Dear readers,
I have to admit that I’m really excited to start this experience as the Editor-in-Chief of such a prestigious magazine.

I can still remember the first time I was invited to write a column for the *IEEE Instrumentation and Measurement Magazine*. The invitation was a great honor, and the writing of the column was a delightful process. I can readily confess that, at the time, I was not so aware of the magazine and its target readership. That first time was a great experience; since then I have shared with the magazine readership several of my research interests, including noise in measurement systems, energy harvesting for autonomous sensing, ambient assisted living, smart materials and inkjet printing technology for the rapid prototyping of sensors. Subsequently, this has led to a productive give-and-take on several subjects with the Instrumentation and Measurement community which comprises senior and young researchers, academics, and representatives from the industrial sector.

My experience as a reader….
Each *Instrumentation and Measurement Magazine* issue is a terrific experience. I find myself always immersed into deep science, presented in a very simple way, and accessible to anyone who is curious to learn and understand measurement subjects.

For the past couple of years, however, it is been much more than this. Each issue is now focused on a specific subject, with the aim of providing a “global view” of that subject/topic. This is a unique feature for a publication that targets such a wide readership and a unique resource for readers wishing to go through Instrumentation and Measurement subjects in a well organized and structured way. I would like to express my sincere thanks to the previous Editor-in-Chief, for the amazing job she has done! Thanks Wendy!

This is, exactly, my vision of what the *Instrumentation and Measurement Magazine* should be: a medium to communicate fundamental topics involving measurement science to the general audience, a springboard for current and incoming challenges in instrumentation, and a way to
share theoretical aspects with non-theoretical people. There will always be particular attention paid to the user side (including industrial needs), with the aim of opening minds and highlighting measurement topics, some of which are very often neglected or badly ignored. The measurement subject is central to almost every branch of science. The community at large should be aware of this, and this magazine can be a valuable path to such awareness.

This is exactly the case of the subject of this issue, dedicated to the SI topic. I would like to thank the Guest Editor of this issue, Dr. Richard Davis, who usually serves as a columnist of this magazine, for addressing the challenging field of Basic Metrology. Thanks Richard! And thanks to all of the valuable authors who have contributed to this issue.

This issue focuses specifically on the revision of a number of SI base units, the kilogram, ampere, kelvin, and mole, approved at the 26th meeting of the General Conference on Weights and Measures (CGPM) in Versailles, France. This revision aims to improve the SI, by providing new definitions based on fixed numerical values of the Planck constant \((h)\), the elementary charge \((e)\), the Boltzmann constant \((k)\), and the Avogadro constant \((NA)\). Such an engaging subject, definitively capturing the interest of people involved in the Instrumentation and Measurement framework!

Let me conclude by thanking colleagues who have afforded me this opportunity to serve as the EIC for the *IEEE Instrumentation and Measurement Magazine*. It is a great honor for me, and I can promise that I will do my very best to uphold and extend the high standards already inherent in the magazine.

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**Guest Editorial**

**The Revised International System of Units (SI)**

Richard Davis

A major revision to the SI was unanimously approved by delegates to the General Conference on Weights and Measures (CGPM) on November 16, 2018, to take effect on the following World Metrology Day: May 20, 2019. The revised SI has arrived but was a long time in coming.

What does the revised SI mean for the public in general and for metrology in particular? For the public, the international system of units still looks the same. The seven base units have not changed, and all SI units can still be written in terms of these seven, if one chooses to do so. Neither have the sizes of the units been changed. Familiar notions of the mass of a kilogram and the length of a meter remain intact as do the sizes of all other SI units. For metrology, however, the changes have been profound. The kilogram, defined since 1889 by the mass of a platinum-iridium cylinder kept in a suburb of Paris, has been redefined in terms of fundamental constants of physics, which are invariable and available. This was the last remaining artifact definition of an SI unit. Furthermore, the definitions of the ampere, the kelvin, and the mole have also been redefined to take advantage of metrology in the 21st century. While on a firmer footing than the
kilogram, the definitions of the ampere and kelvin were no longer suitable and have been changed, and advances in technology have allowed the definition of the mole to be simplified.

