# Shaving Milliseconds off of Test Time

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THE concept of a test sequencer is not entirely new. Essentially a sequential list of test operations that reside outside the PC, test sequencers have been readily available in higher-end ATE systems that can cost upwards of a million dollars. Now, test sequencers are becoming more common in less expensive instruments as well. Here's a look at how test sequencers can speed up tests on optical devices, saving time and money.

A test sequencer is essentially a sequential list of test operations that a system performs on a device. Test sequencers are preloaded into a test instrument, saving the instrument and the device handler from having to communicate continuously with the PC. This automates the test process and shaves precious time off of the test cycle.

In a typical test setup without test sequencing, a PC communicates with a test instrument via an IEEE-488 (GPIB) link and with a part handler through a serial link. The PC receives a signal from the parts handler indicating that a component is in place and that the test can begin. The PC then sends a command to the instrument to make a measurement. Data is then sent from the instrument to the PC where the PC decides whether the DUT (device under test) is in tolerance or not. If it is out of tolerance, the PC sends a signal to the handler to reject the part and another test can begin.

The main problem with this type of setup is the slow and continuous communication of data between the PC and the instrument. The test sequencer approach, on the other hand, involves a connection from the PC to the instrument and from the instrument to the device handler. Eliminating the link from the PC to the device handler removes a significant communications bottleneck by enabling the instrument to communicate directly with the handler. The test sequence is downloaded to the instrument from the PC, which is a one-time event. When the device handler places a part into position, it sends a signal to the instrument to begin the test. The instrument performs the test, makes the pass/fail decision, and sends instructions back to the handler. This eliminates the continuous transfer of data over GPIB and therefore decreases test time.

In most cases, an improvement in overall test throughput of as little as 10 to 100

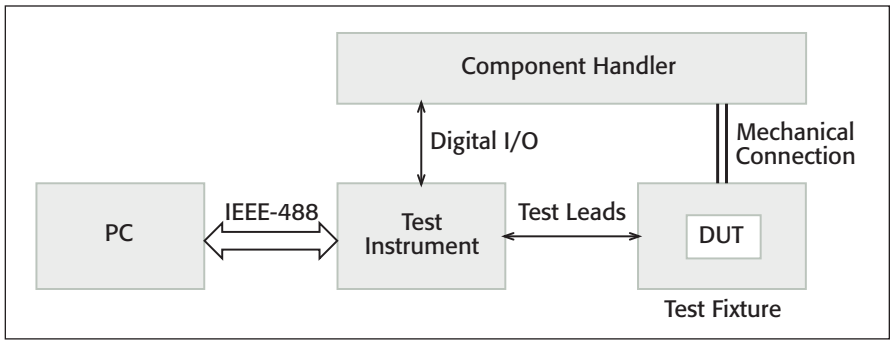


*Figure 1. In a typical production test setup, a test sequencer residing in the instrument eliminates a link between the PC and the component handler, speeding up the test process.*

milliseconds per part has a direct impact on the cost of test and therefore the overall profitability of a manufacturing line. Not only that, the quantity of products shipped goes up because testing is quicker, therefore helping a manufacturer add capacity without investing additional capital.

Instruments with test sequencers can run up to 100 complete test sequences without PC intervention. Each test can include source configurations, measurements, conditional branching, math functions, and pass/fail limit testing with binning capability. Some units can slow down more sensitive measurements and speed up others to optimize overall timing.

The traditional barrier for smaller manufacturers or those with higher mix/ lower volume products, or startups, has been the cost of test systems. Test systems based on instruments and test sequencers can now be developed, deployed, and operated for typically tens of thousands of dollars versus several hundred thousand dollars for large ATE systems. KEITHLEY

## About The Author:

Mark Cejer is a Business Manager for Keithley Instruments, where he is responsible for developing Precision Electronic Test applications, markets, and products. Mark has been with Keithley for over 10 years and during that time has led the launch of the Keithley SourceMeter® Line, the Integra Series DMM/Data Acquisition System line, DMMs, and other precision instruments. He has a BSEE from the University of Akron and an MBA from Case Western Reserve University. He can be reached at 440-498-2873 or at mcejer@keithley.com.



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