ERIKS

KNOW + HOW

ISSUE 36

INDUSTRIAL DIGITALISATION

This topic can be both exciting and daunting in equal measure. In this edition we want to help demystify this familiar buzzword with tangible day to day processes.

ERIKS IN ACTION:

When TCO means taking care of oil
There's a great deal more to lubrication than you think. Well-managed lubrication can improve efficiency, increase productivity and lower TCO.

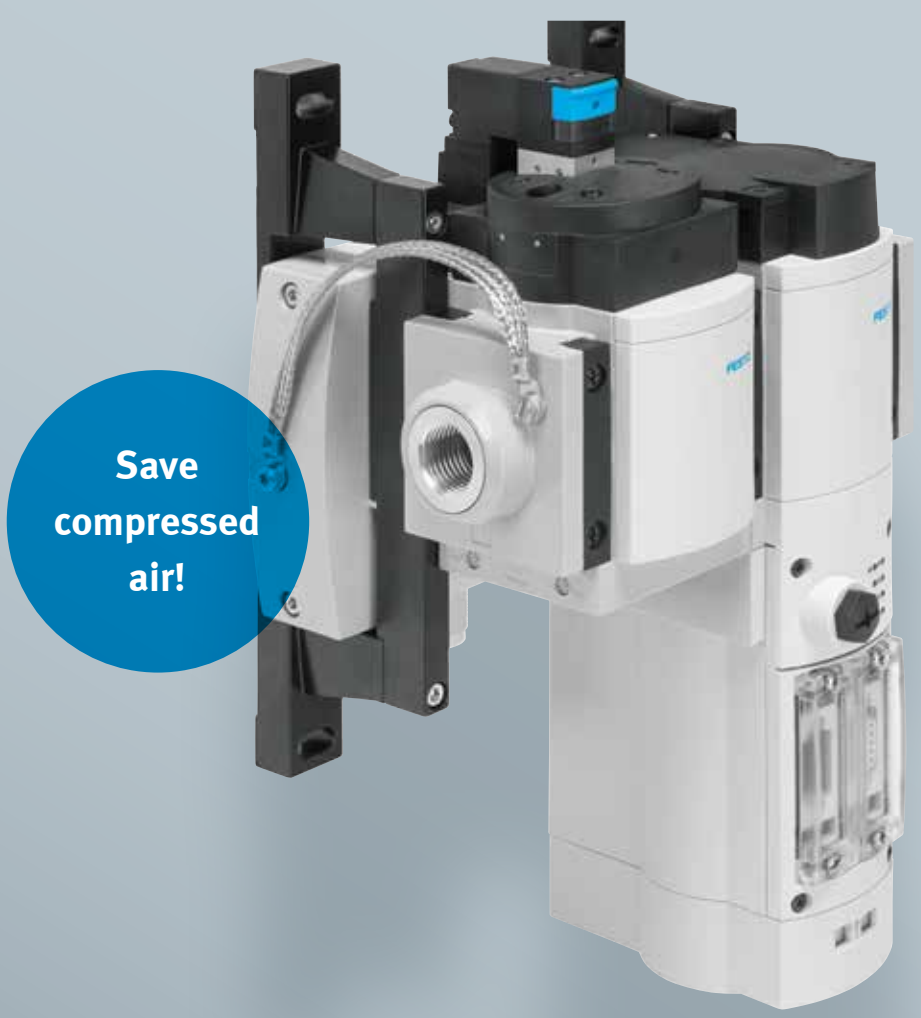
IN FOCUS:

A step by step approach to industrial digitalisation
Digitalisation of industrial processes doesn't have to be all or nothing. A selective, cautious approach to implementation may yield bigger rewards.

DEBATE:

Can 5G unlock industry 4.0?
Will 5G's secure area 'network slicing' generate confidence amongst UK manufacturers.

FESTO



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Welcome

There's no denying that the prospect of industrial digitalsation is both exciting and daunting in equal measure and no doubt many of you will be at different stages on the road to digital transformation. In our latest edition, we want to help demystify this familiar buzzword into tangible day-to-day processes. We'll be providing you with an update on the latest news and technology available, taking an in-depth look at industry 4.0 and all that comes with it, and outlining some ways in which industry can work together.

What better way to get your head around it than by hearing from key industry players such as Schaeffler and Bosch Rexroth on the use of condition monitoring in Industry 4.0 and what we can learn from machines? You'll also hear from our very own Business Development Manager, David Manning-Ohren, on how to go about intelligent data collection.

We are all familiar with TCO referring to Total Cost of Ownership, but in this issue, we will delve into lubrication services and how in this scenario, we need to look at Taking Care of Oil. In addition to this, Piab's Technical Sales Manager will be highlighting the importance of safety as part and parcel of any job.

Our regular debate piece in this edition looks at how 5G technology may be the answer for helping to instil confidence in companies concerned about cyber-security and hacking in the implementation of Industry 4.0.

We hope you enjoy the issue and if you have any thoughts on anything you've read, please do get in touch with us via email at knowhoweditor@eriks.co.uk or visit our website for more news and views from across ERIKS' range of products and services.

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ISSUE 36

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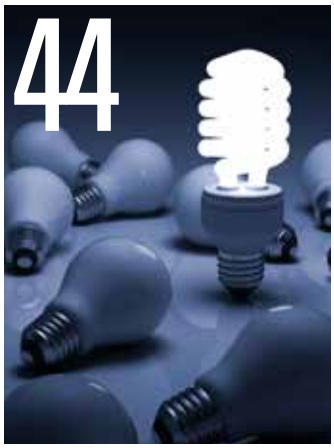
ERIKS in action

In Focus



LATEST **NEWS** AND **TECHNICAL UPDATE**

THE WORLD ECONOMIC FORUM INVESTIGATES THE WORLD'S READINESS TO **TRANSFORM PRODUCTION**

The 'Readiness for the Future of Production Report 2018' from the World Economic Forum provides a snapshot of the current global production landscape and the emerging technologies that will look to shape our industrial future.

The report considers a country's scale and complexity of production (structure of production) as well as key enablers which help countries to capitalise on the Fourth Industrial Revolution to transform production systems (drivers of production). The UK is currently ranked 13th for structure of production and 4th for drivers of production.

The report has eight key findings, highlighting that readiness for the future of production will require guidance on a global rather than national level. Also, countries need to learn from one another, particularly as no country has yet harnessed the full potential of integrating the Fourth Industrial Revolution into production.

WHAT IS THE IMPACT OF **INDUSTRY 4.0** ON SAFETY?

The Campbell Institute Symposium of the National Safety Council has recently focused on the impact of the Fourth Industrial Revolution on safety.

According to the symposium, businesses must become more familiar with the safety implications of emerging technologies, such as smart PPE, and ensure that these product prices are included in future budgets. A technology roadmap can then be created which provides a foundation for planning other aspects of safety that must support the technology and helps to develop an overall safety strategy.

Crucially, the strategy must centre around providing customers with added-value and helping them to do their jobs more safely while considering leadership, culture and measurement so that these elements are closely aligned with Industry 4.0.

UN LAUNCHES REPORT ON THE IMPACT OF **GLOBAL WARMING**

A breakthrough innovation, which offers real time monitoring of the chemical composition and temperature in molten metal furnaces, could save steel makers millions of pounds a year.

According to the UN Intergovernmental Panel on Climate Change (IPCC), the world is currently 1°C warmer than pre-industrial levels and urgent changes are needed to avoid a climate change catastrophe in the next 12 years. The report goes on to warn that changes must be made to keep global warming to a maximum of 1.5°C, otherwise the risk of extreme heat, drought, floods and poverty will increase.

If the global warming temperature were to increase, the greatest impact would be to nature, according to the report. For example, insects which are vital to crop pollination are nearly twice as likely to lose half their habitat at 2°C compared with 1.5°C and corals would be 99% lost at the higher of the two temperatures.

In order to achieve the 1.5°C maximum target, the IPCC has outlined four pathways which include different combinations of land use and technological change. Reforestation, electric transport and carbon capture technology have all been cited as crucial methods of meeting the target.

Hyundai Cradle, Hyundai Motor's corporate venturing and open innovation business has announced it is investing in a Massachusetts based firm, Perceptive Automata, to further develop autonomous vehicles. The company claims it has developed sophisticated AI software which gives self-driving vehicles and automated systems the ability to understand the state-of-mind of people, including pedestrians, cyclists and other motorists.

Through the use of sensor data from vehicles showing interactions with people, Perceptive Automata is able to train deep learning models to interpret human behaviour the way people do. With this human-like intuition, autonomous vehicles will be able to quickly anticipate the actions and intent of pedestrians, cyclists and motorists for a safer driving experience.

A £4.1m facility has been opened at Manchester Metropolitan University which is dedicated to developing new sources of green, emission free energy and making it available to as many people as possible. The Manchester Fuel Cell Innovation Centre (MFCIC) will be focussing on hydrogen and fuel cell technology whereby sustainable electrical energy is created via a chemical reaction between hydrogen and oxygen, with water as the only by-product.

The research team at MFCIC plans to share its expertise and £2.5m of dedicated specialist equipment with small and medium-sized enterprises (SMEs) across Greater Manchester so they can better understand the commercial and environmental benefits of hydrogen and fuel cell technology. What's more, as part of the HySchools project, the centre will be creating teaching materials and practical lab investigations for schools in the local area to help educate the next generation about hydrogen power and its role in securing an environmentally sustainable future.

EASE THE **DAILY GRIND**

Make the daily grind – or any grind – less wearing and more efficient, with a new reinforced grinding wheel for steel, from PFERD.

The new PFERD Ceramic SG Comfort grinding wheel combines an abrasive layer with optimum grain arrangement, and a reinforced grinding wheel with outstanding grinding performance. The result is better performance, and improved ergonomics.

Where conventional reinforced grinding wheels can be noisy, the Ceramic SG Comfort has lower noise emissions. Where conventional grinding wheels may vibrate, the Ceramic SG Comfort vibrates less. And when a conventional grinding wheel may need changing, the Ceramic SG Comfort can go on performing, with longer life between tool changes.

Suitable for peripheral grinding as well as all other applications, the PFERD Ceramic SG Comfort can be used just like a conventional reinforced grinding wheel. But that's the only way it's the same.

FILLING A GAP IN THE MARKET

Cut gaskets leak because of gaps. But LOCTITE Liquid Gaskets cut leaks. And now the LOCTITE 518 Pen makes a LOCTITE Liquid Gasket even easier to apply.

Recently reformulated and improved, LOCTITE 518 is a medium-strength, general purpose gasketing product that's ideal for use on cast iron, steel and aluminium flanges. Forming a flexible, chemical-resistant seal that won't tear or decay, LOCTITE 518 fills gaps up to 0.25mm with a 100% seal, even on contaminated surfaces.

The new LOCTITE 518 Pen makes application easier and less messy, with a roll-on applicator.

Once applied, the liquid gasket cures when confined in the absence of air, such as between close-fitting metal surfaces. No activator is needed, and when fully cured, LOCTITE 518 resists high pressure. Yet even after extended service, parts disassemble easily.

With no need for a large inventory of cut gaskets, or for manual assembly of conventional gaskets, LOCTITE 518 reduces costs and saves time. Just roll-on, seal, and forget about gasket leaks.

WORLD'S FIRST **WIRELESS VALVE MANIFOLD SYSTEM**

Now there's no need to put up with cable failures and production downtime. SMC's new EX600-W wireless valve manifold is the cable-free solution you can use even in a welding environment.

A master and slave configuration connecting up to 127 slave modules to a master over a 10 metre radius, the EX600-W is specifically designed to resist network interference.

ABSENCE OF VOLTAGE TESTING **MADE SAFER – AND QUICKER**

Safety regulations for servicing electrical equipment demand a voltage verification test to validate absence of voltage. A new tester from Panduit makes the process safer, and quicker too.

The VeriSafe™ Absence of Voltage Tester automates the voltage verification process, to save time and reduce operator error and risk. Once the VeriSafe tester is installed, all it takes is the push of a button to verify absence of voltage. This is confirmed by an active green indication light – which illuminates only when absence of voltage has been verified.

A portable tester has to be verified on a known source before and after testing. It's time-consuming, and can even expose users to electrical hazards. With the VeriSafe tester, the device testing and retesting procedure is automatic – saving time and ensuring the process is carried out in the proper sequence, every time and every test.

As well as reducing the risk of exposure to electrical hazards, the VeriSafe tester supports compliance when used as part of the lockout/tagout process described in NFPA 70E.

Operating on a bandwidth of up to 2.4GHz, it's outside the range of normal mechanical industrial noise and signals, including welding apparatus.

Frequency hopping every 0.005 seconds, plus wireless power suppression to a 1mW maximum, also prevent interference with wireless devices.

By connecting the wireless slave units onto the motion point, the system allows a manifold to be fitted closer to the end application point. This enables things to be made smaller, the valve size to be limited, and the pipework size and amount of air required to be reduced.

All of which helps to make SMC's world-first EX600-W a world-beater too.

BENDING TO CUSTOMER **DEMANDS**

In response to customer demands for lighter, more flexible, easier to handle hoses, Gates has introduced the new patent-pending MXT.

Designed for applications in industries with demanding performance requirements – including agriculture, mining and construction – the MXT hose is made with high-performance reinforcement and a robust, abrasion-resistant rubber cover. But making it tougher hasn't made it heavier or less flexible.

In fact, the new MXT requires up to 35% less force-to-bend, and is up to 30% lighter, compared with similar Gates compact products. That means it's quicker to install, installations can be more ergonomic, and once installed it improves fuel efficiency.

Offering all the benefits of the Gates MegaSys product portfolio – such as longer hose life and shorter minimum bend radii – Gates MXT hose covers around 90% of the hydraulic wire braid product applications, and meets or exceeds numerous industry standards.

Fully compatible with Gates MegaCrimp, Gates MXT is the straight answer to your flexible hose requirements.

ERIKS IN ACTION

ANY BEARING, ANY PROBLEM, ANYWHERE.

The ERIKS Bearings and Lubrication Product Business Unit has the answer.

ERIKS

David Carmichael
Senior Project Engineer

Wherever there's a piece of moving machinery, there's almost certainly going to be a bearing. And wherever there's a bearing, sooner or later there's likely to be an issue: whether it's routine maintenance or a catastrophic failure. Whatever the case, ERIKS' Bearings and Lubrication Product Business Unit (PBU) has the experience, the know-how, the resources – and the answers.

If you wanted to find two things as unalike as chalk and cheese, ferries and bricks would pretty much meet the brief. After all, ferries float while bricks definitely don't. But for the ERIKS Bearing and Lubrication team, they're just two more problems to solve. Firstly, repeated bearing failures on a chain ferry; and secondly, a catastrophic bearing failure on a brick hammer mill.

> "LOOKING BEYOND THE SYMPTOMS TO FIND A LONG-TERM, COST-EFFECTIVE SOLUTION"

With three Product Development Managers, two Application Engineers and a CAD specialist within the Unit itself – and the resources of ERIKS Engineering Services to call on if required – the PBU looks beyond the symptoms to find the cause, then finds a long-term and cost-effective solution. A solution that not only gets the equipment back up and running, but helps reduce the Total Cost of Ownership too.

For the ferry operator, that meant resolving the cause of the bearing failures, and removing some significant health and safety risks with the existing bearing set-up.

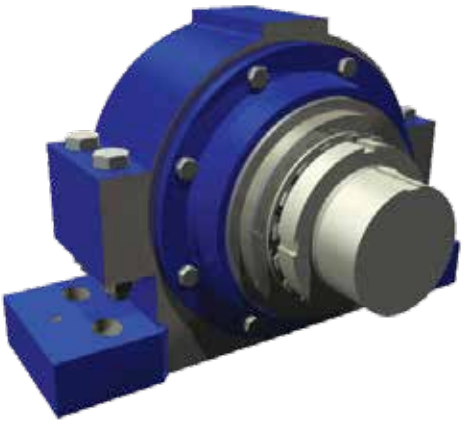
> "BACK UP-AND-RUNNING, WITH A REDUCED TOTAL COST OF OWNERSHIP"

Far from plain sailing

Repeated bearing failures on a chain ferry linking Devon and Cornwall were causing a huge inconvenience. Occurring sometimes as frequently as every 12 weeks – particularly in bad weather – and generally within 6 months at best, the breakdowns could leave the ferry stranded until the sea was calm enough for it to be hauled back to the coast for repair.

