Product News

Ansyo Supports High-Speed Digital Engineering Through New Graduate Program

The University of Colorado Boulder will launch a master’s degree program that will integrate and feature Ansys’ best-in-class electronics simulation in its new Professional Master’s Program in high-speed digital engineering.

The program will provide aspiring engineers with hands-on experience by incorporating Ansys’ industry-leading electronics simulation into its curriculum of high-speed digital engineering topics from signal and power integrity to electromagnetic compatibility.

The ten-course master’s program will integrate the Ansys Electronics Desktop Student software product, which students can easily download to access Ansys HFSS, Ansys Maxwell, Ansys Q3D Extractor, and Ansys Icepak. Ansys’ student products are a key component of the Ansys Academic Program, which supplies universities with affordable software for use in the classroom and in research, while providing students with free resources for self-learning.

As a subset of the PMP-HSDE program, CU Boulder will offer certificate programs tailored to specific design skills and tools. The master’s and related certificate programs will be offered through the department of electrical, computer and energy engineering.

The Ansys Electronics Desktop Student simulation package provides students with the opportunity to gain firsthand experience in high- and low-frequency electromagnetics, electromagnetic and electrothermal analyses, and more, while cultivating a greater talent pool of well-trained, career-ready electronics engineers for potential employers.

Currently, engineering students across more than 3300 universities in 90 countries are developing industry-ready simulation skill sets with Ansys’ products. In Spring 2023, CU Boulder will introduce the on-campus program with the potential to expand access through an online option after a successful launch.

For more information: https://www.ansys.com/

Laser Ablation for Elemental Analysis of Forensic Samples

To determine the source of inorganic elements collected at a crime scene, forensic scientists need dependable procedures. Physical evidence may be identified and compared using laser ablation inductively coupled plasma mass spectroscopy (LA-ICP-MS), which can distinguish elemental and isotope variations down to the part per billion (ppb) level.
An elemental examination of an item discovered during an inquiry might provide important information about its origin and history. However, since the item itself may need to be produced as evidence, any approach utilized for this examination should be nondestructive.

Laser ablation or photoablation is the process of removing material from a solid (or occasionally liquid) surface by bombarding it with a laser beam. The ingested laser energy heats the material, which dissolves or vaporizes at low laser flux. Using a high-intensity laser, the substance is often converted to plasma.

The LA-ICP-MS is a powerful analytical method for performing very precise elemental and isotopic analyses on solid materials. By focusing a laser beam on the specimen surface, laser ablation is employed in LA-ICP-MS to generate tiny particles. The ablated particles are then transferred to the secondary excitation source of the ICP-MS apparatus, where the selected mass is processed and ionized. The excited ions from the plasma torch are then transferred to a mass spectrometer for elemental and isotopic evaluation.

In short, LA-ICP-MS is a powerful instrument for analyzing a broad range of forensic evidence. This approach is very useful for overcoming the restrictions of extremely tiny sample sizes or samples made of unreactive materials. The LA-ICP-MS method produces a definite “fingerprint” based on trace element ratio data that is used to validate or exclude the origin of forensic evidence. Using a proper plotting application, a direct visual form of data is often created, making it simpler to distinguish samples.

https://www.azom.com/article.aspx?ArticleID=21642

New Laser-Based Volumetric Additive Manufacturing Method Can 3D-Print Glass in Seconds

Using a new laser-based volumetric additive manufacturing (VAM) approach—an emerging technology in near-instant 3D printing—researchers at Lawrence Livermore National Laboratory and the University of California, Berkeley have demonstrated the ability to 3D-print microscopic objects in silica glass, part of an effort to produce delicate, layer-less optics that can be built in seconds or minutes. The results are reported in the latest edition of the journal Science.

Versatile and ubiquitous, glass is increasingly found in specialized applications such as fiber optics, consumer electronics and microfluidics for “lab-on-a-chip” devices. However, traditional glassmaking techniques can be costly and slow, and 3D-printing glass often results in rough textures, making them unsuitable for smooth lenses.

Combining a new microscale VAM technique called micro-CAL, which uses a laser instead of an LED source, with a nanocomposite glass resin developed by the German company Glassomer and the University of Freiburg, UC Berkeley researchers reported the production of sturdy, complex microstructure glass objects with a surface roughness of just six nanometers with features down to a minimum of 50 microns.

UC Berkeley associate professor of mechanical engineering Hayden Taylor, the project’s principal investigator, said the micro-CAL process, which produces a higher dose of light and cures 3D objects faster and at higher resolution, combined with the nanocomposite resins characterized at LLNL proved a “perfect match for each other,” creating “striking results in the strength of the printed objects.”

