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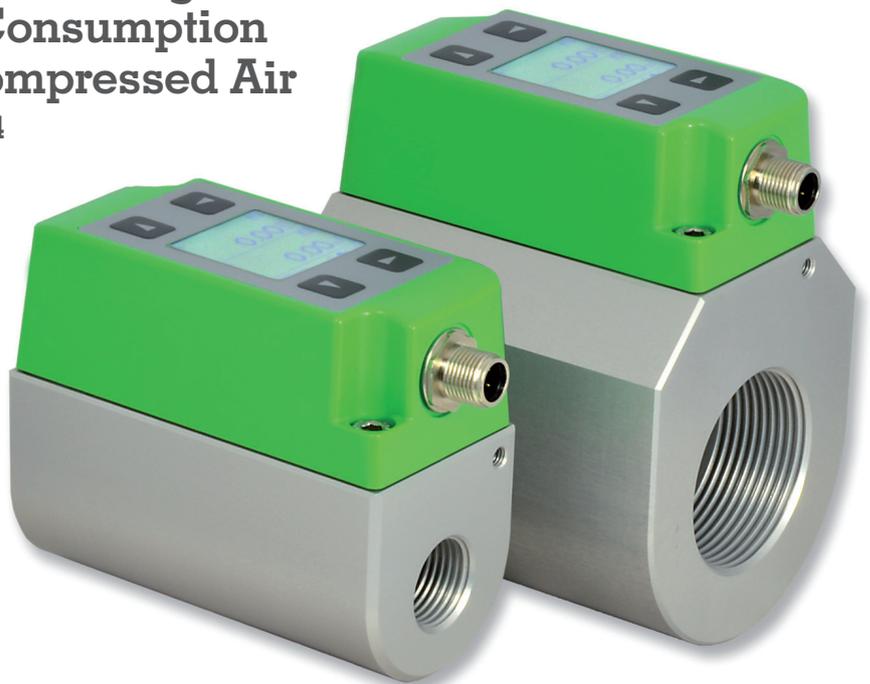
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Dear Reader,

I'm glad to present you the last issue of the 2017. I want to thank you for being with us this year and I hope that you have found in **IEN Europe** all the info you were looking for. Thanks to all our advertisers and to all the authors that gave us their contribution during these months.

New ideas, new opportunities: 2018 is coming and we hope that the European Economy will grow up more and more.

Industry 4.0 is not only a slogan, but a part of our working days: a lot of new solutions are developed every day and presented to us by the companies. So, why don't be prepared and up-to-date on all the developments in the industry world? **IEN Europe's** aim is just that.



In this issue you will find, in addition to the usual and varied product and industry news, the latest technology trends related to the **Automotive Industry**, a special editorial focus on **Mechatronics & Factory Automation** and another one dedicated to **Additive Manufacturing**. Furthermore, interesting case studies and application stories.

Moreover, you can find online, on page 11, our **2018 Rate Card**, the feature list of next year: do not hesitate to contact us for the focus that you think is interesting for you!

Keep following us on www.ien.eu to find what will be in the spotlight of next year.

Marco Marangoni

TIMGlobal Media Associate Publisher

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ABB Wins the Frost & Sullivan 2017 Company of the Year Award

ABB is named Frost & Sullivan's 2017 Company of the Year thanks to its visionary innovation embodied by its distributed control system (DCS) offering and its impact on customer performance. The award recognizes ABB's digital leadership, not only when compared to other industrial automation suppliers, but also against non-industry peers. The award highlights how ABB meets customer needs for improved performance in tough market conditions, at a time when process and power industries' production assets have never been larger or more complex. Frost & Sullivan states that ABB's penetration and expansion in emerging markets have helped it dominate the DCS market with a 20.5% market share in 2016. It notes that ABB's two closest competitors hold market shares of 15.2% and 14.5%. Frost & Sullivan's market research analysts attribute ABB's success to its alignment with market Mega Trends and developing industry-specific DCS solutions to address the demands of different end-user market segments, thereby enabling them to create new opportunities and values for their customers.



Partnership Sealed for JLT Mobile Computers and Steketee

JLT Mobile Computers announces that it has entered into a partnership with Machinefabriek Steketee B.V., who are using JLT VERSO™+ 10 rugged computers to integrate their Smart Farming solutions for precision agriculture. Steketee is a leading developer of high-tech weeding and soil cultivation machines, used by arable farmers and horticulturalists worldwide. Leveraging its extensive experience in the agriculture industry, Steketee develops innovative Smart Farming solutions that increase farmers' efficiency and improve crop yields through the use of IT. Their IC-Light hoeing solution uses a high-definition integrated camera to detect crops in the field and to render a digital image that can be used to detect cultivated crops and enable hoeing machine alignment with outstanding accuracy. The digital image can also be used to measure green surfaces, capture discolorations or count crops. Integrating the IC-Light solution with the rugged VERSO+ 10 computer from JLT Mobile Computers brings exceptional reliability and high computing performance.



The rugged VERSO+ 10 computer deployed in Steketee cultivation solutions is designed to withstand significant temperature changes, severe vibrations, bright sunlight and is IP65 dust and waterproof.

Rittal's New Laser Machining Centre to Automate Processes

In a "UK first", Runcorn and Ewloe-based electrical engineering firm, LCA Controls, has switched its control panel operations from manual production to laser-machining. The move is expected to transform its productivity and efficiency. LCA Controls, which recently came under new ownership, has invested in a Rittal Perforex LC 3015 3D laser machining centre - a system which will revolutionise construction of its stainless-steel panels by automating processes previously done by hand. With its with integrated 3D-modelling and computer-aided design (CAD) capabilities, the Perforex LC 3015 can be programmed to manage measuring and machining to an extremely high degree of accuracy, processing panels in a fraction of the former time. It will allow LCA Controls to service higher volume orders going forward, as well as rapid turnaround of bulk orders – including next day delivery. "Our investment in this new Rittal Automation Systems machine is incredibly important for the growth of our control panel manufacturing and design business here in the UK," said Alan Sheppard, Managing Director of LCA Controls. "It is a statement of intent in terms of our growth, as it means we can deliver more, faster, better, more efficiently for customers across the world without compromising on the quality we're famous for."



YASKAWA Releases New Mobile Apps & Wizards

YASKAWA has released two new mobile apps, Drive Wizard Mobile and the YASKAWA Manual App which eliminate the need for carrying a PC or printed manuals. The Drive Wizard app greatly simplifies set-up, monitoring and diagnosis of the GA700 range of drives while the Manual Reader provides users with full access to the latest GA700 manuals via a mobile device. Both of these apps and the Cloud services currently offered by YASKAWA are completely free of charge and can be accessed simply by scanning QR codes



supplied, then following the links to Google Play. Alternatively, they can be found by opening Google Play, searching for 'Drive Wizard' and 'Yaskawa Manuals'. The Drive Wizard app offers users a wide range of features and benefits such as: drive set-up, online monitoring and diagnosis with parameter details like descriptions, setting range, defaults etc. at a glance. Also, motor auto-tuning from a smart device, detailed alarm / fault descriptions and counter measures. Connection is by Bluetooth or USB via a BT keypad or USB-on-the-go adapter and cable. It is usable offline without internet connection.

Take your factory with you



Remote access for absolute control

Mitsubishi Electric's GOT2000 is the seamless gateway to your entire factory. Featuring intuitive smart device-like gestures and multi-touch commands, the human machine interface (HMI) of this graphic operation terminal streamlines monitoring and control of industrial automation devices. In addition, integrated wireless LAN communications both empowers you with system design flexibility and supports remote access to HMI and connected equipment for easy maintenance and training. Mitsubishi Electric Factory Automation solutions put virtually every type of factory automation device and application at your fingertips.





Solutions for the digital transformation of production

In an increasingly competitive manufacturing environment, businesses need flexibility, improved productivity and the capability to make gains in efficiency and reductions in downtime. Mitsubishi Electric showed how these requirements can be met with a focus on connected production systems, intelligent control systems, edge computing solutions and smart services at EMO 2017.

The e-F@ctory concept from Mitsubishi Electric was used to provide a practical structure for delivering these solutions, enabling the process of digital transformation to happen at a manufacturing level. Key technologies include CNCs, PLCs and EDM machines, plus live demonstrations aligned with partners for the challenges of today's machine tool industries.

Live examples of human and machine connected production systems showed how machine builders can enable end users to gain major business benefits. Increased connectivity is helping to deliver improvements in production optimisation, monitoring, remote services and predictive maintenance.

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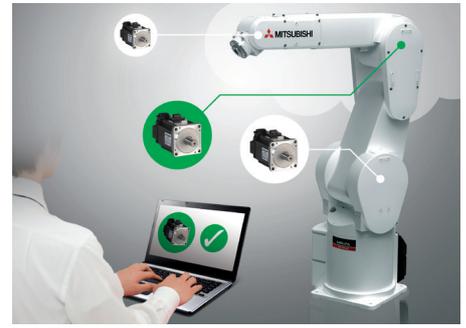
CLPA passes significant milestone as membership exceeds 3,000

2017 has seen the global footprint of CC-Link IE and CC-Link reach a new high, with the number of CC-Link Partner Association (CLPA) member companies passing 3,000. With this surge in members, of whom more than 300 are offering some 1,700 products available for the technologies, CLPA is helping to drive the digitalisation of manufacturing which is central to the goals of Industry 4.0.

Further, double-digit year-on-year growth has seen the number of installed devices increase from around 17 million in March 2016 to over 19 million at the end of March 2017, and today the installed base is well on the way to passing the 20 million mark.

CLPA-Europe General Manager John Browett comments: "The rate of new installations continues to grow at a double digit pace as more and more users come to appreciate the benefits of our technology."

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New concept in robotics for predictive maintenance

Mitsubishi Electric demonstrated innovative predictive maintenance possibilities for robots that can reduce operational costs, increase asset productivity and improve process efficiency at SPS IPC Drives 2017. The cloud-based solution is based on the AI platform within IBM Watson, which enables the smart analysis of operational data to highlight maintenance requirements. In addition, to increase the speed and efficiency of any necessary maintenance activities voice control and augmented reality have been implemented, providing opportunities for significant reductions in downtime.

Today many companies are still caught by surprise when machine failures occur. They tend to fix problems during unplanned downtime, or implement preventative maintenance based on set schedules or numbers of operational hours. However, with predictive maintenance, production problems can be highlighted long before they result in unplanned downtime or impact on yield. Maintenance operators can take corrective action before failure or before degraded machine performance results in faulty products being manufactured.

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MV R Connect wire-cutting machines with new-generation control

This autumn, Mitsubishi Electric unveiled two wire-cutting machines with a new control and simplified operation.

