

T H E E L E C T R O N

N E W S L E T T E R O F T H E I N S T I T U T I O N O F E L E C T R O N I C S

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TM SMART FACTORY EXPO

The year of 2016 has seen the launch of a new exhibition for electronics professionals dedicated specifically to Industry 4.0, the array of technologies that is currently transforming the field of production engineering.

The exhibition, known as TM Smart Factory Expo, was sponsored by *The Manufacturer* and was held at Birmingham's National Exhibition Centre over the two days of 2nd. and 3rd. November, alongside Advanced Engineering and Lab Innovations. These exhibitions in turn ran in parallel with EHI Live (featured in the Autumn 2016 Issue of *The Electron*) and Euro Bus Expo 2016 (featured later in this issue).

The aim of TM Smart Factory Expo, and its accompanying Annual Leaders Conference, as stated by Henry Anson, Managing Director of *The Manufacturer*, is "to help UK manufacturers make informed decisions on new technologies and processes that will improve their businesses and allow them to compete in the ever changing global market."

A major promotion at the event was the TM Thought Leadership Network, which serves as a platform for manufacturers to discuss and learn about the key issues that are shaping the future of manufacturing industry. It is free to join and consists of four forums, namely 'Additive Manufacturing', 'Automation', 'Industrial IoT' and 'Servitization'. TM Smart Factory Expo had 47 exhibitors.

ADVANCED ENGINEERING

The well-established Advanced Engineering exhibition was divided into four sub-events, namely 'Aero Engineering', 'Composites Engineering', 'Automotive Engineering' and 'Performance Metals Engineering'. This had some 700 exhibitors and over 170 free-to-attend presentations.

A new feature for 2016 was the Enabling Innovation programme hosted by Magna International and The Knowledge Transfer Network. This aimed to support the future growth and development of innovation as well as providing networking opportunities for potential partnerships with investors and buyers in the engineering market. A prize of £5,000 was offered for the most innovative and disruptive technology.

Enabling Innovation in Electronics

The Show Guide for Advanced Engineering contained several articles on a variety of engineering themes. Of particular interest to electronics professionals is 'Enabling Innovation in Electronics' by Steven Bagshaw, Marketing Executive for exhibitors CPI.

This article focused notably on the role of printable electronics in the automotive and aero engineering sectors, and the materials engineering sector. A discussion was also featured on the latest developments in printable electronics.

In his introduction the author says:

"More of an enabling technology than an end in itself, the development of printable electronics will deliver new and exciting hybrid electronic applications that incorporate not just the functional benefits of flexible electronics, but also the efficiency and durability of traditional electronics. The Internet of Things represents an evolution in which objects are capable of interacting with other objects. Printable electronics is aligned with this emerging technology through the opportunities that the printing of electronic functionality and sensing brings to applications."

This technology is going to change how so many everyday products are made and how they work, but it's also going to create whole new ways of functioning and new functions that could not have been envisaged using traditional electronics. As a complementary technology to traditional silicon-based electronics, the thin, bendable nature of printed electronics means that technology will be able to provide sensing to new geometries and design areas and design areas in the way components are made and assessed in operation. This will be especially noticeable in the key areas covered by Advanced Engineering 2016."

In the automotive field the author points to major benefits in the ability to embed displays, lighting and touch sensors into vehicle bodies, as well as customisation of interactive cabin designs and incorporation of transparent graphene materials into windscreens:

"Flexible printed sensors will mimic human sensing; instructing the car as its driver would, making decisions based on information from the surrounding environment. Such sensors could be embedded into the car to measure pressure, temperature and movement, and to measure structural integrity."

In aero engineering the author refers to printable electronics "ushering in a new era of aircraft cabin design". He states:

"Printed sensing technology could facilitate the measurement of aircraft structural integrity and monitor individual components, assessing a number of variables, including fatigue, structural strain and damage, wind speed, temperature, moisture levels, corrosion and aerodynamic pressure. Sensors could also be used at the airport to facilitate security measures, e-tickets etc."

In materials engineering printable electronics is envisaged to have a major role in the creation of novel coating and composites surfaces:

"Embedding sensors into materials, machines and surfaces provides the ability to assess parameters such as strain, temperature, corrosion, pressure, humidity etc. Using printed electronics for sensors also means that sensing can be produced using large 'roll-to-roll' printing methods, providing the opportunity for cost effective production methods of bespoke designs."

