KNOW+HOW

THE LEADING MAGAZINE FOR MAINTENANCE ENGINEERS FROM *ERIKS*

ISSUE 24

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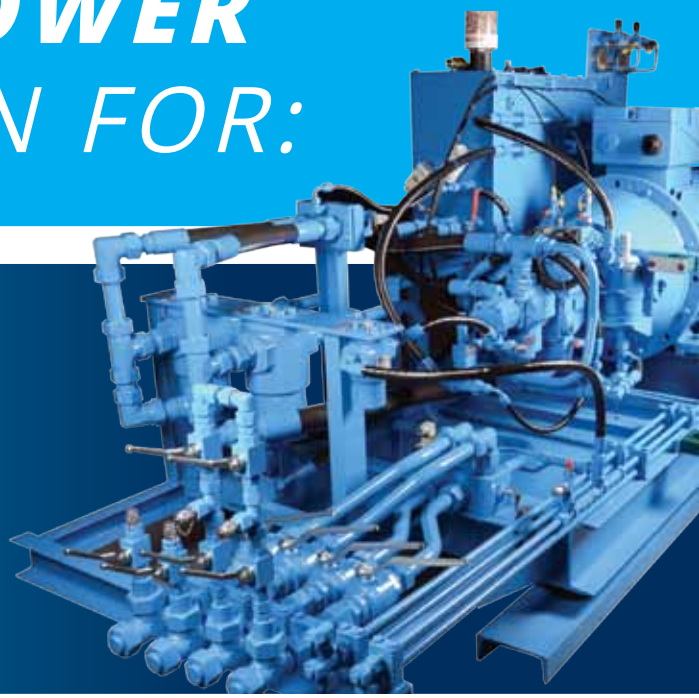

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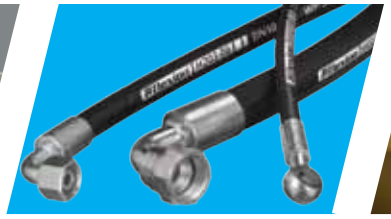

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WELCOME TO KNOW+HOW…

Getting to grips with the latest industrial maintenance news, developments and technologies, this edition of Know+How focuses on one of the most challenging sectors of the UK industrial landscape: the chemical market.

Well renowned as an incredibly difficult market to operate within, with significant potential health and safety issues only kept at bay by the quality of plant equipment and awareness of the end-user. As such, managing an operation which is not only effective but also efficient – both in terms of cost and energy consumption – can be a major challenge for end-users.

In this issue, you'll be able to read up on some of the developments and product launches affecting both the chemical market and the wider industrial services sphere, as well as find out more about our upcoming industry report on the current storeroom dilemmas faced by UK manufacturers.

As ever, we also hear from a number of key players working in the chemical market. IMI puts the spotlight on air purity in hazardous environments, and delves into the details of unclean air on instrumentation and controls. WEG is also on hand to demystify the extraction process for oil and gas companies in the face of depleting natural pressure resources. What's more, we will also take an in-depth look at the role of industrial hose in the chemical market, and how UK end-users may be missing a trick when it comes to the specification process.

We are also very pleased to welcome Laura Syrett, acting editor of Industrial Minerals magazine as our guest contributor. Given the tight grip legislation has on the UK chemical market, Laura looks at the latest phase of the REACH regulation and what that means for the nation's manufacturers.

Finally, the TIG rounds off this issue with a nod towards the measured yet effective rise of the British cycling team, and how manufacturers can draw inspiration from the tactics employed by its mastermind, Sir Dave Brailsford.

If you have any comments you would like to raise on the topics contained in this issue you can email the editor at: ***knowhoweditor@eriks.co.uk*** or you can visit Know+How's own website: ***www.eriks.co.uk/KnowHow*** where you can register for your own personal copy, enquire about the subjects and products discussed or contact one of the contributors.

I look forward to hearing from you.

Alan Whetstone
Managing Director, Editor in Chief

Published by ***ERIKS*** UK, Amber Way, Halesowen, West Midlands, B62 8WG

Chemical Industry

Chinese warehouse explosion highlights the importance of meeting chemical licence regulations

After the chemical explosion on the 13th August in Tianjin, China, it has been revealed that the firm responsible for the handling of hazardous chemicals only had a license for a matter of months.

Further claims surfaced that eight months prior the firm dealt with hazardous material without the correct documentation and stored hundreds of tonnes of sodium cyanide illegally. Operating within 500m of homes, the firm also violated laws that require a minimum distance of 1km, leading to thousands of residents being evicted and damage being reported on over 17,000 residential homes.

Survey reveals climate change remains a major concern for UK public

A survey conducted by IMechE on 2000 members of the public found that 57 per cent were still concerned about global warming, with 14 per cent saying they were "very concerned".

Highlighting flooding, sea level rises, extreme weather events, droughts and water shortages as the main concerns, 25 per cent of survey participants called for a wider use of low-carbon technologies and 15 per cent suggested all electricity production should be switched to renewables.

However, despite their concerns about climate change, 52 per cent of those surveyed opposed increasing taxes on products that increase pollution and carbon emissions.

Opposites attract: Magnetism created in non-magnetic metals

A new method that generates magnetism in metals that aren't naturally magnetic has been discovered by scientists at Leeds University.

In the new study, researchers have altered the behaviour of non-magnetic materials by using an interface coated with the carbon molecule C60 to remove some electrons. The movement of electrons between the metal and the molecules encourages the material to become magnetic.

With iron, cobalt and nickel being the only naturally ferromagnetic metals, this discovery will encourage change for an array of different industries and technologies.

Businesses struggling to recruit enough apprentices to meet 2020 target

A RECENTLY PUBLISHED SURVEY REVEALS THAT FURTHER EDUCATION COLLEGES AND BUSINESSES DON'T BELIEVE THEY WILL BE ABLE TO RECRUIT THE NUMBER OR QUALITY OF APPRENTICES NEEDED TO SUSTAIN ECONOMIC GROWTH OVER THE NEXT FIVE YEARS.

With the government's plans to increase the number of apprenticeships to three million by 2020, the survey found that training academies and businesses across England welcomed the aims but thought they may be impossible to fulfil due to restrictive policies.

Conducted by the Institute of the Motor Industry (IMI), the survey shows that most businesses stated the "employability" of prospective trainees was poor, listing education cuts, insufficient careers advice and schools holding on to pupils to maintain funding as key contributing factors.

The majority of applicants were also said to not have the required academic grades or skills, leading to many businesses claiming they would rather employ a migrant for the job than fill the spot with an apprentice.

With the education participation age being raised to 18 in England, the majority of those surveyed were unaware that this can include a vocational training programme from the age of 16. As a result, apprentice trainers are seeing schools holding on to students, withholding vocational training opportunities from them when they reach 16 years old and encouraging them to stay in sixth form.

IMI CEO, Steve Nash commented: "With funding for education set to be squeezed, employers and training providers in the motor industry are voicing fears that they will lose out in the race for the best learners.

"Schools will seek to keep as many 'paying' students in sixth form as possible. They need only to ration information about alternatives and the already small talent pool available to fill apprenticeship vacancies will be drained."

Government announces new timeframe for shale gas application sign off

The government has announced new guidelines that allow ministers to make decisions on shale exploration plans if local authorities do not rule on the applications within the given 16 week period.

Aimed at councils that continuously fail to submit within the timeframe, the ruling comes as a reaction to Lancashire County Council's yearlong deliberation over the Cuadrilla shale gas application.

With the UK wanting to become a low-carbon economy, shale exploration proves vital. Energy Secretary Amber Rudd comments: "As a One Nation Government, we are backing the safe development of shale gas because it's good for jobs and for giving hardworking people and their families more financial security, as well as being good for our energy security as part of our plan to decarbonise the economy. We need more secure, home grown energy supplies and shale gas must play a part in that."

Eradicating the time and money wasted in previous planning processes, many are encouraged by the new guidelines as it marks a step forward to becoming a more efficient and environmentally friendly country.

Paul Raynes, director of policy at EEF, the manufacturers' organisation, added: "Today's announcement is a clear demonstration from the government that it intends to hit the ground running and get a UK shale gas industry moving. It has been obvious for quite some time that the regulatory quagmire that industry had to wade through was acting as a wholly unnecessary brake on development in the sector. Desperately needed reform was frustratingly slow during the last parliament, but the new government has shown that it is serious about the issue. Today's announcement respects democracy and community engagement, and is also good for energy security, good for growth and good for the UK."

ERIKS to launch industry report

IN THE COMING MONTHS, WE WILL BE ISSUING A DETAILED REPORT LOOKING AT THE STOREROOM PRACTICES OF BRITISH MANUFACTURING, FOCUSING ON EFFICIENCY, INVENTORY AND WORKING CAPITAL IN MODERN INDUSTRY.

UK industry spends millions of pounds every year on indirect stock for its manufacturing processes, from simple tools through to pumps, drives and motors.

However, lack of effective store and stockroom processes and procedures is having a major effect on maintenance practices, productivity and profitability.

We surveyed members of The Institute of Engineering and Technology (IET) to take the temperature of the UK's storeroom management practices in manufacturing and processing operations.

