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- Compressed Air
- Condition Monitoring

## Denso Steelcoat Protection for Garnedd RWE Innogy Power Station

Garnedd Power Station, five miles east of mount Snowdon, is one of 92 run-of-river power stations in Europe operated by RWE Innogy.

In a recent program carried out by the company's maintenance engineers, a Winn & Coales anti-corrosion system was applied to a linear run of pipeline carrying the water flow to the power turbine. The pipe is a 3.5m long and 800mm diameter steel pipe with a previous bitumen coating.



A Denso Steelcoat system, designed for protection of above ground pipework and general steelwork was chosen. This consisted of Denso High-Tack primer followed by Denso Ultraseal Tape, with a final coat of Denso Acrylic paint. A small amount of Denso Profiling Mastic was also used between the pipe and a steel communication duct running directly and closely alongside.

Winn & Coales (Denso) Ltd, Chapel Road, London SE 27 0TR  
Tel: 020 8670 7511. Fax: 020 8761 2456  
mail@denso.net www.denso.net

## Increased demand for XRF analyser hire

Ashtead Technology is renting ever greater numbers of XRF instruments for the chemical, non-destructive analysis of metals in applications such as Positive Material Identification, waste recycling, WEEE and RoHS compliance, manufacturing quality control and contaminated land investigation.

"With a small amount of training, almost anyone can implement detailed metals analysis, and because they are lightweight and robust, XRF analysers are among the most popular rental items," says Steve Drake,



NDT Market Manager. "We have therefore invested in a selection of the leading XRF equipment so that customers are able to choose the instrument and mode that suits their application best."

Ashtead Technology Ltd  
Tel. 0845 270 2707  
Email europe@ashtead-technology.com  
www.ashtead-technology.com

## Goplasticpallets.com Launches Best In Class Collapsible Pallet Box

The new GoBox 1210 K PAC is comprised of three parts: a nestable pallet base, a plastic sealed sleeve and a secure fitting lid.

Its low tare weight of 26.5kg – up to 15kg less than comparable containers – makes it particularly cost-effective and environmentally efficient for engineering, retail and pharmaceutical applications and for handling and delivering large volumes of packaging materials.

Jim Hardisty, Managing Director of Goplasticpallets.com, said: "There are not many jobs an operative can do in just six seconds, but that's as long as it takes to assemble and disassemble our GoBox 1210 K PAC.

A unique design feature of the GoBox 1210 K PAC is a simple mechanism which helps locate the sleeve on the nestable pallet base, holding it securely in

place. This means that the sleeve can be opened and closed in one smooth movement, without the need to lock the sleeve into place. A deep drop-down door on the front of the sleeve offers quick and easy access to goods when open and can be sealed closed for safety in transit.

Special built-in flexible handles on the lid make it easy to lift on and off, and a channel on the underside holds the sleeve in place.

When flat packed, the sleeve fits neatly within the pallet base and the lid slots securely on top, sitting just within the pallet perimeter, protecting the sleeve from getting wet or dirty and promoting long term use.



Each box can hold up to 500kg and when fully-loaded can be stacked two boxes high.

Order the GoBox 1210 K PAC direct from stock today by calling Goplasticpallets.com on: 01323 744057.  
Alternatively, arrange a no-obligation demonstration by emailing the team at: sales@goplasticpallets.com.

# Air Gap Robot Improves Motor Inspection Without Removing Rotor

Robot gives visual inspection of the stator and rotor core and winding through the air gap without a rotor thread out.



A miniature robot fitted with five cameras is being used to crawl in the air gap between the stator and rotor of large motors or generators to visually inspect their status, thereby reducing downtime, inspection costs and the need to withdraw the rotor.

Called the ABB InSight, the 8.5 mm high robotic inspection crawler is tethered to a control cabinet that features two large and three small monitors. A joystick and speed controller is used to navigate the crawler – which uses a magnetic roller mechanism – around the air gap and to adjust four of the five cameras. On board LEDs illuminate the journey, while a microprocessor, accelerometers, RS485 communication and video multiplexing provides a

**Above: ABB InSight with control system and screens**

A modular track can be reconfigured to provide in-situ visual inspections for a wide variety of motors and generators in a fraction of the time of conventional methods. Unlike conventional inspection devices, which are restricted to turbo/hydro generators with very large air gaps, ABB InSight can be used on all large motors and generators which have an air gap of 10 mm or more.

Typical savings using ABB InSight are shown in the table below.

Inspection Activity	With Rotor Threaded Out	With ABB InSight	Savings
<b>Total Outage (days)</b>	<b>8</b>	<b>3</b>	<b>5</b>

video feed of the stator and rotor core, winding, wedges, stator teeth, air ducts, rotor support blocks and parts of the end windings.

The crawler is an extension of the ABB LEAP service which helps to assess the condition of the stator winding's insulation and estimates its remaining

lifetime. Furthermore, ABB InSight is an extension of ABB's maintenance plan. During scheduled minor maintenance (when only the end covers are removed but rotor is not pulled) ABB InSight helps provide more in-depth information on the stator. This data can be utilised to plan future maintenance activities and support decision making on the time and scope of major maintenance, when the rotor is removed.

ABB InSight provides 100 percent uniform, high resolution coverage of the entire length of the stator core, with coverage recorded for later, in-depth assessment and expert evaluation when required. The device captures still images and has a voice-over feature that records the inspector's comments for later use.

This provides a faster, more accurate way to inspect the machines in depth by taking a closer look at broken laminations, core burns, blocked vent ducts, effects of spark erosion and bulging or signs of movement at slot exit or in vent ducts.

ABB ([www.abb.com](http://www.abb.com)) is a leader in power and automation technologies that enable utility, industry, and transport and infrastructure customers to improve their performance while lowering environmental impact. The ABB Group of companies operates in roughly 100 countries and employs about 140,000 people.

For more information please contact:

Tel: 01480 488 080

@gb.abb.com

[www.abb.co.uk/service](http://www.abb.co.uk/service)

ABB Limited

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## SeaShield Jackets Outperform Concrete Mortar Protection

Pipeline Protection (NE) Ltd has used eighteen Winn & Coales SeaShield jackets in an unusual application as part of the protection of the Jurby outfall pipe in the Isle of Man.

This outfall discharges foul effluent from Manx Utilities' nearby treated waste water plant.

The forty metre beach length of the pipe was originally protected against corrosion with a factory-applied polyethylene coating some five years ago. In order to resist the erosion of the coating and the pipe by a combination of wind-borne and water-borne sand and gravel particles in this extremely aggressive environment, a fibre cement mortar was applied.



In July of this year an inspection by Pipeline Protection (NE) revealed that the fibre cement had been eroded in some critical areas and particularly in the intertidal zone. It was here that the SeaShield 100 jackets were then applied. Their structure consists of HD polyethylene sheeting, and they also have excellent resistance to uv radiation.

In early October after seasonally high tides a further inspection indicated that erosion of the outfall had been checked. A senior engineer at Pipeline Protection said: "The SeaShield jackets still looked very good."

The jackets are normally used as part of Winn & Coales SeaShield 100 system which was specifically developed for anti-corrosion protection in splash and intertidal zones, including for exposed pipes. In this main use the system consists of Denso Paste S105, Marine Piling Tape, SeaShield jackets and Smartbands for fixing. This seals the substrate against oxygen and water, preventing corrosion.

Winn & Coales (Denso) Ltd, Chapel Road, London SE 27 0TR  
Tel: 020 8670 7511 | Fax: 020 8761 2456 | mail@denso.net | www.denso.net

## Rutronik becomes Global Distributor for Sensirion

Rutronik Elektronische Bauelemente GmbH will be serving as a global distributor for Sensirion.



The manufacturer's sensors are based on CMOSens® Technology, which enables the fusion of the sensor element and analog and digital analysis technology in a single CMOS silicon chip. The result is a sensor chip that enables cost-effective, high-precision and reliable detection of physical parameters.

For Further Information:  
www.sensirion.com | info@sensirion.com  
Tel. +41 44 306 40 00 | Fax +41 44 306 40 30

# Hansford Sensors Launches New Semi-Permanent Mounting Solutions

Hansford Sensors, the leading manufacturer and global supplier of industrial accelerometers, has extended its range of mounting options for vibration sensors still further with the launch of the new HS-AM series of mounting magnets.

The HS-AM magnets are an effective temporary mounting solution that enables vibration sensors to be securely connected to the mounting face of an asset while readings are taken using a hand held data collector.

The new HS-AM series is available in a range of sizes, from 20mm to 40mm, and pull strengths, between 12kg and 45kg, to meet the mounting needs of manufacturers operating critical machinery in almost any application, such as metals, cement

and pharmaceutical production. Each magnet within the series has an operating temperature range of up to 80 degrees centigrade. In addition, where manufacturers opt for quick fit mounting, the HS-AM magnets can be fitted with an AS012 Stud Adapter.

Chris Hansford, Managing Director at Hansford Sensors, explains: "The launch of this series further strengthens our range of mounting solutions and accessories. The HS-AM magnets ensure a secure surface fit and are ideal for manufacturers that



require effective, no-nonsense semi-permanent mounting."

Visit the Hansford Sensors website for further information on the HS-AM magnets and to view the company's market leading industrial accelerometers.

For More Information:  
Telephone: +44(0) 845 680 1957  
Email: sales@hansfordsensors.com  
Visit: <http://www.hansfordsensors.com>

# The Complete Solution In One Event

**Southern Manufacturing and Electronics returns to FIVE, Farnborough, from February 9th to 11th 2016.**



The event retains its popular three day format, making it even easier to plan a visit to one of the most important annual engineering exhibitions in the UK.

The maintenance function is an extremely broad area covering everything from advanced machinery down to the humble nut and bolt. So to have the opportunity to see it all in one venue is extremely appealing to busy engineers. Combine that with free entry, free on-site car parking and easy access by road or public transport, and you have an extremely compelling case to attend. Southern Manufacturing and Electronics is the most important industrial show south of the Midlands and probably the best marketplace for maintenance solutions in the UK.



At around 18,000 square metres, and showcasing more than 800 exhibitors, Southern 2016 is a significant event by any standard. Among the vast range of products and services presented are the latest machining centres from leading vendors such as Amada, XYZ Machine Tools, Matsuura, Dugard and many others. Tooling solutions include ITC and Quickgrind, and there's hardware such as welding systems and compressors from firms such as TPS Weldtech and Atlas Copco. MecWash returns with its aqueous cleaning systems, and there's surface treatment machines from Guyson International, tooling kits from Hearnar, oils from Q8 Oils, clean rooms from Connect 2 Cleanrooms, filtration from Filtermist, machine safety solutions from Bernstein and literally thousands more. A searchable index of companies and solutions on show can be found at [www.industrysouth.co.uk](http://www.industrysouth.co.uk)

Combined with exhibition and demonstration areas, the event's free seminar programme is another

highly popular attraction. Two programmes run side-by-side in 2 theatres, focusing on manufacturing and electronics respectively, encompassing discussions on technical innovations, business management, marketing and the present business regulation. Among the highlights this year is a session on reducing energy consumption in manufacturing businesses.

