Fiber manufacturers are continually evaluating new test strategies in order to increase production output and to reduce manufacturing cost. The challenge is that they usually perform at least five measurements on the full fiber length, and at least three more measurements on short samples from the spool. Because these measurements are performed at multiple separate test stations, fiber spools need to be transported from station to station and fiber ends are prepared/aligned/coupled to test systems multiple times. The testing process is inherently inefficient and costly.

What if all critical fiber tests could be performed at just two test stations? That’s what Photon Kinetics has achieved with its Full Length Test Station on display at OFC 2017, and the Short Sample Test Station PK introduced at OFC in Los Angeles just 2 years ago.

At the Full Length Test Station, fiber ends are connected just once via the fiber coupling station that features two 1100 Single Fiber Aligners. Then five essential measurements (OTDR, spectral attenuation, mode field diameter, chromatic dispersion and interferometric PMD) are sequentially performed utilizing standards-compliant test methods. Because the station employs the industry-leading 8000 OTDR and 2880 Fiber Analysis System (see inside), it takes just 30 seconds to obtain all five measurements. This makes the Full Length Test Station the perfect partner for the recently introduced Short Sample Test Station (2300 Fiber Analysis System) which is able to characterize both fiber geometry and cut-off wavelength in just 15 seconds.

Both the Full Length and Short Sample Test Stations are controlled by the innovative PKSL software application that automatically detects which PK measurement systems/options are connected to the system controller (via USB) and how they are configured. It then allows the user to execute fully customizable test routines that employ the attached systems/options. The benefits are clear. Test routines, whether single or multi-parameter, are created and customized using the same PKSL Test Wizard, operators work with a common graphic user interface with local language support and test results are stored in a common database.

High performance full length and short sample measurement stations, plus a common software platform, provide fiber manufacturers with ultimate measurement speed and overall test efficiency, enabling both maximum production output and minimum testing cost.
A critical component of the Long Length Test Station being introduced at this year’s OFC 2017 (cover story) is the new 2880 Fiber Analysis System. The 2880 takes the unparalleled measurement speed of its predecessor, the 2800 Fiber Analysis System, to the next level enabling chromatic dispersion measurements that are the fastest, by far, of any test system available.

The 2880 is the latest member of the PKSL (Photon Kinetics Scripting Language) product family which means that the system runs on the same software platform as the 2300 Fiber Analysis System, 2302 Coating Geometry System, 2311 Fiber Curl System and 8000 OTDR. Just determine your test plan, connect the necessary PKSL systems to the station controller (via USB) and the PKSL application will run them all. The PKSL application provides the ability to create and execute either single or multi-measurement test sequences via a common user interface (with local language support) and stores results in a common database.

Besides the new PKSL software platform, the 2880 also features numerous hardware improvements that have not only improved measurement performance but have also facilitated the addition of number of new measurement options. These new options include the 2880-INT Interferometric PMD and 2880-ATT Attenuation Options. The 2880-INT employs the patented General Analysis (GINTY) method which makes it particularly well-suited for optical fiber production testing because of its high measurement speed (less than 5 seconds) and its ability to measure fiber having ultra-low PMD. The 2880-ATT option adds spectral attenuation measurement capability and can be configured to measure fibers longer than 150 km across a broad range from 1270 to 1650 nm.

A new software platform plus unrivaled chromatic dispersion, polarization mode dispersion and spectral attenuation capability make the 2800 a valuable tool for all fiber and cable manufacturers.

Next Generation Alignment Systems
Take on Both 200 and 250 um Fibers

Photon Kinetics has long understood that the time required to couple the ends of a fiber to a test instrument can often take longer than the time required to actually perform the measurement. That’s why it developed integrated, high-speed fiber handling and alignment capability for its fiber test systems, and pioneered products such as the 1001-MFH Multiple Fiber Handler and the 1100 Single Fiber Aligner to couple fibers to “pigtailed” test instruments such as OTDRs and dispersion test systems.

In the near future Photon Kinetics will add to its history of fiber handling innovation with the introduction of a new line of automated fiber coupling products, the 1050 Series Fiber Aligners. Utilizing several proven PK technologies, the 1050 Series will provide low loss, low reflectance, high-speed coupling of ribbons or loose tubes composed of either 200 or 250 um (coating OD) fibers to test instrument pigtails. Similar to the current 1001-MFH Multiple Fiber Handler, the 1050C configuration will feature cassette loading of multiple loose tube or ribbon fiber holders, but in a far more compact package and with USB control.

Other configurations of the 1050 will include the 1050F and 1050S Fiber Aligners which can be used for coupling single fibers or subunits (tubes/ribbons) respectively. All configurations of the 1050 will feature integrated fiber preparation tools as well as highly reliable video alignment and automated application of index matching oil.

Interferometric PMD System Joins Production Test Product Line

While the new 2880 Fiber Analysis System being demonstrated OFC 2017 features optional interferometric PMD measurement capability, this same capability is also available as a stand-alone measurement system. The new 2820 Interferometric PMD System is yet another member of the PKSL product family that now includes the 2300 and 2880 Fiber Analysis Systems, plus the 8000 OTDR. As a part of the PKSL family, the 2820 features the same easy to use, touchscreen-capable, graphic user interface with local language support, test sequence creation via the PKSL Test Wizard and a common results database.

