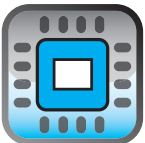
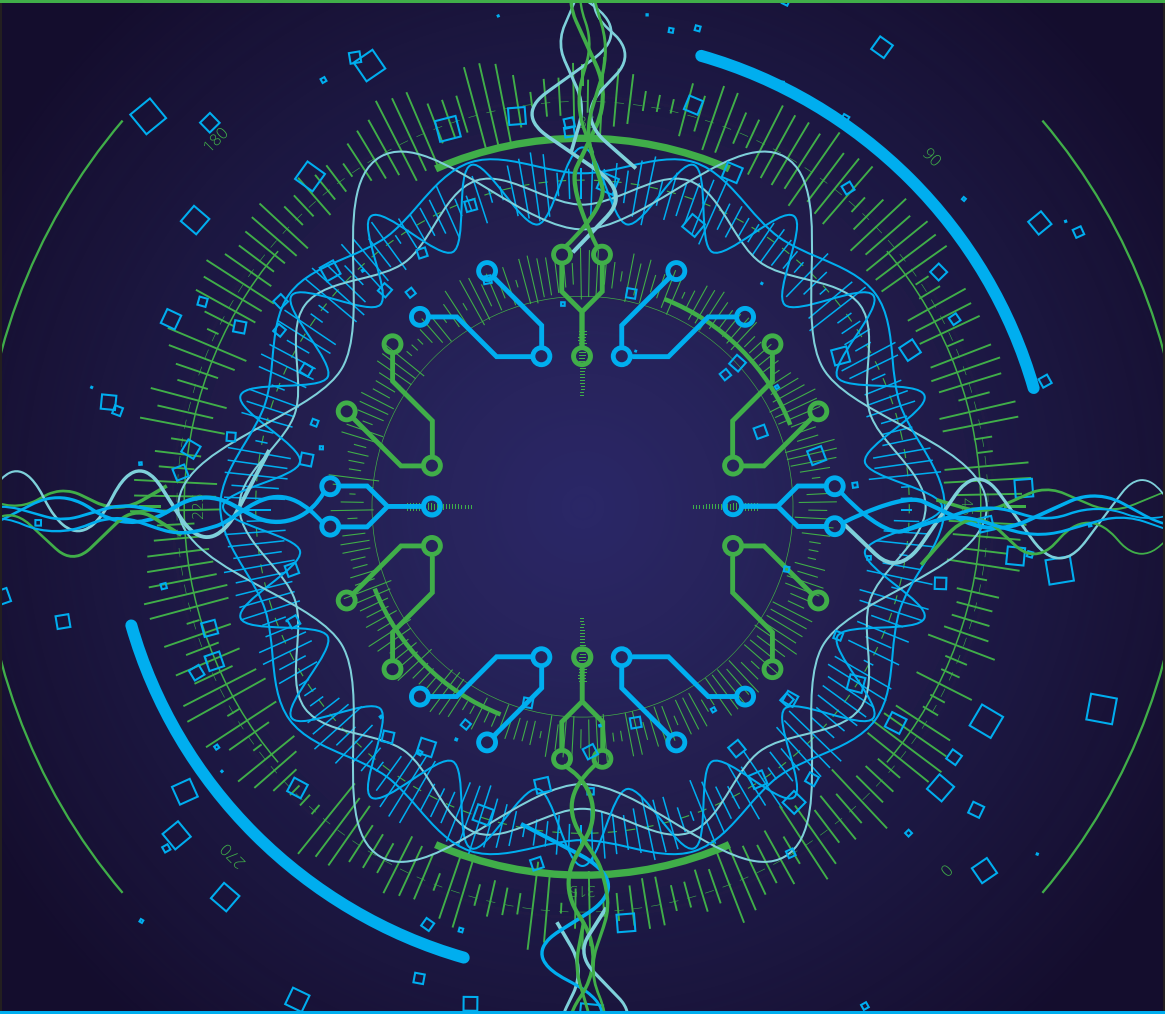




BATTERY TECH EXPO

International Centre,
Telford, UK.
15th March 2018



POWER ELECTRONICS EXPO

Stand F7-F8

Discover the world's first hybrid battery and demand side solution from ESB & GridBeyond. Learn how we enable previously untapped assets to earn significant revenues on stand F7-F8.

11:40am, Main Theatre

Michael Phelan, CEO GridBeyond, presents a case study of the world's first approved hybrid battery & demand side network in operation in a large manufacturer, transforming energy into opportunity.



GridBeyond
formerly Endeco Technologies

For more information

Call 01923 431 638

Visit endeco-technologies.com/gridbeyond

WELCOME TO: The Battery Tech & Power Electronics Expo 2018

David Reeks
Managing
Director,
10four Media
Ltd.



Turn to page 12 to find the expo floor plan and full list of exhibitors.

Events Team:



Rebekah Ford



Helen Peden

The battery and power electronics markets are on the cusp of a revolution with the industry investing heavily in the next generation of development.

Today you'll have the chance to experience the latest technological developments across the battery technology, energy storage and power electronics sectors. In the main exhibition hall, you'll find leading exhibitors from across the UK and Europe showcasing the very latest innovations. During the day, industry experts will be presenting a variety of topics on the centre stage.

PLATINUM SPONSORS:



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The Battery Tech & Power Electronics Expo 2018

SPEAKER AGENDA



10:00 – 10:20
Innovate UK

Speaker: Dr Anna Wise – Innovation Lead – Batteries, Innovate UK
Subject: The Faraday Battery Challenge: Accelerating the UK battery industry

Anna joined the Automotive team of Innovate UK in June 2017. Her focus is delivering the innovation programmes in battery technology for electric vehicles, in particular the innovation aspect of the £246 million Faraday Battery Challenge. Before joining Innovate UK, she was based in the USA at Stanford University and SLAC National Accelerator Laboratory. There she carried out collaborative research with business and academia to understand battery behaviour using high intensity X-rays. Anna was awarded a Ph.D. in Chemistry from the University of Southampton in 2012.



10:20 – 10:40
Steatite

Speaker: Khalid Khan – Business Development Director, Steatite
Subject: The use and development of lithium batteries in emerging markets

Khalid has extensive experience within the battery industry, an area in which he has worked for the last 9 years, covering a range of battery chemistries. Khalid is currently focused on the introduction and development of battery technologies into harsh and critical environments.



10:40 – 11:00
Advanced Propulsion Centre

Speaker: Garry Wilson – Director of Business Development, Advanced Propulsion Centre

Garry Wilson has more than 30 years experience in the automotive industry working for vehicle manufacturers and suppliers. He held various leadership roles within BMW, Land Rover, MG and Rover including Chief Engineer for Powertrain Manufacturing Engineering. He has worked for Roush and Delphi and most recently as a Board member at Torotrak and has experience in all aspects of the motor industry and business functions with predominant experience in powertrain engineering and manufacturing.

At the APC, Garry's key focus is Business Development which includes development of the Hub and Spoke network which will bring together the key technical, regional and specialist skills across the UK.



11:00 – 11:20
Laser 2000

Speaker: Peter Collins – Field Sales Team Leader, Laser 2000

Subject: Into the Blue – laser welding of batteries

Peter Collins is the field sales team leader for the Industrial team at Laser 2000 UK, a specialist photonics distributor; working closely with customers finding photonic solutions that help solve their requirements and problems. He received a BEng(Hons) in Integrated Engineering with Management and an MSc (Eng) in Advanced Engineering with Laser both at the University of Liverpool. Peter has been active in the area of photonics for 12 years, working in laser R&D and laser materials processing applications, before moving into a sales position at Laser 2000. At Battery Tech Expo he will introduce a ground-breaking new high-power blue laser which opens up entirely new ranges of applications, such as welding copper foils for Li:ion batteries.