And that was only the beginning of the difficulties.

As David Carmichael, Senior Project Engineer at the ERIKS PBU describes it: "The design of the pulley sheave assembly went against all



basic bearing principles, creating a significant health and safety hazard for anyone carrying out a repair."

In addition, the location of the bearing inside the assembly required the complete removal of the bearing before any repair work could be started. This meant a turnaround time for repair of as long as 8 hours. So rather than simply fitting yet another replacement bearing which would inevitably break down, ERIKS looked further into the cause of the breakdowns.

The bearings are part of the idler pulley assembly, which keeps the chain in line as it leaves the ferry at the boat's four corners. The ERIKS investigation revealed a misalignment in the machinery, which was causing excessive axial load and allowing ingress of contaminants. Together, these put the assembly under excessive stress and strain, leading to the repeated bearing failures.

ERIKS' solution was to remove the assembly and take it back to the workshop, where it was completely stripped down and re-engineered to a new design. This redesign made use of split bearings, which not only allow repair without removal of the whole assembly, but also offer better sealing against environmental contaminants, and are more tolerant of misalignment. The new unit is also removable, if required, simply by undoing four bolts – making replacement a job with a 2-hour turnaround rather than 8.

> "A 2-HOUR TURNAROUND RATHER THAN 8"

Whereas the previous bearing assembly had never lasted longer than 6 months, the ERIKS redesign was recently inspected after 9 months of operation and still showed no sign of any problems.

Up against a brick wall

Another problem for the Bearings and Lubrication PBU was the catastrophic failure of a brick hammer mill, used for powdering clay before extrusion. In this case, the cause was slightly ironic. Lack of lubrication led to the failure – and the lubricant had been escaping from the oil sight glass, installed to check the lubrication level.

With the bearing unit housings completely destroyed, the customer discovered they had been made obsolete by the original manufacturer two decades earlier. Having replacements specially made would require a 6-month lead time, during which the entire £19.8m factory would have to shut down.

Called in to solve the problem, ERIKS' not only designed and manufactured a new housing, but also changed the original design to make it quicker to fabricate and less likely to fail again.

The new design was made from solid steel, suitable for ERIKS to manufacture in-house. Also, rather than relying on oil for lubrication, it was designed to use grease, to reduce the chance of lubricant loss. Using grease and a labyrinth seal provides two advantages:

1. Even if the seal starts to fail, the grease won't escape – so the failure mode won't be repeated.
2. Automatic lubricators on the seal enable the grease to act as a purge of contaminants from the dusty operating environment.

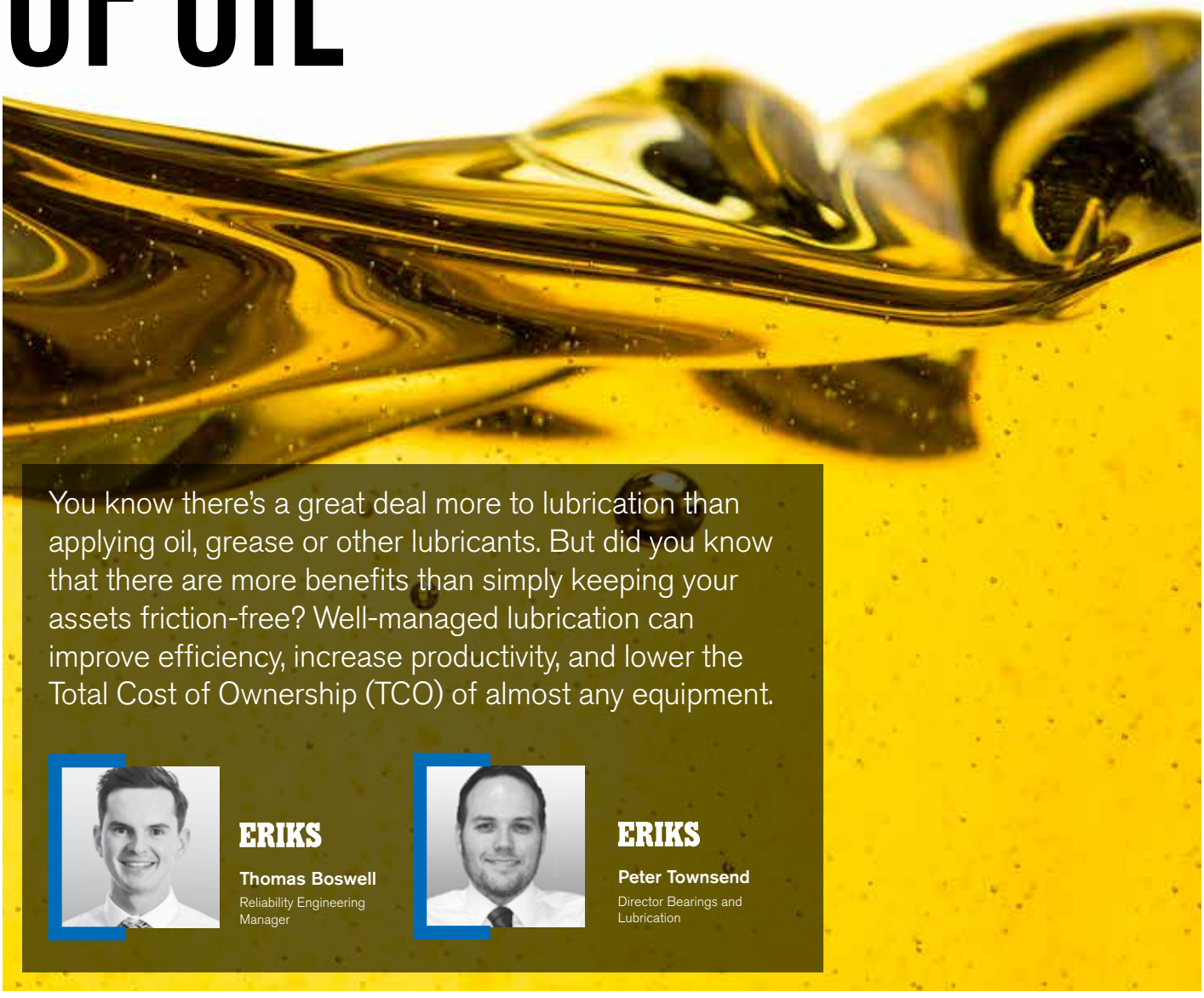
> "AVOIDING A POTENTIAL TOTAL SHUTDOWN AND MAJOR FINANCIAL LOSS"

Fabricating 5 new 150kg housings, rather than waiting for them to be cast, meant ERIKS could design, manufacture and fit all 5 within 6 weeks, avoiding a potential total shutdown and consequent major financial loss.

At the last inspection the bearing units were still operating perfectly, and should carry on for at least a decade before needing replacement.

By which time, the ERIKS Bearing and Lubrication Product Business Unit will have solved hundreds more bearing problems, on dozens more assets as different as chalk and cheese, brick mills and boats.

WHEN TCO MEANS "TAKING CARE OF OIL"



You know there's a great deal more to lubrication than applying oil, grease or other lubricants. But did you know that there are more benefits than simply keeping your assets friction-free? Well-managed lubrication can improve efficiency, increase productivity, and lower the Total Cost of Ownership (TCO) of almost any equipment.

ERIKS

Thomas Boswell
Reliability Engineering Manager

ERIKS

Peter Townsend
Director Bearings and Lubrication

Many businesses believe the only way to save time and money on lubrication is to outsource the task. It's true that paying someone else to make regular rounds with an oil can or grease gun leaves engineers free for more important things with a greater influence on productivity.

Yet looking beyond the grease nipple and the oil valve – with the ERIKS Lubrication Service – can provide far greater benefits: from higher asset productivity to greater reliability, and from reduced downtime to significant TCO savings.

The 6 critical lubrication points

The ERIKS Lubrication Service does much more than simply keep lubricants topped up.

After all, if you're using the wrong lubricants, too much lubricant or too little, lubricating too often or not often enough, then the last thing you want is lubrication as usual. That's why the ERIKS' service covers 6 critical points, starting with an in-depth review of your lubricated assets and lubrication regime.

1. Review

Experienced ERIKS engineers – trained, certified and skilled in lubrication management and field lubrication – review your current situation. They'll look at how many lubrication points you have, your current lubrication practices and schedules, which lubricants you use in what volumes, from which suppliers, and at what cost.

> "TRAINED, CERTIFIED AND SKILLED IN LUBRICATION MANAGEMENT AND FIELD LUBRICATION"

2. Audit

After reviewing your current lubrication operations, ERIKS' engineers will carry out a full on-site audit. This will assess the number of assets, number and type of lubrication points (nipple, gearbox, hydraulic, automatic), and their accessibility. The audit will also record individual asset data such as running times and Mean Time Between Failure figures. Lastly, the engineers will investigate opportunities for lubricant consolidation and inventory reduction, and investigate preferred suppliers.

3. Plan

Based on knowledge gained from the review and audit, ERIKS' lubrication specialists can now look at the opportunities for improvement, and plan for implementation of the new lubrication regime. Improvements may include lubricant consolidation, optimised lubrication volumes and frequencies, and revised lubrication schedules, routes and tours.

> "CHANGING THE LUBRICATION SCHEDULE FROM TIMETABLE-BASED TO CONDITION-BASED"

Advice will be provided on storage, disposal, handling and spills, and Best Practices will be introduced.

> "ONLY A MATTER OF TIME BEFORE BENEFIT AND COST-SAVINGS ARE REALISED"

These may include colour coding to reduce errors, automation to ensure optimum lubrication and reduce manual labour, and Health & Safety and regulatory compliant processes and procedures. A key improvement will be changing the lubrication schedule from timetable-based to condition-based.

4. Commission

With the plan agreed, the next step is to commission whatever's required to make it a reality. This could mean installation of single-point or automatic lubricators to simplify the lubrication process. It could mean applying QR codes, labels or tags to assets, to ensure the right lubricants are always used on the right machines. It may entail modifying – or even creating – lubricant stores. And of course it means ensuring that all employees affected are fully aware of Best Practice, and ready to implement it.

5. Implement

Once the other critical points have been addressed, putting the lubrication service into action is the simplest step of all. And it will only be a matter of time before the first benefits and cost-savings are realised.

6. Monitor, manage, continuously improve

Even with the systems and processes in place, the work isn't over. ERIKS Lubrication Service will continue to monitor assets, manage the service, and look for improvement opportunities. These will range from increasing lubrication efficiency, asset reliability and productivity, to reducing lubrication costs and, most importantly, reducing asset TCO.

Crumbs!

Now available nationwide, the ERIKS Lubrication Service has been trialled in several areas, with impressive results. One notable example is the biscuit factory in Scotland which adopted the service.

The TCO of their assets has significantly reduced. And the fact there have been no mechanical-based equipment failures in the 12 months since the service began, is just the reliability chocolate covering on the biscuit.

THE **APPLICATION ENGINEER** WILL SEE YOU NOW

Miracle cures at the Know-How Surgery

ERIKS are well-known for their capabilities in procurement, stores and inventory management. But did you know they also run surgeries? They can't help you with that nasty rash but, as multi-product specialists, their expertise can save you money and reduce your downtime, through a Know-How Surgery Day.

"GAIN ACCESS TO ERIKS' KNOW-HOW"

Surgery Days are a great way to gain access to ERIKS' know-how, without spending valuable time visiting an ERIKS location. Instead, the team will organise relevant application engineers to visit you, scheduling 30-minute appointments to discuss your specific application issues.

Invitations are sent out in advance to key personnel, and – based on knowledge of the customer's product group purchasing, on-site applications and equipment needs – ERIKS will ensure that engineers with the relevant know-how are in attendance on the day.

For example, a recent Know-How Surgery Day for a well-known pharmaceutical and beauty products manufacturer involved application engineers from Sealing and Polymer, Power Transmission, Flow Control and Fluid Power Transfer and Control Product Business Units.

Ahead of the Surgery Day, the invitees were also contacted by phone to book appointments and gather brief details of their issues, so the engineers could prepare.

For this particular customer, topics ranged from a dry-running pump to perishing nylon tubing. From water ingress on motors during washdowns, to a pump and motor coupling problem. And from a leaking manifold to finding a suitable motor for a proposed new automated wash system.

"ERIKS PROPOSED OR ACHIEVED SOLUTIONS FOR ALL THE ISSUES"

By the end of the day, the ERIKS engineers had proposed or achieved solutions for all the issues. At one extreme, this was as simple as locating a manway seal in the stores, which saved the customer from buying-in a new seal. At the other, it involved arranging a further visit from a pump manufacturer to investigate the dry-running pump issue at first hand, with a view to reducing downtime and increasing efficiency.

For the new wash system planned for 2019, ERIKS early involvement means that when the time comes to specify the motor, the Business Unit will have all the information to hand, ready to propose the most suitable solution for reduced downtime and longer life.

All these problems were resolved without any need for the customer's personnel to spend time off site. More issues were dealt with, for more people, in less time because – unlike an off site surgery – everyone with a problem could attend. And the outcomes were downtime avoided, efficiency increased, and total cost of ownership reduced.

So the Know-How Surgery can even cure headaches and pains in the neck.

LESS TESTING TESTING

Putting rotating equipment through its paces in a test scenario is a key element of manufacturing and repair. Now ERIKS are making it easier and more efficient, with a new testing facility at the ERIKS Power Transmission Centre of Expertise in Kingswinford.

ERIKS

Mark Maher

Technical Manager Power Transmissions

New and newly-repaired rotating equipment requires testing for a range of reasons: from checking its operation against the specified parameters, to elements of ATEX certification. However, on-site testing after installation is not just difficult and inconvenient.

It's also too late.

If there are issues which need resolving, the best time to resolve them is before the asset is delivered and installed. Which means that's also the best time to test it. So ERIKS have invested in a leading-edge test facility for rotating equipment, to save customers time, trouble and cost.

> "THE BEST TIME TO RESOLVE ISSUES IS BEFORE THE ASSET IS DELIVERED AND INSTALLED"

> "A LEADING-EDGE TEST FACILITY FOR ROTATING EQUIPMENT"

Heavyweight testing capabilities

ERIKS can already test rotating shafts in the workshop, connected to a 200kW motor but not subject to a load. In the new test facility, power transmission shafts can be tested with a load of up to 5,000Nm, or 55kW.

This produces data that's more relevant for ERIKS' engineers, and for customers too.

It's also data achieved in a sustainable way. Rather than drawing a full 55kW of power to drive the motor, the new test facility recirculates energy, so the only power needed – once the motor is operating and the shaft rotating – is what's required to top-up any losses.

This helps to reduce energy use and ERIKS' carbon footprint, without in any way affecting the validity of the testing.

Data, delivered

In-depth data on industrial equipment has in the past been provided by University Engineering departments. But cuts to their budgets have left a gap in their resources – and therefore a gap in the information available to end-user customers.

ERIKS' new testing facility fills that gap, by producing valuable, accurate product test data. And with ERIKS eConnect, the data is readily available in the cloud to anyone who needs it.

> "VALUABLE, ACCURATE PRODUCT TEST DATA"

Now a customer no longer needs to spend time travelling to the facility to see a test taking place, or wait for a written report. Instead they can simply log-in remotely and watch live-streamed testing, with the test data displayed on a dashboard even as it's being created.

Passing the test

Decades of condition monitoring experience at customers' sites have helped ERIKS to develop the expertise to test anything that can be measured. Now this new test facility places ERIKS at the forefront of rotating equipment testing.