Admission to Southern 2016 is free. To register for tickets, search the exhibitor list or book a seminar place simply visit [www.industrysouth.co.uk](http://www.industrysouth.co.uk). Show visitors can keep up to date with the latest event and exhibitor news by visiting the show's official blog, <http://blog.industrysouth.co.uk>, by following @industry\_co\_uk #southmanf on Twitter or by



joining the show's official group on the popular business networking site, LinkedIn at <http://linkedin.industrysouth.co.uk>

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W. [www.industrysouth.co.uk](http://www.industrysouth.co.uk)

# Process Technologies Boosted With Big-Bag Handling

Processing procedures involving powdered, granulated or other free-flowing materials require regular, high volume product top-ups to maintain adequate production through-puts.



The specialised big-bag, air operated hoists manufactured by J D Neuhaus are suitable for operating with single or twin bag loads. These handling products also provide safe, speedy and accurate positioning, even where limited headroom conditions exist.

Typical applications include food products (salt, sugars, flour, starches etc), chemical and construction/building markets (limes-hydrate, plastics, minerals, cement), together with specialist markets including pharmaceuticals, granulate/GGBS, energy, environment/recycling/sewage etc.

Individual bag loads of 1100 or 2200kg can be accommodated, with precision handling facilities incorporated for discharge at storage sites or process line delivery chutes etc. The hoist systems are also designed for reliable and safe operation within dust laden atmospheres, including areas

at risk of explosion. Their operating medium is compressed air (6 bar pressure), with additional spark protection also being available, ensuring explosion protection classifications according to Directive 94/9/EG (Equipment and Protection Systems Intended for use in Potentially Explosive Areas [ATEX]). The explosion potential of dust laden atmospheres can be high where handling powdered chemicals, but with more innocuous food based components or metallic powders all being susceptible to ignition where critical air/dust content conditions are reached.

The JDN big-bag handling hoists are purpose designed and feature twin overhead trolleys connected with rigid spacer beams, and the whole unit running on an overhead support beam. The hoists are dust-proof and explosion protected,

designed for full 24/7 operation within extreme low headroom conditions. Individual handling capacities 1100 and 2200kg are available in two configurations of either single or twin lift/load hooks. The single hook unit is designed for operation with a standard cruciform lifting beam. The twin load hook models operate with more complex beam designs, or for standard lifting beams featuring twin suspension points. They can also be operated with synchronised lifting operation. Each hoist is fitted with a chain box, which is sited to eliminate the risk of collisions between loads and the chain box. The hoist low-headroom designs are also compatible with the handling of a wide variety of bulky or unusual loads. These big-bag hoists have 100% duty ratings, so eliminating downtimes. They can also be supplied with a wide variety of beam sizes and profiles, with optional hook centres located as required. The compact, modern design incorporates many JDN standard components to guarantee reliable operation combined with cost effective manufacture. No additional motor lubrication is required and only a small number of wear-free moving parts are incorporated for minimum maintenance. The hoists can be supplied with optional explosion protection ratings of: EX II 2 GD IIA T4 / II 3 GD IIB T4 and EX II 2 GD IIB T4 or II 2 GD IIC T4.

Further information is available on request to:

J D Neuhaus GmbH & Co. KG, 58449, Witten-Heven, Germany

Telephone: +49 2302 208-219  
Fax: +49 2302 208-286  
e-mail: [info@jdngroup.com](mailto:info@jdngroup.com)  
[www.jdngroup.com](http://www.jdngroup.com)

# New Standalone Measurement Solution Reduces Cost of ISO 8573 Oil Vapour Monitoring for Compressed Air & Gases

The recent update to add a touchscreen interface to the CS-iTEC S 120 oil vapour sensor has now been further enhanced with the addition of an integral 100 million unit data logger function to produce a complete standalone monitoring solution for oil vapour sensing in accordance with ISO 8573.



Measuring down to 0.001mg/m<sup>3</sup> in accordance with ISO 8573-1 quality class 1, the device offers simple control through the 5" touchscreen display with graphical readout of oil concentration over time and is ideal for periodic audits or permanent installation. The innovative design using a high accuracy PID sensor has reduced production costs considerably compared to other methods and this reflects in the highly competitive price point for this unit.

Available for portable or fixed monitoring, the compact size of the S 120 unit in conjunction with the 6mm quick connect inlet simplifies installation and the commissioning is very quick due to the easy to use touchscreen controls.

The S 120 interfaces easily with existing plant systems with communication options including 4-20mA, SDI, RS485, Modbus/RTU and relay outputs in addition to the USB output for the logged data.

Calibration can be achieved simply and cost effectively by the user through the supply of pre-calibrated exchange sensors that are easy to swap and remove the need for the whole unit to be disconnected and returned. This saves time and where monitoring needs to be continuous, the need for a complete standby unit to replace the original while away being calibrated.

The CS-iTEC GmbH range including the S 120 is available in the UK through Red Dragon Ltd and will be displayed at Birmingham NEC on stand AF250 during the Air-Tech exhibition in April 2016.

Red Dragon Ltd, Unit 15 Abergorki Industrial Estate, Treorchy CF42 6DL  
 T: 01443 772500  
 E: sales@measuremonitorcontrol.com  
 W: www.measuremonitorcontrol.com



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# Vaughan Chopper Pumps Meet The Challenges Of Increased Volumes From The 'Super' Sewers

When you are upgrading one of Europe's largest sewers which currently serves 3.5 million people, increasing capacity by 60% and taking into account a predicted population increase of 10% by 2021, it's understandable why they are regarded as 'SUPER sewers'.



These are the scale of the upgrades being undertaken by Thames Water at their Beckton and Crossness sites in East London. These new super sewers are feeding significant volumes of sewage and effluent to the upgraded treatment works and VAUGHAN CHOPPER pumps are playing a vital role in meeting the challenges of the increased capacity at the treatment works.

The projects, valued at £190m for Beckton and £220m for Crossness, will boost the site's treatment capacity by 44% and will significantly reduce the volume of storm sewage that often overflows into the Thames water course during and after heavy storm events. Furthermore, with waste increasingly regarded as a source of alternative energy, a key part of both projects involves the extraction of biogas from the organic waste within the sewage processed at both sites. The biogas allows self-sufficiency in powering the plants through CHP (Combined Heat & Power) generating systems, while

selling excess energy back into the National Grid is another possibility.

Extraction of the gas is performed by 12 anaerobic digesters across the two sites and each digester uses a pair of VAUGHAN HE6W10-277 Horizontal Chopper Pumps driven by 30kw/4 pole WEG motors, selected and supplied by P&M Pumps Ltd.

Each pump set is sited outside the digester but are literally the beating heart of the large scale ROTAMIX systems by pumping through just four floor mounted double nozzle assemblies inside each 3600m<sup>3</sup> digester quickly achieving a complete and dynamic mix, suspending all organics, fats, oils and grease (FOG), grit and non-organic solids into a homogenous slurry.

Commenting on the project, Matt Harvey, Director at P&M Pumps said, "This application is extremely demanding as the load on the chopper pumps can



be exacerbated by the substantial debris that can sometimes reach the pumps in spite of the upstream filters.

The WEG motors proved to be the ideal solution to the challenges arising at the Beckton and Crossness sites. In addition to their ATEX conforming EExd rating the motors operate at higher efficiencies which to the minimum requirement of their IE2 rating and an important factor in contributing to the projects overall energy efficiency. Furthermore, it addresses 90% of total operational costs attributed to energy expenditure over the lifetime of typical motors used in pumping applications.

As the sole UK suppliers of the bespoke design ROTAMIX (Digester Mixing) and STM (Small Tank Mixing) tank mixing systems using the integral VAUGHAN chopper pump driven by WEG energy-efficient motors, System Mix

are making an important contribution to the success of AD plants at numerous installations across the UK.

For further information on how SYSTEM MIX in conjunction with VAUGHAN CHOPPER pumps can help eliminate the operational and biological issues occurring in AD operations.

Contact: Andy Parr, System Mix Ltd, Sawtry, Huntingdon, UK.  
Tel: +44 (0) 1487 830123  
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# BSRIA Instrument Solutions Applauds The BOHS Breathe Freely Initiative



Instrument Solutions, a key supplier of products into the Health & Safety market has applauded the newly launched Breathe Freely collaborative initiative, designed to prevent occupational lung disease in the construction industry.

Alan Gilbert, BSRIA Instrument Solutions General Manager, said: "The correct fitting of RPE and the background monitoring of construction workers is extremely important aspect of Health & Safety yet is often misunderstood and ignored in the workplace. Exposure to asbestos and silica dust is daily hazard and everybody involved in the construction process including all levels of management down to the worker sweeping the floor needs to understand the importance of using correctly fitted and tested face masks.

Led by BOHS (The Chartered Society for Worker Health Protection) – in partnership with key organisations – it will provide guidance, tools and resources that facilitate the recognition, evaluation and control of workplace exposures leading to the implementation of a recognised management standard.

## The relevant Instrument Solutions are:

The **TSI PortaCount Pro+** is part of a portfolio of instruments offered by Instrument Solutions to ensure users of RPE (Respiratory Protection Equipment) are safe in the workplace. It is complimented with instruments such as background dust monitors including the recently released TSI environmental DustTrak that can be used to monitor ambient levels of pollutants in external environments with information stored in the cloud for immediate access anywhere in the world.

UK construction workers are at high risk of contracting lung disease from the work that they do. In 2015, approximately 3,500 will die from cancer caused by past exposures to asbestos, 500 more from silica dust, another 5,500 will be diagnosed with occupational cancer, and – today alone – an unknown but significant number will breathe in the hazardous substances that will one day seriously affect their health or kill them.

The **PortaCount Pro+** respirator fit tester is used for the testing of full facemasks, SCBAs, respirators including disposables (P1 and P2 versions).

Some of the construction industry statistics are startling. For example: 3,500 occupational cancer deaths are caused by exposures in construction. And the UK construction sector has the largest number of reported cases of occupational lung disease of any industrial sector."

BSRIA Instrument Solutions  
T: +44 (0)1344 459314 F: +44 (0)1344 465556  
E: info@bis.fm W: www.bis.fm

# Dialight's Stand-Alone Wireless Occupancy Sensors Deliver Maximum Flexibility, Control & Efficiency for Smart LED Lighting Systems

Cordless, Plug-and-Play Sensors Install in Any Location to Control Single Fixture or Lighting Group for Maximum Energy Savings

Dialight, the innovative global leader in LED lighting technology for industrial applications, today unveiled its new wireless occupancy sensor, a unique battery-powered plug-and-play sensor that speeds and simplifies installation to provide maximum lighting control flexibility and energy savings in industrial applications.

Designed to integrate seamlessly with any Dialight smart lighting system, the new wireless sensor can be placed virtually anywhere within a facility, without the need to install or move cabling, for nearly unlimited lighting control options. A single sensor can be programmed to control multiple lights and groups of lights, eliminating the need to install a sensor on every light.

Using Pyroelectric InfraRed (PIR) technology, each sensor can instantly switch a single light or a group

of lights from off to on or from a dimmed state to on when motion is detected for full visibility and brightness only when needed, greatly reducing on-time and power consumption. Multiple sensors can be linked to a single Dialight gateway to manage several (or up to 100) nodes (sensors and lights) from a single wall controller.