Details of the report will be featured in the next edition of Know + How and can be download at **www.eriks.co.uk**

UNTANGLING INDUSTRIAL HOSE SPECIFICATION

THE SCIENCE OF INDUSTRIAL HOSE IS ONE OF THE BACKBONES OF THE UK CHEMICAL INDUSTRY. HOWEVER, WITH CONFLICTING MESSAGES CAUSING CONFUSION AMONGST END-USERS, OVER-SPECIFICATION HAS BECOME COMMON PRACTICE. THIS CAN END UP NEEDLESSLY COSTING THE INDUSTRY HUNDREDS OF THOUSANDS OF POUNDS EACH AND EVERY YEAR. CARL LILLEY, BUSINESS UNIT MANAGER AT ERIKS INDUSTRIAL HOSE, AND AN EXPERT IN INDUSTRIAL HOSING, OUTLINES THE CURRENT STATE OF AFFAIRS.

Carl Lilley
Business Unit Manager, ERIKS Industrial Hose

For better or for worse, the UK industrial landscape is not renowned for dipping its toe in uncharted waters and, given the highly dangerous nature of many of the materials handled day in day out in the chemical market, this specific sector is no different.

One area, in particular, where caution has been taken to the extreme is industrial hosing. The chemical industry is strictly governed by a wide range of standards – dictating minimum requirements from health and safety, to material choice – all of which end-users must adhere to in order to safeguard their employees and their plant. Both of these requirements would subject them to hefty financial sanctions if damaged, not to mention added costs from production down time, product loss and the labour involved. As such, there is a tendency amongst chemical companies within the UK market to regularly over-specify the type of hose used to transport potentially hazardous materials around their plant and processes.

Whilst being overly cautious, is not – in theory – necessarily a bad thing; in practice it can soon become a hefty financial burden, as the cost of both buying and maintaining industrial hose which may be over specified for the specific application, will soon add up given the volumes used.

In reality, this issue stems from the manufacturers. There is a real lack of clarity amongst those supplying the UK market, in terms of what hose material or technology may be suited to each application, with different companies offering varied and often conflicting advice when it comes to how their products may or may not be used. As such, UK companies regularly tend to select industrial hosing which, despite being suitable for their application, may be considerably more expensive than another product which can offer equivalent levels of both performance and reassurance.

Yet surprisingly, the attitude to hose technology is actually reversed when it comes to steam hoses. Despite still forming a vital part of many chemical applications, the UK specification habits for steam hoses tend to veer towards buying on cost, rather than performance and life span. Herein lies another major issue as whilst end-users are often over-specifying when it comes to hose technology for handling hazardous materials, many are guilty of trying to compensate for that excess capital expenditure by looking to make cutbacks elsewhere. In many instances, this results in them opting for the cheapest possible solution for their steam hoses.

On the surface, steam may not pose the same threat to employee health and safety as hazardous materials. Yet, in reality, a steam leak can have devastating consequences. Given the temperature will be well in excess of 150°C, along with the elevated pressures it is likely to be operating under, any potential leak could result in serious injury to personnel, or significant damage to plant or equipment.

> "The cost of both buying and maintaining industrial hose which may be over specified for the specific application, will soon add up"

Yet, in spite of the risks posed by a steam leak, the UK continues to look to specify purely on price. In the grand scheme of things, this is a fairly new problem, which has been particularly exacerbated by two facets; first – the rise in low-cost imports from Eastern Europe and China; and second, the availability of these products to buy on the internet.

One of the reasons why correct industrial hose is recommended for steam applications is its ability to handle both the temperature and pressure requirements the market demands. It has to go through rigorous testing to achieve certification, all of which comes at a cost which is then filtered down to the end user. However, low-cost imports often do not go through these tests and end-users who purchase cheap steam hose will put themselves, their employees, and their equipment at risk. Unfortunately, the rise of the internet has made such technologies readily available for end-users to purchase themselves, as opposed to going through a specialist supplier who has the potential to impart valuable insight into what may best suit each specific application.

The great tragedy is that, in the long run, the cheap imports turn out to be much more expensive, and so end-users will continue to suffer from increased MRO spend if they don't make a change. Instead, it is much better to consider the total life cost of an industrial hose system. If a hose costs twice as much as a low-cost imported alternative, but is able to last three or four times longer and avoid the need for an engineer to routinely spend many hours a week tightening bolts and couplings to prevent steam leakages, then its total life cost makes much more financial sense than simply buying and regularly replacing a cheaper, imported model.

Ultimately, the first step to resolving the issue is to be completely honest and open when it comes to industrial hose specification – for both chemical applications, and for steam. Next, get in touch with a specialist industrial services support partner, such as ERIKS Hose Technology who, through a thorough understanding of your market place and its demanding requirements, will be able to assess both your existing facility and it's suitability for your application. In doing so, end-users will be able to find a balance where they can reduce their cost on chemical hose by not over-specifying, and then ensure that they select a steam hosing which can withstand the rigours of the job without failing, and contributing to inflated MRO costs.

For more information on ERIKS Hose Technology, please visit: **www.eriks.co.uk/Industrial-Hose**

Single point lubrication enhances component life

SIMALUBE, A PORTFOLIO EXCLUSIVE TO ERIKS, IS A RANGE OF SINGLE-POINT COMPACT LUBRICATORS IDEAL FOR USE IN CHEMICAL MANUFACTURING APPLICATIONS, AS ITS NON-SPARKING NATURE ENSURES THE LUBRICATOR POSES NO RISK IN EXPLOSIVE ENVIRONMENTS.

With a variable dispensing period of between 1 – 12 months, simalube can be applied directly to the lubrication point exactly when it is required, enhancing the life cycle of component parts such as bearings, chains, guides and gears.

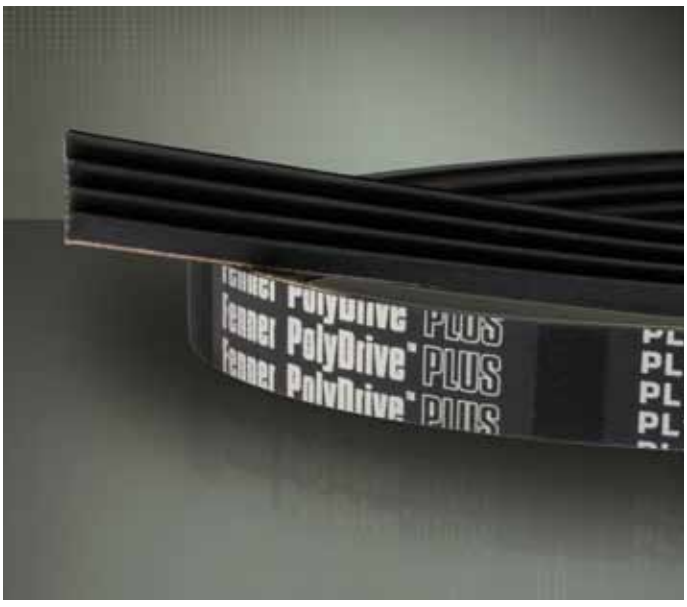
Activated with a simple twist of the dispensing dial, simalube will dispense lubrication at regular intervals with no manual interaction required, making the lubricator ideal for use in demanding applications where lubrication points are in difficult to reach locations or in dangerous production zones. The simplicity of the dispenser ensures the common procedure of manually greasing components is no longer necessary, eliminating maintenance team's exposure to noise, dust and dangerous moving parts, helping to increase health and safety levels.

The environmentally friendly simalube is available in a range of industry standard greases and oils and is capable of transferring lubricant in varying temperatures from -200C to +550C. When the lubrication cartridge is empty, it can simply be recycled or refilled and put back into service.

For more information, please visit **www.eriks.co.uk/Lubrication**

Fenner unveils new range of high efficiency belts

NEW TO THE FENNER RANGE, THE LATEST IN ITS LINE OF HIGH EFFICIENCY BELTS HAS BEEN UNVEILED THAT ARE IDEAL FOR USE IN COMPACT DRIVES IN HOUSEHOLD AND HEAVY MACHINERY APPLICATIONS.

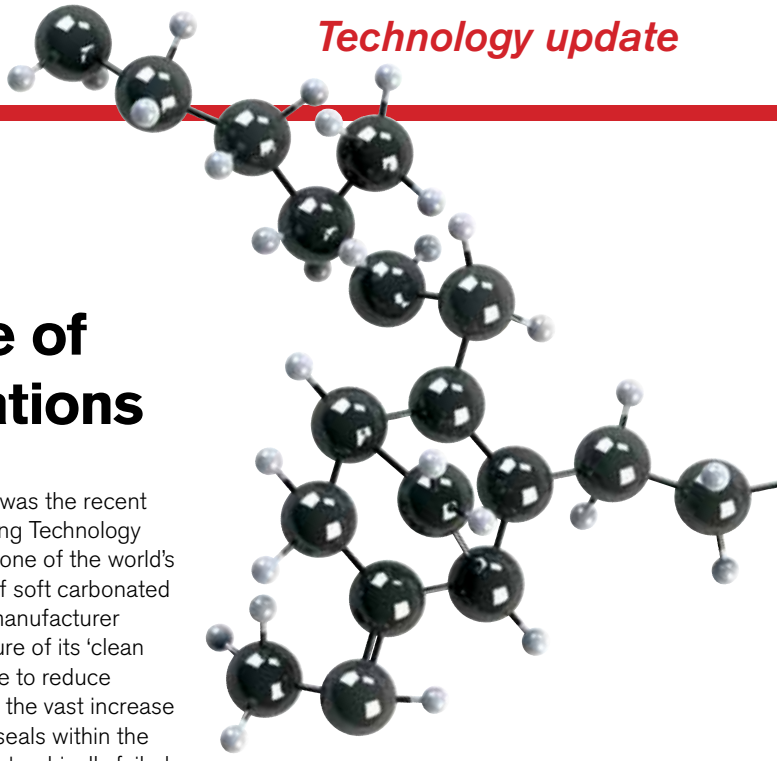


The new Fenner PolyDrive PLUS ribbed belts offer economic solutions to the most difficult drive conditions, such as large transmission ratios, high belt speeds, small pulley diameters and back idler pulleys.