It not only ensures that new products perform as specified, meet customer needs, and satisfy legislative or certification requirements. It also helps ERIKS to design and engineer the right products for customers' needs, at the right prices for customers' budgets.

IN FOCUS
DEMYSTIFYING INDUSTRIAL DIGITALIZATION

TRANSLATING INSIGHT INTO GROWTH

It was Turing in the 1950's who originally cited the idea of thinking machines, but it is only in the 21st Century that computer and technology advancements have made it possible. Its scope is far-reaching and offers a wealth of benefits across industry, not least in the manufacturing sector.

Realising its potential is now one of the biggest challenges industry faces.

Reflecting the enormous challenge, UK Government, in the Autumn Budget, committed an investment of £1.1 billion to the Industrial Strategies Challenge Fund to help support the development of technologies in the future. As part of this, up to £121 million has been allocated for the Made Smarter programme supporting the transition of manufacturing into a digitally-enabled future. The budget also outlined an investment of £50 million to a new Turing AI Fellowships scheme, with the intention of bringing some of the best global researchers in Artificial Intelligence (AI) to the UK.

It's an interesting rhetoric which, presented as part of the budget announcement, places an increased focus on the UK's vested interest in the sector and the establishment of digitally-enabled technology (including AI) throughout the UK. This is not an overnight adoption however, there are some fundamental basics that need to happen to spur the revolution on. We aren't for example going to have a truly connected industrial world if we don't have a decent network to enable the transfer of data.

> "THE RISE OF THE INTELLIGENT MACHINE S UPON US AND REACHES ALMOST EVERY ASPECT OF OUR LIVES"

Evolving our digital skillset

The rise of the intelligent machine is upon us and reaches almost every aspect of our lives, from Siri on our phones, to Alexa in our homes and, of course throughout the manufacturing sector. In fact, while for many this may seem like a giant leap, the reality of the situation is that we are already using some of these technologies. Programmable controllers and sensors, used throughout industry for the purpose of predictive maintenance for example, already provide a level of data, but it is often humans that have to analyse it.

The ability to process information and analyse numerous streams, simultaneously, is the power of AI. In simple terms and avoiding the mirk of industry buzzwords, artificial intelligence can be easily broken down. If we consider that Industry 4.0 relates to the deployment of automated technology, artificial intelligence enables its connection and analysis – helping industry to make sense of it all. In short, it becomes the brain of the automated factory.

That's not to say that humans will not have a place in the future industrial environment, it's just that the skills required will change somewhat. With a greater focus on digital enterprise and computer science, industry will require more people with this skillset but that's not to say that current roles will become redundant, more that they will evolve.

> "UPSKILLING THE EXISTING WORKFORCE CAN REAP DIVIDENDS IN THE FUTURE"

Upskilling the existing workforce with digital skills, even on a basic level today, can help reap dividends in the future. In fact, in some recent research conducted by UK Government, entitled the 'Digital Skills Crisis' 12.6 million people in the UK lack basic digital skills and yet, in the same report, it is cited that 90 per cent of new roles require them.

The challenge therefore is two-fold – firstly to attract individuals with digital skills into manufacturing and secondly to upskill the existing workforce. In truth, those new to the sector may also require some knowledge of engineering, so it could be a two-way street.

The greatest asset

The benefits of AI are potentially numerous, but real-time problem solving is perhaps one of the key attributes that can reap the greatest benefits. Informed decision making across a business will ultimately improve efficiencies and reduce wastage across the supply-chain. An interesting aspect of this however will be who manages the data and oversees operations, potentially shifting away from the factory floor to the management level, but this is yet to be seen.

> "INFORMED DECISION MAKING WILL ULTIMATELY IMPROVE EFFICIENCIES AND REDUCE WASTAGE"

In terms of interoperability, AI is potentially really exciting but the challenge is well-known. Industry must develop standards for which technology is bound, enabling the easy transfer of data across platforms. This is one of the biggest challenges faced by AI at this time, as without a common language, analysis of data across platforms will be incredibly complicated as the information sources and languages are potentially endless.

Data sharing will be an important element of this, and even in ERIKS own research, 79 per cent of respondents would only offer limited or no disclosure of information with their OEM equipment partner. Ensuring ease of access to data will be key to the success of AI and it's important therefore that industry begin to breakdown some of the barriers that are preventing this from happening.

The success or failure of AI, across borders is underpinned by the seamless transfer of data between equipment and suppliers, and so the topic of standardisation is significant.

AI presents a fantastic opportunity for industry, but we have a long way to go before it becomes fully established in UK businesses. The key now is baby steps, we aren't talking about an overnight evolution of technology, it will be a slow process and a journey that we are only just beginning.

AI will steadily change the face of the industry, it's just a question of when businesses will start their own journey.

HOW TO IMPROVE YOUR RELATIONSHIPS

This isn't advice on dating, but on data. To be specific, on making data more useful to you and making it work harder for you. And it all comes down to relationships.

ERIKS
David Manning-Ohren
Business Development Manager

When it first became possible to gather industrial data digitally, people collected it for specific purposes. To help with production monitoring or asset maintenance, for example.

Then as more data became available, and collecting and storing it became quicker and easier, they began collecting all the data that's going. "Just to be on the safe side."

But like trying to get a glass of water from Niagara Falls – or trying to start a relationship on Tinder – that can leave you drowning in too much of the wrong data, when what you really want is to be able to access only what's necessary for your requirements.

It can also leave you with lots of separate silos of data, when what's really needed to make data work effectively is (you've guessed it) relationships.

The future of data

Basically there are two types of data: fixed and moving.

Fixed data, as the name suggests, is data that doesn't change. Your fixed data might be a list of part numbers for an asset. ERIKS' fixed data might be the same part numbers, but also cross-matched with your location so we know where to deliver them when you order. That's a simple relationship which can make even fixed data harder working and more valuable.

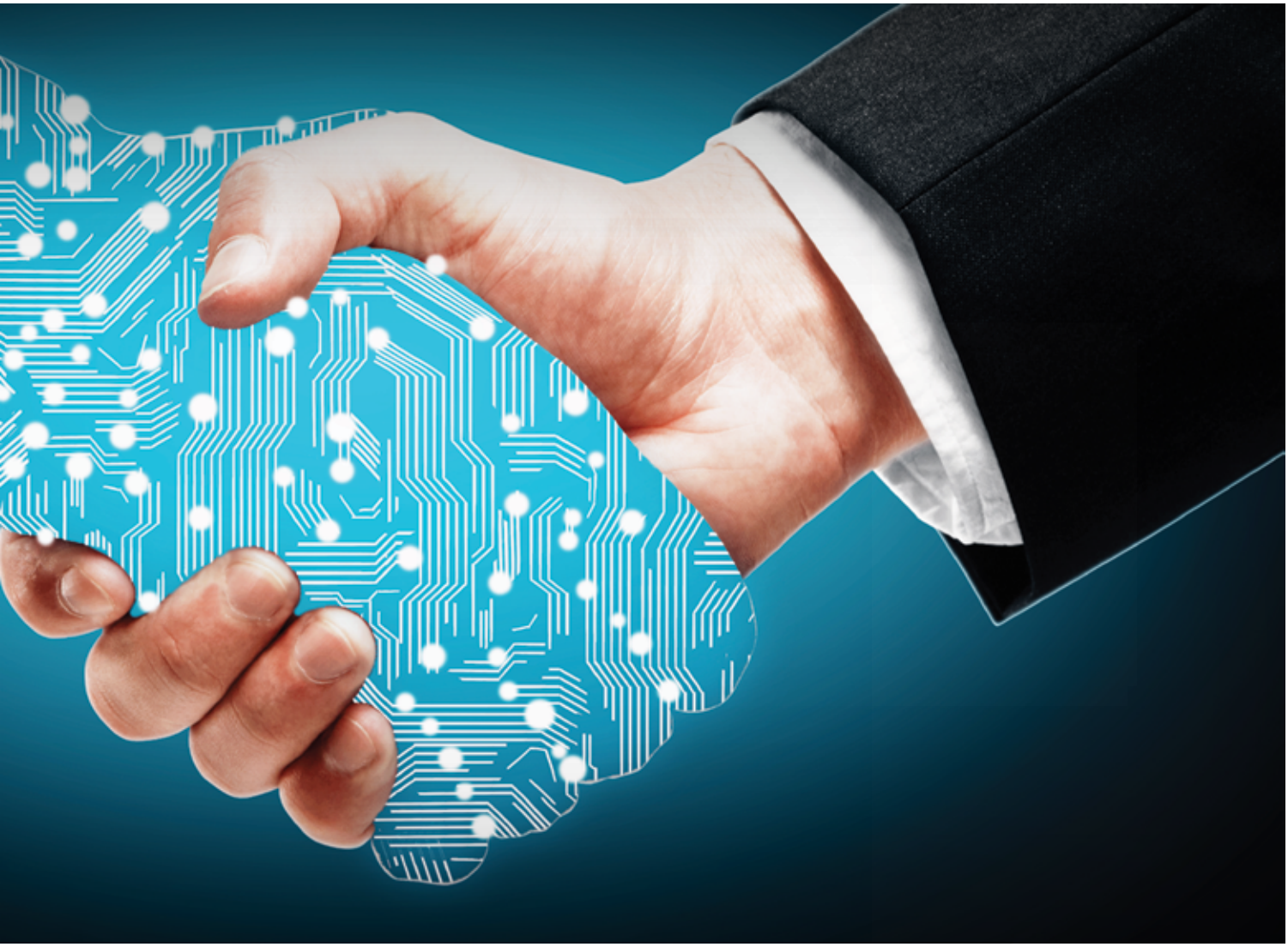
> "ADD INTELLIGENCE AND DATA INSTANTLY BECOMES IMMENSELY VALUABLE"

Moving data is more complex. It's data which changes over time, such as energy inputs or power outputs. If you can establish a relationship between those two, then you've added intelligence and the data instantly becomes immensely valuable.

To add even more value, it's important to consider the future. Right now, you might only want to know one thing about one particular asset. But needs change. So it's worth thinking ahead.

You could be collecting motor and pump data, for example. They're costly, often process-critical, components, and they're ones you'll clearly want to maintain at peak efficiency, and want to repair or swap-out quickly in the event of failure.

But isn't that motor connected to a driveshaft? Doesn't that driveshaft have gaskets? Isn't the pump connected to valves? A failure of any one of those components could halt production just as effectively as failure of the motor or pump itself. Having the relevant data readily to hand could help to get it quickly up-and-running again.



Where do you want your brains?

Putting specialist engineers on the ground – putting brains in boots – is expensive. More intelligent data collection – putting brains in your data systems – is less costly and often even more effective. Having more accurate, more connected data available can help you to make more informed and better decisions.

But who do you trust to provide that data and build the relationships between it?

> "MAKE MORE INFORMED AND BETTER DECISIONS"

Take a conveying system as an example. The OEM will have all the data on the conveyor itself. What they won't have is the bigger data picture: information on the belts, the rollers, the gearbox, the motors, and all the other connected assets which are the parts which form the whole.

It's not in their experience, it's not in their interests, so it's not in their data collection remit.

> "CROSS-DISCIPLINE EXPERTISE TO GATHER AND INTERPRET THE DATA"

ERIKS, on the other hand, can understand, maintain, repair and replace all those components. Because we know the failure modes, we know where monitoring will be most effective to provide the most valuable data. Because we understand the system as a whole, we have the cross-discipline expertise to gather and interpret all the data.

And because above all we're engineers, we know how to act on the data to service, maintain, repair or replace assets. To keep your whole system operating at optimum efficiency at all times.

Choose an ERIKS asset survey, and the result won't be just a collection of figures. It will be an intelligent connected resource to enable equipment optimisation, monitoring and maintenance in an ongoing process. It may even be the start of a beautiful (business) relationship.

IS YOUR BUSINESS 1IN3?

FESTO

Richard Causley
Relationship Development Manager

Only one in three manufacturers has a high-availability manufacturing IT strategy or solution in place. Yet the average manufacturer deals with more than 15 hours a week of downtime, and unplanned incidents are on the rise. When Festo looked into their maintenance programme and processes, they achieved a 15% increase in Overall Equipment Effectiveness (OEE). Here's how they did it.

Scharnhausen, Germany, is the location of one of Festo's latest production facilities. It's also the location for an Industry 4.0 initiative which saw state-of-the-art production technology integrated with a forward-looking maintenance programme and processes. The aim was to improve Total Production Maintenance (TPM) and Overall Equipment Effectiveness.

The first step was to equip maintenance engineers with the latest digital technology, to help improve maintenance efficiency and provide immediate access to information and resources. The iPad tablets now carried by Festo's service and maintenance personnel are connected by Wi-Fi to over 100 machines, and to the factory's Manufacturing Execution System (MES). This gives engineers access to information including up to 15 years' worth of service history, manuals and repair instructions for each machine, notification of pending and current problems, and scheduling of maintenance tasks.

Being able to email and chat while on the move also makes it easier for personnel to collaborate on maintenance tasks, while direct access to the MES allows real-time information uploads and parts stock checks.

> "THIS INITIATIVE SAW A SIGNIFICANT ROI, IN FOUR WAYS"

Less than 6 months to save

In less than six months, Festo's initiative saw a significant ROI, in four different ways:

1. Less travel time

An immediate saving came from a reduction in time wasted travelling around the site. Instead of walking back to the central maintenance office between jobs, the maintenance engineers' iPads enable them to communicate wherever they are, so they can stay on the factory floor and continue working.

2. Reduced repair time

The software allows immediate access to all the information the engineers need. It also increases the maintenance team's efficiency, by enabling them to share knowledge. Data in multi-media formats allows photos and videos to be saved against maintenance tasks, which accelerates time to fix by spreading knowledge between personnel and across shifts.

The instant chat function enables colleagues to provide remote support to overcome obstacles.

3. Improved efficiency

Data recorded from maintenance checks and error messages can be collated over time. This big data helps further improve efficiency.

"BIG DATA HELPS FURTHER IMPROVE EFFICIENCY"

4. Improved OEE

Overall Equipment Effectiveness is a Key Performance Indicator for Festo. Thanks to this initiative ensuring greater availability during planned production time, OEE increased by 15%. Carrying out preventative maintenance during non-producing periods, rather than reactively, increased availability, and in some areas disruptive downtime due to unscheduled maintenance has been virtually eliminated.

A maintenance revolution

Utilising smart sensors and artificial intelligence – to analyse machine performance and predict issues before they happen – is one of the key benefits of Industry 4.0. Artificial Intelligence can balance the criticality of a failure with production priorities, to enable informed, real-time decisions that maximise OEE.

The optimum maintenance regime is a blended solution of:

- regular observation, inspection, cleaning, lubricating and adjusting by operators
- planned replacement of gaskets, seals, lubricants and filters, and
- deployment of the maintenance team based on advanced analytics and diagnostics.

"THE OPTIMUM MAINTENANCE REGIME IS A BLENDED SOLUTION"

Going beyond the digital

Optimisation of productivity can't happen purely as a result of digitisation. It also depends on employees' motivation, training and skills to engage with the technology. Good operators not only know how to operate their machinery, but also understand how it works and how to provide first-line support.

For Festo, the Scharnhausen production facility is also a 'Learning Factory', where employees can upskill and acquire practical knowledge. Festo has its own training and consulting division – Festo Didactic – which trains operators on new technology, and continuous learning is part of the culture for all employees.

When new technology is being implemented, Festo engages the teams in the process from the planning and implementation right through to the operational phases. This helps to fine-tune requirements, and ensures employees understand and feel engaged in change and its objectives – ensuring smooth integration and reducing resistance to change.

With the advance of Industry 4.0 now unstoppable, change is inevitable and so is the need to understand and accept it. It's all part of making every piece of equipment and every manufacturing facility as efficient and productive as they can be.

