APPLICATION NOTE

CAS DATALOGGERS

Production Monitoring of a Metal Stamping Press

Real-Time Data Acquisition Prevents Defective Parts

A manufacturer of automotive torque converters needed to increase quality and reduce scrap in their metal stamping operations. One of the main parts of the converter was created on a hydraulic stamping press, which created a series of indentations in a metal ring. In a stamping press, hydraulic cylinders force hardened rectangular punches into the metal blank displacing the metal into a corresponding die; in this case, creating 136 separate indentations in each part. The hardened rectangle punches are subject to wear and breakage so they approached us for a production monitoring tool for these presses.

In this automated environment, where one part was turned out every 45 seconds, many defective parts could be fabricated before a visual inspection by the press operator detected that the indentations weren't being properly formed because of a worn punch or one that had failed. The plant ran multiple punching machines simultaneously with failures sometimes occurring as often as once per shift. This resulted in a great deal of scrap since the parts could not be reworked. Therefore, plant management needed a highly accurate data acquisition and control device that could continually monitor the punches in real-time for signs of developing breakage. A high-speed, real-time data acquisition solution was the answer.

Installation

The manufacturer installed a custom system designed by CAS DataLoggers incorpo-

-rating an ADwin-Light-16 Real-Time Data Acquisition System to measure the force generated during the stamping operation. A pressure sensor was attached to each hydraulic cylinder used to drive the punches, providing data on the punch's force as the indentation was formed. Data was collected over a period of time to characterize the load signature from a properly operating press. This signal was coded into the ADwin and used as a reference against the real-time signatures collected during production. A start signal from the PLC used to control the press was fed into the ADwin's digital input to trigger the acquisition cycle. The force waveform was sampled at 1,000 samples per second over a period of several seconds during which the indentation was formed.

The ADwin immediately computed the maximum and minimum force and compared it to a stored load signature. If the operating curve was outside of the programmed tolerance, the ADwin used a digital output to send a signal to the PLC to indicate that there was a problem and to stop the machine. This eliminated the production of defective parts which had to be scrapped.

This ADwin-Light-16 features 8 16-Bit analog inputs, of which 3 were used to sample the pressure signal from the 3 hydraulic cylinders in the press. 2 of the 6 digital inputs/outputs were used for the interface to the PLC controlling the press. The system also has a 32-Bit SHARC real-time DSP with its own local memory to handle data acquisition, online statistical processing, and control of outputs.

Real-time development was performed using ADbasic software. With ADbasic, users can easily create event driven applications to capture and process data, generate output signals and provide open or closed loop control. ADbasic's functionality allows access to all the ADwin's I/O as well as implementing calculations, logic, state machines, and communication with a PC.

Benefits

The automotive manufacturer benefited significantly following the installation of the custom ADwin system for their production monitoring. The system provides real-time monitoring of the stamping operations and allowed the plant's broken punches to be detected immediately, greatly reducing scrap costs and wasted time. And, as more data was collected it became possible to identify tooling that had become worn prior to failure, which further reduced scrap and machine downtime. The early-warning system also reduced the once-constant need for operators to inspect each part for defects. The ADwin system was an economical solution that provided a near-immediate ROI and greatly increased quality.

For more information on the ADwin-Light-16 real-time data acquisition system, or to find the ideal solution for your application-specific needs, contact a CAS DataLogger Application Specialist at **(800) 956-4437** or www.DataLoggerInc.com.