Designed for high transmission ratios, the new ribbed belts are capable of operating at speeds up to 60 metres per second and utilise pulley grove dimensions manufactured to ISO 9982 standards.

Available in PJ, PK, PL and PM profiles, the PolyDrive PLUS ribbed belts offer higher power output when compared to previous ranges due to its low vibration characteristics, leading to a far more efficient belt.

For further information, please visit **www.fptgroup.com**



ERIKS EPDM compound enhances the performance of food and beverage applications

ERIKS' ETHYLENE PROPYLENE DIENE TERPOLYMER (EPDM) 55985 COMPOUND HAS IMPROVED CHEMICAL AND THERMAL RESISTANCE WHEN COMPARED TO TRADITIONAL COMPOUNDS, MAKING IT IDEAL FOR USE IN FOOD AND BEVERAGE APPLICATIONS.

EPDM 55985 is a Peroxide cured sealing element traditionally used in conjunction with O-rings or moulded parts of food and beverage applications that require high levels of chemical resistance. The compound can operate in temperatures varying from -450C to + 1500C and can offer resistance to chemicals such as alcohol, alkali and steam.

A great example of this was the recent assistance ERIKS Sealing Technology department provided to one of the world's largest manufacturers of soft carbonated beverages. The drinks manufacturer increased the temperature of its 'clean in place' (CIP) procedure to reduce bacterial growth. Due to the vast increase in temperature, various seals within the bottling equipment catastrophically failed, leading to repeated production stoppages and increased maintenance costs.

Taking on the advice of the ERIKS Sealing Technology team, the drinks manufacturer implemented the EPDM 55985 compound into its bottling application and quickly reaped the benefits of significantly improved efficiencies and a large reduction in maintenance costs.

ERIKS Sealing Technology is the only national industrial services company that can offer a complete sealing technology solution. Through two UK sealing core competency centres, ERIKS can help identify sealing problems, provide solutions and offer advice on application improvements.

For further information, please visit **www.eriks.co.uk/Seals**

Mann Tek's new self sealing couplings to improve site safety

WITH CONCERNS GROWING THROUGHOUT THE EUROPEAN CHEMICAL INDUSTRY OVER SAFETY PRACTICES AND EMISSIONS AMONGST AGEING PLANT STOCK, MANN TEK HAS UNVEILED ITS LATEST GENERATION OF DRY DISCONNECT COUPLINGS (DDC) TO MEET THE DEMAND FOR A SPECIALIST QUICK-RELEASE SOLUTION WHICH CAN KEEP SPILLAGE AND UNWANTED EMISSIONS TO A MINIMUM.

Available through ERIKS, the third generation of Mann Tek DDC systems come in a range of sizes, from 3/4" up to 8", and are manufactured to the NATO STANAG 3756 standard.

Unlike many other dry break coupling systems, Mann Tek's latest offering has been designed around a need for maximum flow rates, low weight, and fast and safe connection and disconnection; as well as easy maintenance. For example, the new range of couplings offers a maximum flow loss of just 10 per cent compared to open pipe, and are up to 20 per cent lighter than some traditional dry break couplings. Coupling sets can be stripped down and re-sealed on-site within 30 minutes! Suitable for almost any hose-based application which requires zero tolerance towards spillage, the Mann Tek DDC range can accommodate 99.9% of all known chemicals, with a large range of different seal and coupling materials available to choose from. Specific couplings for both LPG and cryogenic liquid transfer are also available.

As part of the main distributer agreement, ERIKS is able to provide on-site training or a third party annual inspection and service to customers.

Please visit:
www.eriks.co.uk/Industrial-Hose

THE £¼M BEARING

CAN SOMETHING AS SIMPLE AS A REPLACEMENT BEARING SAVE A BUSINESS ALMOST £¼M IN A SINGLE YEAR? IT CAN – AND WITH THE HELP OF ERIKS, IT DID.

The bearing sits at the base of a screw conveyor in a chemical plant, where it is continually subjected to an aggressive chemical that is transported by the conveyor. This heavy contamination meant a bearing replacement was typically required seven times a year, involving stopping the conveyor and halting production for half a day at a time.

The customer contacted the ERIKS Service Centre in Grimbsy for advice, and Mark Bratley, Sales Engineer, Electro-Mechanical Services made a site visit to assess the situation and propose a solution.

Tough decision

Clearly what was required was a bearing built for tough operating conditions – and the obvious choice was a Timken Spherical Roller Bearing Solid-Block Housed Unit.

Made with cast-steel housings and Timken high-performance spherical roller bearings, these are the only spherical roller bearing housed units to offer steel solid-block housings as standard. The design, positioning and dynamic performance of the primary and secondary seal options add to the overall reliability. In addition, steel auxiliary covers are also available, offering even more protection against harsh conditions.

Once the new bearing design was agreed and approved by the customer, then Mark Bratley, together with the customer's on-site engineer and two technicians, made the replacement.

Seventh heaven

Whilst the replacement was being made, the opportunity was taken to inspect the motor and gearbox. As suspected, the only problem was the bearing, which had been worn out by its exposure to the aggressive chemical.

Replacing this with the new Timken bearing on the original motor and drive unit took half a day, after which the equipment and process were restarted. This bearing replacement was nothing which hadn't happened before. But previously, it had taken place seven times each year.

On this occasion, the expectation was for the new Timken bearing to last longer – and over eighteen months later, the expectation has been proved right.

After twelve months of continual operation the bearing was inspected, and reported to be in as-good-as-new condition. Six months on, it is still operating as expected, with no reason to believe it won't continue to do so.

So even at approximately five times the cost of the previous bearing used, the new bearing paid for itself in a matter of months, by eliminating the need for more replacements. And when the additional, sizeable cost of half a day's lost production for each replacement is also taken into account, it's easy to see why the customer was happy to sign off cost savings of £240,000 – with the prospect of continued savings of the same order for several years to come.

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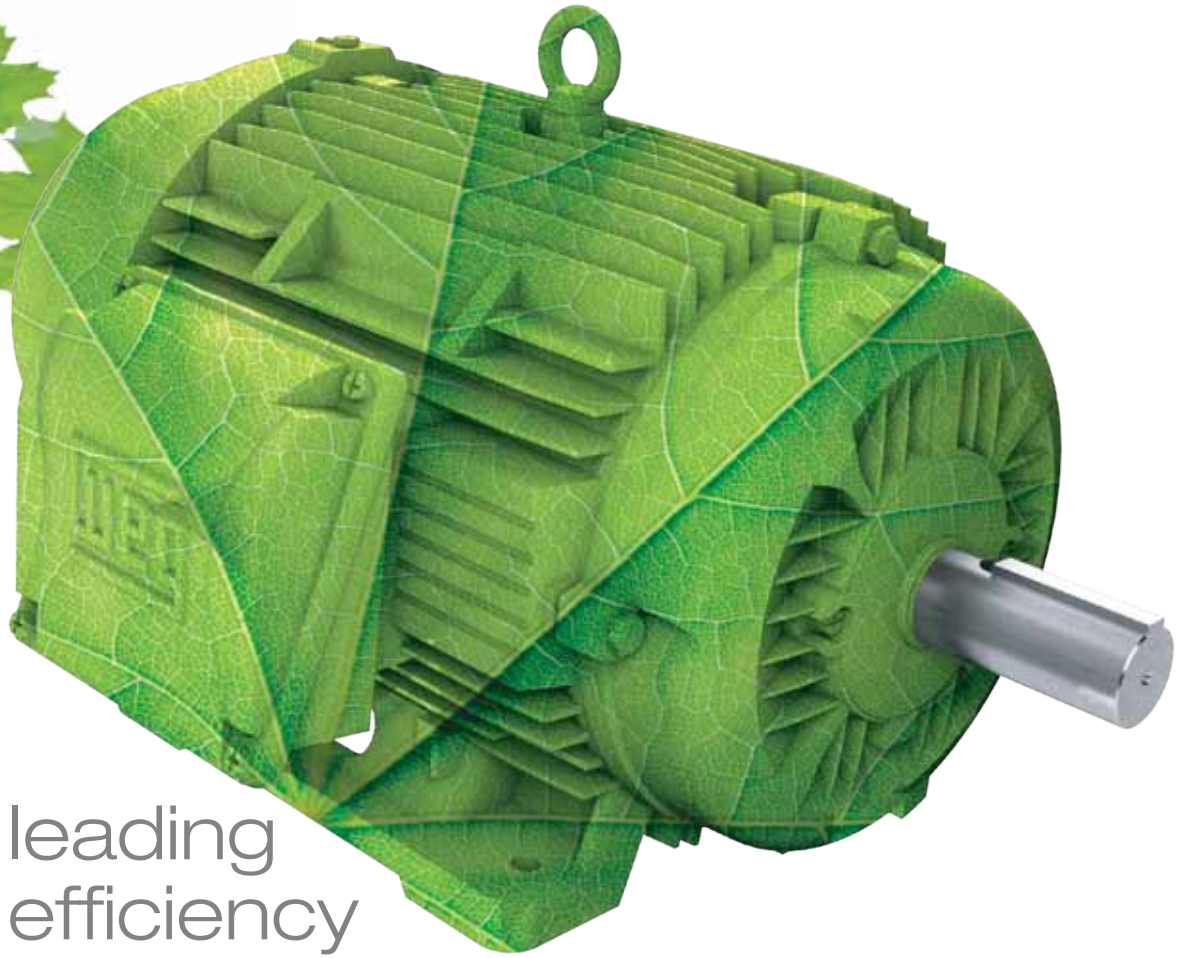

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The W22 range coupled with Drives and Control Equipment are built to withstand the toughest industrial applications meeting the demands for operation across different industries.