The 2820 employs the patented General Analysis (GINTY) PMD measurement method, a version of the interferometric PMD test method that is uniquely capable of measuring the ultra-low PMD values that are typically found in fiber and cable production test. Just as important is the fact that the 2820 can perform the measurements in less than 5 seconds, providing both effective and efficient PMD measurement capability without significantly adding to overall measurement time and expense.
While the 2300 Fiber Analysis System is the ideal test station for performing fiber geometry and cut-off wavelength testing on short lengths of standard single-mode fiber, it can also be configured to perform several other fiber geometry and transmission measurements.

Geometry options include the 2300-PMF option, which provides the hardware and software necessary to characterize the end-face geometry of either bowtie or panda type polarization maintaining fibers. Results include core and cladding parameters such as diameter, non-circularity and core/clad concentricity, as well as the geometry of the fiber’s stress elements. The 2300-MSF option enables characterization of the geometry of micro-structured fibers having one or more rings of holes surrounding the fiber core. And for large diameter fibers, the 2300-LDF option employs optimized optical components to enable end face geometry measurement of fibers having cladding diameters up to 400 µm. For larger diameter capability contact the factory.

Besides options for end face geometry, other options are available to expand the 2300’s measurement capability. These include options for fiber coating geometry (2302), fiber curl (2311) and mode field diameter (2304). The Multimode Fiber Spectral Attenuation Option (2300-MMF) extends the 2300’s spectral scanning range down to 800 nm and ensures overfilled launch to enable measurement of both 50 and 62.5 µm core fibers. An automated serpentine mandrel mode filter (2300-MAN) can be added to the 2300-MMF to create standards-compliant launch conditions.

### OASYS.net Enables Comprehensive OTDR, PMD and/or CD Testing

Many of the world’s cable manufacturers utilize the 8000 or 8000i Series OTDRs with the OASYS.net OTDR Automation Software for final QA and in-process testing respectively. The most recent release of OASYS.net gives users the ability to not only perform automated OTDR measurements, but also allows users to perform polarization mode dispersion and/or chromatic dispersion measurements at the end of the OTDR measurement process with either the 2820 Interferometric PMD System or 2880 Fiber Analysis System with the 2880-INT Interferometric PMD Option.

At the completion of each OTDR measurement, OASYS.net will pause the measurement process to allow the fiber under test to be switched to the 2820 or 2880 system. The PMD and/or CD measurements are then performed. When complete, OASYS.net stores the PMD and/or CD results in the OASYS.net results file along with the OTDR data and then prompts the user to couple the next fiber to the 8000 or 8000i OTDR.
New 850 and 953 nm DMD Measurement Options Support Production of Next Generation, Wideband Multimode Fibers

The introduction of wideband multimode fibers (IEC Type A1a.4) presents new challenges for optical fiber manufacturers. These fibers must not only meet a bandwidth requirement at 850 nm, but they must also exceed a minimum bandwidth at 953 nm as well. The most practical way of ensuring that the stringent 850 and 953 nm bandwidth requirements are met is through the characterization of differential mode delay at both 850 and 953 nm, from which both the effective and overfilled launch modal bandwidth (i.e. EMBc and OMBc) can be calculated.

Photon Kinetics’ industry-standard 2500 Fiber Analysis System now offers two options for performing 850 and 953 nm DMD characterization. For fibers with higher overall DMD, or longer fiber lengths, a diode laser-based solution provides the requisite measurement capability. This option employs diode lasers at 850 +/- 2 nm and 953 +/- 6 nm each with a single-mode fiber launch in compliance with DMD measurement standards. The diode laser-based DMD option is capable of a system temporal response better than 100 ps.

For fibers with very low DMD or for short test lengths, a high resolution DMD measurement system is available that utilizes Ti:Sapphire lasers and provides system temporal responses less than 25 ps (at 850 nm) and 35 ps (at 953 nm). Contact Photon Kinetics for more information or for help in determining the optimal system configuration for your test requirements.

Analyzer To Accommodate Larger Diameter Preforms

The 2600 Preform Analyzer was originally designed to accommodate preform core rods with outside diameters up to 100 mm. For many years, this was not a limitation as most fiber manufacturers were producing core rods considerably smaller than 100 mm. But preform manufacturing processes have evolved, and today the production of larger diameter core rods is possible. Given that fiber manufacturers are always looking for ways to increase the length of fiber that can be obtained from a single preform, there is growing interest in be able to produce and analyze core rods larger than 100 mm.

In response to this interest, Photon Kinetics in now in the process of developing a configuration of the 2600 Preform Analyzer that is capable of accommodating core rods up to 120 mm diameter. This configuration will include mechanics, plus a modified optical system that will enable the longer scan range.

If the production of preform core rods up to 120 mm is in your strategic manufacturing plans, contact a Photon Kinetics Sales representative for more information.

Photon Kinetics includes products formerly branded as York Technology, PK Technology, GN Nettest and NetTest.