A new option that displays the output of numeric values as easy-to-read graphics – much like in an aircraft's cockpit – is now available. Hans-Jürgen Pelzers, Sales Manager Europe, explains: "Operation has to be simple, quick and flexible so that the user is able to achieve precise results with little effort – even when working to the highest standards." The new manual control box of the MV R Connect features a bright, user-configurable display and is equipped with all the important functions. With a freely rotating and pivoting 48 cm multi-touch display, the operator can comfortably make settings according to his needs.

Thanks to the built-in cost and performance monitor, the operator can analyse machine profitability and uncover reserves to optimise processes and boost efficiency at all times. Diagrams depict operating costs and output. All operating material statuses and maintenance cycles can be called up at a touch – and, if desired, read out. The machine comes with a network connection, USB, FTP, DNC and open data interfaces, and can be linked up to existing production planning and analysis systems.

In tune with the anticipated future requirements of Industry 4.0, the abundance of processable data available with these machines ensures transparency throughout the production stages. Intel Security is pre-integrated to provide security. Product Manager Stephan Barg says: "Transparent production is now possible and is proving to be appreciably more profitable and cheaper with the MV R Connect series."

The newly designed Job Planner makes it possible to simply bring forward urgent jobs, with automatic saving of the parameters of the interrupted jobs meaning work can be resumed later on.

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Condition Monitoring Services

Crisp producer relies on Schaeffler UK for vibration analysis and thermographic surveys

Schaeffler UK is providing route-based monitoring services to a UK-based producer of crisps. By analysing the vibration data from a range of plant and equipment at the site, Schaeffler is able to detect any damage to components such as rolling bearings and gears early, therefore reducing costly, unplanned downtime and prolonging the life of the equipment. In addition, Schaeffler provides regular thermographic surveys of electrical panels in order to detect faulty electrical components early.

Regular on-site vibration monitoring, analysis and thermographic surveys

As part of its service contract, Schaeffler UK provides regular on-site vibration monitoring, analysis and thermographic surveys to

the customer. A field service engineer from Schaeffler visits the plant on a periodic basis to collect vibration data, which he then analyses and then compiles a report for the customer. Crisp production at the plant is round the clock with incoming raw potatoes washed, peeled, sliced and fried. Flavour is added and the crisps are then bagged and packaged ready for delivery to customers. During each visit, a Schaeffler field service engineer takes vibration measurements to identify any deterioration of rolling bearings and other general mechanical components (e.g. gears, fan blades) on a variety of plant and equipment at the site. This equipment includes small motors, gearboxes, pumps and fans. This equipment drives a variety of plant such as conveyors, peeling machines,

cold and hot washers, fryers, slicers, bucket elevators, heat exchangers, extruders and centrifuges.

FAG Detector III

Vibration measurements are made and stored using Schaeffler's FAG Detector III handheld vibration monitoring device. With its built-in software, 'Trendline', which includes a database of more than 20,000 different bearing products from different suppliers, this device enables the user to collect, store and analyse vibration measurement data. Used in combination with the data viewer, the bearing database is ideal for assessing a machine's condition. For example, up to four different characteristic values can be stored and displayed against one measurement point (several defect bearing frequencies can be checked efficiently using a single measurement point). The FAG Detector III is used to measure and record vibration data at each selected measurement position on the monitoring route at the customer's plant. The three basic measuring parameters are velocity (a measure of overall machine vibration that responds to mechanical issues such as imbalance, misalignment and looseness), acceleration (typically used to monitor gear defects and progressing bearing defects) and enveloped acceleration (a measure of high frequency, impact-type events, typified by early bearing or gear faults).

The measurement data is then analysed by the Schaeffler field service engineer, who then writes an analysis report and recommended action list (if this is required) for the customer's maintenance team. The report typically includes Acceleration and/or Veloc-



Schaeffler's FAG Detector III



ity Trend plots that show alarm limits (red and yellow lines) and how the vibration data has varied over time.

David Goves, Applications Engineer at Schaeffler UK comments: "The alarm limits for the equipment [motors, pumps, fans, etc.] are initially set at default values based on ISO recommendations. However, as the database of measurements is built up over time, these alarm limits can be reviewed and may be adjusted to more appropriate levels."

The FAG Detector III is used to take measurements on each item such as drive motors, gearboxes, pumps, pedestal bearings (housings) and so on. For each piece of equipment included in the agreed patrol monitoring route, velocity measurements are normally taken in the horizontal, vertical and axial planes at the drive end and non drive end of each item. Additionally, acceleration measurements may be taken in the horizontal planes of gearboxes and motors. Furthermore, enveloped acceleration measurements may be taken in the horizontal plane on each item of a piece of equipment. The exact set-up for each piece of equipment may vary depending on its size, accessibility and previous history of issues.

Report on all the items of equipment

After analysing the recorded vibration data using the FAG Detector III's Trendline software, Schaeffler is able to report on all the items of equipment and to recommend any repairs or remedial action that is required. If bearing wear is found to be the cause of high vibration levels on a gearbox, for example, this can be reported to the customer, who can then source the appropriate bearings and plan precisely when the maintenance work i.e. re-

placing the defect bearings, can be carried out without disrupting the rest of the plant.

David Goves cites some examples: "From a recent site visit, we analysed the data and compiled a report for the customer. This included a list of recommended actions on those items of equipment that had exceeded the pre-defined alarm limits. For example, we advised the customer to check the grease levels on certain pieces of equipment. We also reported on other more general mechanical issues such as imbalance of fans and rotor blades, and misalignment of belt and pulley drives. We also recommended that the customer checked fasteners and housing bolts on particular items of equipment such as gearboxes that were showing signs of mechanical looseness."

Thermal imaging of electrical panels

Thermal imaging technology produces fast, accurate results in a real time, high resolution illustration, enabling engineers to detect problems that otherwise may be overlooked. Remedial work can therefore be carried out before costly system failures or production stoppages occur.

"The great advantage with using thermal imaging technology is that it is non-invasive and can detect hot areas, enabling us to evaluate the condition of electrical components inside panels and control cabinets, and whether potential problems are likely to occur," explains Goves.

At the crisp production plant, a Schaeffler field service engineer normally conducts a site survey of electrical panels and control cabinets using a handheld thermography camera, which incorporates a built-in digital



FAG Detector III is used to take measurements on each item such as drive motors, gearboxes, pumps, pedestal bearings

camera and customised reporting software. Equipment checked includes fuses, switchgear, wiring and cabling. "We can quickly open a cabinet and sweep the electrical components inside for any hotspots. If we do find any hotspots, these are often caused by loose wiring or cabling, a defective fuse or the fault could be due to some faulty equipment further down the line. The important thing is that we report the fault and the customer can then check it immediately before any line stoppages occur," says Goves.

After analysing the recorded vibration data using the FAG Detector III's Trendline software, Schaeffler is able to report on all the items of equipment and to recommend any repairs or remedial action required.

►► 54013 at www.ien.eu

Future Trends in the Connector Industry

Miniaturisation and other challenges for versatile hybrid connectors

Author: Bob Stanton, Director of Technology, Omnetics Connector Corporation

To identify trends and ensure deployment of the latest technologies, customers often ask which connectors are currently proving popular. At Omnetics Connector Corporation, recent exponential sales growth has been witnessed in the Metal Nano-D connector series, which was developed in line with Military Standard specification number 32139 for small yet rugged high-density interconnects. Notably, Nano-D connectors are set on a pin-to-pin spacing of 0.635mm (in contrast to the older Micro-D connector, which is twice the size).

In generic terms, today's connector industry is subject to six different areas of growth, which are referred to using the acronym 'FESTER' (Faster, EMI-shielded, Smaller, Tough, Easy to lock, and Rapid design and delivery). Matching all of these attributes is the Nano-D, a connector that can also be quickly modified to meet customer or application-specific design criteria.

Among the applications driving demand for Nano-D is body-worn electronics, which are now being used by a wide range of industries from mountain climbers to military ground troops. Electronics attached to soldiers' helmets and vests help military troops retain constant contact with battlefield control, as well as receive mapping, imaging and other critical information.

A further application fuelling the trend for Nano-D connectors is found within UAVs, typically as a result of the demand for rugged yet lightweight performance. For the same reasons, manufacturers of ground robotics are also ramping up their adoption of Nano-

D. Notably, the connector is still sufficiently large to offer up to 3 amps of current per pin where required. Simultaneously, the connector can accommodate high-speed differential signal processing data that includes USB signals up to 5Gb.

Looking ahead

Among the current important focus areas at Omnetics is rugged miniaturisation of high-speed digital signal processing. This work has been prioritised as there is soon likely to be an evolution of highly portable Ethernet systems, SBCs (signal board computers), portable surveillance systems that capture high volumes of data, and emerging chip technologies focused on processing that data at ever-faster rates.

New products available today include HDMI and USB-C connectors, which are smaller and more rugged than existing standard counterparts. Frequently, requirements arise for a standard USB format connector at one end of a copper cable with a high-density connector at the other. With this in mind, Omnetics is working attentively with several cable designers to establish a new level of innovation and performance that goes far beyond today's commercial products.

With good reason, design engineers are often keen to learn about the special characteristics of hybrid connectors and cable sets, which reduce the system's number of cables, require less panel space where the connector meets a module, and ultimately save the customer money. At Omnetics, hybrid connectors are focused on rapid custom configurations that



Bob Stanton, Director of Technology, Omnetics Connector Corporation

integrate various signal technologies into a single connector and cable.

Special designs

Although Omnetics offers a certain number of standard hybrid connector sets, today's ever-shorter design-to-product phase means that the company works more with designers looking to fulfil specific criteria. For instance, a common demand is the need to combine power, signal and speed in the same connector.

Tasked with such a requirement, Omnetics can work closely with the design engineer to determine the quantity of each signal type and pre-



Latching of Micro- and Nano-Connectors

challenges. When using hybrid cables and connectors, the PCB must be designed so that it can adapt to receiving dissimilar signals in close proximity. Traditionally, power supply signals come into the back end of a PCB, while high-speed signals arrive at the front. Although design engineers want the advantages of combined signal and power, they must also help in the 'signal launch' to and from PCBs. In addition, a high-speed differential signal arrives on a pair of wires, so both signals must be patterned with identical signal length to the processor. Any difference in signal arrival time causes signal 'skew', leading to pixilation or no signal at all.

Miniaturisation trends

Hybrid connector miniaturisation has increased demand for small but sturdy latching or locking hardware from the connector to the mating socket. Clearly, finding room and avoiding tools is important, which is why new latching connectors from Omnetics have been developed and tested to exceed the same shock and vibration standards of older connectors that require screws.