In looking to the future the author highlights developments in organic light-emitting diode (OLED) lighting:

"As the lighting technology is made on flexible plastic films, use of flexible OLEDs has the potential to be integrated into formed components or seamlessly bonded onto curved surfaces. The commercialisation of this technology will open up a host of exciting design opportunities to create new value-adding lighting products within, amongst others, the automotive and aerospace manufacturing industries."

Another key application is the use of inkjet printing to produce electronic circuits:

"CPI is working on this technology to produce low cost copper-based circuits on PET (polyethylene terephthalate). The technology is applicable for a range of applications including printed antennae, sensors, electrodes, flexible PCBs and other components suitable for machine-to-machine communication devices."

CPI is the UK's National Centre for Printed Electronics. It specialises in assisting companies to take innovative ideas from concept to production. It offers open access capability in the scale up and commercialisation of printable electronics applications such as printing sensing and OLED lighting. Facilities and expertise assists clients in understanding how their products and processes perform under manufacturing conditions, so accelerating their commercial realisation.

More details are available from www.uk-cpi.com

CRUISING WITH ROBOTIC ENTERTAINMENT

The science of robotics has advanced into the field of entertainment with its incorporation into Royal Caribbean's recently launched ship 'The Quantum of the Seas'.

A multi-level room offering 270-degree panoramic views through vast floor-to-ceiling glass walls is transformed into a "Visterama" screen 30 metres long and 6 metres high, in the centre of which is a RoboScreen® created by ABB partner Robotic Arts. This features six ABB IRB 6620 robots mounted onto an 8,200 kilogram capacity gantry with custom Daktronics screens.

The combination of robots and screen allows for previously unattainable styles of entertainment in which the RoboScreens® become performers in themselves, interacting with dancers, acrobats and singers to create a vivid and powerful show.

Whilst such RoboScreens® have been used previously for major international touring rock acts, such as Bon Jovi, this is the first permanent installation for a major performance venue and the first time they have been used on an oceangoing vessel.

Robotics Technology Manager for ABB, Nick Hunt, states:

"Based on the audience reaction to the system so far, it is clear our band of high-tech companies has hit on something special. People have never seen anything like it and often end up simply staring in wonder."

ABB was an exhibitor at TM Smart Factory Expo and at its UK centre in Milton Keynes is a specialist facility for the design, building, testing and commissioning of bespoke robotic manufacturing cells. At the exhibition the company was also promoting YuMi®, an advance in robot technology for small parts assembly that allows robots and humans to work together to create a smarter future for UK manufacturing.

For more information contact ABB, Auriga House, Precedent Drive, Rooksley, Milton Keynes MK13 8PQ. Telephone: 01908 350 300.

BREAKTHROUGH IN REMOTE LASER WELDING

A three-and-a-half-year collaborative programme led by the Warwick Manufacturing Group at the University of Warwick and involving twelve industrial and academic partners has developed software solutions that now enable the implementation of Remote Laser Welding.

Previously the technology was impeded by a lack of methodologies for precise and effective planning and simulation of its application leading to time-consuming and costly trial-and-error procedures.

The new solution includes:

- * Jig and fixture design and optimisation
- * Selection and optimisation of welding joining process parameters
- * Off-line programming of remote welding robots
- * In-process joint quality monitoring

The results from the Remote Laser Welding Navigator programme has led to the first ever fully digitally developed Remote Laser Welding process.

The project has enabled the adoption of Remote Laser Welding in place of Resistance Spot Welding, which has resulted in a five-fold increase in speed with a 60 per cent reduction in floor space through Remote Laser Welding optimised design.

WMG University of Warwick was an exhibitor at TM Smart Factory Expo and may be contacted at The International Manufacturing Centre, University of Warwick, Coventry CV4 7AL. Telephone: 024 7652 4871.

CASE STUDY: DETELECTRONIC

Detectronic has created and delivers intelligent network monitoring for the British and European water industry. Many of its customers maintain the sewerage systems that stretch over long distances and Detectronic's remote monitoring devices provide data and reporting that are key to preventing pollution caused by network failures.

