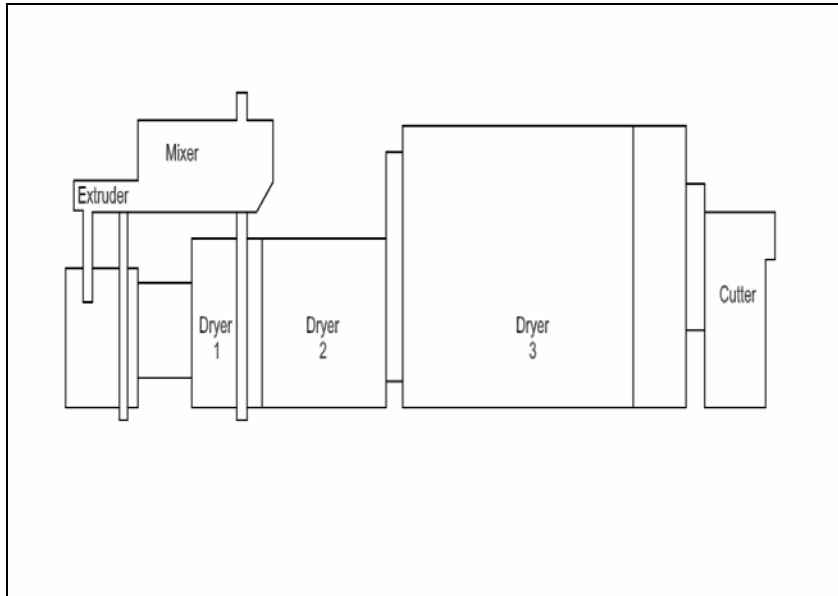


Figure 1 - Pasta process diagram



Figure 2 - Long strands of spaghetti visible in the extruder area at the beginning of the pasta process