11:20 – 11:40
Intertek

Speaker: Thomas Carl – Laboratory Manager, Intertek

Subject: EV Battery Safety – testing, regulations and standards

After graduating from the University of applied science of Kempten for Machine Building in 1999, Mr. Carl worked for 13 years as a construction development engineer for different industrial sectors, including machine tools, packaging and the tabasco industry. In 2012, he changed from development of construction to testing services and started at Intertek as test engineer for Li-Ion Batteries (mainly Electrical Vehicle Batteries). In this function, he helped build the Intertek Centre of Excellence for Battery Testing in Germany. From 2015 on, Mr. Carl took over the position and responsibilities as Laboratory Manager. In this role, he expanded the Laboratory to become one of the leading test centers in Germany for Battery, EV Charger and Environmental Testing, as well for the service of Global Market Access (GMAP). Intertek is a well-respected supplier by automotive OEM's, TIER 1's and manufacturers around the world.



11:40 – 12:00
GridBeyond, formerly Endeco Technologies

Speaker: Michael Phelan – CEO, GridBeyond, formerly Endeco Technologies

Subject: Energy security, unlocked grid revenues with low financial risk from the world's first hybrid battery demand-side solution

Michael is a pioneer for demand side response, CEO and co-founder at Endeco Technologies. Michael has over 22 years management experience in sales, marketing and product development in electronic and software companies targeting the energy sector. Prior to joining Endeco Technologies, Michael held positions at Philips, Microsol, PCAS and Duolog in automation and electronics. He was responsible for developing European, Asian and American markets and OEMs such as Invensys, Mitsubishi, Toshiba, and Alstom. In addition, he has facilitated several successful exits. Michael is a graduate of University College Dublin where he obtained an MBA in Business Administration, Management and Operations.



12:00 – 12:20
Catapult

Speaker: Dr Alastair McGibbon – Head of Business Development, Catapult

Subject: SiC and GaN power electronics applications: The role of the CSA Catapult

Alastair has over 30 years' experience in the semiconductor industry in industry and academia. Most recently, he has supported the UK Power electronics community through Power Electronics UK. As Business Development Manager for the Compound Semiconductor Application (CSA) Catapult, his focus is working with the UK power electronics supply chain to help them grow through the deployment of GaN and SiC devices in fully integrated, reliable and cost-effective commercial systems.



12:20 – 12:40
The University of Sheffield

Speaker: Dr Dan Gladwin – Deputy Director of CREESA, The University of Sheffield

Subject: Batteries: Grid connected energy storage and applications

Dr Dan Gladwin (PI) is a Senior Lecturer in the Department of Electrical and Electronic Engineering, within the University of Sheffield. He has particular expertise in energy storage and management, power electronics, and intelligent systems. He is a founding member and Deputy Director of the Centre for Research into Electrical Energy Storage and Applications (CREESA) at the University of Sheffield, and is a named investigator on more than £8.5M of funding from EPSRC, H2020 and Innovate UK in the last 5 years. He manages the work on electrochemical energy storage for grid scale storage and is co-investigator for the £3.8M 1MWh / 2MW lithium titanate facility at Willenhall. He is also co-investigator on the recently started £1.5M TransEnergy project (EP/N022289/1) that is investigating the feasibility of storage on different types of railway networks and in particular the integration of parked electric vehicles close to lines. He has published over 50 papers in the areas of battery modelling and state estimation, optimisation, energy storage and power systems. He is also currently leading a H2020 project to install Europe's largest hybrid flywheel battery energy storage system.



13:10 – 13:30
Rockfort Engineering, Mahindra Formula E

Speaker: Angus Lyon – Head of Powertrain Mahindra Formula E – Director of Rockfort Engineering

Subject: Electric Racing: Pushing batteries to the limits

Angus has 22 years' experience within the automotive and motorsport industries. Working for OEMs, Tier 1 and R&D start-ups as well top level F1 and electric racing teams, Angus gained a strong capability in all areas of active systems from suspension to engine and transmissions as well as extensive expertise in EV/HEV technologies. Over the last 10 years Angus has developed EV motors and systems including the car currently holding the world electric land speed record. In 2013, Angus started Rockfort Engineering Ltd, a systems and safety consultancy specialising in development and application of EV/HEV technologies and systems.



13:30 – 13:50
AVL

Speaker: Nikolas Sariyannis, Development Engineer, AVL, Germany

Subject: Enhancing mileage and lifetime BMS

After completing his German-French double diploma in Mechanical Engineering at Karlsruhe and Paris, Nikolas joined AVL in 2017. Developing modern automotive battery cells, he gained wide-ranging insights into the challenges of the battery cell development process from an OEM perspective. Lately Nikolas is directing his efforts towards developing innovative battery management strategies to further enhance the systems efficiency at no additional cost.



13:30 – 13:50
AVL

Speaker: Mike Parsons – Business Manager Electrification, AVL

Subject: Solutions for validation testing of battery cells, modules & packs

Mike joined AVL UK in January 2017 as Business Manager for Electrification – providing turn-key systems to improve the efficiency of testing batteries (cell/module/pack), charging systems, e-motors, inverters, fuel cells, e-axles and complete electrified powertrains.

Previously, after studying Electronic Engineering at the University of Southampton, Mike spent over 20 years in research and development of hybrid-electric vehicle powertrains for high-mobility off-road vehicles.



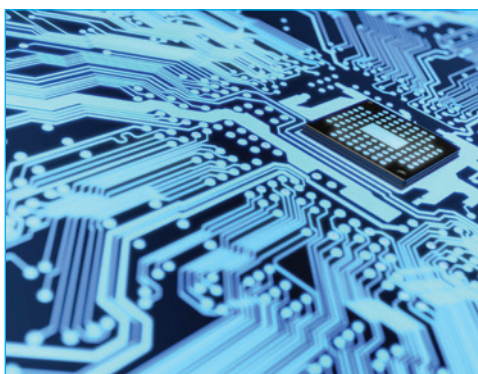
13:50 – 14:10
Qinetiq

Speaker: Dr Gary Mepsted – Technical Manager – Advanced Batteries, Qinetiq
Subject: Advanced lithium-ion cells for next generation battery packs
Gary holds a degree and PhD in chemistry from University of London and he is a Fellow of the Royal Society of Chemistry. He has been working in the field of batteries and fuel cells for more than 20 years and currently leads QinetiQ's advanced power team, which focuses on development and evaluation of batteries and supercapacitors for demanding environments, and fuel cell technologies. Examples include development of very high energy primary lithium cells and a thin, flexible Li-ion cell as well as a portable hydrogen generator and a reformer technology that operates from diesel and other fuels. Gary's team operates a small production facility for manufacture of lithium based cells and a test facility for evaluation and certification. Gary is author of more than 35 papers and 6 patents.



14:10 – 14:30
HORIBA MIRA

Speaker: Greg Harris – Head of Commercial – Strategic Projects & New Technologies, HORIBA MIRA
Subject: Development of the hybrid powertrain and traction battery for the next generation of Hybrid Refuse Vehicles
HORIBA MIRA has recently developed the series hybrid powertrain and high voltage lithium ion battery for the next generation of efficient, lightweight Dennis Eagle vehicles within the UVR (Urban Vehicle Range) programme. This presentation will cover key aspects of the powertrain control and battery development programme including requirements definition, concept development, controls software, battery design, design validation planning and functional safety.