LV

To find out more visit www.weg.net

WILL REACH BE A STRETCH FOR YOU?

THE DEADLINE FOR THE THIRD AND FINAL STAGE OF REACH – THE REGULATION THAT COVERS REGISTRATION, AUTHORISATION AND RESTRICTION OF CHEMICALS IN THE EU – IS NOW IN SIGHT. BUT IF YOU BELIEVE THE EXPERTS AT THE EUROPEAN CHEMICALS AGENCY (ECHA), IT WON'T BE A HUGE BURDEN IF YOU'RE A CHEMICALS MANUFACTURER OR IMPORTER.

Laura Syrett
Acting Editor of Industrial Minerals

Phase 3 of REACH requires the registration of all chemicals made or imported into the EU, in quantities of 1 tonne or more per year. The deadline for registration is 1 June 2018. This tightens up on Phase 1 (1 December 2010 deadline) for registering chemicals in volumes greater than (depending on their hazard classification) 1,000, 100 and 1 tonnes per year, and Phase 2 (1 June 2013), for all chemicals in volumes of 100 tonnes or more per year.

Introducing REACH has been a long-term exercise. The regulation came into force in 2007, but the initial proposal was made back in 2000, and was followed by seven years of comment on the text of the legislation.

The ECHA, which evaluates registrations for compliance, says that the third deadline will apply to much smaller businesses than earlier phases, but the legislation is sensitive to industry realities.

Humans v chemicals

Chemicals are vital to a huge range of European industries, from steelmaking to cosmetics. But many consumers know little or nothing about the substances they come into contact with every day, such as:

- **Bromine compounds** – added to plastic casings of televisions, laptops and mobile phones to make them flame retardant
- **Sodium carbonate** – used to make glass bottles and laundry detergents
- **Titanium dioxide** – the white pigment in most types of household paint.

This contact between humans and chemical compounds was one of the key driving forces behind REACH.

Kevin Pollard, Head of Dossier Submission and PIC at the ECHA, explains that "REACH is about understanding the hazards and uses of substances, and ways of managing the related risk to protect human health and the environment." It also makes businesses responsible for demonstrating safe use, whereas before, REACH assessment of chemical hazards was left to national authorities.

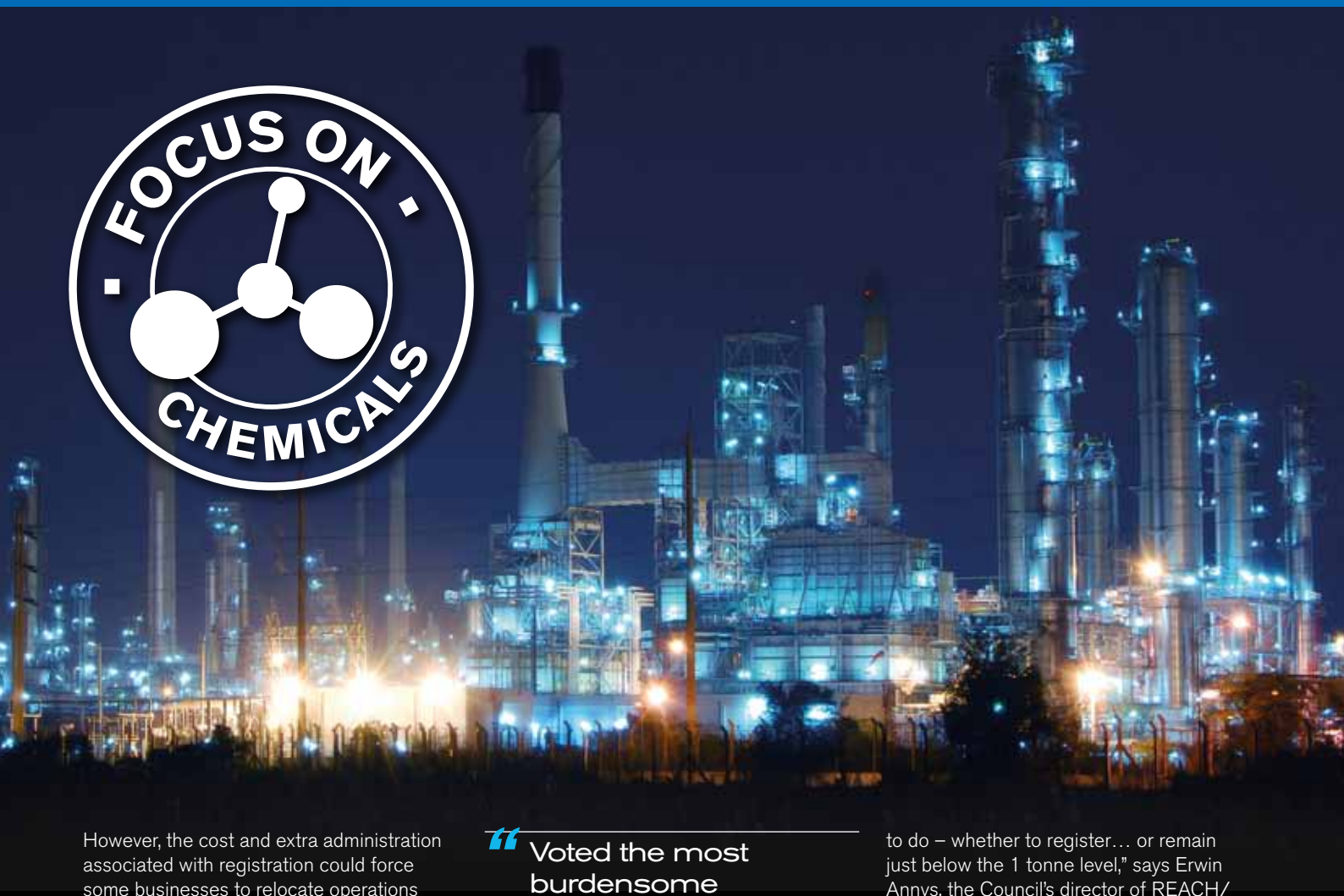
Up to speed?

The third registration deadline will affect smaller companies operating in the EU, and Pollard accepts that some of these may not be "fully up to speed" with REACH requirements.

For that reason, they've been given the longest notice period to review their supply chains and adjust to any extra expenses compliance may cost them.

The cost of registration, for example, can range from a few hundred pounds for small volume, non-hazardous chemicals (such as certain commodity fertilisers), to tens or even hundreds of thousands of pounds for large volume substances, which may currently be lacking large amounts of hazard information.

As well as protecting people and the environment from the effects of hazardous chemicals, REACH registration is aimed at allowing free movement of approved substances within the EU market, and promoting innovation and competitiveness.



However, the cost and extra administration associated with registration could force some businesses to relocate operations outside EU borders.

Business burden

Pollard says that since REACH came into force in 2007, the ECHA has not seen any strong evidence of downstream chemical consumer companies relocating to avoid registration. He admits that ahead of the 2010 registration deadline there was "quite a lot of politics" around that concern, "but that didn't happen."

Others are worried that the costs and bureaucracy of registering low volume substances will curb growth in some business areas, particularly amongst SMEs.

Tom Bowtell, Chief Executive of the British Coatings Federation (BCF), notes that REACH was "voted the most burdensome regulation in the EU by SMEs" in a 2012 European Commission poll.

"The BCF welcomes the intentions behind REACH in eliminating very hazardous substances, and appreciates that ECHA's

> "Voted the most burdensome regulation in the EU by SMEs"

2018 deadline gives time for SMEs to prepare," says Bowtell. "However, SMEs will find it almost commercially impossible to recover the costs incurred by REACH when registering substances between 1-5 tonnes, regardless of the Phase 3 deadline."

Bowtell also points out that many BCF members affected by REACH are those who work with niche, high value applications in small quantities, and that the regulation will hamper advances in the sector. "REACH will stunt innovation and growth opportunities for SMEs in Europe, because they can't be sure of being able to obtain the chemicals they want."

The European Chemical Industry Council (CEFIC) has conceded that fallout from Phase 3 registration is still uncertain. "There are still quite a large number of companies who haven't really decided what they intend to do – whether to register… or remain just below the 1 tonne level," says Erwin Annys, the Council's director of REACH/ chemicals policy.

"At the end of the day, it is of course a purely commercial decision-making process as to whether you can still make money on these chemicals," he said.

By Laura Syrett, Acting Editor of Industrial Minerals – the specialist news and information service covering all aspects of the non-metallic minerals industry.

THERE'S SOMETHING IN THE AIR

CLEAN AIR IS SOMETHING WE TAKE FOR GRANTED. BUT WHAT'S CLEAN ENOUGH FOR US TO BREATHE MAY FALL FAR SHORT OF WHAT'S CLEAN ENOUGH FOR YOUR SENSITIVE AND EXPENSIVE INSTRUMENTATION AND CONTROLS. PARTICULARLY IN THE KIND OF CHALLENGING ENVIRONMENTS FOUND IN THE CHEMICAL INDUSTRY. SO WHAT SOLUTIONS DO IMI PECISION ENGINEERING HAVE, TO ENSURE THAT AIR – WHICH YOU CAN'T SEE – IS FREE FROM CONTAMINATION – WHICH YOU CAN'T SEE EITHER?