Four articles in this special issue of *Instrumentation and Measurement Magazine* introduce the revised SI and the reasons the international community has welcomed it so strongly. The first article, an introduction that I have written, emphasizes the SI as a “system,” as its name implies. The complete system of units is now defined by giving fixed numerical values to seven defining constants which in turn may be used to define the historical base units and all other SI units. The choice of the base units is not arbitrary, but neither is it unique. It is easy to think of a different set that would give the same system; but the historic base units serve to link all versions of the SI, past and present. It is the definitions of four of the familiar base units that have changed in consequence of the set of defining constants. And it is the set of defining constants that opens the door to innovation.

The paper by Stephan Schlamminger and his colleagues at the National Institute of Standards and Technology (NIST, USA) discusses the redefinition of the kilogram and the ampere. The authors have been heavily involved in the challenging interdisciplinary experiments required to redefine the kilogram, and to realize the benefits to mass electrical metrology of having the Planck constant and the elementary electrical charge as two of the seven defining constants of the SI. Their article shows why it is misleading to think of the elementary charge as merely the constant that now defines the ampere and the Planck constant as merely the constant that now defines the kilogram. The authors also make the case that the revised SI finally fulfills a dream of the 18th-century Age of Enlightenment—to create a system of units for all times and for all people.

Graham Machin of the National Physical Laboratory (NPL, UK), an expert in thermometry who has led several international projects designed to exploit the redefined kelvin, explains how it has been possible to redefine the kelvin in terms of the Boltzmann constant. As Graham explains, the new definition of the kelvin no longer singles out a particular temperature of the thermodynamic temperature scale to define the entire scale. New possibilities follow from this change.

Finally, Juris Meija of the National Research Council (NRC, Canada) presents the redefined mole in the historical context of the development of metrology in chemistry. Juris is currently Chair of the Commission on Isotopic Abundances and Atomic Weights (CIAAW) of the International Union of Pure and Applied Chemistry (IUPAC), and was a member of the IUPAC task group that proposed the text of the new definition of the mole.

It has been my pleasure to work with this group of distinguished authors and long-time colleagues on a topic of such importance to metrology.

And don’t miss Luca Callegaro’s personal take on the revised SI in this month’s Future Trends column. His column is a valuable complement to the four articles introduced above.
An Introduction to the Revised International System of Units (SI)
(Summary)

Richard Davis

The International System of Units (SI) is indeed a “system,” as its name implies. The complete system of units is now defined by assigning fixed numerical values to seven constants. The chosen set of defining constants eliminates the 130-year old definition of the kilogram based on the mass of a metal cylinder and generally makes the SI more compatible with contemporary science and technology.

This summary was written by the author.

The Units for Mass, Voltage, Resistance and Electrical Current in the SI
(Summary)

Stephan Schlamminger, Patrick Abbott, Zeina Kubarych, Dean Jarrett, and Randolph Elmquist

The ultimate success of certain challenging experiments has enabled redefinitions of the kilogram and the electrical units (ampere, volt, ohm, etc.). The Planck constant and the elementary electrical charge are now two of the seven defining constants of the SI, making obsolete the non-SI electrical conventions introduced in 1990 to take advantage of quantum voltage and resistance standards.

This summary was provided by the Guest Editor.

The Redefinition of the Kelvin
(Summary)

Graham Machin

This article explains how it has been possible to redefine the kelvin in terms of a fixed value for the Boltzmann constant. New technologies for improved temperature metrology are enabled by this change, but the widely-used International Temperature Scale of 1990 (ITS-90) still has a role to play.

This summary was provided by the Guest Editor.
**Mole: The Unit of Chemical Amount**

(Summary)

Juris Meija

The mole, which is a unit primarily used in chemistry, has been redefined in terms of a fixed value for the Avogadro constant. The mole is the unit of a quantity called “amount of substance,” also referred to as “chemical amount.” Highlights in the history of metrology in chemistry are presented. The rationale for the new definition is explained.