14:30 – 14:50
Potter Clarkson

Speaker: Helen Johnstone – European Patent Attorney – Chartered Patent Attorney, Potter Clarkson
Subject: Business after Brexit – opportunities and threats
As a Patent Attorney Litigator and Partner at top-tier, full service European patent and trade mark attorneys and IP lawyers firm Potter Clarkson, Helen regularly advises clients on IP strategy issues such as global filing strategies, and has been involved in due diligence exercises, representing clients at hearings before the European Patent Office. Helen's work has also seen her involved in litigation before the UK Intellectual Property Office and the Patents County Court.
Specialising in the mechanical, electro-optical and electro-mechanical areas, as well as medical devices, Helen also has experience in the field of battery energy storage. Helen also has extensive experience in the design field, dealing with all aspects of design protection, both registered and unregistered. Helen's shares her extensive experience through working with academic institutions and associated technology transfer departments.



14:30 – 14:50
Potter Clarkson

Speaker: Ben Lincoln, European Patent Attorney, Chartered Patent Attorney, Potter Clarkson
As a Patent Attorney Partner at top-tier, full service European patent and trade mark attorneys and IP lawyers firm Potter Clarkson, Ben works with a range of clients from SMEs to large multinational companies. With a background in physics and computer science, Ben's expertise lies in the fields of semiconductors, hybrid power delivery, telecommunications, green technology, plastics engineering, control systems for manufacturing and automotive components. Ben has helped many firms, large and small, with the drafting of patent applications, the prosecution of patent applications around the world and the development of patent strategies. Ben also regularly represents clients at hearings before the UK and European Patent Offices.
As sector lead for Potter Clarkson's energy sector group, Ben helps coordinate a team of talented patent attorneys each with different experiences in battery industry related technologies. The energy sector team members work together to best serve the needs of our clients.



14:50 – 15:10
Tektronix

Speaker: Omer Sheikh – Applications Specialist, Tektronix
Subject: Challenges of High-Sided FET Measurements and avoiding CMRR Issues

Omer is an Applications Specialist for Tektronix, focusing in the Power Electronics field. With over 8 years of experience in the test and measurement industry, he provides comprehensive technical advice in the selection, use, and application of Oscilloscopes and Probes to customers in a wide variety of Power related applications. He has a BEng degree in Electronics and in his free time enjoys participating in cricket and online gaming.

Floating differential measurements (such as high-side Vgs) are difficult or impossible to make due to high frequency (fast turn on and turn offs), and the presence of high common mode voltages (such as Vds) affecting oscilloscope probes which do not have sufficient common mode rejection at high bandwidth. The poor common mode rejection leads to the measurement being dominated by the common mode error instead of the actual differential signal. This presentation will look at the utilisation of Galvanically Isolated Differential Probes which do not de-rate with frequency at the operating requirements of GaN and SiC devices to allow accurate differential measurements to take place.



15:10 – 15:30
WMG, University of Warwick

Speaker: Mark Ellis – Principal Engineering – Battery Systems, WMG, University of Warwick
Subject: Enhancing battery performance – a manufacturing challenge

Mark Ellis is Principal Engineer, Battery Systems for WMG at University of Warwick. Mark has over 20 years' experience in the automotive industry in OEM and Tier 1 supplier product development management roles. He has been working on vehicle electrification projects with a focus on electrical energy storage systems for last seven years. Most recently, Mark held the role of Engineering Manager at Johnson Matthey Battery Systems, working on advanced Li-ion battery systems development for Micro-hybrid, HEV, PHEV & BEV platforms.

He is presently working on projects relating to Li-ion module and battery pack manufacturing, and enhancing battery module power and energy density through improved design. His research interests include joining technologies for high conductivity materials, cell thermal characterisation, thermal management and design for manufacture & reuse. Mark is a Chartered Engineer and holds a BEng in Materials Science from University of Birmingham, MSc in Engineering and Business Management (Warwick) and an MBA (Aston).



15:30 – 15:50
Strategy Analytics

Speaker: Kevin Mak – Senior Analyst – Global Automotive Practice, Strategy Analytics
Subject: The future battery market for electric vehicles

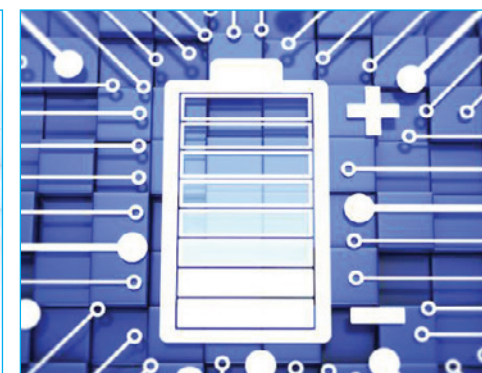
Kevin Mak is an Analyst of the Global Automotive Practice at Strategy Analytics, specialising in the strategic analysis of automotive electronic systems, semiconductors and sensors.

For eleven years, he has been responsible for writing reports on the automotive electronics industry and forecasting global trends for a wide range of clients in light vehicle production and suppliers in Tier 1 electronic systems, sensors and semiconductor components. He has previously worked for Pioneer as a sales analyst and planner for the UK subsidiary's aftermarket in-car entertainment and navigation sales division and also holds an MSc in Information Management and Finance from Westminster University.

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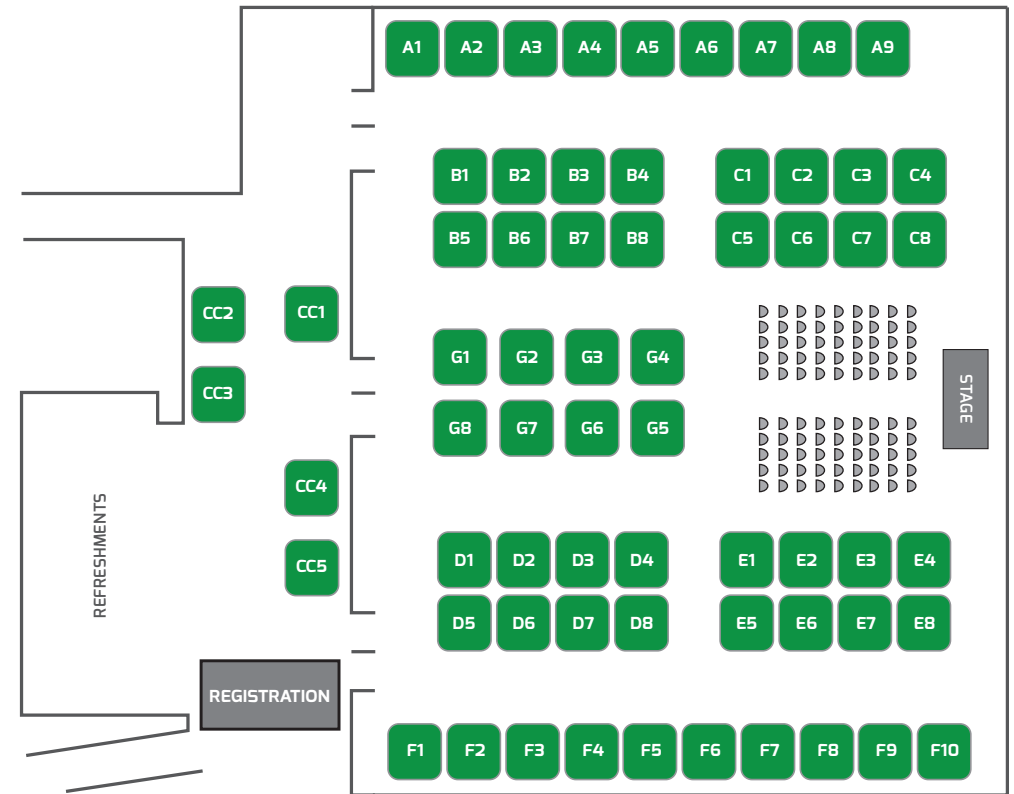


