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Issue 27 2020

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## From simple to complex

**W**ith the launch of its new low cost high specification VEGABAR pressure switch/sensor and VEGAPOINT level switches, it enables VEGA to help customers in even more areas in the food and beverage production processes. This brand new compact instrument series is perfectly tailored to the standard applications that still require high quality and strict hygiene.

The new level and pressure devices have a universal adapter system of process fittings that provide the flexibility needed to keep installation and spares inventory costs low. A unique ultra-bright, eye-catching, 360° illuminated status display ring ensures visibility, safety and process reliability. Its status colours can be custom-selected easily seen from any direction – even in bright daylight. Some of the new pressure switch/sensors

feature displays and keypads with dual easy-read text and VDMA menu, ensuring the right set up every time and easy understanding of pressure measurement or switch status.

Another prominent feature of the instruments is their communication capabilities. They feature Bluetooth wireless, which offers another option for safe remote and easy set up or function check of devices without the need for a PC, cables or connectors. Just download the free, simple (and award-winning) VEGATOOLS App. Also available is the IO-Link protocol, this ensures compatibility, intelligent data transfer and simple, fast system integration.

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Above, VEGAPOINT level switches: Bluetooth enabled for precise set up and selection of status colours.

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## Extremely Compact – Extremely Robust – Extremely Versatile - RHEINTACHO Speed Sensors of the FE Series

Peter Cisar, Head of Development at RHEINTACHO, is enthusiastic about the FE series: "With the FE series, we offer a speed sensor family that offers a variety of different signal outputs in a compact design – in addition to meeting the highest protection requirements with IP67 and IP6K9K."

There are two different immersion depths, 18.4mm and 32mm, available as standard. This offers the possibility to select the optimal sensor for the respective installation conditions.

Another technical detail to increase flexibility is the deliberate avoidance of a connector integrated directly on the sensor body. This reduces the risk that the connector is located at a structurally unfavorable point in the overall system. Another advantage



of the cable outlet is the relocation of the connector to a more suitable position, especially with regard to environmental conditions such as moisture, dirt/dust as well as vibration. In particular, vibration should not be underestimated.

The space requirement of common connector systems is also disadvantageous in relation to this very compact sensor - an important aspect in restricted installation positions. For optimal protection against the ingress of moisture,

connectors molded directly onto the cable or molded on the back are used.

Today, RHEINTACHO offers the FE series with these different output signals: 1-channel (for speed detection), 2-channel (for detection of speed and direction of rotation) and a pulse-width modulated current signal (also speed and direction, as well as diagnostic options).

The advantages of the RHEINTACHO FE concept are obvious: A sensor series which is specified and approved for an application. The mechanical interfaces are identical, regardless of which signal you or your users choose. With the RHEINTACHO FE series, you choose the right speed sensor precisely for the requirements of the application.

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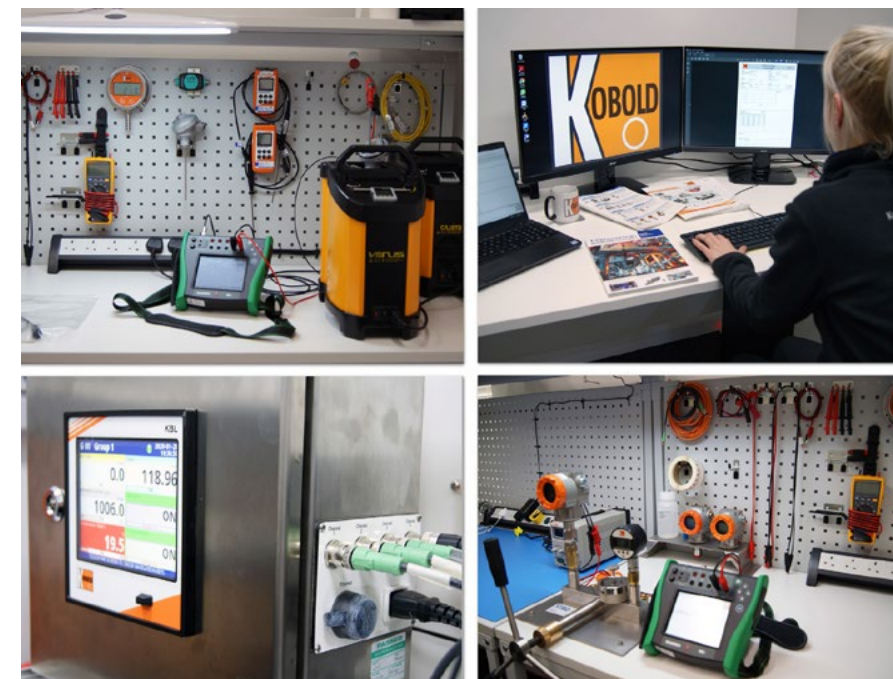
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Hannover – German 20th to 24th April

- **CHEM UK 2020** - Booth H8  
Manchester – Event City 13th to 14th May
- **WWEM 2020** Water, Wastewater & Environmental Monitoring - Booth P7 Telford International Centre 11th to 12th November

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## Operational expansion



The UK's leading manufacturer of temperature sensors is set to expand its operations in South Yorkshire after securing a six figure lending package from NPIF – BEF & FFE Microfinance, which is managed by Business Enterprise Fund (BEF) and Finance for Enterprise (FFE) and part of the Northern Powerhouse Investment Fund.

The funds provided by Finance for Enterprise will be used to help Dinnington-based Labfacility acquire the adjacent 6,000 sq ft premises to its existing manufacturing and stores facility as it targets future growth within the export sector. The property has been secured on a 10 year lease and will increase the size of the company's site to 18,000 sq. ft.

Responsible for producing a range of more than 5,000 temperature instruments, sensors, and couplings, Labfacility manufactures more than a million products each year which are sold in 120 countries across the globe and used in the engineering, pharmaceutical, aerospace, oil & gas and food production industries.

In recent years the company became mindful of the potential uncertainties caused by delays in Brexit. Working closely with growth accelerator manager Jim Scott, the company began exploring international growth options in markets which would be largely unaffected by the current political uncertainties and began exploring non-EU markets. Export orders now account for over 25% of the company's sales, resulting in regular orders being placed by businesses based

in the US, China and Australia. However, in order to meet demand, Labfacility knew it needed additional working space. When a neighbouring unit became available the company turned to Finance For Enterprise for help, recognising that a quick deal was needed in order to help it achieve its future growth plans.

The six figure loan has enabled Labfacility to not only secure the new property, but invest in upgrading the building as well as purchasing new equipment, enabling it to boost production, as well as creating additional new roles including a planned six apprenticeships within the business as the company sets its sights on future growth.

Labfacility was launched in 1971 by Norman Riddett, from his family home and has now grown to employ some 80 people across sites in Dinnington and West Sussex.

Under the leadership of Norman's son, Martin, Labfacility pioneered its temperature sensor manufacturing operations in Dinnington in 1991 after acquiring a local competitor. Since that time, the number of staff employed in South Yorkshire has risen from just three employees to over 40 with further recruitment anticipated.

Martin Riddett, Managing Director, Labfacility said:

"The growth and success we have achieved in recent years is very much the legacy of our work with Jim Scott, who helped us to understand the possibilities and opportunities available within the

export market. Sadly, Jim passed away before our latest phase of growth had been fully realised. The success we are achieving today is a testament to his hard work and dedication.

Alan Scott, Senior Investment Manager, Finance For Enterprise said:

"Businesses often find their growth plans stifled because they are unable to access lending from traditional high street lenders. Entering the export market can be lucrative but it isn't without risk.

"At a time when the manufacturing sector has been particularly hard-hit as a result of the uncertainties surrounding Brexit and possible future trade deals with the EU, Labfacility was quick to seize the opportunities offered by entering into new export markets, but crucially targeted areas outside Europe, ensuring that the impact of Brexit could be mitigated. We have worked with Labfacility for a number of years and the approach they have pioneered has resulted in the company achieving significant growth in overseas markets, enabling the company to invest in new premises and jobs within South Yorkshire.

The Northern Powerhouse Investment Fund project is supported financially by the European Union using funding from the European Regional Development Fund (ERDF) as part of the European Structural and Investment Funds Growth Programme 2014-2020 and the European Investment Bank.

For further information, please visit [www.labfacility.com](http://www.labfacility.com)



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## Designed for the future: The Milliflex Oasis® system for bioburden and water testing

**Q**uality control in the pharmaceutical industry is a key component in the manufacturing of life saving drugs.

Monitoring the levels of microbial bioburden of raw materials, in-process samples, and final product requires products with precision. Accidental contamination (false positives) due to manipulation in the lab can lead to manufacturing slowdowns, financial losses, and potential drug delivery delays to patients in need.

As a result, the pharmaceutical industry is looking for options with fewer manipulations when performing bioburden testing. Merck is looking to the future when robotics will become a more prevalent option for companies to increase productivity, gain more control over testing steps, and increase traceability for each operational step performed. This is key to producing reliable results or identifying the root cause of out-of-specification results.



The Milliflex Oasis® system is a complete solution that includes the services for a secured workflow with the highest possible throughput. It includes:

- All-in-one filtration equipment
- Ready-to-use sterilized filtration units
- Pharmacopeia compliant culture media

Not only does the Milliflex Oasis® enhance laboratory efficiency but also provides compliance with international pharmacopeia standards while ensuring reliable results. Data integrity is critical for quality control laboratories. From the primary packaging to the individual

