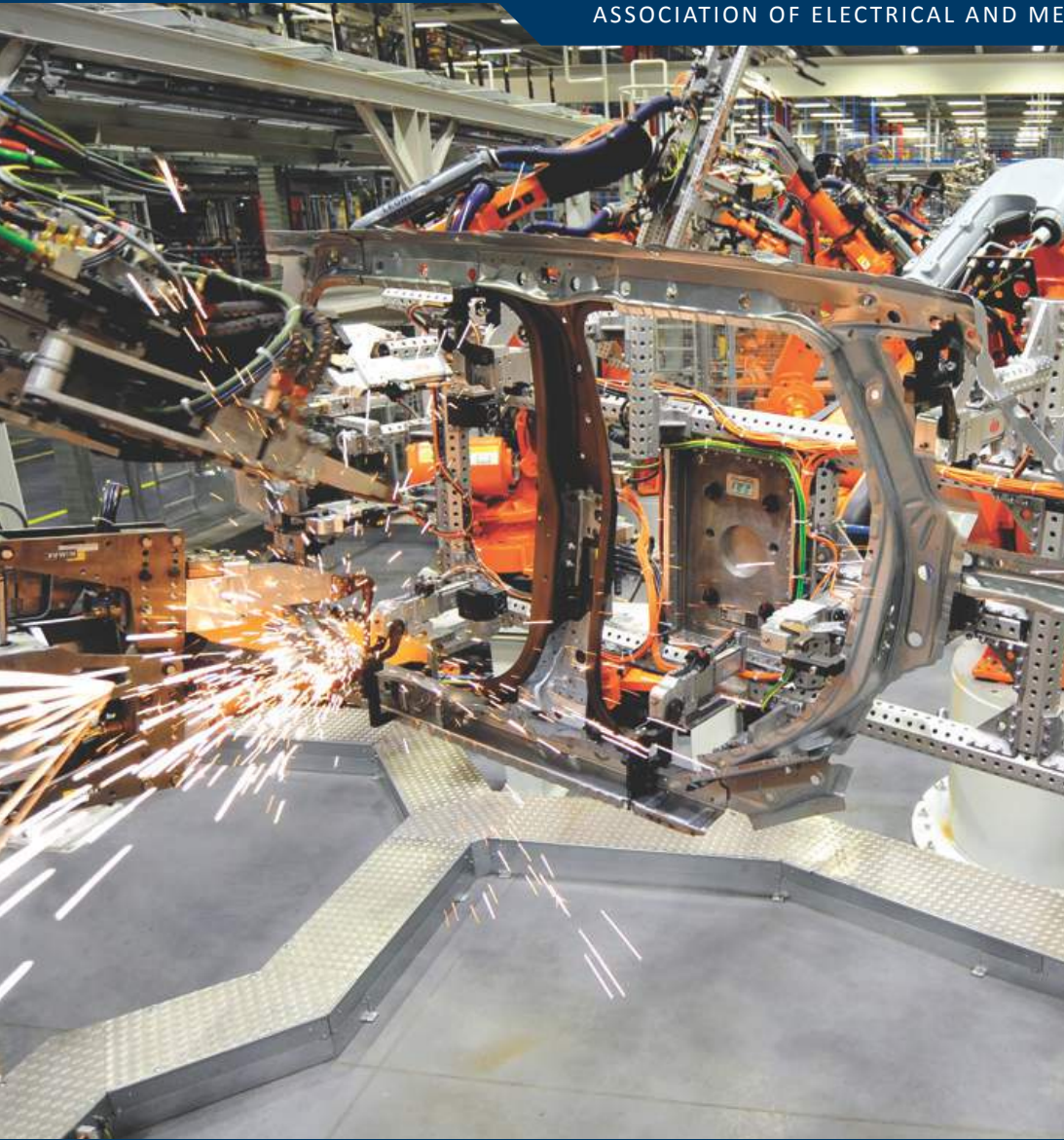


AEMT Journal

Volume 17 Issue 1 www.theaemt.com

ASSOCIATION OF ELECTRICAL AND MECHANICAL TRADES



INSIDE THIS ISSUE...

Maintaining Performance in Older Pumps

Siemens achieves breakthrough with 3D printed gas turbine blades

Launch of the inaugural AEMT Awards 2017

Brexit: Standards and compliance for hazardous area industries

Tackling the skills shortage in Engineering

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Journal

VOLUME 17 | ISSUE 1

Front cover photos:

1. Robots welding the side frame for the new 5-door MINI in Plant Oxford's bodyshop.
2. Apprentice Max fitting coils in the Bowers Electrical workshop.
3. Process and maintenance engineer reviews the pumping system design at Sulzer.

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AEMT COMMENT

Celebrating the Problem Solvers.

The real story behind the engineers and technicians of repair companies from around the world, is one of problem solving. AEMT Members are among the world's best when it comes to getting industry out of emergency situations. It's their skills, knowledge, experience, and intuition, which insures that power is generated, water flows, food is processed, and cars are manufactured.

These skilled people, busy working in the background, can often go unrecognised. This year the AEMT launches the first Awards ceremony to recognise these people and their organisations.

We also take a closer look at where these skills are developed, in the UK, and how they are changing for the better. Dr. Martin Killen of the AEMT takes a look at the skills shortage; Bowers Electrical stands up for the struggles a deaf apprentice has in getting through his apprenticeship; and Houghton International help a major railway company in the training of their apprentices.

Sulzer, and a new AEMT member Fixturlaser take a look at some technical aspects of repair. Sulzer pays great attention to details when balancing older pumps for efficiency. Fixturlaser looks at the technicalities of aligning two drives correctly.

Innovative in its time, Cragside House in Northumberland was pioneering in hydro-electric power. Recently, the National Trust has called upon engineers at WEG to provide the motor/generator for their new Archimedes screw power installation at the house.

Manufacturers of coil manufacturing tools and workshop equipment, Rotary, have gone through some changes, and celebrate the successful pickup of their new design language.

Siemens have made a breakthrough in 3D printing, which they feel will benefit both the manufacturing and repair industries – they have just completed testing on printed gas turbine blades.

The AEMT takes members on a tour of a cutting-edge manufacturing facility in Oxfordshire, the BMW MINI plant, where 1200 ABB robotic arms are assembling 3, 5 and 6 door MINIs.

Thomas Marks
Editor and Marketing Manager

INDEX

Maintaining Performance in Older Pumps is a Balancing Act	10
Advanced Machining and Coil Making Technologies at Rotary Engineering	17
Innovation at Cragside with hydro-electric power from WEG	20
Why Shaft Alignment – A Practical Reliability for Industry	29
Siemens achieves a breakthrough with 3D printed gas turbine blades.....	31
Brexit: Standards and compliance for hazardous area industries	34
Launch of the inaugural AEMT Awards 2017	36
Tackling the skills shortage in Engineering	38
Greater Anglia apprentices gain 'traction' with Houghton International	39
Deaf apprentice starts at Bowers Electricals	40
Members Event: BMW MINI Plant Visit	42

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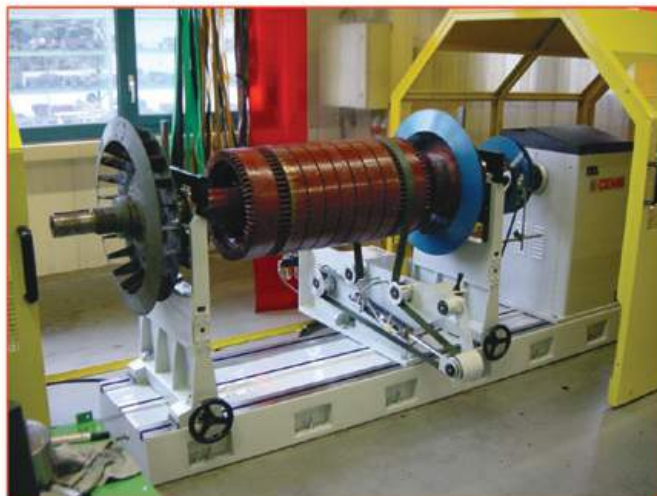
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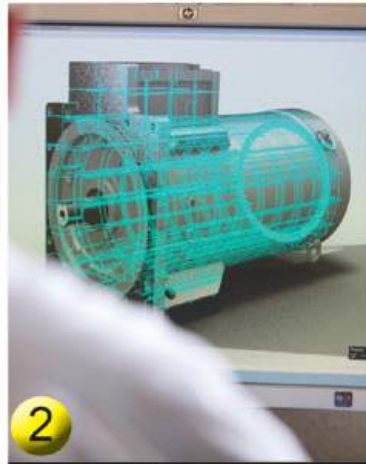
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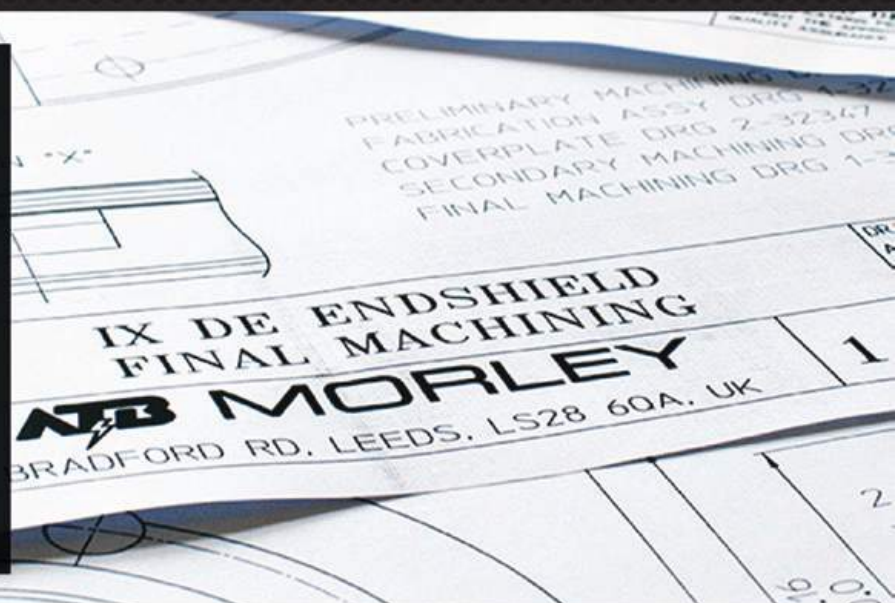
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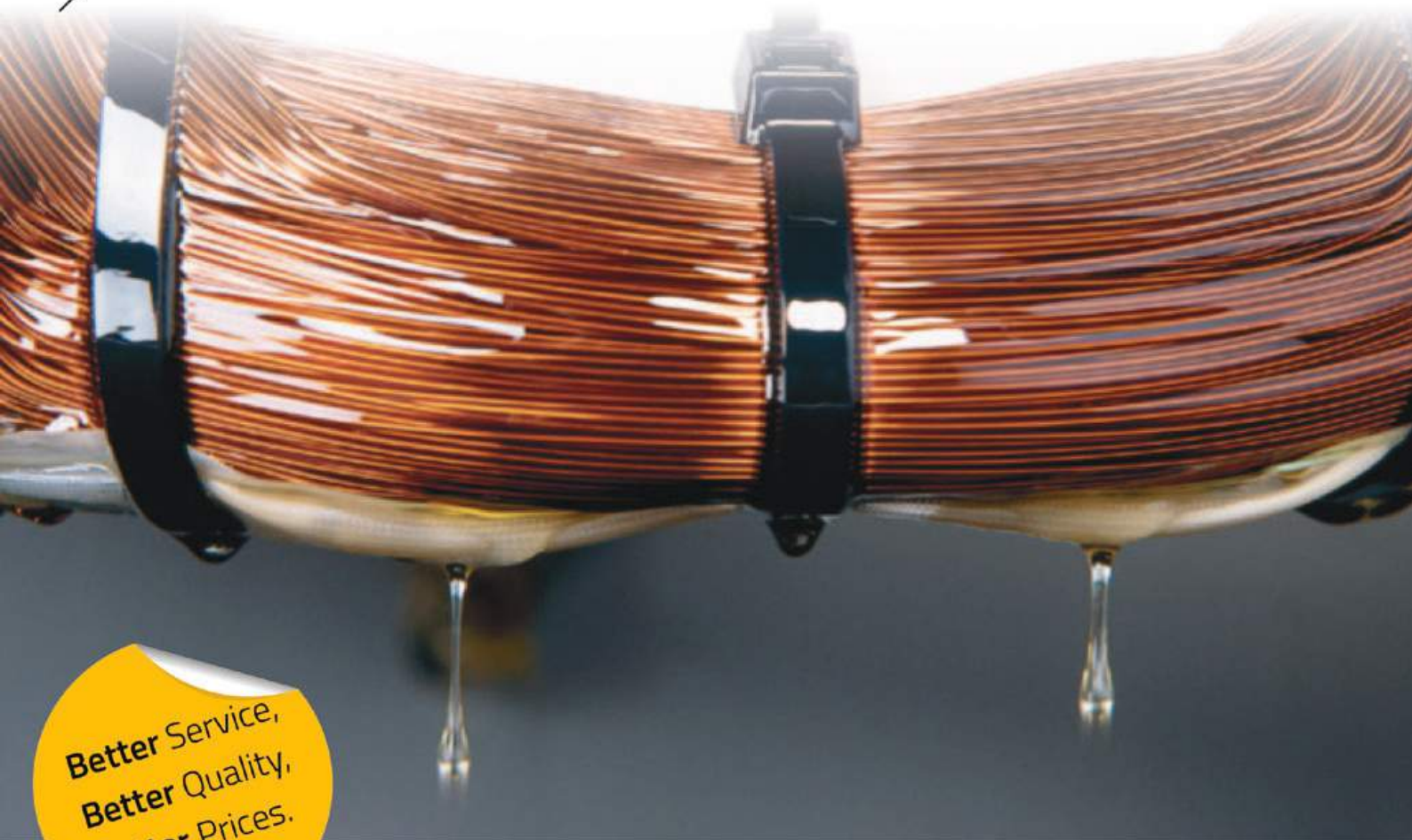
- Malcolm Grogan, Scottish & Southern Energy

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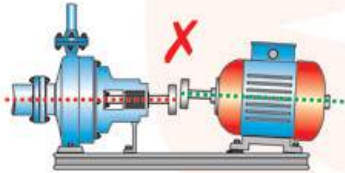
Stats show that poor shaft alignment accounts for as much as 50% of rotating plant failure.