Glass objects tend to break more easily when they have more flaws or cracks or a rough surface, so there is a large potential advantage to making objects with smoother surfaces than other 3D printing processes. The benefit of VAM for micro-optics is that it can produce extremely smooth surfaces without layering artifacts, resulting in faster printing without additional time for post-processing steps such as polishing.

For more information: https://www.llnl.gov
One Minute Mentor: Heat Treatment Applied to Tool Steels

After hot forming, tool steel usually is submitted to heat treatment processes that may be split into two major steps. These are shown here in a graphical form illustrating the typical processing and heat treatment sequences, splitting them into the steps done before hardening and those done for hardening, as a function of time, temperature, and phase transformation.

The first step is done to produce a low-hardness condition, which is important to machining, but which also should promote a homogeneous microstructure, usually referred to as the annealed condition. The second step involves this homogeneous microstructure being converted to a higher-hardness condition, usually by martensite formation during the hardening and tempering heat treatments.

For more information: www.asminternational.org/news/industry/-/journal_content/56/10180/48542500/NEWS

Plots of temperature versus time showing sequence of operations required to produce tool steels. (a) Thermomechanical processing. (b) Hardening heat treatment. L, liquid; A, austenite; C, cementite; F, ferrite; $M_s$, temperature at which martensite starts to form on cooling; RT, room temperature.
Physicists Develop Ideal Testing Conditions of Solar Cells for Space Applications

Researchers at the University of Oklahoma, with the National Renewable Energy Laboratory, the University of North Texas, the NASA Glenn Research Center and several collaborators within the space power community, have recently published a paper in the journal *Joule* that describes the optimal conditions for testing perovskite solar cells for space.

Perovskites are a material used in a type of solar cell, which convert light into electrical energy. Ian Sellers, a physicist at the University of Oklahoma and a co-author of the paper, said perovskite solar cells are creating excitement in the photovoltaics community due to their rapidly increasing performance and their high tolerance to radiation that suggests they could be used to provide power for space satellites and spacecrafts.

“Perovskites are exciting to a lot of people in the photovoltaics community because this new solar cell material can reach high efficiencies and has done so quickly and relatively simply,’” Sellers said. “But these materials also have significant issues in terms of stability and yield, particularly in atmospheric conditions—moisture, oxygen degrades this material, so it was interesting that there were a few people who suggested that despite these terrestrial instability issues, this system appeared radiation hard and appropriate for space.”

Applications for this research opens an array of possibilities. One area of research interest includes the investigation of perovskites’ use in permanent installations on the moon, specifically in whether lightweight flexible perovskites could be sent into space folded up and successfully deployed there, or even made on the moon.

Likewise, future research could explore the utility of perovskite solar cells for space missions to planets like Jupiter that have an intense radiation environment or for satellite missions in polar orbits with high-radiation levels.

For more information: https://phys.org/news/2022-05-physicists-ideal-conditions-solar-cells.html

Smallest Earthquakes Ever Observed in Micron-Scale Metals

On the micrometer scale, deformation properties of metals change profoundly due to the complex intermittent redistribution of lattice dislocations caused by external loading. This results in the forma-

On the micrometer scale deformation properties of metals change profoundly. The smooth and continuous behavior of bulk materials often becomes jerky due to random strain bursts of various sizes. Courtesy of Péter Dusán Ispánovity and David Ugi
tion of the uneven step-like surface upon deformation. To study this phenomenon, research groups of the Eötvös Loránd University of Budapest, Charles University of Prague and École des Mines de Saint-Étienne have developed a highly sensitive micromechanical platform, where weak elastic waves emitted by the specimen can be detected during the deformation of micron-scale pillars.

Compression experiments performed on such zinc single crystalline micropillars in a scanning electron microscope confirmed that these so-called acoustic signals indeed occur during strain bursts, so, this experiment allowed us, for the first time, to practically hear the ‘‘sound of dislocations.’’

The most surprising outcome of the experiments is that this process, despite the fundamental differences between deformation mechanisms of metals and that of tectonic plates, was found to be completely analogous to earthquakes.

‘‘These results are expected to bear high technological impact since, for the first time, we were able to observe direct connection between acoustic signals and the plastic events that emitted them,’’ said Péter Dusán Ispánovity, assistant professor at Eötvös Loránd University and head of the Micromechanics and Multiscale Modelling Research Group.

The methodology can also be used to investigate other types of deformation mechanisms, such as twinning or fracture, so the results, which were published in Nature Communications, are expected to open new vistas in the research of micromechanical properties of materials.

For more information: www.elte.hu/en/

**SZX-AR1 Augmented Reality System Simplifies Microscope-Based Manufacturing**

Evident, Japan, released its SZX-AR1 augmented reality system that retrofits to existing Olympus SZX series stereo microscopes to simplify complex microscope-based manufacturing tasks and simplify assembler training. Manuals, assembly instructions, images and instructional videos can be projected in the microscope’s field of view so that assemblers can work more efficiently.