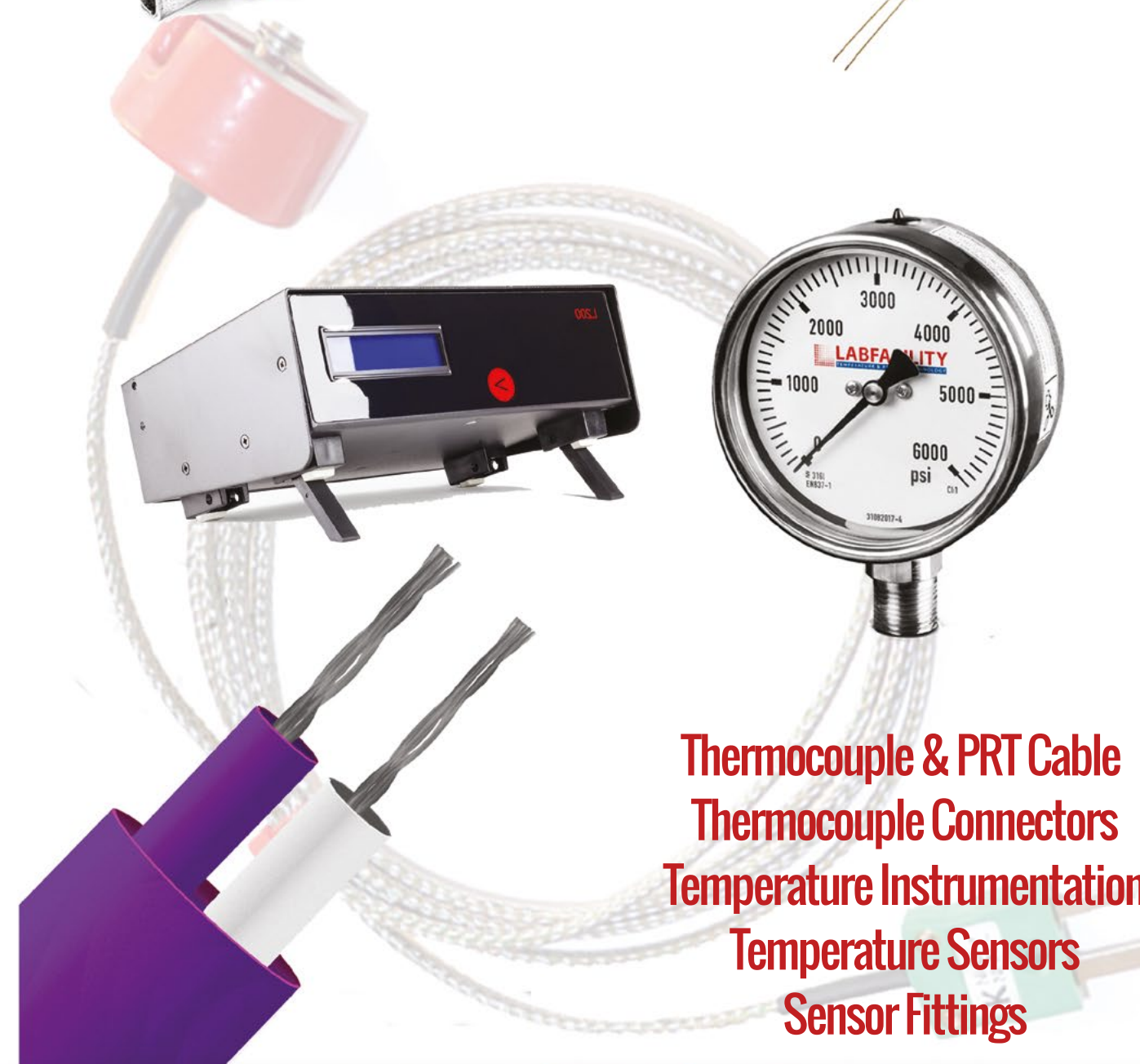
product, the Milliflex Trace® feature ensures complete traceability by including detachable labels, a 2D barcode that can be scanned for direct access to documentation, and unique identification of each funnel and each media plate.

The most challenging testing step of the filtration method for quality control is transferring the membrane to the culture media. The Milliflex Oasis® system, unlike standard systems on the market, uniquely allows touch-free membrane transfer to the media plate. This protects the membrane from secondary contamination and ensures perfect contact between the membrane and the agar.



The new Milliflex Oasis® system has been designed for the current needs of industry and is preparing for the automation of the future.

For more information click [here](#).



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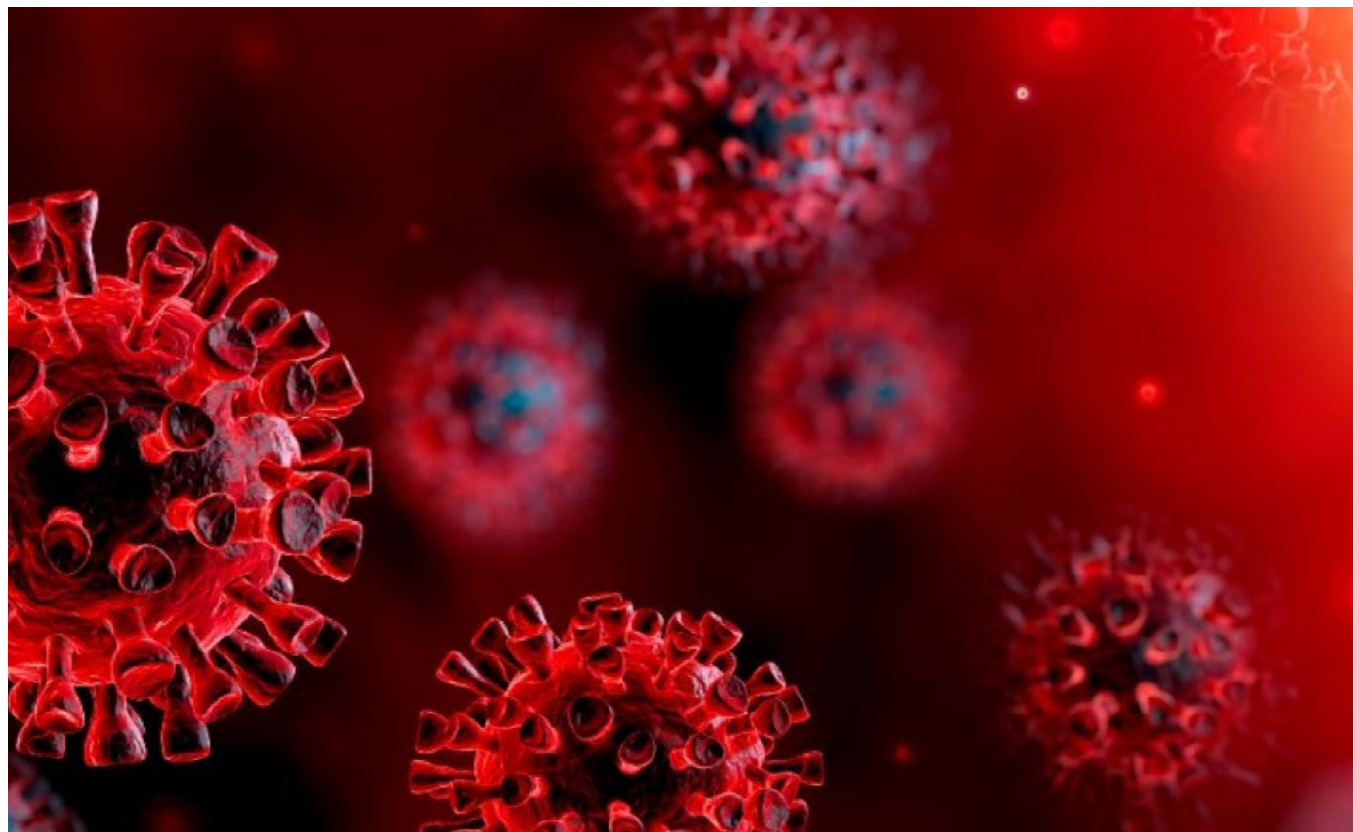
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## Scientists Developing Point Of Care Covid-19 Test

A team of scientists from the University of Surrey, Lancaster University and Brunel University are developing an easy-to-use test that can inform people if they have COVID-19 in just half an hour.

The proposed molecular test and smartphone app would let people who are self-isolating test themselves, and allow health care workers test both patients and themselves – helping the UK to dramatically upscale its testing capacity.

The battery-operated, hand-held device is simple and straightforward to use: nasal or throat swabs are placed into the device; then, in 30 minutes, it can identify whether the individual has COVID-19. The samples do not need to go to a laboratory and the same device can test six people at once.

The science behind the test has been used and evaluated in the Philippines to check chickens for viral and bacterial infections. The UK-based team is adapting the Philippines method to detect COVID-19 in humans and is calling on backers to help them mass-produce the kits.

The team is also working on adding a telemedicine functionality to the mobile app that can control the device, track the users' movements and contact anyone who has had a close interaction with the person diagnosed to suggest steps to take in order to reduce the risk of COVID-19 infection and spread.

The estimated cost of the device is approximately £100 each to mass-produce and about £25 to 6 samples.

Professor Roberto La Ragione, Deputy Head of the School of Veterinary Medicine at the University of Surrey, said: "We are delighted to be involved in the development of rapid diagnostic tools for Covid-19. With a fast response from manufacturers, we could deliver a point-of-care test kit to support mass-scale testing within the NHS and globally."

Professor Wamadeva Balachandran from Brunel University London said: "Now that we know multiple genomes of COVID-19, we can develop the molecular test in a week and have it up and running on the device in three or four weeks. We are confident it will perform well and

we urgently need industrial partners to come on board. This innovation is set to have a huge impact on society.

"Normally, anything like this would have to undergo extensive clinical trials, but this is not a normal situation. Speed is essential. With local hospitals' help we aim to do a limited amount of testing using positive and negative samples that are currently available. According to the Imperial College model, this pandemic might last for 18 months -- and cases will rise over the next few months. The new test would be a tremendous help in easing the pressure on the healthcare sector."

Dr Muhammad Munir, Molecular Virologist at Lancaster University, said: "The team strongly believes that with our combined expertise we will be able to make this device and its associated system available for adoption within a few weeks, and take a step closer to beating COVID-19."

Manufacturers can contact wamadeva.balachandran@brunel.ac.uk

## COVID-19 Drives & Motors Resilience Plan

During these difficult times, we understand that your current engineering teams may be reduced due to a requirement of self-isolation. This will undoubtedly put extra stress onto you and your colleagues to keep vital production lines running.

To keep your site running through these testing times, we are offering our customers a free resilience plan to cover your critical assets if they fail over the next 3 months and, of course, a plan to ensure if this does happen, we can get you back up and running with minimum fuss.

We know site visits may not be an available option to you right now so we can create this plan on a conference call, a safe environment for everyone. However, if you are still happy for us to visit site, a self-certification document will be issued before we arrive.

Our qualified engineers and yourselves will go through your critical drive & motor assets and any specific technical applications that are required, as well as assessing the life cycle position of the asset.

We will then draw up a contingency plan based on replacement options, spares, available hire units or direct replacement availability that we can put in place to keep your site running if one of these critical assets were to breakdown.



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# Itron- Over 50 Years of Electronic Display Innovation



Founded in 1966 by Dr.T.Nakamura, the company has developed from being the first supplier of Vacuum Fluorescent Display (VFD) to a leading manufacturer of high performance CIG driver wide-temperature industrial displays. It is a member of the Noritake Group which specializes in ceramic based products with abrasives, chinaware, materials, furnaces and electronic divisions.