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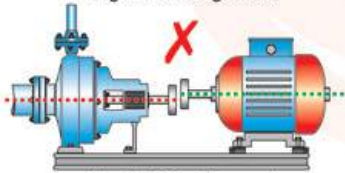
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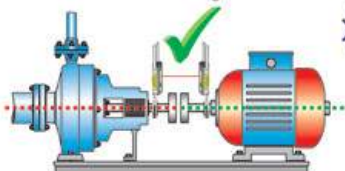
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The refurbishment process requires attention to detail for the best results

Maintaining Performance in Older Pumps is a Balancing Act

Pumping applications account for more than 20% of global electric motor energy consumption and conscientious plant owners have been trying to maximize the efficiency of this equipment for many years. This task is made more difficult for older equipment for which the full specification data is no longer available or has been reappropriated for a new task.



Process and maintenance engineers should review the pumping system design in the event of a process change.

system curve. The pump duty point (design point) is only one point on that system curve.

As operating conditions evolve over time, so the pumping application demands also change, this can include a change in flow, media characteristics or duty. However, just because a pump is capable of operating on the outer edges of the system curve does not mean that there will not be consequences in terms of performance or reliability.

For this reason, manufacturers establish the minimum operating flow as well as listing all of the limiting design conditions, such as net positive suction head required (NPSHR), maximum flow and others. It is important to understand the consequences of dialing back pump

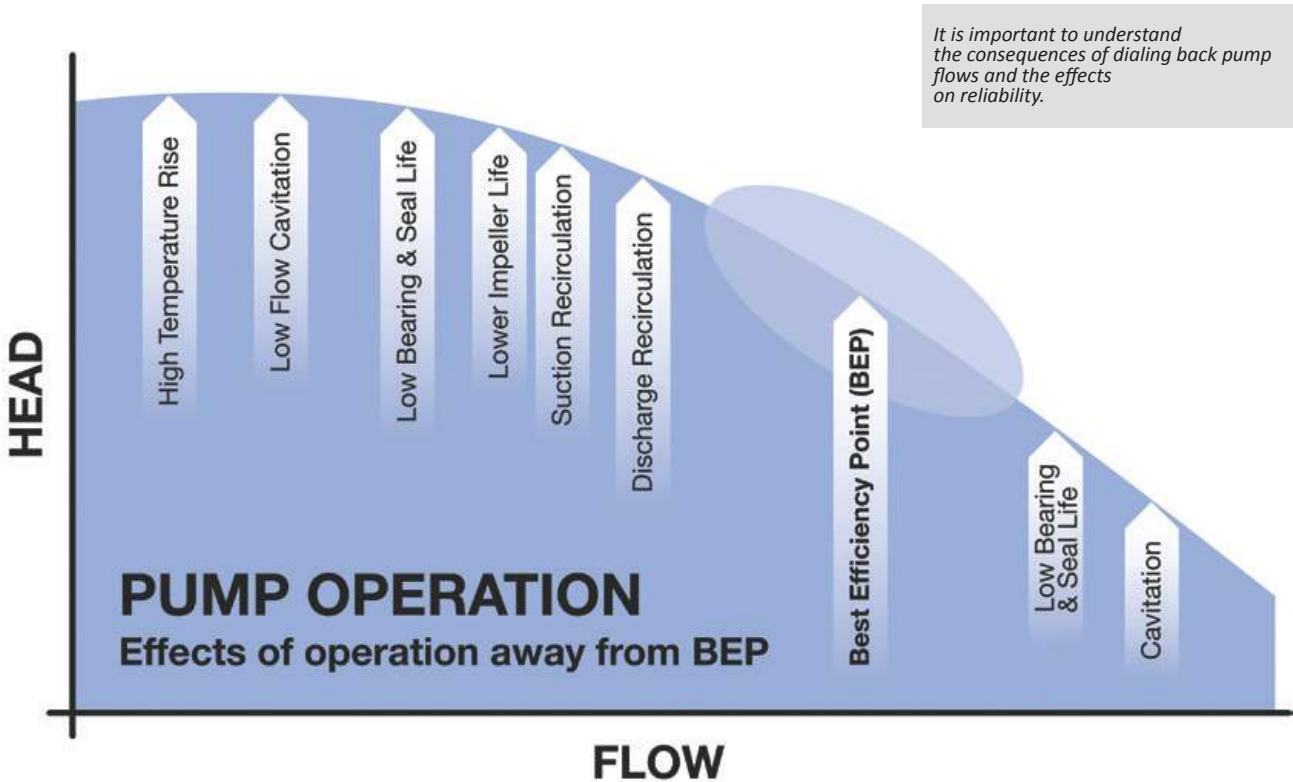
flows which means measuring the operating conditions and calculating the point at which the pump will be operating on the system curve.

This can be illustrated by a recent repair project that was completed by one of Sulzer's service centres. A multi-stage boiler feed pump was brought in for repair and it was immediately clear that the pump had suffered some severe damage. An initial inspection showed that the suction-side seal, several impellers, sleeves and stationary components had been destroyed. The evidence indicated that the pump had been operated at or near shutoff flow. When a pump operates in a boiler feed system, iron oxide deposits are often found in the casing. In this case the deposits were absent in the first

Jerry Ruc, experienced field engineer with Sulzer, looks at some common causes of poor performance and suggests methods of improving efficiency.

Many of the pumps that are in operation today were built in the 1960's and 70's, which is a testament to the original design and the skill of matching the pump to the operating demands of the application. A properly specified pump will operate reliably for decades, with only a minimum of repairs needed. It is essential that designers match the conditions that encompass the entire system, typically referred to as the

As operating conditions evolve over time, so the pumping application demands also change, this can include a change in flow, media characteristics or duty. However, just because a pump is capable of operating on the outer edges of the system curve does not mean that there will not be consequences in terms of performance or reliability.



three stages of the pump but intact on the latter stages. This indicated that the pump had experienced a condition where the input energy from the impellers had turned the water to steam before it had a chance to exit the pump. The creation of steam in a pump is a violent condition which induces considerable vibrations and can lead to surface erosion.

Normally, the frictional losses in a pump are converted to a few degrees of heat and discharged out in the water flow. With very low or no flow, this energy builds up in the pump and eventually the heat input to the liquid builds to an amount that surpasses its vapour pressure and it becomes two phases –

liquid and gas. As the input of energy increases the liquid heats to the point of transformation and turns completely into the gas phase.

Operating a pump under these circumstances is clearly inefficient and steps should be taken to properly assess the minimum flow requirements of an installation, along with remedial work to indicate when this condition is not being met. In this way pump performance and reliability will be improved.

The possible causes of the pump failure in this example were reviewed with the plant owner who was keen to avoid similar cases in the future. A number of issues were highlighted including a

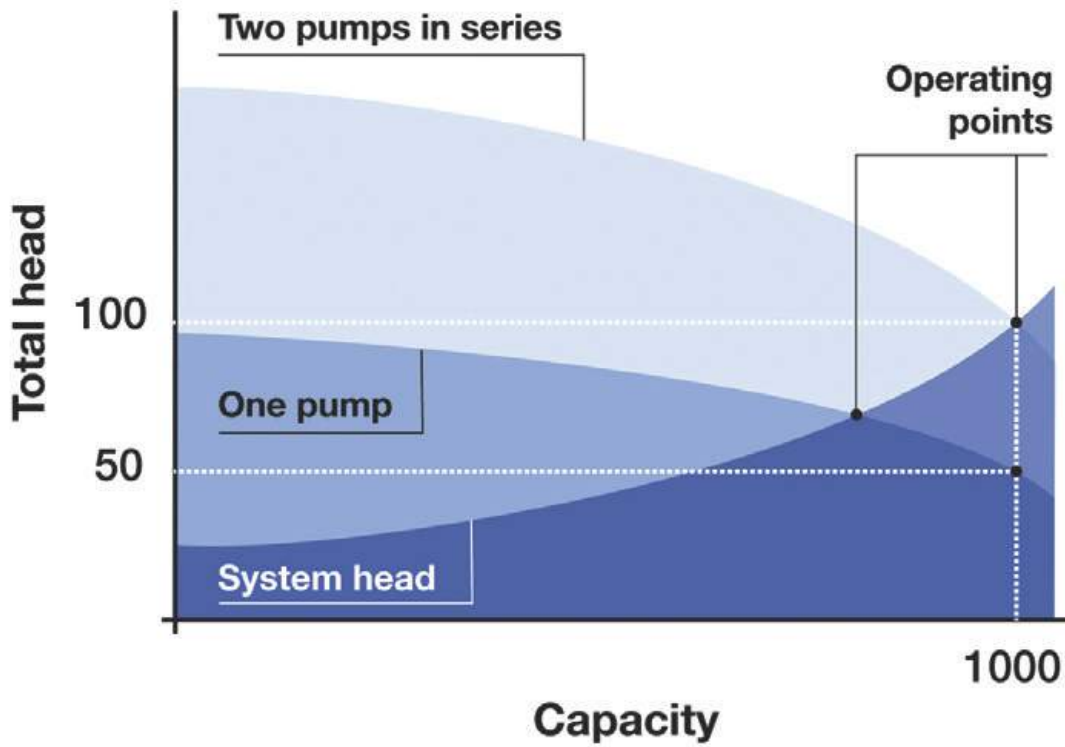
misunderstanding about the required flow rate of the pump. Predominantly, the plant bases calculations on steam rates so these were converted to water flows and plotted on the pump operating curve. This established that the pump was not only operating close to the minimum flow point but its pump operating curve was fairly flat at the lower flow region.

To make matters worse, the failed pump discharges into a header, along with other, similar pumps; this creates a parallel pumping system that is designed to increase system flow. The balancing act of a parallel operating system is to ensure that each pump is operating equally in terms of the flow. The main control valve will provide the necessary back pressure to locate the pumps on their curves but this works with the assumption of equal conditions at the suction point. After all, a centrifugal pump is a differential pressure device, meaning a lower suction will deliver lower discharge pressure, which will position the pump on a slightly different point of its curve.