All of this begs the question: when will miniaturisation reach its limits? To arrive at the answer, it should be remembered that signal integrity management has always been the key element in connector technology. Omnetics has tested the number of mating and de-mating cycles a connector can endure – a key feature for potential failure. Connectors manufactured by Omnetics exhibit over 10,000 mating and de-mating cycles without failure, while some competing miniaturised connector designs fail at a much lower number.

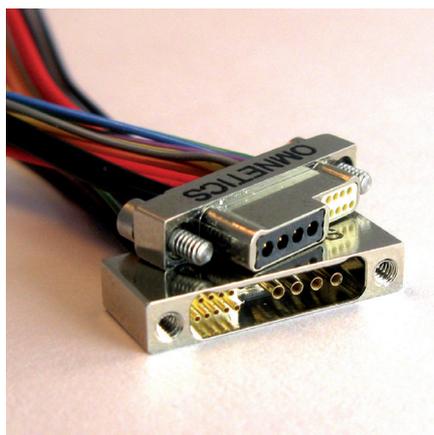
Ultimately, physical latching and mating will continue to challenge the industry as connectors get smaller. Additionally, cable strength and reliability – as internal wires and cable diameter reduce in size – can limit some designs. In the long run, proximity-based inductive coupling may become more and more commonplace, in a similar way that many mobile phones can now be charged by placing them close to a power source.

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cisely how much power is needed to optimise the performance and functionality of the connector for the specific application. The process typically starts with a standard micro- or nano-sized connector design before the insulator and pin/socket sets are modified accordingly. Solid Modelling software is used to accelerate this phase of the project and, once complete, the design is sent directly to the customer. Following discussions, rapid prototype tooling is actioned to set the insulator with the correct hole sizes so that the pin can be matched to the selected socket sets.

It is highly important at all stages of such projects to assess the key technical considerations. For example, when the requirements of speed and power are combined, cable design becomes a major element of scrutiny. High-speed differential signal pairs must be twisted in a wrapping process that speeds performance, before drain wires are added. The three-wire set is then shielded with metal foil to prevent noise interference to and from adjacent wiring sets. Power signals are also known to create hum, noise or jitter in the cable and connector. With this in mind, hybrid elements are isolated or set apart from the lower voltage signal wires.

Compact size, light weight, rugged performance, and higher speed signal transmission are typically among the special characteristics of Omnetics hybrid connectors. As a result, interest in hybrid connectors has spiked, especially as they can be prototyped specifically to



customer requirements. No longer do engineers have to compromise size or function by using off-the-shelf connectors.

Chip technology

In the future, chip technology could well prove to be the driving force behind cable and connector development. It is noticeable that CMOS (Complementary Metal-Oxide Semiconductor) technology has driven higher speeds, and now more GaAs (gallium arsenide) to GaN (gallium nitride) is being seen in the market, most importantly at lower voltages and lower current flow levels. As speed increases and voltage requirements decrease, ever-smaller cable wire and connectors will be needed.

Of course, miniaturisation in interconnections and hybrid connectors brings about certain

HOUSINGS WITH IMMERSION PROTECTION

More security against liquid penetration



The Han M portfolio by **Harting** provides new bulkhead hoods with increased resistance to external influences. In accordance with IEC 60529, the new bulkhead housings protect interior parts against strong water spray (IP66 degree of protection) and against temporary immersion in water to a depth of one meter (IP67 degree of protection). The special flange of the Han M die-cast aluminium housing prevents water from penetrating into the connector - thus protecting the contact points inside the connector. The new housings of the Han M series complete HARTING's housing range in sizes 6 B, 10 B, 16 B and 24 B. The Han M provides space savings of almost one-third compared to housings with protection class IP68.

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MOBILE LINEAR POSITION SENSOR

Position measurement for hydraulic cylinders



Turck is adding the robust LTE for direct integration in hydraulic cylinders to its portfolio of linear position sensors. The magnetostrictive sensor can withstand shocks of up to 100 g and the vibrations that typically occur

with agricultural and forestry machinery. The device is also insensitive to external influences, so that the LTE is even suitable for use in the hydraulic cylinders of construction machinery in extremely severe environments. The wear-free operating LTE guarantees high precision, linearity and repeatability. The sensor has a 16-bit resolution and also offers three signal ranges for mobile equipment (0...5 V, 0.25...4.75 V, or 0.5...4.5 V) in addition to the standard analog output signals of 0...10 V and 4...20 mA.

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INTEGRATED CONTROLLERS

CNC and PLC functionality in one device



OMRON announced the global release of its new NJ/NY-series CNC Integrated Controllers. In these new CNC Integrated Controller series, the Sysmac Integrated Platform has been

expanded to include CNC functionality, enabling high-precision complex profiling and increasing the production capacity of processing machines. The integrated controllers provide both CNC and PLC functionalities and synchronize both processes at high speed. This significantly increases the production capacity of the entire machine. Furthermore, by adding CNC setting and G-Code programming to its Sysmac Studio platform, OMRON also provides a true Integrated Development Environment (IDE) for configuration, programming, monitoring, and 3D simulations.

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FRAMELESS INDUSTRIAL MONITOR

Scratch-proof IP 65 multi touch HMIs



Kontron has introduced the Kontron FusionView series of industrial monitors with frameless design. They are available in display sizes from 10.1" up to 21.5" and can be used in either landscape- or portrait format. The front panel is IP65-protected and the PCAP Multi-Touch-Display can be operated with or without

gloves. An RFID reader which is installed behind the glass makes it possible to customize different authorization and security levels; thus providing in-depth access control. Users further have the option of incorporating Wi-Fi connectivity for easy integration into existing networks. All monitors are highly shock and vibration resistant and are perfectly suited for operation from 0°C to 50°C.



►► 53997 at www.ien.eu

PIEZORESISTIVE MANIFOLD SENSORS

Low pressure measurement from 1 mbar



First Sensor presents its new piezoresistive low differential pressure sensors of the HTD series with measuring ranges from 1 mbar to 7 bar. The very small and flat sensors with a footprint of only 8 x 13 mm and a height of <7 mm are ideal for space-saving manifold assemblies. The HTD differential pressure

sensors feature digital signal processing with 15 bit resolution and an SPI interface as well as an analog output signal. The high-accuracy and long-term stable sensors with 3.3 V or 5 V supply are suitable for battery-powered applications in mobile and portable devices. In manifold modules, the SMD miniature sensors allow a compact. Additional output signals such as I²C bus, 1-wire, alarm outputs or pulse width modulation are available on request.

►► 53999 at www.ien.eu

ROBUST POWER OVER ETHERNET SWITCH

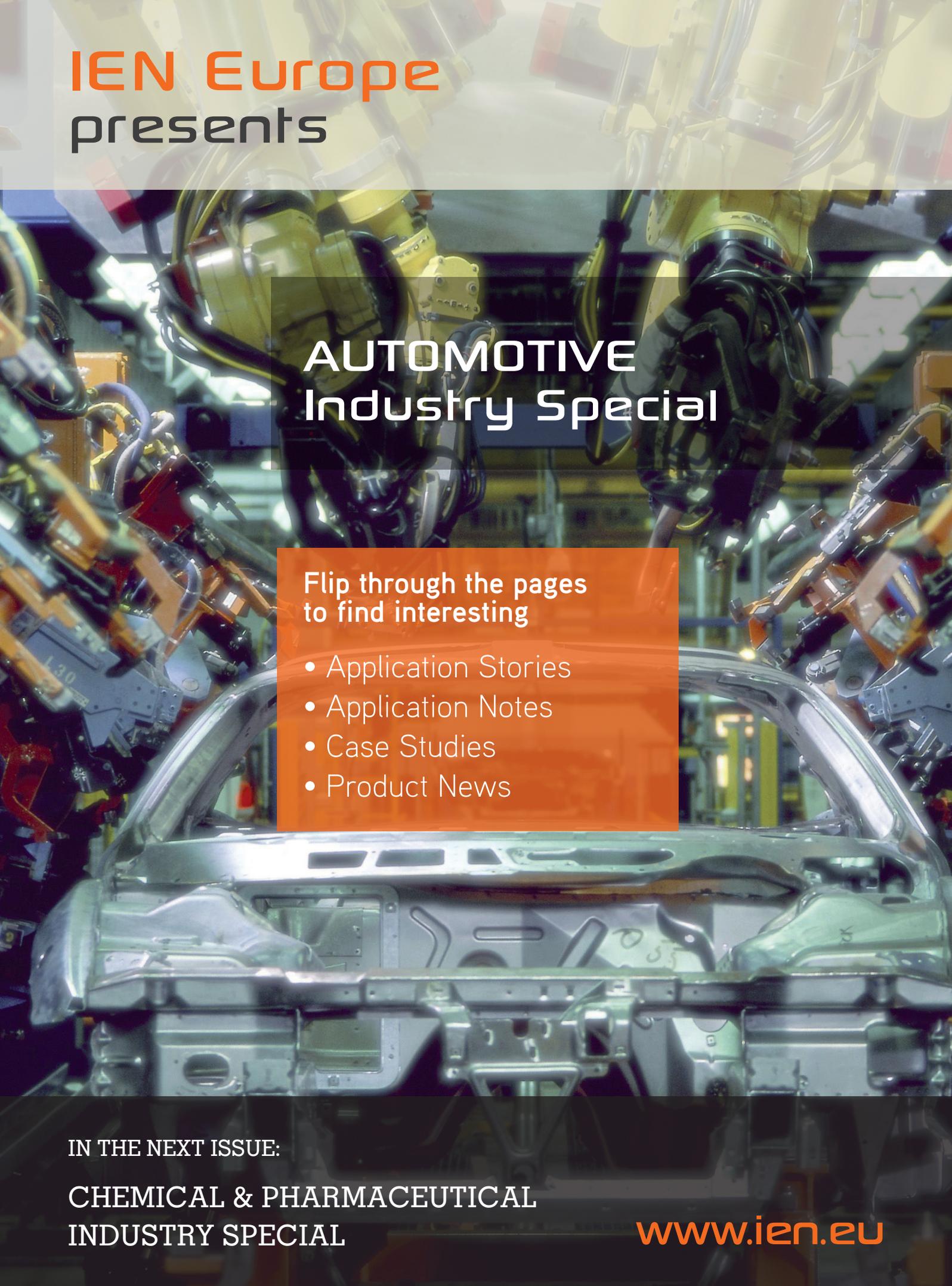
Reduced installation cost and effort



Wieland is expanding its range of industrial network solutions by the wienet UMS 8-4PoE-W Ethernet switch. The switch with eight Fast Ethernet ports, of which four are PoE-capable with injector function, is ideally suited for network devices that require little power, for example IP cameras. The switch is equipped with broadcast-storm, Ethernet ESD as well as power line EFT protection, thus preventing network disturbances and outages. Up to 15.4 W power at 48 V

DC can be fed per PoE port according to IEEE 802.3af. It can be operated in temperatures ranging from -40 °C to 75 °C and boasts a robust metal housing in IP30 with very good EMC properties.