Figure 3 - Spaghetti hangs on bars as it enters the dryer

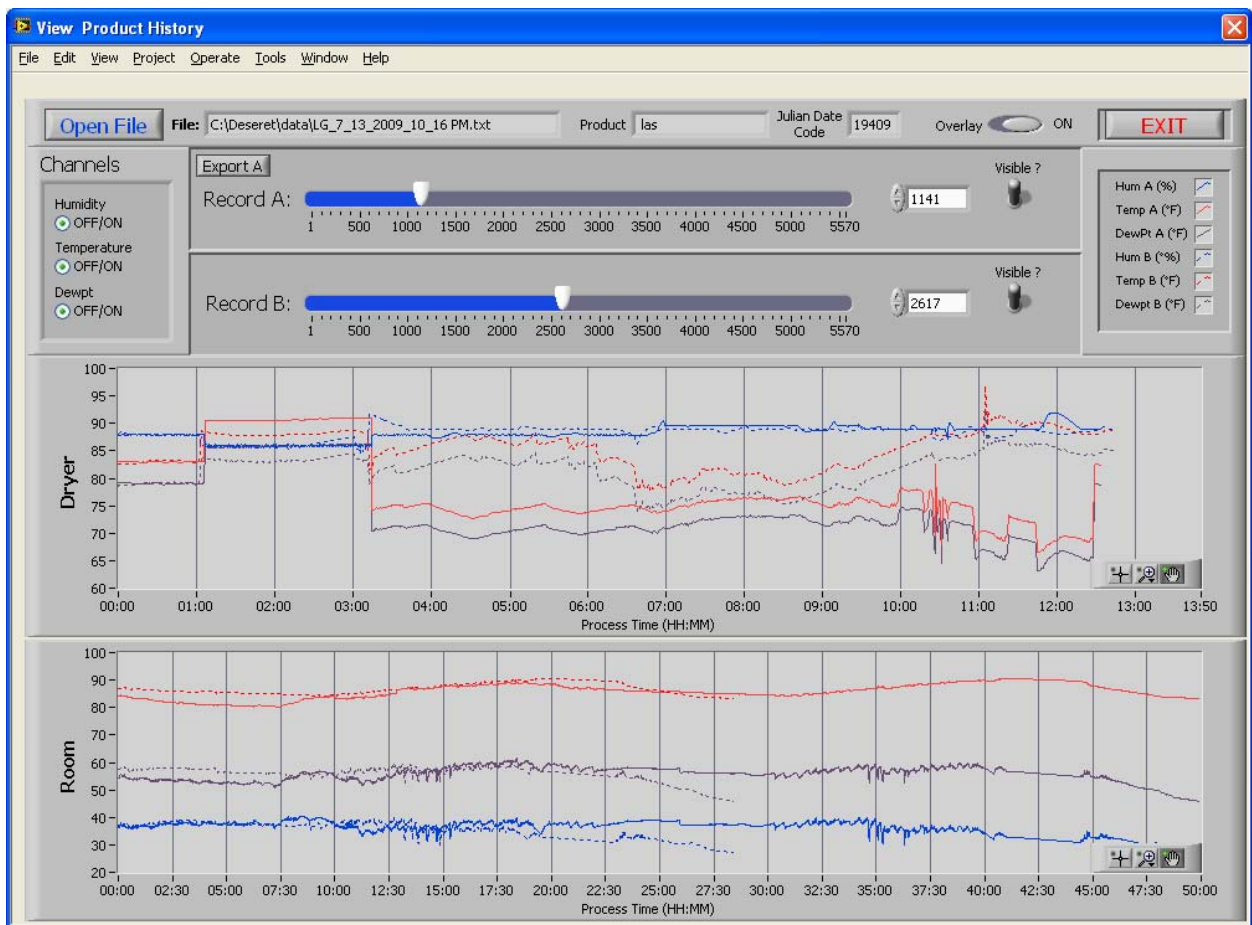


Figure 4 – Pasta production runs can be compared graphically for training or diagnostics

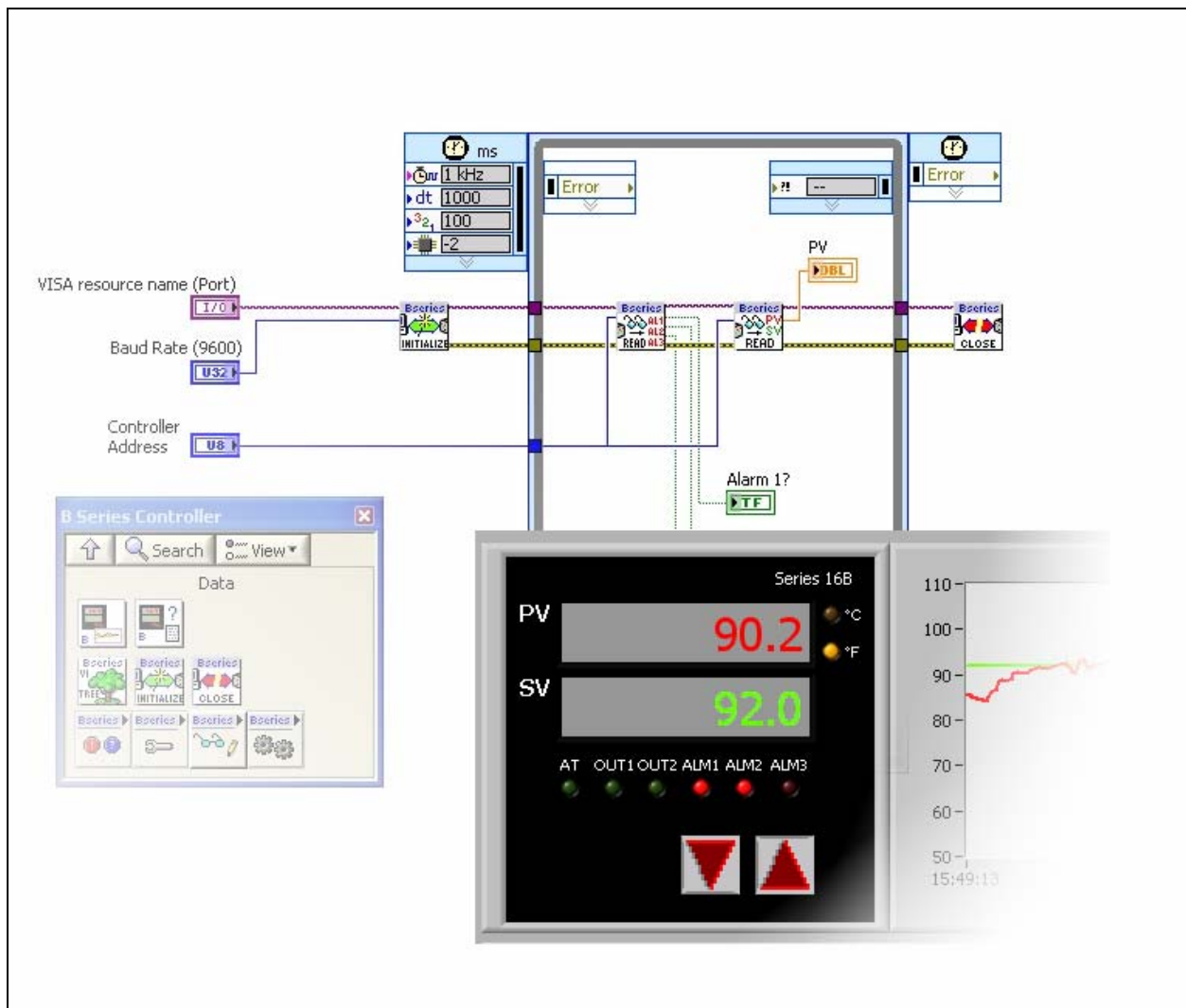


Figure 5 - Process Controller Communication Libraries (<http://www.integratedpro.com>) for LabVIEW offer quick development of RS-485 communication-based process controller networks in NI LabVIEW (<http://www.ni.com>) graphical programming environment.