Programmable dimming and customizable timeout options allow facilities to configure fixture on-time for each sensor at one-minute intervals. Lights can be programmed to remain on for up to 30 minutes once motion is no longer detected and then dim or turn off instantly.

Auto-detect technology instantly recognizes new sensors on the network upon activation for fast and easy configuration. And, each light and sensor in the network can be securely monitored and configured



remotely from anywhere through the Dialight cloud-based gateway portal using a tablet, laptop or smartphone.

With its 10-year lithium batteries and self-healing 2.4 GHz IEEE 802.15.4 mesh networking system, the new occupancy sensors offer the same long-life performance and dependability of the complete Dialight wireless lighting system, backed by a 5-year warranty.

For information about Dialight please visit [www.dialight.com](http://www.dialight.com)  
Or Call: +44 (0)1638 665161

# Emerson Embeds Prediction Data Into Protection System

Emerson Process Management has introduced the CSI 6500 ATG protection system, a stand-alone machinery protection solution that also allows users to cost-effectively introduce prediction monitoring of critical assets from the same system.

Predictive intelligence is a key component to increasing availability and improving the reliability of plant assets.

New CSI 6500 ATG multi-functional cards can be easily reconfigured for a wide range of measurements, including the impacting or peak-to-peak data used in Emerson's unique PeakVue™ technology. In addition to monitoring the start-up and coastdown of critical turbo machinery for safe operation, users will be able to utilise PeakVue technology to identify the earliest indications of developing faults in gearboxes and bearings.

With the CSI 6500 ATG, it is no longer necessary to return to the control room or open cabinets in

the field to view or analyse data. The CSI 6500 ATG can be networked over wired or wireless Ethernet to deliver asset health information to authorised users through a PC or phone application.

To facilitate easy system integration with third party systems, CSI 6500 ATG is the first protection system to include a secure embedded OPC UA server.

"Studies show that it costs 50% more to repair a machine after it has failed versus predicting the failure and thus planning for the repair costs," said Thomas Wewers, director of technology for Emerson's reliability solutions. "For users whose budget doesn't cover the cost of both a protection and a prediction system, getting prediction data



from a protection system is an incremental step towards improving the insight on asset health."

The CSI ATG system complies with the traditional API 670 certification and is certified for installation in demanding environments where Class 1 Div2/ATEX Zone 2 approvals are required.

For more information about Emerson's new protection cards and other CSI technologies, please visit: [www.EmersonProcess.com/csi](http://www.EmersonProcess.com/csi)

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# Implementing A Calibration System – How To Overcome The Common Pitfalls

Why talk about calibration system implementation? Isn't it enough to focus on comparing equipment and software feature lists?

The reason is that a calibration system implementation is only about 20 to 30% technology, the rest is business culture and process. Calibration system implementation is also very time- and resource-consuming – the risk of failure is high. Typically, a calibration system implementation involves many different functions and departments within an organization and takes a long time to complete.

## Why implement a new calibration system

An efficient, modern, automated, computer-based calibration system, and related processes, have many benefits, this kind of system will save money by reducing the costs of calibrations. The most significant savings are accrued when getting rid of the paper-based calibration system; electronic record keeping is more effective and it's possible to get rid of manual recording of calibration results in the field by using documenting calibrators. Calibrate less, because the system can help to concentrate on the most critical calibrations and avoid unnecessary calibrations.

Using electric record-keeping and documenting calibrators, the errors common in manual entries can be avoided. This will help to ensure compliance with quality system and regulatory requirements.

## Why focus on the implementation process instead of product features

Often the components of the calibration system (software and calibrators) are selected and compared based on their features and functions only. However, even the components with the best features will not automatically change the way of working.

The implementation is a very time- and resource-consuming operation, and the risk of failure is therefore high. These facts need to be taken into account when implementing a new system.

Many companies have experience with ERP, accounting and other system implementations, but most often it is the first time the company/people implement a calibration system. This will increase the risk of failure.

Typical failures in IT project implementations include overruns of costs and schedule. Also, the expected benefits are not always obtained. Often, dissatisfaction is caused by the incapability of the system vendor/supplier to support the implementation process with required services and documentation.

## 1. Features – functions - price arms race

It is good to remember that the software that has the longest list of features and functions is not necessarily the best. Also, the cheapest software may become the most expensive in the end. It is important to analyze the weaknesses in the current calibration process as well as the goals for the new process. It is important to find the most suitable system and the best vendor as a partner to guide the company through the implementation process.

## 2. Unclear goal and purpose

First of all, it's essential to remember to specify a clear goal for the new calibration system. Without a target it is very easy to fall straight into the discussion of details and features. This causes a high risk for the failure of the process.

## 3. Modelling old legacy system into a new system

Sometimes there is a tendency to use the existing, old, paper-based legacy calibration process and force the new computer-based system to conform to the old one. This approach most often results in failure. When the technology and tools are updated, the calibration process should be updated, too. Also, this approach most often does not utilize the

benefits and possibilities of the modern automated calibration system.

## 4. Failing to gain early user and stakeholder adoption

The users and stakeholders must be involved at an early stage and remain throughout the whole implementation process. The bigger the process changes are, the more important to involve the users. The stakeholders include, for example, calibration process owners, IT, compliance and quality.

## 5. The "Big Bang" implementation

For large, multi-site implementations, the "Big Bang" implementation style has proven unsuccessful and will more often result in failure. Instead, the successful calibration process implementation projects have been gradual roll-outs of the sites instead of one big launch. It is recommended to have a Proof-of-Concept approach where the solution is successfully implemented on one site before the roll-out to other sites starts.

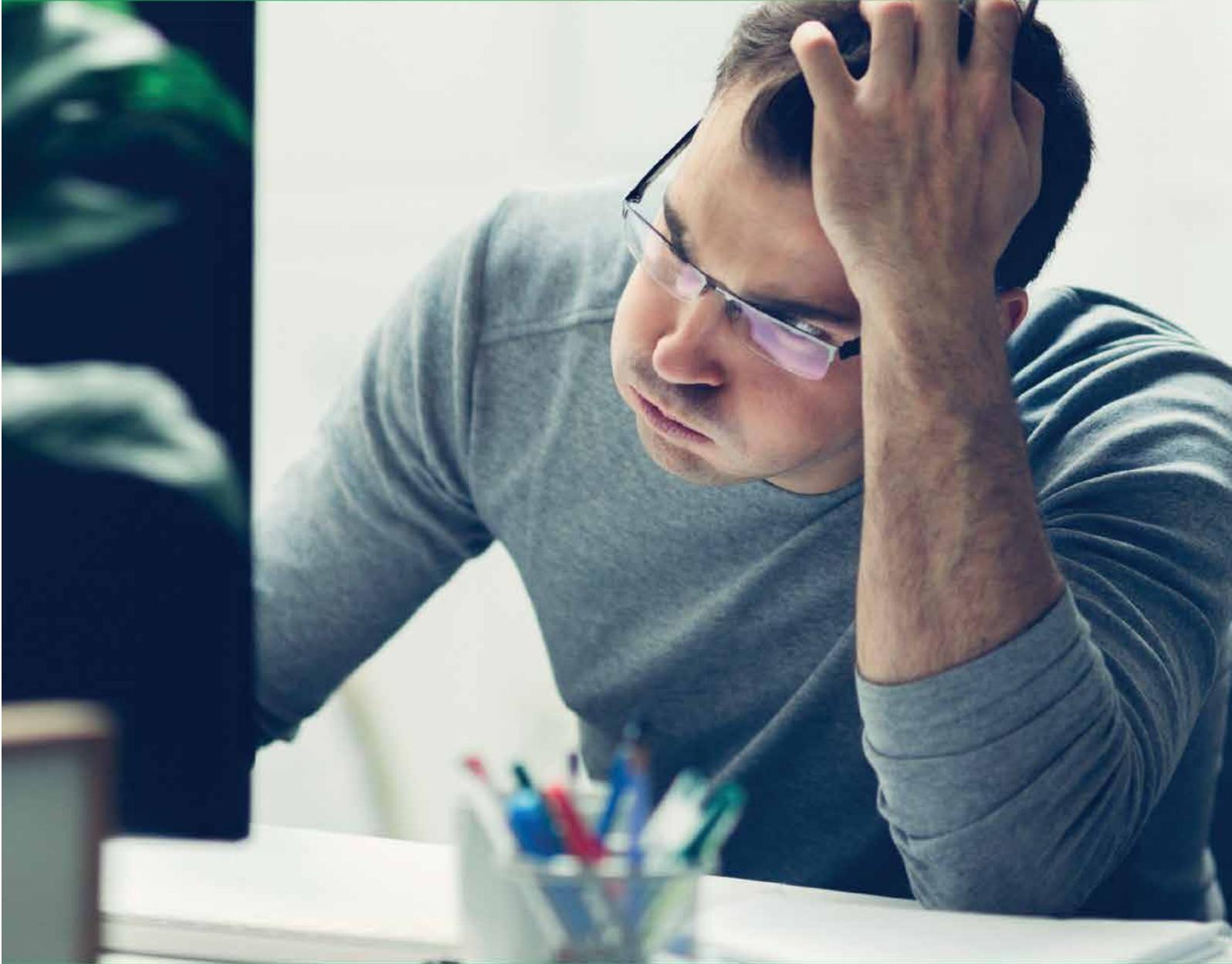
## 6. Under-resourcing and lack of project organization

It is good to remember that a calibration system implementation is a joint-effort of the customer and the vendor. Often, three quarters of the resource requirements are the customer's responsibility and one quarter the vendor's.

As regards the customer, there must always be a well-defined project organization with a dedicated project manager. As mentioned earlier, other resources typically needed are application and process experts, IT resources. Legal council is needed in the contract phase.

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# Implementing a calibration system?



**Our calibration and IT expertise helps you face calibration process improvement projects that are typically complex and consume a lot of time and resources.**

Only 20% to 30% of a calibration system upgrade is tools and technology, the rest is business culture and process. Therefore, the success of a new calibration system depends especially on the implementation of the system and the ability to define and adopt a new calibration process. We are the experts in both technology and implementation, so you can focus on the opportunities, while we support and guide you in the evolution of your calibration system and successful implementation of the calibration process change. Learn more at: [beamex.com/CalibrationProcessImprovements](http://beamex.com/CalibrationProcessImprovements)

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# Holidays and Pinholes: The Chink in the Armour

Traditionally, armour is considered only as strong as its weakest point, highlighting the significant dangers of any subsequent breach.



A chink in one's armour poses life-threatening consequences, not dissimilar to that caused by vulnerabilities within a protective coating. Any weakness can lead to the exposure of the substrate beneath, allowing access to the destructive forces of corrosion and erosion, ultimately making the coating redundant. Within the industry, these defects are referred to as holidays, an area of the substrate that has not been properly coated, presenting as a discontinuity in the coating film. This includes misses, inadequate coating thicknesses, inclusions and pinholes, all of which register as anomalies. Throughout this post, we aim to dispel some myths surrounding holidays and pinholes, whilst also exploring holiday detection and the solutions used to fix these defects.