With devices such as the MSFM Sewer Flow Monitor and the Ultrasonic Level Sensor, Detectronic offers highly accurate, real-time monitoring of raw sewage, industrial effluents and storm overflow. Data is constantly being transmitted to Detectronic's dedicated operations centre, which delivers continuous data screening and analysis for its clients. All of these operations depend upon a reliable cellular network with SIMs that are capable of working over many years and in remote areas.

A major problem for Detectronic was unreliability of cellular coverage for roaming devices and inconsistent upgrades. A point was reached where the company could no longer accept providers that did not offer competitive and comprehensive roaming services that covered all of its clients throughout the UK and Europe. The company also required equipment that could be guaranteed to perform in service for at least five years in line with standard water industry contracts.

The solution came in the form of Aeris, a carrier-agnostic IoT partner with robust roaming connectivity. Free-roaming SIMs were provided with updated connectivity to suit long-term installations.

The company states:

'In addition to Aeris' own cellular networks, Aeris has agreements with hundreds of carriers worldwide so Detectronic's devices will always have the strongest signal, no matter their location or movement. This means that data can get back to the Detectronic data centre as quickly and accurately as possible.'

Aeris was able to improve roaming connectivity and, as a result, increase reliability of the signals pouring in from remote sensors to Detectronic's operations centre. This gave Detectronic greater confidence in the performance of their SIMs that can be passed on to their clients.'

More reliable SIMs out in the field also decreases the chance that Detectronic has to send technicians out to troubleshoot problems. This eliminates costly, time-consuming 600-mile round trips to service distant devices.'

For more information telephone 01189 253 202 or visit www.aeris.com

ADVANCES IN COLLABORATIVE ROBOTICS

In 1961 General Motors introduced the first industrial robot to its production line and at the time humans were at high risk of injury when working within a robot's vicinity.

More recently vision and force sensing have enabled robots to 'see' and 'feel' what is around them, and now a generation of 'cobots' (collaborative robots) has been developed that can work alongside humans without the need for safety fencing.

In the article 'In Collaboration' in *Environmental Engineering* Vol. 29, No. 3, June 2016, Andy Pye defines 'collaborative robotics' as "power and force limited robots that are all equipped with force sensing" such that "in any situation they can feel an abnormal force and stop their motion immediately". They are still not 100 per cent safe in that they cannot be certain not to have an impact, but they can reduce an impact and avoid certain types of incidents.

The author notes that 'cobots' are "probably the easiest type to integrate into a workshop" with applications "multiplying exponentially".

In 2011 a two-part International and European standard was published covering safety requirements for industrial robots (EN ISO 10218) and this includes guidance on the use of 'cobots', but the recent expansion of this field of electronic engineering has led to the need for a further Technical Specification (ISO/TS 15066 Robots and Robotic Devices - Safety Requirements for Industrial Robots - Collaborative Operation).

The author states:

"In order to ensure that humans are not exposed to unacceptable risks when working collaboratively, the current standards describe four separate measures that can be used to reduce risk. At least one of these must be fulfilled, in addition to having visual indication that the robot is in collaborative operation."

The four measures are:

- (i) Safety-rated Monitored Stop (when a human has been detected entering the collaborative workspace, the robot stops)
- (ii) Hand Guiding (where a human can guide the robot at the end effector by hand, with additional requirements to include safe-limited speed monitoring, a local emergency stop and a three-position enabling device that must be held in the centre position)

(iii) Speed and Separation Monitoring (where the robot must maintain a specified distance from the human and operate at a pre-determined speed, with a risk assessment that includes the consideration of approach speeds of parts of the human body as specified in EN ISO 13855)

(iv) Power and Force limiting by inherent Design or Control (the power and force of the robot actuators must be monitored by safety-related control systems to ensure that they are within limits established by a risk assessment)

In all four of these measures the safety-related control system that provides the functionality has to meet either:

(a) The Safety Performance Level d(PLd), with category 3 architecture (the identified level to which the safety-related parts of a control system resist faults and their subsequent behaviour if a fault occurs) as outlined in EN ISO 13849, or

(b) Safety Integrity Level 2 (SIL 2) with hardware fault tolerance HFT1 as specified in EN [IEC] 62061

In the most recent development Fanuc Robotics UK has pioneered the operation of a 'cobot' within a caged cell containing a conventional Level 3 robot.