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MEP Technologies	A5	Caltest	E5
ICW	A6	UTC Aerospace Systems Marston UK	E6
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Universal Science/ Materials Direct	A9	Maccor/Cellcare	F1
Kummer Semiconductor	B1	Potter Clarkson	F2
Alvatek	B2	Netzsch	F3
Tektronix	B3	Nordson Dage	F4
Wavelength Electronics	B4	Intertek	F5
Pheonix Contact	B5	Intertek	F6
ETPS Ltd	B6	GridBeyond formerly Endeco Technologies/ ESB	F7
Millbrook	B7	GridBeyond formerly Endeco Technologies/ ESB	F8
Advanced Chemical Etching	B8	Rockfort Engineering	F9
Thermal Issues	C1	Thermo Fisher Scientific	F10
Qinetiq	C2	Kratzer Automation	G1
Hidden Analytical	C3	Acota	G2
Zwick	C4	Binder	G3
Power Products International	C5	AVL	G4
Lauda Technology	C6	AVL	G5
The University of Sheffield/ CREESA	C7	All Batteries	G6
Lincad	C8	Power Shield	G7
ZEISS	D1	Thermal Hazard Technologies	G8
SPAL Automotive	D2		
Advanced Propulsion Centre	D3		
Teledyne	D4		
Steatite	D5		
Expert Tooling and Automation	D6		
Munters	D7		
Accutronics	D8		
		Concourse Area	
		Catapult	CC1
		Telonic	CC2
		API Capacitors	CC3
		TecInteractive	CC4
		Strainsense	CC5

Exhibition Plan





AVL INTEGRATION TEST SYSTEMS FOR ELECTRIFICATION

Accelerating xEV development and validation

As of today, integration and validation of electrical HV components is still a very time-consuming procedure. Traditional lab-based testing solutions are not purpose-designed for integration purposes, thus often lack the required flexibility. Much of the integration and validation work is thus still done with prototype vehicles. Using integration test stands, AVL is changing this process for electric drives. The AVL E-Integration Test System allows for the testing and validation of all electrical high-voltage components. In this, the seamless and open AVL tool chain supports in ultimately increasing functionality and reliability throughout all xEV development tasks.

HIGHLIGHTS AT A GLANCE:

- Simplified integration testing
- 50% reduction in testing time which translates into a reduction in overall development time
- HV validation as early as possible in testing time or even parallel to product development
- Full access to AVL methodology approach and experts for xEV development

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MILLING SIEVING ASSISTING

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VISIT US ON STAND

A1



RETSCH is the leading solution provider for neutral-to-analysis sample preparation and characterization of solids.

Based on a century of experience RETSCH develops size reduction and sieving equipment which is characterized by excellent performance, operating convenience, safety and longevity.



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VISIT US ON STAND

A2



Power Capacitors Ltd is Power Factor Correction, having specialised in power quality since 1973. Our experience is as diverse as our customer base which includes multi-national manufacturing, financial and utility companies to SMEs and private individuals. For a consultation or a full survey and specification we are happy to support customers old and new.

Power Capacitors Ltd is an established leader in the specification, design and manufacture of Power Factor Correction systems, committed to delivering the right solution for every application. Our team of highly trained and experienced engineers will properly identify the rating and design of equipment required in every case.

Our experienced engineers are available throughout the UK providing regular servicing and maintenance to ALL makes of Power Factor Correction equipment, ensuring that optimum operation is maintained, maximising the financial and technical benefits.



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www.sliceenergystorage.com

VISIT US ON STAND

A3



Denchi Group are a leading UK designer and manufacturer of Lithium-ion based battery systems for power and energy applications. Supplying a diverse customer base spanning the defence, aerospace, marine and mining markets, the applications for their battery products demand the highest levels of performance and reliability.

Having built a reputation for delivering a range of rugged and dependable products for the land battlespace, they have been designing specialist batteries, battery management systems and chargers at their purpose built Scottish facility for over 15 years. Continually innovating, more recently they have extended their capabilities to the market for energy storage systems.

A UK company providing leading edge design and manufacture of battery packs and systems for automotive and non-automotive applications.

With extensive expertise in the design and development of lithium-based battery packs and full systems, expert Technologies can offer a complete development solution to support a variety of applications, from small high power battery packs to energy storage systems and automotive traction batteries. With an In-house, flexible, low-volume manufacturing facility, we can reduce product development time by creating more mature prototype battery systems earlier in the development process.

www.meptec.co.uk

VISIT US ON STAND

A4

A5



ICW are a specialist manufacturer of metallised film capacitors producing polypropylene and polyester capacitors and capacitor assemblies, based in Wrexham North Wales we produce our products using state of the art technology in our manufacturing process and have been established over 40 years.

We focus in markets including hybrids and electric vehicles, naval, aerospace, industrial, motors, drives, working with customers on hybrid and powertrain solutions. Our goal is to utilise our capabilities, knowledge and expertise to explore with existing and new companies and markets like EV's to expand mutual collaboration for UK, European and global OEMs and Tier 1 suppliers.

www.icwlimited.co.uk

VISIT US ON STAND

A6



MDL Technologies provides sales, consultancy, system integration, project management and installation of electronic test equipment and facilities. MDL works in partnership with leading test equipment manufacturers providing test solutions for: Battery, EVSE & EV, Power Electronics, EMC, RF, Microwave, Wireless, Video and Electrical Safety.

www.mdltechnologies.co.uk

VISIT US ON STAND

A7



Würth Elektronik eiSos is one of the leading manufacturers of electronic and electromechanical components in Europe. The product portfolio includes: EMC components, capacitors, inductors, RF inductors and LTCC components, transformers, components for circuit protection, power modules, LEDs, connectors, switches, power elements in press-fit technology and assembly technique. Our direct sales organization is active in 43 countries throughout the world. With 16 production facilities spread all over the globe, we guarantee complete design-in support, samples free of charge and the delivery of our components anywhere in the world

www.we-online.com

VISIT US ON STAND

A8



Materials Direct 247 is an exciting new online service, with a large selection of technical materials for use in the Electronics and LED lighting sectors, such as thermal materials, gaskets and optical films. Using our four-step ordering system is quick and easy, with quotations given instantly. There is never a tooling charge no matter how many parts you order, or the quantities you order them in. This makes Materials Direct 247 ideal for prototype and small batch orders, with parts being delivered in as little as 24 hours of payment. We supply products from many trusted brands, such as Universal Science; 3M, Laird and many more!

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VISIT US ON STAND

A9



John P Kummer Limited supply Equipment and materials to companies and institutes throughout the UK, Ireland and the Nordic region. Our products have applications in many areas, including the following:

- Specialist Epoxy adhesives
- Test
- Inspection
- Metrology
- Failure Analysis
- Specialist processing

Our customers include some of the largest in their fields. They are active in various advanced fields including:

- Semiconductor fabrication
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- Makers of Medical instruments
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- Research Institutions

www.jpnummer.com

VISIT US ON STAND

B1





Alvatek distributes and supports a range of electrochemistry research equipment including test, research and manufacturing equipment for battery and energy storage applications.

By providing our customers with expert advice and timely high-quality support, our aim is to ensure that our customers are happy to recommend Alvatek to their peers.

At Power Electronics Expo Alvatek will be taking the opportunity to launch a new line of AC power sources from N4L. These sources are perfect for applications including testing and research of renewable energy products.