*This summary was provided by the Guest Editor.*

**Amending of Embedded Thermometry Method for Testing Friction Temperature Rise of Braking**

(Summary)

Zengsong Li, Jiusheng Bao, Yan Yin, and Tonggang Liu

The defects and causes of the embedded thermometry method for testing temperature rise were explored. Based on the principles of heat transfer, the friction plate was simplified as the thermal model, which was heated on one side and isolated on the other hand. Its laws of heat transmission were analyzed and thus the amending model of the embedded thermometry method was built. The results showed that the built amending model could improve the temperature measuring quality of the embedded thermometry method effectively.

*This summary was written by the authors.*

**Tracking Using State Estimation: A Brief Introduction**

(Summary)

Shlomo Engelberg and Benny Milgrom

We compare the performance of the well known Kalman filter to that of a simple receding horizon filter, a less well known technique. Our goal is to introduce the less well known family of techniques and show some of its advantages and disadvantages relative to Kalman-filter-based techniques. We use a single example throughout: we consider tracking the position of a ball thrown in a uniform gravitational field. We assume that two forces act on the ball—gravity and a random perturbation (perhaps gusting wind). We also assume that our measurements are noisy.
We compare the performance of the Kalman filter and a very simple receding horizon filter. The receding horizon filter does not need as much information about the system in order to work well—though it is not as good as the Kalman filter when one has enough (precise and correct) information about the noise to use the Kalman filter.

This summary includes text from the conclusion of the article.

**Strengthening the Practical Education of Students in the Field of Instrumentation and Measurement**

(Summary)

Adam Jóśko, Zbigniew Watral and Andrzej Michalski

Experience from many years of work with students in the area of I&M at the Warsaw University of Technology and the Military University of Technology helped define one of the greatest ills of technical academic training, which is the lack of practical application to real-world problems. While the level of theoretical knowledge acquired by students is sufficient, their practical skills leave much to be desired. The solution that addresses these two problems and allows us to solve them (to some extent) is the Industrial Design Laboratory (IDL) which was developed and implemented by the Faculty of Electrical Engineering of Warsaw University of Technology. IDL prepares students for typical industrial procedures for designing, launching and implementing new products for production. The basis for this type of activity is the specific functional and hardware structures of the laboratory, as well as the project catalog, which collects all project tasks reported by commercial entities in the area of I&M.

This summary includes text from the introduction of the article.

**Columns**

**Future Trends in I&M**

**Connections with the Universe**

(Summary)

Luca Callegaro

A note from Melanie Ooi: For this issue, I am excited to have Luca as our guest columnist, especially given his vast experience and expertise as an electrical metrologist. Dr. Callegaro works at Istituto Nazionale di Ricerca Metrologica (INRIM), the Italian National Metrology Institute. He provides a unique electrical metrology perspective on the future of the new International System of units and its impact on science and industry. If you want to know more, in addition to the references that Luca provides in his column, you can read the other valuable...
Life After Graduation

The New SI is Here!

(Summary)

Vincenzo Marletta

Actually, each time an improvement in the measurement system has been adopted, a new improvement in the technology has been obtained. This is why, in my opinion, the new SI is a point of arrival but also a new starting point. A similar opinion has been also pointed out by the National Institute of Standards and Technology. It will be the starting point of a new technology era. I cannot forecast now what the technology improvements will be, but I am ready to bet that they will affect heavily the life of people. Precision measurements already pervade modern life. Just think of the production processes of the technological devices we are used to having. Those processes require a huge amount of precision measures that we do not even imagine and without which it would not have been possible to produce those objects.

Departments

New Products

Robert Goldberg

Please send all “New Products” information to:
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Simplify Lab Management and Optimize Learning in Engineering Teaching Labs

Keysight Technologies, Inc. has introduced the BenchVue Lab Management and Control solution, a new software tool designed to simplify the configuration, monitoring and tracking of lab instruments, while optimizing student learning.
Practical hands-on learning using real, industry-standard bench instruments is one of the most valuable experiences universities and teaching institutes offer engineering students hoping to thrive in the workplace after graduation. However, with dozens of test benches, each equipped with multiple instruments, educators managing electrical engineering labs need to spend significant time manually setting up test benches, configuring and updating instrument firmware, and tracking lab assets for calibration and repair.

Keysight's new BenchVue Lab software application enables educators to spend less time on the manual set up and tracking of lab instruments and focus on what really matters—providing a high-quality teaching experience. It does this by giving educators centralized control, data logging and automation to seamlessly connect, configure and monitor all instruments within a lab.