In 2009, Itron saw the opportunity for smart, integrated display and touch modules in the industrial sector following their growing dominance of the telecoms market. The challenge was in enabling the existing microprocessor-based display user to be able to drive such a

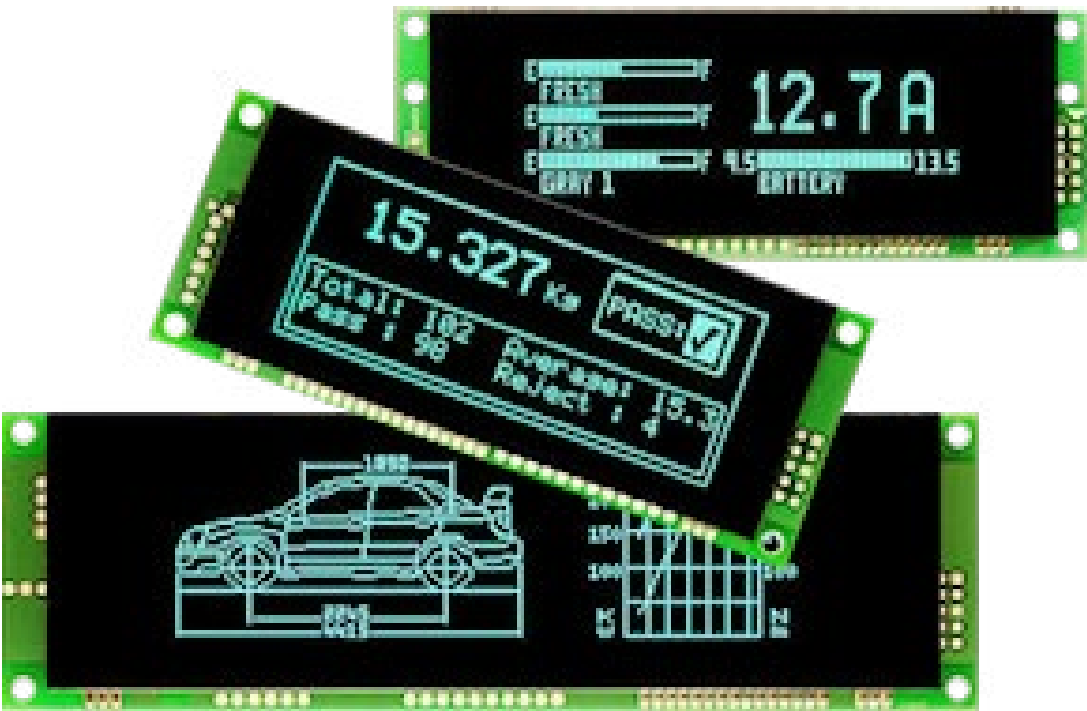
complex sub-assembly. Taking years of experience in developing bespoke user interface solutions, Itron has invested in developing their own innovative operating system, iDevOS, to allow product designers the opportunity to upgrade to a much more sophisticated user interface whilst maintaining their current microprocessor-based core electronics. This is the essence of the latest range of intelligent TFT modules.

This strategy has enabled Itron display users across the globe to offer their own customers, in turn, the reliable easy to use touch-display user interface demanded by modern consumers, in a timely and effective manner - as an integral part of their own natural product development without the need

for substantial changes to their core processor roadmap.

Additionally, Itron's range of Metallised Projected Capacitive Touch screens (MPCT) offer market-leading user interface performance based on fundamental 'metal layering in glass' IP developed over the last 50 years. This MPCT technology, when integrated with other innovative products will offer customers a range of products with superior technical performance that can safely take Itron into the next few decades.

Itron now exports its touch-screens, VFD and TFT display products from manufacturing plants in the UK and Japan to customers throughout US, Europe and Asia.



## Wide Temperature Display Modules

Itron UK's original electronic visual display expertise can be found within this wide temperature , industrial range of products featuring Vacuum Fluorescent Display technology or VFD's . Itron UK's Wide Temperature Display Modules-based industrial displays have been at the forefront of European industry for the last 40 years

and they still find new opportunities in applications that cannot be solved any other way as reliably and cost effectively.

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# The Future of Condition Valve Monitoring

All industrial operations are continually driving to improve efficiency and productivity to increase profit margins and maximise bottom-line returns. In many sectors (such as the Oil and Gas Industry), this drive occurs against a back drop of heightened health and safety demands and environmental concerns as well as the need to implement improvements on old assets that can often be operating beyond their initial design life.

An important means of delivering on these expectations is to reduce the number of unscheduled plant shutdowns. On average 92% of shutdowns are unplanned and cost oil and gas companies an estimated \$42 – 88 million a year in worst case scenarios. It has been observed that most unplanned shutdowns are often attributable to worn out equipment, and in a lot of cases is due to the lifespan of an element being exceeded.

With a routine maintenance schedule and a condition monitoring solution, operators could prevent costly shutdowns and increase production up time, reduce maintenance spend and improve plant safety. A study by GE found that data monitoring helped improve oil and gas maintenance schedules resulting in a 36% reduction in unplanned downtime, which in turn resulted in an average of a \$17 million improvement to the bottom line.

As such, asset monitoring, asset management, and predictive maintenance solutions are gaining popularity.

## CONDITION MONITORING ON VALVES

As valves are a critical constituent element of any flow-based process, valve performance is an important factor to review when trying to prevent unscheduled maintenance, plant shut downs and loss of batch production. The immediate effect of valve problems can then be the failure to meet client expectations whilst indirect effects may include higher insurance premiums and increased HSE scrutiny, meaning that, valve problems can often be very costly.

Whilst some operators are already deploying Condition Monitoring on Control Valves and Critical Valves, many valves, notably those used for On/Off process and shutdown applications, are often left unmonitored.



## WHY AREN'T VALVES BEING MONITORED?

Whilst technology is available to monitor these valves, operators are dissuaded from this investment primarily due to the prohibitive hardware and installations costs.

Although some OEMs have touted various valve testing and monitoring systems, many of the solutions offered can pose operational, financial and/or functional implementation issues. This is because they are generally significantly more costly than traditional systems; can require installation of new wiring and hardware and can have software integration. Where the automation is of relatively low value, as is the case with on/off valves, it can be difficult to justify the time and money involved with implementing a useful Condition Monitoring solution.

If and when Condition Monitoring systems are installed on automated on/off valves, they typically require trained personnel to perform the monitoring task. However, due to a lack of training, lack of specific valve knowledge and insufficient time available, data will often only be analysed for a small fraction of automated on/off valves, if at all.

The result of all these factors is that, in the current environment, vast swathes of on/off valves are not being monitored and subsequently maintained in a meaningful or useful way, contributing to a significant increased risk of valve failures.

## INTRODUCING THE VALVE DIAGNOSTIC MONITORING SYSTEM

Imtex Controls has been developing and manufacturing solutions for the process industries for over 30 years. As part of this history, Imtex have been supplying valve monitoring and testing solutions that are easily implemented to both new and ageing assets, to enable operators to log data from shut down valves for a number of years. However, it became obvious that whilst Operators are keen to explore Condition Monitoring solutions, investment in this

area has been limited due to the lack of a simple, cost effective solution that allows for automated end-to-end data acquisition and analysis.

Following experience in data capturing for critical valves a NEW automated valve diagnostic monitoring system (VDMS) has been developed to resolve all the implementation and investment issues. By providing seamless monitoring of automated valves using a simple but fully integrated, end to end solution, the system helps to deliver a safe and more productive plant of the future.

The component parts of the VDMS system allows this type of system to be installed without any extra cabling, no additional software, and no change in procedures, all for a similar cost to a standard valve position transmitter. This makes VDMS the first of its kind.

The difference between the VDMS and other technology available is that it is easy to install in both green field and brown field environments with minimal additional infrastructure requirements, but allows every valve operation to be automatically captured, analysed and acting upon if necessary through a cloud based diagnostics application.

The system monitors the health of automated valves through comparative and real time analysis of every valve operation with the goal of predicting time to valve failure. Maintenance and pro-active interventions can then be scheduled in advance of any issues. By cost effectively installing this technology on all automated valves, a plant can ensure efficiency of production, as well as prevent unscheduled delay and unsafe plant condition.

This technology is useful for all stages of plant operation and so can provide an opportunity to improve efficiency, safety and security of all plants, existing and future.

With big data now being recognised as the future of industrial and manufacturing processes, it's innovations like the VDMS that can make all the difference to data aggregation for safety, efficiency and not least profitability.

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or visit our website: [www.imtex-controls.com](http://www.imtex-controls.com)







## The Optimum Solution

**T**F Automation design, engineer and manufacture process automation solutions, supporting a wide range of manufacturing industries from, aerospace and automotive through to medical, food, printing and packaging.

Investment in the latest automated manufacturing technologies is a key issue for many of our customers who see it as a viable strategy to tackle skills shortages while maintaining the agility to stay competitive in a global market and we work closely with them to ensure cost effective and efficient solutions.

Projects range from product identity and traceability as well as units with vision inspection. We automate intricate operations with pick and place and product assembly systems incorporating robotics as well as designing numerous work-stations for product testing. This has meant our continued involvement in the supply chain for the automotive and aerospace industries as well as heating/plumbing products, personal protection and medical.

The need to improve process and productivity is a constant challenge for all our customers. Our focus is on providing solutions to reduce the risk of human error in tasks that are constant, predictable and repetitive. We engineer and program our machines to perform tasks over and over again, offering accuracy and repeatability far superior to the same task carried out manually, thus ensuring increased output and efficiency.

With over 40 years' experience, our strength is in our assessment and understanding of the requirements of each project, end user and operative. We take the time to consider all possible solutions for clients, ensuring that both their expectations and their clients' are met and the optimum solution provided.

To find out more or to discuss your next automation project with our design team, contact us on 01274 308005, email us at [info@tfautomation.co.uk](mailto:info@tfautomation.co.uk) or visit our website [www.tfautomation.co.uk](http://www.tfautomation.co.uk).



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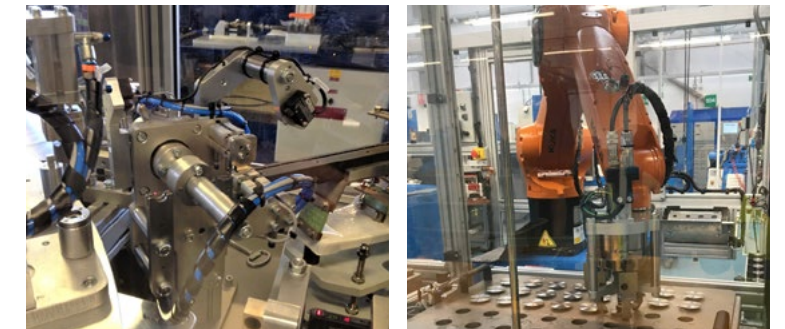


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## SPECIAL PURPOSE MACHINE MANUFACTURER

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### EXPERTISE

- Assembly & testing
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- Manual workstations



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*Electrically operated grippers from Zimmer's GEP2000 range offer a number of distinct advantages*

## Zimmer Group E- Grippers Deliver Benefits For Automated Assembly Applications

**R**ecognised as experts in automation and handling technology, Zimmer Group now offer a series of highly functional and easy to control electrically driven grippers. Designed primarily for assembly tasks and for handling small parts, these latest generation products deliver a number of distinct advantages for automated assembly operations.