## Holidays from hell: An engineer's nightmare

The occurrence of holidays can only be attributed to either applicator error or a lack of knowledge surrounding the application of coatings. This includes the knowledge of environmental conditions, which can affect and overall hinder the application. A common cause of holidays, which is particularly affected by environmental conditions, is the coating viscosity. Imperfect viscosity can undermine the success of the overall application. In extreme temperature conditions, the coating can become too viscous, or too fluid, and will become too difficult to

**Above: Appearance of pinhole holidays in coatings**

apply. Subsequently, this will form sags and curtains and will undoubtedly lead to misses or skips within the coating structure.

The characteristics of the coating, upon application, can also increase the likelihood of holidays occurring once the coating has been cured. Primarily, insufficient or incorrect mixing of the coating's components can create areas that won't cure, leading to disbondment amongst other coating defects. Moreover, overmixing the coating prior to application can combine too much air with the product, creating a significant number of air bubbles.

Predominantly, pinholes are formed when air bubbles rise to the surface of the coating, burst and are not resealed by the coating itself. These minuscule holes can be simply limited to top layer of the coating, or continue directly through two coats, exposing the substrate. When brush-coating a substrate, applicators must ensure that they apply two layers. After the initial layer, the second coat must be applied perpendicular to the original, thus covering over any potential holidays that are present. If this doesn't happen, any existing discontinuities, such as pinholes, may not be covered.

What's more, significant areas of error stem from difficult to access areas and ensuring that an even coating is applied across the substrate. In perfect practice, applicators should use mirror-access techniques to remove the doubt over discontinuities in hard-to-reach locations.

## Equipment and methods of holiday detection

A lot of these defects cannot be visibly spotted; therefore, certain types of equipment are used to locate coating anomalies. Predominantly, coatings are insulative products, protecting the conductive metal substrate. Using electricity in order to locate these film discontinuities, holiday detectors pass a current over the coating, trying to create a closed circuit with the substrate beneath. An anomaly can be identified by using both high and low-voltage instruments, however each must be matched specifically with the application, dependent upon several variables. For instance, the environment's conditions must be suitable for effectively testing the surface, especially with regards to the surface conditions. A dry and cured coating is essential for positive test results; otherwise trapped solvents or uncured areas, still present within the coating, can provide false readings.

Typically, either the low-voltage wet-sponge test or the high-voltage spark test is used, with each possessing distinctly different capabilities in terms of functionality. Obviously, the significant difference concerns the voltage of the two pieces of equipment; however, this does impact on the type of coating each can be used for. Manufacturers' guidelines state that the low-voltage wet-sponge testers are only recommended for coatings with a maximum thickness of 500 $\mu$  (microns). For coatings which are applied at thicknesses exceeding 500 $\mu$ , high-voltage equipment should be used (assuming that the coating is compatible).

Another significant difference concerns how they detect the presence of holidays. The low-voltage equipment utilises water, as a pathway for the electricity, to connect with the areas of exposed substrate. In contrast, the high-voltage equipment is able to bridge the gap between the tester and conductive material, simply through the air. There are also considerable safety differences in that the wet sponge system operating at a maximum of 90V cannot harm the operator or the coating, whereas the high voltage version operating up to 60,000V can if not correctly operated seriously damage both the operator and the coating being tested.



## Problems surrounding holiday detection

One of the biggest problems surrounding holiday detection revolves around voltage settings and dielectric strength. Every coating possesses a dielectric strength, which determines the specific voltage that a coating can withstand, before it begins to break down. Choosing between high and low voltage testers, in addition to setting the correct voltage, so as not to cause further damage to the coating, is crucial when using equipment of this nature.

Ian Wade, Belzona's NACE Certified Coatings Inspector, commented further that: "Alongside voltage, the speed of inspection can also have an impact on the coating. When using the DC high-voltage spark tester, the inspector must not move the probe too slowly across the coating in a single pass, as this can create holidays (minimum speed

## Above: High-voltage spark testing in action

### Above: High-voltage spark testing in action

must be at least 0.3m/s, 1ft/s (NACE SP0188)). Similarly, with the low-voltage holiday detector, the user will also have to make sure that full contact with the coating is continuous and no to move the probe too fast or too slow.

"Moreover, the user will have to ensure that they do not over saturate the sponge as this can lead to erroneous results, likewise the same problem will arise if the sponge is not saturated enough (1 part wetting agent to 128 parts water). Check the grounding of the equipment by making contact on a bare spot on the substrate with the sponge and repeat periodically to verify grounding."

As highlighted, sometimes the pinholes are so minute that the passage of water from the low-voltage tester, through to the conductive surface underneath, is restricted. In these instances, applicators will use a surfactant in order to lower the

surface tension of the water. With a reduced surface tension, the solution is able to penetrate the pinhole and effectively recognise the coating's defect.

In order to provide different characteristics and additional properties to coatings, additives and fillers are added. Some of these comprise of metallic fillers, which must be acknowledged before any testing is conducted. When confronted with metallic-filled coatings, which may be semi-conductive, a low-voltage testing method technique is preferable, for example using the wet-sponge technique. On the other hand, high-voltage testing equipment can be used to discern whether a non-metallic filled coating has a holiday.

## Restoring the armour

The chances of poor application techniques can be eliminated by following specific coating guidelines and procedures. In terms of achieving the best coating possible, void of potential defects such as holidays and pinholes, it is necessary to follow NACE standard SP0188. As always, safety is paramount when using equipment of this nature and as part of NACE guidelines, there are certain measures that must be remembered. Inclusive of electrical safety checks, when conducting high-voltage tests, it is necessary to carry out full assessments of the testing environment to ensure that there are no potentially explosive elements. Moreover, complete electrical grounding of the substrate is vitally important to avoid any electrical shocks.

Solutions for repairing holidays are completely dependent upon whether the coating can be renewed or not. If the lining is at the maximum coating thickness, then another coating cannot be applied on top of the existing holiday. The area around the discontinuity is initially delineated with the edges feathered in towards the defect. Once completed, the area can be frost-blasted, before a replacement coating can be applied. On the other hand, if the coating is under the maximum thickness, another coating can be applied. By simply roughening the surface prior to a successive application, the holiday can be covered and successfully eliminated. After the repair is complete, another holiday test must be conducted in order to establish that the repair has been successful. Notably, the area of repair is the only place that should be tested, in order to prevent excessive stress against the coating's integrity.

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# Under Pressure: Can Your Steam Boiler Handle It

With fluctuations in steam pressure having the potential to affect energy savings, environmental credentials, and wear and tear to boiler components, it is vital that boilers operate to the correct design pressure at all times.



Matthew Walton, Contracts Manager for Industrial Boilers at Bosch Commercial and Industrial, explains how this is best achieved.

“Once associated with the industrial revolution, steam is an essential product for a multitude of modern technologies. Demand spans both the private and public sectors with applications varying from power stations through to food and drink manufacture.

“Steam releases a large amount of heat when it condenses and so can carry vast quantities of energy. However, for users to capitalise on this precise system control is required to provide the correct amount of high quality steam safely, efficiently and at the correct pressure.

### Water levels

“During steam generation inconsistent pressure levels can have a significant impact on water levels within the boiler, leading to operational downtime if not maintained correctly. As a boiler generates steam, any impurities will not boil off and therefore concentrate. As these impurities become more

concentrated a foam will form which can be carried over into the steam main.

“These seemingly harmless bubbles can lead to serious issues. At a base level the foam can result in a false reading for the water level. Additionally, it means not only is the steam wet as it leaves the boiler, resulting in poor quality steam also known as “carry-over”, but the water also contains high levels of dissolved and suspended solid that can contaminate boiler system components such as control valves and heat exchangers.

“As foam does not transfer heat as quickly as water it can lead to a serious failure or even an explosion as furnace metals reach softening point. Therefore, it is vitally important that control measures are put in place to ensure the correct water level is maintained at all times.

### Effects of water carry-over

“Water carry-over is contaminant that leaves the boiler with the steam be that in solid, liquid, or vapour form, resulting in water hammer and the corrosion of vital boiler components. Aside

from damage to the system, an often overlooked consequence of carry-over is the efficiency loss due to wet steam. Since water at a given pressure has lower heat content than steam, wet steam has lower heat content than dry steam.

“The causes of carry-over are generally either mechanical, namely boiler design, high water level, firing method, and load characteristics or chemical, due to high solids concentration, excessive alkalinity, grease or oil. Carry-over can usually be verified by testing, with low conductivity condensate indicating high purity steam, while high results indicate the presence of carry-over.

“While all process users need high quality steam, it is important to remember that this depends on the ability to maintain the correct steam pressure to ensure it can separate from boiling water without carrying water particles with it throughout the entire system operation, rather than on the efficiency of the boiler.

“Even the most well-designed and operated boiler system will produce minor amounts of water carry-over however, the key is to know how much can be tolerated and then operate accordingly to achieve the required steam purity.

For more information on Bosch Commercial and Industrial and its range of products and services please visit: [www.bosch-industrial.co.uk](http://www.bosch-industrial.co.uk) or call 0330 123 3004.

Alternatively, follow Bosch Commercial and Industrial on Twitter (@BoschHeating\_UK) and LinkedIn (Bosch Commercial and Industrial UK).

# Riello introduces low NOx versions to popular RS series

Riello has introduced low NOx (<80mg/kWh) 'blue flame' versions to all sizes of its RS range of burners.

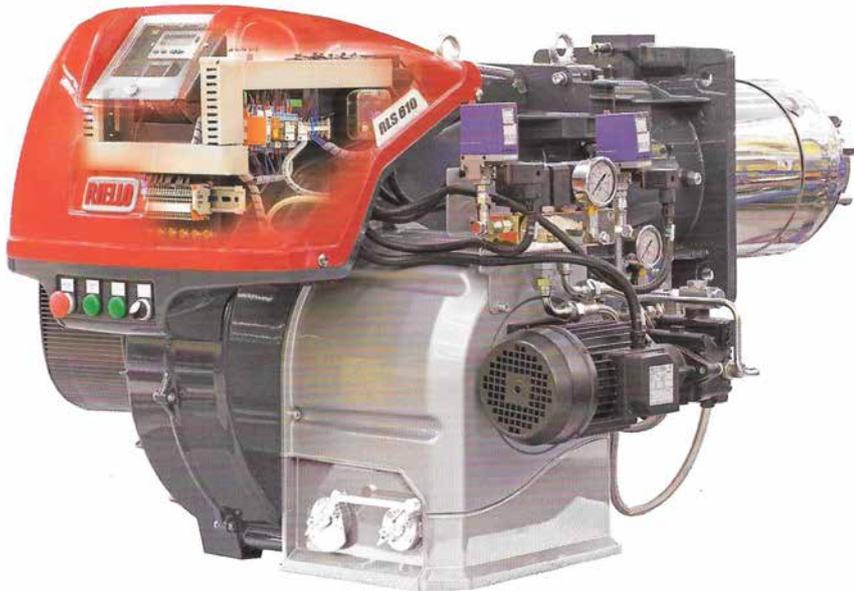
This is achieved through the use of a low NOx combustion head to ensure emissions conforming to EN 676 Class 3 in capacities from 3,600 kW to 6,250 kW.