The pumps automatically adjust their flow output to match the back pressure with the more / less pressure differences in piping and suction delivery to each,

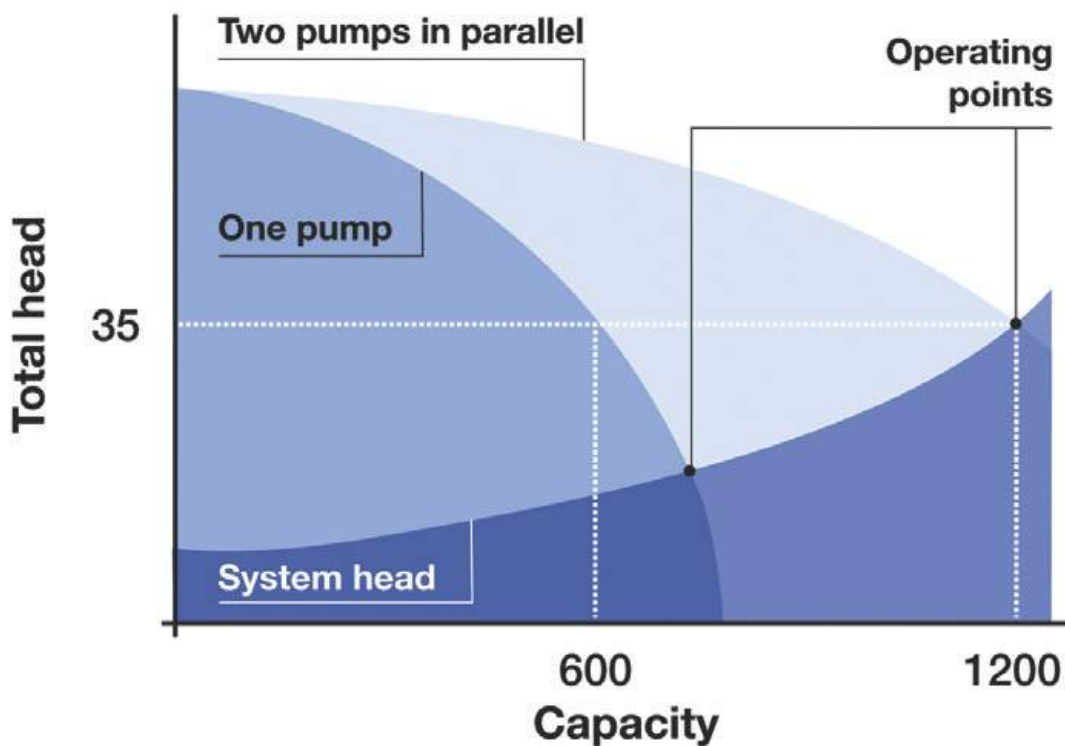
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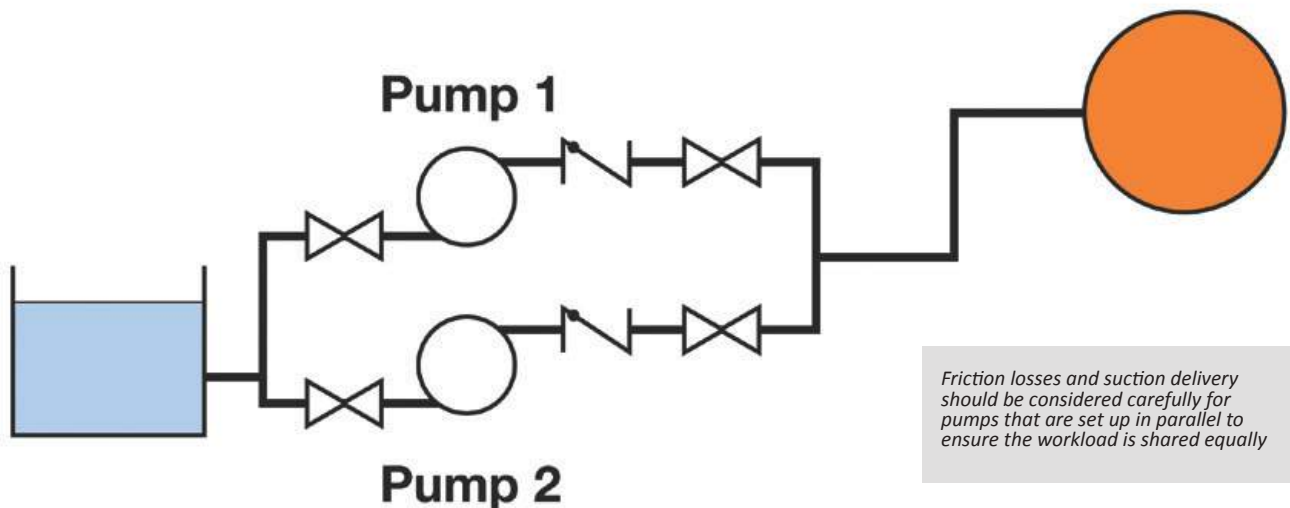
Pumps operating in series



Pumps are arranged in series to increase the total head of the system, while pumps in parallel increase flow.

Pumps operating in parallel





such that the total resistance at the junction of the two on the discharge is equal. Typically, the small differences are fairly easily tolerated by the pump. The problem comes when the required operating point changes and is pushed back on the curve, closer to the flat portion of the curve.

At this point the 'weaker pump' can be pushed back into the unstable operating region. This pump is perceived as weaker for any number of reasons such as lower suction pressure and flow, greater discharge piping restriction and certainly the wear of the internal clearances which affect the efficiency. For this reason many reliability engineers trend their equipment by position, serial number, operating hours and number of starts among other factors. Their focus is to ensure the pumps are equal in the system and that one will not have an advantage over any other.

The key to a successful parallel pumping

system is to use pumps with the same shaped characteristic curve and to ensure identical operating environments for each of the pumps. This is best achieved by using the same model pump with identical impeller trims, and both set mechanically to the same OEM standards, including the internal wear parts and design clearances.

By using the same suction source for each pump, the suction pressure at the entry points will be the same. The suction pipe should have the same line size and length to each pump, while the valves should also be the same size and type. This way the friction losses are then equal for each pump.

Having addressed the suction side, the discharge pipe needs to increase to full-line size as soon as possible after the pump and if possible the discharge pipes should be symmetrical from the pumps to the point at which the lines rejoin. Finally, one essential aspect that

is often overlooked is the minimum flow line, which should be required for each pump. This ensures that the minimum flow condition is always satisfied, protecting the pump from overheating and subsequent damage.

Many industrial processes utilize a variety of pump designs, often from several different manufacturers and so achieving a comprehensive performance review of the installation can be difficult.

It is essential that process and maintenance engineers review the pumping system design in the event of a process change to ensure that it remains suitable under the new operating conditions. Pump manufacturers and specialist maintenance providers, such as Sulzer, are able to provide detailed information on existing pumps and make modifications to current systems to deliver maximum performance and reliability.

Furthermore, expert advice from experienced pump engineers can help operators to maximize the flexibility of the system and ensure continued service for many years to come. ■

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When a pump operates in a boiler feed system, iron oxide deposits are often found in the casing

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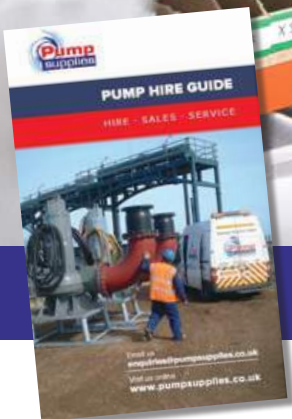
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Jane Green (Finance Director) and Simon Swallow (Managing Director)

Advanced Machining and Coil Making Technologies Drive Growth at Rotary Engineering

New technology and changes in key positions are helping fuel the growth of Rotary Engineering.

Simon Swallow is well known to many AEMT members and customers around the world in the role as Engineering Director. With the recent retirement of Robert Fennell, Simon has now taken over the role of Managing Director. Simon's new role is still very much at the forefront of the business, maintaining contact with key customers and trade associations and still backed by a great team of engineers.

Simon explained "Robert and I have worked closely and successfully in running Rotary Engineering together for a long time, his retirement and the

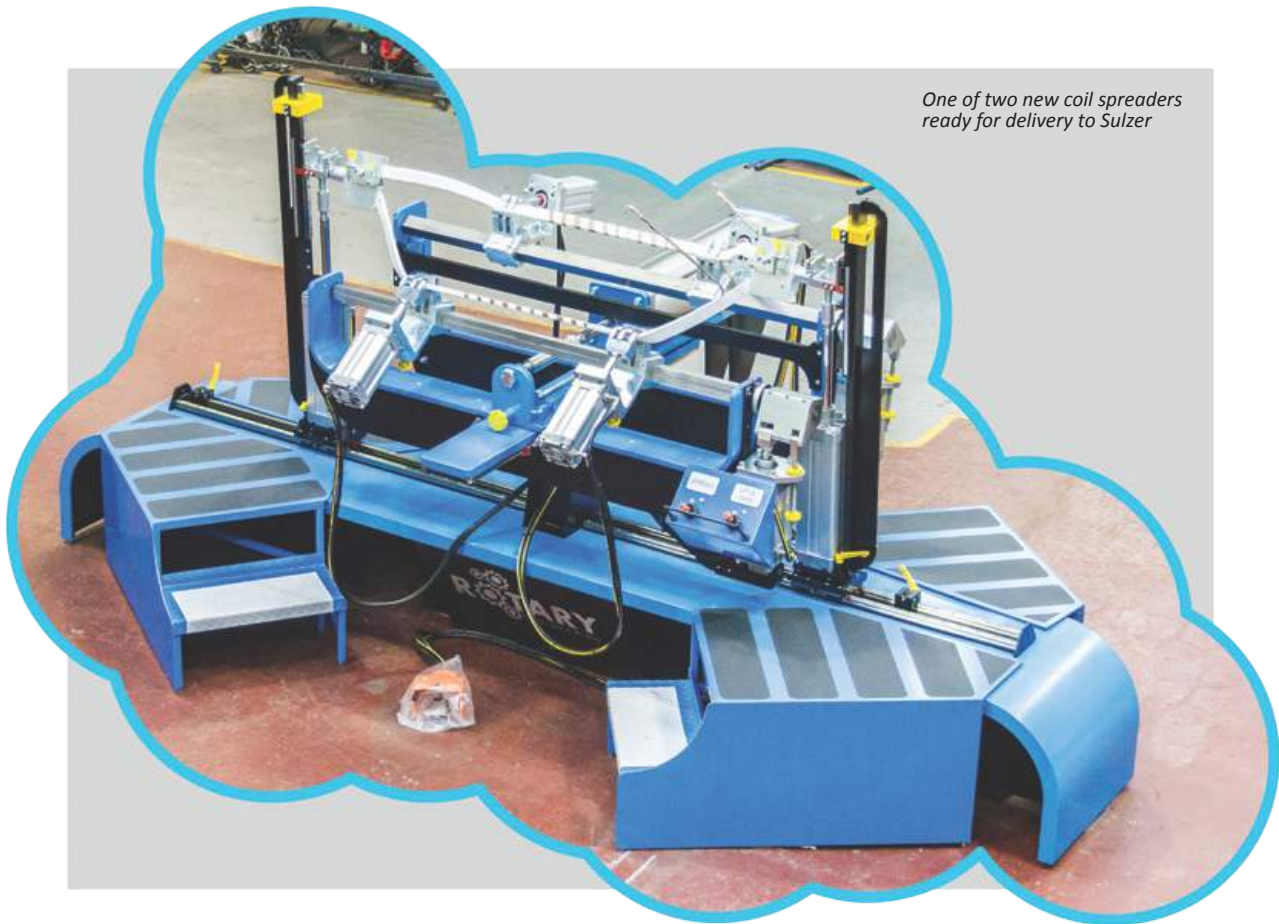
smoothly implemented succession plan has been slowly phased in during the last few years."

The financial and operational side of the business is managed by Jane Green. Jane is a Chartered Management Accountant with a background in manufacturing and has been with Rotary since 2011. Jane has now been appointed as Finance Director and has a more strategic role in the business since Robert's retirement.

So what will change, now that Simon and Jane have taken over? "The direction the company takes was defined before

the change in directorships. Rotary will continue focusing on the core areas of business such as coil manufacturing machines, workshop equipment, and magnet repairs" explains Simon. "and recently there has been further development work on our equipment, including spreaders for wind turbine coils."

Two years ago, Rotary employed the services of Fripp Industrial Design consultants to develop a new product design language (see Journal Vol 15-1 p35). Since they launched the first Coil Spreader, with its aesthetic blue



One of two new coil spreaders ready for delivery to Sulzer

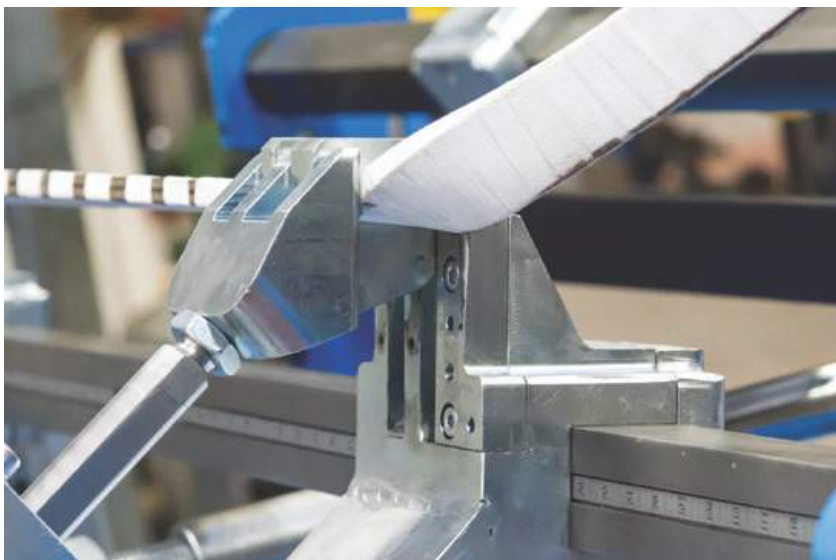
curves, engineering improvements, and functional colour coding, Rotary's workshop and coil making equipment has become very popular. Most of Rotary's coil manufacturing and motor rewind equipment has been updated and the team work closely with trusted customers to develop the right solution for every application.

CNC Machine

One of Simon and Jane's most coveted acquisitions is a new Fanuc Robodrill CNC milling machine. The technology enables the company to bring many jobs in house, saving time, cost, and most of all, offering customers a quicker, more bespoke offering.

Simon explains, "the CNC machine vastly improves our service offering and has given our team a new training opportunity which they have thoroughly enjoyed."

Taking a close up look at two brand new spreaders sitting on the workshop floor, ready for their customer Sulzer to pick up; Simon pointed out some of the pieces that the milling machine had created. The fingers, which help spread the coils, were machined from solid pieces of metal in a complex 3D shape. As a result Rotary were easily able to respond quickly to the customer requirement for interchangeable fingers with different radii for different coil geometries.



The bespoke fingers on the coil spreader created with the new CNC milling machine.