Electrically operated grippers from Zimmer's GEP2000 series offer a number of advantages for small parts handling including: adjustable gripping forces of between 80 N and 400 N and jaw strokes of between 10mm and 16mm. Another important feature of this range of

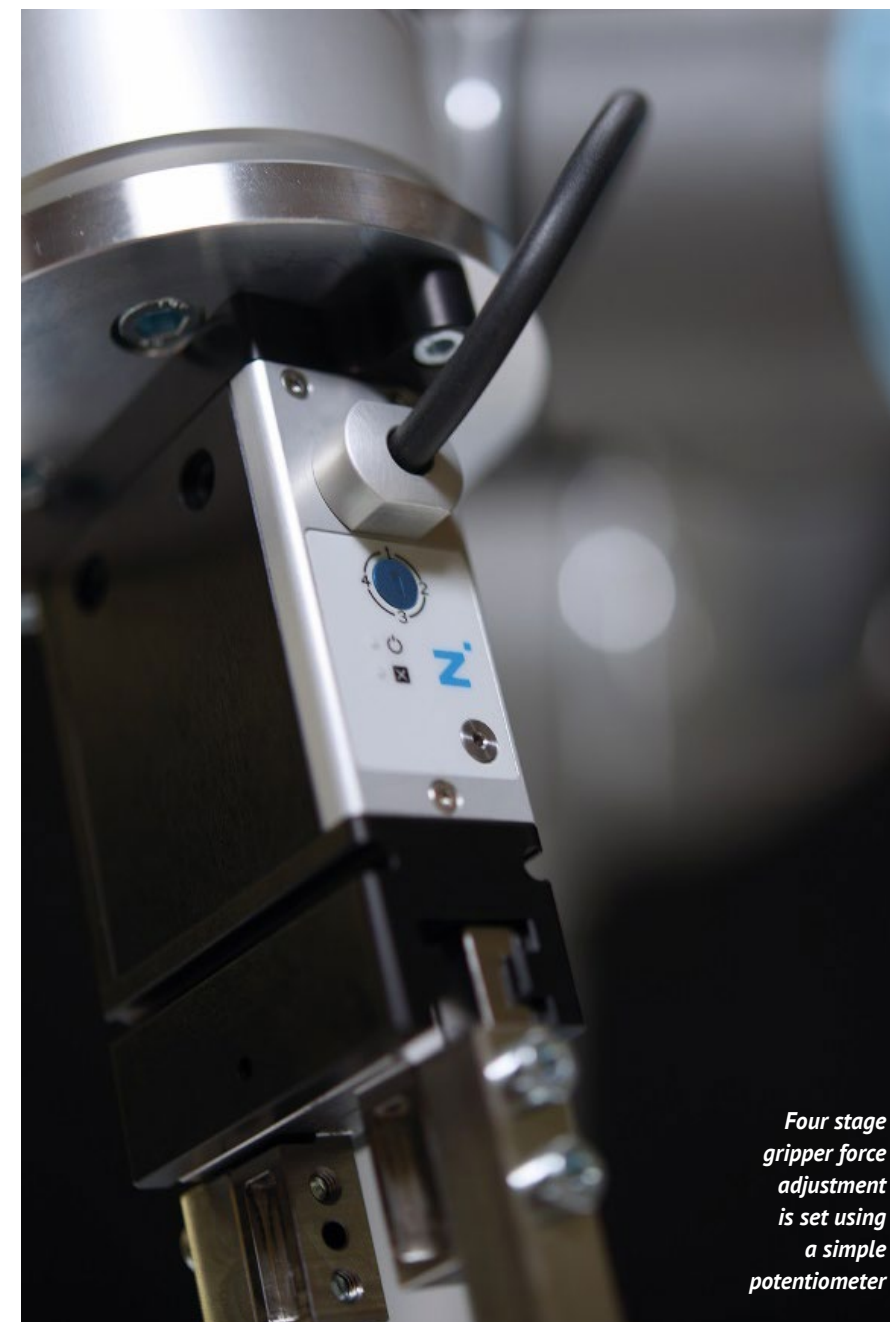
grippers is their mechanical self-locking mechanism, which prevents the loss of the workpiece in the event of a power failure.

All grippers within the range feature an integrated control system and are available in three control versions: With IO-Link, digital I/O and digital I/O plus an analogue output to set or interrogate the jaw positions.

With the IO-Link version, the gripper offers all the system-specific advantages of that interface, which includes not only simple handling and operation, but also easy integration. By connecting a single cable, the gripper can receive data from

and transmit data to the master controller. Parameters such as gripping force and gripping speed are set centrally. The gripper uses IODD (IO Device Description) to send signals to the higher-level control system.

The resultant benefits include considerable time savings during initial setup or when replacing the gripper. IO-Link also sets new horizons for advanced diagnostic functions and predictive maintenance, which in turn enhance machine availability. No additional hardware, in the form of other controllers is required thanks to this highly sophisticated control system.



*Four stage gripper force adjustment is set using a simple potentiometer*

The IO-Link master is all that is needed to act as a link between the gripper and the fieldbus, and no additional software needs to be installed on any PLC being used.

Zimmer Group also provides its own Human Machine Interface (HMI) for easy operation. This tool, which has a special gripper-adjustment user interface, is able to store parameters for up to 32 different workpieces.

In the I/O version, the grippers operate as simply as a conventional pneumatic valve. The gripper opens when it receives a control signal, and the jaws are closed when it receives another one. In this cost-effective version, a four-pole cable that supplies the gripper with both electrical energy and control data is all that is

required. A commercially available central distributor can be used to control several grippers at the same time. Should gripper position information be required, this can be achieved using magnetic field sensors, which can be accommodated in the two grooves incorporated within the gripper. The gripper is able to use these sensors to send a signal as soon as a set query position is reached in just the same way as a traditional pneumatic gripper.

Zimmer Group has developed a simple solution for adjusting the maximum gripping force, which can be set directly on the gripper using a potentiometer with four separate positions. This is not only quick and easy, but also offers the advantage of the setting being easily visible, even if the power has failed or if the gripper has been removed.

For applications where more precise information relating to the position of the gripper jaws is required, Zimmer Group offers a digital I/O version together with analogue sensing. An analogue sensor, which outputs a voltage of between 0 and 10 volts, depending on the jaw position, is integrated into the gripper as standard. This voltage can be evaluated using an analogue card in a higher-level control system, making it possible to determine the position of the gripper jaws with an accuracy of less than 0.05 mm.

### **ROBUST MECHANICAL DESIGN DELIVERS LONGEVITY IN SERVICE**

Zimmer Group's GEP2000 series electrically powered grippers feature an industry leading mechanical configuration. The hard anodised aluminium housing is at the heart of the grippers' robust construction and reliability, and the field proven flat guide design will allow the gripper to perform 10 million part handling or assembly cycles without requiring maintenance.

All versions in the range offer a mechanical emergency release, which is an important safety feature. Should there be a need for the gripper to be opened manually, in exceptional circumstances, the screw on the self-locking gearbox can be turned using a separate screw which is easily accessible externally. As a result, the gripper can still be opened, even in the event of a power failure when for example, a workpiece needs to be removed.

All grippers are sealed to IP40 standard, and their high accuracy allows for rapid replacement minimising any interruption of production. The grippers in the GEP2000 series are powered by 24 VDC, and the gripper jaws are able to operate with a current draw of less than 500 mA. The current draw only increases to 2 A, a current that all conventional IO-Link masters can supply, for a few milliseconds at the moment of start-up, when the mechanical self-locking mechanism is released, and the motor is being brought up to speed.

**ZIMMER**  
group

[www.zimmer-group.de/en](http://www.zimmer-group.de/en)



# Investment In New ESD Facility Opens Up £2m Of New Opportunities For PP Control & Automation

One of the UK's leading providers of strategic manufacturing outsourcing services has invested over £100,000 into creating a new Electrostatic Discharge manufacturing facility.

PP Control & Automation, which works with 25 of the world's largest machinery builders, is now targeting up to £2m of new opportunities where this dedicated and controlled environment will help it take on more complex and delicate builds encompassing high-end PCB assemblies and box builds.

"It is a decision that is already paying off," explained Garry Myatt, Sales Director at PP Control & Automation.

"A number of our existing clients were asking us for this additional capability, so we decided that the time was right to make the investment and bring this service into our offering."

He continued: "This meant developing an environment that met the needs of our customers and legal compliance to the recognised standards and involved special flooring, benches and test equipment - all grounded to earth to ensure that life of the electronics is protected from potential electrostatic discharge.

"Five people are now employed in this area and all have undergone specific training to ensure compliance. We estimate that there is £2m of new opportunities in the pipeline and, if these come to fruition, this manufacturing cell will increase in capacity and we'll need to recruit more staff."

As a strategic outsourcer with its core competency being 'box build and system integration', populated printed circuit boards are handled just like another material line item by PP Control & Automation and the requirement is managed accordingly through an approved vendor process.

With 80% of customers on a kanban supply agreement, implementing the right processes and key partnerships from the



start is key, with robust planning and lean manufacturing operations, backed by a skilled workforce of electro-mechanical technicians, ensuring that the business is currently operating >98.50% 'on time in full (OTIF)' service.

PP Control & Automation is also ideally positioned to offer 'Design for Manufacture and Assembly' (DFMA) in conceptual development of ideas as well as in basic consulting.

"Many companies continue to develop a product design that leads to unnecessary costs, requires an inflexible supply chain and suffers from inefficient manufacturing processes," pointed out Garry, who has more than 25 years' experience in sales.

"This is why our Engineering, Operations and Supply Chain are integrated at the earliest possible stage to help optimise a design that's efficient to manufacture and have parts readily available to ensure a quicker time to market."

PP C&A's outsourcing partnerships provides machine builders with better production flexibility, reduced lead times and greater control over their supply chain and costs.

Garry concluded: "We've got a lot of exciting diversification plans, some of which focus on making the most of the ESD manufacturing facility with both existing and new clients.

"With 2019 being a record year, securing over £3m of new orders from the healthcare, food and drink and packaging sectors, we anticipate further growth in 2020 from this new manufacturing service.

"A spin-out from Aston University is already tapping into this area where we are offering a full turnkey service, from material sourcing through to testing. Volumes are increasing monthly and the expectation is there that this will be a service that PP will take globally on behalf of the client."