The RS series of high-power monoblock burners is characterised by the advanced technological developments that have contributed to its design and energy-efficient performance, delivering high power levels whilst minimising size and weight. Dual fuel RLS low NOx models will soon also be available, featuring a dedicated pump motor to ensure a long life for the oil pump, combined with energy-savings.

RS models 310, 410, 510 and 610 are available in various air-fuel ratio control configurations, with the option of mechanical cam or electronic cam for modulation control. Variable speed drive technology ensures both low noise and electrical power savings.

Easy access to internal components through a hinged panel facilitates speed of commissioning and maintenance.

For further information visit:  
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# Sipsmith Specifies Steam For Traditional Still System

Established in Hammersmith in 2009, Sipsmith Distillery is a small, independent business that, using the first copper still to launch in London for almost 200 years, crafts truly artisanal gins and vodkas of uncompromising quality.



'heads' cut (containing methanol) and the final 'tails' cut are disposed of, the 1,500-litre Constance produces approximately 950 litres at still strength (82% for the gin and 90% for the vodka). This distilled liquid is then cut with water to create a bottling strength product that produces up to 2,500 bottles. The smaller 300 litre stills Prudence and Patience can produce up to 500 bottles each per run, with Patience currently being used to produce predominantly new products or for product development.



Explaining the reasons for specifying Fulton, Felix mentioned the ties with nearby Fuller's Brewery which uses Fulton's boilers in the brewing process. "Fulton are very well respected and, being a UK manufacturer, are very easy to deal with. We undertake our own water analysis every month but do have a service contract with Fulton, which visits the site every three months to conduct its own analysis and check the condition of the boiler and the system. This proved invaluable on one occasion when, between Fulton visits, we had dosed too much chemical into the feed water tank. However, Fulton was on hand, its technician was very helpful and offered the correct procedure for a solution."

The distillery gives female names to each of its stills and the first, Prudence (designed and built by Carl Distilleries near Stuttgart, Germany), originally used electricity to power elements in the steam jacket surrounding it. But, as Sipsmith's export market grew and production increased, the founders realised additional stills were required to meet demand. The company's second still, named Patience, is another 300 litre still that also used electric elements to heat the steam jacket. But it wasn't until a third and larger still – the 1,500 litre Constance – was required that the company decided to switch from an electrically-heated process to one using a steam boiler.

Commenting for Fulton, sales and marketing manager Doug Howarth says: "We visited Sipsmith Distillery when they were using German electrically-powered stills but wanted to install a gas-fired steam boiler for their new, larger premises. Our area manager discussed the specifications and options with them and an order was subsequently placed for a Fulton 20J vertical boiler and associated ancillaries. We continued to provide assistance and technical support throughout the installation and during commissioning."

As Doug goes on to explain, many craft breweries and distilleries start off using electric but, as they reach the right size and output, quickly move to

steam-based systems such as those from Fulton. "While electric systems can be quite efficient, they only heat the water required for the steam jacket, so are not as manageable or controllable as steam boiler based systems," says Doug.

Felix James, Head of Operations at Sipsmith Distillery says: "For us, the difference is the same as cooking using electric or gas. Prudence and Patience both used electric elements initially but, to control the water temperature, you could only switch on or off the four elements in the steam jacket. And then there would be a delayed response as it would take time to transfer the energy through to the stills. With steam, once it's turned down or off, the stills are very quick to shut down or respond to the temperature change."

He goes on to say that unlike 'big plant' distillation processes that can produce a spirit in less than two hours, each Sipsmith gin or vodka distilling process takes up to eight or nine hours to complete.

Steam from the Fulton 20J boiler is gradually introduced into the still's steam jacket until the alcoholic wash inside the still reaches 78.3 degrees centigrade, the boiling point of alcohol. As the wash boils and turns to vapour, it rises through the still's helmet and swan's neck before returning to liquid form in the condenser. After the initial

An additional benefit for the distillery is that all condensate from the boiler's steam raising process is returned to the feed tank to reduce energy and further improve the system's efficiency.

Looking to the future, Felix says that with the Fulton boiler only being used to raise steam at 0.7 bar for the process, there is plenty of scope for expansion when the time comes to further increase production capacity.

The eight models in Fulton's 'J' Series vertical boiler range can be supplied with gas, oil or dual-fuel burners, covers outputs from 96 to 960 kg/h and can raise its full steam output in just 20 minutes. Its simple design and robust construction makes them ideal for most brewing and distilling applications.

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## FOX MODEL FT1 GAS-SELECTX® FEATURE IMPROVEMENTS

MARINA, Calif.– 20 Jan 2016 - Fox Thermal Instruments announced the expansion of the Gas-SelectX® gas selection menu available on the award-winning Model FT1 Thermal Mass Flow Meter to include more pure gases: Air, Argon, Butane, Carbon Dioxide, Helium, Hydrogen, Methane, Natural Gas, Nitrogen, Oxygen, and Propane.

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## KING'S HIRE BOILERS JOIN THE NAVY

When facilities management specialists Interserve Defence needed temporary boilerplant for their major CHP project at HMS Drake in Plymouth dockyard, they contacted the UK's leading experts, King's Boiler Hire Ltd.

Interserve's project management team outlined their requirements of hiring a large MTHW boiler to supply heating and hot water whilst their new Energy from Waste Combined Heat and Power Facility was being commissioned at the Royal Navy's prestigious HMS Drake site.



Following technical discussions, King's Boiler Hire promptly delivered an 8MW MTHW boiler to the Plymouth site mid-September, ready for installation and commissioning.

Having a wide range of temporary boilers available and being able to react promptly and efficiently to any situation is what sets King's Boiler Hire apart and developed excellent long-term working relationships with companies such as Interserve.

Due to the high profile of this project, a documentary film crew followed the progress of King's temporary boiler unit from their Mildenhall, Suffolk base through to delivery and installation at H.M.S Drake. The documentary, which will be of interest to engineers and naval personnel alike, is expected to be broadcast early 2016.

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# New Ferrule Opti-Gard™ SoLo rupture disc from Elfab provides high performance pressure relief for ultra-low pressure hygienic applications

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Ferrule Opti-Gard™ SoLo enhances the existing Opti-Gard™ range, the most technically advanced rupture disc available on the market since its initial launch in 2003.

Ferrule Opti-Gard™ SoLo features a 95 per cent operating ratio and three per cent tolerance, providing the highest performance characteristics available on the market for hygienic and aseptic installations.

Available in a variety of sizes, and suitable with the

lowest burst pressure capability on the market, the design is non-fragmenting and capable of supporting vacuum and back pressures. The disc is for installation between tri-clamps and ferrules, and benefits from an uninterrupted surface finish to meet FDA approvals, making it ideal for use in CIP and SIP applications.

The unique design also includes an integral Flo-Tel™+ actuator as standard, offering the added benefit of non-invasive, ATEX- approved rupture detection through the Flo-Tel™+ system.



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## AirBench release VertEx Booth – High Efficiency Containment Booth

AirBench Ltd are pleased to announce the release of our new modular booth designed for attachment to the VertEx cross-draught system.

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The use of very high efficiency fans allows the complete booth installation to operate from low power supplies while achieving very high airflows. The booth shown in the above image is approximately 2.5m wide, 2.4m high, and 2.2m deep, and draws more than 20,000m<sup>3</sup>/h. This impressive air movement, and the associated booth lighting, all runs from a single 13a socket.

The fully modular construction allows for any width of booth to be delivered using standard components and VertEx base units.

The VertEx Booth is available with the full range of AirBench filters up to and including H12 HEPA filtration as required.

More information, including videos and datasheets, is available at [www.airbench.com/vertex](http://www.airbench.com/vertex). Contact us for an assessment of your dust issue or a demonstration of VertEx.

# TLV Website

## Online Resources For Steam & Other Fluid Systems

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TLV. A Steam Specialist Company

Products Steam Theory Training Corporate Profile

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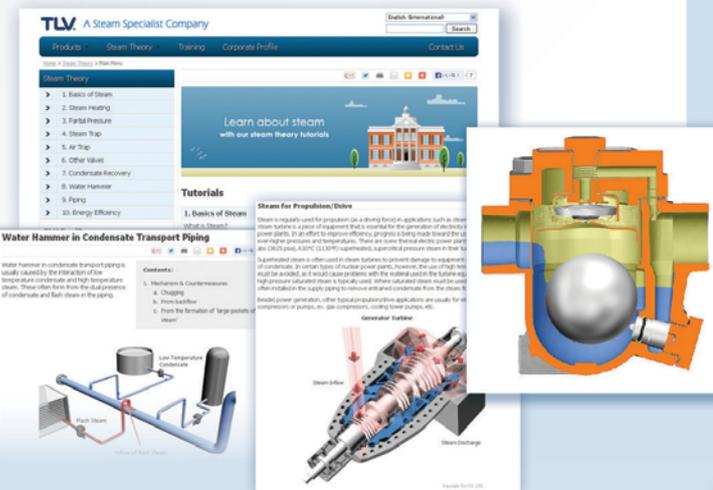


### 5 Latest News

- 2013/10/15 TLV introduces new steam solutions engineering app **New!**
- 2013/10/15 TLV Toolbox - Mobile App for Steam Engineers **New!**
- 2013/08/29 Condensate Recovery Piping
- 2013/06/26 COSPECT® - The Next Generation of Steam Pressure Control Equipment
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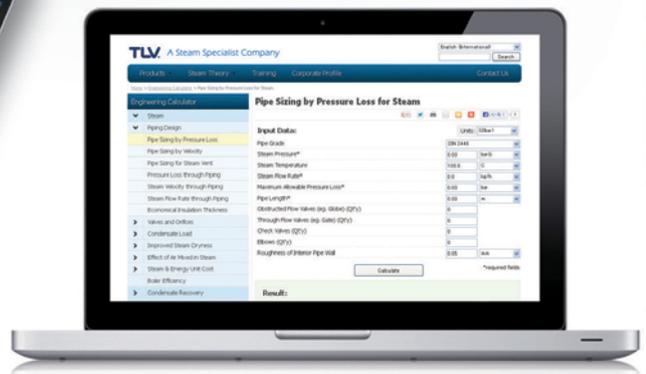


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# Top Ten Tips for the Industrial Trainer

## By John Saysell , Senior Trainer, MCP

MCP's technical training specialises in practical learning programmes for upskilling technicians and operators. UK Businesses now require a more flexible, multi-skilled workforce. In the past a mechanical fitter would need an electrician to disconnect a motor from a pump. Now with basic electrical skills, the fitter can recommission the motor and get the plant up and running quicker. MCP focuses on high frequency low risk tasks to make the most impact on the bottom line. These notes are offered in the interest of better training outcomes.



### Trainers Please Note!

Whether you are a team leader, a manager or a trainer, you have an interest in ensuring that training delivered to employees is effective. So often, employees return from the latest training course and it's back to "business as usual". In many cases, the training is either irrelevant to the organisation's real needs or there is too little connection made between the training and the workplace or even workstation!

In these instances, it does not matter whether the training is superbly and professionally presented. The disparity between the training and the

workplace just wastes resources (certainly not Lean!), resulting in mounting frustration and a growing cynicism about the benefits of training. You can turn around the wastage and worsening morale by following these Top Ten Tips on getting maximum impact from your training.