1. https://www.industryweek.com/information-technology/manufacturer-it-applications-study-finding-real-cost-downtime
2. https://due.com/blog/understanding-the-financial-cost-of-downtime-in-manufacturing/
3. https://www.vorne.com/solutions/reduce-down-time-in-manufacturing.htm

Why technology will never replace technical skills

A 19:1 ratio of planned to unplanned maintenance is commonly considered to be world-class. But few factories are operating at this level, and every manufacturing company has its own approach to optimising production and increasing productivity.

Many simply focus on fixing breakdowns as quickly as possible, though smart maintenance – based on machine monitoring and failure prediction – is increasingly being employed.

But even in the smartest factory of the future, where technologies such as augmented reality may be used to support maintenance, organisations will still rely on engineers who know about the technology involved and have:

- the fault-finding skills to understand the cause of the problem and the options available to fix it
- the ability to identify failed parts or use their knowledge to source functional equivalents
- the practical skills to carry out the repair
- the ability to restart the machine in a safe way and ensure it is running optimally

A STEP-BY-STEP APPROACH TO INDUSTRIAL DIGITALISATION

Digitalisation of industrial processes doesn't have to be all or nothing. In fact, manufacturers who are selective in their approach to implementing digital technology are more likely to profit from a more cautious strategy, taking the process step-by-step. Victoria Van Camp, CTO and President of Innovation and Business Development at SKF, explains why.

Victoria Van Camp
CTO and President of Innovation and Business Development

Digitalisation is now a fact of life for manufacturers big and small. Yet "going digital" means different things to different organisations.

For businesses with big budgets, and with flexible workforces less resistant to change, Industry 4.0 can mean implementing an all-encompassing, enterprise-wide digital manufacturing model. This might be appropriate for them, but going all out for digital transformation is not for everyone.

> "GOING ALL OUT FOR DIGITAL TRANSFORMATION IS NOT FOR EVERYONE"

One manufacturer might want to cover the minutiae of their commercial operations, production scheduling, or even engineering- and maintenance related functions. Another might want to digitalise operations to boost productivity and efficiency, improve product quality, or rationalise supply chain activities.

Adopting a digitalisation strategy that covers all these needs at a stroke might seem fully in tune with Industry 4.0 thinking. But a more rational approach may be to build up to a level of digitalisation. And to do it at a pace that maintains the business's ongoing success and the wellbeing of its employees.

Pick from the digital toolbox

This more measured approach involves dipping into a "digital toolbox" – choosing from the many available technologies to achieve specific goals.

> "OPEN UP NEW HORIZONS FOR PLANT OPERATIONS AND MAINTENANCE"

A digital toolbox is a suite of products and services (sensors, measurement equipment, reporting software etc.) that can be individually selected, as and when needed, to help you make incremental improvements to overall performance and efficiency.

A prime area for the digital toolbox digitalisation approach is condition monitoring. Using digital technology, this can now go far beyond instantaneous machine health monitoring, to open up new horizons for plant operations and maintenance. Algorithms now available to predict machine health trends are so accurate, they can be used with complete confidence as the basis for maintenance scheduling.

All-inclusive package

SKF is currently helping its customers to introduce digitalisation strategies without the need for a large capital investment. Instead, all the infrastructures they need to acquire data from a particular area of operations, process it and act on it become part of an all-inclusive service package.

> "AN ALL-INCLUSIVE SERVICE PACKAGE"

One example is SKF's Rotation for Life programme: a performance-based contract that enables a company to move towards digitalisation at whatever pace it chooses. All they have to do is pay a monthly fixed fee, for digital technologies focussed on improving the performance and availability of rotating equipment.

While big data is unquestionably the new industrial currency, it has to be properly interpreted to have any practical value. So digital technology implementations are vital for data gathering and number crunching.

But it's the remote diagnostic capability (using expertise from companies such as SKF) that can make all the difference.

Simply assessing equipment performance locally in real time is a small step. Having the data expertly interpreted at a remote location, and translated into effective maintenance recommendations, is a giant leap.

Drowning in data?

Some industrial customers are already struggling with the volumes of data that implementing digital technology can generate. Understandably, they may be reluctant to add to it. Yet it doesn't have to be this way. All it takes is a little bit of consideration about how the data is going to be used.

As the first stage, SKF recommends conducting a process audit. Process knowledge and process data are vital to understanding how a machine is currently performing and – more importantly – how that performance might be improved.

> "DIGITALISATION IS NOT A MAGIC WORD"

Digitalisation is currently a buzzword, but it's not a magic word that changes everything. It's really no more than a tool to boost machine performance, and to make life a little easier for maintenance staff by giving them ready access to reliable data.

If you're a manufacturer, you have far more important things to worry about than your machinery's bearings and lubrication. You just want your rotating equipment to work and work reliably. Digitalisation is the tool that makes it happen – and now it's available to you straight out of the toolbox.

INDUSTRY 4.0 – ARE YOU READY 4 IT?

SMC

Pete Humphreys
Strategic Product Sales Manager

Pete Humphreys, Strategic Product Sales Manager at SMC Pneumatics UK Ltd, takes a look at how UK manufacturers can optimise the opportunities and deal with the challenges of Industry 4.0.

Industry 4.0 promises – or threatens – to revolutionise the way we all do business. But is it really the Fright Night scenario many organisations seem to believe? Or is it an exciting opportunity to provide the ultimate added-value service to our customers, wherever they are in the supply chain?

Not new, just different

Industry 4.0 is not new technology. It's simply a new business philosophy bringing together all the different processes in the manufacturing and supply chain, wherever they're located, in a way that wasn't possible before wireless technology.

> "INDUSTRY 4.0 IS NOT NEW TECHNOLOGY"

What makes the philosophy attractive is that many aspects are straightforward.

For example, Maintenance Engineers currently carry out preventative maintenance regardless of whether a machine needs it. In the Industry 4.0 scenario, the machine will instead self-monitor its condition, order a replacement part when required, and even alert the Maintenance Engineer to schedule its fitting.

> "ENABLING MANUFACTURING BUSINESSES TO OPTIMISE PRODUCTIVITY AND CUSTOMER SERVICE"

This optimises productivity, minimises equipment downtime, and increases the efficiency of the Maintenance Engineer's essential role.

Integration and communication

SMC's end-user customers are already asking us about Industry 4.0, and how we can use it to better serve their accounts. They're very aware that the added value it can provide is not limited to larger multi-nationals.

This means businesses like ours have to be ready to show that our production systems can integrate and communicate with customers' systems. Our sensors and networks need to be able to talk to customers' Enterprise Resource Planning software, to facilitate prediction of component demand – leading to optimised productivity.

Industry 4 example

When a Sales Engineer receives a customer order, he loads it onto the company's CRM system using his tablet computer.

The data is used to procure the raw materials, create the works order, schedule delivery and communicate with the logistics function to make the delivery to the customer.

The factory is already set up to make the components, but the works order now tells the production line the exact specification required for the next two units. The production line software will then decide when is the most efficient time to manufacture them. It may be immediately, to avoid a tool change, or it may be later in the schedule if other similar components have also been ordered.

This is how Industry 4.0 can enable manufacturing businesses to optimise productivity and customer service, and at the same time reduce unnecessary machine downtime, and provide an instant, real-time picture of the whole business process.

Three into 4.0

Already supplying components for smart production lines, SMC is continuing to develop new products to move the process on.

Serving customers at all points in the supply chain – from OEMs and distributors to end users – we're perfectly placed for an holistic view of the opportunities Industry 4.0 brings. In particular, opportunities thrown up by its intelligent self-diagnostic systems.

We believe there are three key market drivers industrial manufacturers need to consider:

1. **Identify the main benefits to your business:**

   - Greater production flexibility
   - Reduced rates of defective goods
   - Cost optimisation across the whole business
   - Reduction of capital tied up in plant

2. **Decide which of the Industry 4.0 basic technologies are the most appropriate for your business:**

   - Smart sensors feeding data back to intelligent machines (e.g. robots and smart manufacturing systems)
   - 3D printers
   - Cyber-physical systems – computers and networks running and monitoring a physical process
   - SMAC – social, mobile, analytical and cloud-based systems running software applications

3. **Manage your customers' expectations of what Industry 4.0 can deliver:**

   - Higher quality bespoke products
   - More customer-focussed service
   - Sustainable production methods
   - Instant real-time reporting

Analysis of these three key drivers against your own business needs will enable you to create a strategic plan that smoothly and successfully moves your business into the Industry 4.0 era.

At SMC, we're already changing the way we work, and developing a long term strategy to keep us competitive and viable. If industry as a whole wants to compete in today's cyber-driven world, now is the time to start taking these steps. Because Industry 4.0 is already here – and here to stay.

WHAT CAN WE LEARN FROM MACHINES?

WHY WE'VE ALL BEEN ASKING THE WRONG QUESTIONS UNTIL NOW...

Artificial Intelligence excites many, inspires many, and concerns many others. But it's already here, so we need to learn to make the most of it. However, we've all been going about it the wrong way, by asking the wrong question. The question isn't will machines become more intelligent than us, but how will intelligent machines help us become more intelligent?

rexroth
A Bosch Company

Richard Chamberlain
Strategic Product Manager
(Service)

Artificial Intelligence (AI) is founded on machine learning – when software is given the ability to solve complex problems, undertake increasingly complex processes and tasks, and crucially, learn.

Machine learning software starts like an infant: exploring its systems and surroundings, and learning pathways and protocols. Then it "grows up", and learns ever-more efficient ways to achieve tasks and solve complex problems. And it never stops learning.

"AI IS JUST ANOTHER KIND OF LEARNING MACHINE"

AI is just another kind of learning machine, created within set parameters for a purpose we define. It could be an e-commerce platform that learns what a customer likes ("because you liked X, we thought you might like Y"), or an industrial maintenance routine that keeps machines moving. So how do we create machine learning and, by extension, AI?

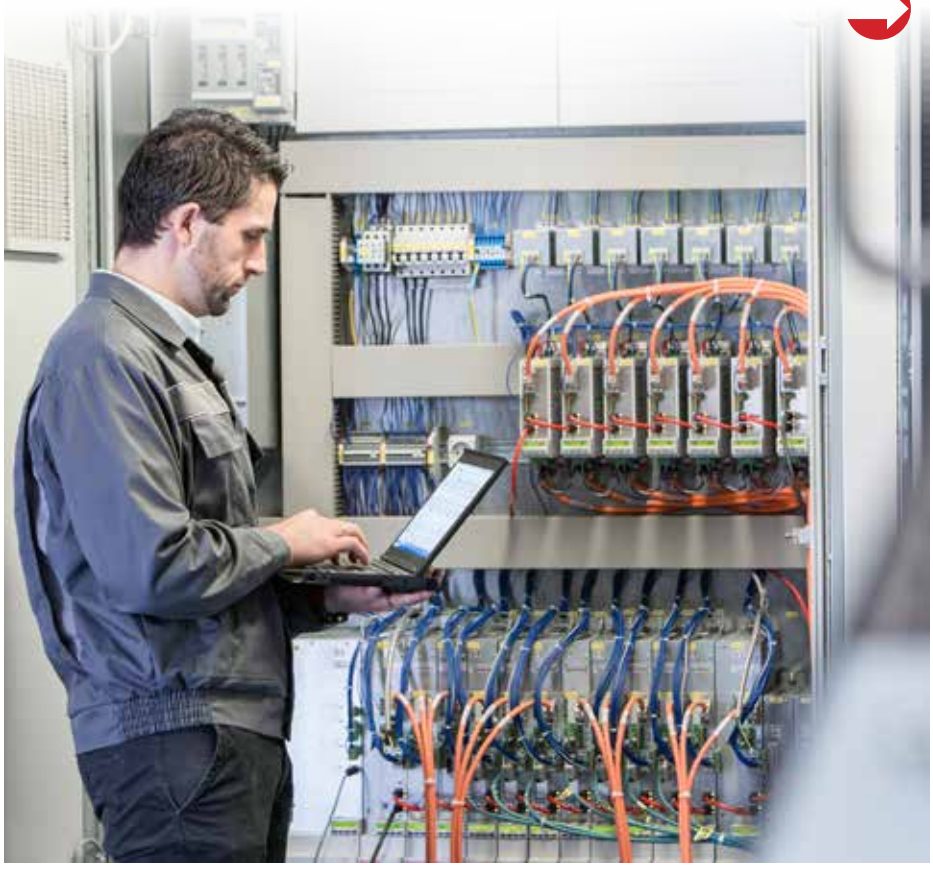
Building on data

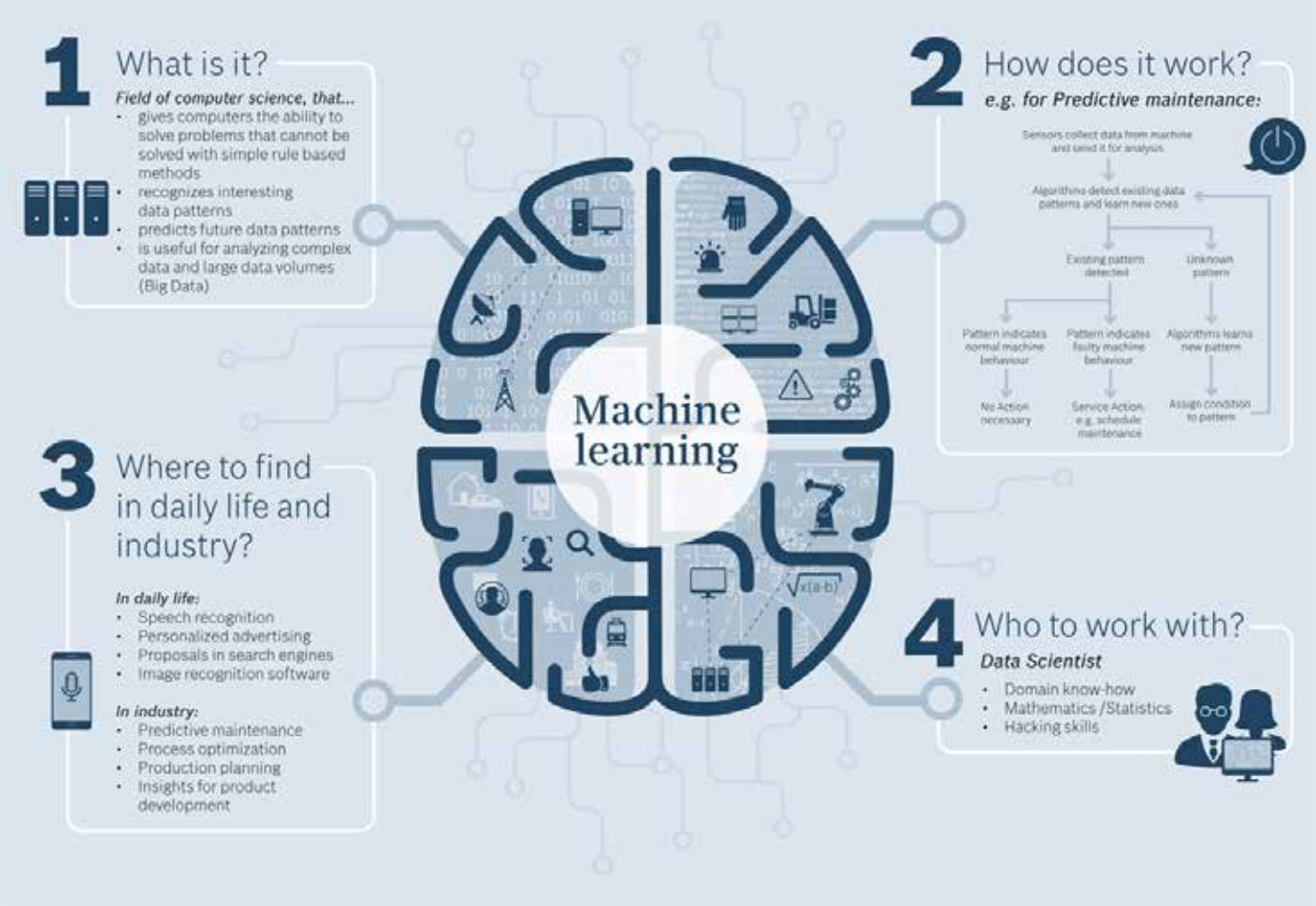
Machine learning is built on, or from, big data. The sensors at the core of Industry 4.0 collect huge, comprehensive data sets, which then must go through a three-step process to make them useful:

Step 1. Visualise – put data in a form where we can see it and work with it
Step 2. Evaluate – evaluate its patterns and purpose
Step 3. Act –to change systems in line with findings.