Coil Specialists

Rotary recently developed a coil spreader for permanent magnet generator wind turbine coils. The coil spreader has had to deal with the complexity of the coils desired for permanent magnet machines including complex geometry, tight angles and tough loops. Rotary's flexibility and



Simon Swallow shows off the new CNC milling machine at Rotary Engineering.

"the CNC machine vastly improves our service offering and has given our team a new training opportunity which they have thoroughly enjoyed"

approach to customers' needs mean they can respond effectively to new challenges and deliver equipment that is right for the job.

Coil pressing technology has also been enhanced. Working with customers and insulation suppliers the Rotary range of Coil Presses now feature PLC controls, data logging and dual press facility for the most efficient use of this critical item of plant. Repeatability and control are

also enhanced enabling recording of the pressing cycle for future use and data output for quality assurance.

Rotary still manufacture in Sheffield to the same exacting standards, everything is built in house, to order to match specific requirements and visitors are always welcome.

If you are interested in knowing more about the new range of machines please

get in touch with Simon Swallow and arrange to visit their headquarters in Sheffield, UK.

Do take the opportunity to visit their website where Rotary have diligently been uploading product videos. www.rotary.co.uk

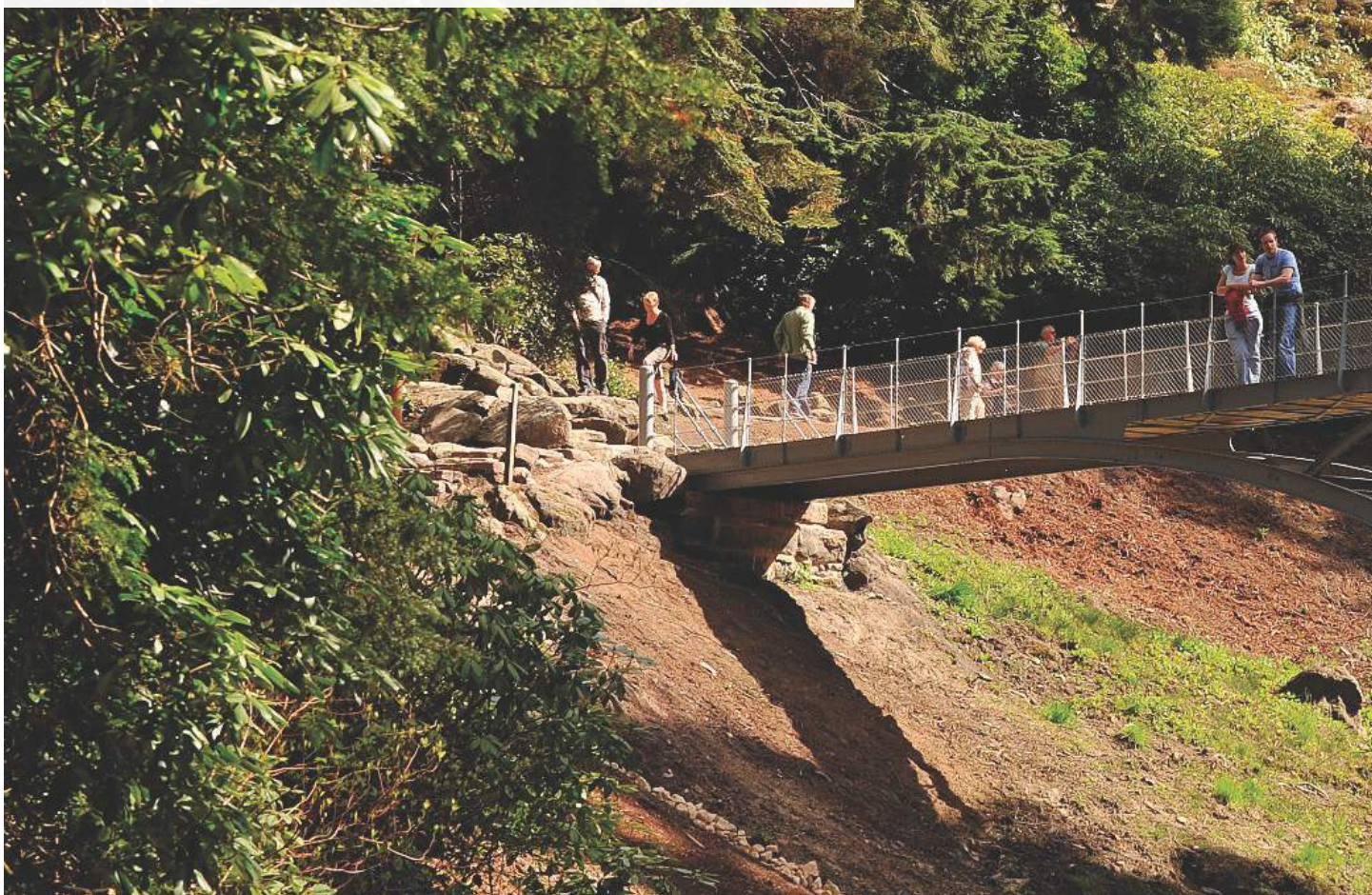
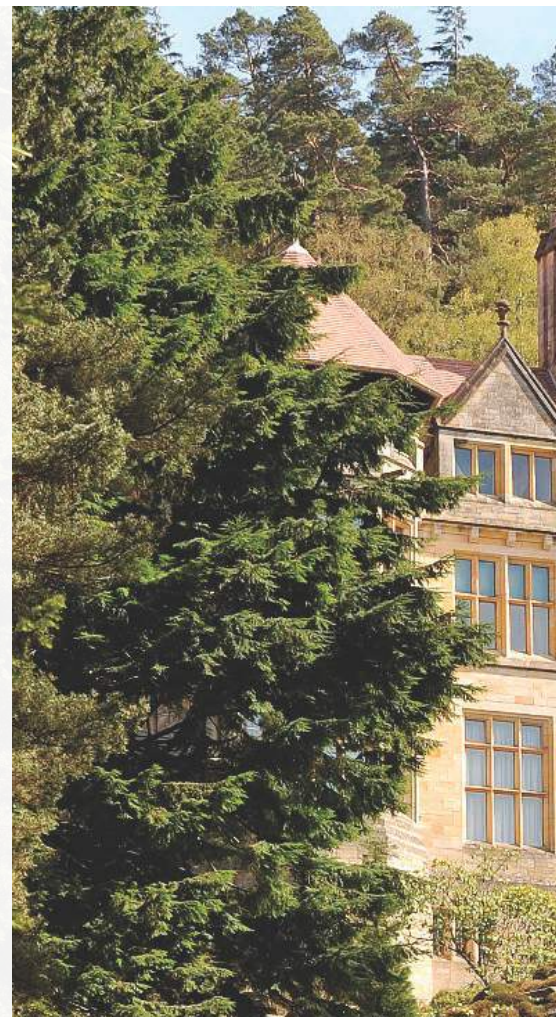
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A coil winding machine with the new design language. Rotary provide a full range of workshop equipment also.



Innovation at Cragside with hydro-electric power from WEG

Built in the 1800s by Victorian engineer and Inventor William Armstrong, Cragside is credited as being the first house to be lit with hydro-electricity - and over 100 years later it is generating green electricity again from water power thanks to a WEG W22 high efficiency electric AC motor / generator.



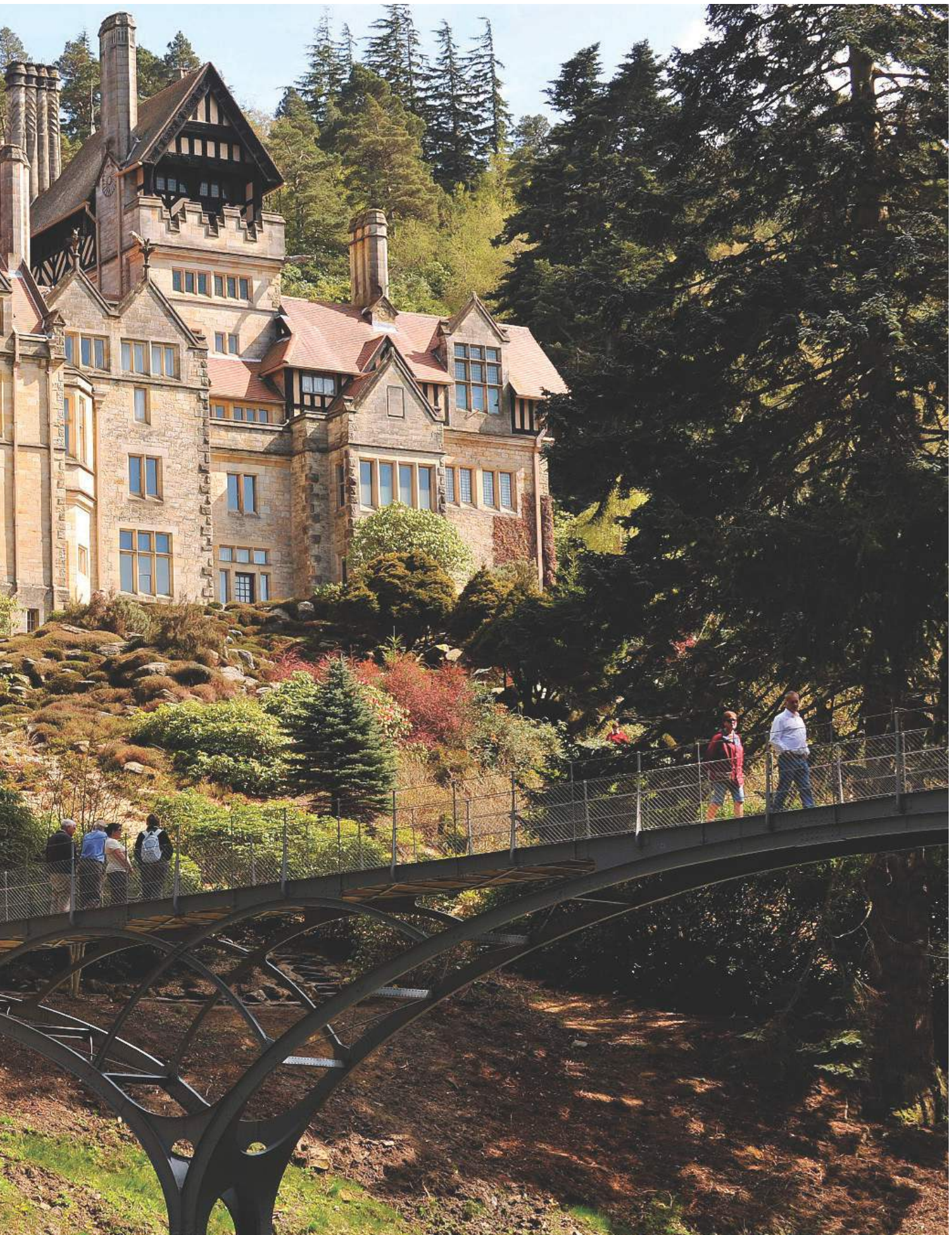


Photo: The National Trust

Positioned on the main entrance drive, the Archimedes screw generator is easily viewable to the visitors. Supplied by the Tumbleton lake, it can run all day when visitors are touring. Hydro-electricity is popular in some of the other mountainous properties managed by the National Trust where it is more viable as a green power source.



An Archimedes screw, although ancient in principle, is actually a very efficient way of generating power when you have a large volume or flow of water, but low head.

William Armstrong was one of the most prominent industrialists of his age, pioneering the use of pressurised water to power hydraulic equipment such as dockside cranes; after which he went on to introduce breach loading field artillery guns and many other engineering marvels. Towards the latter part of his career he showed a visionary attitude towards reducing dependency on fossil fuels and the need for developing renewable power sources.

Putting his money where his mouth was, he and his wife Margaret created the Cragside estate, north of Newcastle in Northumberland, there they famously planted seven million trees over an area of over 1,700 acres, together with five artificial lakes that were used to generate hydro-electricity. This innovation made Cragside the first documented house in the world to have been lit by hydro-electricity, using incandescent lamps provided by fellow inventor Joseph Swan.

As the first engineer and scientist to join the House of Lords, William Armstrong left a career legacy as well as his spectacular house, now run by the National Trust. The house contains many gadgets that would have been revolutionary in their day, including hydraulically powered lifts, dishwashers and cooking spits. Re-introducing one of the most famous, the hydro-electric power generation, has been achieved thanks to a WEG motor/generator installed as part of the new Archimedes screw power installation.



The Archimedes screw was switched on by actor, Robson Green

An Archimedes screw generator was chosen because the team was looking for a generator that would work efficiently with a low head of water. An Archimedes design is ideal because it does not require water pressure to operate, just water flow and a head – which is provided by one of the manmade lakes created for exactly this purpose. The lighting for the entire house can now be powered using the flange mounted high efficiency 18.5 kW rated WEG W22 IE3 electric motor.

An Archimedes design is ideal because it does not require water pressure to operate, just water flow and a head – which is provided by one of the manmade lakes created for exactly this purpose.



The lighting for the entire house can now be powered using the high efficiency WEG IE3 electric motor driven over-speed as a generator.