Leading brands represented include Ivium Technologies, BaSyTec, Scribner Associates, N4L, PalmSens, BASi, EL-Cell, Adani and more.

www.alvatek.co.uk

VISIT US ON STAND

B2



We are the measurement insight company committed to performance, and compelled by possibilities. Tektronix designs and manufactures test and measurement solutions to break through the walls of complexity, and accelerate global innovation. Together we empower engineers to create and realize technological advances with ever greater ease, speed and accuracy. Tektronix solutions have supported many of humankind's greatest advances of the past 70 years.

www.uk.tek.com

VISIT US ON STAND

B3



Wavelength Electronics Ltd presents the products and capabilities of the following manufacturers of power supplies and components for power conversion, control and protection. Astrodyne TDI PSUs and EMC filters for applications from 10W to 100KW.

Cornell Dubilier aluminium electrolytic and polypropylene film power capacitors. Illinois Capacitor super capacitor modules and sub-assemblies. Vanguard Electronics inductors chokes and transformers.

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www.wavelengthelectronics.co.uk

VISIT US ON STAND

B4



Phoenix Contact's position as a global market leader in device connection technology, industrial control and automation solutions is achieved by developing "Inspiring Innovations". With thousands of new products launched each year, we lead the way in product development and innovation.

This year's highlight products include the SKEDD direct plug-in PCB connector, M12 device connectors, UCS & ECS enclosures designed for embedded systems & harsh environments, and electric vehicle charging solutions.

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VISIT US ON STAND

B5



ELECTRONIC TEST & POWER SYSTEMS

ETPS specialise in programmable power supplies and test systems. Our wide selection of products caters for almost any power, voltage or current requirement. Specific ranges include programmable AC & DC sources, battery/capacitor emulators, bidirectional PSUs, chargers, high voltage PSUs, electronic loads, battery/capacitor cyclers and drive cycle test equipment. If nothing in our standard range is suitable then we'll look to engineer a custom solution. We also provide an ever expanding range of rental power systems.

www.etps.co.uk

VISIT US ON STAND

B6



Millbrook is the leading provider of vehicle test and validation services to customers in the automotive, transport, tyre, petrochemical, defence and security industries. It is independent and impartial in everything it does.

Millbrook is making a significant investment in the equipment and facilities needed to test large batteries. The investment allows Millbrook to assess the performance of battery cells, modules and packs, to determine pack performance during a crash event and to subject batteries to a range of environmental conditions. Millbrook's test tracks have proved ideal for the assessment of stop-start systems and electric propulsion options.

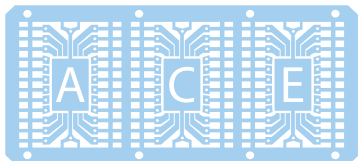
www.millbrook.co.uk

VISIT US ON STAND

B7



Millbrook is part of the Test and Measurement business segment of Spectris plc.



www.ace-uk.net

www.ace-uk.net

VISIT US ON STAND

B8



Advanced Chemical Etching Ltd (ACE) is the largest independent etching company in the UK, based in a 25,000 sq ft state-of-the-art facility in Telford Shropshire. Manufacturers of 2D & 3D precision etched metal components, prototyping and low volume products. Activities are far and wide and can include anything from safety critical components for cars and aircraft to meshes and electronic connectors.

Located on Stand B8 they will be showcasing their new unique solutions for the etching of exotic materials titanium (TiME) and aluminium (ACmE). Technical Engineers from ACE will be on hand to discuss individual etching requirements.



THERMAL ISSUES
FLEXIBILITY IN RESPONSE

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C1



We deliver flexible, scalable solutions for electronic and electrical components that require thermal management and electrical isolation.

Our products have been proven to enhance the performance of Battery Management Systems in high performance EV's.

We meet the changing needs of your business with intelligent, bespoke solutions engineered to your exact requirements.

Whether you need rapid prototyping with next day delivery on custom made parts, or an ongoing JIT requirement – we'll offer a flexible approach that fits your business model.

QINETIQ

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VISIT US ON STAND

C2



We are a company of over 6,000 dedicated people providing technological and scientific expertise that helps our customers protect, improve and advance their vital interests. By listening to and anticipating your needs, we can provide unique solutions that combine our depth of knowledge and experience with a collaborative and enterprising approach. We work across every aspect of the life cycle of critical equipment and infrastructure, providing services and products that address our customers' most pressing challenges. Our breadth and depth of experience spans many markets and industries.

HIDEN

ANALYTICAL

www.hidenanalytical.com

VISIT US ON STAND

C3



For over 35 years Hiden Analytical has been a global leader in the design and manufacture of scientific instruments for research, development and production applications. In vacuum, gas, surface and plasma processes our quadrupole mass spectrometers have gained worldwide recognition for their precision and outstanding performance.

As a privately-owned company our reputation is built on creating close, positive relationships with our clients. Many customers work at the forefront of new technology - in the fields of plasma research, surface science, vacuum processing and gas analysis. To maintain this reputation we have, over the years, established exceptional levels of technical expertise in these areas within our company.

Zwick / Roell

www.zwick.com

VISIT US ON STAND

C4

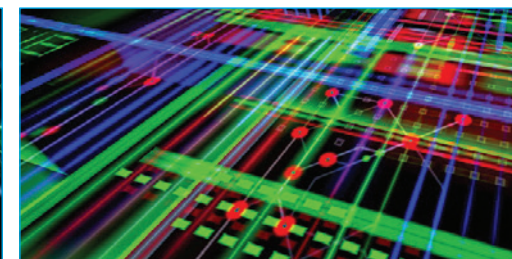
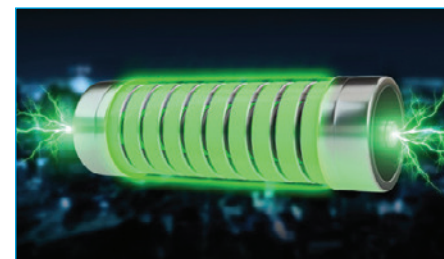


Zwick Roell manufactures and supports a wide range of materials testing machines, systems and accessories for use in research, quality control, production environments and academia.

Our extensive portfolio of products can be used to determine the mechanical properties of both materials and components and can accommodate tension, compression, flexure, friction, peel, torsion, impact, melt flow, hardness and fatigue testing procedures, making them ideal for the most rigorous testing requirements.

Our product range also includes many accessories such as specimen groups, electronics, software and essential hydraulic components.

To complement our products we provide technical support, planned maintenance cover, UKAS calibration and comprehensive operator training.





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CREESA

**CENTRE FOR RESEARCH INTO ELECTRICAL ENERGY STORAGE
AND APPLICATIONS**

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UAVs
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BATTERIES

SUPER CAPACITORS

FLYWHEELS

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Power Conversion
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2nd Life Batteries

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**'Working in Partnership with Industry to help the UK maintain its position
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www.ppi-uk.com

VISIT US ON STAND



Power Products are a leading UK designer & manufacturer of Power Semiconductor assemblies and high performance Thermal Management products for the power electronics industry. From simple single device assemblies to complex multi-phase rectifier systems, the team can offer a range of standard constructions, or custom designs to suit the application. Mechanical & thermal design options include extruded aluminium profile heatsinks and a range of construction styles for combination copper & aluminium liquid cooled plates. Power Products are also able to provide advanced thermal management products including press fit, welded and pressed fin assemblies, controlled atmosphere brazing, and friction stir welding.



www.lauda-technology.co.uk

VISIT US ON STAND



LAUDA is a solution provider for process cooling, thermal management and viscosity measurement to the automotive and aerospace industry. Our products are supported by the knowledge gained through many successful projects from the cooling of dynamometer engine test beds to the precise viscosity measurement of lubricants, oils and fuels.

Over the years we have successfully fulfilled the needs of many research establishments, providing both cooling and heating solutions, covering a range of -100 °C to 320 °C for a wide range of test apparatus."