Keysight's BenchVue Lab enables educators to:
• Streamline lab management via a customizable home screen with widget control that allows administrators to configure measurement settings on all lab instruments from a single admin PC.
• Easily track asset inventories and changes to the asset list with automatic updates provided as part of the solution's lab configuration status.
• Deliver an enhanced learning experience with full desktop and BenchVue application sharing that enables easy remote monitoring and student assistance in the test lab. Students can also easily control instruments, log data and screen shots, and automatically join lab sessions.
• Easily connect all lab instruments, including Keysight and others. Over five hundred Keysight test and measurement instruments are supported, along with non-Keysight test instruments compliant with the VISA connection protocol.

Additional information is available at www.keysight.com/find/lms.

Test Solutions for 5G NR Base Stations
5G is becoming a reality. Rohde & Schwarz offers test solutions for the new 5G mobile communications standard—for example, for generating and analyzing 5G NR signals in line with the latest 3GPP specifications (Version 15.2.0). 5G New Radio (NR) specifies new frequency bands above and below the bands presently used for mobile communications. In the FR1 frequency range below 6 GHz, the most important bands are between 3.4 GHz and 4 GHz, and in the millimeter wave range (FR2) between 26 GHz and 29 GHz. The new R&S FSW signal and spectrum analyzer analyzes 5G NR signals in the uplink for the development of 5G devices and components such as power amplifiers and in the downlink for 5G base station tests. It determines all key performance parameters such as error vector magnitude (EVM). The R&S SMW200A RF vector signal generator produces the required signals for uplink and downlink receiver tests. Both instruments are ideal for characterizing the high-performance, efficient Doherty amplifiers needed for 5G base stations. The two-path R&S SMW200A generates highly synchronized signals, while the R&S FSW provides the right analysis functions for optimizing the properties of Doherty amplifiers and other amplifiers.
New for performance tests on 5G NR base stations is the wideband R&S SMW-B15 fading simulator option integrated into the signal generator. To test base station data reception under realistic conditions, the wideband version of the R&S SMW200A simulates the required high-precision transmit signals in the millimeter wave range in line with the test specifications for 5G NR Rel. 15. Signals with bandwidth up to 2 GHz and fading channels with bandwidth up to 200 MHz can be generated with carrier frequencies up to a maximum of 44 GHz at the press of a button.

Another highlight is the patented R&S PWC200 plane wave converter. This converter makes it possible, for the first time, to precisely measure far-field properties in the antenna near field.

For further information, go to www.rohde-schwarz.com.

New 3D Technology Solves Challenging High-Speed Assembly Verification and In-Line Measurement Applications
Cognex Corporation has released two high-performance 3D vision systems, the 3D-A5000 area scan 3D system and DSMax32T laser displacement 3D system, and a new method of 3D part location, PatMax 3D. These three new offerings allow Cognex to meet users’ diverse 3D vision needs for 3D inspection applications, bringing superior 3D inspection to factories and manufacturers.

The 3D-A5000 acquires detailed area scan 3D images in a fraction of the time of current methods, due to the patent-pending 3D LightBurst™ technology. This technology casts a unique blue light pattern onto the part, capturing a full field-of-view 3D point cloud image in under 200 milliseconds from over 1.5 million 3D data points. It enables higher throughput and shorter cycle times for time-critical in-line applications.

The DSMax32T uses telecentric optics and unique high-speed laser scanning technology to acquire full frame, high-quality images. Combining data from 2,000 profile points, a full resolution, full frame 18 kHz acquisition rate, and advanced optics significantly increases throughput compared to traditional laser displacement sensors.

In addition to the 3D toolset, the 3D-A5000 also takes advantage of the new PatMax 3D™ part location tool that finds objects within a 3D point cloud image. PatMax 3D is a fast and accurate solution for locating and identifying objects which are tilted, stacked, or not properly seated with a fixture.

For more information, visit www.cognex.com/3D-A5000 or www.cognex.com/DSMax.