The author states:

"While most other collaborative robots are encased in a sensing cover that stops the robot when a human gets too close, Fanuc's collaborative robot ensures safety through the use of intelligent sensors, which automatically stop the robot if it touches a human operator. This means that the CR-35iA can go closer to the jig and other peripherals when required."

The author then quotes the Regional Sales Manager for Fanuc, Mr. John Rainer, as follows:

"In real world applications, if someone accidentally gets closer to the robot than they should, you don't necessarily want it to stop automatically. Slowing it down may be a more appropriate response: it helps to optimise productivity, but at the same time eliminates sudden stoppages at high speeds, which could lead to vacuum-gripped parts being dropped due to the high inertia. Only when a human puts a hand through the SC300 safety sensor will the robot stop. This vision-based protective device uses image processing technology to detect the intrusion of objects through its detection window. The sensor is continuously looking for a reflected pattern from a special reflective tape around the cell entry window. When an object of a certain resolution blocks the device's view of the pattern, the safety function is activated."

The author notes additionally that the human-safe CR-35iA cobot has a 35kg payload, which "opens up applications that have previously been off-limits for both traditional industrial robots and lighter duty collaborative robots."

He states:

"With health and safety regulations stipulating 25kg as the maximum load a human operator may handle, there is a real requirement for a robot to handle higher loads than this."

NANOTECHNOLOGY PROVIDES BREAKTHROUGH FOR ELECTRICITY GENERATION

Scientists in France have begun using a nanomaterial membrane to generate electricity through the diffusion of salt ions.

The process, known as 'osmotic power', uses a combination of sea water, fresh water and a semi-permeable membrane of molybdenum disulphide that is just three atoms thick. The membrane separates two fluids with different salt concentrations such that salt ions pass through the membrane until the concentrations are equal.

As the ions pass through a tiny hole in the membrane, known as a nanopore, electrons are transferred to an electrode which then proceeds to generate an electric current. As positively charged ions pass through the membrane, negatively charged membranes are left behind. This creates a voltage that allows current generated by the transfer of ions to flow.

The article 'Green Electricity produced from Ion Transfer' in *Laboratory News*, August 2016, quotes Jiandong Feng, Lead Author from the Ecole Polytechnique Federale de Lausanne, as follows:

"We had to first fabricate and then investigate the optimal size of the nanopore. If it's too big, negative ions can pass through and the resulting voltage would be too low. If it's too small, not enough ions can pass through and the current would be too weak."

The scientists calculate that a one metre square membrane with 30 per cent of its surface peppered with nanopores could produce 1MW of electricity, which would be sufficient to power 50,000 standard energy-saving light bulbs.

As molybdenum disulphide readily occurs in nature and can be grown from chemical vapour deposition, it is envisaged to be quite possible to ramp up the process to a larger scale in the future.

BREAKTHROUGH IN GRAPHENE PRODUCTION

Scientists in Germany have created, for the first time, defect-free graphene from graphite.

Graphene, which consists of a single layer of carbon atoms, has the potential to be used in a wide range of emerging technologies, particularly in the semiconductor industry, but its potential for use is affected by the size, area and number of defects currently created during synthesis.

The team discovered that by using benzonitrile in production it was possible to produce defect-free graphene directly from graphite with a low-cost, efficient process that allows the number of charge carriers (mobile electrons) to be controlled during synthesis. This means that specific electronic properties can be set.

Graphene is commonly produced by chemically exfoliating graphite using a process in which metal ions are embedded in graphite so as to create an intercalation compound. The stabilised graphene is then separated from the solvent and re-oxidised. During this process, however, defects can occur due to the hydration and oxidation of carbon atoms, but the addition of benzonitrile prevents this.

The reduced benzonitrile molecule that is formed during the reaction turns red if it does not come into contact with either oxygen or water. This allows the number of charge carriers to be determined through absorption measurements. This is usually achieved by measuring voltage.

The article 'Scientists achieve Breakthrough in Graphene Production' in *Laboratory News*, October 2016, quotes Professor Andreas Hirsch of the University of Erlangen-Nuremberg, as follows:

"This discovery is a breakthrough for experts in the international field of reductive graphene synthesis. Based on this discovery we can expect to see major achievements in terms of the applications of this type of graphene which is produced using wet chemical exfoliation. An example could be cutting defect-free graphene for semiconductor or sensor technology."