And then – repeat.

This is made possible by the other main components of machine learning: algorithms and mathematical models. From these bases, combining huge computing power with precision training, software learns to use the data for itself. Seeing and connecting patterns, pathways and predictions, it takes over the processes of visualising, evaluating, acting, improving and learning. It is becoming AI.





"SOFTWARE LEARNS WHO YOU ARE, WHO YOU KNOW, AND WHAT KIND OF PRODUCTS YOU MAY LIKE"

Theory, in practice

Where can you find machine learning like this in the real world?

It's already at work in social media and e-commerce, where software learns who you are, who you know, and what kind of products you may like. It's also being applied within industry – across condition monitoring, predictive maintenance and quality management – to give users visibility and control over their data and to deliver the three key benefits for which manufacturing is always striving:

- reduced costs
- increased quality
- increased output

A "health index" program for predictive maintenance, for example, combines data, algorithms and models into software that can proactively monitor and predict asset condition. Factoring in multiple variables, observing usage patterns and making relevant connections, it can alert the customer when asset health will degrade past a threshold.

A key advantage is the accuracy of fault-finding and prediction.

Detecting a fault by chance in any given case carries a probability of 13%. Expert human monitoring increases the success rate to around 43%. But machine learning increases fault detection to over 95%. So there's greater transparency over the long-term health of equipment, which reduces costs while improving quality and output.

Machine intelligence starts with human intelligence

The possibilities for machine learning in industry are limitless. But the most important factor is finding the right partner to work with.

Of course you need data scientists to gather, visualise, evaluate and act on data, but there's a bigger picture too.

"THE POSSIBILITIES FOR MACHINE LEARNING IN INDUSTRY ARE LIMITLESS"

As well as software, there's hardware, sensors and technology to be connected in an end-to-end system. So a single-source, turnkey solution is ideal.

Similarly, flexibility of service to build systems for specific needs is vital. As are experience and expertise to solve problems and pain points, and to apply relevant use cases to deliver the right solution.

So while machine learning is built on data, AI starts with HI: human intelligence. The value of machine learning in our connected world is that the smarter our software gets, the smarter we can work. And the smarter we can work, the greater the benefits for our industries, our lives and our world.

DESIGNED FOR WHEN YOU KNOW WHAT YOU'RE PUMPING... AND WHEN YOU DON'T

TSURUMI PUMP
STRONGER FOR LONGER

TSURUMI SUBMERSIBLE PUMPS
3 YEAR
GUARANTEE

OBART
PUMPING SOLUTIONS

FLUID CLEANLINESS AND THE CLOUD

THE FIRST INDUSTRY 4.0 FLUID MONITORING SOLUTION

Monitoring and maintaining fluid cleanliness are critical to improving the operation and reliability of manufacturing systems. Now an Industry 4.0 solution from Pall is the first to utilise the IoT (Internet of Things) for more effective fluid monitoring.

ERIKS

Paul Dooley
Business Development Maanger Fluid Power and Industrial Hose

According to Fortune magazine[1], using IoT sensors to continuously monitor machine performance can:

- **reduce maintenance costs by up to 35%**
- **cut unplanned outages by up to 50%**
- **add years to the life of assets.**

But no-one has applied this technology to lubrication and hydraulic fluid cleanliness – until now.

Now the patent-pending Pall Crixus™ Fluid Monitoring Platform not only offers intelligent fluid monitoring, but also connects it to the cloud for 24/7 access and time-saving, money-saving, predictive analytics.

> "TIME-SAVING, MONEY-SAVING, PREDICTIVE ANALYTICS"

Healthcare, not A&E

A rigid time-based maintenance schedule is like an annual health check. There's nothing to stop you getting ill in-between. And waiting for a fault to develop and system downtime to result before acting is like waiting for a heart attack before you take more exercise.

Far more effective is to take preventative steps in advance. In industrial terms, that means monitoring fluids and lubricants for cleanliness and contamination, 24/7. Then instead of dealing with unplanned system downtime (which is like being blue-lighted to A&E), you can address issues before they become critical, to maintain system reliability and uptime.

The development of the IoT and the cloud makes this kind of monitoring more feasible than ever before. And the new Crixus Fluid Monitoring Platform makes it a reality for fluid cleanliness management for the first time ever.

> "A REALITY FOR FLUID CLEANLINESS MANAGEMENT FOR THE FIRST TIME EVER"

Information and experience

Crixus gathers the information you need to understand the condition of your fluids and filters, through a series of in-line process sensors connected to the Crixus Cloud predictive analytics platform.

That's where intelligent software translates the real-time data, maps it against historical trends, process variables and predictive algorithms, then presents it through a reporting and notification system to whoever needs to know.

Maintenance engineers, for example, can access fluid condition and filter performance from anywhere there's an internet connection, using desktop or mobile applications. There's also RFID technology built in to Crixus-equipped filter elements, plus 360° LED beacons in filter housings. So each individual filter in a system can be pinpointed and identified, and its performance verified locally using a tablet or smartphone.

Engineers can check the filter media grade, remaining service life and other data on the spot, helping to streamline maintenance and improve site efficiency.

> "60 YEARS OF PALL INTELLIGENCE PROGRAMMED-IN"

Of course data can only tell you so much. Where the Crixus data platform wins out is by having 60 years of Pall intelligence programmed-in to the predictive data analytics package. Combined with analysis of historical data trends, it enables greater accuracy in spotting potential issues, and far more effective planning of condition-based maintenance schedules.

User-programmable alarms also allow Crixus to be tailored to your individual system and its requirements.

Ahead of the game

By monitoring your fluid and lubrication systems 24/7, Crixus can provide you with instant notification of system issues or maintenance requirements. So it helps you to respond faster to reduce downtime.

But it also helps to reduce the likelihood of those system issues occurring. Using real-time data and historical data trends, it predicts when they might happen – giving you information to put even more effective preventive maintenance procedures in place.

With any asset, variables such as component wear and other factors mean that maintenance is more effective when it's fluid. For your fluid and lubrication systems, now it can be.

A day in the life of a systems engineer

7am Checks system status from home using smartphone. No overnight problems.

8.30am Checks status in office via desktop. Crixus web app shows decrease in fluid viscosity across stamping machine process. Alert triggered.

8.35am Requests fluid analysis.

9am Results indicate degrading of hydraulic fluid. Replacement required. Actioned.

11am On road to meeting, mobile signals an alert.

11.05am Calls site maintenance team (hands-free!) to notify of alert.

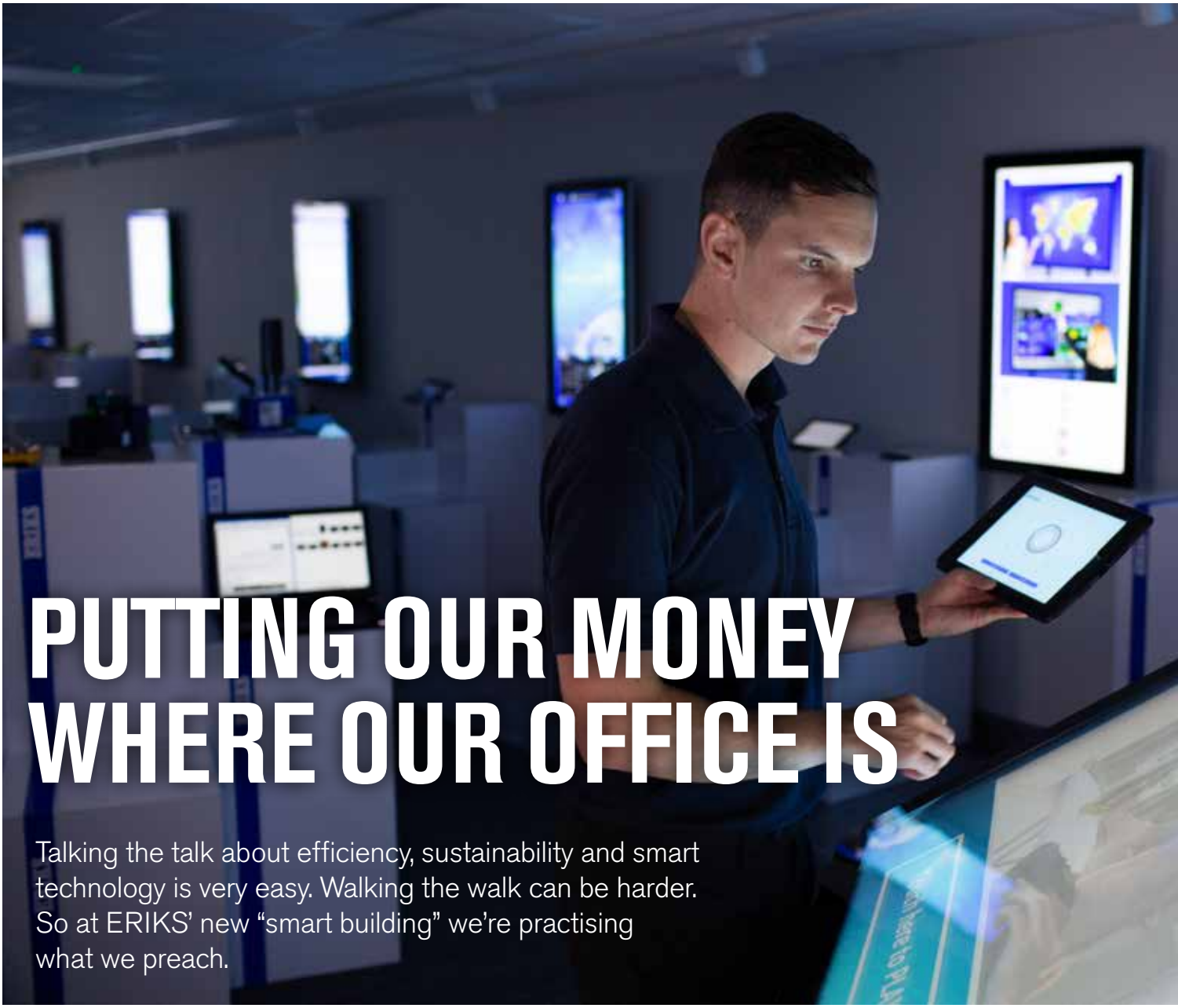
11.20 Team locates filter using Crixus mobile app. Identifies need for critical filter replacement.

2pm Back from the meeting, logs in via desktop. Sees that required actions have been completed and system status updated. Production running smoothly.

2.05-6pm Free to deal with all the other issues of a systems engineer's day, to keep production up and running the data is displayed immediately on a remotely accessible dashboard.

The result is more efficient testing, quicker results, faster and more accurate fault diagnosis, and less downtime. That's smart thinking, in a smart building.

1. Manyika, James and Michael Chui. "By 2025, Internet of things applications could have $11 trillion impact." Fortune. Jul 22, 2015 http://fortune.com/2015/07/22/mckinseyinternet-of-things/



PUTTING OUR MONEY WHERE OUR OFFICE IS

Talking the talk about efficiency, sustainability and smart technology is very easy. Walking the walk can be harder. So at ERIKS' new "smart building" we're practising what we preach.

ERIKS

Mark Jackson
Project Engineer Power Transmission

Starting from the ground up in a new building is not something you get the chance to do every day. So when you do, you have to make the most of it. For ERIKS, the opportunity was to incorporate extensive monitoring, sensing, connectivity, energy efficiency and sustainability technologies, to turn the building into a real-world technology testbed.

"A REAL-WORLD TECHNOLOGY TESTBED"

The premises, in Kingswinford, are home to the Centre of Expertise for Power Transmission, (see page 15). For the Power Transmission team, it's the perfect location for establishing testing and diagnostics capabilities unparalleled in the industry. For the wider business, it's the perfect place to adopt the latest energy-efficient building practices.

To bring the whole project together, the ERIKS Brain project team was set up to exploit the potential of sensing, monitoring, controlling, testing and diagnostics capabilities, in one time-saving, money-saving customer app.

When two plus two is five

Collecting data about asset functionality is nothing new. Where ERIKS' new building goes further is by gathering together individual data points, analysing them in combination, and then making an assumption based on that information.

"TESTING AND DIAGNOSTICS CAPABILITIES UNPARALLELED IN THE INDUSTRY"

For example, the water consumption of a building's plumbing system can already be measured. Sensors can identify whether doors have been opened. Proximity detectors can tell if there is someone in a building.

In isolation, the data doesn't tell you much. Analysed by a human being, with a dash of added intuition, it might tell you more. What ERIKS have done is bring together the technology and the data, and combined it with artificial intelligence capable of making informed assumptions based on the input.

For example, the technology senses an unexpected late-night increase in water consumption. It confirms that the building's entrance and exit doors are still locked. It identifies that there is no-one in the building. Then it puts all that information together to deduce there's a suspected water leak. All in a matter of milliseconds.

Not only that, but it can then automatically take action: turning off the water supply and sending an alarm to the on-call buildings maintenance engineer.

"OPTIMISING ENERGY-EFFICIENCY AND PRODUCTIVITY"

In the same way, sensing and monitoring technology installed in the right places, analysed in the right way, and pooled to drive automated decision-making, can be applied to production assets and process equipment: optimising energy-efficiency and productivity, minimising unscheduled downtime, and eliminating catastrophic failures.

Cold, hard facts

It's this capability to gather real-time data, analyse it quickly and act on it through automation which makes the capabilities of the ERIKS' smart building applicable to industry.

For example, monitoring of the building's air conditioning plant will identify if energy is being wasted on days the building is not in use. Manufacturers could do the same for process refrigeration units, to identify if and when they could be adjusted to use less power.

They key factor is that monitoring and analysis of data enables decision-making based on hard facts, not supposition, so the answers will always be valid and actionable, with observable results.

Putting it to the test

While the ERIKS Brain project team assesses the potential for industrial monitoring and control, and works towards developing an ERIKS app, ERIKS customers are already benefitting.

One of the building's features is a new, highly-efficient, testing and diagnostics capability for rotating equipment, see page 15.

"MONITORING AND ANALYSIS OF DATA ENABLES DECISION-MAKING BASED ON HARD FACTS"

Now there's no longer the need for an engineer to manually measure gearbox temperature with an infrared thermometer for hours at a time. Or any need for customers to visit the Centre to see testing in progress, or wait days for the results. Instead, sensors gather the required data, a live video-feed provides streamed footage of the tests, and the data is displayed immediately on a remotely accessible dashboard.

The result is more efficient testing, quicker results, faster and more accurate fault diagnosis, and less downtime. That's smart thinking, in a smart building.

ON PATROL WITH THE VIBRATION DETECTIVE

The Vibration Detective is to machinery what the Horse Whisperer is to horses. A highly-trained Schaeffler field service engineer equipped with a handheld FAG Detector III, the Vibration Detective regularly patrols one of the UK's energy-from-waste (EfW) facilities, to provide early warnings of trouble, and help keep the country's lights on.

SCHAEFFLER

David Goves
Applications Engineer

Vibration can tell you a great deal about plant and equipment, if you know how to collect and read the data. Which is why, since 2012, Schaeffler have been providing a regular site patrol, to monitor and analyse vibration data from a range of critical assets at a UK-based EfW facility. Generating electricity by burning hundreds of thousands of tonnes of household and commercial waste every year, the site's furnaces help to feed the nation's need for electricity, and any unplanned downtime means less power to the National Grid.