High Density Matrix Switch Card Extends Flexibility for Functional Test
Marvin Test Solutions, Inc. has released the new GX6188 High Density Matrix 6U PXI switch card for test applications with high I/O count and multiple test system resource switching requirements. The GX6188 is compatible with standard 6U PXI chassis as well as Marvin Test
Solutions’ GENASYS platform which includes complete turnkey test systems, subsystems, and modular instrumentation.

The GENASYS architecture incorporates “any resource to any pin” architecture and the innovative end-to-end switching software, SwitchEasy, greatly simplifying the routing of signals from an instrument resource to the UUT as well as preventing the routing or connection of signals which could damage the system or UUT. Additionally, GENASYS switching modules include on-board circuitry for counting and recording the total number of relay closures, providing prognostic data for predicting relay life.

Building on the architecture of the GENASYS switching platform, the GX6188 features an integral, 3-dimensional 104x8x8 switching architecture which accommodates multiple resources and facilitates the creation of larger switch matrices through the interconnection of multiple cards to the 8-wire global bus which is available on the GX6188’s front panel.

To learn more about the GX6188 and the entire GENASYS product line, visit www.MarvinTest.com.

**Dual-Channel Multimeter Combines Highest Density and Performance**

The Keithley DMM7512 dual channel 7½-digit sampling multimeter incorporates two independent and identical digital multimeters into a low profile 1U high, full-rack width space-saving enclosure. Featuring high density and performance, the DMM7512 is suited for a range of demanding high-volume manufacturing test applications that require measurement capacity, performance and a compact footprint.

With volumes and demand ramping up, manufacturers producing products and components such as laser diodes for 3-D sensing, mobile devices, automotive sensors and IoT devices need to minimize test costs, minimize the quantity of test equipment, and minimize floor and rack space consumption. They also need to ensure adequate test capacity and performance to meet production requirements. Currently, all other 7½-digit, high accuracy DMMs fall short of meeting these requirements, providing only a single-channel in a 2U high, half-rack width chassis.

Eliminating the need for a separate instrument to capture waveform parameters, the DMM7512 enables test engineers to capture transient signals and waveforms, even low-level waveforms such as battery drain currents, with its 1 Msample/s, 18-bit digitizer that has voltage sensitivity of 1 µV and current sensitivity of 0.1 nA.

For DC measurements on low power components, the DMM7512 provides 10 nV, 0.1 µΩ, and 1 pA sensitivities. It supports high accuracy, low resistance measurements with offset compensated Ohms, four-wire measurement, and dry circuit measurement.

For production environments, the DMM7512 reduces test time by executing test scripts using its Embedded Test Script Processor (TSP).
Data Loggers Record Physical Parameters Monitoring Physical Damage
The recording and storage systems from MSR Electronics are the size of a thumb and are particularly well-suited for transportation monitoring of all types of equipment. How often does cargo suffer damage during transport, whether as a result of jolts and shocks or fluctuations in temperature, pressure or humidity? Proof of causation and damage is usually extremely difficult, if not impossible, simply because the necessary facts are missing.

This issue can be solved by small, electronic MSR175 data loggers, which accompany the cargo during transport and accurately record varying parameters that contribute to a damage event for later analysis, all of which is installed in a waterproof plastic case and can be reused many times over.

In order to record events causing damage, they feature high-performance sensors combined with sophisticated storage and evaluation electronics. Their data provide the necessary facts to verify the perpetrators of damage or to further optimize transport packaging. For whatever reason these small loggers are used, they help to optimize transport processes, minimize the consequences of damage and ultimately save costs. They can collect important data—even over a period of several weeks. Data is collected using two 3-axis acceleration sensors (±15 g and ±100 g) integrated in the MSR175 data logger to record critical events, such as shocks and knocks, at a measurement frequency of up to 6,400 measurements/s.

The transportation data logger has a memory capacity of over two million stored measured values, which can record a minimum of 1,000 shocks over a period of several weeks. In addition, the MSR175 measures and records temperature profiles from -20 °C to +65 °C. A second type variant of this data logger is available with three further internal sensors—one humidity, one light and one pressure sensor—supplying additional useful transportation data.

The software package for the MSR175 data logger includes the “MSR Dashboard,” the “MSR ReportGenerator” and the “MSR ShockViewer.”