►► 54001 at www.ien.eu

The background of the entire page is a photograph of an automotive assembly line. Several yellow and grey robotic arms are positioned around a silver car chassis. The scene is brightly lit, highlighting the metallic surfaces and the complex machinery of the factory.

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Unlocking the Secrets of the Racing Track

FLIR high-resolution thermal imaging cameras show the value of engine pre-heating products

Author: Ruud Heijnsman, Public Relations Manager for FLIR Systems (EMEA region)

Engine pre-heating systems are becoming an ever more valuable asset and even a competitive advantage on today's car racing tracks. Many racing professionals acknowledge the value of this technology, because it helps them prevent engine wear, poor performance on the track and even the loss of hard dollars. Hot Products Engineering, a US manufacturer of pre-heating engines, puts a lot of effort into spreading the gospel about engine pre-heating. The company now also uses thermal images taken by a FLIR camera to show the value of its engine pre-heating products.

Warming up the engine is one of the essential rituals every motor racer performs before getting on the track. Until recently, for many racing disciplines (kart, drag racing, etc.) this ritual just meant starting the engine cold and revving it. However, even without the issues of racket, risk, and stink, starting a racing en-

gine cold is always a poor choice if there's an alternative, because it involves metal-to-metal friction, incomplete combustion, and expensive race fuel to warm it up.

Preheating Engines

A universally accepted solution to this problem elsewhere in auto racing is to use an engine pre-heating system. This method quietly builds and maintains exact temperatures using inexpensive unleaded gas from a small, quiet generator. Ten years ago, after thirty-odd years of precision engineering work at a National Laboratory in Livermore, CA, USA, Pete Davis founded Hot Products Engineering Inc. and began designing and supplying pre-heating products for motor racing. Today, his Hot Head engine heaters are used by racing teams all over the world. Davis has now combined his engineering background and his

own racing experience to develop a new product line that gives so-called 'blue collar' racers the same advantages that other modern race teams—Indy Car, Le Mans, and CCA—rely on. Today, Hot Products Engineering systems are valued by prestigious teams racing in series that include, NASCAR, American LeMans, MSA, IndyCar, World of Outlaw Sprint & Dirt Late Model, USAC, IMCA, SCORE, 600 Microsprint, Bonneville and AMA Motocross.

The Advantages of Preheating

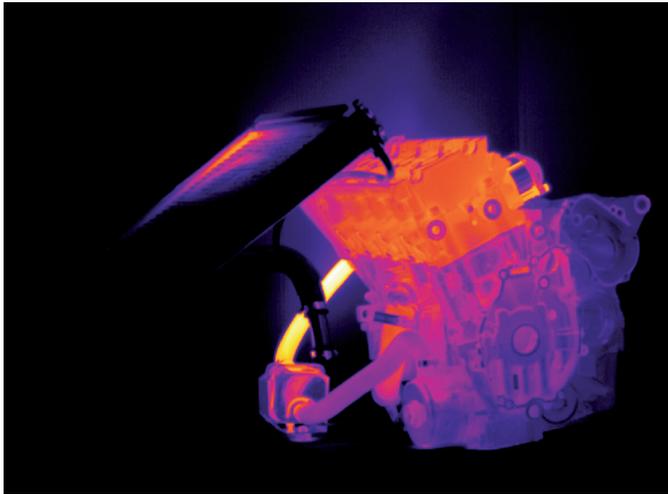
Race car engines will only achieve peak power at a very specific temperature. An engine pre-heater will ensure that the engine is always within a narrow range of that temperature, so that maximum power will be available right from the start. That ideal temperature depends largely on the type of car being raced. Engine temperature will not only affect racing performance; an insufficiently heated engine can also result in cold-temperature-related engine failure, causing a driver to not even finish the race. Additionally, cold starts can cause significant engine wear. Pre-heating can save racing teams hard dollars while reducing engine wear, saving on expensive rebuilds, and virtually eliminating the risk of an expensive cold-piston seizure.

Linear Thermal Expansion

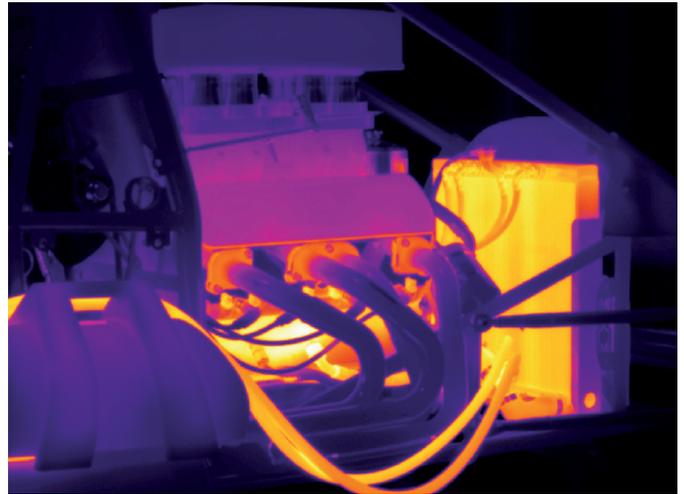
The whole reason we need to let our engine warm up revolves around the concept of linear thermal expansion. An engine is made up of a number of different materials. The piston is made from a certain type of aluminum alloy, the cylinder another type of aluminum

Warming up the engine is one of the essential rituals every motor racer performs before getting on the track





A thermal image of a pre-heater heating a 600cc racing engine



The thermal imagery produced by the FLIR SC6700 clearly shows how the temperature quietly builds and maintains exact between 135°F and 210°F

alloy, the rings cast iron or steel, the valves from steel, stainless steel, or titanium, and the guides are made from yet another material. Once the engine is started, these components begin to heat up from combustion and friction as they slide back and forth. None of these materials are exactly alike, and because of this they will expand when heated or contract when cooled at different rates. This interaction between material and change in temperature is predictable and linear. When a cold engine is first started the piston heats up and expands first. Heat is transferred from the piston to the rings and then to the cylinder wall. If we rev the engine and generate lots of combustion cycles and increase the frequency of friction too early the piston will grow much faster than the cylinder. If there is not adequate space between piston and cylinder to account for this growth, the engine could suffer that is known as a cold seizure. By allowing the engine to warm up before you start riding, you allow all the components in the engine to slowly expand and stabilize. Once the engine is warm, changes in the engine part dimensions are less drastic and there is much less risk of damaging the engine.

Bringing Science-based Tech to the Drag Racing Strip

In a test set-up along a drag racing track, a FLIR SC6700 was used to capture the result of a Hot Head DragPro competition Engine Heater. The thermal imagery produced by the FLIR SC6700 clearly shows how the temperature quietly builds and maintains exact between 135°F and 210°F. This set-up does not come from out of nowhere. Thanks to his background and experience with the National Laboratory, the founder of Hot Products Engineering, Pete Davis, is no stranger to the power of thermal imaging: "I have used thermal imaging cameras before to study thermal patterns in a research and development context, so I knew that these cameras can see things that aren't visible to the naked eye." So, when Pete Davis started a company that would manufacture engine preheating systems – a product that obviously solves a temperature-related problem for its customers – he knew that thermal imaging would be able to show racing professionals the value of a pre-heating system. "We are constantly developing new markets for our engine pre-heating systems and so we need to educate our customers all the time about the value of our products. Thermal imaging is a great help for this, and we rely

heavily on the images that we have captured with the FLIR SC6700," Pete Davis continues. "Before, we really had no visual information about the efficiency of our products, until we used this thermal imaging camera." "The FLIR images also help us establish our image of a science-based company. Hot Products Engineering (HPE) is based in Pleasanton, California just over the hill from major universities, National Laboratories and Silicon Valley. These surroundings play an important role in efficiently developing our products.

Working with the FLIR SC6700

The FLIR SC6000 Series cameras offer high speed and high-resolution imagery in a package that is easy to use, yet flexible in configurations for just about any scientific or research application. "The FLIR SC6700 thermal images present the heat build-up of the engine in great detail," says Pete Davis. "The FLIR camera is very advanced, but still easy enough to use and it reveals its info very swiftly to the user. Additionally, the FLIR SC6700 offers you a lot of options, after the image capture, to visualize, explore or modify your thermal images."

►► 53915 at www.i-en.eu

Keeping Classic Cars on the Road with Reverse Engineering

An interview with Davyd Richards of Redesign Sport Ltd. about how modern equipment helps extend lives of historic cars

Davyd Richards, founder of bespoke car restoration company, Redesign Sport Ltd (RSL), lifts the bonnet on how he and his team are using technology from SOLIDWORKS reseller NTCADCAM to do exactly that for a classic 1952 Ferrari.

Gone are the days when a shortage or complete lack of spare parts would ultimately see classic or historic cars retired from the road and consigned to a museum or collection. By harnessing the latest scanning technology in conjunction with SOLIDWORKS, the ability to reverse engineer obsolete parts provides the means to jump-start the life of such vehicles and prolong their lifespan.

Can you tell us a bit about what RSL does?

In a nutshell, we restore historic vehicles and have been doing so since 2006. We are finding that certain parts are getting increasingly harder to source and the cars rarer and rarer. In some cases, the vehicles we have coming through are one of a kind, so we realised that we need to take matters into our own hands.

Classic car owners like to go racing or undertake long distance tours, but irrespective of how much the customer is willing to spend, these

£1million - or even £20million - cars sometimes can't go anywhere because sourcing old parts or getting them remade has hitherto been horrendously difficult. In the last 3-5 years, there has been a revolution and evolution in scanning technology; I remember when I first saw a FaroArm in action, then a Faro Focus 3D scanner. It blew my mind. This offered the capability to scan old, broken parts and put the data into the 3D space for CAD modelling. Scanning massively improves the accuracy and time in reverse engineering these beautiful cars and their associated parts. It also reduces the mental fatigue of the engineer, who would have previously relied on traditional methods - or worse, been forced to model a component from memory!

What scanners do you use?