Even a brand-new airline system uses air that's been around for ever – and which is already contaminated. So from day one, your new airline could be subjecting your equipment to water, oil or particle contamination. The result will be corrosion, clogging or seal softening, leading to increased air and energy use, higher costs, reduced performance – and increased downtime and maintenance costs if you are lucky.

> "Will protect your sensitive, expensive instrumentation and controls"

If you're unlucky, you could face a catastrophic equipment failure and an unplanned shutdown.

So if you're designing a new system now, you should be designing-in the solution to contaminated air. And if you're already operating an airline system without the necessary protection, now's the time to think about taking remedial steps, before it's too late.

Never out of their depth

IMI Precision Engineering have been designing and manufacturing the leading IMI Norgren brand of gas and air preparation systems specifically for the oil, chemical and gas sectors for over 30 years.

These IMI Norgren pressure regulators and filters are designed and built to operate under some of the toughest conditions you can imagine: on rigs in the harsh environment of the North Sea. In that kind of location, there's plenty of fresh air about – but usually blowing in on a Force 10 gale, and whipping up 40-foot waves to go with it.

Robust construction and dependable performance are essential in locations like these, when the nearest replacement parts may be a supply ship voyage away, and an unplanned shutdown could cost thousands of pounds an hour. So as you can imagine, products that can perform successfully out at sea will easily take a chemical plant environment in their stride.

Made from 316 stainless steel, IMI Norgren filters and regulators have a high level of resistance to corrosive atmospheres and media, and meet international safety standards. They provide not only a longer service life, but also longer service intervals without noticeable loss of performance or increased energy use.

They're also designed for straightforward fitting, to help keep downtime to a minimum – as well as being available in a range of different port sizes, to suit numerous different applications. The filter solutions also offer a choice of manual or automatic condensate drain, to suit your needs.

Triple filtered for purity

It's not just premium vodkas and super-strength lagers that use triple filtering. IMI Norgren air preparation solutions also use a three-stage filtering process, to ensure the filtered air is as free from contamination as practically possible.

Most filters only filter out particles down to 10-25 microns in size. The set of 5 micron, 25 micron and oil removal filters in IMI Norgren filtration systems, on the other hand, will filter particles as small as 0.01 microns, and oil contamination down to

316 stainless steel filters

- F22: ½ port general purpose – particle and water removal
- F22H: ½ port – oil and fine particle removal, 3-stage filtration
- F05: ¼ port miniature – particle, water and oil removal

Regulators

- R05: ¼ port miniature – 20 bar (300 psi)
- R38: ¼ port – 31 bar (450 psi) inlet, precision control
- R22: ½ port high flow, control to 17 bar (250 psi) outlet

Filter regulator combination units

- B05: ¼ port miniature 20 bar (300 psi)
- B38P: ¼ port and 3/8 port, high flow
- B38: ¼ port – high accuracy, ½ port – high flow
- IFR: ¼, ½ port filter regulator, seal options to -50°C (-58°F)

Spring-loaded regulators

- Heavy-duty quick and adjustment regulators from ¼ to 1 porting
- J44: ½ port, steam applications to 300°C (570°F)
- J50: 3/8 port, 750 bar (10,875 psi) inlet, outlet control to 550 bar (7975 psi)
- J55: ½ port 420 bar (6090 psi) inlet, outlet control to 103 bar (1490 psi)

Dome-loaded regulators

- K16 and K50
- Pilot operated, balance valve regulators in 3/8 to 2 porting
- Liquid and gas operating temperatures – -40°C to +150°C (-40°F to +300°F)
- Up to 420 bar (6000 psi) inlet pressure and 300 bar (4350 psi) outlet

0.01ppm. This means far more effective protection for your sensitive instrumentation and equipment. Which in turn means less maintenance, and far less likelihood of unplanned shutdowns.

IMI Norgren solutions are also designed to operate with high flows across a wide temperature range. Their high-pressure regulators, for example, are suitable for oil and gas at temperatures as low as -40°C and as high as +150°C, and for steam applications up to 300°C. These regulators – depending on the model – can handle inlet pressures up to 750 bar and outlet pressures of up to 550 bar.

Solutions to suit you

As well as a choice of features, IMI Norgren filters and regulators offer you the choice of purchasing single products for maintenance or repair use, or a complete assembly customised to meet your needs. IMI Precision Engineering are renowned for working in close partnership with customers to address specific challenges and develop appropriate tailored solutions. These are based on this market-leading company's long experience creating systems for some of the most extreme environmental and operating conditions in the world.

The result is a range of products which will protect your sensitive, expensive instrumentation and controls, so your equipment can operate more cost-effectively for longer – delivering down-to-earth benefits from air.

IMI NORGREN

FED UP OF SCRAPING YOUR FACE?

INTRODUCING THE FIRST GRAPHITE GASKET THAT IS EASY TO REMOVE FROM THE FLANGE - WITH XP TECHNOLOGY. THIS LATEST INNOVATION OF GASKETS IS AVAILABLE FROM ERIKS' FLOW TECHNOLOGY DIVISION AND IS DESIGNED TO REDUCE YOUR MAINTENANCE COSTS AND INCREASE PLANT RELIABILITY.

In addition to offering quality own brands such as the RX range of gaskets, ERIKS Flow Technology stocks market leading brands such as Frenzelit. And it's Frenzelit who have launched a new generation of gaskets featuring "Extended Performance" – or XP – technology.

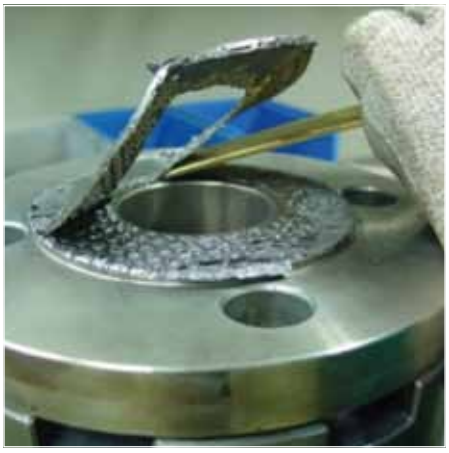
The XP range offers a number of advantages particularly interesting for the chemicals sector, but also attractive for any industry where more stable sealing, longer gasket life, and quicker and easier fitting are important. Or in other words, almost any industry sector!

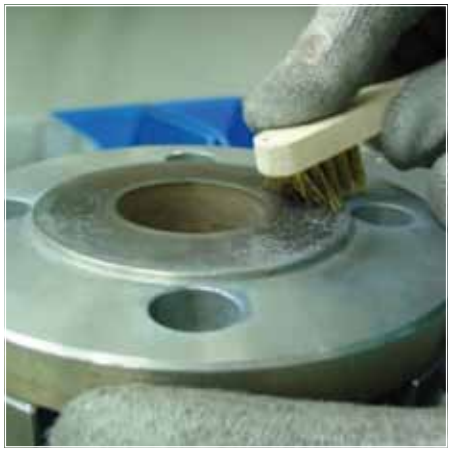
The longer-lasting seal

What makes Frenzelit XP gaskets deliver their Extended Performance is a special process technology applied to standard high-quality graphite gaskets, which are manufactured from expanded metal-reinforced graphite.

The special processes involve inorganic deep passivation of the pure graphite, on the basis of nanotechnology, which significantly enhances performance in several areas.

Graphite has a fundamental tendency to oxidise, which leads to loss of mass and weakens any seal the gasket provides. This usually results in a maximum application temperature of 550°C, though in some cases oxidation mass losses can be measured from as low as 450°C. However, the deep passivation of the graphite through the specially developed new XP process either slows down reaction with ambient oxygen and any other oxidising medium, or defers it until a higher temperature is reached.





> "The first graphite gasket that is easy to remove from the flange"

The result is prevention of unavoidable mass loss to a temperature 150°C higher than with a standard graphite gasket – which means a more stable seal, for longer.

Non-stick...

Even though non-stick coatings are used on standard graphite gaskets, they tend to be based on organic substances such as resins, which decompose at temperatures above 200°C, allowing the gasket to adhere to the sealing surface.

This means that when a gasket is removed for replacement there's some residue left behind. Investigations have shown that leakage problems can be caused by as little as 0.1mm thickness of residue, because the new gasket can't create a fully-effective seal as a result. When the gasket in question is fitted in a tongue-and-groove flange connection, removing all traces of residue is even more of a challenge.

However, XP gaskets maintain their non-stick properties over the whole application temperature of a graphite gasket, and in contact with all the typical media which require sealing.

Even on bare sealing surfaces, old XP gaskets can be removed without leaving any residue at all.

...that sticks at it

The exceptional properties of the XP gaskets ensure they do the same job as conventional graphite or fibre gaskets for longer, and with more stability and less leakage, at higher temperatures. And when they do need replacing, they leave no residue, so maintenance time and cost are reduced.

A small chemical plant in Germany was using 4,000 graphite gaskets per annum. They were also paying maintenance staff an hourly rate of €50.

By changing to XP gaskets, they reduced or eliminated cleaning when replacing gaskets, which saved 3 minutes per flange. A calculation of 4,000 savings of 3 minutes adds up to no less than 200 man-hours, which at €50 an hour represents an annual maintenance cost saving of €10,000.

The finishing touch

There are four Frenzelit gaskets available with XP finishing:

- novaphit® SSTC / XP
- novaphit® SSTC^{TA-L} / XP
- novaphit® MST / XP
- novatec® PREMIUM XP.

The first three options are all graphite gasket sheets, which in the case of the SSTC / XP and SSTC^{TA-L} / XP have an expanded metal insert. The SSTC^{TA-L} / XP and MST / XP both comply with German TA Luft air pollution regulations. In addition, the MST / XP, has a multilayer structure rather than an insert.