TOPOLOGICALLY OPTIMISED 3D COMPONENT GOES INTO SPACE

Weight reduction is a decisive factor in the space industry, since the lighter a satellite is the less it costs to send it into space. At the same time the component has to perform under extremely harsh conditions once in space as well as during the launch procedure, which means that it must be robust as well as light.

These requirements have led manufacturers to explore the potential impact that new design techniques and manufacturing methods could have on the weight of their products.

Since 2013 RUAG Space (Europe's leading equipment supplier to the space industry) has been conducting extensive research and development work to investigate how to 'print' its components using an additive manufacturing process (3D printing). In particular, RUAG engineers wanted to use the technique to produce an aluminium component that would be significantly stiffer, whilst at the same time lighter, than the original design, as well as reducing design and development time.

The first stage was to identify those components that could feasibly be manufactured in this way. Then a development process had to be devised using suitable materials, and experienced and reliable development and manufacturing partners obtained that would provide support in the design, optimisation and manufacturing of the component. Finally, a validation and testing process was needed that would guarantee the quality of the additively manufactured part. An antenna support arm was selected as a component that could be manufactured additively and had a high weight-saving potential.

Altair ProductDesign was selected to support the design for the 3D printing process due to the company's expertise in developing and utilising optimisation techniques. Optimisation methods allow manufacturers to save weight by identifying where material is required in a structure and where it can be removed without negatively impacting on performance. This has a close synergy with additive manufacturing technology as the manufacturing method allows for the creation of shapes that more closely match the ideal material layout identified during the optimisation process.

In order to perform the optimisation studies the combined team deployed Altair's structural solver, OptiStruct, which is part of the HyperWorks suite of simulation tools. A 'design space' was identified within OptiStruct and the known load cases that the antenna would be subjected to during launch and in space were applied. The resulting information enabled OptiStruct to present an ideal, material efficient design that RUAG and Altair could use as a basis for the final design.

For the design after a first optimised layout had been created with OptiStruct, the engineers used Solid Thinking Evolve (a surface modelling tool), which yielded a faster design process relative to traditional CAD tools.

With the optimisation and design stages complete, the component was manufactured by RUAG's additive manufacturing provider EOS. The accuracy of OptiStruct combined with the ability of Altair ProductDesign to interpret the optimisation results into a feasible part meant that relatively few adjustments were needed to the final component so as to meet the EOS 3D printing requirements.

German-based EOS used the EOS M 400 system to produce the aluminium antenna support, which at 40cm in length is one of the longest metal components so far ever produced using Direct Metal Laser Sintering.

Altair state:

'The symbiosis of optimisation and Additive Manufacturing enables a new level of lightweight design since this process is able to realise structurally efficient components which were not previously possible without a lot of time and effort using traditional production methods. The final design developed by RUAG in conjunction with Altair ProductDesign is much closer to the ideal design proposal coming from the optimisation results. Stiffer and lighter components contribute enormously to cut down launching costs for space vehicles and satellites.

For the engineers this new technology offers many advantages including more design freedom, faster design and manufacturing processes and customised products with a higher performance. Industrial 3D printing for space applications is still in its infancy but the method, especially when combined with topology optimisation, will change the way products are developed and produced. Space applications have always been at the forefront of new technology and history shows that applicable technologies were always adopted by other branches quite quickly after having been used successfully in the space industry.'

Michael Pavloff, Chief Technical Officer for RUAG Space, adds:

"Our goal is to equip one of the Sentinel-1 satellites with antenna support components that have been manufactured using an industrial 3D printer. 3D printing has enormous potential for our business and we are currently in the process of developing further space applications. In the future it will be possible to create entire satellite structures using a 3D printer. This means that electrical harnesses, reflectors, heating pipes and other assemblies that today still have to be manufactured individually could then be integrated directly into the structural elements."

Altair was an exhibitor at Advanced Engineering and further information may be obtained from Baljesh Mehmi, Sales and Marketing Director, Altair, Imperial House, Holly Walk, Leamington Spa, Warwickshire CV32 4JG. Telephone: 01926 468 600. Email: info@uk.altair.com

EURO BUS EXPO 2016

The Euro Bus Expo 2016 exhibition had around 286 exhibitors and was described by Event Director Helen Conway as " a fully sold-out show". For electronics professionals the feature of the exhibition of most interest had to be the Technology Zone, which had 37 exhibitors and about which the Show Guide stated:

'A myriad of new technologies have emerged in the last ten years to make life easier for operators and their passengers. With ticket suppliers predicting that we are on the brink of a contactless revolution, and the UK Cards Association confirming that 61.8 million contactless cards are in use in the UK, the prospect of going contactless is an exciting one for the industry, and something that can be discovered in the Technology Zone this year.'