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www.creesa.co.uk

VISIT US ON STAND



The Centre for Research into Electrical Energy Storage & Applications for Research (CREESA) is one of the UK's leading research centres on electrical energy storage.

Industry focussed, we have a number of unique assets offering a multitude of opportunities that span from EV battery packs, their second life usage, grid connected storage and hybrid energy solutions. The breadth of our work ranges from modelling and validating large scale battery cell behaviour, through to operational understanding for the supply of grid services.

Our team is expanding and we are looking for industrial partners who have synergy with our core activity.



Lincad is a leading expert in the design and manufacture of lithium-ion batteries, chargers and associated products for a range of applications across a number of different sectors. With a heritage spanning more than three decades in the defence and security sectors, Lincad has particular expertise in the development of reliable, ruggedized product with high environmental, thermal and electromagnetic performance.

www.lincad.co.uk

VISIT US ON STAND

C8



With a dedicated team of engineers, all product is designed and manufactured in-house at our facility in Ash Vale, Surrey. Lincad is ISO 9001 and TickITplus accredited and works closely with its customers to meet their power management needs.



ZEISS is an international leader in the fields of optics and optoelectronics. Developing and producing solutions in the fields of precision measuring and cutting-edge microscopy, ZEISS are a global technology leader constantly seeking innovation. Its product line ranges from complete solutions for multi-dimensional metrology, both in the lab and in production, to offering complete microscopy solutions for biomedical research, the healthcare sector and high-tech industries. Join us on our stand to discover more from our portfolio of ZEISS optical solutions including the O-INSPECT, DuraMax, Smartproof 5 and Smartzoom 5.

www.zeiss.co.uk/industry

VISIT US ON STAND

D1



High performance fans and blower manufacturer.

www.spalautomotive.co.uk

VISIT US ON STAND

D2



The Advanced Propulsion Centre (APC) is a £1 billion, 10-year programme to position the UK as a global centre of excellence for low carbon powertrain development and production. It was formed in 2013 in a joint commitment by government and the automotive industry, through the Automotive Council, and aims to save 50 million tonnes CO2 by 2023.

APC facilitates partnerships between those who have good ideas and those who can bring them to market. The services provided by the APC enable projects which provide profitable growth and sustainable opportunities for the partners involved. Each programme enhances the UK's position as a propulsion nation and contributes to the country's economic prosperity.

So far, APC has launched and awarded eight funding competitions to more than 130 organisations, with investment totalling £589 million. The awarded projects have safeguarded more than 20,500 automotive supply chain jobs and saved 34 million tonnes CO2 – the equivalent of taking 1.5 million cars off the road.

www.apcuk.co.uk

VISIT US ON STAND

D3



Teledyne LeCroy is a leading manufacturer of advanced real-time oscilloscopes up to 100GHz bandwidth, protocol analyzers, and other test instruments that verify performance, validate compliance, and debug complex electronic systems quickly. The Company is focused on incorporating powerful tools that enhance "Time-to-Insight" to rapidly find and fix defects in electronic systems, dramatically improving time-to-market for a wide variety of applications.

www.teledynelecroy.com/europe

VISIT US ON STAND

D4



Steatite Ltd is a market leader in the design, development and supply of rugged and industrial computers, custom lithium battery solutions, secure communication systems, and advanced antennas & subsystems, all ideally suited to harsh operating environments.

www.steatite.co.uk

VISIT US ON STAND

D5





Founded in 1972 Expert has developed over the years to become a recognised supplier of high quality Assembly Tooling, Special Purpose Machines and Automation to the Automotive, Aerospace and transport Industries in the UK and Internationally. Expert has over four decades of experience and knowledge in supplying to industry and in the last 10 years has concentrated on the emerging technologies used in the construction of vehicle body assemblies and there sub components in lightweight materials including composite and aluminium. Expert has become a preferred supplier of body in white assembly tooling for JLR, Aston Martin, McLaren, as well as many tier 1 companies in the Automotive supply chain.

www.expert-amt.com

VISIT US ON STAND

D6



Munters is a global leader in energy efficient indoor climate control and dehumidification. Using innovative technologies, Munters creates the perfect climate for customers in a wide range of industries.

Munters are experts in the design, manufacture, supply and installation of turnkey dry room systems to achieve ultra-low dew points of less than 1% humidity ($\leq -40^{\circ}\text{C}$ Dew-point). Specifically designed to meet the needs of advanced battery manufacturers' requirement for precise and low dew point control, while at the same time consuming less energy. Over 40 years' experience with proven global installations for manufacturing,

www.munters.com/batterydryrooms

VISIT US ON STAND

D7



Accutronics is an industry leader in design, development & manufacture of portable power solutions for Medical, Defense & Security, Test & Instrumentation and Robotics applications where failure is not an option. Together with our US parent company, Ultralife Corporation, we create high quality, high performance power solutions that meet demanding application requirements. OEMs worldwide depend on us to be a valued partner delivering both custom and pre-engineered batteries and chargers which are differentiated by innovation, time to market, performance, reliability & safety – from design to manufacture & everything in-between.

www.accutronics.com

VISIT US ON STAND

D8



Fullbrook Systems specialise in the measurement and processing of liquid systems in chemical, pharmaceutical, printing and coating. Of particular interest to companies working with lithium slurries in the development of battery technology is the DISPERMAT range of dispersion and milling equipment for laboratory research as well as for the production of larger batches. Fullbrook also work closely with Ametek Brookfield and offer viscometers for use in the laboratory and interestingly production use where coating processes are commonly measured and controlled. The Turbiscan is able to determine stability of colloidal systems and provides useful information on particle size, stability and agglomeration.

VMA_Getzmann GmbH are well known for the DISPERMAT® and TORUSMILL® ranges of dispersion and milling equipment. Their adaptable systems are ideally suited to the dispersion of lithium battery slurries which often have poor flow characteristics and are difficult to disperse. High speed dissolvers, horizontal bead mills and high shear rotor stator systems are all in use in battery development. Container wall scrapers and double jacketed containers for cooling are standard options within the DISPERMAT® range. The company has a well equipped applications laboratory and works closely with customers who visit to find the best solution for their dispersion projects.

www.fullbrooksystems.co.uk

www.vma-getzmann.de

VISIT US ON STAND

E1



HORIBA MIRA is a global provider of pioneering engineering, research and test services to the automotive, defence, aerospace and rail sectors. We provide vehicle manufacturers and suppliers around the world with comprehensive support - ranging from individual product tests to turnkey engineering design, development and build programmes. With over 70 years' experience in developing some of the world's most iconic vehicles, HORIBA MIRA applies advanced engineering, test and validation capabilities to our customers' challenging programmes, including supporting the simulation, design, development, build and testing of high-voltage battery systems.

www.horiba-mira.com

VISIT US ON STAND

E2





BESPOKE BATTERIES FOR THE APPLICATIONS OF TOMORROW



With years of knowledge in the design and manufacture of niche, bespoke battery systems, MEP Technologies are the perfect choice for battery system designed to meet your exacting requirements. We specialise in the creation of high power and high energy density systems, where performance requirements exceed the norm.

From small, high-power packs to larger energy storage systems or electromotive applications, MEP Technologies Ltd have the skills and experience to turn your requirements into reality. And with our background in validation, you'll find your application consists of one of the most reliable systems possible.

When you think batteries, think MEP Technologies

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Website: www.meptec.co.uk



Leybold is a worldwide company which has been trading for 165 years, offering customers the largest sales and after sales network in the vacuum technology industry. Our wide manufacturing range includes fore vacuum pumps, high vacuum pumps, vacuum systems, vacuum gauges, leak detection instruments, flanges, fittings and valves as well as complete vacuum solutions.