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Robin Wright, a Cragside Engineer, also shares a passion for all things mechanical, commenting on the installation he said, "I think he [Lord Armstrong] would be delighted with the new hydro-power installation, he was an innovative thinker and loved anything that used water to make power, he also made comments about coal lasting two hundred years and solar power being something for future generations to exploit, so a bit of a visionary."

Phil Hall, Sales Engineer from WEG commented, "In most modern Archimedes screw generator applications there tends to be some inertia within the system – this can be due to the physical size of the screws or the use of a gear reduction stage. Employing a motor is helpful in this instance as the motor can be used to drive the screw until it reaches operational speed and the water flow takes over. Once the water is pushing the screw, then the motor is disconnected from operation as a motor and is mechanically driven overspeed,

i.e. over its synchronous speed in order to generate power.

"The system, although ancient in principle, is actually a very efficient way of generating power when you have a larger volume, or flow of water, but not much space to create a pressure head to drive a mechanical system. The losses are mainly in the gearbox rather than in the motor or the bearings that support the screw, but we need that geared stage to increase the rpm enough to overspeed the motor.

"At Cragside the 17 metre long screw drives the 18.5 kW motor at over its 980 rpm synchronous speed via a gearbox, only when the system needs to startup does the motor draw power to get going. The motor is rated at 93% efficiency so it maximises the available energy conversion from the screw when working as a motor, or a generator."

Andrew Sawyer, Property Curator at Cragside commented: "It is a very visual

At Cragside the 17 metre long screw drives the 18.5 kW motor at over its 980 rpm synchronous speed via a gearbox, only when the system needs to startup does the motor draw power to get going.

demonstration of the way hydro power works, an almost sculptural sight in the landscape. Lord Armstrong was an exceptional man with an ingenious mind and the prospect of bringing his vision for Cragside into the 21st century is a dream come true.

Water from Tumbleton lake, the lowest of the five lakes on the Cragside estate, will feed through the turbine and into the burn below. As water passes through



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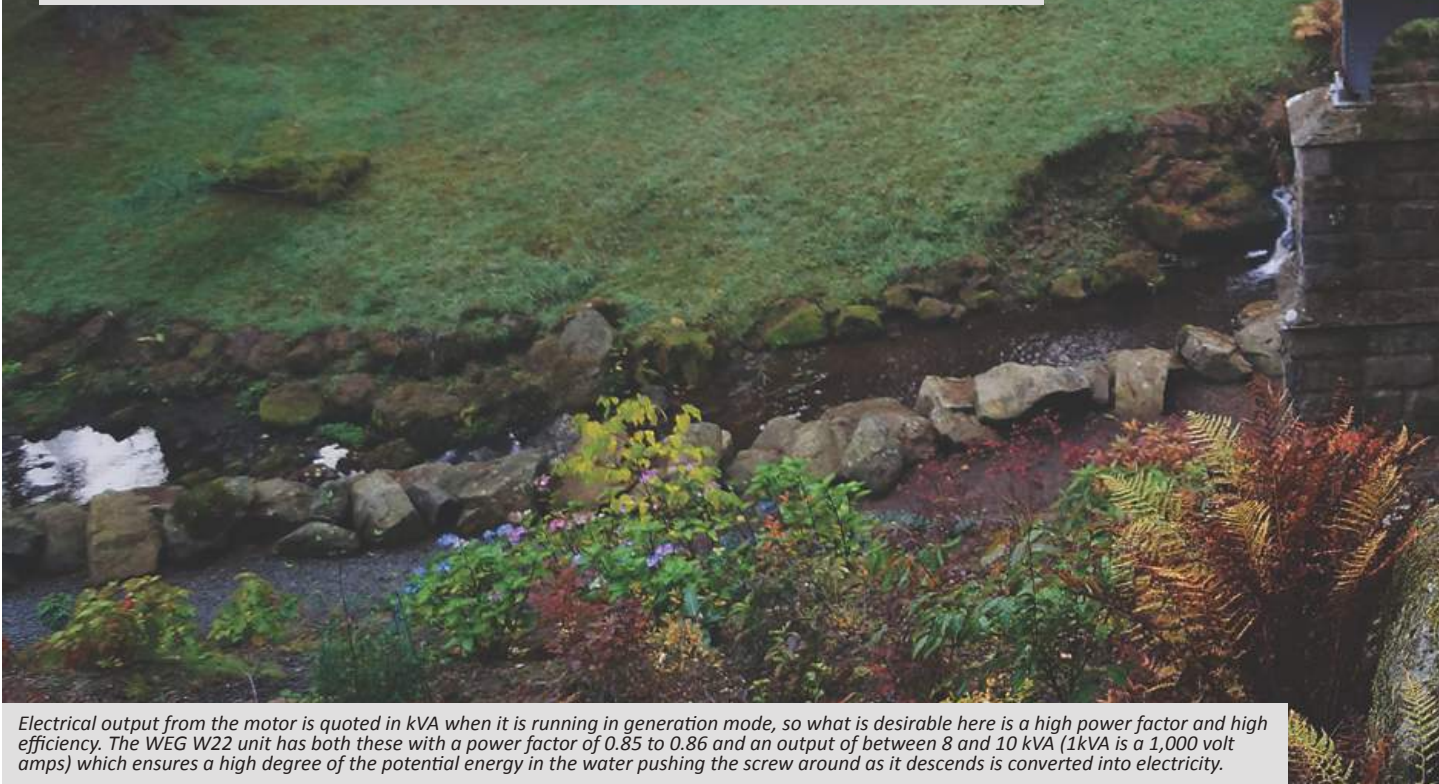
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The new Archimedes screw being installed at Cragside in Northumberland



Electrical output from the motor is quoted in kVA when it is running in generation mode, so what is desirable here is a high power factor and high efficiency. The WEG W22 unit has both these with a power factor of 0.85 to 0.86 and an output of between 8 and 10 kVA (1kVA is a 1,000 volt amps) which ensures a high degree of the potential energy in the water pushing the screw around as it descends is converted into electricity.

The best thing about the screw is that it's visible and we hope this will add to people's understanding of why Cragside is so special. Visitors will be able to view the technology from the lake side.

the spiral blades it causes the screw to turn, thereby harnessing the energy of falling water. The technology is well proven with over 100 installations in Europe and was chosen by the National Trust for its many advantageous features. Sarah Pemberton, Head of Conservation for Yorkshire and the North East at the National Trust explains: "The technology is easy to maintain due to the simple mechanics, and because it works at



low speed, it's possible for fish to pass through the turbine unharmed. The best thing about the screw is that it's visible and we hope this will add to people's understanding of why Cragside is so special. Visitors will be able to view the technology from the lake side."

The W22 motor range from WEG represents affordable energy efficiency; the standard motor reaches IE3

efficiency levels of 93%. The W22 range covers frame sizes from IEC 63 to 355A/B and can deliver between 0.12 and 500 kW. For more specialist applications, the W22 range can be supplied with increased levels of ingress protection, up to IP66, as well as being specified for operation in potentially explosive atmospheres.

When considering the total cost of ownership (TCO) for a W22 the cost of

acquisition typically represents less than 5% of the total cost of ownership over an average operational lifetime. In contrast, the associated energy savings provided by premium IE4 efficiency motors far outweigh this additional investment in purchase price, particularly in applications where the process operates on a frequent shift, or 24hr basis. ■



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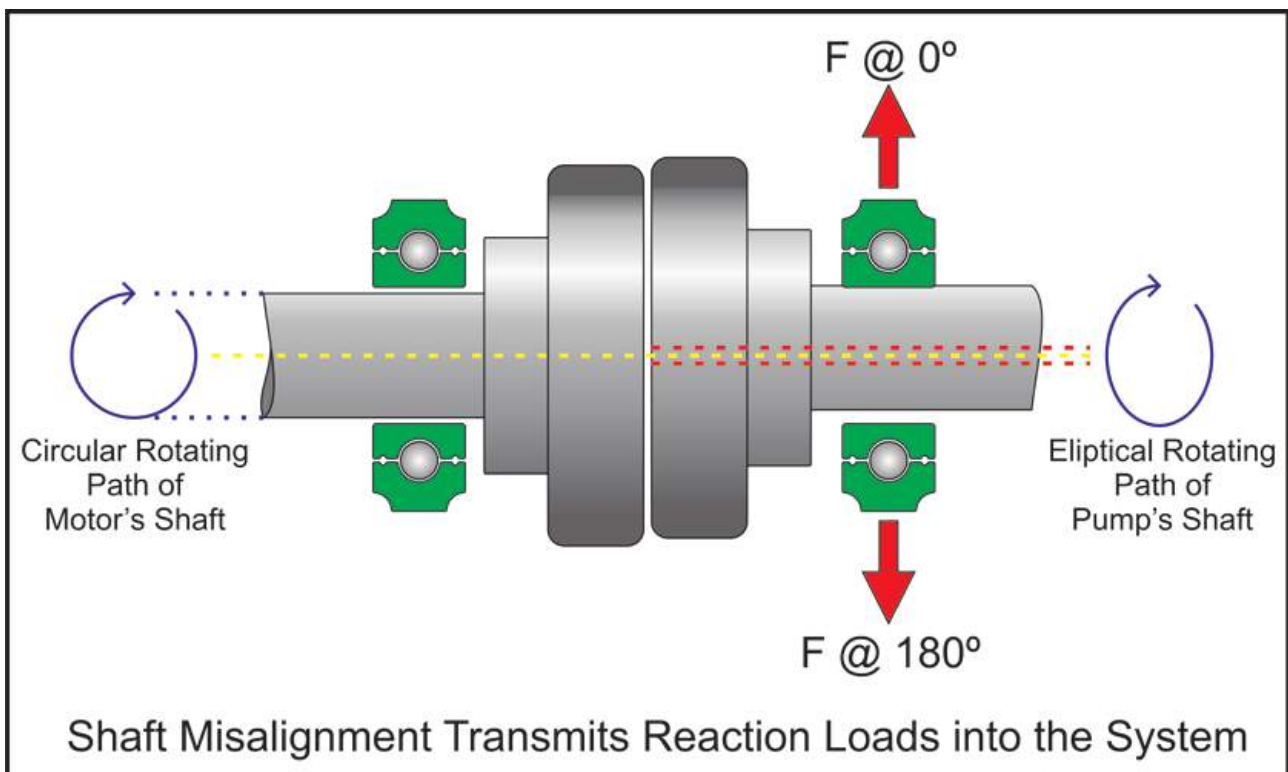
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Why Shaft Alignment – A Practical Reliability Tool for Industry

A significant factor influencing the reliability of rotating machines is their respective alignment accuracy. When a driven process machine operates in a misaligned condition with respect to its driver, mechanisms along this drive train are exposed to additional loads such as the bearings, mechanical seals and couplings.



In most cases Misalignment will increase machine vibration, whilst life expectancy of components will decrease exponentially. This is why the majority of plants use some method to verify initial alignment setup. Generally speaking, rough alignment practises are not accurate enough to prevent disruptions to production output. Unplanned stoppages caused by equipment failure can be common.

Alignment tolerances for machines are readily available. Coupling manufacturers can also provide recommended guidelines for offset and angularity maximums. It is safe to say a coupling will not fail, if aligned to the

manufacturer's tolerances.

Without precision alignment being carried out on the machine train as a whole, however, it is safe to say, that the coupling will suffer from a reduced lifespan.

Precision Shaft Alignment

Coupling misalignment is a condition where the shafts of the driver and the driven machines are not on the same centreline. A non-coaxial condition can be either parallel or angular misalignment but most commonly it is a combination of the two. This compound influence in both the vertical

and horizontal directions is what has made the relatively simple correction of misalignment so frustrating. Correcting one affects the other and the alignment technician, without access to the correct tools, is forced to hunt their way through the alignment process, struggling with repeated measurements and subsequent shifting of the moveable machine.

Misalignment is typically caused by the following conditions:-

- Inaccurate assembly of components, such as motors, pumps, etc.
- Relative position of components shifting after assembly
- Distortion due to forces exerted by piping

- Distortion of flexible supports due to torque
- Temperature induced growth of the machine structure

Alignment Practices to Improve Plant Reliability

It is unfortunate that many maintenance departments have been downsized, resulting in most plants having fewer staff members, and in turn, having a narrower skills sets. Planned and preventive maintenance practices are an ideal largely of the past now, whilst reactive maintenance seems to be more common place in today's world.

Modern trends indicate that plant management spend much of their human capital addressing unscheduled maintenance, and for the purpose of this discussion specifically, focussing on machine alignment. Studies show that up to 50% of costs related to breakdown of rotating machinery is likely to be due to shaft misalignment. These findings

further highlight that most often it is small machines that are the most neglected when it comes to proper alignment.

Generally, attention to precision shaft alignment is centred on large, expensive, process critical machines, whilst trends show that most of the unscheduled maintenance activity is carried out on small equipment. It goes on from this then that process critical plant, therefore, is unlikely to be able to produce at full capacity if its auxiliary plant is broken down. The good news is, reactionary maintenance can be reduced through the implementation of a simple set of plant specific criticality needs such as:-

- putting in place easy to use working standards,
 - ensuring that technical staff have the necessary skills,
 - have the tools necessary to carry out their duties and,
 - a training program is introduced, focusing on these proactive specifics.
- In the modern workshop environment,

those capable of, or, who really understand shaft alignment, are in short supply. This really does not need be the case any longer, as high precision laser alignment tools, from companies such as Fixturlaser UK, have an intuitive graphics driven user interface combined with technically advanced laser transceivers.