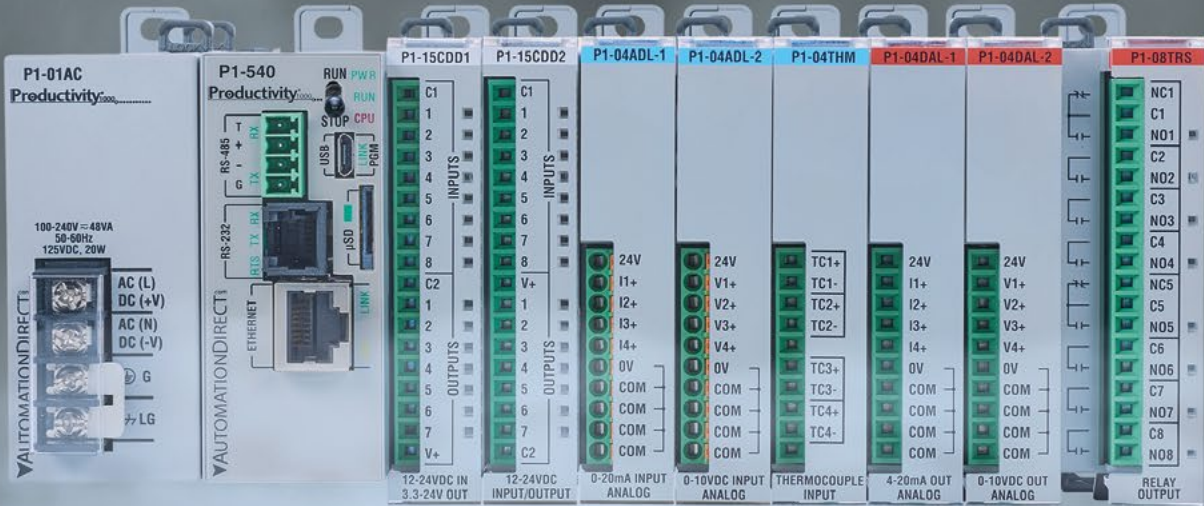
Backed by Canadian investment company Ardent Capital, PP Control & Automation is exploring the possibility of a joint venture or an acquisition in North America.

For further information, please visit [www.ppcanda.com](http://www.ppcanda.com) or follow @ppcanda on twitter

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# Together, We Keep Industry Moving

ENE Limited is a family run business, established in 1996 that has evolved to meet the ever-changing demands of the food industry.

Our team has grown from 4 employees to 60+ today. ENE's specialised team is experienced in our field, enabling us to deliver high quality products with a reliable service.

We strive to meet the ever-changing needs of our customers, therefore if you give us your requirements, we will design from concept to purpose.

Our special purpose machines include Spiral Conveyors, Convergers, Labelling & Sleeving Systems, Divergers, Packing Conveyors, Lazy Susan's and Bone Pullers. We supply all conveyor belt types to suit the specific application.

We work closely with the food sector and our catalogue has standard and bespoke systems....

Working closely with the food sector we offer practical efficient solutions. By understanding demand from our customers and their production lines, we have created a catalogue of standard and bespoke systems. With our fully equipped facility and a team of expert technicians, we manufacture all parts in-house.

## We can offer....

### DURABILITY

- Top resistance to hydrolysis
- Good resistance to fruit acids
- Hard-wearing belts for use in abrasive environments
- Fray-free edges
- Belt edge sealing

### VARIETY OF APPLICATIONS AND VERSATILITY

- Homogeneous belt bodies
- ProLink Modular belt series
- Different patterns for inclined conveying
- Belts for deep freezing sections (cooling towers)
- Special Troughable belts for coagulation

Our range covers the Meat Processing, Poultry, Seafood, Fruit & Veg, Dairy, Baking, Confectionery and Pharmaceutical industries.

As the Forbo agent in Ireland, our belts guarantee the consistent support of your HACCP concept and production. From Conveying, Processing to Packaging we have belt types to suit all processes; such as mixing, cooling, weighing, metal detecting and packaging. There you can exploit your quality productivity potential to the full.

### Product Features

- Smooth surface allows cleaning to microbiological level and clean-in-place process
- Sealed edges and tension members prevent ingress of microbes
- Kevlar tension members provide high strength, low stretch
- Tough polyurethane construction
- Water and chemical resistant
- Meets FDA material requirements for wet food contact
- Stainless steel lacing
- PosiLace™
- Plastic rivets
- Meat and poultry and dairy certifications
- Runs on most plastic modular pulleys
- Optional sidewalls and flights available

- HACCP belts with excellent release characteristics
- Belts suitable for knife edges and ones with patterns
- Belts with profiles and side walls

### EASE OF USE AND MAINTENANCE

- Incision-proof belts that are easy to clean
- Belts with large open areas for washing and drying
- Blue belts for fast checking processes that don't strain eyes

### A WIDE RANGE OF BELTS....

- Check-Weigher belts of equal thicknesses and exceptionally precise splices that make endless belts superfluous



- Elastic belts for use in packaging machinery with homogeneous structures and easy to clean surfaces
- Light-permeable belts for vision-supported robot systems (pick & place)
- Temperature-resistant belts for use in shrinking tunnels and round belts

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The SFB safety fieldbox for PROFINET/PROFIsafe systems is suitable for simple plug and play installation of up to eight safety devices.

Thanks to its universal device interface with an 8-pole M12 connector, it can be used to connect a wide variety of safety devices: electronic and electro-mechanical safety interlocks, switches, sensors, light curtains and operation panels.

The SFB is a simple, inexpensive installation solution which provides highly flexible, individually configurable safety solutions for complex machines and systems.

- 8 universal 8-pin M12 device ports
- Connection of electronic and electromechanical switchgear devices
- 4 control panels connectable (with EMERGENCY STOP)
- 1-channel and 2-channel control of the interlocking function
- Automatic resettable fuse integrated
- Robust industrial design



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# FOAMplus® perfect protective packaging solution from Storopack

As a leading global protective packaging supplier Storopack recognizes the importance of ensuring goods are protected during transit and arrive in perfect condition.

Damaged goods not only incur costs for replacement orders but also affect businesses' reputations. So while costs need to be kept to a minimum it is vital to choose the correct protective packaging type.

Usually a void fill packaging medium will suffice. However when the product is more sensitive to shock and vibration, such as engineering, electronics, aeronautical, and many other expensive products then more consideration has to be given to using the right type of in-the-box protective packaging.

Storopack's FOAMplus® range is a perfect solution for companies that manufacture or ship products that require this highest degree of protection eliminating transit and handling damage.

The success of FOAMplus® polyurethane

foam is based upon its huge versatility as a packaging medium. The foam can either be dispensed directly into the carton where the expanding foam will mould itself to the contours of the product shape or can be made into pre-moulded cushions to enhance presentation. The product will satisfy the most rigorous cushioning demands for high value, fragile and awkward shaped products. The light weight foam packaging also ensures that shipping costs are kept to a minimum whilst providing customers with total product protection.

As a space saving solution FOAMplus®, polyurethane foam packaging is 'on demand' and mixes two components together which then expands up to 200 times its liquid volume negating the necessity for large storage areas required for pre-fabricated packaging.

The benefits for customers are numerous. As well as an ideal solution for protecting awkward and valuable products, customers with product design changes and new product line additions are able



to quickly adapt the packaging without the need to carry a large range of bespoke cartons or fabricated packaging.

There are two dispensing methods available for the insitu protective packaging solution. Either FOAMplus® Hand Packer, a manually operated system, with a fully electronic microprocessor control to maintain consistent quality that delivers the foam direct into polythene lined carton via a foam dispensing gun.

Alternatively the Bag Packer² Foam-in-Bag dispensing system is fast, easy to use, efficient and economical. The machine can produce up to 23 foam-filled bags per minute at the touch of a button. Polyol B 5504R, foam B component is made from 30 percent recycled polyurethane.

[www.storopack.co.uk](http://www.storopack.co.uk)



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The bulk hopper and dosing system- right- feeds the line with 50g units of product, which is then flow-wrapped and check-weighed



## Complete Dosing to Packaging Solution Keeps FMCG Products Moving

An increase in demand for its dosed products is behind the latest investment by a leading brand owner in a fully automated dosing, wrapping and packaging line from CME Limited.

The system delivered by CME comprises CME's wrapping and cartoning systems together with systems from a number of other manufacturers. The technologies used include a check weigher, dosing system, flow wrapper, carton erector and overwrapper. Together they deliver the complete range of processes required to dose and package this high-volume product.

CME Limited's Managing Director Paul Knight explains: "Our client was seeking a supplier capable of not only delivering a turnkey solution, but one with the expertise to identify and integrate the most appropriate combination of technologies for their application. Our experience of working within different sectors, combined with our ability to deliver innovative design concepts and agile project management methodologies were significant factors in the client selecting CME for this project."

The system which operates at 100 units per minute, accepts product in bulk form. This is then fed to the packaging line

from a dosing system which dispenses in units of 50g. These individual doses are then wrapped as packages with both longitudinal and horizontal seals, prior to being check-weighed.

Individual check-weighed packages are then presented to a cascade loader and from there to a carton erector, where each 50g pouch is loaded to individual packs. The packs are then re-orientated before being individually wrapped in the CME wrapper, they are then collated and processed within the CME cartoner to produce a carton containing 10 x 50g packs. The final operation overwraps this multi-pack carton in a separate system.

Paul Knight concludes: "Our experience in different sectors including the food and beverage and pharmaceutical markets show our flexibility and adaptability to deliver systems to different markets with different needs. This project demonstrates the capability, expertise and resource CME can bring to bear on sophisticated projects where multiple technologies need to be integrated to develop a bespoke solution to automation and packaging applications."

This system adds to the increasing number of machines and systems being exported by CME Limited to international customers.

[www.cme-ltd.com](http://www.cme-ltd.com)

The final operations in this system include multi-pack cartoning, with the CME machine – centre – and carton overwrap operation – left



The individual pouches of product pass through a carton erector – right - before being re-orientated and presented to the CME Wrapper left







*“Part of your drive”*

## PUTTING PRODUCT QUALITY & CUSTOMER SERVICE ABOVE ALL

Est. 1986, WMH Transmissions Ltd is a market leader in high quality mechanical power transmission products and have been supplying both OEM and re-seller markets in the UK for over 30 years.

Initially, WMH supplied quality rack & pinions from their partner company in Germany who have specialised in the manufacture of racks for over 120 years. WMH were the first company to grind racks in Europe and continue to this day to develop and improve. State of the art 3D CNC machining cells give WMH the capability to specially manufacture almost any rack and pinion system to suit specific application requirements.

WMH soon expanded their product range into other mechanical power transmission components such as bevel gears & gearboxes, worms & wheels, splined shafts & sleeves, chains & sprockets, couplings and also screw jacks.

The business soon expanded into the manufacture of trapezoidal leadscrews and nuts and so an in-house machine shop, complete with whirling machinery, was founded at the production facility in Tamworth, Staffordshire.