Genuine spare parts and full UK service support is offered; on-site service with experienced Leybold field engineers, as well as in-house service at our Chessington centre, for not only Leybold equipment but all vacuum product manufacturers. You can work with us to develop a maintenance contract.

www.leybold.com

VISIT US ON STAND



Panasonic industrial batteries are distributed in Europe by Panasonic Industry Europe GmbH (PIEU).

Panasonic Industry Europe GmbH is part of the global Panasonic Group and provides industrial products and services in Europe.

The portfolio covers key electronic components, devices and modules up to complete solutions and production equipment for manufacturing lines across a broad range of industries.

Panasonic started manufacturing batteries back in 1931. Today, with numerous production sites around the globe, the corporation offers the widest selection of any battery manufacturer worldwide.

www.industry.panasonic.eu

VISIT US ON STAND



The product spectrum includes batteries in diverse technologies, including primary batteries and rechargeable secondary batteries.





Started in 1992 Caltest provides test instrumentation and high level technical support, an extensive range of demo and rental equipment and a comprehensive service/UKAS calibration department.

Caltest proudly represent a number of industry leading manufacturers supplying:

- AC and DC Power Sources and Loads
- Power Analysers
- Wound Product Testers
- Frequency Converters
- Electricity Meter Testers and Calibrators
- Oscilloscopes
- HiPot
- Multimeters
- And more...

www.caltest.co.uk

VISIT US ON STAND **E5**



UTC Aerospace Systems Thermal Management business, HS Marston based in Wolverhampton, Designs and Manufactures a wide range of cooling solutions, from traditional extruded products through to complex brazed cold-plates for customers and markets worldwide including battery & power industries.

Through in house development and investment in state of the art equipment our product range has matched the needs of the electronics industry by providing cooling solutions that both prolong component life and improve system reliability.

www.hsmarston.co.uk

VISIT US ON STAND **E6**

Recent growth has seen the addition of new vacuum braze furnaces as well as new 5 axis machine centers to facilitate the additional business won in both Military and Civil aircraft programmes.

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Drive systems for electric vehicles require new Li-ion battery technologies and reliable, inexpensive manufacturing approaches.

Joining of these battery cells presents challenges such as welding of highly conductive, dissimilar materials, multiple-sheets-joining, and varying material thickness combinations. Different cell types and pack configurations also influence joining methods.

Our blue fibre-coupled laser module emits in the blue spectrum at 450 nm. This new technology offers advantages over legacy IR lasers thanks to high absorption at blue wavelengths. Improving welding speed and broadening the process window directly translates into faster production times.

www.laser2000.co.uk

VISIT US ON STAND **E7**

Laser 2000 has been serving the UK market with professional photonics equipment for over 25 years.



Nikon Metrology offers innovative measurement products, including optical and mechanical 3D metrology solutions which respond to the advanced inspection requirements of the consumer, automotive, aerospace, electronics and medical industries. Visit our stand for live interactive demonstrations and talk to us about your application.

www.nikonmetrology.com

VISIT US ON STAND **E8**



Maccor manufactures testing equipment for the battery and energy storage market (batteries, capacitors, fuel cells, etc.) more companies rely on Maccor every day for their battery and cell test equipment needs. Today Maccor has thousands of systems in operation in more than 50 countries.

www.macor.com

VISIT US ON STAND **F1**



Potter Clarkson LLP is an award-winning, top tier firm of European patent and trade mark attorneys and IP solicitors. Established in 1889 in Nottingham, the firm is one the largest full-service IP practices in Europe.

Dedicated to offering clients around the globe unrivalled expertise on intellectual property rights and strategy across a variety of industry sectors and technologies, Potter Clarkson also offers the full range of IP legal services (including both contentious and non-contentious), making it the European firm of choice for several global giants, household names, universities, SME's, start-ups and individuals.

www.potterclarkson.com

VISIT US ON STAND **F2** 



NETZSCH Gerätebau GmbH offer a full range of thermal analysis solutions to enable characterisation of battery materials in addition to battery performance & safety of coin batteries (MMC 274 Nexus®), cylindrical batteries in an adiabatic environment (NETZSCH ARC® 254 Adiabatic Calorimeter) and larger batteries in our Isothermal Battery Calorimeter (NETZSCH IBC 284)

Measurement data can be used not only for battery cell construction and design, but also for determining the proper handling, thermal safety and the degree of danger associated with improper storage or use.

www.netzsch.com

VISIT US ON STAND **F3** 



Nordson DAGE's 4600 Battery Bondtester is an automated large area Bondtester capable of testing wire bonds in a variety of ways, including both destructively and non-destructively (for safety critical applications). The system can quantify the strength of wirebond connections with a high throughput and in operator free mode. Heavy gauge wire bonds or battery tab welds typically involve forces of 20-100kg. We offer custom solutions specific to these applications, with both shear and pull testing modes. Our advanced multi-angle optics, alongside our auto-area calculation software, allows direct analysis of bond pads to understand the mode of failure.

www.nordsondage.com

VISIT US ON STAND **F4** 



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Intertek is a leading Total Quality Assurance provider to industries worldwide. Our network of more than 1,000 laboratories and offices and over 42,000 people in more than 100 countries, delivers innovative and bespoke Assurance, Testing, Inspection and Certification solutions for our customers' operations and supply chains.

Intertek's Transportation Technologies business line are attending the Battery Tech Expo 2018 in order to showcase their skills and expertise in eMachine and battery testing technologies as well as a range of other automotive testing and certification products. Our experts are also available to discuss the facilities and equipment our recent investments have enabled.

www.intertek.com/automotive/miltonkeynes

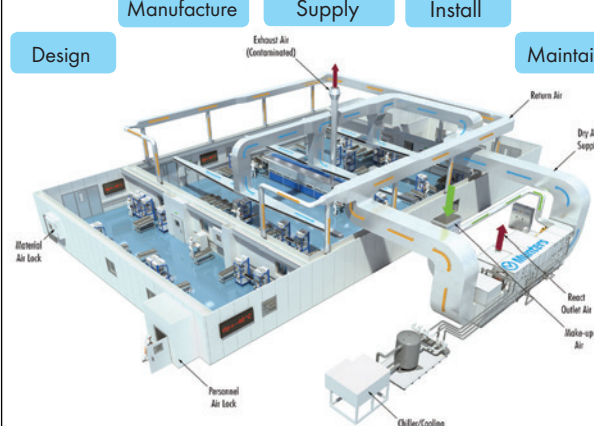


VISIT US ON STAND **F5** **F6**



Dry Room Systems for R&D and Production

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Munters, global leaders in indoor climate control, create turnkey dry room systems to:

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- Over 40 years' proven global expertise

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Your Perfect Climate



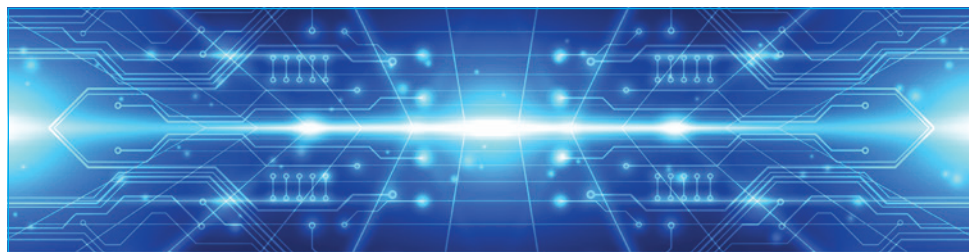
GridBeyond™ (formerly Endeco Technologies) rewards your business's untapped energy flexibility. Our state-of-the-art technology platform and world's first hybrid battery network are future-proofing our clients' participation in demand side response. We ensure opportunities in National Grid revenue schemes and savings programmes are optimised, whilst our advanced portal dashboard, analytics, reporting and benchmarking offer invaluable OEE and predictive maintenance data.