A couple of days training, will go a long way in reducing machine failures due to misalignment. With training and the correct tools, the precision alignment task is made quick and easy.

In summary:

- Stats show that poor shaft alignment accounts for as much as 50% of rotating plant failure.
- Management buy-in and adopting key maintenance elements, sets the standard toward reducing unplanned plant stoppages.
- By adopting easy to use, cutting edge alignment technology; such as Fixturlaser's VertiZonal™ Compound Moves, plant reliability will be improved. ■

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The blades had to endure 13,000 revolutions per minute and temperatures beyond 1,250 degrees Celsius.

Siemens achieves breakthrough with 3D printed gas turbine blades

Siemens has achieved a breakthrough by finishing its first full load engine tests for gas turbine blades completely produced using Additive Manufacturing (AM) technology.

The company successfully validated multiple AM printed turbine blades with a conventional blade design at full engine conditions. This means the components were tested at 13,000 revolutions per minute and temperatures beyond 1,250 degrees Celsius.

Furthermore, Siemens tested a new blade design with a completely revised and improved internal cooling geometry manufactured using the AM technology. The project team used blades manufactured at its 3D printing facility at Materials Solutions, the newly acquired company in Worcester, UK.

Materials Solutions specializes in high performance parts for high temperature applications in turbomachinery where accuracy, surface finish and the materials

quality is critical to ensure operational performance of the parts in service. The tests were conducted at the Siemens testing facility in the industrial gas turbine factory in Lincoln, UK.

3D printing

Siemens finished its first full load engine tests for conventional and completely new designed gas turbine blades produced using Additive Manufacturing technology. "This is a breakthrough success for the use of Additive Manufacturing in the power generation field, which is one of the most challenging applications for this technology," said Willi Meixner, CEO of the Siemens Power and Gas Division. "Additive Manufacturing is one of our main pillars in our digitalization strategy."

"The successful tests were the result of a

dedicated international project team with contributions from Siemens engineers in Finspång, Lincoln and Berlin together with experts from Materials Solutions. In just 18 months they completed the entire chain from component design and AM material development to new methods for lifting simulations and quality controls. With our combined know-how in 3D printing, we will continue to drive the technological development and application in this field," added Meixner.

The blades were installed in a Siemens SGT-400 industrial gas turbine with a capacity of 13 megawatts (MW). The AM turbine blades are made out of a powder of high performing polycrystalline nickel superalloy, allowing them to endure high pressure, hot temperatures and the rotational forces of the turbine's high

speed operation. At full load each of these turbine blades is travelling at over 1,600 km/h, carrying 11 tons or equivalent to a fully loaded London bus, is surrounded by gas at 1,250 °C and cooled by air at over 400 °C. The advanced blade design tested in Lincoln provides improved cooling features that can increase overall efficiency of the Siemens gas turbines.

Additive Manufacturing is a process that builds parts layer-by-layer from sliced CAD models to form solid objects. Also known as '3D printing' it especially provides benefits in rapid prototyping. "This exciting technology is changing the way we manufacture by reducing the lead time for prototype development up to 90 percent," said Meixner. "Siemens is a pioneer in Additive Manufacturing. We can accelerate the development of new gas turbine designs with an increased efficiency and availability and can bring these advancements faster to our customers. This new flexibility in manufacturing also allows Siemens to develop closer to the customer's requirements and also to provide spare parts on demand."

Siemens has a broad knowledge in essential areas like materials sciences, automation, manufacturing and process know how and is thus in a great position to shape the future in the 3D printing industry. The successful test of the advanced blade design is the next step in order to use the full potential of AM. Siemens is developing unique gas turbine designs which are only possible with AM and extends its serial production for printed turbine equipment. With an experience of more than 100 years in the energy market, Siemens converts the new design possibilities to specific solutions for its customers.

Siemens extensively uses AM technology for rapid prototyping and has already introduced serial production solutions for components in the gas turbines' compressor and combustion system. In February 2016 Siemens opened a new production facility for 3D printed components in Finspång, Sweden. The first 3D printed component for a Siemens heavy-duty gas turbine has been in commercial operation since July 2016. ■



Siemens finished its first full load engine tests for conventional and completely new designed gas turbine blades produced using Additive Manufacturing technology.

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What effect will Brexit have on standards and compliance for hazardous area industries?

Tim Marks represents the AEMT as a member of BSI, IEC, and IECEx standards committees for Explosive Atmospheres and Rotating Electrical Equipment. He looks at some of the issues facing the Hazardous Area industry now that the UK Parliament has agreed to Brexit.

There are currently a lot of blank faces, particularly in Whitehall when it comes to the subject of standards, directives, and compliance in the wake of Brexit, but what does it mean for the Hazardous Area industries and will it cause problems for companies doing business in the UK?

The main message here is a sense of check; first one needs to understand the difference between standards and Directives. Technical standards embody the best practice put together by technical experts to create a uniform engineering or technical criteria. They are becoming more and more international, are not mandatory, and will not be affected by Brexit. European directives, may have technical input, but emanate from the European Parliament. They must be embodied into the laws of each EU member and are mandatory. The two however are often interlinked and standards, can be used to support and help meet European directive requirements.

The European Directives are designed to create a level playing field for trade within the EU. They may also form a technical barrier to goods emanating from outside the EU. They cover all angles of trade, from machinery and transport to eco-design, health, safety etc.

Hazardous Areas are covered by the Atex Directives for potentially explosive atmospheres (Atex emanates from the French: ATmosphères EXplosibles). There are two Atex directives:

ATEX 95 originally ATEX 94/9/EC, but superseded by ATEX 2014/34/EU on April 20, 2016.

ATEX 137 workplace directive 99/92/EC covering Health and Safety on site.

DSEAR (The Dangerous Substances and Explosive Atmospheres Regulations) embodies the Atex directives into the UK legal system.

To a large degree these directives create an invisible barrier to trade with Europe, and are items that will still need to be conformed to after Brexit. Every item manufactured in Europe or manufactured outside the EU for use in an EU zoned hazardous areas has to have a valid certificate of compliance to the Atex directives. The certificate gives information of the results of testing for compliance to the Atex directive and named standards, as well as safety issues, labelling details, etc. The certificate is only issued after three samples of each item have been extensively tested in an accredited laboratory by a Notified Body in the EU. This can be a very expensive hurdle for a company wishing to sell their product range into Europe, however Atex is no different to the barriers that EU companies meet if they wish to export to the US where they have to meet UL or FM standards, or the Canadian CSA standards, Japan, China, etc.

So what are the top seven problems that may affect the UK Hazardous Area Industry after Brexit?

Will Brexit affect UK manufacturers and importers, who already ensure that

their products have the required Atex certificates?

If the UK continues to ensure that products manufactured, or imported, into the UK, abide by the Atex Directives, discussions over ease of access to the EU countries by the Customs Union Committee should be more straightforward. The existing Atex certificates will ensure ease of access into the European market.

Will Brexit affect the users from international oil and chemical companies to local flourmills?

There would be no advantage in the UK deciding not to comply with the Atex Directives and many advantages in keeping the status quo. Users of Hazardous area equipment will still specify, buy and conform to the Atex directives as long as DSEAR in the UK continues to embody the Atex Directives.

Will the government alter DSEAR if it no longer needs to comply with Europe?

DSEAR ensures that everything manufactured or imported to the UK still complies with the European Directive. Atex works well and is well respected internationally. Its requirement in the UK protects our markets from a flood of non Atex compliant equipment, and should continue to facilitate the free movement of Hazardous Area Equipment from the UK to Europe, and vice versa.

Will UK companies still be able to manufacture European standards and Directives?

Standards are becoming more and more international and most of the developed countries are signed into adopting the ISO (International Organisation for Standardisation) or IEC (International Electrotechnical Commission) standards. Both are now based in Switzerland and produce international standards for adoption by member countries. The majority of these are harmonised into the European CEN or CENELEC standards systems, and most EU members are also members of ISO and IEC. Occasionally CEN or CENELEC will produce a standard as a result of a new directive, and this can go the other way and stimulate the production of a corresponding ISO or IEC document.

All standards are readily available for anyone or any manufacturer to purchase and comply with.

Will the UK be able to have input into the Atex Directives;

Fortunately Atex directives are quite mature now and after 20 years have just had some minor updates. The UK took part in the consultation process and provided technical and procedural input during the review to produce the updated Atex 2014/34/EU. We may not officially be able to attend future consultations, or have any MEP's to comment on new directives, however the results of the process and every consultation is available on line. Technical alterations to Directives often encompass alterations to the International Standards, which the UK is well represented on. I am sure that the UK voice would also be heard through international federations and UK international companies with representation in the EU.

Will the UK still be able to have input into the European and International standards.

Generally as these standards become available or go through a maintenance update, they are harmonised into the European standards CEN or Cenelec for IEC electrical standards. These standards are then adopted by EU member states (in the UK they are adopted as a British Standard). Occasionally there will be notes at the beginning of a standard

for local requirements, these can be numerous in some countries, but are becoming unusual in the UK. Generally we are very well represented on standards committees, and any problems we foresee in a standard are normally solved at the committee stage. Standards are not a legal requirement, but they normally help manufacturers and users meet their legal obligations. They also create a high standard of best practice for products and create a level playing field for products entering a market and a standardisation of products produced for that market.

Will our notified bodies for Potentially Explosive Atmospheres retain EU notified body status after Brexit?

This is an important issue. The EU has 67 notified bodies in this segment. Eight of them are in the UK, compared to 12 in Germany, 10 in Italy, 6 in Poland, and 3 in Turkey, other EU members such as France have 2, 1, or no notified bodies.

Turkey, I hear you say. Yes Turkey!

Perhaps the exception that proves the rule, which may help Brexit negotiations. Turkey is not even a member of EFTA, but this decision was issued by the Customs Union Joint Committee in document 2006/654/EC for "the elimination of technical barriers to trade in a particular product" and facilitate the progress of Turkey's application to join the EU".

This does ring alarm bells if we have declared that we are leaving the Customs Union.

The current UK notified Bodies will require a similar decision from the Customs Union Joint Committee to the one above. The notified bodies in the UK are well respected internationally and have a wealth technical experience. They do a large amount of business with European and international companies requiring Certificates of Conformity for Atex to sell their products in the EU. This includes products from America, China, and internationally, as well as those manufactured anywhere within the EU. Manufacturers not only require new prototypes testing, but continually modify and update their products. If this is to continue in the UK after Brexit, the

sooner a Joint Customs Union Committee agreement is reached to clarify the situation, the better.

The UK notified bodies need to be at the front of the negotiation agenda once Brexit is formalised. There are 188 bodies listed by the EU, who can test and issue Certificates of Conformity with directives covering everything from Shipping and Rail to manufactured products, medicines etc. These range from the UK accreditation company UKAS to specialist companies like SGS Baseefa, an AEMT member. These bodies use their specific expertise to test for conformity with every mandatory Directive including Atex, Machinery Directive, Marine Equipment Directive, Pressure Equipment Directive, Lifts Directive, Low Voltage Directive, etc. The list is long and covers every area. To facilitate trade agreements with the EU, the UK Government will probably negotiate to abide by most of the directives, such as Atex.

The 188 bodies involved in testing and accreditation are world class companies employing staff with very specialist technical abilities. Many of them stand on International Standards Committees and facilitate a huge amount of international trade in the oil, chemical and other industries. It is imperative that the UK Government ensures that Brexit and a split from the Customs Union does not jeopardise the incredibly valuable work that these companies carry out internationally, and ensure that this industry, maintains its leading place on the world class stage.

There are many active groups looking after the interests of the industry, who will continue to communicate with the marketplace about developments and changes, as well as providing sensible advice to government committees. However now is the time to address these issues.

The mechanisms are in place to continue to ensure compliance doesn't become any more complex or onerous, and that our ability to do business successfully remains largely unaffected by this particular aspect of Brexit.

For information see EU Website: <http://ec.europa.eu/growth/single-market/european-standards/> ■



New Awards Programme Celebrates Electrical & Mechanical Trades - Call for Nominations now open!

Staged on Wednesday 29th November 2017, at the Doubletree by Hilton Hotel, Coventry, UK the inaugural AEMT Gala Awards Dinner will bring together the entire electrical and mechanical trades sector in a global celebration of business and professional excellence. Recognising and rewarding the achievements of both individuals and companies operating within this important industry sector, personal endeavour, technical innovation, engineering advancement and commercial acumen will all be acknowledged and celebrated.

Industry wide engagement

Operated by the Association of Electrical and Mechanical Trades (AEMT) and produced by Touchwave Media, the awards will for the first time acknowledge the skill, effort and sheer dedication of the people and businesses serving this large and international sector of industry.

With sponsorship provided by a host of leading industry names, and extensive promotional support afforded by the two publications dedicated to this sector - Plant & Works Engineering and Drives & Controls – well deserved industry-wide recognition will at last be given to those businesses, large and small, who are excelling in their endeavours.