Fixed-Line Blue Laser Scanning Sensor
Hexagon’s Manufacturing Intelligence division has launched its first blue laser scanning sensor for creating point clouds. The HP-L-5.8 joins Hexagon’s comprehensive range of tactile and non-contact sensors for CMMs (Coordinate Measuring Machines) and is designed for companies who need a versatile, affordable, fixed-line laser sensor.

The HP-L-5.8 performs equally well when taking point cloud measurements from dark or shiny surfaces. Designed to be rugged and compact, it protects the sensor from collisions and vibrations and is ideal for use in areas where accessibility is restricted as well as on smaller CMMs.
The HP-L-5.8 is seamlessly compatible with Hexagon CMMs that use PC-DMIS 2018 R2 and subsequent versions of the software and works with an automatic indexing probe head or continuous wrist, making it easy to operate for users of tactile probing tools.

For more information, visit www.HexagonMI.com.

**Contactless Connectivity in an Extremely Small Form Factor**

Unlike almost every other aspect of mobile and computer hardware design, the connector has remained undisrupted for decades. Product designers struggle with delicate metal connectors that put unsightly holes in otherwise beautiful products. And, the EMI, RFI, and ESD design issues with connectors have only gotten worse as communications speeds have increased over time. Wireless communications eliminated many of those connector design issues but added new ones like cost, antenna design complexity, major power consumption and customer frustration with slow wireless networks, managing passwords, and pairing issues.

With Kiss Connectivity, a solid-state connectivity solution, Keyssa has reinvented the connector and designed a new category of contactless connectivity to solve the manufacturing and consumer challenges of today’s wired and wireless-network options for connecting devices.

Kiss Connectivity, Keyssa’s tiny solid-state connectivity solution enables users to transmit large amounts of data and video rapidly and securely between two devices that are in close proximity to each other. Just kiss and the devices connect automatically.

Kiss Connectivity uses Extremely High Frequency (EHF) signals to transmit information using standard protocols, like USB 3.0, DisplayPort, SATA or PCIe.

When built into tablets, laptops, smartphones or docks, this solution saves space and frees product designers to create sleeker, yet rugged, form factors currently constrained by today’s large, delicate, mechanical connectors.

Key Features:

- Comes in two form factors:
  - 3 x 3 mm half duplex (KSS104M)
  - 5 x 5 mm half duplex (KSS104)
- Data rates up to 6 Gbps in each direction
- Supports common high-speed and low-speed protocols
- Easy integration:
  - Clockless architecture; no external crystal needed
  - Integrated digital logic
  - Integrated antenna
- Ultra low-power
- No software or drivers required in an extremely small footprint.

For more information, please visit www.keyssa.com.
**New Arbitrary Waveform Generator**
Tektronix, Inc. has launched the AWG70000B Series Arbitrary Waveform Generator with new features that enable it to fully support the testing of complex electronic warfare and wireless communications systems that require the ability to dynamically alter signal sequences during test scenarios.

In complex test scenarios, engineers and researchers need flexibility to accurately recreate real-world signals and cycle through fast-changing signal tests quickly. To meet these requirements, Tektronix is bringing new Streaming Waveform ID functionality to its family of high-performance arbitrary waveform generators and doubling available waveform memory to 32 GSamples.

The Streaming Waveform ID feature provides users with immediate access to a total of 16,383 sequence steps though a direct Ethernet interface. With this expanded access, users can change scenarios quickly to replicate real-world simulations far more accurately in less time. In electronic warfare simulation, dynamic signal scenarios and deeper waveform memory enable engineers to generate more complex and longer strings of continuous radar pulses to more effectively simulate electronic counter measures.

For wireless communications research, engineers can now change modulation types on the fly to simulate Doppler radars, building obstructions or other obstacles to improve orthogonal frequency division multiplexing (OFDM) signal durability in real-world deployments.

The new AWG70000B Series also includes support for the Microsoft Windows 10 operating system to meet IT security mandates for instrument operation in government agencies and corporate IT departments.

The AWG70000B Series provides up to 50 GSamples/s,10-bit vertical resolution and spurious-free dynamic range (SFDR) of up to -80 dBc. This enables generation of highly precise RF signals and gives users high confidence in their measurement stimulus system.