The fourth option – the novatec® PREMIUM XP – is an all-round gasket manufactured from a combination of aramid fibres and graphite. The combination enables it to perform far beyond the parameters of a conventional fibre gasket, not only providing substantial leakage reduction, but also excellent residual stress and media resistance, and an increase in application temperature range to around 300°C.

novaphit® XP gaskets are ideal for waste water treatment plants within chemical plants, whilst both novaphit® XP and novatec® XP are suitable for applications such as chemical plant filter systems, exhaust systems and pipe systems, general apparatus and much more.

ERIKS' XPertise

With decades of experience in the chemicals sector, ERIKS Flow Technology Division can meet all your gasket needs, on time and within budget.

Expert engineers are available to visit your site and identify areas for efficiency improvements, and cost-savings. And of course the complete Frenzelit XP range is available from stock with fast delivery.

To find out more about Frenzelit XP gaskets visit **www.eriks.co.uk/gaskets** or call our Core Competence Centre on +44 (0)1226 329200.

Frenzelit
creating hightech solutions

UNDER LESS PRESSURE TO PERFORM

OIL AND GAS FIELDS USUALLY RELY LARGELY ON NATURAL PRESSURE TO HELP THE EXTRACTION PROCESS. BUT AS FIELDS BECOME DEPLETED AND THE NATURAL PRESSURE BEGINS TO FADE, EXTRACTION BECOMES MORE DIFFICULT. ENGINEERS WORKING IN OMAN APPROACHED WEG FOR HELP IN ENHANCING THEIR GAS RECOVERY, WITH BESPOKE VARIABLE SPEED DRIVE SYSTEMS.

Boosting extraction from their depleting reserves is part of a US$33 billion project aimed at enhancing Oman's hydrocarbon production capabilities, and helping the country to broaden its economic base - unlocking about one trillion cubic metres of natural gas over the next 25 years, providing a long-term competitive feedstock for its petrochemical industry.

Plans are also in hand to develop downstream industries producing ethylene dichloride, caustic soda and other chemicals.

As part of this major effort, US$550 million is being invested in a depletion project. A daily gas production capacity of 30 million cubic metres will be developed, to be fed to the existing central processing facility.

To increase the pressure and keep the gas flowing, extra compressors are being installed. WEG electric motors will play a key role.

Efficiency and endurance

Motors are the largest individual source of energy use, accounting for 45% of the world's electricity consumption. Over half of this energy demand originates from motors used in fans and compressors, so it was essential for this project to make the drive system for the main gas compressor as efficient as possible, and able to endure the most demanding applications.

> "WEG has exceptional experience of developing complete drive solutions for oil and gas applications"

With that requirement in mind, Indian company Larsen & Toubro decided to partner WEG for this project.

WEG's bespoke solution is forty-eight 30kW variable speed drives and motors, and thirty-two 15kW drives and motors. These will be supplied as systems, and mounted in control cabinets. The systems will also include a high-capacity circuit breaker for emergency cut- outs, and a bypass system for direct-on-line starting.

WEG has also fitted its equipment with a passive input harmonic filter. This will reduce problems relating to mains-borne corruption of the power supply, while an output filter will be used to protect the drive.

Testing and training – worldwide

The variable speed drive systems have been tested at WEG's manufacturing facility in Brazil, under the scrutiny of inspectors from PDO and Larsen & Toubro. The testing simulated the harsh environmental and operating conditions that may occur in the field.

Performance tests of the motors are being conducted at the fan manufacturer's plant in Korea, and training sessions for PDO staff have been organised in the Brazilian factory. WEG's vertical manufacturing process has enabled the company to supply Larsen & Toubro with all the overloads, switchgear, relays and pushbuttons used in the drive cabinets. This not only ensures component compatibility and trouble-free system building and commissioning, but also efficient ordering and delivery.

Other elements in the cabinet include a control power transformer, auxiliary contactors and circuit breakers. Additionally, a door-mounted control panel incorporates a backlit LCD keypad, while a redundant serial link (2 channels Modbus-RTU over RS485) provides communication to the wider control system. Lastly, the control cabinets include space heaters, which are essential given the extreme temperature differences between day and night in the Oman desert, which can cause potentially damaging condensation.

40% cost reduction

The W22Xd IE4 Super Premium motor, is the most energy-efficient flameproof motor available, and combines explosion protection with IE4

efficiency levels. Its long service life and low maintenance costs also help businesses in the process industry increase productivity, improve reliability, and cut costs – by up to 40% compared with conventional models.

WEG drives minimise voltage surges by carefully regulating the time between the pulses of their integrated gate bipolar transistors. This decreases the possible surge magnitude, and allows longer cable runs with no negative effect on the motor insulation. Patented flux optimising technology produces lower and fewer peak voltages at the motor terminals, which decreases motor temperature rise by as much as 11%. The result is extended insulation – and therefore motor – life, because it is doubled for every 10°C decrease in operating temperature.

Perfect solution

Colin Cox, Managing Director, WEG Middle East, pointed out that WEG has "exceptional experience of developing complete drive solutions for oil and gas applications – both upstream and downstream. Our involvement in such a major project as the PDO Saih Rawl Field is a fine example of our commitment to help the industry operate more efficiently and reliably.

"Our high performance drive and motor architecture make WEG products the perfect solution for the most arduous industrial applications, as are likely to be found in Oman's PDO Saih Rawl Field Depletion Project. We can provide the ideal explosion-proof motor for virtually every application, even with extreme operating conditions such as ambient temperatures from -55°C to +80°C and altitudes up to 5,000m."

The WEG W22X range of ATEX certified electric motors and WEG variable speed drives are available in the UK from WEG's European distributor and service partner ERIKS UK.

ON A PLATE

SOME EMPLOYEES WOULD RATHER TAKE A RISK WITH THEIR SAFETY THAN TAKE A SHORT WALK TO STORES FOR THE NECESSARY PERSONAL PROTECTION EQUIPMENT (PPE). BUT WITH A WIDE RANGE OF HIGH-QUALITY, EFFECTIVE PPE NOW AVAILABLE FROM POINT-OF-USE VENDING MACHINES, YOU CAN HAND YOUR EMPLOYEES SAFETY ON A PLATE, AND TAKE AWAY THEIR EXCUSES NOT TO TAKE CARE OF THEMSELVES.

The Health and Safety at Work Act and the PPE Equipment at Work Act make the employer's responsibilities clear. You must provide the right equipment and the means for employees to access it when they need it.

In their hands
In any industry, hands are highly vulnerable – and the chemicals industry is no exception. No-one is likely to pick up loose chemicals with their bare hands, but splashes and spills can occur and hands need protection from them.

If gloves are going to be worn for any length of time, as well as being resistant to potentially aggressive chemicals they need to be comfortable to wear. If instead they are going to be worn for short periods and put on and taken off repeatedly, then that needs to be easy to do. So a range of different types of gloves, as well as a choice of weights and sizes, is essential to have on site.

ERIKS offers a wide choice of gloves for the chemicals industry from some of the worlds leading manufacturers. The Chemprotec range from BM Polyco, for example, is a natural rubber glove offering protection from a wide variety of chemicals and cleaning agents including acids, alkali's and alcohols. Available in heavy and medium weights, and lengths from 30cm to 66cm, Chemprotec meets the EN374 standards for Resistance to Chemical Hazards, as well as EN388 Mechanical Protection. Alternatively, the RX Chemresist and Ansell Sol-vex ranges are versatile Nitrile gauntlets well-known within the chemicals industry and generally regarded as the 'go to' glove for less aggressive chemicals. Suitable for light chemical applications, these also meet EN374 and EN388 protection standards as well as offering good grip and sensitivity, which can be important for operating switches, buttons and knobs.

For handling the most dangerous chemicals, a full enclosure with isolator gloves is the safest approach. These gloves have full integrity welds and are 100% leak- and chemical penetration-proof. BM Polyco offers industry leading protective gloves of this type within its range.

Visibly safer
Not every hazard within the chemicals industry is easy to see. In fact, chemical burns from vapours, mists and fumes invisible to the naked eye cause a greater number of serious injuries than the more obvious splashes and spills.

For some chemicals, sufficient protection against the risk of inhalation will be offered by a basic "dust" mask. But where the particles involved are smaller and therefore more able to penetrate, more complex masks are required. 3M is a world leader in this type of PPE, offering a range encompassing everything from simple disposable or reusable masks, through to powered air or supplied air respirators.

Whatever the type of mask, what's important is that it is comfortable to wear and doesn't restrict breathing, movement or vision. The more restrictive it is, the more likely an employee is to risk not wearing it "just this once". And once may be all it takes. It is vital that respiratory protection should be fitted correctly and employers need to ensure face-fit testing and training is carried out on all employees expected to wear respiratory protection.

Fast First Aid
If a person does come into contact with a potentially harmful chemical, it is essential to act fast to prevent or limit harm. This is particularly the case if the chemical has somehow found its way into the eye.

Washing out the eye as quickly as possible is the most effective way to provide First Aid, so eyewash should always be provided in areas where a chemical splash of this nature is possible. Although 0.9% saline solution is the most generally used eyewash, where chemicals are concerned, the use of a neutralising eyewash solution such as the Cederroth Eyewash, can be instrumental in protecting the sight of the affected employee. Cedorroth Eyewash is an isotonic borate buffer solution designed to neutralise acids and chemicals on contact. This has been clinically proven to be more effective, and is one of the fastest-acting solutions available.

Rotapoint PPE Vending machine, courtesy of Supply Point Systems

When every second counts, that's an important consideration.