In the mid 2000s, WMH began to stock HIWIN linear motion and, in 2012, were appointed as the main HIWIN agent in the UK market. Currently, WMH are the single largest stockiest of HIWIN linear motion components in the UK.



The current HIWIN range offered by WMH Transmissions Ltd includes cut and finished linear ball, roller, wide and miniature guideways, machined ballscrew and nut assemblies, single axis linear stages, bearing support units, crossed roller bearings, linear actuators, ball bushes and hardened ground linear shafting.

Bespoke In house machining and processing facilities have been developed specifically to offer their customers exceptionally short lead times on HIWIN linear motion products from the stock held at their UK factory.



## ALWAYS IMPROVING

After years of development, WMH eventually outgrew the original premises and so, in 2013, they moved into a 40,000 sq.ft facility on the other side of Tamworth. Situated directly opposite the services on junction 10 of the M42 the current facility is in a prime location with easy access to the motorway network across the UK.

The current premises has enabled WMH to sustain their growth and also has some unique features including a dedicated training and conference room, first floor cafeteria and a large show room which is home to a display of the vast range of products and the services on offer from WMH.

WMH Transmissions Ltd offer full design support service for all of their products. A fully equipped, in-house technical department features the latest 3D CAD software and a team of qualified, experienced engineers can offer free calculations to support your machine design process no matter the scale or complexity of build.



From the substantial stock supply at their midlands based facility, WMH Transmissions Ltd offers an exceptional production process and with fast delivery times. This helps to reduce the construction time of customer machine builds and the express delivery service also reduces productivity losses as a result of breakdowns.

The range of products offered by WMH Transmissions Ltd includes drop in replacements for the vast majority of other established manufacturers and so offering an alternative to long lead times.

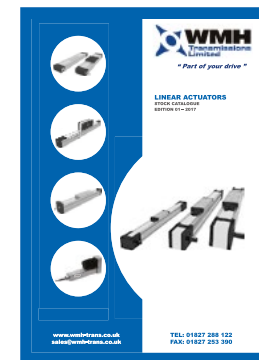
WMH Transmissions Ltd are proud to offer their outstanding products and bespoke services throughout the UK, Europe and beyond.



SCREW JACKS



HIWIN LINEAR MOTION



LINEAR MODULES



TRANSMISSION PRODUCTS



*“Part of your drive”*

Quality Products & Short Deliveries

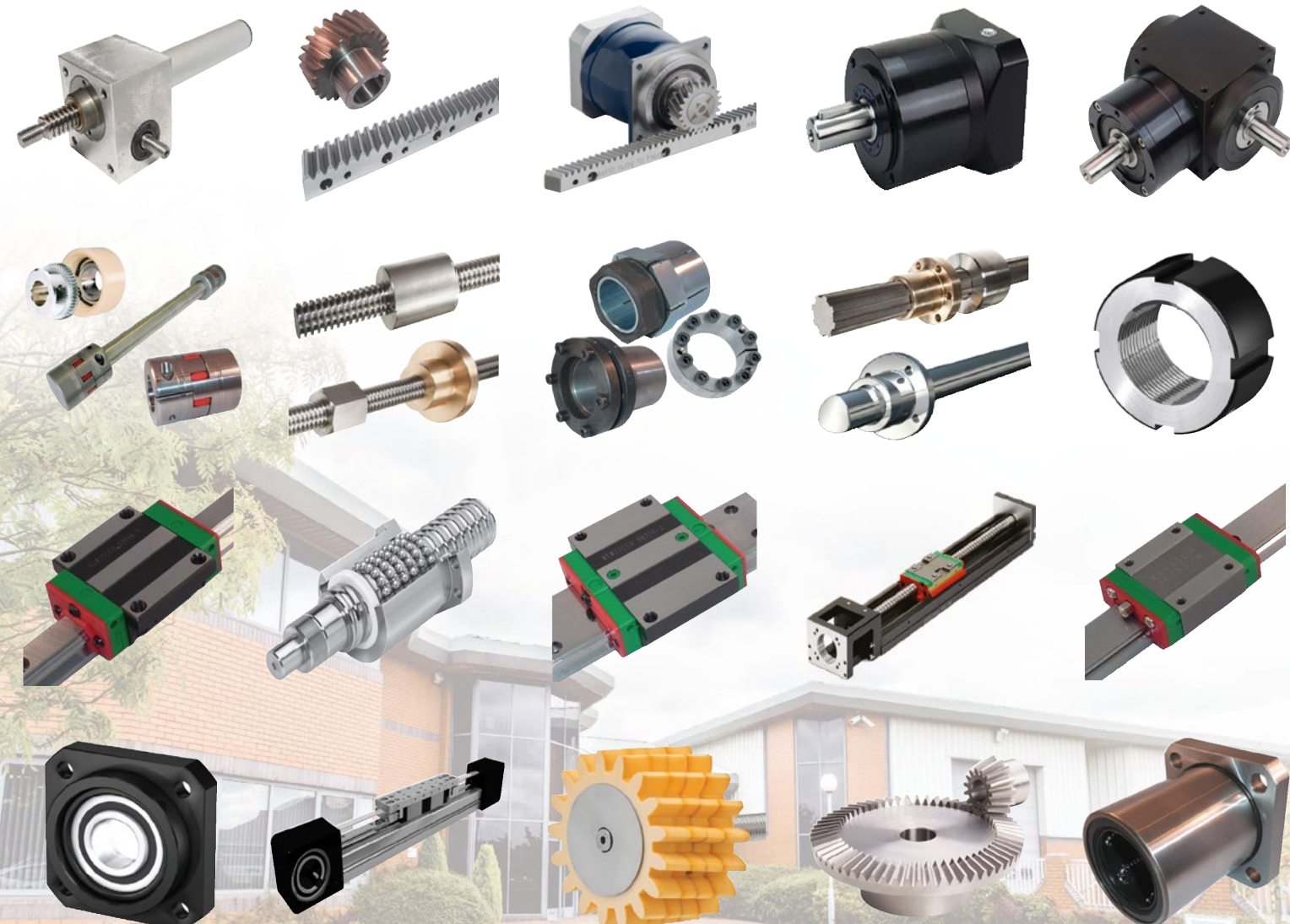
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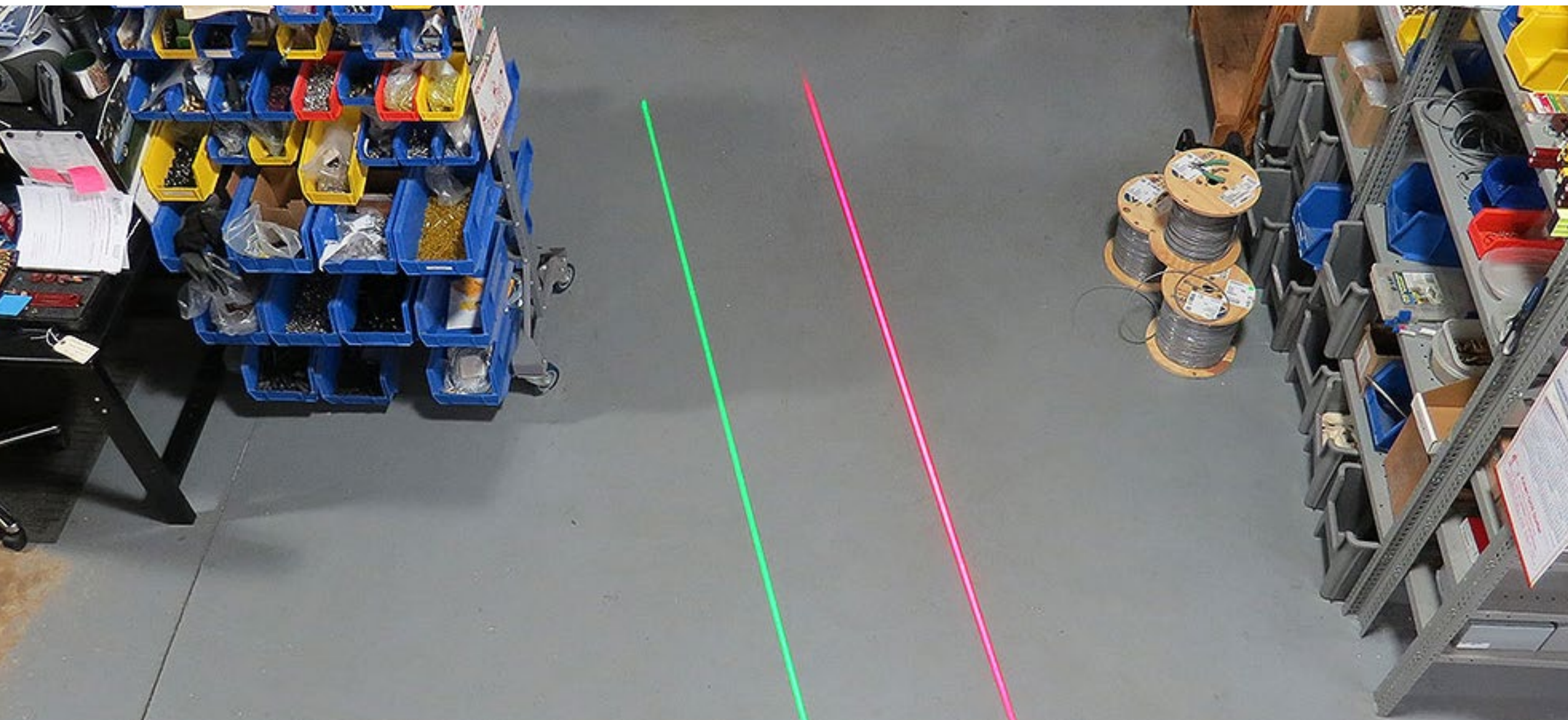


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adverse conditions and overcomes color vision deficiency.

Laser Tool's 58 Series laser alignment modules are used to align, aim, and position parts and machinery to instantly and accurately measure X-Y deviation at any point along the line up to 300 feet long. These laser modules are AC or DC powered, will operate up to 60°C and include various line generating optics for different applications that need laser line lengths of 150mm to 2mm at a 460mm distance.

Complete product lines are already established based on specific industry applications. This includes the Pathway Laser Systems™ which produces radiant, bold lines that replace the typical tape and painted lines on warehouse floors used to guide people and equipment safely throughout the same work environment; Laser Docking Systems™ for freight terminals to assist trailer centering to loading docks in adverse weather and low light conditions; Forklift Laser Systems™ for precise and accurate loading and overhead stacking as well as Overhead Crane exclusion zone lasers for bridge and gantry style lift systems.