By working together, your site not only benefits from our in-depth understanding of energy opportunities but from a hub of expertise. Our highly qualified team collaborate with third party maintenance providers, energy suppliers, equipment manufacturers, commercial battery suppliers and financiers to prepare a free feasibility site audit and customer journey plan.

ESB is a state owned energy utility which operates right across the electricity market: from generation, through transmission and distribution to the supply of electricity and services. Our Energy services team works in partnership with large organisations to dramatically reduce energy costs, consumption and carbon emissions. We offer energy solutions and consultancy, working in partnership with customers from across UK and Ireland providing the capital funding so there is no upfront investment required. As experts in energy supply, technology, systems and project management, we deliver a range of smart, sustainable energy management solutions tailored to the needs of large businesses.

www.endeco-technologies.com

VISIT US ON STAND **F7** **F8** 



www.rockfortengineering.com

VISIT US ON STAND **F9** 

Rockfort Engineering are specialists in complex electronic systems design and integration and for road and track applications with expertise in the latest electric and hybrid systems as well as all active systems including engine, hydraulics, transmission and vehicle dynamics systems. Safety and quality are key to our approach with an engineering philosophy based upon the automotive industry safety standard ISO262. Whether a prototype or production development, projects are approached in the same way ensuring safety and delivery success are achieved with the minimum of wasted resource. We can undertake projects from technology developments through to complete vehicle powertrain systems."

ThermoFisher SCIENTIFIC

Thermo Fisher Scientific is the world leader in serving science. Our mission is to enable our customers to make the world healthier, cleaner and safer. Through our Thermo Scientific brand, we help customers in the battery industry accelerate innovation and enhance productivity, with instrumentation that aids research in advanced battery and energy storage technologies.

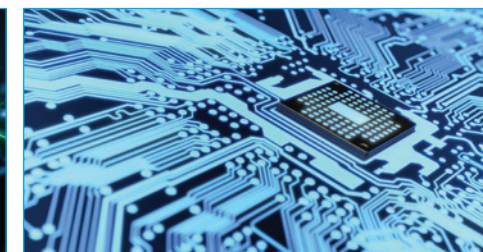
We provide a range of products for:

- Rapid material characterization and analysis
- In-situ analysis of battery components
- Vibrational spectroscopy
- Surface analysis
- Electron microscopy

www.thermofisher.com/energy

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kratzer
AUTOMATION

Battery Test Systems, provided by KRATZER AUTOMATION: Highly specialised facilities are required to develop powerful hybrid concepts and battery technologies for testing Vehicle Energy Systems, electric drive trains, individual cells, batteries and battery packages. KRATZER AUTOMATION offers tailored solutions for development and quality assurance of automotive batteries – from individual battery test stand up to complete test fields. We at KRATZER AUTOMATION analyze your requirements and create a concept from layout up to operation and support of the test stands. Our technical solutions are underlined by a focus on operating efficiencies.

www.kratzer-automation.com

VISIT US ON STAND **G1** 

ACOTA

Acota supplies thermal management and dielectric fluids for improved battery performance. We offer a range of chemically inert, clear, colourless, stable non-flammable fluids with low environmental impact and high thermal stability, as used in Formula E cars. Acota is the sole, authorised UK distribution channel of 3M™ Novec™ Engineered Fluids and 3M™ Fluorad™ brands.

www.acota.co.uk

VISIT US ON STAND **G2** 

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BINDER is the world's largest specialist in simulation chambers for the scientific and industrial laboratory. Mature advanced technologies, pioneering innovations and absolute precision characterize the brand image of BINDER. Our focus lies on the perfect simulation of biological, chemical and physical environmental influences for a variety of industries. In addition to our product range, we offer our customers a comprehensive selection of options and accessories. They can optimize standard units to their requirements profile. With BINDER INDIVIDUAL, customized solutions are even possible based on our standard units.

www.binder-world.com

VISIT US ON STAND **G3** 

AVL 

AVL is the world's largest independent company for development, simulation and testing technology of powertrains (hybrid, combustion engines, transmission, electric drive, batteries and software) for passenger cars, trucks and large engines.

www.avl.com

VISIT US ON STAND **G4** **G5** 

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Enix Power Solutions and AllBatteries UK offer a range of portable power solutions offering a variety of products/services since 1986.

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- Cater to bespoke battery requirements.
- All chemistries offered in our range of product.
- Widest range of batteries in stock in Europe: More than 8,500 lines in stock.

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- Stock over 4,000 lines of cells/packs from leading cell manufacturers.
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- Responsive technical support

www.allbatteries.co.uk

VISIT US ON STAND **G6** 

Part of the international group of companies known as VDI Group.



PowerShield specialises in the design, manufacture, installation and operation of advanced battery monitoring systems for organisations with critical services that rely on continuous power.

PowerShield 8 is our best system yet for monitoring and managing stand-by battery banks. PowerShield's continuous data sampling, reporting and battery management capability delivers reduced costs, peace of mind that you have batteries that perform when needed, and you are maximising the life of your batteries.

www.powershield.com

VISIT US ON STAND **G7**

thermal hazard technology

Thermal Hazard Technology (THT) is one of the leading suppliers of lithium battery safety testing equipment. Their Accelerating Rate Calorimeter (ARC) provides an adiabatic testing environment typically leading to full thermal runaway. Isothermal Battery Calorimeters (IBC) for high precision heat measurement and heat capacity are also available.

www.thermalhazardtechnology.com

VISIT US ON STAND **G8**



Compound Semiconductor Applications

Catapults put technology to work to tackle issues and take advantage of opportunities presented to the UK. The CSA Catapult helps UK companies, particularly SME's, to grow by exploiting advancements in compound semiconductor technologies which translate into opportunities for:

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The CSA Catapult will provide world-class research facilities with access to independent, trusted expertise to develop capabilities in the above and accelerate the commercialisation of compound semiconductors in key application areas such as healthcare, the digital economy, energy, transport, defence and security, and space.

www.csa.catapult.org.uk

VISIT US ON STAND **CC1**



TEST INSTRUMENTS & POWER SUPPLIES

AC and DC Programmable Power Supplies and Electronic Loads from Kikusui and Lab Power along with precision current measuring devices from Danisense. Test and Measurement instruments including Oscilloscopes, Spectrum Analysers, Waveform Generators, Data Loggers, Electrical safety Testers and a full range of EMC Pre-Compliance Test instruments from Rigol, Tekbox, Kikusui, Graphtec and Micsig.

www.telonic.co.uk

VISIT US ON STAND **CC2**



UK Manufacturer & Designer of capacitors for Grid, Inverter and Pulsed Power Applications.

api-capacitors.com

VISIT US ON STAND **CC3**



MEETING ROOM TECHNOLOGY SOLUTIONS

TecInteractive are an independent meeting room technology provider.

We specialise in Video conferencing, Interactive presentation equipment, meeting room booking systems, audio systems and large format video walls. From specification, to supply, installation, training, maintenance and tech support, we provide all of these services to the highest standard using our specially trained and experienced in-house teams.

www.api-apacitors.com

VISIT US ON STAND **CC4**

Being an independent provider (i.e not tied to any vendor/brand) means we can offer impartial advice and through our experience in the industry, can recommend the best technology blend for our customers.



MAKING SENSE WITH SENSORS

StrainSense has been a trusted and reliable supplier of specialist sensors and instrumentation products. We supply quality sensors for Vibration, Acceleration, Shock, Strain, Pressure, Position, Force, Instrumentation, Inertial, Tilt/Inclination and Torque for both static and dynamic applications.

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