**1.** Make sure that the initial training needs analysis focuses first on what the learners will be required to do differently back in the workplace, and base the training content and exercises on this end objective. Many training programs concentrate solely on telling learners what they need to know, trying vainly to fill their heads with unimportant and irrelevant theory.

**2.** Integrate the training with workplace practice by getting managers and supervisors to brief learners before the program starts and to debrief each learner at the conclusion of the program. The debriefing session should include a discussion about how the learner plans to use the learning in their day-to-day work and what resources the learner requires to be able to do this.

**3.** Ensure that the start of each training session lets learners know the behavioural objectives of the programme. i.e. what the learners are expected to be able to do at the end of the training. Many session objectives that trainers write simply state what the session will cover or what the learner is expected to know. Knowing or being able to describe how someone should safely isolate an electrical supply is not the same as being able to safely isolate an electrical supply.

**4.** Make the training very practical. Remember, the objective is for learners to behave differently in the workplace. With possibly years spent working the old way, the new way will not come easily. Learners will need generous amounts of time to discuss and practice the new skills and will need lots of encouragement. Many actual training programs concentrate solely on cramming the maximum amount of information into the shortest possible class time, creating programs that are "nine miles long and one inch deep". The training environment is also a great place to embed the attitudes needed in the workplace. However, this requires time for the learners to raise and thrash out their concerns before the new skills are required. Give your learners the time to make the journey from the old way of thinking to the new.

**5.** With the pressure to have employees spend less time away from their workplace in training, it is just not possible to turn out fully equipped learners at

the end of one hour or one day or one week, except for the most basic of skills. In some cases, work quality and efficiency will drop following training as learners stumble in their first applications of the newly learned skills. Ensure that you build back-in-the-workplace coaching into the training program and give employees the workplace support they need to practice the new skills. A cost-effective means of doing this is to resource and train internal employees as trainers/coaches/assessors. You can also encourage peer networking through, for example, setting up user groups and organising “tool box” talks.

**6.** Bring the training room into the workplace through developing and installing on-the-job aids. These include checklists, reminder cards, process and diagnostic flow charts, training rigs and software templates.

**7.** If you are serious about imparting new skills and not just planning a “talking shop”, assess your participants during or at the end of the program. Make sure your assessments are realistic and genuinely test for the skills being taught. Nothing

concentrates participant’s minds more than them knowing that there are definite expectations around their level of performance following the training.

**8.** To avoid the back to “business as usual” syndrome, align the organisation’s reward systems with the expected behaviours. Planning to give positive encouragement is much more effective than planning sanctions if they don’t use the new skills back in the work place.

**9.** Conduct a post-course evaluation some time after the training to determine the extent to which participants are using the skills. This is typically done three to six months after the training has finished. You can have a vocationally qualified assessor observe the participants or survey participants’ managers on the application of each new skill. Let everyone know that you will be performing this evaluation from the start. This helps to engage team leaders and managers and avoids surprises later on.

**10.** Lastly, celebrate the success of the programme by getting senior managers to present certificates and awards for the initial training and later on for

demonstration of skills back in the workplace. For people who actually use the new skills back on the job, give them a gift voucher, crate of beer, bonus or an employee of the month award. Or you could reward them with interesting and challenging projects or make sure they are next in line for a promotion.

Organisations waste a lot of scarce resources in conducting ineffective training programs. Employee morale also suffers when employees see managers not really serious about instilling the new behaviours. By following the ten pointers above, you will have actively engaged managers in the training process and provided those all-important links between the training and the participant’s workplace. You can then sit back and enjoy the results; happy and effective employees.

For more information:

[www.mcpeurope.com](http://www.mcpeurope.com)

[training@mcpeurope.com](mailto:training@mcpeurope.com)

## Condition Monitoring Training

**SPM Academy trains executives, supervisors, production personnel and maintenance personnel who are involved in different ways in mechanical condition monitoring.**

SPM offers some of the world’s most efficient and simplest methods of condition monitoring on rotating machines. The SPM Academy provides the training that serves as an integrated part of the company’s approach to condition monitoring. The SPM Academy is thus a prerequisite for the SPM concept whose strategy is to enable your own personnel to carry out measurements, evaluate the results and make decisions.

SPM Academy trains executives, supervisors, production personnel and maintenance personnel who are involved in different ways in mechanical condition monitoring. The objective is to enable you to obtain the information that is critical to your production in plenty of time, so that you can avoid expensive production stoppages. SPM Academy offers standardized courses as well as customized training.

### SPM Academy courses offered:

#### Condition Monitoring Analyst

SPM Academy offers three levels of SPM certified training courses. The participant learns about shock pulse and vibration measurement techniques as well as general maintenance strategies. The certification is a proof of knowledge and capability in the certified area, and a useful merit for various jobs in industrial sectors. Most courses end with a written exam.

#### Accredited Vibration Analyst

SPM Academy offers three levels of Vibration Analysis training in compliance with ISO and conducts the test that can give the participant the

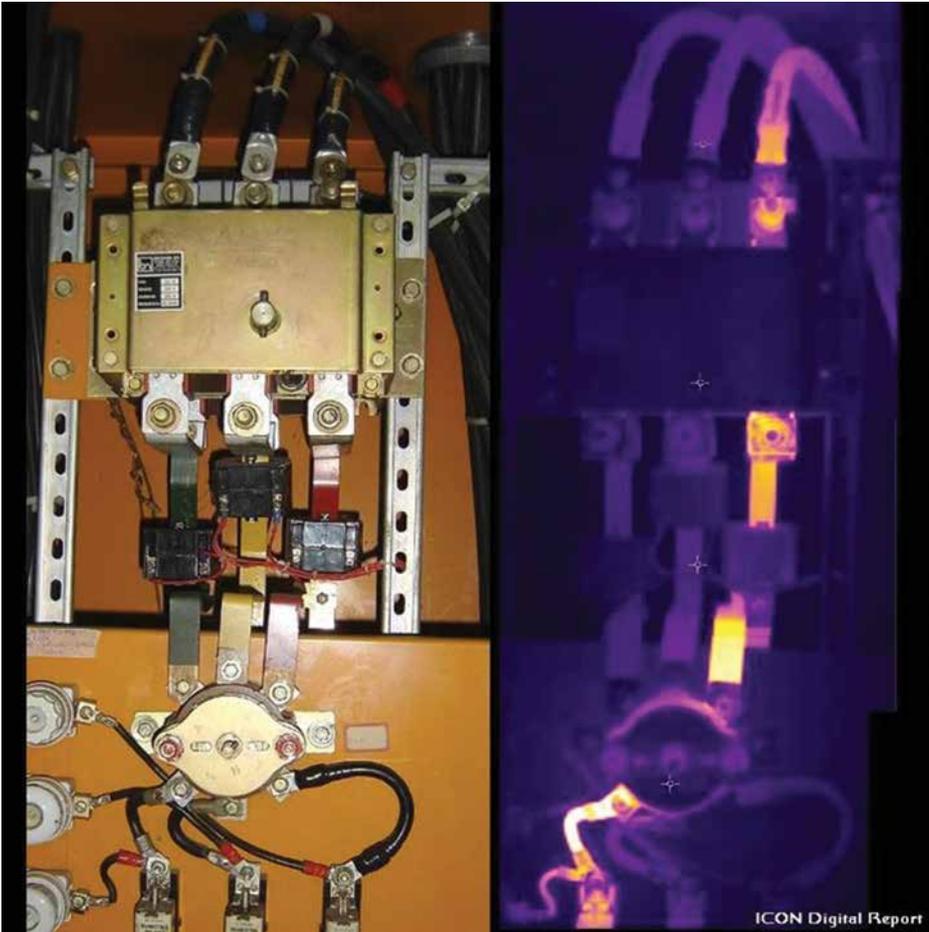


official ISO 18436-2 approval as Vibration Analyst. The certification is internationally recognized and is becoming a merit or even a demand for some types of jobs in industry and offshore.

For further information, please visit our website [www.spminstrument.co.uk](http://www.spminstrument.co.uk)

# SUCCESSFUL INFRARED THERMOGRAPHY – WHAT NOT TO DO!

Some suggest it can take years to become an expert in infrared (IR) imaging.



## Ignoring temperature measurements

While some thermographers want to set emissivity to 1.0 and do everything qualitatively, this isn't advisable. Again, FLIR knows of many instances where this tactic proved to be a failure. In one conspicuous example, a crimp on a VFD (variable frequency drive) was simply reported as 'hot' following an IR thermogram. However, had the user of the IR camera taken the time to measure the temperature each day against a pre-defined baseline, he or she would have seen that it was increasing.

Unfortunately, in this instance, the crimp failed before the manufacturer could replace it, incurring unnecessary downtime and cost. Put simply, part of the idea behind a baseline survey is to establish conditions 'today' that can be compared with past and future. Remember, temperatures are better comparisons than a subjective interpretation of a colour palette.

## Not assessing the risk

Any electrical connection showing heat can be deemed a failure; the question is, what type of failure: minor, intermediate or critical? The vital factor to consider here is risk, which can be defined as the probability to failure multiplied by the consequences.

The probability of component failure can be affected by: the operating temperature of the part and its environment; temperature rises; past operation history; individual experience of the thermographer; and the intuition of experienced repair people. In a similar vein, the consequences of failure can be based on everything from equipment damage, fire potential and personal injury, through to system shutdown, availability of parts and scheduling.

However, to get there a bit quicker, FLIR has identified 10 critical (and common) thermography pitfalls that are well worth avoiding in order to ensure the capture of successful thermograms: over-emphasising temperature measurements; ignoring temperature measurements; not assessing the risk; misidentifying parts; not being open-minded; not understanding the science; not understanding the limitations of IR; not understanding the capabilities of IR; over-reaching; and complacency.

## Over-emphasising temperature measurements

Qualitative thermography has a strong role to play in IR imaging success, such as knowing whether it's the temperature or the thermal pattern that's most

important. FLIR has encountered many examples of this over the years. A notable case involved a large, 45 kg battery that despite only being under the influence of an 85 mA trickle charge, was showing high heat. The thermographer was trying to measure the temperature, but in reality, there was no need as it was plain to see that the internal resistance was exceptionally high. In fact, the battery was almost a short circuit – if the breaker had closed it would have failed catastrophically.

An experienced thermographer knows when to spend time measuring temperature, and when not. This was a clear, near-critical failure that demanded immediate attention without the need for temperature measurements.

In short, a low probability of failure with low consequences will mean little more than a normal repair, while a high probability of failure with high consequences will demand immediate removal from service, with every other scenario between.

## Misidentifying parts

All professional thermographers need to make sure that their reports are checked sufficiently so that all components have been identified correctly.

Thermographers are often expected to take IR images of many different machines, systems and structures. No one can be an expert in them all, so it's easy to make mistakes. In the event of uncertainty, always ask.

## Not being open-minded

There's little doubt that taking IR images requires an open mind. Any thermographer who flashes their gaze across an image without proper care and attention will simply think there is nothing amiss and move on.

This can be a dangerous strategy. There is an amazing world of thermal things to find in every IR image. The advice is always take the time to look, and keep an open mind.