Other developments in technology include ever-more complex software solutions, passenger counting, innovative fuel management, top-of-the-range training aids, new passenger infotainment, and clever data storage. And there are plenty of other technologies to explore that offer solutions to the industry - from on-board WiFi, the "Internet of Things" and innovative real-time GPS technology, to newly-developed ticketing software, training apps for drivers and fleet management software to support operators' requirements'.

Below some of the developments highlighted at the show are presented.

THE BUS DID GO TO SPECSAVERS

In order to promote greater use of public transport, Nottingham City Council has launched an initiative with Specsavers HQ to provide real-time information screens supplied by passenger information specialists 21st. Century, which uses 21st. Century's own core Electronic Passenger Information Software.

Specsavers employs 350 people at the NG2 Business Park in Nottingham, which has a shortage of parking spaces, and in order to encourage staff members to leave their cars at home the company has installed a 21st. Century 46-inch LCD display screen in its reception that streams live traffic and public transport updates.

Councillor Corall Jenkins, Executive Assistant for Transport at Nottingham City Council, commented:

"The City Council is pleased to award Specsavers the honour of being the first ever business to have a real-time bus and tram display screen installed. Together with its other initiatives, this is a real step forward in driving a more sustainable transport system through the Totally Transport Initiative."

Solar-powered E-Ink Bus Stop Displays

At Euro Bus Expo 2016 21st. Century launched a new range of E-Ink and solar-powered bus stop displays designed and built by the company's own in-house technical team.

The range includes RTPI (Real-time Passenger Information) boards and bus stop displays with advertising capabilities. The 13.3 E-Ink display screen uses minimal power and displays real-time travel information that can be viewed from any angle even in bright sunlight. The 10-inch touchscreen display has the capability of displaying both real-time information departure boards and advertising templates. There is also a 28-inch low-power stretched shelter display with the full functionality of a standard model.

All of the displays in the range connect to 21st. Century's powerful and feature-rich content management system known as EPI. This gives network operators the ability to monitor the content of their displays and set templates for departure boards, information space and advertising space. It also enables operators to cluster screens in order to target the correct information to the correct audience via the cloud-based portal.

21st. Century is a member of ITxPT (Information Technology for Public Transport), which is an initiative that has been established to promote a single industry standard for 'plug-and-play' IT systems. This aims to make all technology installed on public transport vehicles work across an open platform, utilising the same set of technical standards.

Further information may be obtained from 21st. Century, Units 3-4 ZK Park, 23 Commerce Way, Croydon, Surrey CR0 4ZS. Telephone: 0844 871 7990. Email: darren.maher@21stplc.com

NEW VEHICLE HEALTH CHECK SCHEME REDUCES GEARBOX COSTS BY 68 PER CENT

A new vehicle health check scheme from Voith Turbo, which is now being used on over 600 buses in the UK, has reduced gearbox costs by 68 per cent at at least one depot.

The scheme, which is the first of its kind in the UK bus industry, uses new software that can predict potential transmission failures.

A year ago only two depots were using the scheme, but with a rapid uptake there are now over 600 buses at 16 depots making large savings on transmission maintenance costs.

When the bus operator agrees, a Voith service engineer first reviews vehicles out of warranty, and afterwards carries out health checks on transmissions that are nearing the end of their warranty period.

The service engineer, with the aid of a laptop equipped with a software package known as Adascanner, then downloads a stream of information from the bus fleet's transmission ECU files for analysis. While interrogating the ECU, Adascanner monitors particularly the condition of clutch plates, which cannot be inspected visually without stripping down the transmission. This is important because clutch plates can cause widespread damage to other gearbox components when they fail, and predicting when they are coming to the end of their life is a major breakthrough for Voith.

Adascanner measures clutch closure pressures which are recorded in the gearbox ECU. By measuring slip times, the ECU adapts the pressure required for clutch closure ensuring smooth and efficient gear shifts. As the pressure increases it is recorded in the ECU data.