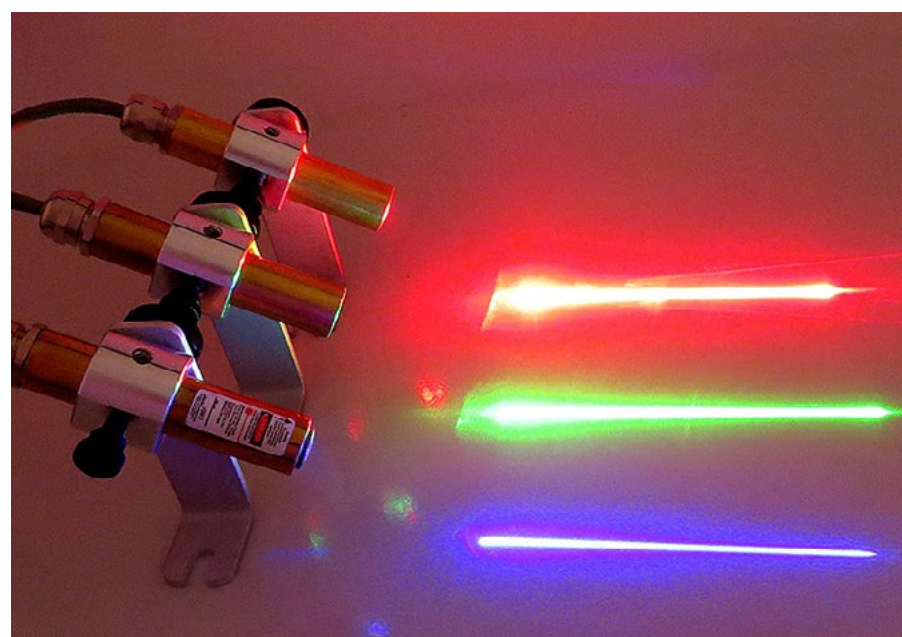
Clients have access to all the combined resources of Laser Tools Co. at [www.lasertoolsco.com](http://www.lasertoolsco.com). Engineers are on hand for specific tool designs, Technicians are available to ensure exact tolerances and power requirements are achieved and attentive Customer Service Representatives answer the phone on the first ring. Orders can also be placed through our European Representative, Coast Laser at [https://coastlasers.co.uk/COAST\\_LASERS/INDUSTRIAL\\_LASERS.html](https://coastlasers.co.uk/COAST_LASERS/INDUSTRIAL_LASERS.html)

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**L**aser Tools Co., Inc. has been a leading manufacturer of high precision, laser alignment tools for over two decades in the USA. Each product line is certified for the Mining and Tunneling industry in the United States and is currently seeking renewal in Russia. Through their devotion to constantly improve each product line by creating new designs specifically suited for the industries that their clients serve, Laser Tools Co. recently introduced high power laser line generator modules for various industrial and commercial applications including manufacturing and assembly operations.

By incorporating a shorter wavelength light into their existing 58 Series laser alignment modules, Laser Tools Co Inc. has developed a higher frequency of laser lighting.







**"Part of your drive"**

## PUTTING PRODUCT QUALITY & CUSTOMER SERVICE ABOVE ALL

Apex Transmissions Ltd is a leading supplier of precision planetary gearboxes and Bosch Rexroth linear motion components in the UK market.

Having a passion for providing customers with only the highest quality goods and a strong drive to offer an unrivalled customer service, Apex Transmissions Ltd has earned a reputation as a trusted supplier right across the UK and beyond.

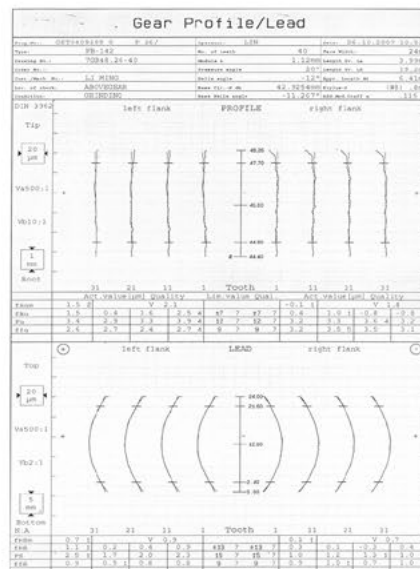
Originally founded as the official UK agent for Apex Dynamics products, and with a team of experienced staff with a thorough understanding of the specific requirements of the UK market, Apex Transmissions Ltd were able to offer customers exceptionally short lead times on gearboxes from stock at the Apex UK head office facility located centrally in Tamworth, Staffordshire.

This helped many companies across the UK struggling with excessively long delivery times from other leading gearbox manufacturers to finish their projects on time and under budget, reinforcing the reputation of Apex Transmissions for customer service and earning customers' trust.

Soon, the reputation of excellent customer service and an in depth product knowledge and market understanding earned the attention of Bosch Rexroth UK. After some discussion between the two, Apex Transmissions Ltd began to stock, process and distribute Rexroth linear motion products into the UK market.

In house machining and processing facilities were developed and specifically tailored to offer their customers exceptionally short lead times on Rexroth linear products from the stock held at their UK factory.

To this day, Apex Transmissions Ltd continues to develop and improve upon their range of Bosch Rexroth linear motion products and services. Their current portfolio focuses on machined ballscrew and nut assemblies, finished linear ball, roller, stainless ball and miniature guideways and linear ball bushes.

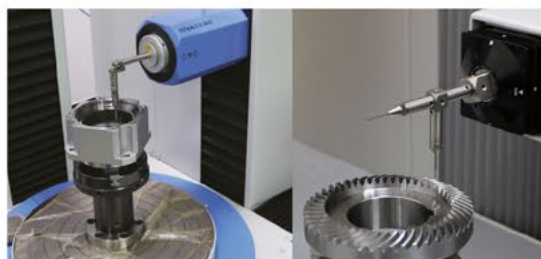
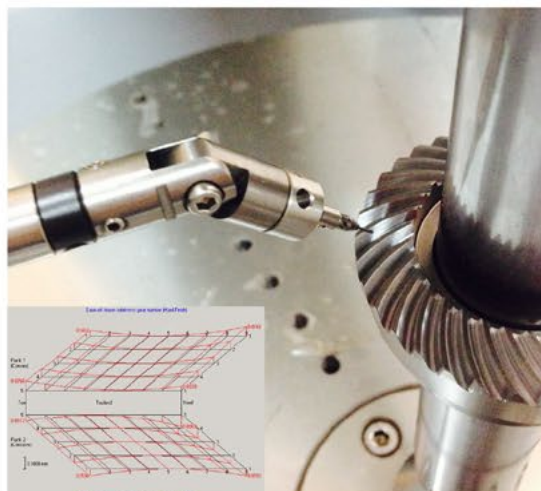


## CHANGING DIRECTION

For 2019, Apex Transmissions Ltd are proud to offer their new range of precision planetary, spiral bevel and hypoid gearboxes. Featuring improved quality and solid, robust construction, their new gearbox range reflects their commitment to the market to continuously improve product quality and the service provided.

The new range offers full helical gearing across the range for smoother, quieter operation and higher torque density compared to a gearbox with straight gearing. As well as this, all gears are case hardened and ground to further improve the torque capacity, speed and service life of the unit.

Apex Transmissions Ltd offer full design support service for all of their products. A fully equipped, in-house technical department features the latest 3D CAD software and a team of qualified, experienced engineers can offer free calculations to support your machine design process no matter the scale or complexity of build.



From the substantial stock supply at their midlands based facility, Apex Transmissions Ltd offers an exceptional production process and with fast delivery times. This helps to reduce the construction time of customer machine builds and the express delivery service also reduces productivity losses to production companies as a result of gearbox breakdowns.

The range of gearboxes offered by Apex Transmissions Ltd includes drop in replacements for the vast majority of established gearbox manufacturers and so offering an alternative to the long lead times.

Apex Transmissions Ltd are proud to offer their service and products for distribution throughout Europe.

## PLANETARY GEARBOXES



## BOSCH REXROTH LINEAR MOTION



## YOUR FREE CATALOGUES



Quality Inspection Table	
Planetary Gear Reducer	
AMF NO: 7MP-120A-120-A1	(Date): 2018 11 12
MODEL: SP110-04T-132	(Backlash): PS
(Serial NO): M1280934	
A. (assembly)	(PASS)
1. (axial runout)	YES
2. (ax. damage)	YES
B. (performance)	(PASS)
1. (OA. of input shaft)	YES
2. (OA. of output shaft)	YES
3. (OA. of input shaft)	YES
C. (performance)	(PASS)
1. (axial runout of input shaft)	YES
2. (backlash)	YES
3. (noise)	YES
D. (assembly & handling)	(PASS)
1. (assembly checking)	YES
2. (handling checking)	YES
3. (final checking)	YES
(Confirmation):	(Inspector):

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**Quality & Robust Construction**

**Supplied with Individual Test Reports**

**Official Bosch Rexroth Linear Stockist**

**Unrivalled Customer Service**

**Fast Delivery From Our UK Stock**

**In-House CAD Design & Calculations**



# Delta to Showcase Medical Product Innovation at Compamed Trade Fair in Germany

Delta, a global leader in power and thermal management solutions, will present a selected range of its medical power supplies (MPS) designed for the high-intensity demands of medical applications, as well as several DELBio biomedical products at Compamed, the leading trade fair for the medical supply industry. Within the MPS portfolio, the MEG series AC-DC configurable power supplies are figured as an ideal option for a wide range of medical applications with high power density up to 27W/inch<sup>3</sup> and power output up to 3000W.

“The medical industry has very specific requirements in regards to the MPS solutions. It relies on a multitude of medical applications, with a non-performing or faulty product potentially can lead to the difference between life and death in an emergency situation. The Compamed event provides us with the perfect platform to showcase our bespoke solutions in action, and gives attendees a hands-on experience with many of the products and biomedical devices in the field,” says Mr. Kenny Tan, deputy director for Delta’s Industrial Power Supplies & Medical Applications Business for the Europe, Middle East and Africa (EMEA) region.

The Delta stand comprises three dedicated areas for each MPS product type within its expansive product range from configurable power supplies, built-in power supplies, to external adapter, as well as its biomedical products from consumer medical devices, medical imaging systems, to vitro diagnostic products, delivered through DELBio, a member of Delta Group.

## CONFIGURABLE POWER SUPPLIES

The MEG-A series feature high efficiency and high power density up to 27W/inch<sup>3</sup>, and can be configured by 3 types of modules with max. outputs of 240W, 300W and 1200W respectively. The series offer 4 types of power frames that can accommodate 1 to 9 slots depending on the selected power module(s) to create power outputs from 16.5W–3000W. The output voltage can be configured up



to 60V by GUI interface through USB communication (PMbus/RS232/RS485). This means users can focus on the end-device design, instead of developing the power supply themselves, to increase product development efficiency and achieve faster time-to-market. The MEG-A comes with both medical and ITE safety approvals and the design is compliant with the RoHS Directive 2011/65/EU for environmental protection.