The signal generator works with advanced SourceXpress PC-based software to simplify and accelerate test signal creation. SourceXpress allows users to create signals anywhere and control multiple AWGs.

Find more information at [www.TEK.com](http://www.TEK.com).

**Virtual Factory for Test**
Seica is demonstrating the power and performance of the new VIVA Next hardware and software platform in a totally innovative setting: a virtual factory where users will be able to explore hands-on, inside and out, Seica’s three new systems: Pilot V8 Next flying probe tester; the fully automated Compact SL Next for in-circuit and functional test; and the Firefly Next,
Seica’s laser-based selective soldering system. In addition, Seica demonstrates the power of the 64 bit VIVA Next software, which takes the open architecture concept to a whole new level.

Seica is also showcasing two new products, the Compact SLIM, a revolutionary new ICT (In Circuit Tester), and the AOL/THT system for conformal coat thickness inspection. The SLIM is ideal if you are looking to integrate the system using automation strategies such as cobots, where it is ideal to have the system interact physically with local operators versus totally autonomous industrial robots. Seica’s desktop AOI/THT system provides both conformal coat thickness inspection and component THT inspection in a unique, small footprint platform.

The VIVA NEXT Test Studio gives the user freedom to develop functional test sequences using whatever software is most familiar or preferred. The Test Studio initializes the environment and control of the overall test flow, such as: test program settings, barcodes, board status, pass/fail information, report generation, and variant management, allowing the programmer to concentrate attention only on what matters most, the test program.

The VIVA MyView environment makes it easy to customize the graphical interface for the operator, using the Seica graphic editor. Since MyView can also interact seamlessly with third party applications, it can provide one single operator interface (HMI) to manage all the steps of the test sequences.

For more information, please visit www.seica.com.

1200 W High Power Piezo Driver for Fast Switching Applications
PI (Physik Instrumente) LP has released the new model E-619, a high-power piezo amplifier designed to drive high-capacitance multilayer piezo actuators with rapid rise times or high frequencies. As a special form of electro-ceramics, piezo materials are the gold standard when it comes to speed, force, and precision in a small package.

Providing sink/source currents up to 10 amps and an output voltage swing of 160 V-pp (-30 V to +130 V), the new piezo driver delivers up to 1200 Watts of peak power. Despite its high performance, this amplifier is very efficient due to its energy recovery circuitry. A temperature sensor input provides overheating protection of piezo actuators.

Piezo actuators allow response times in the microsecond range. This behavior is beneficial for operating fast switches, valves, micro-machining and micro-dispensing equipment, as well as for active optics and vibration cancellation applications.

Find more information at www.pi-usa.us.

Schottky Diodes Offer Improved Efficiency, Reliability and Thermal Management
Littelfuse, Inc. has introduced two second-generation series of 650V, AEC-Q101-qualified silicon carbide (SiC) Schottky Diodes. The LSIC2SD065CxxA and LSIC2SD065AxxA Series SiC Schottky Diodes are available with a choice of current ratings (6 A, 8 A, 10 A, 16 A or 20
A). They offer power electronics system designers a variety of performance advantages, including negligible reverse recovery current, high surge capability, and a maximum operating junction temperature of 175 °C, so they are ideal for applications that require enhanced efficiency, reliability, and thermal management.

When compared to standard silicon PN-junction diodes, the 650V Series SiC Schottky Diodes support dramatic reductions in switching losses and substantial increases in the efficiency and robustness of a power electronics system. Because they dissipate less energy and can operate at higher junction temperatures than Si-based solutions, they allow for smaller heat sinks and a smaller system footprint. This provides end-users with all the advantages of more compact, energy-efficient systems and the potential for a lower total cost of ownership.

Typical applications for 650V Series SiC Schottky Diodes include:

- power factor correction (PFC),
- buck/boost stages in DC-DC converters,
- free-wheeling diodes in inverter stages,
- high-frequency output rectification and
- electric vehicle (EV) applications.

Additional information is available on the LSIC2SD065CxxA Series SiC Schottky Diodes product page and LSIC2SD065AxxA Series SiC Schottky Diodes product page. Please visit www.littelfuse.com.