We undertook a great deal of market research before ultimately opting for a Craform HandySCAN 700. I had a demo and the salesman was able to scan half the car in 15 minutes, so I knew it was a game changer. It comes with VX Elements lightweight scanning software, which scans to mesh directly, as opposed to other scanners which scan as a point cloud and

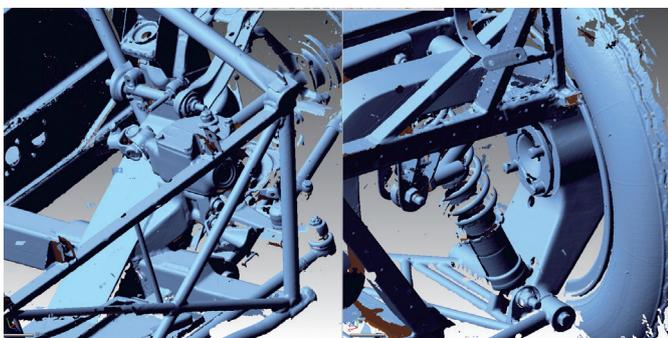
then convert to a mesh. This enables us to see information in real time and, if need be, change the resolution or laser intensity on the fly.

For example, if I'm scanning across two different materials - say a highly polished red paint to rubber - I can change the shutter setting and alter the intensity of the laser halfway through. We have also used Romer Arms which are much like the FaroArm; it runs Geomagic Design X software, which was a revolution. This powerful piece of kit lets me convert the 3D scan data into high quality CAD models that I can then use in SOLIDWORKS.

So, what's the secret to scanning?

For a long time, 3D scanning was almost a black art. Everyone thinks you need the most amount of data and information to reverse engineer, but sometimes it's irrelevant because you can't do anything with it. Scanning items and helping them get that scan data into a SOLIDWORKS file is much of what RSL is about.

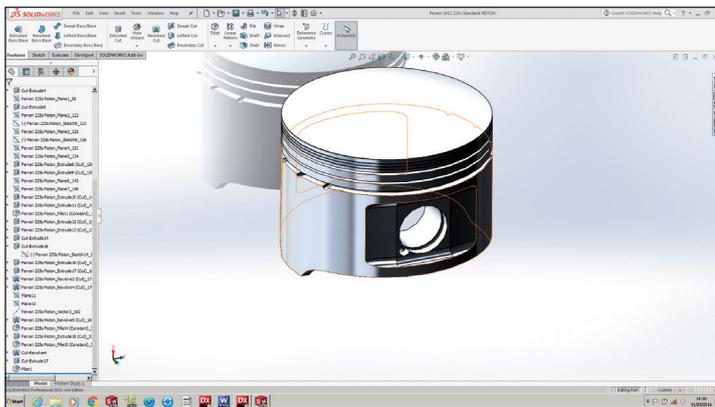
Whether it is scanned data from a laser, geo satellite MMR or a photogrammetry scanner, we can process it, trim out the erroneous data that isn't needed and then work with the cus-



RSL Chassis scan



RSL Ferrari main image

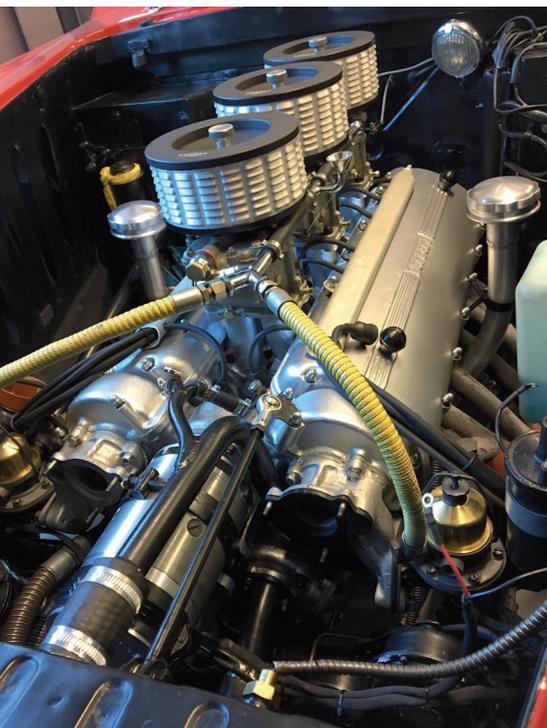


RSL Ferrari
Piston
CADMODEL

tomor to try and meet their aim. From there, we can help them get the relevant data into their SOLIDWORKS environment.

Tell us about the 1952 Ferrari

A customer in the US asked us to look after his 1952 Ferrari 225 for the Goodwood Revival. The car had been given a fresh engine build and a check over in the US, but when we fired it up a day before the race, a conrod came out of the side of the engine. This part moves the pistons up and down so the prognosis was terminal. Unfortunately, upon stripping the fresh engine we found that every nut and bolt inside the engine had been left loose during the original rebuild. Needless to say, we missed the event, but the customer asked if we could get the car race-ready for the Monaco Historic Grand Prix. We had eight weeks to turn things around.



RSL Ferrari Engine

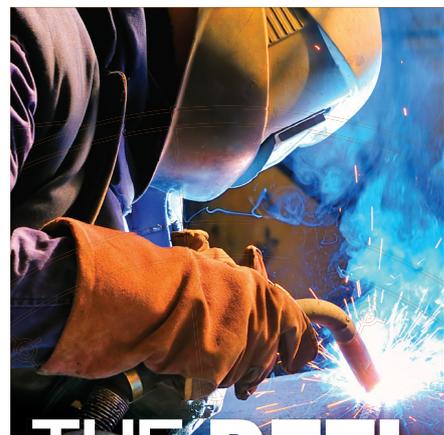
What happened next?

This is where we were able to demonstrate our expertise. We scanned the piston on a Thursday morning using the HandySCAN, modelled the scan data in Geomagic Design X then transferred it live into SOLIDWORKS. Our chosen manufacturer uses SOLIDWORKS for modelling where, if needed, they could tweak the design. eDrawings and part files flew back and forth, but by the Monday morning the 12 pistons went into production and we had the new pistons in our hands three weeks later. We also used SOLIDWORKS to remodel two distributors on the Ferrari, which were causing problems with the ignition system. We remodeled every single component in the same way and sent all the parts out to different manufacturers. The parts had only ever been together on the screen in SOLIDWORKS, but when they all arrived they all fitted together perfectly the first time - just as I knew they would. The car drove magnificently in Monaco and after a quick check-up back in the UK, it was delivered to Heathrow for its flight back to the US.

How is SOLIDWORKS helping you?

We use other pieces of software, but always come back to SOLIDWORKS because we simply couldn't operate without it. When I worked for a Porsche Supercup racing team, I'd seen the guys next door use CATIA on their Le Mans LMP project and thought it would be painfully difficult for a CAD newbie like me to come in and use it. I then discovered SOLIDWORKS 3D CAD, which was very easy and quick to learn. I have been using Geomagic Design X in real world projects for the past couple of years and between the two products, RSL has achieved a huge amount of success - especially the 2D drawing facility. In fact, I can confidently say that I don't believe there is a more complete package on the current market.

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Automation of Thermochromism Compensation

Enables 100% inline inspection in plastics production

It is generally understood that the effect of temperature will change the observed colour of a product. Even with a temperature difference of just 20°C, colour deviations of more than 2 ΔE units can occur for certain colours. This effect is known as 'thermochromism'. Therefore, it is usually necessary to allow the product to cool before a precise colour measurement can be taken. In a drive for 100% inline inspection and reduction of product wastage to zero, a method must be developed that compensates for the effects of thermochromism. Micro-Epsilon has been working closely with SKZ, (Süddeutsche Kunststoff-Zentrum) to develop a working solution.

Tackling thermochromism with colour and temperature sensors

In injection moulding processes, products are normally moulded with colour pellets supplied in batches that can be supplied from different manufacturers. It is therefore essential to continually monitor precise colour values of these products to ensure that they are exact. In order to provide 100% inline control of product colour during injection moulding of plastic parts, the SKZ institute has developed and tested a method to correlate the difference in colour of an object at different temperatures - thermochromism behaviour, using colour spectrophotometers and infrared temperature sensors from Micro-Epsilon. Colour measurements carried out using a colorCONTROL ACS7000 spectrophotometer and temperature measurements using the CT series infrared temperature sensors from Micro-Epsilon, generate a master curve at several different temperature levels that describes the thermochromic behaviour of each specific colour or shade.



This allows colour values measured on a warm product to be converted to the actual room temperature colour values. The pre-calculated 'cooling curves' are stored in the system software and allow the colour values determined during the de-moulding process (typically 60 to 80°C) to be converted into a reference temperature, for example, 20°C. This enables the colour to now be automatically checked earlier in the process, which reduces cycle times, optimises productivity and increases yield, compared to conventional sample checks.

Inline quality control and colour inspection in injection moulding

Different inspection techniques can be skilfully combined, enabling easy, flawless in-process monitoring. In injection moulding, for example, the new moldCONTROL inline thermography system and the colorCONTROL ACS7000 inline colour measurement system from Micro-Epsilon can be combined to measure and inspect during production. Here, a moulded component is conveyed directly in front of an infrared camera during the production process. Modern injection moulding systems are normally equipped with

an automatic handling system for removal and storage of components. The positioning of the component in front of the camera enables a precise time window to be met when recording thermographic images. This ensures that the thermographic images from one video image to another can be compared. During automatic removal of the components, a "good/bad" component decision must be made within a short time frame. The aim here is to prevent problems that may disrupt further processing and to take any corrective measures as quickly as possible, to avoid any unnecessary additional costs.

Defect detection using thermal imaging

The moldCONTROL inline thermography system detects variations in quality by using a high speed and high resolution infrared thermal imaging camera. It records the entire component in up to six different views and examines it. The principle is simple: a thermoIMAGER TIM thermal imaging camera records the infrared radiation emanating from the mould and visualises it. The temperature distribution provides a quality statement about incorrect temperature control of the mould, malfunction of the tool temperature, visible geometry errors and hidden defects. The software displays the reference image, the IR image of the component and the difference between the two images. The identified temperature differences provide the basis for a 'Pass/Fail' decision. Temperature alarm limits can be freely specified using the SKZ operating software. Defective components can be sorted and removed depending on these settings.