By taking vibration measurements on a monthly basis from up to 70 items of critical equipment on the lines feeding the furnaces, Schaeffler's Vibration Detective can identify deterioration of rolling bearings, gears, fan blades and more, on everything from electric motors to gearboxes, fans (primary, secondary and induced draught), conveyors and pumps.

> "IDENTIFY DETERIORATION OF ROLLING BEARINGS, GEARS, FAN BLADES AND MORE"

As David Goves, Applications Engineer at Schaeffler UK explains: "Typically, one item of equipment may include a motor driving a gearbox, pump or fan. For each item of equipment, we would typically record vibration data from the motor non-drive end and motor drive end, for horizontal, vertical and axial mounting positions, and the same for gearboxes."

Bad vibes

There are three basic vibration measuring parameters which help identify equipment issues.

> "THREE BASIC VIBRATION MEASURING PARAMETERS"

The first is velocity, which arises from mechanical issues such as imbalance, misalignment and looseness. The second is acceleration, which is typically used to monitor gear and progressing bearing defects. And the third is enveloped acceleration, which is a measure of high frequency, impact-type events, typified by early bearing or gear faults.

Once the data has been collected using the handheld FAG III, it's analysed by Schaeffler's field service engineer, using the FAG Detector III's free-of-charge Trendline software. The results are then written-up in an analysis report for the customer. The report will often include

Acceleration and Velocity Trend plots showing pre-alarm and main alarm limits, and how the vibration data has varied over time.

> "ACCURATELY ASSESS A MACHINE'S CONDITION AND MAKE INFORMED RECOMMENDATIONS"

The Trendline software also contains a database of more than 20,000 different bearing products from different suppliers. By comparing the data collected against the database, it's possible to accurately assess a machine's condition and make informed recommendations for any necessary actions.

Ready, steady, stop

Knowing how close a piece of equipment is to failure makes it possible to plan for scheduled maintenance which won't disrupt operations.

This means not only is the rest of the facility unaffected, but also there's no unplanned downtime as a result of unforeseen failure.

For example, if bearing wear is found to be the cause of high vibration levels on a gearbox, the customer is made aware, can source the appropriate bearings, and can plan to stop the asset and replace the worn component at the most convenient and least disruptive time.

Not only will any catastrophic failure, unplanned downtime and loss of production be avoided, but by maintaining the equipment at its optimum, the life of motors and gearboxes will be prolonged, to reduce their Total Cost of Ownership.

Looks like another case solved for the Vibration Detective.

Fan-tastic

A recent patrol by the Vibration Detective produced a list of recommended actions for the customer, for equipment which had exceeded the pre-defined alarm limits in the Trendline software. One item was a large primary air fan. Vibration data collected from the fan's non-drive end motor had shown a slowly increasing velocity trend over several months, suggesting a minor issue was developing.

Schaeffler recommended inspection, cleaning and rebalancing of the fan blades, which the customer was quick to do. After removal, steam cleaning and reinstallation of the blades, the fan's vibration and noise levels returned to normal. A minor issue had been promptly resolved before it could turn into a major one.

OPTIMAL MOTOR FLUX – AND HOW TO ACHIEVE IT

Optimising motor flux at low speeds enables the production of full torque with minimum motor losses. WEG has the latest, most cost-effective solution.

Jose Paulo Giacomoni
Application Engineer,
Automation

Historically, variable speed constant torque applications were driven by DC motors, fed from DC variable speed drives and cooled by a separately driven blower. This allowed full load operation to low speeds, but design factors limited the speed range to 20:1.

In the 1990's, consumers migrated to AC motors powered from VFDs, but this didn't resolve all the issues.

Cooling limitations on TEFC AC motors limited AC-powered solutions to variable torque applications. The cooling air flow from the shaft-mounted fan used on a TEFC motor is dramatically reduced as speed decreases. If the load isn't reduced at the same time, cooling is reduced and the motor over-heats.

Yet because variable torque loads (such as centrifugal fans and pumps) require less torque as speed is decreased, they were suitable for the drive/motor combinations available at the time.

The evolution of VFD

As VFD technology evolved, motor designs were modified to provide adequate cooling even at low speeds.

This was accomplished by upsizing TENV motors at low HP ratings, and by fitting a separately driven blower in place of the shaft-mounted fan. Although many manufacturers refer to these TEBC designs as 1000:1 or 2000:1, they are all thermally capable of full torque operation from zero to base speed.

While these motors had advantages in certain applications, they tended to lead to specialised designs.

Most industrial constant torque (CT applications) don't require continuous operation at full torque below 1/20th of base speed. But some larger or special applications require full torque continuously at or near zero speed, and these use DC motors fed from DC drives limited to 20:1 CT. Most applications have a smaller CT speed range.

VFD + WEG = Optimal Flux

The latest and simplest solution to achieving optimal flux is to combining a WEG Variable Frequency Drive (VFD) with a WEG Motor.

"LATEST AND SIMPLEST SOLUTION"

With the design characteristics of a WEG motor loaded into the WEG VFD, the Optimal Flux control algorithm increases motor flux slightly at low speeds. This allows the same torque to be developed at lower current.

WEG developed this Optimal Flux solution to address the needs of the broader constant torque AC VSD market. Specifically, to satisfy applications with +/-0.5% regulation without an encoder, and with a CT speed range greater than 10:1 (less than 100:1 is required). Optimal Flux allows the operation of certain WEG motors over speed ranges approaching 1000:1 without thermal damage, see chart below, and without closed loop feedback from a motor-mounted encoder.

"MOTORS LAST TWICE AS LONG"

As each 10°C of temperature reduction typically doubles motor life, the 11% reduction in operating temperature (compared with non-Optimal Flux Control VFD) means motors also last twice as long.

Cutting your losses

Most heat in motors is the result of I^2t losses. If motor current can be reduced even slightly, the losses are noticeably reduced.

Variable torque loads do this because they need less torque (and therefore less current) as their speed is reduced. Constant torque loads, on the other hand, may require full torque even at low speeds. So reducing the current to reduce losses isn't feasible, because it also reduces torque.

However, with the design characteristics of the WEG motor loaded into the CFW11 VFD, the optimal flux control algorithm increases motor flux slightly at low speeds. This allows the same torque to be developed at lower current.

"FULL TORQUE WITH MINIMUM MOTOR LOSSES"

The result? The WEG VFD can optimize motor flux at low speeds, simultaneously producing full torque and minimizing motor losses.

	V/Hz	Sensorless	w/ Encoder
Speed Range	1:20 (90 rpm to 1800 rpm)	1:100 (18 rpm to 1800 rpm)	Down to 0 rpm
Speed Regulation	+/- 1%	0.05%	0.01%
Staring Torque	100%	150%	150%

Why choose WEG?

- Elimination of incompatibility, as WEG tests the drive and motor under full load conditions before delivery
- Single source customer support for motor and drive
- Less downtime, resulting in cost savings
- Elimination of costs associated with a separately driven blower, including blower starter, additional cable run to the motor, and energy to operate the blower
- Elimination of output reactor for motor cable runs up to 100m
- Saving money through lower purchase cost of WEG motor vs. "special" VFD designs

WHEN IS A BROOM A BRUSH – AND HOW MUCH MORE WILL IT COST YOU?

Is it a broom? Is it a brush? Is it a Wooden-Handled Manual Sweeping Device? Inconsistent descriptions are just one way your stores management and ordering processes can waste time and cost money. Whereas ERIKS MRO Supply Chain Management is one way to increase efficiency, reduce wasted time, and save significant sums too.

ERIKS

David Arbuthnott
Strategic Accounts Director

ERIKS research has revealed that 65% of a business's resources are dedicated to controlling just 10% of its purchases. And when a replacement part is required, finding it wastes an average of almost a quarter of an hour. Every part, every time. Which only goes to explain why between 10% and 50% of an engineer's time is wasted on non-core tasks: such as looking for those elusive parts.

> "INCREASE EFFICIENCY, REDUCE WASTED TIME, AND SAVE SIGNIFICANT SUMS"

To continue the example from above, it's clear that the need to know whether to search for a part in the broom cupboard, the brush cabinet or the manual sweeping device storage facility is an issue that can't be swept under the carpet. So ERIKS have a choice of stores ordering and management solutions which can solve that problem, and more.

Look no further

If you want to put an end to fruitless searching – or any searching at all – for MRO spares, ERIKS' My Data Factory is the answer.

By directly importing parts data into ERIKS' ERP system, parts can be searched for automatically with no initial human intervention. My Data Factory simply searches for any form of match in any section of a part number, to produce an answer on availability and pricing.

> "INTERROGATING ERP SYSTEMS OF ERIKS UK, BELGIUM, NETHERLANDS AND GERMANY"

An engineer or parts manager only has to get involved if the system throws up more than one match – which can happen. Then ERIKS' technical know-how and experience is required to identify whether the customer actually requires, for example, pneumatics spares or a bearing component.

Because the search is computerised, not manual, it's obviously faster – and more comprehensive. The system not only interrogates the ERP system of ERIKS UK but also ERIKS Belgium, ERIKS Netherlands and ERIKS Germany, to produce the very best match.

> "REDUCING THE TIME A CUSTOMER WAITS FOR A QUOTE FROM DAYS TO MINUTES"

What's in a name

Dedicated Project Managers. Multinational automated searches for the parts you need. Tens of thousands of pounds in lost production. It's all a long way from deciding what to call a brush (or a broom).

But it's all part of the same process of ensuring that your MRO processes are as efficient and cost-effective as possible. And it's all part of the ERIKS MRO Supply Chain Management service.

INNOVATING ON THE EDGE OF THE POSSIBLE

THE SPACEX HYPERLOOP CHALLENGE

In 2017, SpaceX / Tesla CEO Elon Musk launched the first Hyperloop Challenge, to develop a capsule that can travel the fastest in a 1.2km Hyperloop vacuum tube. For the 2018 Challenge, ERIKS was the official partner of the Delft University of Technology (TU Delft). Here's the story of their attempt to set the record.

ERIKS

Paul van der Stigchel
Manager Engineering

The idea behind the Hyperloop high-speed transportation system is to use reduced-pressure tubes to carry pressurised passenger-carrying capsules ("pods") at close to the speed of sound. Low air resistance in the tubes means pods could reach 750mph with greater energy-efficiency, less environmental impact and at lower cost than an aircraft. Potentially, using the Hyperloop could be as convenient as catching a Tube train.

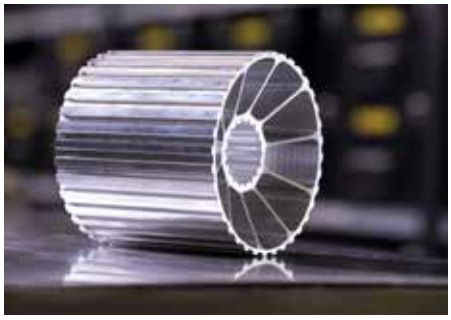
> "USING THE HYPERLOOP COULD BE AS CONVENIENT AS CATCHING A TUBE TRAIN"

The annual Hyperloop Challenge for students is intended to drive development of the necessary technology, and the winning team is the one whose pod travels fastest through the SpaceX Hyperloop tube. The aim is simple, but getting there involves a huge amount of design innovation and engineering development – which is where ERIKS know-how naturally excels.

The partnership between ERIKS and the 36-strong student team from TU Delft began in September 2017, with Paul van der Stigchel, Manager Engineering at ERIKS Aandrijftechniek B.V., providing liaison between company and team. ERIKS also provided a continuous supply of components throughout the project, giving the team free access to the company's parts centre in The Hague.

> "A HUGE AMOUNT OF DESIGN INNOVATION AND ENGINEERING DEVELOPMENT"

As Pieter-Bas Bentinck – one of the students – pointed out, "We had partners who only provided financial support, but the people at ERIKS made their time, expertise and components available. What's more, they were involved in the project at a very early stage."



In fact ERIKS was involved in one of the team's very first design decisions: choosing between an electric motor with wheel drive or a linear induction motor. ERIKS advised that a wheel drive with electric motor and permanent magnet provides around 80-90% efficiency compared with 20% for a linear induction drive, so the students opted for the obvious choice.

Reinventing the wheel

Choosing wheels to cope with high speeds and the tunnel's extreme environment proved one of the biggest challenges.

High centrifugal force at high speed places enormous loads on rubber tyres, and with up to 17,000rpm likely, tyre temperature could rise as high as 200°C in just 15 seconds. Finding a tyre to provide grip and torque whilst also remaining firmly attached to the wheels' aluminium rim required the most research of any aspect of the pod's design.

ERIKS' Elastomer Research Testing Centre laboratory developed three entirely new rubber compounds for the team to choose from, but even with the choice made they needed to fit the tyre reliably to the aluminium core. At ERIKS' rubber technology department in Alkmaar, moulding specialists designed and produced a mould capable of vulcanising the rubber to the rim at 160°C and 140 bar pressure. On ERIKS' advice, a thin coating layer was also applied to the sandblasted rim to ensure optimum adhesion between aluminium and rubber. Even so, it took four months, four attempts and four different versions of the wheel to achieve a successful wheel and tyre combination.

Support wheels were also required, to keep the capsule stable. ERIKS' Industrial Plastics department's first choice of polyurethane wheels proved too weak, so the eventual solution was to use Gesadur polymer-filled plastic, which incorporates three-dimensionally linked fibres able to withstand extremely high pressure.

Thinking inside the box

Accommodating the battery to power the pod was another problem, since a battery needs at least 1 bar air pressure to operate – higher than the pressure within the Hyperloop tube.

> "THIS HAD NEVER BEEN DONE BEFORE, BUT ERIKS' SPECIALISTS ACHIEVED IT"

A carbon fibre box with higher pressure inside was developed, and ERIKS devised a sealing solution to ensure no air could escape. Sealing the battery-to-motor connector proved more difficult, as it had to pass from pressure to vacuum while transmitting 200kW. This had never been done before, but ERIKS' specialists achieved it.

Having made sure the pod had the power, traction and stability to travel at the highest speeds, TU Delft and ERIKS had to be certain it could stop.

With no air in the tube for cooling, the brakes were at risk of failure through overheating. With ERIKS' advice and support, a double braking system with compressed air-operated callipers was developed.

Flying colours

From the many worldwide entries, only twenty were judged good enough to go forward to Test Week and its hundred-plus intensive tests on different components. Then only 3 pods – including the TU Delft / ERIKS design – made it through to Competition Day on 22nd July, and a pod launch in the Hyperloop tube itself.

Unfortunately the competition run took place in the afternoon, which at SpaceX's Los Angeles Hyperloop site means very high temperatures. The TU Delft / ERIKS pod suffered an overheated motor, which activated its safety mechanism and shut it down at just 142kmh. This put the team in second place to the winners, who achieved a record speed of 466kmh.

> "WE WOULD NOT HAVE SUCCEEDED WITHOUT ERIKS"

Second place was still an enviable achievement. ERIKS' Head of Communications Daan Heijbroek said: "ERIKS is by nature a modest company, but we can be proud of this achievement. I think we were able to show our added value. We really contributed to its success." And in the words of Pieter-Bas Bentinck: "You could say that we would not have succeeded without ERIKS."

MAKING INDUSTRY **WORK BETTER**

MAKING SAFETY PART AND PARCEL OF THE JOB

Parcel sorters at TNT were suffering a package of problems. They had a large number of injuries, took a high level of sick leave, and needed significant rehabilitation. Clearly, the company urgently needed to find a suitable parcel lifting system. They found the solution in Piab's range of ergonomic lifters.

piab

Ian Hodkinson
Technical Sales Manager, Piab

The job of parcel sorting at TNT involved frequent knee to shoulder-height lifting, of packages mostly weighing 3-12kg. However, 15% weigh as much as 20kg. With workers spending on average two hours a day, five days a week, lifting these parcels, it's not surprising that injuries – especially in the lower spine – were common.

