Production Monitoring of a Metal Stamping Press

Real-Time Data Acquisition

A manufacturer of automotive torque converters needed to increase quality and reduce scrap from the metal stamping press operations. The parts were created on hydraulic stamping presses which created a series of indentations in the metal part. In a **metal stamping press**, hydraulic cylinders force a hardened punch into the metal blank displacing the metal into the corresponding die; in this case creating 136 separate indentations. The hardened punches are subject to wear and breakage.

In this automated environment, where one part was turned out every 45 seconds, many defective parts could be fabricated before an operator's visual inspection detected that the indentations weren't properly formed from a worn punch, or one that had failed. The plant ran three simultaneous punching operations 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 which 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 incorporating an ADwin-Light-16 Real-Time Data Acquisition System to measure the force generated during the stamping operation. A load cell was attached to each hydraulic cylinder used to drive the punches, providing highly-accurate data on the punch's force. Data was collected over a period to characterize the load signature from a properly operating press. This signal was coded into the ADwin and used as a reference against the active signatures collected during production. A signal from the PLC used to control the press was fed into the ADwin's event input to trigger the acquisition cycle. This constituted the real-time machine monitoring solution. The force waveform was sampled at 1 kHz over the period during which the part was stamped.

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 sent a signal to the PLC to indicate that there was a problem and stop the machine. This eliminated large runs of poor quality parts that in the past had to be scrapped.

This 16-channel data acquisition system featured 8 16-Bit analog inputs, 2 16-Bit analog outputs, and 6 digital inputs and outputs (TTL/CMOS compatible). The system also has a 32-Bit SHARC DSP with its own local memory to handle system management, data acquisition, and on-line processing and control of outputs.

Real-time development was performed using ADbasic software. With ADbasic, users easily optimized and compiled the program code, and implemented the real-time processes. ADbasic's functionality allows access to all the ADwin's I/O as well as implementing floating-point operations, process control and communication with a PC. A library complete with standard functions including filtering, various examples for counter use, closed-loop controllers, and function generators made for a quick implementation.

Benefits

The automotive manufacturer benefited significantly following installation of the custom ADwin data acquisition and control system. The system provides real-time monitoring of their stamping operations. Use of the ADwin system 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 easy 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 ADwin Real-Time Data Acquisition Systems, or to find the ideal solution for your application-specific needs, contact a CAS Data Logger Applications Specialist at **(800) 956-4437** or visit our website at www.DataLoggerInc.com.