Award categories

The following seven categories make up the 2017 awards programme:-

- Technical Innovation of the Year – Product
- Technical Innovation of the Year – Project
- Environmental Contribution Award
- Industry Supplier of the Year
- Contribution to Skills & Training Award
- Rising Star Award
- Lifetime Achievement Award

Call for nominations

Entries are now being sought for any company, product, application or individual involved in the supply, installation, service, maintenance and repair of industrial machinery technology such as electric motors, drives, pumps, fans, gearboxes, generators, transformers, switchgear and ancillary equipment. Individuals can put forward entries for themselves and their own company, or they can nominate others that they know merit recognition. The online entry process couldn't be easier, so anyone wishing to play their part in highlighting engineering excellence should visit the AEMT Awards website – www.aemtawards.com.

Closing date for entries

The closing date for all entries is 5.00pm on Friday 18th August 2017. So for those wanting industry-wide recognition for a job well done, be it for technical innovation or application know-how, for environmental consideration or service and repair, they should make a note of this key date.

It is free of charge to enter the awards, but the promotional value associated with being selected as a finalist is worth many hundreds of pounds. For those individuals and companies fortunate enough to be announced as one of the seven winners during the charged atmosphere of the gala awards dinner, the promotional benefit is even greater.

Further details

For more information, visit the website www.aemtawards.com or contact the producers, Touchwave Media by phone on 07785 290034 or by email at andrew@touchwavemedia.co.uk ■



Awards 2017

Introducing the Inaugural AEMT Awards 2017...

The Awards will bring together the entire electrical and mechanical trades sector in a global celebration of business and professional excellence. Recognising the achievements of both individuals and companies operating within this important industry sector.

Entries are now being sought for any company, product, application or individual involved in the supply, installation, service, maintenance and repair of industrial machinery technology such as electric motors, drives, pumps, fans, gearboxes, generators, transformers, switchgear and ancillary equipment.

The 2017 'Call for Nominations' are now open, so be sure to visit the AEMT Awards website to review the seven award categories and decide which ones you will be entering!

www.aemtawards.com

EVENT CALENDAR

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OPEN

08
March

NOMINATIONS
CLOSE

18
August

JUDGING
SESSION

07
September

WINNERS
ANNOUNCED

29
November

2017 Partners





Dr. Martin Killeen - Lead Lecturer, and Technical Consultant for the AEMT.

Tackling the skills shortage in Engineering

As someone who has been heavily involved in education and training in engineering and technology, both at apprenticeship levels and undergraduate levels, one constant worry within the industry has been the replacement of skilled and experienced employees.

Research by the Royal Academy of Engineering identified a future need to increase the numbers in STEM education in general to support the manufacturing and maintenance sectors. While the intake into graduate studies has increased over the past 20 years, the number selecting Engineering is still proportionally low.

While the high technology end of the industry advance on recruiting from newly qualified graduates and post

graduates, the manufacturing and maintenance elements also rely on the apprenticeship route for recruitment.

Many companies also comment that the skill levels of newly qualified staff are not comprehensive enough and that they need further training or development before they become truly useful and productive. Therefore, this requires companies to implement an in-house culture of continuing professional development (CPD) and support for

newly qualified recruits, while trying to prosper in an increasingly competitive environment.

It has always been argued that the best way to develop the skills you need is to create a good company training scheme that has credibility in the industry, meets the skill profile required and attracts highly competent people to apply. It is easier for a large company to develop such schemes that will deliver the company's future job specific skill profiles. This approach is a logical solution to any skill shortage but it does require a commitment to sustainable investment, even if the profit margins are slim.

The recent addition of a training levy on the large companies has focused most to make sure they allocate their funds to advanced or intermediate apprenticeship schemes, but the jury is still out on the outcome in terms of quality. The introduction of trailblazers has, for some, caused confusion and frustration because yet again the available funded schemes have changed in terms of content and criteria.

Training has always been a challenge for small and medium enterprises (SMEs) that may not have the resources to operate a large training scheme. Such companies are often at the forefront of high technology and development, requiring a highly advanced but small workforce. Without in-house training, these companies may have to recruit from competitors or from overseas.

However, the pool of skilled employees is being put under additional pressure with the implications of Brexit in recruiting EU citizens. In addition, projects such as HS2 can also be considered as a threat, since they will recruit engineers from the already diminishing pool.

Going forward, some may feel they do not have a skills shortage in their company at the moment, but all the studies indicate that this will be a general issue for the industry. Companies will have to set aside larger amounts of money as part of a their business plan for recruitment and training costs and they will also have to be proactive in making sure the education sector includes the skills and knowledge required for the future. ■



Rail training.

Greater Anglia apprentices gain 'traction' with Houghton International

Electro mechanical engineering specialist Houghton International welcomed apprentices from train operator Greater Anglia last month as the first delegates on its new 'Introduction to traction motor and MA set repair' training course. The course aims to share knowledge and help educate the next generation of rail engineers in key areas that impact the performance and reliability of the rolling stock they maintain.

The four day hands on workshop offers an introduction to the repair, maintenance and life extension of electromechanical assets in the rail industry. Alongside a general overview of traction motors and MA set repair, it provides an insight into the best practice rotating machine testing, fault diagnosis, general overhaul and major repair procedures.

Delivered via a mix of classroom and workshop sessions, participants see

traction motors (AC and DC), MA sets, HST alternators and inductor coils and get the chance to participate in general overhaul, rewinding and fault diagnosis. Callum Raywood, Apprentice at Greater Anglia, commented: "I found the training very enlightening because it explained comprehensively the systems and principals within the machines that we conduct testing on.

"Genuinely this knowledge has already helped me during my work, simply

because when people try to explain things about MA's, I know exactly what they are talking about and can ask useful questions based on what I learned."

Chris Robson, Sales and Marketing Director at Houghton International, commented: "The training is designed to help apprentices or those new to the industry to get a better understanding of the components that make up the vehicles they work on every day and what they should look out for whilst in operation.

"We have been working in the Rail industry for over 15 years now and strongly believe collaborative working is key to successful delivery and that all staff can benefit from an enhanced understanding of the intricacies of the products to help identify faults early on and improve maintenance procedures." Suited to those who work in engineering and maintenance, on completion of the course participants will leave with the knowledge and confidence to identify faults, understand failure modes and recommend rectification work.

Rob Evans, Fleet Support Engineer at Greater Anglia, added: "At Greater Anglia we are continually looking to improve the reliability and performance of all of the sub-systems on our rolling stock. Having worked closely with Houghton International to develop the products that they overhaul on our behalf, and on the processes used for overhaul and maintenance, we wanted to explore how we could invest in training of our technicians to support this work, and other rolling stock maintenance activities that we undertake.

"Houghton International proposed a comprehensive week long course, with clear objectives, to develop the understanding of electrical rotating machines that our maintenance technicians have.

"The first course was attended by our apprentices and feedback has been extremely positive. We hope to send further technicians on this training soon, supporting the component reliability improvements that we have achieved in conjunction with Houghton International." ■



Max fitting coils in the Bowers workshop.

Max Buxton is deaf, but this didn't stop him from starting his apprenticeship with Bowers Electricals.

"I always wanted to work with electrical things," beams Max. "They're really interesting!" Max was diagnosed profoundly deaf at three weeks old and had a cochlear implant.

He communicates using a combination of BSL (which is Max's first language) lip reading, some speech and sign supported English (SSE).

Due to a family connection, at age 14, Max began helping out at a local electrical company in the school holidays. He then did his work experience placement there and at 16 was offered an apprenticeship. "It made sense; I'd

always been interested in engineering so I just thought, why not?"

"I was really excited about my first day," remembers Max, who does 4 days a week at work and one at college. "I'm currently in the 2nd year of my Level 3 Diploma in Engineering, Maintenance, Installation and Commissioning."

"At college, we learn things like

engineering principals, and health and safety. I have support from an interpreter, and a note taker. At work, I do cleaning, electrical installations, rewinding of coils, detailing of parts, and connecting wires; some very in-depth jobs!"

"Max and his supervisor John deal with some big motors," says David Bowers, CEO at Bowers Electrical. "They rebuild them completely. On one motor Max

cleaned out the slotting, a difficult job and he had it absolutely perfect. It's amazing how he's got on,"

"Max has never had a problem communicating at Bowers, as they use SSE and Max is able to lip-read." says Rob, Max's Dad.

"Some of our colleagues were originally concerned about Max's deafness from a health and safety perspective, but they just didn't understand what he could do. Max has been safely trained to use the crane and electrical tools such as the band saw," explains David.

But while Max is thriving at work, one aspect of his apprenticeship has been holding him back. The assessment criteria set by the government requires all apprentices to achieve certain levels of Maths, English and ICT. The English has proved particularly difficult for Max because his first language is BSL and he is also dyslexic. When he finished his intermediate Apprenticeship, he hadn't achieved the required English functional skills Level one. He wasn't expected to pass it and would be held back indefinitely without any funding to continue his course.

"Sometimes he was near the end of the line and we had to really push him and tell him he could do it." Rob remembers.

Max eventually passed 18 months after his first attempt. "I just scraped it," he says. It's very difficult to translate BSL into English and for it all to make sense." Max's funding restarted and he began his advanced Apprenticeship, but to complete it he must now pass Functional skills in English at level two.

"I know people in their twenties who can't get level two- you can just go on for years with it," sighs Rob. "So, this was the argument; that BSL needed to be recognised as an equivalent to English."

Max's English is by no means at the same level as his intelligence," adds his mum Heather. "He knows everything he needs to do to pass; it's just getting it down on paper - it's so frustrating."

Max has been fortunate enough to have lots of support from his parents. They



Max with employer David Bowers after achieving the dedication to apprenticeships award.

have helped him develop his English and in campaigning for the recognition of BSL. Before Max passed his level one functional skills and faced being unable to continue with his apprenticeship, Rob wrote to the government department then responsible for the funding and to his MP. It wasn't until he got other deaf organisations involved that he made progress.

"We contacted the National Deaf Children's Society, Signature, BATOD (the British Association of Teachers of the Deaf) and ADEPT (Association of Deaf Education Professionals and Trainees) and found out Signature was trying to get BSL formally recognised as a qualification equivalent to GCSE English," explains Rob. "With these organisations behind me, I went back to my MP who was then really supportive. He followed it through and the government agreed to change the criteria from September 2016."

This policy change was officially announced in January and while its good news for deaf young people considering apprenticeships, Max still hasn't received any written confirmation of

how this will affect him and others doing apprenticeships. He just has to wait and see.

"We hope in the future that Max will develop enough English to do an HNC and that they may be able to assess him in a different way. Hopefully the change in policy will mean English will be less of a problem," shares Rob.

"The change in policy gives deaf young people a chance," Heather adds. Rob advises others like Max, "If a deaf young person wants to learn a practical skill, they need to pester companies. Just see if you can go for a week and get some experience. If they like you, you stand a good chance of getting somewhere."

"I'm sure Max will finish his apprenticeship, although it might take him a bit longer with the theoretical side. When he qualifies, we hope that he'll stay with us and move up," says David. "I'd like that", concludes Max. "It's a really interesting job and I love it." ■



1

BMW MINI Plant Visit

The last AEMT meeting in Oxford took members on a visit around the cutting-edge BMW MINI production facility in Oxford. Before hand, members met at a nearby venue for networking and seminars. Updates were provided on recent AEMT news; focusing very much on how members can get the most of the impending AEMT awards later this year – see page 36 for more info.

In 2012 BMW invested £750 million in their Cowley, Oxford MINI production plant. The investment included upgrading their car body assembly plant with 1200 ABB robotic assembly arms; making it one of the most cutting edge car making facilities around.

On arrival at the visitor centre, members were ushered into two groups of 15 and briefed on the safety aspects of the tour. Squashed into the back of a minivan, we were escorted straight to the jewel in the crown – the ABB Robotic body assembly plant.

On entrance, our tour guide introduced us to a sample stripped down body of a typical MINI. Seen like this, it's easier to see how under each car's



2

glossy bespoke exterior is a framework designed for adaptability. A discreet registration number on the car bonnet – the common denominator of each MINI car – identifies what the finished car will look like. Underneath the dashboard is room for left or right hand drive steering axis – a reminder that many of these cars will be exported to the European and International markets.

Entering the robotic assembly centre is like entering some sort of space age Jurassic Park – hundreds of cages disappear off into the vast facility, with 100s of red robotic arms lurching back and forth inside them. In fact, this analogy is given by the staff – the colloquially named ‘Jurassic Park’ cage is given to a particular assembly section for the underbody of the cars; so named because of the visceral nature the robot

arms dart, lurch and pirouette back and forth.

One would be forgiven for thinking that the plant manufactures in batches of cars. In fact, with robot technology in place, the production line can be building a basic 3 door, racing green, MINI and then immediately go on to build a 6 door, red, clubman MINI with sunroof and trims.

After the body assembly facility, the car goes through the spray facility, which, due to the legacy design of the building, meant a viewing gallery was unavailable. So members were instead ferried to the final assembly building, which did not disappoint after the robotic assembly line.

In the final assembly line, human workers still play an important role. Whereas in body assembly there were just 90

employees, in this facility 700 staff work in shift to install dashboards, chairs, speakers, motors, wheels; the lot! Having said that humans still play an important role, and they are working very much in harmony with a whole host of supporting robotics.