To protect employees without losing productivity or slowing down operations, TNT began the search for a lifting system which could handle at least 75% of its packages. And to complicate the matter, they wanted a simple-to-operate system, equally suitable for right- and left-handers.

> "INJURIES – ESPECIALLY IN THE LOWER SPINE – WERE COMMON"

A lift in productivity

Extensive desk research convinced the company that Piab's Vaculex TP vacuum-based tube lifter was the ideal ergonomic handling solution. However, to ensure a well-informed choice, Piab and TNT jointly commissioned an independent comparative study by Xdin.

The study comprehensively analysed the ergonomics of TNT's work processes, using the proven Methods-time Measurement technique.

This analyses the working time of manual processes and assesses how changes in them may affect productivity.

> "THE PIAB VACULEX TP TUBE LIFTER IMPROVED THE SORTING PROCESS IN SEVERAL WAYS"

The study found that the Piab Vaculex TP tube lifter improved the sorting process in several ways.

Firstly, it reduced the working time required for each lift. The time saved was especially significant with heavier packages. Secondly, it was faster and more effective at optimising the positioning of the parcels in the transport cage –making the best possible use of the space. And thirdly, it increased productivity by an estimated 16%.

> "INCREASED PRODUCTIVITY BY AN ESTIMATED 16%"

Although this increase is significant in itself, it's even more impressive than it appears, as TNT Sweden Operations Manager Thomas Engman points out. "Vaculex was the only supplier to offer a lifting system that did not actually reduce productivity [so it]... works even better than we had hoped for. The Vaculex TP is very easy to use, and for beginners only brief instruction is required. The ergonomic benefits of the device – helping to reduce sick leave – also make it easier to find and retain qualified personnel."

41% safer lifting

TNT's concern for the health and safety of their employees led them to commission additional analysis – this time to provide information on occupational safety and health issues.

Carried out by the National Institute for Occupational Safety and Health, the method focused on analysis of the combined effects of an activity rather than a single operation. In other words, it took the pulling, lifting, lowering and stacking of the parcels as a whole, and considered the effects on the employee carrying out the tasks. A Composite Lifting Index (CLI) was then determined from the sum of the largest single task and the incremental addition by each subsequent task.

As the size of the CLI increases, so does the risk for any given employee. This means a greater percentage of the workforce is then likely to be at risk of developing exercise-related problems – and especially lower back pain.

So lifting tasks with a CLI greater than 1.0 pose an increased risk of lifting-related back pain in some of the workforce. And experts agree that if the CLI exceeds 3.0 then nearly all workers are at increased risk of injury. Based on this analysis, using the vacuum lifter reduces the health risks of TNT parcel sorting personnel by 41%.

> "IF THE CLI EXCEEDS 3.0 NEARLY ALL WORKERS ARE AT INCREASED RISK"

Although the original aim was for 75% of parcels to be lifted by the system, in fact 99% are now handled using the Vaculex TP lifter. This means that the productivity and speed of operations in the parcel sorting area have not only been maintained, but quite probably increased, because as far as the employees are concerned, all packages – regardless of size and shape – are effectively weightless and easy to handle.

Safer and healthier employees, higher productivity, better working conditions. That's TNT parcels – sorted.

WHEN GIVING THE CUSTOMER LESS IS MORE

Giving the customer what they want is the key to more successful product design and engineering. So IMI Precision Engineering has worked closely with customers across numerous key industry sectors, to discover how pneumatic controls could be improved. They found the key requirements – then produced the IMI Norgren IVAC Cylinder to meet all their needs, and more.

ERIKS

Mark Stone
Product Manager,
Fluid Power

"LESS ENERGY USE, LESS DOWNTIME"

The requirements across all sectors can be summed up essentially as less energy use, less downtime, and less ugly design.

The most predictable requirement was energy-efficiency. Increases in energy costs show no sign of slowing down. And since increased energy-efficiency goes hand-in-hand with carbon footprint reduction, businesses are looking for ways to improve their environmental credentials at the same time as cutting bills.

The weight-optimised IVAC actuator with integrated valve can help reduce energy consumption by up to 50% compared with conventional pneumatic systems. With fewer components, and a new patent-protected design, the IVAC reduces energy consumption by minimising dead volume. While conventional cylinders use the air in the tubing, IVAC uses only the air in the cylinder.

The energy-efficient design not only optimises cylinder air consumption, but also reduces the overall cost per mm of stroke. kWh and CO_2 emissions are also reduced – making a significant contribution to meeting energy targets and KPIs.

However, saving energy – and energy costs – wasn't all that customers said they wanted from a cylinder. And it's not all that the IMI Norgren IVAC delivers.

Time is money

IMI Precision Engineering's conversations with customers revealed that time wasted through production downtime, as well as time spent on asset installation, are both prime concerns.

"LESS TUBING, LESS WIRING, LESS TIME SPENT ON INSTALLATION"

A product which is not only reliable once installed but also quicker and easier to install in the first place, goes a long way towards satisfying customers' requirements.

So the IVAC cylinder is a modular design, which has only one electrical connection and only one air supply. That means less tubing, less wiring, less time spent on installation – and less to go wrong.

Lastly, and perhaps most surprisingly, potential customers for pneumatic controls said that improved aesthetics were an important consideration. "Tidy house, tidy mind" and "Tidy desk, tidy mind" are well-known expressions with some truth behind them, and the philosophy seems to be extending onto the factory floor.

"ONE ELECTRICAL CONNECTION, ONE AIR SUPPLY"

Keep it clean

A more aesthetically pleasing production line not only creates a more pleasant and productive working environment. It also means that any underlying inefficiencies have nowhere to hide.

In addition, as end-customers become more selective and more knowledgeable about the producers of goods, and about what the food sector calls "provenance", the appearance and quality of the production facilities can be almost as important as the appearance and quality of the product itself.

The cleanline versions of the IVAC are not just about aesthetics. They're also easier and quicker to washdown effectively, making them ideal for applications such as food production.

More savings, more quickly

The simplicity of the IVAC Cylinder range makes ordering easier too. All you have to do is specify bore size, stroke length and valve functions, and the correct IVAC cylinder can be quickly identified – making it quicker still to start saving energy.

You don't even have to wait to see how much you could save.

Enter details of your current cylinder application into the online IMI Norgren IVAC Cylinder calculator, and you can see in an instant what switching to an IVAC Cylinder could do for your energy consumption.

It's yet another way that IMI Precision Engineering gives the customer more, and less.

Left Hand does it right

The Left Hand Brewing Company of Colorado, USA, needed new kegging equipment to meet rising demand, but lacked space for a traditional installation. They also wanted to save on energy costs.

The solution was the Innokeg Till CombiKeg from KHS, Dortmund, Germany, which uses a rotary design rather than a straight line installation.

The design is made possible by the space-saving IVAC pneumatic cylinder with integrated valves and actuator controls. By eliminating piping and connections commonly used to link cylinder and valve, and using one central connection for compressed air and electricity, the amount of space required is greatly reduced. And less tubing also means less energy usage – reduced by as much as 50%.

LOOK OUT ABOVE!

ERIKS
Emma Hunt
Product Manager,
Tools & Consumables

Working at height can be a serious health and safety risk – and not only for the reasons you might think. While you or your employees are focussed on not falling from a platform or other high-level workplace, have you thought about the dangers of dropping a tool while you're up there? "Look out below!" won't cut it as a safety precaution. It's up to the workers at height to take preventative measures.

If you only associate working at height and dropping things with steeplejacks and scaffolders, you're far short of the reality. Dropped objects are, for example, the third most frequent cause of fatality and injury in the Oil & Gas industry. That industry even has an initiative called DROPS (Dropped Objects Prevention Scheme) to provide advice and information, and promote Best Practice. However the same principles apply across all industries.

Whether someone's using a cherry picker to access light fittings on a high-ceiling, or using a ladder to reach an otherwise inaccessible lubrication point, there's a risk of dropped tools. So to protect employees and achieve compliance with regulations, it's worth getting a grip on employers' obligations and the best solutions.

> "IT TAKES ONLY A SPLIT SECOND FOR THE TOOL TO SLIP"

Slippery fingers syndrome

Everyone's heard of "butterfingers". But – except perhaps in a food factory – the more common problem is slippery fingers syndrome.

Engineers are always likely to have oily or greasy fingers, which aren't very effective at keeping a grip on tools. Even the grip of non-slippery fingers on a heavy tool can be weakened after prolonged use. Then it takes only a split second for the tool to slip.

If you're lucky it will only fall onto the floor below and not onto a fellow worker. However relying on luck is not a Health & Safety policy.

A more reliable, compliant solution is to choose tethered tools.

At the end of your tether

There are several different options for tool tethering, but the effect is the same.

> "A DROPPED TOOL COULD LITERALLY BE THE SPANNER IN THE WORKS"

At one end of your tether is whatever tool is being used. At the other is a secure attachment. When the tool is released – accidentally or deliberately (to rest those numb fingers, perhaps) – it won't drop further than a few inches.

That not only protects others against the risk of injury. It also has other advantages.

If you're working in a confined or dark space, retrieving a dropped tool can be tricky. If you're working close to a mechanical asset, a dropped tool could literally be the spanner in the works. Or if you're working in an industry where hygiene is critical – such as food or pharmaceuticals – then a dropped tool is the ingredient no-one wants to add.

> "A RESPONSIBLE DECISION FOR EMPLOYEE HEALTH AND SAFETY"

Tool tethering takes the weight of responsibility off your shoulders, even if you drop a heavyweight tool.

Your hands aren't tied

ERIKS works with two of the largest manufacturers of hand tools – BAHCO and FACOM – to offer a comprehensive range of tethered tools. Or to put it another way: a comprehensive range of high quality tools that just happen to be tethered.

So by choosing tethered tools you're not restricting your choice or compromising on tool quality. You're just making a responsible decision for employee health and safety.

Next time a tool needs replacing, or a completely new tool is required, look up a tethered solution as a matter of course. Then no-one will need to look down in panic if they drop it.

The height of illegality

Failing to take suitable precautions when working with tools at height is illegal, as the Working at Height Regulation 2005 makes clear.

Falling Objects

10.(1) Every employer shall, where necessary to prevent injury to any person, take suitable and sufficient steps to prevent, so far as is reasonably practicable, the fall of any material or object.

(2) Where it is not reasonably practicable to comply with the requirements of

paragraph (1), every employer shall take suitable and sufficient steps to prevent any person being struck by any falling material or object which is liable to cause personal injury.

THE ICED, HALF CAFF, RISTRETTO, VENTI, 4-PUMP, SUGAR-FREE, CINNAMON, DOLCE SOY SKINNY LATTE OF GASKETS

Most coffees are variations on caffeine and milk. Most gaskets are variations on a circle. There's a large handful of gaskets which are kept in stock for quick and easy ordering. But what if you need a never-before-ordered gasket that demands one or more changes to standard parameters? The ERIKS Gasket Configurator means you won't even have to wait long enough for your coffee to go cold.

ERIKS

Mick Holland
Director Sealing and Polymer,

Whether it's a different size, different grade of material, or needs to be compliant to a different standard, a variation from the norm can delay an order by many days. Which can in turn delay a production line getting back in action while it waits to be repaired.

It's for situations – and gaskets – like these that the new ERIKS Gasket Configurator has been developed. Think of it as the world's fastest and most flexible barista, but for gaskets not for grandes to go.

Is that a "Z" or a "2"?

Just 8 materials options combined with the standard pipe generates 46,000 possible gasket variants. So imagine just how many possible combinations there could be.

Uploading a new part to an ERP system requires approx. 300 different fields to be completed, so parts are typically loaded upon demand aiding delay.

But entering a new cut gasket onto the system is only the end of the process. Before then, it will have to be drawn to exact scale and the drawing checked against the customer's specification.

The percentage of sheet material required will need to be calculated for the Bill of Materials. Not to mention working out the engineering details: which machine, set-up time required, whether to use a knife or a die, and so on.

All that takes time. And just one mistyped letter or number and the finished product will not only be wrong, but even potentially highly dangerous.

An error in a gasket for a food or pharmaceutical line could lead to contamination. A gasket for use on an oil rig, which doesn't correctly meet the specifications and standards, could lead to fatalities if it fails.

"A HUGE DEMAND TO CUT TIMESCALES AND COSTS"

So there's no room to cut corners. But there's a huge demand to cut timescales and costs.

Here's how the ERIKS Gasket Configurator does both.

Configurator to CAD to cut

Using the ERIKS Gasket Configurator, the process could hardly be simpler or quicker, because – virtually simultaneously – it:

- connects directly with the configurator software to set up the ERP
- creates a system generated customer quote
- designs the part in CAD
- calculates the Bill of Materials and
- calculates the required time for knife cutting

"CREATES A SYSTEM GENERATED CUSTOM QUOTE"

Taking a more complex example, designing and preparing a unitised rotary seal for production using traditional manual methods could take 6 hours. And that's assuming no errors which result in having to go back to the beginning.

Using the ERIKS CAD Configurator, the whole process can be completed in minutes. But that's not the only way it saves time and money.

Same again?

Very few "one-offs" are truly once only. Quite often, what begins life as a made-to-order gasket will become a made-to-stock part. When it does, the time savings and cost savings increase accordingly.

"REDUCES ERRORS"

By creating a parametric part number in the Configurator, all the information required to make repeat parts to the same specification is ready to go. So next time the order can be for 5 or 50 instead of 1, and the price per part will be significantly reduced, as will the time to delivery.

For the manufacturer with a production line out of operation, it can mean the difference between meeting or missing delivery deadlines, and between making a profit or making a loss.

It's much more crucial than speccing your coffee. But the ERIKS Gasket Configurator can give you exactly the same buzz.

Hygienic Geared Drives, the safe solution

Fenner®

Reliable | Trusted | Connected

90% of bacterial contamination is caused by bad hygienic design, don't become part of that statistic, trust Fenner® Hygienic Geared Drives

Designed specifically for wash-down duty applications using acid or alkaline solutions required for food, beverage, pharmaceutical and process industries, the Fenner® range of Hygienic stainless steel geared drives provides complete interchangeability for simple upgrades as well as offering up to 15 times the service life.