Safety within reach
Speed is important in prevention as well as in First Aid. If someone thinks it takes "too long" to walk to stores to get the PPE they need, they might be prepared to take a risk and go without. That's where point-of-use PPE vending machines come in.

> "It's safety on a plate, with savings dished out on the side"

Able to dispense the whole range of PPE – from helmets to safety boots – they help increase the take-up of PPE by employees. Yet they also reduce the cost of providing it, through closer control and accurate, automated record-keeping.

Another important advantage for employers of PPE vending is the audit trail it provides.

We've already seen that providing equipment is no guarantee employees will wear it. But if you have carried out a full risk assessment, provided the necessary PPE, made it easy to access, and given instruction in its use, you have done as much as is practicably possible. The dispensing record maintained automatically by the machine will show if the right PPE was accessed at the right time. In the event of an accident you will have demonstrated that everything possible was done to prevent it.

Reasonable steps
Providing the right equipment is the first step for an employer in meeting Health and Safety obligations. Providing the necessary training in its use is the second. And placing PPE as few steps as possible from where it's needed is a valuable additional measure, which can even save money without compromising safety.

In fact, it's safety on a plate, with savings dished out on the side.

THROWING NEW LIGHT ON CONDITION MONITORING

THE LIGHT IN QUESTION IS INFRA-RED. AND IN THE RIGHT HANDS, IT CAN BE A HIGHLY EFFECTIVE CONDITION MONITORING DEVICE, ABLE TO DETECT FAILING EQUIPMENT, INSULATION BREAKDOWN, LEAKAGES AND MUCH MORE, AND THE ENERGY WASTAGE THAT RESULTS. WITH THE RIGHT CALCULATIONS TO BACK UP THE OBSERVATIONS, IT CAN EVEN HELP YOU DECIDE WHETHER REMEDIAL ACTION WILL BE COST-EFFECTIVE OR NOT.

Many businesses in the chemical industry possess a thermal imaging camera - often for use by their electrical engineers. However, in the right hands - and if the camera is up to the job - it could have an additional application for wider condition monitoring using thermography.

A trained operator with a high-quality thermal imaging camera – such as the £63,000 model used by ERIKS Condition Monitoring engineers – can help you to minimise downtime, maximise uptime, reduce energy losses and maintenance costs, and even avoid catastrophic failures and Health & Safety incidents.

Seeing isn't believing

Almost anyone can use a thermal imaging camera to detect a hot spot – just as almost anyone can kick a ball. But not everyone with a pair of football boots is Ronaldo, nor ever could be. In other words, simply spotting the most obvious problems doesn't mean understanding all their ramifications and cost implications.

However, ERIKS thermal imaging technicians are in the Champions League, thanks to their engineering and condition monitoring experience, their extensive training, and their Level II certification as thermographers.

Put all those things together and you have thermographers who not only know exactly where to point their device to detect the problems, but also what the images and results mean. And, perhaps most importantly, they know how to translate those results into clear profit and loss figures, so it's obvious what a problem is costing you, how much it would cost to put right, and therefore whether it's cost-effective to do so.

With ERIKS' help, you not only see the previously invisible problem, but can also believe and understand its ramifications for your bottom line.

Hot spots and cold hard cash

At its most basic, thermography can detect hotspots in equipment, which can be an indication of unwanted friction, wear, or perhaps even imminent failure. But whatever the cause, in an operating environment like the chemical industry – where volatile and potentially flammable chemicals are present – raised temperatures are something to be avoided.

An effective thermographic survey gives you early warning before the problem develops or becomes critical.

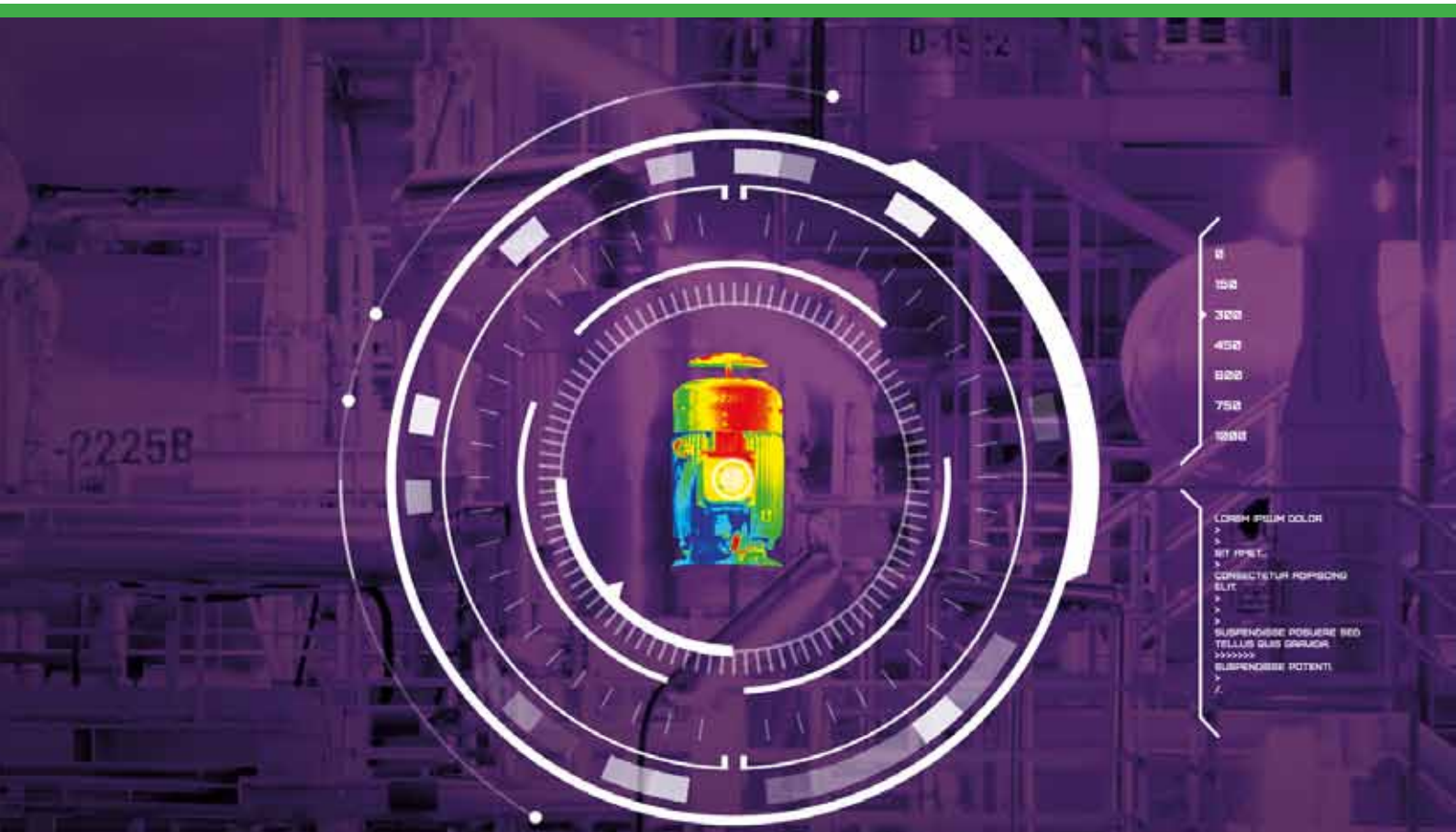
With a more experienced thermographer, more advanced thermography can detect far more problems in far less obvious places – and therefore potentially deliver far greater savings.

For example, when a chemical process is dependent on an endothermic or exothermic reaction, maintaining a constant temperature is crucial. But if insulation has failed, maintaining that temperature is going to require more energy. If there's also been water ingress as a result of the failed insulation, you're using additional energy to heat or cool unwanted water, in addition to the heating or cooling requirements of the actual process.

Detecting this kind of problem is a valuable first step. Where ERIKS' engineers can go further is in determining the scale of the energy loss and converting that into financial terms.

The result is a defined payback period which you can use to calculate the cost-efficiency of carrying the energy loss, compared with carrying out a repair.

"An effective thermographic survey gives you early warning before the problem develops or becomes critical."



Tuned to save

The highly sophisticated camera used by ERIKS – with a highly trained thermographer behind it –not only uses infrared to detect concerns, but is also tuned to detect hydro-carbon emissions. This makes it possible to see leaks of volatile organic compounds (VOCs), which other cameras will not detect.

This kind of Optical Gas Imaging (OGI) camera is actually highlighted for its effectiveness, in the EU Directive on Industrial Emissions, which has the force of law in the UK. The Directive means that companies must conform with the application of best available techniques for pollution prevention and control.

Since research shows that 34% of leaks take place in just 1% of plant, being able to pinpoint the source of the leak not only minimises the amount of plant which has to be shut down, but also the amount of downtime even for the areas affected. ERIKS' engineers are also experienced in carrying out "active thermography", which involves monitoring temperature changes as a result of outside influences. Whether it's the rising or setting of the sun, or a change in the process itself, detecting and understanding the changes in temperature that result can help to highlight previously unidentified problem areas.

Similarly, checking the skin temperature of storage tanks can identify insulation problems. And the camera can also be used to check fluid levels in tanks (confirming the correct functioning of tank sensors) without the need for opening or entering the tank.

Safety cameras

Removing the need for a visual inspection of a tank is not the only way thermography can reduce health and safety risks.

In a chemical plant, the slightest leak of a corrosive or poisonous substance, or a noxious gas, can be catastrophic. Employees, watercourses and the environment can all be put at serious risk. Even damaged insulation as a result of water ingress can be a safety risk. If the water freezes and expands, it may further crack the insulation, causing it eventually to fall off and potentially injure an employee.