►► 53914 at www.ien.eu

SUSTAINABLE SURFACE TREATMENT

Two-step process for chassis surface treatment



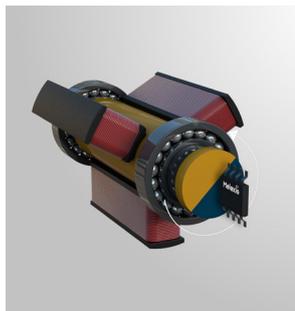
In cooperation with Audi, **Henkel** has developed an auto body pre-treatment process. The patented two-step process enables surface treatment of multi-metal auto bodies with an aluminum content of up to 100 percent. In zinc phosphating, which was the conventional process, the volume of waste products increases as the aluminum content of mixed material bodies rises. These are very costly to remove from the pre-treatment bath and the surfaces that are treated in them. Due to the different surface properties of steel and aluminum body components, the Bonderite two-step process pre-treats them in two stages. This allows more aluminum to be used, while reducing the disadvantages of the current process, i.e. energy and chemical use decrease during the production process. Servicing expenses, the associated downtime, and waste volumes are also reduced. Audi was the first company to integrate this method into its processes. The two-step process has now become the global standard for pre-treatment of auto bodies with a high aluminum content and is applied by leading automobile manufacturers around the world. The Bonderite two-step metal pretreatment process for multi-metal bodies provides superior corrosion performance while reducing investment- and processing costs.

national process, the volume of waste products increases as the aluminum content of mixed material bodies rises. These are very costly to remove from the pre-treatment bath and the surfaces that are treated in them. Due to the different surface properties of steel and aluminum body components, the Bonderite two-step process pre-treats them in two stages. This allows more aluminum to be used, while reducing the disadvantages of the current process, i.e. energy and chemical use decrease during the production process. Servicing expenses, the associated downtime, and waste volumes are also reduced. Audi was the first company to integrate this method into its processes. The two-step process has now become the global standard for pre-treatment of auto bodies with a high aluminum content and is applied by leading automobile manufacturers around the world. The Bonderite two-step metal pretreatment process for multi-metal bodies provides superior corrosion performance while reducing investment- and processing costs.

►► 53918 at www.ien.eu

RESOLVER MOTOR POSITION SENSOR

Measuring absolute angles in automotive applications



Melexis announces a new second-generation resolver motor position sensor based upon its proprietary Triaxis Hall magnetic sensing technology. The new single IC solution MLX90380 is compatible with any brushless motor - including Permanent Magnet Synchronous Motors (PMSM) and Brushless DC Motors (BLDC) - thanks to its ability to

measure the absolute angle. It is ideally suited to the ever-growing number of automotive applications arising as a result of the greater electrification of vehicles. The precision sensor is suitable for high-speed rotating applications, such as automotive electrical power steering motors and superchargers, due to its 2µs sampling and 8µs output refresh rates. The MLX90380 provides Sine and Cosine analog ratiometric outputs while other options include the ability to select sensitivity from 10mT to 70mT and three different configurations for the magnetic field axis. Unique to the MLX90380 is its ability to be mounted in either end-of-shaft or through-shaft applications. By simply selecting the correct option code, designers are now able to measure rotation and position at any point along a shaft by using a ring magnet in conjunction with the MLX90380. The sensor operates from -40°C to +150°C, making it ideal for harsh applications such as industrial and automotive.

►► 53991 at www.ien.eu

BALL SCREWS FOR TOUGH CONDITIONS

Reducing downtimes in machining centres



A supplier asked **NSK** for its expert advice to help to reduce the downtime frequency in production of automotive brake systems. A NSK-Team duly investigated the race-ways and lubrication conditions in three faulty linear drives in order to determine failure causes. The result: a combination of high loads, penetrating cutting fluids and high ambient temperatures was responsible for the short lifespan. NSK recommended using ball screws that have been specially developed for high speeds and loads. This product range features a customer-specific nut that is tailored exactly to the application and provides greater axial stiffness, not just of the ball screw, but the entire powertrain, thus increasing machine precision. Moreover, as preload is spread over several balls, service life is increased considerably. As recommended, the ball screws were equipped with the company's proprietary X1 high-performance seals. These seals prevent any cutting fluid from penetrating the linear system and stop the ball screw lubricant from contaminating the machining centre's cutting fluid or coolant. The X1 seal also has excellent grease-retention capabilities. Optimal lubrication of the ball screw in tough operating conditions is assured by using the K1 lubrication unit, which enables the lubricant's useful life to be considerably prolonged, again contributing to lower costs.

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Metal Printed Recuperators

Production of complex heat exchangers in low volumes

Technology from Renishaw is helping HiETA to move metal additive manufacturing (AM) from prototype manufacture into commercial production of its specialist range of heat exchangers. In particular, the recent addition of Renishaw's RenAM 500M system at the company has enabled manufacturing times and, therefore production costs, to be reduced dramatically.

The RenAM 500M is a laser powder-bed fusion additive manufacturing system designed specifically for the production of metal components on the factory floor. As well as incorporating a powerful 500 W laser to give faster processing than earlier models, the new equipment features an automated powder handling system that enables more consistent

process quality and reduced operator time on the machine.

Background

HiETA was founded in 2011 to develop metal AM methods for the production of complex, light-weight structures for various types of heat-management applications. Parts manufactured include recuperators, turbo-machinery and combustion components for micro gas-turbines, phase-change heat exchangers for fuel cells and integrated waste-heat recovery systems, and components for highly-efficient internal combustion engines, including turbo-machinery and sections for handling exhaust gases.

Stephen Mellor, now Lead Project Engineer at

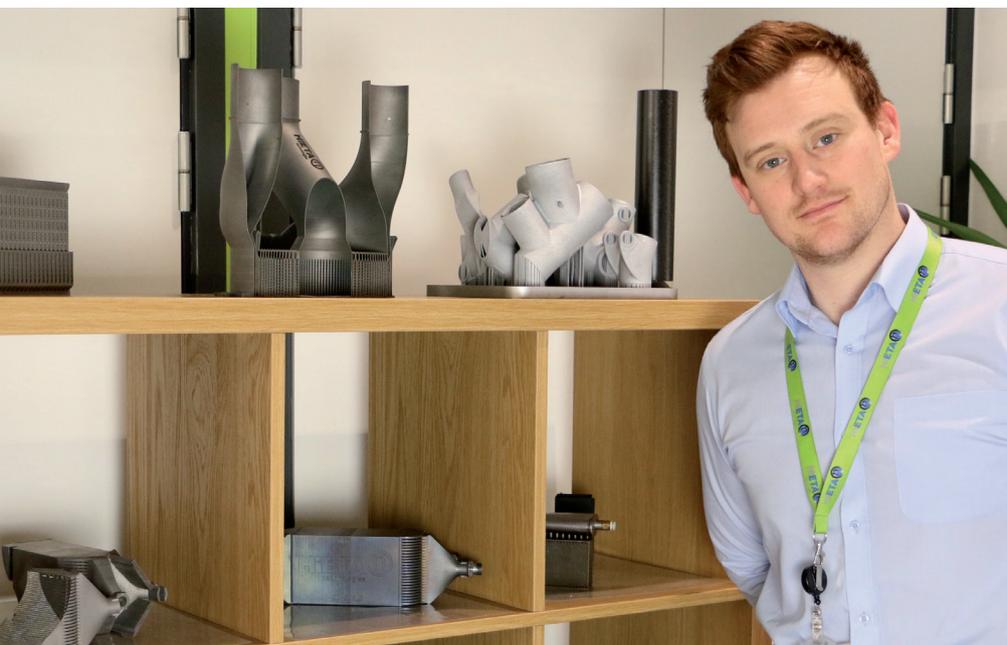


AM cuboid heat exchanger

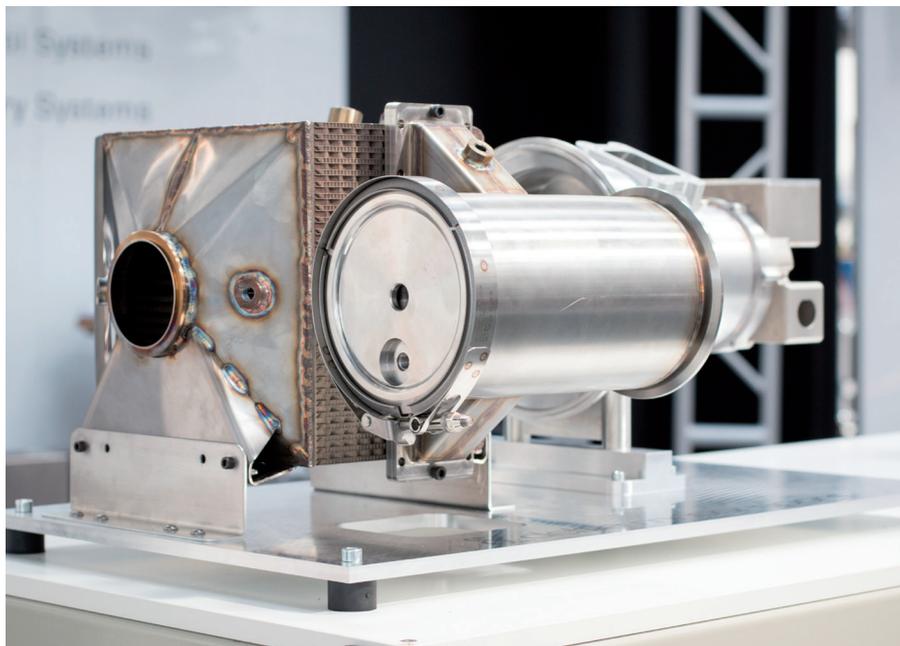
HiETA, became the company's first employee after an approach by the directors, who had registered some patents on using additive technologies to produce heat exchangers. He had first become involved with AM while studying engineering at Exeter University, UK and, subsequently, specialised in research on the technology for his PhD. HiETA now has more than twenty-five staff and an impressive range of facilities that can together cover the whole AM product development process, starting with a review of the customer's requirements, and then moving from an initial design through to computational fluid dynamics (CFD) and finite-element analysis (FEA), manufacturing with the Renishaw equipment, testing and validation.

Challenge

Traditionally, heat exchange products are often made up from thin sheets of material that are welded together. The complexity of the designs makes production both challenging and time-consuming, while the material used for the welding process adds to the overall weight of the part. Prior to the work at HiETA, little research had been undertaken into the use of



Stephen Mellor with a range of complex additively manufactured components



Micro turbine incorporating HiETA MiTRE recuperator

AM for the manufacture of heat exchangers. The initial challenges were, therefore, to confirm that AM could successfully generate sufficiently thin walls of the required quality and, then, to produce a complete component with the complexity of a typical heat exchanger. The third challenge was to use the knowledge and experience developed to move the process from the manufacture of samples and prototypes into low-volume production.