## Not understanding the science

According to FLIR, there are thousands of thermographers who know precious little about the science behind IR images – they simply take pictures. However, few would want to end up in court against an expert witness should something go wrong. A thermographer of this nature would be unable to defend their temperature measurements sufficiently.

By way of example, how many know that there are three sources of energy that reach the temperature detector: the camera's internal and external



optics (IR window); the atmosphere (distance, air temperature, humidity); and the target (emissivity and reflectivity)? All these must be considered to provide accurate temperature measurements.

Fewer still may be aware that emissivity is not always the most important property, such as when imaging furnace tubes where the target surface is lower than the T-reflective environment (due to T-reflective radiation). Put simply, understanding the science means the application becomes easy.

## Not understanding the limitations of IR

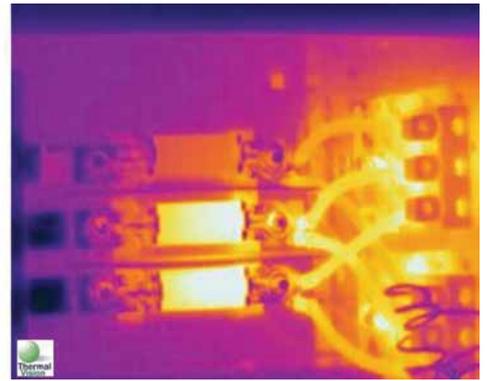
An IR camera can do many things but it cannot, for example, see through walls. In further examples, a bolometer detector used in many IR cameras cannot image a fast-moving object, while an InSb detector cannot easily image an object with a large temperature range.

Ultimately, it's important to define the measurement and imaging mission before selecting the best camera to use.

## Not understanding the capabilities of IR

Some IR cameras can target below 4  $\mu\text{m}$  in size, at over 2000 frames per second. At the other end of the scale, certain IR cameras offer the capability to view low Earth-orbiting satellites.

These are exciting times for the IR industry, where cameras have become far more affordable and software capability has soared. As a result, the list of



applications seems to grow constantly, particularly in industry and science. However...

## Over-reaching

IR cameras have been put to some questionable uses over the years. They have even been known to make appearances on so-called 'ghost hunter' television programmes.

Here, the user of the IR camera will see the colour of the room change, which they claim proves the presence of a ghost. The reality is of course somewhat different. Any experienced thermographer will be aware that this is simply the effect of bolometer-type camera drift witnessed frequently at near-ambient temperatures.

## Complacency

According to FLIR, no one should consider themselves a complete expert in IR imaging. Put simply, thermographers looking to guarantee their success and not their failure, must avoid becoming complacent, and instead become eager to learn more.

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Web Site: www.flir.com

# TalkTalk Invests In Electrical Failure Prevention And Personnel Safety

The telecommunications company, the TalkTalk Group, has appreciated the value of thermal imaging for many years.



The technology is used to detect electrical faults that could disrupt its network operation, although historically, thermal surveys were only conducted during maintenance shutdowns.

As a result, five years ago, IRISS industrial grade VPFR (viewing pane fixed reinforced) polymer infrared windows were fitted to the intake cabinets in the majority of the company's data centres. This made it possible for much more valuable measurement data to be acquired as thermal imaging could be conducted on live systems.

It also meant that this vital preventative maintenance work could be undertaken without compromising the safety of the electricians and thermographers. Elevated levels of PPE required for invasive surveys were no longer necessary, which in turn reduced survey time and associated costs.

The introduction of IRISS infrared windows has proved so valuable that this year a second wave of investment was authorised. Accordingly, IRISS re-surveyed all of the company's data centres and its recommendation was to fit custom, rectangular CAP-CT 24 windows in the main electrical cabinets and smaller CAP-CT 12 windows to the busbars at the base.

The IRISS CAP Series infrared windows are latest generation products that provide many technical and performance advantages. In common with all IRISS windows, the CAP Series is made from a durable

and fully impact resistant, grill-reinforced polymer that provides fixed and stable infrared transmission. Importantly, the window maintains an IP65 seal on the enclosure so inspection becomes a non-invasive task, eliminating the risk of arc flash.

The special polymer that IRISS uses in its infrared windows is also clear which means it provides TalkTalk engineers with the largest viewing area available. This allows assets to be monitored completely undisturbed in the visual, ultraviolet and all infrared spectrums.

Having decided on the product that met all criteria for performance, durability and safety the next hurdle was to establish the protocol for the installation of windows. Not only did the work need to be undertaken with the system fully operational, it also had to be completed during off-peak hours, between midnight and 6:00 AM. For IRISS however, this simply meant repeating the measures it adopted for another client, Stansted Airport.

## Proven protocol

At Stansted, there were identical restrictions and a conversation between the Airport's Engineering Compliance Manager and TalkTalk's Regional Data Centre Engineer, Gary Lyons, gave the telecommunications company every confidence in IRISS's capabilities. As with Stansted, IRISS used a fire-retardant covering board rated for 1000V to fold across exposed panel when the cover was

removed. This allowed IRISS engineers to install the infrared windows at speed and in safety. A vertical installation format was also agreed to minimise panel cutting time.

This formula has been successfully applied at the first of the TalkTalk data centres and will be repeated at a second site in the coming weeks. Ultimately, it is the company's intention to fit IRISS Electrical Maintenance Safety Devices (EMSDs) in all of its data centres, either by retrofitting them to existing switchgear or specifying them as part of any new build.

"These excellent IRISS Electrical Maintenance Safety Devices will now help to prevent any future failures as regular thermographic images can be taken and recorded," confirmed TalkTalk's Gary Lyons. "Their installation was carried out in a very professional and efficient way with no disruption to the electrical infrastructure within the data centre."

Ongoing investment in preventative maintenance is considered vital as TalkTalk cements its position as one of the UK's largest broadband and voice communications companies. Indeed it is central to the company's commitment to building a Next Generation Network on which it will expand coverage and develop innovative new products and services for its customers.

IRISS Ltd, Unit 2 Grafton Place, Montrose Road, Chelmsford, Essex, CM2 6TG  
Tel: +44 (0) 1245-399-713  
info-emea@iriss.com  
www.iriss.com

## New Fluke Connect® Assets makes preventive maintenance practices possible for all maintenance managers

Software and wireless test tools offer easy installation and setup while helping prevent equipment failure.

Unplanned downtime due to equipment failure can cost manufacturers up to three per cent of their revenue, according to the U.S. Federal Energy Management Program. Manual methods of tracking equipment health to predict failures are time consuming and prone to errors and incomplete data, while existing computerised maintenance management systems can be costly and complex and often require significant IT resources to implement.

Fluke Connect® Assets changes the way equipment maintenance is documented, reported, and managed.

Fluke Connect® Assets is a cloud-based wireless system of software and test tools that gives maintenance managers a comprehensive view of all critical equipment — including baseline, historical, and current test tool measurement data, current status, and past inspection data — enabling them to set up and sustain a preventive maintenance (PM) or condition-based maintenance (CBM) system easily with minimal investment.

It features the industry's only wireless one-step measurement transfer from more than 30 Fluke Connect wireless test tools, eliminating manual recording of measurements so maintenance managers can be more confident that the equipment history is accurate.

The system's features allow maintenance managers to analyse multiple types of predictive data (for example, electrical, vibration, infrared images) all in one program, side by side, in a visual format that enables easy scanning. In fact, it's the first software that allows you to compare multiple measurement types in one system, making it easy to see correlations and spot problems. This intuitive display of multiple measurements enhances the productive use of data and the ability to identify a problem, since each measurement type tests a different aspect of equipment health and together they present a more complete picture.

### Key features of Fluke Connect Assets include:

- Asset Health dashboard — is a hierarchy based overview of the status of all assets over time, with drill-downs to the individual asset record for



more details. This permits managers to identify anomalies or correlations across equipment.

- Asset Analysis — is a record for each piece of equipment that is the single source for all of its maintenance information. Managers and technicians can trend and compare thermal, electrical and vibration data over time for each piece of equipment in order to make optimal repair and replacement decisions.
- Asset Status dashboard — allows managers to quickly scan the most recent status updates for key assets so they can better monitor team and equipment activity.

Entire maintenance teams can capture and share data via their smartphones regardless of their location using AutoRecord™ to automatically record measurements from Fluke Connect wireless test tools, upload the data to Fluke Cloud™ storage and then assign it to a specific asset for sharing and analysis. Technicians can collaborate with their colleagues to discuss problems while sharing data and images in real time with ShareLive™ video calls, speeding up problem solving, decision-making and approvals.

With the Fluke Connect Assets system, maintenance managers and technicians generate more reliable data to make informed decisions about equipment health, reducing unexpected equipment downtime, improving costs, and enhancing the efficiency of their teams.

For more information on the Fluke Connect Assets, visit: [www.flukeconnect.co.uk](http://www.flukeconnect.co.uk)

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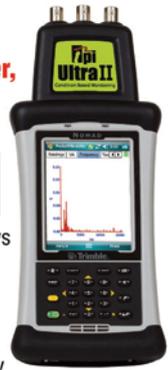
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- Includes high performance laser tachometer.
- Balances to user defined grades using easy-to-use balancing wizard.

\*An additional accelerometer A9012 needed for two plane balancer

[www.tpieurope.com](http://www.tpieurope.com)

## New Advanced Display Options For Sentry G3 Take Machinery Protection To A New Level

Condition monitoring specialists SENSONICS have introduced advanced display options for their successful Sentry G3 machinery protection monitor, the high performance signal conditioning unit.

The latest Sentry G3 system not only provides machine protection to the API670 standard it also offers an intuitive colour LCD display in each module to enable plant engineers to rapidly identify abnormal conditions and better manage the dynamic behaviour of their rotating plant.

The advanced features now include; Vibration, position and speed parameter trending facilities, including log and view of up to 60 days of data, 'look back' at trends and alarms, plus download data for further analysis in Excel.

In addition, it is now possible to directly view proximity probe gap and vibration transducer bias voltages, to verify correct transducer operation and calibration. A single view page for all warning, danger and health alarms provides rapid feedback on the complete module alarm status.

The G3 system offers excellent channel density with up to 24 measurement channels in a 3U format, also each channel can provide independent analogue outputs of current and voltage for DCS connection,

in addition to an alarm relay. Further alarm relay expansion is possible through connection to digital outputs at the rear of the module.

The system is designed for mounting in a custom 19" rack assembly which also contains a dual redundant power supply option.

Sentry G3 provides state-of-the-art protection for the following modes:

**Measurement** - Absolute bearing and relative shaft vibration, displacement and thrust position, speed, phase and reverse rotation, differential and casing expansion, rod drop and temperature.

**Turbine Specialist Measurement** - Shaft eccentricity, mark - space differential expansion, rotor to stator air gap.

**Flexible Configuration** - LPF, HPF, tracking and notch filters, programmable warning and danger alarms, cross channel voting, FTT, harmonic and phase analysis,



programmable transducer supply, scalable module hardware with plug-in DSP card, up to 4 channels, Dual redundant power supply, gateway communications module, USB programmable, alarm defeat and module park and calibration modes.

The additional features incorporated into the latest Sentry G3 system ensures more than just machine protection, providing a set of tools to assist plant engineers to optimise the control and management of their rotating plant.