The risk of employee injury or worse is, of course, the major consideration. But there are also financial considerations arising from

injury or pollution, not to mention reputational damage. Again, professional thermography can identify potential problems before they become critical.

So whether you want to save energy, save money, or save yourself, condition monitoring with thermography incorporating optical gas imaging is a highly effective method – but only if carried out by experienced, qualified and certified operators using the correct high-quality camera. As you would expect, ERIKS has the equipment and the know-how.

WHEN NO REACTION IS A GOOD REACTION

MANY CHEMICALS CAN REACT VIOLENTLY WITH GENERAL ENGINEERING MATERIALS, OR QUICKLY DEGRADE AND COMPROMISE THEM, WITH DANGEROUS OR CATASTROPHIC RESULTS. AS A RESULT, ENGINEERS FREQUENTLY FACE THE CHALLENGE OF FINDING SUITABLE FLUID SYSTEM COMPONENTS MANUFACTURED FROM NON-REACTIVE MATERIALS.

Gareth Thomas
Applications Engineer - Scientific Products at SMC

With tens of millions of unique chemicals known to exist already, and new ones being discovered or synthesised every day, it may sound like an impossible task to choose the correct, unreactive, wetted material for any given chemical application. But fortunately, there's one material which is so unreactive, it's easier to list the handful of chemicals it does react with, than the tens of millions it doesn't.

The substance is Polytetrafluoroethylene, or PTFE for short – the first of the fully fluorinated polymers, discovered by chance in 1938. Since then, research has added other related substances, including PFA (Perfluoroalkoxy) and FEP (Fluorinated Ethylene Propylene).

What they all have in common are some remarkable properties, of which – for the chemical industry – the most useful is the fact that they are virtually inert to all known chemistries. This makes them an ideal material for fluid system components for use in the chemical industry.

From ultra-pure to highly toxic

Process chemistries are often required to be maintained at high purity levels, which can be very difficult to achieve with common engineering materials. At the opposite end of the spectrum, many chemicals are highly toxic even at concentrations of parts per billion. In these cases, a containment failure due to incorrect material or component choice could have very serious consequences.

So when designing a fluid system for chemicals, the choice of materials for the components is critical: not only to the process results but also – and more importantly – to the safety of operators and maintenance engineers.

However, choose components manufactured from PTFE, and you can relax. These can safely come into contact with chemistries ranging from ultra-pure water to highly toxic and corrosive compounds, with no unwanted effects. The fact that PTFE will not react means the components will compromise neither the safety and integrity of the system, nor the purity of the fluid they are carrying.

PTFE is also easy and economical to extrude or mould into tubing, fittings, valves, and other associated flow components. So you can assemble an entire chemical handling or delivery system from PTFE-based components, all of which will remain totally inert and completely safe.

Choose your tube

The core of any chemical delivery system is the tubing that interconnects the various components.

Whilst PTFE tubing offers all the benefits of other PTFE components, other chemistries and applications may require other solutions. SMC, for example, manufactures tubing not only in PTFE but also FEP, PFA and SUPER PFA Fluoropolymers. As well as offering chemical resistance, this specialist tubing has an operating temperature range of up to 260°C, depending on the series. With tubing available in a range of imperial and metric sizes, with some available in translucent colours for easy identification, this is a highly versatile solution.

Form and function

When you are designing a chemical fluid system, you will have a range of functional requirements to be fulfilled. You may require valves, regulators, pumps, flow meters, vacuum generators, and even thermal control units – all of which must offer the

> “It is essential for manufacturers of chemical systems to keep pace”

same low or non-existent level of reactivity. Fluoropolymer is a material which offers a workable solution for a wide range of these functional products.

When air-operated diaphragm pumps are present in a system, pressure regulation is often installed downstream, to define the system working pressure and smooth and reduce the pulse output of the diaphragm pump. There is also often a need to monitor the flow rate of chemicals through a system, which may range from as low as 1ml/min up to 45 L/min. Flow switches provide a solution and – when a non-invasive monitoring method is required – ultrasonic measurement versions are also available.

Maintaining the heat of a chemical can also be crucial, requiring an accurate and effective thermo controller. The HED thermo controller from SMC is one such device, allowing the temperature of a chemical to be directly controlled with an all-PFA heat exchanger and Peltier devices. Control is from 10-60°C, with an accuracy of +/-0.1°C.

Keeping pace with chemistry

With new chemicals being discovered or developed almost daily, and thousands of different applications within the chemical industry, it is essential for manufacturers of chemical systems to keep pace.

There are, for example, currently 12,000 basic SMC products, with over 700,000 variations. And new or improved products are added at a rate of 35-50 every year.

So when you’re putting together your next system, simply ask ERIKS for whatever SMC components you need, and you’ll get exactly the reaction you want.

On yer bike

"I'm not one for drawing parallels between sport and business. I struggle to see how Sir Alex Ferguson's team talk at half-time in a Champions League Final can be transferred into a factory production planning meeting or how Clive Woodward's strategy for winning the Rugby World Cup is comparable to gaining competitive advantage in the water industry.

But, I must admit that I've recently got very interested in cycling. Don't get me wrong, I haven't gone out and bought a bike and there is no chance of anybody seeing me in lycra, but you have to admire what British cycling has done in recent years.

Let's just put this into perspective for a moment. If you had predicted ten years ago that there would be three British winners of the Tour De France in a four-year period, people would have laughed at you.

British cycling was nowhere. We had virtually no history of winning international competition. Getting 'on yer bike' was something that a few people did to get to work and a very small minority did in their spare time.

The really interesting thing is how Sir Dave Brailsford, the mastermind behind the success of British cycling, did it. There was no blinding flash of light and cry of 'Eureka' heralding a brilliant innovation, which immediately catapulted UK cycling into the forefront of the sport.

Instead, Brailsford did it by what he calls 'marginal gains', in other words the little things that grouped together deliver real competitive advantage. In fact, Brailsford does not regard himself as an innovator, he refers to the process by which Team Sky became the predominant cycling team in the world as "continuous improvement."

Sir Dave's search for continuous improvement went everywhere, from the nutrition of the riders, to their training programmes and bike seat ergonomics, through to the pillows riders used to sleep on and the type of massage gel used by team physios.

Which, despite my earlier scepticism, is where I draw a direct parallel with industry.

Because, although methods like Six Sigma and condition monitoring are gaining traction, too little time is still spent on continuous improvement processes. Too little time is spent looking for that one per cent gain in machine performance which, allied to the use of a new bearing, a different maintenance schedule and more regular calibration, could improve performance, by not just one per cent but by five, six or even ten per cent.

Which begs the question, what if we released our maintenance teams from the reactive and unplanned and asked them to identify the marginal gains which could deliver real productivity improvements? What if we spent less time looking for an innovation 'magic bullet' and more time working with what we have and just making it perform better?

It will be a long time before you see a maintenance engineer on a podium on the Champs Elysees, holding a bouquet of flowers whilst being sprayed with the finest champagne, but those at the sharp end have it in their abilities to make the sort of marginal gains which could make British industry as competitive as British cycling."

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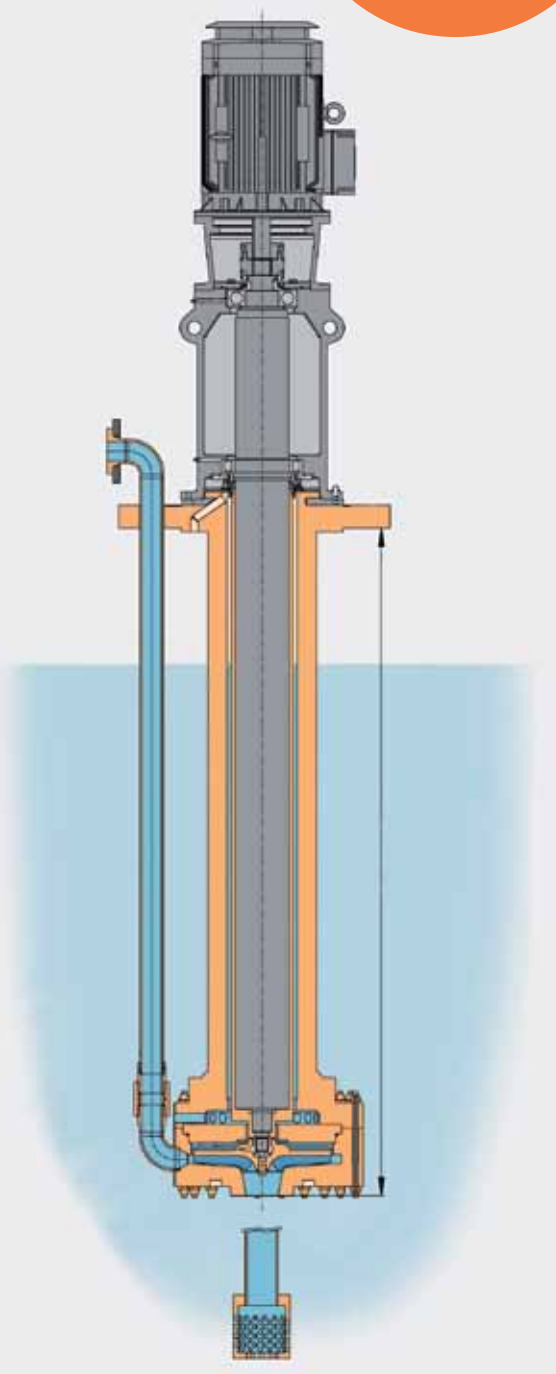

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