Adascanner takes the data and displays it on a computer screen so that engineers can visually inspect the shift pressure at closure. As clutch plates deteriorate they require more pressure to prevent slipping, indicating that they are likely to fail in the near future.

More information may be obtained from Voith Turbo, 6 Beddington Farm Road, Croydon, Surrey CR0 4XB. Telephone: 020 8667 0333. Email: john.domigan@voith.com

ON-BOARD DIGITAL ADVERTISING NETWORK LAUNCHED

On November 1st. at Euro Bus Expo leading provider of WiFi media channels and monetisation services for the public transport industry LetsJoin launched the On-board Digital Advertising Network (ODAN), which dynamically collects audience data from passenger WiFi services, allowing leading media buyers to plan and book their campaigns in the same way as they book other on-line media. This means that regional transport fleets will benefit from being part of a national advertising network, attracting higher value national media budgets while LetsJoin is able to guarantee that operators receive the highest possible revenue from their passenger WiFi by auctioning it to the highest bidder.

First launched with Lothian Buses in 2015, the LetsJoin platform was developed with the leading media buying agencies and already has a proven track record for delivering successful WiFi-based campaigns for major high street brands as well as local businesses and events. LetsJoin's technology is also certified for use with leading WiFi hardware manufacturers.

LetsJoin state:

'The LetsJoin On-board Digital Advertising Network maximises the value of an operator's passenger WiFi audience by aggregating the user base of multiple fleets, maximising the digital advertising space, and providing advertisers with sophisticated Audience Behavioural Insights which are used to optimise Return on Investment on their media spend.'

The LetsJoin On-board Digital Advertising Network provides a platform for individual transport fleets to attract major national media campaigns and benefit from the significantly higher spend that comes from the larger media buying agencies. By aggregating WiFi audiences from multiple fleets the network becomes attractive to larger brands, increasing demand and therefore increasing value.'

A revenue guarantee is important and it is important and it is possible because LetsJoin provides detailed "as live" analytics to the media buying agencies in advance of them placing an order. This means that agencies can specify the size and type of the audience they wish to reach and agree a price based on real audience data.'

For more information contact LetsJoin, 35 Kingsland Road, London E2 8AA. Telephone: 020 7613 8350. Email: admin@letsjoin.com

CASE STUDY: GOLDEN BOY

Luxury coach hire company Golden Boy Coaches is saving around 60 hours a month on administration, as well as cutting operating costs since it moved its tachograph analysis to PSV-specific software provided by TruTac eight months ago.

The family-owned company, based in Hoddesdon, specialises in high quality coach hire (as opposed to excursion packages), focusing on private hire and contract hire with customers such as Tescos, councils, schools, and travel and tour companies. It has 37 vehicles, including 14 large coaches (53/57 seaters), two 70-seaters, 11 minibuses and a number of midi vehicles (29 and 33 seaters).

Golden Boy had been using another tachograph analysis supplier for around eight years since digital tachographs were introduced in 2007, but when the Confederation of Passenger Transport (CPT) became a partner of TruTac, Golden Boy began to examine the CPT Tacho Analysis.

This system is fully web-based, with complete digital and analogue tachograph analysis and automated reporting, specifically designed for PSV operators and Golden Boy has been using it since November 2015.

Under the previous system Golden Boy had to pay for every vehicle download and driver download, but with the TruTac system the company now only pays for the driver card downloads, and a significant discount is obtained for being a CPT member.

Transport Manager for Golden Boy, Andy Wing, comments:

"The biggest time saver for us is when it comes to monitoring the Working Time Directive - previously our drivers would use time-sheets and at the end of the day we would have someone in the office actually adding up those times manually, putting them on a spreadsheet. However, the TruTac system records everything for us and displays it in the way we want so I can see it live and see who's coming near the driving time limits and who's not. With 43 drivers' cards to process, the time saving on administration is easily 15 hours a week.

A lot of tacho software is aimed at anybody that uses tachos - it's not broken down by type of transport - but we operate very differently to HGV operators. This system from TruTac is specifically aimed at PSV operators."

More information is available from Jemma James, Commercial Director, TruTac Limited, Unit 5 Westwood House, Westwood Business Park, Coventry CV4 8HS. Telephone: 02476 690 000. Email: jemma.james@trutac.co.uk