Further details are available from: Russell King, Sensonics Ltd, Berkhamsted, Hertfordshire, UK.  
Tel: +44 (0) 1442 876833.  
Email: sales@sensonics.co.uk  
www.sensonics.co.uk

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**HDENV**

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# Fluke Thermography Seminars programme for 2016

Fluke, the global leader in portable electronic test and measurement technology, is offering a series of free Thermography Seminars as part of its programme of seminars for 2016 in the UK and Ireland.

Designed to look at the benefits of thermal imaging techniques to improve maintenance practices, the seminars are one element of the Fluke Academy programme which can be seen at <http://www.flukeacademy.shuttlepod.org/UK-seminars>

The seminars covering Thermography are designed to highlight how thermal imaging can be used to identify the presence of faults in equipment under normal working conditions, in new or existing installations. Each seminar will cover:

- The difference between a visual image and a thermal image
- What that difference means to be able to find latent electrical defects like bad connections
- An understanding of some limitations of thermal imaging
- An introduction to the common types of

electrical defects in High, Medium and Low voltage that can be detected with a thermal imager

- The benefits of thermal imaging for improving maintenance practices
- Tips and tricks on using a Fluke Thermal Imager to help detect electrical defects.

Other seminars in the Fluke Academy programme cover power quality improvement; one designed to help facilities reduce their energy costs; troubleshooting motors and drives to minimise plant downtime; calibrating and troubleshooting process instrumentation; and electrical testing.

The web page also provides access to webinars and webcasts that provide online training to obtain the maximum benefit in the application of thermal imagers, power quality meters and portable



oscilloscopes, as well as highlighting training courses with partner institutions.

Information about all Fluke products can be obtained via the Fluke web site at: [www.fluke.co.uk](http://www.fluke.co.uk).

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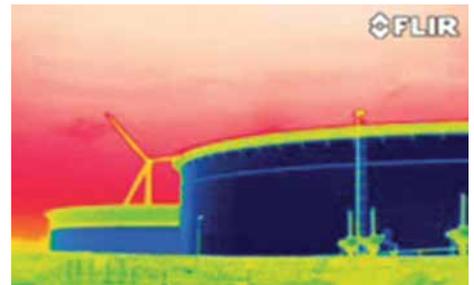
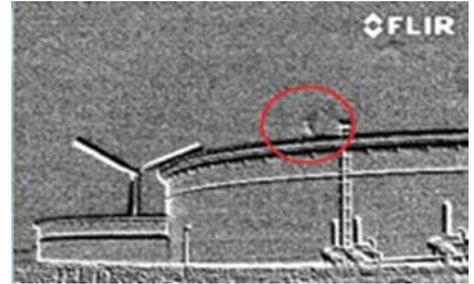
# High Sensitivity Gas Leak Detection

High Sensitivity Mode (HSM) is a technological innovation developed by FLIR Systems to enhance the leak detection performance of their GF-Series optical gas imaging cameras.

FLIR's proprietary High Sensitivity Mode is based upon an image subtraction video processing technique that effectively enhances the thermal sensitivity of the camera.

The HSM feature subtracts a percentage of individual pixel signals from frames in the video stream from the subsequent frames, thus enhancing the differences between frames, which make leaks stand out more clearly in the resulting images. Using the high sensitivity mode even the smallest of gas leaks can be spotted using a FLIR GF Series optical gas imaging (OGI) camera.

FLIR GF Series OGI camera's offer quick, non-contact measurement of gas leaks in real time. Where many other measuring instruments only present users with a number, GF Series OGI cameras present visual information, making the leak detection process more intuitive. Optical gas imaging cameras can also be used in hard-to-access locations, since they can detect small leaks from a distance. Unlike restricted point measurement provided by 'gas sniffers' a GF Series OGI camera allows you to detect gas leakage anywhere within the field of view of the camera. This speeds up the process of inspection for gas leaks considerably.



For further information please visit:  
[www.flir.co.uk/cs/display/?id=55758](http://www.flir.co.uk/cs/display/?id=55758)  
or contact FLIR Systems on +32-3665-5100  
or [gasimaging@flir.com](mailto:gasimaging@flir.com).

## Proven Strategies And Best Practices For Efficient Asset Management And Maintenance

An aligned approach to IT systems, asset strategy, and people and productivity has the power to profoundly impact operational and commercial success.

The T.A. Cook event "Maintenance Days Europe" is designed to reflect the latest challenges facing the global asset management community, with a user focused agenda that has been comprehensively researched with maintenance and asset management professionals.

Maintenance Days Europe will allow to explore global asset management strategies and best practices in implementing ISO 55000. Attendees will hear practical case studies on the optimisation and life extension of ageing assets as many global operators are working with (and trying to prolong the life of) ageing plants and equipment. With IT innovation offering increased asset visibility and efficiency, they will also learn about the latest IT trends, mobile condition assessment, data management, analytics, and more.

Over two information packed days, this event will feature case studies covering the strategically important areas

of asset strategy and asset intelligence management. Experts from a diverse range of process industry organisations like BASF, ENGIE E&P, GE Power, MOL, SABIC UK Petrochemicals, Tarmac and many more who will share best practice, challenges and lessons learned. For example, Sitech will explain how they use predictive analytics to improve plant performance. Transport for London will show how they have implemented an effective asset management strategy. GlaxoSmithKline will share their experience on successfully implementing a Reliability Based Maintenance Program. Abu Dhabi Oil Refinery will discuss how to use obsolescence as an opportunity to optimise and modernise assets through timely and in depth due diligence. Nowhere else will you have access to this level of experience and expertise, all in one place at one time.

This event is a unique platform to gain practical advice, ideas, and processes that organizations can implement



in their own working environment. Nowhere else will such a diverse range of strategic and technical topics be covered by practitioners. This is a great chance to network and share experiences with maintenance and asset management professionals from a diverse range of industries.

**Maintenance Days Europe will take place 1-2 March, 2016 in Birmingham, UK.**

Find out more at the event website:  
[www.tacook.com/maindayseurope](http://www.tacook.com/maindayseurope)

# COMPACT POINT OF USE DRYERS OFFER HIGH PERFORMANCE AND RELIABILITY

The Atacama range of adsorption dryers manufactured by Hi-line Industries Ltd have an established provenance for successful operation as 'point of use dryers' across a wide range of industrial and commercial applications, wherever there is a localised demand for the supply of clean, dry compressed air.



The Atacama products feature twin towers, each filled with desiccant, providing high performance coalescing pre-filtration combined with positive particle after-filtration. Only one single tower is on-line at a time, while a small amount of the dry, compressed air throughput is used to automatically regenerate desiccant in the second off-line tower. The change-over procedure is achieved under the well established PSA (Pressure Swing Adsorption) principle. High rates of reliability are achieved by top quality engineering design and the simple principle of positively driven valves, as opposed to less reliable 'shuttle valves' employed on cheaper lower quality dryers. An optional off-the-shelf centrifugal water separator is also available where required for the positive removal of extracted oil & water prior to adsorption. In addition, an energy saving dewpoint controller incorporating 'LED Dewpoint' display is also available as an optional extra to provide the most energy efficient drying cycle at all times.

Typical applications for the Atacama products include a wide range of general processing and packaging operations including medical, dental and food, which is complemented with industrial applications such as powder coating, printing, laser technology, plasma cutting, pneumatic controls and many other diverse general engineering fields.

The standard product range covers five models, accommodating flow rate volumes from 5 up to 100cfm of clean, dry air at variable dewpoints from 20°to -40°C. Lower dewpoint models down to -70°C can be supplied.

These compact, space saving design products can be supplied ex-stock as standard with 240V (4-16 bar) operation with 110V operation available upon request. Service kits and maintenance items are also available with the same off-shelf, next day delivery.

Further information is available from:

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# Prepare for the Spring Clean With a Nederman Industrial Vacuum Cleaner

Whilst buying a Vacuum Cleaner for your partner at Christmas can be construed as a dangerous act, buying one for your business is a great idea.

If you want to get your business ready for the Spring clean or your next visit from customers, auditors or even potential surprise visits from the HSE, your first port of call this season should be the Winter discount offer that Nederman has on some of its wide range of Industrial Vacuum Cleaners.

The Nederman line of Industrial Vacuum Cleaners

are a versatile range of products that can handle everything from dust and fume to granulate, grit, swarf, hazardous and even combustible materials, including contaminants that may be airborne on the floor or even laying on your plant and equipment. Whether you are using on-tool extraction, on-torch fume extraction, extraction via nozzles or just need to clean up your shop-floor, there is always a Nederman vacuum cleaner designed to fit your needs.

As part of the Winter promotion, Nederman is offering a heavily discounted price on three of its vacuum extraction systems. The smallest of the three machines is the Nederman 160E, which is suitable for dust, granulate and fume extraction and cleaning. As Nederman's smallest dust collector, this compact vacuum unit is ideal for on-torch welding extraction, on-tool extraction for small grinders & sanders and for industrial floor cleaning. With a maximum air flow of 160m<sup>3</sup>/hr, a weight of 19kg and a motor power of 1200W; the 160E is light-weight, easy to handle and it also offers low operating and maintenance costs.

For more robust applications, the mid-range 300E model is available. The 300E

is a robust and very manageable vacuum unit for extracting welding fumes, grinding dust and for general cleaning on construction sites, industrial and automotive workshops. With a maximum airflow of 300m<sup>3</sup>/hr and a maximum vacuum of 22kPa, the unit has a very powerful 2400W motor. At just 36kg, the 300E is lightweight and easy to manoeuvre with its four wheels and a width of just 600mm. The versatility of the 300E is highlighted by the wide selection of ancillary tools available such as brushes, nozzles and hose couplers that can all fit into the accessory box on the 300E model.

The largest machine in the Nederman Winter offer, is the 216E. The 216E is a very powerful dust collector for most extraction needs, regardless of whether its dry or hazardous materials. The 216E vacuum cleaner has cyclonic pre-separation and the filter system is enhanced with a cartridge separated by a protective plate. With a maximum air flow rate of 460m<sup>3</sup>/hr and a motor power of 2400W, the robust 69kg 216E is the vacuum cleaning unit for all your workshop needs. So, if you want to benefit from improved working conditions, improved quality and efficiency whilst enhancing the cleanliness and appearance of your business; please contact your local Nederman dealer before May 2016 when this seasonal promotional offer ends.



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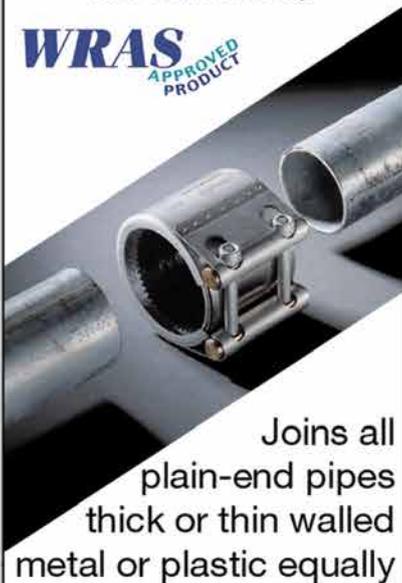
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