The logistics of the operation are mind boggling, for everything manufactured off site – the fabrication of the body parts, the seats, wheels and sound systems – the delivery has to be spot on. Since the cars are coming through the assembly line in a given order – the delivery of the components have to be lined up in the correct order as well. For the tyres alone, there could be many variations of tread, hub cap, or alloys, and colour. ■



1. Robots welding the side frame for the new 5-door MINI in Plant Oxford's bodyshop.
 2. Ian Baxter and Steve Leng of Morgan Advanced Materials with Alex Page of Mid Kent Electrical.
 3. At engine marriage as the engine is lifted up under the car for fitment.





6



7



8



9

- 4. Andrew Savage of Mid Kent Electrical with Paul Hirst of PAR.
- 5. Jake Bucknell of WES.
- 6. MINI Wheel Fitment.
- 7. Members Meeting before the BMW MINI Visit.
- 8. Raj Patel of Alpha Electrics and Robert Shoebridge of W H Shoebridges.
- 9. Body side sub assembly.



Robert Shoebridge with daughter Eleanor, 4th generation.

100 years of the Three R's with W. H. Shoebridge & Sons Limited – Rewind, Refurbish or Replace

Steve Ashman of Solutions in I.T. spent the afternoon with Robert Shoebridge at their Northampton head office to find out about the business and the key to their long-standing success.



Background of the Business

W. H. Shoebridge is almost a hundred years old, where did it all begin?

It was established in 1919 by William Harry Shoebridge, he'd been through the

first world war in the electrical division of the army and been trained as an engineer and a winder up in Lancashire.

He moved to Northampton to be with

his father who was governor in the local prison. When he was demobbed he decided to start a company repairing batteries, vacuum cleaners, dynastarts and dynamos, hoovers, in fact anything



Stock ready 24 hours a day for plant emergencies.

with an electric motor in it. He progressed the business through the 20's, 30's and up through the second world war when my father joined him.

Grandfather [William Harry] retired in 1955. My father then took over and ran the business right up to 2011.

The business has always been in Northampton then?

This is the third site since the 1920's. We have been here about twenty five years and in 1964 father opened a branch in Wisbech, Cambridgeshire and then one in Peterborough in '85. In 2002 we bought the engineering plant at Spalding, that's our heavy side. They specialise in pumps, heat exchangers, steam valves, confined space, site work and all kinds of electro-mechanical.

Diversity and Vision

What kind of capacity do you have in Spalding?

We've recently installed a 72" Webster and Bennett vertical borer, a 5.5 metre lathe with a 39" capacity in the gap, we've got a 14" slotter, so it's all big stuff we are capable of doing. About 18 months ago, we had a new bay built with an 8 tonne overhead crane.

How many people do you have over Spalding?

14 guys over there, so a total of 42 of us in the business.

When did you come into the business?

I would say 1972.

...and what was your route to management?

I was just a boy then, I had two years in college, where I thoroughly enjoyed a machine and electrical mechanical course. I was then sent down to Wisbech. I had a year with them and then I had a year back here and then another year back in Wisbech.

So, that's where I did my time. All hands on, buying and selling and of course, repping around. Right from the start I was interested in buying and selling. I always like the relationships and being with the staff as well.

So, nowadays are you doing the repping for Northampton?

We have a guy here now, but I will also

do it and I will also do it at Wisbech and Peterborough or Spalding. I still enjoy going out and about and if there's a prospective customer, someone I can see I will drop literature off or pop in to see them.

It's a large area from here to Spalding?

It is a big area and I always go down there every week, spend some time with the guys and the work continues to come in from all over the country.

This side of the business is about local relationships, do you get much work nationally or internationally?

We do business with Ireland, some in Europe over the years and Africa. Pakistan used to be a good trade for us, although that market has changed now, they have their own infrastructure and they can buy motors as cheaply as we can now. A few nice orders here and there with the Commonwealth countries, but all of the old machinery have now been superseded.

Its interesting how work travels, when people hear what we do they send us work. We've got good staff, a good job is done and at a fair price and people send us whatever.

What would you say is your unique thing over at Spalding?

The capacity and the size of the site, which is one and a half acres. The staff are also very experienced.

What kind of business is Spalding attracting?

Heavy industry and that's on the back of the utility work, then of course there's food, agriculture, and any thing to do with water and steam.

You mentioned steam?

Steam live lines, valves, testing, heat exchangers, but no boiler work.

The People behind Shoebridge

In terms of running your branches you have key people in place, is that the key to making it all tick?



Webster and Bennet 72" borer.

We have our staff fully involved and are lucky to have long standing members who have been with the company for many years. We have several who started when I started.

We have an open-door policy, if they want any kit, to put their case forward and I like to spend the money.

I spoke to a chap on the way in and asked him how long he'd been here. He said six years and the fella over there thirty-five. How do you keep low staff retention?

It's the variety of the job really, no job is the same and there is great satisfaction in doing a good job.

We also operate a twenty-four-hour operation.

What about training?

We have youngsters coming through on apprenticeships and that is a big help to us, they're working alongside the guys in the workshop. They are very good at taking young lads under their wing. We do try and hand-pick the good guys. Over time we've had so-called journeymen that come in. Some have proved invaluable, and if they are bad, they aren't here long.

What challenges does the business face these days?

Sometimes it does worry me, even more so years ago when there weren't so many smoking chimneys. Manufacturing was going abroad, but I've come to accept

the fact that the whole manufacturing sector has levelled out. We do have manufacturing here and we are more involved with maintaining the infrastructure of what's left. From utilities, to hotels, hospitals, office blocks, even warehouse and distribution, which we probably wouldn't have got involved in years ago.

Is the emphasis on service and repair, or replacement?

We are replacing motors when we can because it's uneconomical to rewind some of the motors. It's what I call the Chinese influence. You can't do anything about that, whereas years ago they weren't here. So you could get good money for a rewind or refurb on a motor, but that's changed. It's the same in your world, where you may have spent £3,000 a few years ago on a computer, now you go down to PC world and spend £700.

Long Term Relationships

You've aligned your brand with Brook Crompton, haven't you?

We've been with Brook Crompton since the fifties, in fact, we were with Crompton before that. We've always supported them because they were British. Later as a business we had to get involved with buying Chinese motors. Brook Crompton and Exico are big suppliers to us now, although we sell anybody's make or model to suit the application and our customer's needs.



New large motors ready for distribution.

Are you trying to attract a certain type of industry or new market?

We're pushing towards mechanical repairs. We also work on site and have the availability of stock, which we hold a lot of. We will diversify into anything the customer requires. The motor is often the smallest part of systems such as, food mixers, grinders, gearboxes, and pump systems.

Robots?

No, we've never got involved with the servo side, we have overhauled them, but that along with electronics is a specialist thing altogether.

Control systems?

Inverters are horses for courses, we don't build panels. The customer will often stipulate which control he wants, Siemens, ABB, etc.

What's your approach to controlling the work in progress? At the end of the day you've got orders coming in, how do you maintain it?

There's only one simple answer to that and it is to walk the floor and know what you've got, what's coming in and keep your eye on it and make sure it all stays together. If I sit on my backside thinking that everything is going to magically appear on my computer screen, it won't.

Walk the floor, get involved, and know what's going through the works.

Quality and Training

What do you think about the skills shortage in the industry?

There is a shortage definitely. The industry hasn't been very proactive, because as a service industry we were a bit jittery and weren't too sure as to what there would be left for us to do. The colleges weren't given any guidance about what to do, the construction industry has the same problem, but they are coming on board now.

Apprenticeships?

Absolutely, for years every company had apprentices and that system is finally starting to come back. I think it's because companies are being encouraged, being given tax breaks or the like and the technical colleges have got to come away from the idea that they are all universities. There is too much emphasis on university and of course, it has come back to bite us.

Any famous names amongst your client list?

We've got lots of names you'll recognise, all of the local estates, hospitals, etc. There was one job for Fossett's Circus in Peterborough, a gearbox was damaged and we did the repair. I jumped in the car and took it back. The circus was all

set up for the Roger Moore James Bond film, unfortunately that day they had all disappeared off to Pinewood to do the shooting.

How do you see the electro-mechanical industry changing?

It's certainly looking for efficiency savings, efficient drives, reducing costs. If you can improve something say, put an inverter on a drive, making it run cheaper; that's good. If you can put a case forward for them to spend the money, they will spend it. 70% will go for the cheap option. You have to respect the customer decision.

Brexit is going ahead next Wednesday, what effect is it going to have on this industry?

Personally, I think it is a wonderful opportunity and we need to get out from this socialist control we've had for the last forty years. Germany, France and Italy to some extent have looked after their industry and they've made damn sure we've lost ours, because we've sucked in so much of their control.

I think now there is an opportunity to go out into the big world and go for it. They will still want us don't you worry. We will always spend more with them, than they spend with us. It's time to get back to the basics. Work and network again, with the world.

What about the import market, do you think it's going to be affected, bringing motors into the country?

It will, but why don't we start making them here. It will help us and industry will come back. Why would we want to ship it from China or Germany when we can do it here?

We touched on the Chinese economy, where do you see that going now?

That will continue, but I think they will get more expensive like Japan did in the sixties and seventies. The Chinese workers will want better quality of life and their wages will go up. It will all level out. I probably won't see it, the next generation will and hopefully it will all begin to come back to us. We certainly can't compete with mass cheap labour.

Working with the AEMT

AEMT, when did you originally join?

It would have been in the mid to late eighties?

What was your reason for joining then?

I think it was my father who got interested in it. We had contacts in the trade who were members and they were saying why aren't you members? John Peach, the AEMT President at the time from Nottingham and Dowding and Mills, he persuaded us. Soon after we joined, I was on the council for 5 years as the Midland

Area Chairman, I thoroughly enjoyed that. I got the chance to network around the rewind shops that were buying motors off us. Before the days of the internet, this was the only way to work. Some of the contacts I got in those days I am still in contact with now and if they come across something quirky they will still phone us.

What about achievements on the council, what were you proud of?

In those days, we were going through a bit of a recession trying to hold the industry together. Hold the peace with the competition and learn from the big firms.

What role do you see of the AEMT in industry now, has it changed?

I see them as an important investor in courses, keeping the members interested, and networking. That's what's important to us all. Nowadays, through technology and increasing demands, members are a lot more insular, busy in their own worlds. Years ago you were forced to network, to arrange parts, arrange actions, there wasn't any internet. Email is brilliant, but you don't get to speak to people.

How can the AEMT help you achieve your aims as you go forward?

With different accreditations, I suppose, customer driven needs that come out of the wood work and helping with new legislation. We are members of EASA which is an American organisation and it has its place, but the AEMT represents British business and we need more of it.



A new investment for the company, a 120 ton vertical press.

The Life Outside

Work aside, how hectic is your private life?

I have the fourth generation of the Shoebridges to look after. Father was a great collector of cars, which I am now maintaining and adding to, an 83 yr old mother, outside of that, gardening and socialising with my daughter. Being here is demanding.

I still do a 24 hour callout for a week when it's my turn. The customer expects you to be here 24 hours a day. ■

You can discover more about W.H. Shoebridge & Sons Limited and Shoebridge Engineering Limited from their website at www.shoebridges.com.

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Can You Afford NOT to Have this Book?

By William T. Thomson, Ian Culbert

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Hardcover \$140.00



This book is primarily for industrial engineers. It has 13 chapters and contains a unique data base of 50 industrial case histories on the application of MCSA to diagnose broken rotor bars or unacceptable levels of airgap eccentricity in cage induction motors with ratings from 127 kW (170 H.P.) up to 10,160 kW (13,620 H.P.). There are also unsuccessful case histories, which is another unique feature of the book. The case studies also illustrate the effects of mechanical load dynamics downstream of the motor on the interpretation of current signatures. A number of cases are presented where abnormal operation of the driven load was diagnosed. Chapter 13 presents a critical appraisal of MCSA including successes, failures and lessons learned via industrial case histories.

- The case histories are presented in a step by step format, with predictions and outcomes supported by current spectra and photographic evidence to confirm a correct or incorrect diagnosis
- The case histories are presented in detail so readers fully understand the diagnosis
- The authors have 108 years of combined experience in the installation, maintenance, repair, design, manufacture, operation and condition monitoring of SCIMs
- There are 10 questions at the end of chapters 1 to 12 and answers can be obtained via the publisher

Current Signature Analysis for Condition Monitoring of Cage Induction Motors serves as a reference for professional engineers, head electricians and technicians working with induction motors.



Current Signature Analysis for Condition Monitoring of Cage Induction Motors

Industrial Application and Case Histories

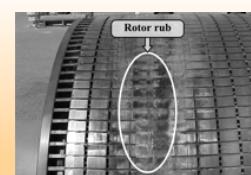
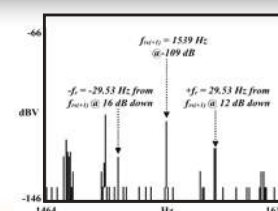
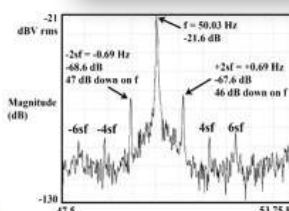


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