## BUILT-IN POWER SUPPLIES

The recently released MEB-750A will also be on display at the show. With an output voltage of 24V, this 750W 4x7” built-in 1U form factor is suitable for type BF patient access applications.

## EXTERNAL ADAPTER

Additionally, the new Delta MEA low-power adapters will be demonstrated at the trade show. These external devices have an output voltage of either 12V, 15V, 19V, or 24V, comply with rigorous industry standards, and are low power

consumption and low leakage current compliant.

## BIOMEDICAL SOLUTIONS

The DELBio offerings on display will include its diabetes care products, including blood glucose monitors, Oximeter vital sign monitoring system and the Mesh Nebulizer range of respiratory products. Its blood glucose meters feature physiological analysis technology, as well as a selection of its fingertip pulse Oximeters. This integrates innovative, non-invasive technologies for monitoring oxygen saturation and pulse rate.

Delta looks forward to meeting with its medical supply customers at Compamed that will take place at the Fairground in Düsseldorf, Germany from November 18 to 21. Customers and visitors can visit Delta at Stand 8BR01 in Hall 08B.

For further information about Delta, please visit [www.delta-emea.com](http://www.delta-emea.com).

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## Bulk Bag Discharger With Safety Cage

A new BULK-OUT® Model BFF Bulk Bag Discharger features a steel safety cage to prevent contact with moving parts during operation and automated unloading of bulk bags. The enclosure features externally-mounted controls and full height doors with an Intrinsically Safe Relay (ISR) that halts operation when the door is open. The discharger is equipped with top-mounted receiving cups and a removable bag-lifting frame for forklift loading of bulk bags. Z-CLIP™ strap holders at the frame extremities allow rapid, secure insertion and removal of bag straps.

A manual SPOUT-LOCK™ clamp ring positioned atop a pneumatically-actuated TELE-TUBE™ telescoping tube provides quick, dust-tight connections between the bag spout and hopper, and maintains downward tension on the spout as the

bag empties to eliminate creases, folds or bulges that could hinder material flow.

Additional flow promotion is afforded by FLOW-FLEXER™ bag activators that raise and lower opposite bottom sides of the bag at timed intervals, loosening compacted material and directing it into the discharge spout. As the bag lightens, the stroke of the bag activators increases, raising the bag bottom into a steep "V" shape, while top-mounted POP-TOP™ extension devices elongate the entire bag, promoting total discharge with no manual intervention.

The universal flanged outlet of the hopper allows connection of a rotary airlock or charging adapter to feed optional pneumatic or mechanical conveyors, or other downstream equipment.

This unit is constructed of carbon steel with durable industrial finish, with stainless steel material contact surfaces, or in all-stainless steel finished to food, dairy or pharmaceutical standards.

The company also manufacture bulk bag conditioners, bulk bag fillers, flexible screw conveyors, tubular cable conveyors, pneumatic conveying systems, bag dump stations, drum/box/container tippers, weigh batching and blending systems, and engineered plant-wide bulk handling systems with automated controls.

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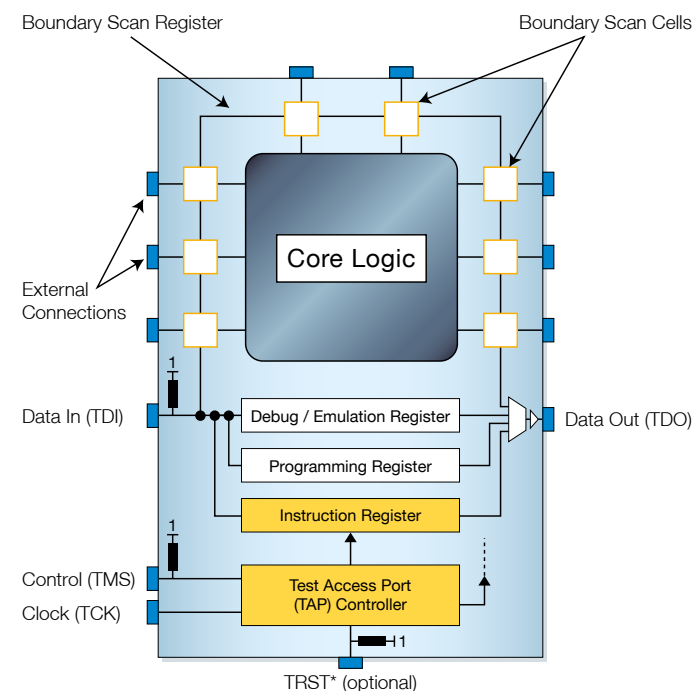
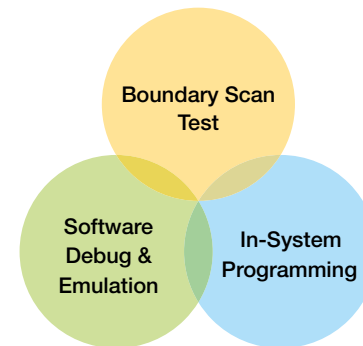
# What is JTAG and how can I make use of it?

## JTAG is more than debugging and programming

You may be familiar with JTAG because you have used tools with a JTAG interface. Processors often use JTAG to provide access to their debug/emulation functions and all FPGAs and CPLDs use JTAG to provide access to their programming functions.

**JTAG is NOT JUST a technology for processor debug/emulation.**  
**JTAG is NOT JUST a technology for programming FPGAs/CPLDs.**

The debug and programming tools commonly associated with JTAG only make use of one aspect of the underlying technology – the four-wire JTAG communications protocol.



These four signals, collectively known as the Test Access Port or TAP, are part of IEEE Std. 1149.1. This standard was developed to provide a technology for testing Printed Circuit Board Assemblies (PCBAs) without needing the level of physical access required for bed-of-nails testing or the amount of custom development needed for functional test. The TAP was designed to interact with new registers that were added to devices to implement this method of testing.

Very quickly however silicon manufacturers recognised the benefits of using the TAP to access registers offering other functionalities such as debug and programming.

The main register added to a device specifically for JTAG testing is called the Boundary Scan Register (BSR). As its name suggests the individual bits, or cells, of this register are at the boundary of the device, between its functional core and the pins or balls by which it is connected to a board – very often JTAG testing is referred to as boundary scan.

## How XJTAG uses JTAG / boundary scan to test a board

Boundary scan cells (see above) can operate in two modes. In their functional mode they have no effect on the operation of the device – this is the mode in which they operate when the board is running normally. In their test mode they disconnect the functional core of the device from the pins. By putting boundary scan cells into test mode they can be used to control the values being driven from an enabled device onto a net and also be used to monitor the value of that net.

Disconnecting the control of the pins from the functionality of the enabled device makes boundary scan test development significantly easier than traditional functional test as no device configuration or booting is required to use the pins. By providing a mechanism to control and monitor all the enabled signals on a device from a four-pin TAP, JTAG significantly reduces the physical access required to test a board.

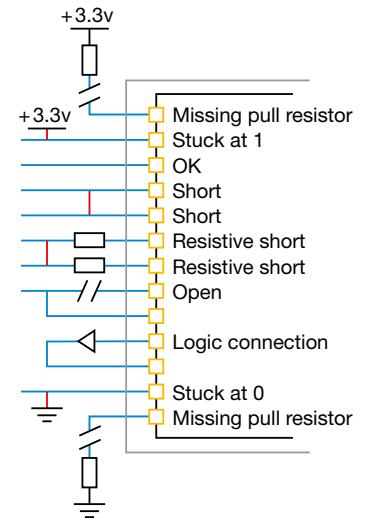
There are two main ways that this boundary scan capability can be used to test a board. The first way, connection testing (see next section) gives good test coverage, particularly for short circuit faults. It is based purely on the JTAG device capabilities, the connections and nets on the board and – in the case of XJTAG – the logic functionality on a board. The second way extends this coverage by using the JTAG enabled devices on a board to communicate with non-JTAG peripheral devices such as DDR RAM and flash.

## What is XJTAG's advanced connection test?

A JTAG connection test will check that the connections around the JTAG enabled devices on a board are the same as those specified in the design.

Where two JTAG enabled pins are meant to be connected the test will make sure one pin can be controlled by the other. Where enabled pins are not meant to be connected they are tested for short circuit faults by driving one pin and checking that these values are not read on the other pins. Missing pull resistors and 'stuck-at' faults can also be found.

XJTAG's advanced connection test also checks for other problems such as short circuit faults beyond series resistors as well as automatically testing for faults around devices whose behaviour can be described in a truth table.



## What about devices that are not JTAG enabled?

While the main devices, such as processors and FPGAs, are normally JTAG enabled, there will be many devices in every design that are not. DDR, SDRAM, SRAM, flash, MDIO controlled Ethernet PHYs, SPI and I2C temperature sensors, real time clocks, ADCs and DACs are just some examples of such devices.

The connection test will still provide excellent coverage for short circuit faults on the nets linking these non-JTAG devices to JTAG enabled devices; however it cannot check for open circuit faults at either the JTAG device or the non-JTAG device.

In order to add this open circuit coverage it is necessary to communicate with the peripheral device from boundary scan on the enabled device. If communication can be verified, there cannot be an open circuit fault. This type of testing can be very simple, for example lighting an LED and asking an operator to verify it has activated, or more complex, for example writing data into the memory array of a RAM and reading it back.

## Is it a lot of work to create an XJTAG test system?

Using the library for standard non-JTAG components installed with XJTAG software, you can get a set of tests up and running for your board with no code development. The XJTAG library contains models for all types of non-JTAG devices from simple resistors and buffers to complex memory devices such as DDR3. Because boundary scan disconnects the control of the pins on JTAG devices from their functionality the same model can be used irrespective of the JTAG device controlling a peripheral.

Most boards already contain JTAG headers for programming or debug so there are no extra design requirements.

## Where do I get information about the JTAG in my devices?


In order to run any boundary scan based testing it is necessary to have some information about the implementation of JTAG on the enabled devices on a board. This information comes from the BSDL (Boundary Scan Description Language) files for these devices. BSDL files must be made available by the silicon vendor for a device to be compliant with IEEE Std. 1149.1.

## Is JTAG test just used in production?

Not at all. One of the key benefits to boundary scan testing is that the only test hardware required is a JTAG controller. Other production test technologies such as flying probe, automated optical/X-ray inspection or bed-of-nails all require specialised test equipment that will not be available on an engineer's bench.

Using boundary scan during board bring-up can remove uncertainties – hardware engineers can test prototype boards for manufacturing defects before system testing, and even before firmware is complete. Test systems developed at this early stage of the product lifecycle can easily be reused, and extended for production.



A large iceberg floats in a blue ocean under a clear sky. The visible tip of the iceberg is small and jagged, while the submerged portion is much larger and more complex in shape, illustrating the concept of seeing beyond the obvious.

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