Solution

HiETA chose to partner with Renishaw and to use Renishaw's AM250 system across a range of projects. Firstly, HiETA worked closely with Renishaw to develop specific parameter sets for the production of leak-free thin walls in Inconel down to thicknesses of 150 microns. Both companies produced samples using a variety of settings on the AM250 at Renishaw's facility in Stone, Staffordshire and the system at HiETA's base on the Bristol and Bath Science Park near Bristol, UK. The resulting samples were heat treated and then characterised at HiETA and Renishaw. The test results enabled the companies to confirm the optimum parameters on the machines for thin-walled structures and also allowed HiETA to develop a design guidebook with parameters for heat transfer in heat exchangers manufactured using laser powder bed fusion technology. Having achieved a leak-free integral wall, the next stage was to move to a complete, full-size unit, which could be completed in a reason-

able build time. Two projects were undertaken, both with the participation of UK-based vehicle integrator Delta Motorsports, in Silverstone. The first was a cuboid heat exchanger (recuperator) to be used as a range extender for electric vehicles. The second aimed to take the design of the components to higher levels of complexity beyond the traditional cuboid shape. More complex shapes can improve product performance and cycle efficiency, give benefits in packaging, and reduce costs. The design chosen for this stage was a recuperator of annular form that could be wrapped around other components and contain integrated manifolds to give a more compact overall system. As well as allowing further optimisation of the Renishaw equipment to handle the larger samples, HiETA used these projects to develop an extraction process for removal of excess powder material from the cores of the heat exchangers.

Results

The first result of the partnership between HiETA and Renishaw was to produce the basic data needed to set up the AM equipment to produce thin-walled structures successfully and to provide the parameters needed to predict the performance of heat exchangers manufactured with the Renishaw equipment. The thermal transfer and fluid flow data that resulted has been incorporated into the CFD and finite-element analysis programs used by HiETA. These programs can be used for an ini-

tial assessment of the likely performance of new component designs and thus confirm that the proposals have the potential to meet the customer's requirements.

At the same time, Renishaw has added software improvements, both to facilitate processing of the large amounts of data when the complete recuperator is sliced into thin layers and to create the build instructions needed for the complete part. The first attempt at making a complete product on the AM250 system generated a successful component but needed a build time of seventeen days. Following improvements to the hardware and software, together with optimisation of the process parameters, this was reduced to eighty hours. Detailed testing showed that the component would meet the requirements in terms of pressure drop and heat transfer. However, this performance was achieved with a weight and volume approximately 30% lower than an equivalent part made by conventional methods.

"With almost all of our projects, we are trying to light-weight components and solve thermal management issues," explained Stephen Mellor. "Through our partnership with Renishaw, we have produced components that are typically around 40% lighter and smaller by volume than anything equivalent that is available on the market. This is possible because, with the Renishaw technology, we can design and manufacture many novel and high performing surfaces integrated into a single component. This would be very difficult to do with conventional methods."

Following the success with the Renishaw AM250, HiETA invested in the more powerful RenAM 500M system to enable more cost-effective production of commercial components in low volumes. "We are now producing parts for engines with real commercial applications and for customers with very demanding requirements," he continued. "We use Renishaw's AM technology to produce very complex parts that give high performance at competitive prices."

►► 53910 at www.ien.eu

3D-PRINTER FOR STANDARD PP

Materials for broad range of requirements available



The **Arburg** Freeformer is able now to process standard PP (Braskem PP CP 393), as well as the specially developed Armat 12 support material. By qualifying standard PP and the new support material, a significant breakthrough in extending

the range of materials suitable for industrial additive manufacturing is made. The new support material is easily removable by dissolving it in a water bath. The process was shown on Formnext in Frankfurt to produce fully functional cable clips. The delicate yet durable structures have the click effect typically found in injection moulding. One great advantage of ARBURG Plastic Freeforming (APF) is that the process can be adapted to the requirements at hand and not the other way around. In addition to amorphous standard granulates such as ABS, PA and PC, the material range includes e.g. elastic TPE, medical PLA or PC approved for the aviation industry. The open system affords users independence: Freeformer customers can qualify their own original material and optimise the freely programmable process parameters specifically to the relevant application - starting from the settings for the geometrical slicing and temperature, through to discharge. All of this process data can be saved and analysed, and designs can be optimised quickly in order to produce quickly and cost-effectively.

►► 53911 at www.ien.eu

"FLUID" 3D PRINTING

Ease of use printing for ceramics and metal



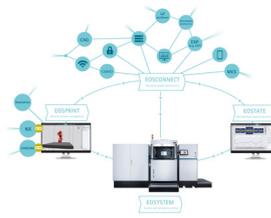
XJet has launched the Carmel AM System product line, comprising the Carmel 1400 and the Carmel 700 AM systems. Featuring the company's patented NanoParticle Jetting technology, the Carmel Product Line is poised to transform the metal and ceramic additive manufacturing

industries by printing separate nanoparticle "inks" or fluids for the build material and the support material. This allows manufacturers to produce ceramic or metal parts with the ease and versatility of inkjet printing. "NanoParticle Jetting technology is a unique 3D inkjet technology that redefines additive manufacturing for metals and ceramics," says Hanan Gothait, CEO and Founder of XJet. "Other additive manufacturing technologies use powders, but we offer a real breakthrough by leveraging our know-how as pioneers of both inkjet printing and 3D printing industries. Our solution prints very fine layers of both build materials and a support material to enable the creation of complex geometries in a very simple and very safe process. While we are currently printing only one build material, we could theoretically print multiple build materials." The XJet Carmel 1400 features a 1,400-square cm build tray, one of the industry's largest, for high-capacity production and a unique ability to print both ceramics and metals.

►► 53913 at www.ien.eu

3D PRINTING INTEGRATION

Highly connective software for additive manufacturing



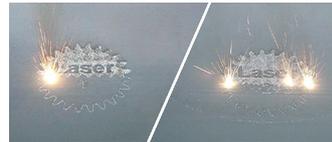
EOS, supplier in the field of industrial 3D printing of metals and polymers, presents EOS-CONNECT a solution that provides industrial grade connectivity to fully integrate industrial 3D printing into manufacturing processes, enabling a

highly flexible production and increased efficiency. The software is able to collect machine and production data for use on a live basis. It offers an open interface capable of providing integration either into intelligent EOS applications providing productivity increase or to be used by third party applications. This way we lay the foundation for companies to truly integrate additive manufacturing in industrial production environments. EOS solutions are highly connective to on premise MES/ERP solutions but also serve upcoming digital marketplaces and IoT platforms. EOSCONNECT will be the most advanced gate opener to gain flexibility and increase productivity. Machine and production data can be gathered and made available in near real-time. This is the next step towards a comprehensive and user-friendly machine park surveillance. This high connectivity enables two beneficial outcomes: Companies gain a seamless handover of production data into their CAQ systems (Computer Aided Quality) for secure traceability, helping them to validate their processes for production.

►► 53912 at www.ien.eu

MULTI-LASER METAL-PRINTER

Outstanding printing times for efficient production



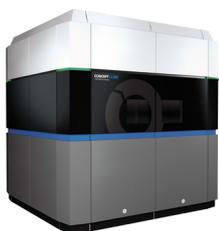
Trumpf presents a fast and productive medium-format 3D printing system for metal components. TruPrint 5000 works according to the multi-laser

principle and is equipped with not just one, but three scanner-guided, 500-watt TRUMPF fiber lasers. The three lasers are fitted with optics specially designed to enable them to operate simultaneously at any point in the system's construction chamber. As a result, they can generate components much faster and more efficiently, irrespective of the number and geometry of the components. Unlike other multi-laser concepts, it is not limited to defined areas in the process chamber. This makes the 3D printer particularly fast and productive. Another reason for the speed is the exposure strategies, which automatically calculate the ideal laser paths, so that all three lasers can always expose multiple parts. The finished components are literally seamless, as the outer contours are produced with a single laser. If all process parameters are in optimum settings, TruPrint 5000 requires just a third of the exposure time per job. Based on Laser Metal Fusion (LMF) manufacturing technology, the system uses laser power to generate complex metallic components layer by layer in the powder bed. The components can measure up to 300 mm in diameter and 400 mm in height and consist of all weldable materials, such as steels, nickel-base alloys, titanium, aluminum and high-carbon hot-work steels.

►► 53917 at www.ien.eu

HIGH-RESOLUTION METAL PARTS PRINTING

Scalable, customizable innovation for large metal parts



GE Additive unveiled the first BETA machine developed as part of its Project A.T.L.A.S program. The meter-class, laser powder-bed fusion machine has been developed to provide manufacturers of large parts and components with a scalable solution that can be configured and

customized to their own specific industry applications. Project A.T.L.A.S (Additive Technology Large Area System) is GE Additive's company-wide program to develop the next generation large additive machines. This first BETA machine was developed in just nine months and complements the company's existing portfolio of products. Ideally suited to industries that require large complex metal parts, such as aviation, automotive, space and oil and gas industries, the new BETA machine builds on technology previously developed by GE, combined with Concept Laser's expertise in laser additive machines. The first few BETA machines are currently being evaluated by a small group of customers and more are available for delivery in 2018. The machine's feature resolution and build rate speeds are better than machines available today and has a scalable architecture that can increase the 'Z' axis to 1.0 m and beyond in the near future. At the moment build volume is 1.1 x 1.1 x 0.3 m (x,y,z) with a 1kW laser. Process and machine health monitoring are enabled by Predix software, GE's cloud-based operating system.

►► 53977 at www.ien.eu

GENERATIVE 5-AXIS MACHINING

Laser Deposition Welding with CNC control



With the LASERTEC 65 3D, **DMG MORI** expands its product portfolio in the field of additive manufacturing by means of a powder nozzle. Based on a 5-axis machine tool, the new, compact model manufactures generatively without interruption, while post-processing

occurs on external milling units. So already existing machining centres are used simultaneously to the setup process, and the production capacities are thus optimally utilised. Compared to the LASERTEC 65 3D hybrid, the LT 65 3D has an approx. 40 percent larger work area in combination with a footprint which is reduced by about 45 percent. The machine is designed as purpose-built solution for prototype construction, small series and repairs as well as coatings. With the fixed integration of the laser head into the headstock, the it has maximum traverse paths of 735 x 650 x 560 mm in the X-, Y-, and Z-axes, so that 3D workpieces with large dimensions and weighing up to 600 kg can also be setup. A high degree of user-friendliness is guaranteed through the specifically developed software with user-oriented surface and integration of CELOS. It enables integrated monitoring for highest process reliability and quality assurance. Moreover, it enables continuous molten pool analysis via process camera and automatic control of the laser power in real-time for homogenous component quality.

►► 53990 at www.ien.eu

TAKE THE GUESSWORK OUT OF THERMAL TESTING

FLIR ETS320™

The FLIR ETS320 is an affordable solution for reducing test times and improving product design for electronic board and device evaluation. Whether the goal is R&D or product testing, heat can be an important indicator of how a system is functioning. The ETS320 helps engineers and test technicians collect accurate, reliable data in seconds and analyze it quickly.

