

TDS5000B Aids Panasonic Communications with Automatic Inspection of Laser Scanning Units - Evaluation speed is dramatically increased by high speed waveform capture, long memory, Open Windows, and AMP automatic measurements



■ Overview

Subject	With conventional type beam test equipment, measurement of the entire scanning range takes a long time. For Panasonic Communications, this takes a lot of people and consumes many man-hours, increasing costs and suppressing productivity.
Solution	The TDS5054B's open windows environment, long memory, and high speed waveform capture are combined with a high speed pulse parameter automatic measurement function of the ALL Pulse Measurement software (APM) to realize high-speed measurement of power and beam diameter on the image surface.
Advantages	Measurement time is reduced dramatically, from 6 hours to 6 seconds. An objective evaluation method has been established and improved quality with cost reduction has been achieved at the same time.

● Critical parts for laser printers

Panasonic Communications Co., Ltd., Office Network Company is a device manufacturer for document-related equipment such as IP-PBX systems, business facsimile equipment, high-speed scanners and printers and related devices.

A production group team led by Mr. Mitsuo Ogawa is in charge of development of laser scanning units (LSUs) for laser printer and starting up a plant. The LSU is a functional system that is the heart of the laser printer and integration of several different technologies, including an electrical system that provides laser emission and sensing functions, a mechanical system that includes a polygon mirror drive, and an optical system that consists of a lens and mirror. The company sells LSUs to companies; the technology has been adopted by many printer manufacturers.

● Conventional evaluation requires tremendous effort

In an LSU, the key part is the f θ lens. A polygonal mirror distributes laser beams in a fan-like fashion and the f θ lens then focuses the beams on a plain surface. The company uses a unique plastic mold technology to create the f θ lens. However, as was discussed by Mr. Ogawa, there is a significant problem with the evaluation method. "Because many of our LSUs are sold to printer manufacturers, quality evaluation and inspection are especially important. Previously, the production side used special beam scanning test equipment primarily for optical testing. With this method, it takes two persons six hours to evaluate one lens, therefore, we had to assign a lot of personnel to that task." Furthermore, there are limits in evaluation throughout the entire scanning range.



The F θ lens developed by Panasonic Communications

● Waveform parameter measuring 15,000 pulses

For that reason, the company developed a unique evaluation method using waveform analysis. Actually, a special high-speed sensor was developed during the development of the evaluation equipment. Beams scanned using the new method are observed as high-speed pulse signal arrays. At this time, the amplitude of pulses corresponds to the laser strength and the pulse width corresponds to the beam diameter. Up to 15,000 pulses are captured in 12 μ m units.

In addition to the ability to read high speed waveforms, the oscilloscope must have a long-memory. Before completing the current equipment, the company used a digital oscilloscope by another manufacturer to capture signals from sensors and measured pulse waveforms one by one on a tube surface. However, there are 15,000 pulses and it was not



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realistic to measure pulses one by one.

Also, since the inspection equipment is used in a production line, high speed throughput is requested. From the captured data, the parameters for each pulse are measured and the entire data is added up. In addition to an oscilloscope with long memory, custom application software is required to process the data. Mr. Ogawa initially considered developing the custom application software in-house and was prepared to spend about a year in development.

- **TDS5000B and APM solution**

Tektronix responded to this issue by proposing a combination of a TDS5054B oscilloscope with high speed waveform capture rate, deep memory, Open Windows environment and ALL Pulse Measurement (APM) software. Furthermore, they added to the items measured an electrical pulse width that corresponds to the diameter of the optical beam. APM is pulse parameter automatic measurement software provided by Tektronix Japan that runs on Tektronix oscilloscopes with an Open Windows measurement environment. Since the general-purpose software (LabVIEW by National Instruments Corporation) was the base, addition of measurement items could be handled flexibly and customized software could be provided in a short period of time.

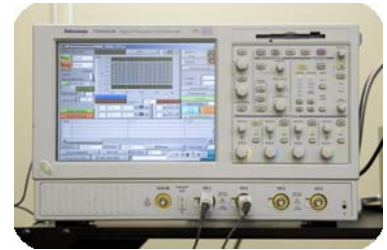


This all resulted in a remarkable achievement. It used to take six hours to evaluate one lens but now it takes just six seconds to capture data and three seconds to perform the calculation, resulting in dramatic time savings. Furthermore, since the front of the lens is entirely scanned and the data is all digitized, power uniformity on the image surface, detected dust and scratches, and also distribution of beam diameters can now be objectively evaluated. Use of the APM brought about other advantages as well, in that the

software in the system is only used for control purposes and is therefore compact.

- **Globally utilizing a network function**

When Mr. Ogawa finished development, he commented, "It is strange that there was no request like this before." This is a good example where high speed waveform read of TDS5000B, deep memory, the Open Windows environment and APM's pulse parameter automatic measurement function perfectly match Mr. Ogawa's requirements.



According to Mr. Ogawa, "Because of the development of this solution we are now able to perform digital and objective evaluation of the entire beam range and the amount of user trust in the results has deepened." Previously, conventionally sensitive inspection was customarily performed on comprehensive performance by outputting result images.

More than one APM system has already gone into operation. "Our production line is in the Philippines and this system supports networking, which is a strong advantage. In fact, we use remote operation to monitor data and replace applications from Japan so we can quickly handle dynamic changes in the production system."

He further added that, "For me, the strong operability of Tektronix's oscilloscope is very attractive; in addition, because the system is combined with APM, it operates without the need for human intervention of any kind. It is a great advantage for the device to be incorporated in the production line."