The microscope-based assembly process can require the assembler to stop multiple times to consult instructions or to memorize these instructions before beginning their work. Repeatedly removing one’s eyes from the microscope oculars is inefficient and memorizing directions can lead to mistakes.

The SZX-AR1 unit solves these challenges by enabling instructions to be projected directly in the microscope’s field of view. Now, an assembler can complete their work without removing their eyes from the oculars or tediously memorizing complex sets of directions.

If there’s a problem during the manufacturing process, an assembler can use third-party collaboration software, like Microsoft Teams, to share a live view through their oculars with an offsite manager or engineer for guidance. The AR1 unit’s image and video recording capabilities make documenting any issues fast and simple.

Rather than relying on an onsite trainer to painstakingly instruct new employees about each step of the assembly process, the AR1 system enables users to receive training while they’re looking through their microscope’s oculars, helping them stay focused and making the process faster and more efficient.

Using the AR1 system, the trainer and trainee no longer need to be in the same place, eliminating travel costs. Manufacturers also have the option of using video recordings to train new employees rather than using a live trainer as the instructions can be projected directly on the sample through the microscope’s field of view.

For more information: www.EvidentScientific.com

**UTSA Corrosion Laboratory Working to Make Several Industries Safer**

Researchers, collaborators, and visiting scientists at the UTSA Corrosion Laboratory at the University of Texas at San Antonio are leading corrosion research that could lead to new ways to make products safer.

With funding from five governmental and industry partners, UTSA professor Brendy Rincon Troconis and her team are using the laboratory to integrate experimental approaches with accelerated degradation through harsh environments and extensive materials characterization with computational modeling to better understand corrosion and assist industrial partners in mitigating its effects.

One project in collaboration with David Restrepo, assistant professor in the mechanical engineering department, and co-principal investigator Rincon Troconis, supports the U.S. Office of Naval Research by investigating the effect of stress on corrosion kinetics.

‘‘A report from aircraft teardowns showed that nearly 80% of cracks on military aircrafts have been found in close proximity to corrosion sites,’’ Rincon Troconis said. ‘‘Considering that aircrafts are also exposed to mechanical stress, it’s important to best understand how they affect corrosion. This can be done through the evaluation of corrosion and attack on structural alloys in relevant conditions. All this information can feed structural life
management tools and lead to more efficient maintenance schedules.’’

The Department of Energy’s National Nuclear Security Administration (NNSA) has awarded $4 million to the Consortium for Advanced Manufacturing to develop and sustain the Consortium of Advanced Additive Manufacturing Research and Education for Energy Related Systems (CA2REERs). This group will expose, recruit, engage and train students from underrepresented groups for career advancement in manufacturing for energy.

Other collaborative research projects involve its partners at UT Rio Grande Valley, the University of Arizona, the Los Alamos National Laboratory, and the Oak Ridge National Laboratory. The NNSA grant will support institutional capability in developing research in advanced material, advanced manufacturing, and renewable energy. Rincon Troconis’ research will focus on atmospheric corrosion and hydrogen embrittlement of additively manufactured alloys.

For more information: www.utsa.edu/

Zeiss Intact 1360-X Inspects Tires in 55 Seconds

Zeiss Industrial Quality Solutions, Germany, released the shearography tire-inspection system Zeiss Intact 1360-X developed specifically for the inline control of new tires. The new system can detect separations and air bubbles, as well as foreign material inclusions in the tires that are difficult if not impossible to detect with an x-ray procedure. To inspect a complete tire — from beaded rim to beaded rim, including the loading and unloading — the system needs just 55 seconds.

The extremely fast inspection times that can be achieved are possible thanks to an innovative sensor technology that includes ten high-resolution probes working simultaneously. This allows the axial movements and the number of inspection cycles to detect errors on both the tire tread and on the side walls of the tires to be reduced. Also, motors bring maintenance-free cameras to the desired position faster than ever before.

All Zeiss Intact systems are equipped with tire size recognition as a standard feature. This ensures the automatic positioning of the probes, and a maximum boost in performance. The result is an inspection process that is simple, fast, and secure. Operator errors,
such as selecting the wrong inspection program, are not possible. This increases the profitability of the entire equipment increases and allows companies to quickly instruct staff to use the machine without their needing to have expert knowledge. Due to the user-friendly software, the inspection results can be easily analyzed and used.

It is also easy to be integrated into existing production processes. In addition to an MES interface as a web API, the Zeiss Intact 1360-X comes standard with a standardized interface for external conveyor systems. As a field test at one of Zeiss’s pilot customers showed, the Zeiss Intact 1360-X lifts “the quality assurance in tire manufacturing to a whole new level,” says Huber.

For more information: www.zeiss.com

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