- Reduce Test Times
- Improve Product Design
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►► 53851 at www.ien.eu

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NFC SENSOR INTERFACE

For mission-critical, long-life applications



ams offers the AS3956, a dynamic NFC tag IC which meets industrial-grade quality standards and provides very high reliability in mission-critical applications and in products with a long operating lifetime. The AS3956 dynamic tag acts as a contactless bridge between sensors and any NFC reader, such as a smartphone, through a host microcontroller. It supports the NDEF messaging protocol in full compliance with NFC Forum recommendations, guaranteeing interoperability with any NFC phones, including Apple® iOS devices. In designing the robust AS3956, ams drew on close interaction with customers that manufacture products for industrial applications and the IoT.

►► 54002 at www.ien.eu

CLAMPING LEVER HANDLES

Especially useful where the lever turning angle is limited



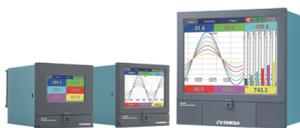
Elesa offers the GN 306 adjustable handles and VCT lobe knob ranges of complementary standard components. These are ideally suited to industrial applications on machines and equipment where quick

operation is required - including machine tools and equipment in the packaging, printing, woodworking and other general industries. The GN 306 adjustable clamping levers in zinc die are especially useful where the lever turning angle is limited and pressure is to be exerted by the end of the threaded shaft. VCT lobe knobs perform the function of allowing quick assembly by hand and are available with female insert or male stud as well as with a selection of colour options.

►► 54004 at www.ien.eu

PAPERLESS RECORDERS

Offer real time display of data



Omega releases the RD1000/2000/3000 Series of paperless recorders, which offer real time display of data in a variety of formats on a high-resolution color TFT touch screen display. The user-friendly unit with plug and play cards can easily be sent to monitor, record and evaluate any application. The user can access data on the

screen, as well as from a remote site via the standard Ethernet, web server or optional RS232/422/485 series interface. The unit's compact size of the paperless recorders saves space and minimizes depth required behind the panel.

►► 54006 at www.ien.eu



IN-LINE FLOW METER

Measures the consumption of compressed air



The EE741 in-line flow meter from **E+E Elektronik** is ideal for measuring the consumption of compressed air and technical gases. Due to its modular design, the compact device is suitable for pipe diameters from DN15 to DN50 (1/2" to 2").

The thermal hot-film anemometer measuring principle provides high accuracy and reliability. The modular EE741 consists of the transmitter unit with flow sensor and a stainless steel or aluminum gauge mounting block. The mounting blocks are available for DN15 (1/2"), DN20 (3/4"), DN25 (1") and now also for DN32 (1 1/4"), DN40 (1 1/2"), DN50 (2") pipes. The gauge mounting block enables easy and reproducible positioning of the transmitter in pipes with an operating pressure up to 16bar (232 psi).

►► 54003 at www.ien.eu

COMPACT MULTIWAY CONNECTORS

To reduce wiring complexity



Passive multiway connectors of **Friedemann Wagner GmbH** are already in the scope of delivery of some handling modules. From now on they can be ordered stand-alone. The small sensor-actor-boxes

are grouted in a robust housing of aluminum (IP65) and are available in different variants (input/output combinations). Common connectors can be plugged (M8, M9, M16 and Sub-D). Cables now can be collected in the terminal-plug and then routed to the cabinet instead of laying the tracks peer to peer - helping to gain a fast, structured wiring. Power and signal LEDs as well as overload- and short circuit-protection are onboard.

►► 54005 at www.ien.eu

OFF-AXIS PARABOLIC MIRROR

With surface accuracy of better than $\lambda/15$ P-V



Optical Surfaces manufactured the off-axis parabolic mirror with surface accuracy of better than $\lambda/15$ P-V, surface quality of 20/10 scratch/dig and surface slope error of $\lambda/10$ /cm P-V. This, together with an ultra-smooth coated reference flat (315 mm diameter), have been produced from Zerodur™ as the main reflective and reference components, for a large flight test alignment collimator under construction in SIMERA Technology Group's optical

clean room. This will be the largest and most capable privately-owned facility for testing of airborne and spaceborne optics in South Africa.

►► 54007 at www.ien.eu

INDUCTIVE POSITION SYSTEM

Detects the absolute position of an actuator



The new PMI F90 inductive positioning system from **Pepperl+Fuchs** can precisely detect the absolute position of one actuator as well as the distance between two. Thanks to IO-Link technology, the system has comprehensive

communication functionality and is equipped for I4.0 applications. Patented multi-coil technology guarantees maximum measurement accuracy. The new PMI F90 inductive positioning system works with a unique, patented multi-coil system. The absolute position of the actuator is precisely detected from the measuring signals of a single coil. In addition to sending the analog position signal, switch points can also be defined.

►► 54008 at www.ien.eu



GAS METER MODULE

Covers natural gases in group E



Sensirion adds the new SGM6200 series to its current product portfolio of SGM6000 modules. One single module covers natural gases in groups H and L and E (as defined in EN437) as well as natural gas mixtures, including non-conventional fuel gases with

up to 25% hydrogen content. The SGM6200 family will output temperature-compensated volumes of natural gas, aligned with today's most widely used billing systems for natural gas. Competitive prices and ultra-low current consumption below 10 μ A enable Sensirion's customers to design very competitive, cutting-edge meters for natural gas. Currently, Sensirion plans to make samples available by February 25, 2018.

►► 54010 at www.ien.eu

TURBINE FLOWMETER

For industrial and medical laser system integrators



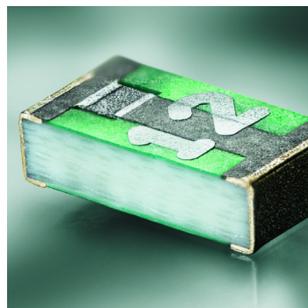
The **Titan Enterprises** 800 Series turbine flowmeter is a trusted monitoring device that ensures accurate and repeatable long-term operation. There are many applications of industrial and medical lasers. Whether used

for cutting, welding, micro-machining, cosmetic or eye surgery - lasers generate a significant amount of heat. To ensure stable long-term laser performance, this heat needs to be quickly and effectively dissipated. Water circulated through a chiller or heat transfer system is a popular cooling method for lasers. To ensure consistent laser cooling, accurate and repeatable water flow measurement is required.

►► 54012 at www.ien.eu

TEMPERATURE-SENSITIVE SMD FUSE

Protection against excessive temperature and overcurrent



SCHURTER's USN 1206 offers a temperature-sensitive SMD fuse suitable for both overcurrent protection and protection against excessive ambient temperatures. The USN 1206 has been developed as an SMD temperature protection device for power semiconductors (e.g. MOSFETs) in automotive applications. At the

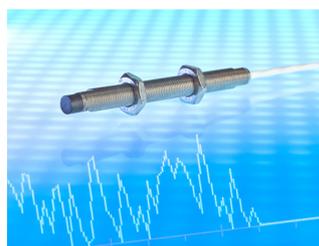
same time, it also provides protection against overcurrent. The USN 1206 from SCHURTER has high I2t values (slow characteristic) and a rated current of 12 A at 32 VDC. The fuse has a current-time characteristic which shifts as a function of the ambient temperature.

►► 54009 at www.ien.eu



PROXIMITY PROBES

Fully integrated for improved reliability



The extensive range of proximity sensors available from condition monitoring specialists

SENSONICS now includes their fully integrated PRI Series.

Building on their established Senturion proximity probe range, the new PRI Series offers a

single probe assembly solution with direct processed outputs eliminating the need for a separate driver. Proximity probes play an important role in machine shaft vibration, position and speed measurements, providing operators critical information on the rotating plant dynamic performance and bearing condition. The PRI is ideal for these applications and offers the following benefits over existing probe systems on the market.

►► 54011 at www.ien.eu

ARBITRARY WAVEFORM GENERATOR

For quantum research and spectroscopy applications



Zurich Instruments has just introduced a new arbitrary wave form generator (AWG). The HDAWG is a high-density multi-channel AWG featuring the highest

channel density and the lowest trigger latency (<50ns) available. Both the 4 and 8 channel models offer 16 bits of vertical resolution at a sampling rate of up to 2.4 GSa/s and a signal bandwidth of 750 MHz. The maximum output amplitude is ± 5 V. Prices start at USD 5,500 per channel, making the total cost of ownership highly competitive. LabOne also contains Multi-Device Synchronization (MDS) supporting a user-friendly way to scale up to 64 channels on eight automatically synchronized instruments at the picosecond level.

►► 53863 at www.ien.eu

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2018

FEBRUARY

embedded world
27.02 - 01.03
Nuremberg
www.embedded-world.eu

MARCH

WIN Eurasia
15-18
Istanbul
www.win-eurasia.com

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18-23
Frankfurt
www.light-building.messefrankfurt.com

AUTOMATICON

20-23
Warsaw
www.automaticon.pl

Maintenance

21-22
Antwerp
www.easyfairs.com

Mecspe

22-24
Parma
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Note: Dates and descriptions of events have been obtained from official industrial sources. The publisher, therefore, cannot be held responsible for errors, changes or cancellations.



BAROMETRIC



HYDRAULIC



PNEUMATIC



DIFFERENTIAL



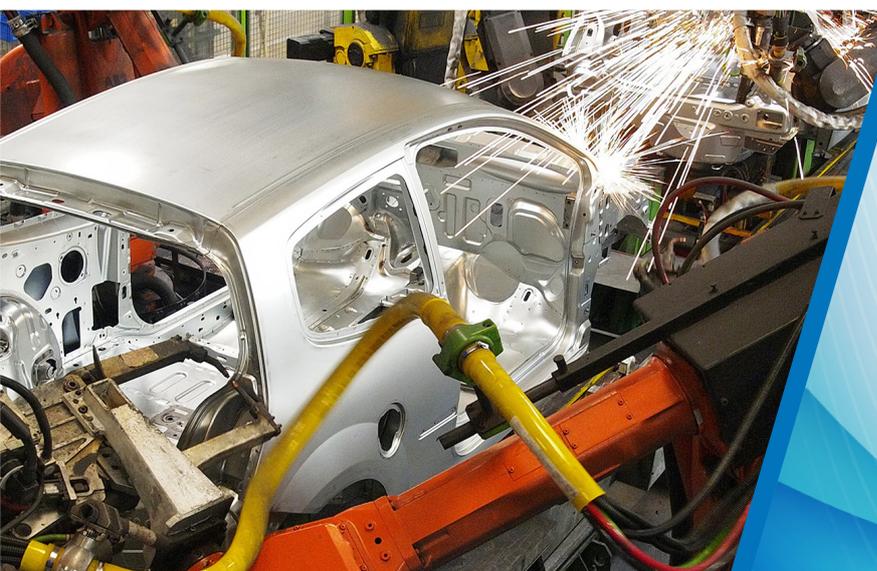
CLEAN-IN-PLACE



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Standard and Custom Transducers



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 Website: www.endustri-dunyasi.com
 Website visitors per month: **32.000**