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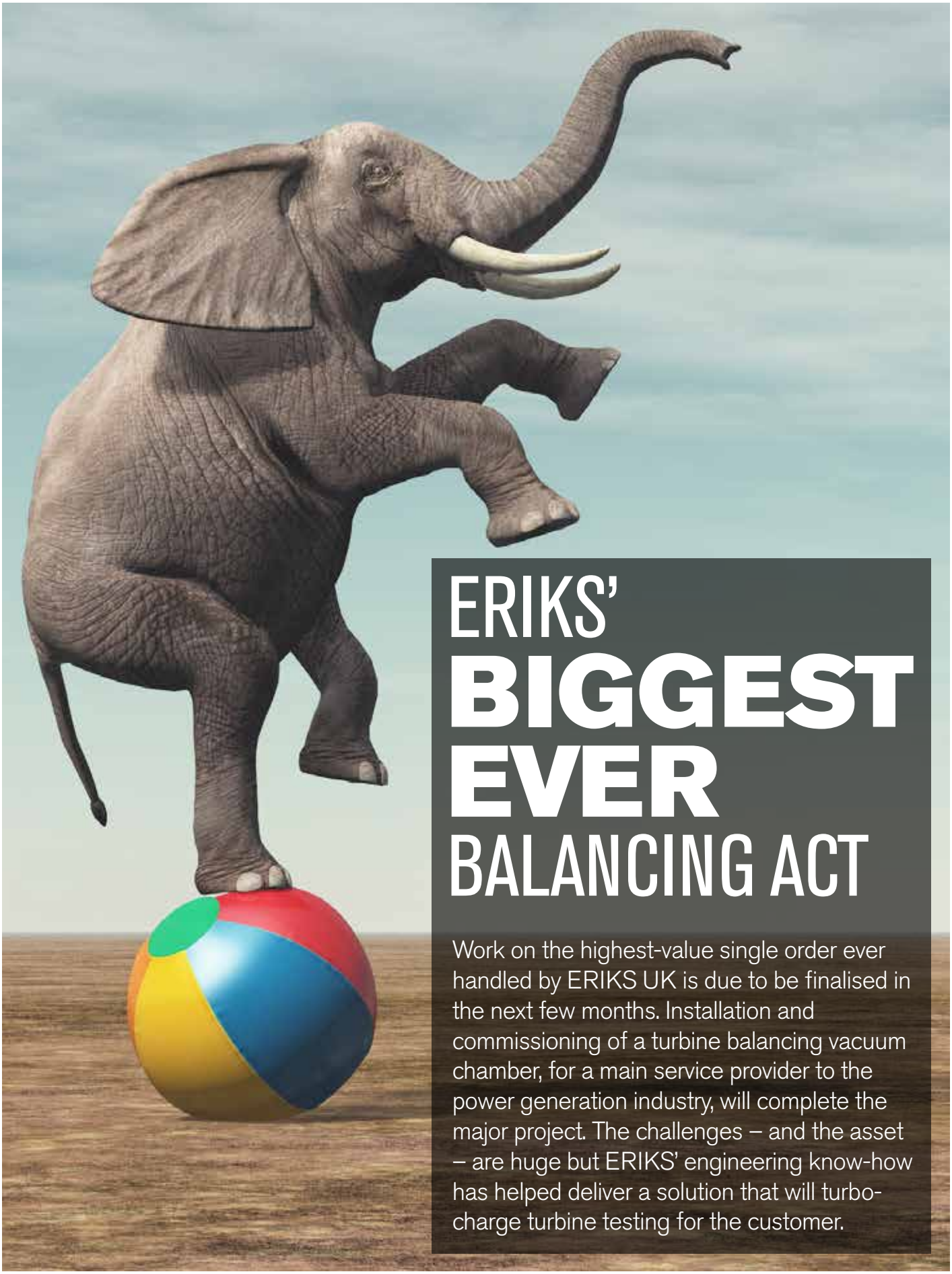

ERIKS' BIGGEST EVER BALANCING ACT

Work on the highest-value single order ever handled by ERIKS UK is due to be finalised in the next few months. Installation and commissioning of a turbine balancing vacuum chamber, for a main service provider to the power generation industry, will complete the major project. The challenges – and the asset – are huge but ERIKS' engineering know-how has helped deliver a solution that will turbo-charge turbine testing for the customer.

ERIKS

Victor Harris
Business Development Director Electronics, ERIKS

ERIKS

Keith Hargreaves
UK Engineering Manager, ERIKS

Rotors for power generation turbines weigh around 60 tonnes each and can measure up to 18 metres in length. At that scale, even a slight imbalance when a turbine rotor is operating at normal speed can rapidly escalate until it causes catastrophic failure of the rotor, or the turbine blades. So when a rotor is removed for maintenance or repair, accurate rebalancing is an essential part of the service

A customer in Newcastle has been operating a turbine balancing vacuum chamber for several decades, and as it nears the end of its service life ERIKS has been supporting it with complex upgrades to increasingly obsolete equipment. Ultimately, the time has come to replace it with a completely new asset.

> "CAPABILITY TO DESIGN, ENGINEER AND INSTALL THE COMPLETE SOLUTION"

Based on the highly satisfactory relationship established with ERIKS over many years, ERIKS' knowledge of the asset, and capability to design, engineer and install the complete solution, we were the natural choice to carry out the project from start to finish.

Future-proof solution

Having been involved in maintaining the asset and upgrading components for many years, ERIKS was tasked with designing, engineering, installing and commissioning a complete future-proof solution with a minimum 20-year lifespan.

This comprises:

- 6MW High Voltage AC motor, drive & switchgear
- custom-designed and manufactured gearbox
- driveline (shaft and bearings)
- fluid power pumped lubrication system
- valves
- custom-designed vacuum seal
- barring system
- control system (scada)

With expertise, experience and engineering resources and partners in all these areas, plus High Voltage installation know-how, ERIKS is ideally equipped to carry out the whole project, and ensure the asset's successful operation for many years to come.

> "FUTURE-PROOF SOLUTION WITH A MINIMUM 20-YEAR LIFESPAN"

ERIKS' complete capability

The scale and scope of the project would have been beyond many other manufacturers. However, ERIKS has all the resources required, either in-house or through partner companies including:

- Fenner – gearbox, inverter and barring system
- Econosto – valves
- WEG – custom-designed motor
- Viking - lubrication pump

> "ENSURE THE ASSET'S SUCCESSFUL OPERATION FOR MANY YEARS TO COME"

To increase its reliability, ERIKS' design engineers have simplified the architecture, and the communications systems are now all Ethernet based systems – so they're capable of being easily upgraded as and when required.

The combination of intelligent design, quality manufacturing and easier upgrades means the operating capabilities of the equipment should be maintained at their optimum, right until the end of its service life.

End-to-end service and support

The installation and commissioning of the new chamber has been timed to take place over the winter, when power stations are operating at full power to meet the demand for electricity. This means none of their turbines can be stood-down for maintenance or replacement, so the customer's turbine balancing equipment can be safely out of commission for a lengthy period.

> "ERIKS HAS ALL THE RESOURCES REQUIRED"

From start to finish, installation should take around sixteen weeks. After that, since different-size blades place different stresses on the turbine balancing equipment, there may still be unexpected issues which need addressing until a whole range of sizes have been tested. So ERIKS will be available for support as part of the project for another 6-12 months.

> "SUPPORTING THE PROJECT FOR ANOTHER 6-12 MONTHS"

And of course – having provided maintenance, support and upgrades to the customer in the past – we look forward to continuing to maintain the lubrication systems, back-up power supply (UPS and back-up generator) and drive train for many years to come.

Full speed ahead

The rotors are run at low speed for initial balancing, then at overspeed for testing. This is why testing has to be conducted in a vacuum chamber. Running at speed in normal atmospheric conditions would create all kinds of difficulties with wind resistance.

The existing drive train and control system for the testing chamber have been in operation since the 1950s – though fortunately not 24/7. On average, the chamber runs several times a month, which involves two days of setting-up, and up to two days of actual turbine balancing operations.

The quality of ERIKS' design and manufacture of the mechanical drive train means it could easily last another 50 years before needing replacing.

Revolutionary solution

During testing, once the turbine rotors have warmed up they can't be allowed to stop revolving or they will warp.

This is where the Fenner barring system comes into action.

Once the turbine rotors are in the vacuum chamber and ready to be run for testing, the barring system is engaged to gently accelerate them from 0-28rpm. Then, using a Triple S clutch, the main drive is engaged. Once this has matched the barring gear speed, the barring gear is disengaged and the main drive takes over, to accelerate the blade to the required rpm for testing.

After the test, the operation is repeated in reverse and the blade can be kept rotating at low speed until the next test, or allowed to gently slow to a stop once all testing is complete.

SUPPORT FOR LIFE

Even the highest quality, best designed, most carefully engineered product won't last for ever. But with the right support it can have a far longer more productive service life.

ERIKS Technical and Engineering Services will help to ensure the product is always operating at its most efficient, with less unplanned downtime.

If a repeat failure should occur, our engineers see it as an opportunity for performance improvement. Using root cause analysis, instead of simply addressing the symptom, they will resolve the issue and prevent it from happening again or happening so frequently.

So rather than possibly saving pennies on the initial purchase price, with ERIKS Technical Services support for life, you can save pounds on maintenance, repairs and replacements.

			SERVICES													
			Advise / Review			Implementation	Optimise / Monitor					Maintain				Full Service
			Application engineering/ problem solving	Training	Spares and maintenance strategy	Installation / commissioning	Process improvement/ TCO	Energy management	Condition monitoring	OnSite inspection	Testing & certification	OnSite maintenance	Lubrication	Repair	Replacement	Asset management
PRODUCTS	Bearings and Lubrication	Bearings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
		Lubrication	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
	Power Transmissions	Open Drives	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
		Closed Drives	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Fluid Power, Transfer and Control	Industrial Hose	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
		Hydraulics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
		Pneumatics	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
		Filtration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
	Sealing and Polymer	Sealing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
		Gaskets	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
	Flow Control	Valves	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Pumps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Tools, Safety and Maintenance	PPE	✓	✓	✓	✓	✓			✓	✓				✓	✓
		Tools	✓	✓	✓	✓	✓	✓		✓	✓		✓		✓	✓
		Electrical	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓

PROBLEM SOLVERS

Air, water, fluids and liquids. They're all around in industry and can cause all sorts of problems. Here are some of the most recent issues they've caused, and ERIKS' all-round solutions.

RIGHT WITH A PEN

LOCTITE

PROBLEM

A leaky seal in lift equipment could result in a dangerous loss of lifting power at a crucial point. A leading lift equipment manufacturer had engineered a three-foot diameter rigid flange. This would be subjected to high stress levels, due to the incredibly high loads involved in the lifting application. A long-lasting seal was required, able to overcome potential causes of leaks such as surface irregularities, flange deformation, gasket relaxation and gasket displacement.

SOLUTION

Rather than a traditional gasket type, ERIKS proposed a liquid gasket. This guaranteed a 100% seal with exceptional reliability. In gaps up to 0.25mm, it fills all surface irregularities, including minor scrapes, scratches and slight imperfections. The liquid also ensures that the stress is evenly distributed, so there's no slipping or settling, and the fastener tension is maintained throughout the gasket's life. And thirdly, a liquid gasket experiences reduced cracking and tearing, for long-term reliability. Applied with the **LOCTITE 518 rolling pen**, the liquid gasket can be placed with less mess and less waste, with no need for additional tools. That's plenty to write home about.

SOAP OPERA

REXNORD

PROBLEM

A beverage filling company was experiencing safety, efficiency and productivity issues on its beverage product lines equipped with metal table-top chains. The moving chains were not only noisy, but also had high levels of friction. Using soap and water as a lubricant meant increased water consumption, poor conveyor reliability, and a health and safety risk from slippery floors. The company's goal was to reduce risk, optimise efficiency and increase production, which would in turn lower the Total Cost of Ownership of the lines.

SOLUTION

ERIKS advised the customer to install a combination of various **Rexnord Engineered Sustainability™ Products**. Replacing the metal table-top with PSX® material plastic Table Top® chain, and ULF™ curves and wearstrips eliminated the need for external lubricants. This not only reduced water consumption but also eliminated the safety risk of slippery floors. The high-quality construction and durability of the Rexnord components increased conveyor reliability, which meant less downtime and higher productivity. And lastly, the plastic chains helped to minimise noise levels, while their lighter weight also meant lower energy use and costs. Who wouldn't drink to that?

CAN'T TAKE THE PRESSURE

ROCOL

PROBLEM

When a well-know Precision Engineering company had problems with a cutting fluid failing under pressure, it led to all kinds of additional problems. Surface finishes were unsatisfactory. Taps broke. And high numbers of components had to be reworked or scrapped. It was inefficient, expensive, and had to be resolved.

SOLUTION

ERIKS recommended substituting the poorly-performing cutting lubricant with the **ROCOL RTD®** range. These hand-applied cutting lubricants – the world's leading solution for reaming, tapping and drilling – offer a choice of 9 different variants, in liquid, compound and spray form. For this particular application, RTD compound applied directly by brush proved the most effective. Not only did it fail to break down but it also resulted in an improved surface finish on threads. In fact, it produced over 1,000 higher-quality threads without failure. This was a staggering 400% increase in productivity. So it looks like the pressure's off.

LEAK-FLAVOUR ICE CREAM

FESTO

PROBLEM

When a leading ice cream manufacturer was aiming to increase energy-efficiency at one of its large production plants, compressed air consumption costs came under scrutiny. ERIKS were recruited to conduct an in-depth technical and compressed air audit of the production line.

SOLUTION

The result was a recommendation to install **Festo's Energy-efficiency module MSE6-E2M**. The module not only measures the flow rates in the compressed air network, but also instantly evaluates the information it's gathered. This means that incidents such as an unexpected drop in pressure can be spotted quickly, and appropriate measures initiated. Since the module has been installed, compressed air consumption during system downtime and breaks has been reduced to zero. At the same time, leak detection has been more effective due to faster reporting of changes in system pressure. The same module also continuously delivers process-relevant data – such as flow, pressure and consumption –which is sent to the machine controller via Profibus. This combination of functions has enabled the module to quickly pay for itself through energy savings and greater visibility into energy use. Tasty!

CAN 5G UNLOCK INDUSTRY 4.0?

So, how are you all getting on with Industry 4.0 then? Don't worry, if your answer is, "Nowhere really", you're not alone.

There are still some formidable barriers in the way of implementation, not least for MRO work. When I talk to senior people in industry, the potential for greater connectivity is quickly apparent, particularly in their maintenance operations, specifically remote monitoring, software and data analytics, augmented reality and predictive maintenance through AI.

But, industry will need help in the form of greater cooperation between suppliers and end-users to implement this vision, specifically the ability for OEMs and component suppliers to gain access to manufacturer IT networks for the purpose of fault-finding, remote monitoring and assisting with technical support.

At the moment, many companies remain deeply reluctant to allow suppliers access to IT networks or the data to enable them to predict component failure or optimise machinery. Concerns about bugs and viruses have developed into deeper concerns about cyber-security and hacking. The downside risks of opening up IT networks to suppliers outweigh the benefits in the minds of IT Directors.

However, on the horizon, is a potential answer in the form of 5G technology. 5G is much more than enhanced 4G, not least because it enables 'network slicing', a form of virtual network architecture with a single network capable of being 'sliced' into multiple virtual networks.

Each 'slice' can be customised with further virtual private networks to meet the needs of specific applications, services and devices. When used in combination, 'slicing' and virtual private network technology, could enable a manufacturer to grant access to a specific 'slice' for an MRO provider, machine builder and automation supplier, via an app. This slice is, in effect, a secure area in which information can be stored, shared and analysed.

Crucially, each virtual network or 'slice' will be isolated. If cyber-security is breached in one 'slice', the attack is contained and cannot spread.

5G therefore has the potential to generate a level of confidence amongst manufacturers and, crucially, its IT gatekeepers, which is not there at the moment. My view is that 5G offers a glimpse of how one of Industry 4.0's biggest barriers, namely security, can be broken down. In fact, I predict that in the future 5G will be the price of entry for Industry 4.0.

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Use WypAll® ForceMax for superior oil and grease removal and tough scrubbing and cleaning jobs. Our unique Hydroknit™ Technology blends recycled cotton fibres, cellulose and tear resistant polypropylene, to deliver the performance of an engineered cloth with a more cloth-like feel. And compared to rags or laundered cloths, you get a clean, consistent cloth every time.

Absorbs 40% more oil and 5x faster than rags[2]

Reduce disposal waste by up to 78%[3]

Occupies 68% less shelf space than rags[3]

Self-dispensing case, with indicator to show remaining cloths

WypAll® ForceMax Industrial Cloths

Code	7569
Dispensing Box Contents	1 x 480 cloths
Sheet specs	33.5 x 34.5 cm

WypAll® Brand Guarantee

Save 20% in 60 Days with WypAll® Cloths[4] or Your Money Back. ***Guaranteed!***

Replace your rags or laundered cloths for 60 days. If you don't see a 20% saving[5], we will re-imburse you the difference between the cost of your product and the Kimberly-Clark Professional™ product up to £1000.

1 Results of Hall Test research by Sapio Research Agency July 2017
2 Results of Laboratory Tests July 2017
3 Comparison based on average WypAll® cloths usage vs. average rag usage
4 Products that are eligible for this programme are ForceMax and all X60, X70 & X80 codes only. No other WypAll® branded products are eligible
5 By participating in this programme the customer agrees to completely replace their current rags or laundered cloths with the agreed WypAll® Cloths.

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