



Glass Production Testing

using the ADC488/16A

Manufacturing

Application Note #35

To maintain optimal output and to minimize material waste, glass-product manufacturers need to closely monitor production machinery. Especially in an emergency, it is vital that engineers diagnose operating problems quickly and accurately.

Application Summary

Hard-to-detect malfunctions in glass-production machinery can diminish output quality and cause costly equipment downtime. This is especially true for machines performing critical cycle and event timing. For example, a difference of only $\pm 5\text{ms}$ in a glass machine's plunger timing can significantly change the weight of the glass entering a mold station, ruining the product and causing expensive damage to the machine.

To detect equipment malfunctions and to minimize scrap, a leading glass-products manufacturer employs a department of applied-manufacturing engineers who maintain its molding and formation machinery. The engineering team's job involves collecting accurate, real-time readings from a variety of production equipment. Typical measurement variables include temperature, pressure, force, and displacement, which must be collected with millisecond- and even microsecond-time resolution. To do this, the team's test-and-measurement

instruments must operate flawlessly in high temperatures, noisy electrical environments, and other extreme conditions associated with glass production.

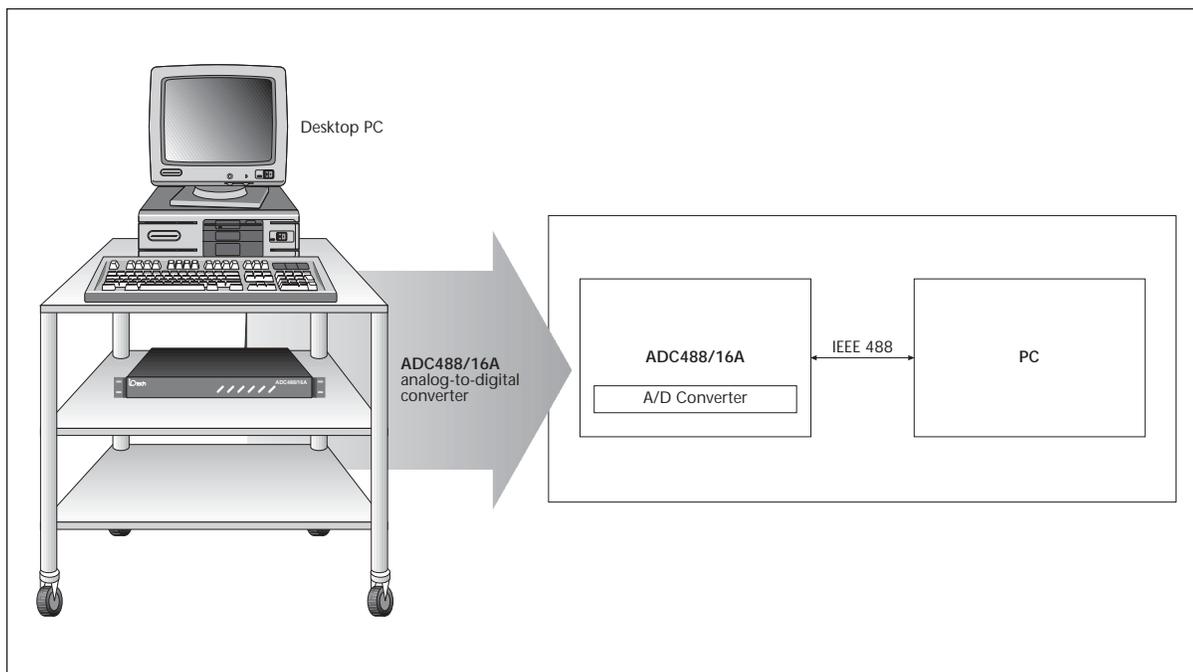
Potential Solution

Originally, the engineers equipped production machines with permanent, site-specific data acquisition hardware. This was very costly as the company had to buy, install, and maintain a system for each machine. These expensive systems were subject to noisy electrical environments, and they did not provide the performance flexibility required for thorough equipment evaluation.

IOtech's Solution

The engineering team set out to design a flexible, high-performance portable PC-based data acquisition system capable of a wide variety of measurements that could be easily transported from machine to machine. This was accomplished in the form of a flexible "crash cart" system using IOtech's **ADC488/16A**™ analog-to-digital (A/D) converter. Ideal for numerous applications, the system could be used as a data logger, waveform analyzer, and low-speed digital oscilloscope.

The **ADC488/16A** accepted up to 16 single-ended or eight differential analog inputs and provided 16-bit A/D conversion of up to 100K samples/s.



Housed on a "crash cart," the PC-based, **ADC488/16A data acquisition system** is a portable solution for quickly diagnosing a variety of machine malfunctions in factory settings



The system featured pre-trigger and trigger functions that allowed the engineers to capture critical readings before, during, and after specified events. All of the collected data could then be transferred to the PC's hard drive via an IEEE 488 GPIB card installed in the PC.

The system's components were attached with mounting hardware and were placed on a cart that could be easily rolled to machines throughout the plant for quick diagnosis. The crash-cart setup proved to be very effective. During one instance, a glass press began producing scrap on one of its stations. To avoid shutting down the press and losing production from the machine's good stations, the engineering team was called in. Within a few hours, the engineers connected the crash-cart system to the faulty station, observed timing and position relationships, and fixed the problem, minimizing downtime and production loss.

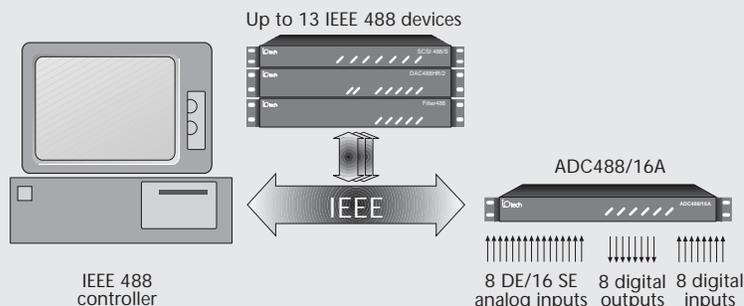
Conclusion

The portable PC-based, crash-cart data acquisition system continues to perform test-and-measurement tasks more efficiently and cost effectively than the expensive, site-specific systems that the glass manufacturer previously used. The system's high performance capacity, extensive signal conditioning options, and portability make it an excellent alternative to data loggers, stripchart recorders, dedicated hand-held devices, and expensive rack mounted systems.

ADC488/16A



The ADC488/16A provides many of the features found in expensive digital oscilloscopes. It enables high-speed, high-resolution, analog voltage measurements via the IEEE 488 bus. The system exceeds most plug-in board performance and provides functions typically associated with expensive waveform recorders and digital storage oscilloscopes.



Features

- Provides 16-bit A/D conversion at up to 100,000 samples/s
- Offers 16 single-ended or 8 differential analog inputs, expandable using master/slave configuration
- Provides ± 1 , ± 2 , ± 5 , & ± 10 VFS programmable input ranges
- Features continuous throughput to the IEEE 488 bus at 200 Kbytes/s (100,000 16-bit readings/s)
- Offers memory expansion up to 8 Mbytes (4 Msamples)
- Analog inputs isolated from ground by 500 VCM
- Includes eight TTL-compatible digital inputs & eight TTL digital outputs
- LabVIEW® drivers available

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