The global magazine for pump users and suppliers

PUMP engineer

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Volume 9, August 2017

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Volume 9, August 2017

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September 12th – 14th
Turbomachinery & Pump Symposia
George R. Brown Convention Center
Houston, Texas, USA
http://tps.tamu.edu/

September 20th – 21st
Valve World Expo & Conference Asia 2017
Suzhou International Expo Center
Suzhou, China
http://www.valve-world.net/vwa2017/valve-world-asia-2017.html

November 28th – 30th
Stainless Steel World Conference & Exhibition 2017
MECC Maastricht
Maastricht, the Netherlands
http://www.stainless-steel-world.net/ssw2017/the-stainless-steel-world-conference-exhibition-2017.html

COVER STORY

Tycon Alloy is committed to investing in people, expansions and future development

In recent years the city of Shenzhen, China has experienced a significant growth in urbanization. As a result, Tycon Alloy Industries Co., Ltd., has focused its efforts on relocating to a new and improved plant in Zhongshan, Guangdong province. Along with this relocation, Tycon has implemented a plan to fully upgrade and increase its offering to customers, including the availability of mechanical equipment, technical advancements in products & services, a focus on energy conservation and emission reduction, competent staff and more. Pump Engineer had the pleasure of speaking with Michael Lo, Head of Operations, Ronald Mak, Business Development Manager, and CY Leung, Continuous Improvement Manager, to learn more about Tycon's focus on its customers, and its strategies for upgrading and future development.

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Dear readers,

We are more than half way through 2017 and Pump Engineer is getting prepared for all that lies ahead in 2018. With that, the Steering Committee for Pump Summit Americas 2018 is delighted to be able to present you with the Preliminary Conference Program for Houston's premier networking event for pump users. Be sure to check out this month's insert for more information! If you have an interest in presenting at this engaging event, please contact me at the email address provided, or visit: **www.pumpsummitamericas.com** for more information.

In this issue of Pump Engineer there are multiple end user interviews, from The Dow Chemical Company to BioSafe Systems. Also, be sure to check out our interview with regular contributor Andre Gafford on page 27, and with this month's special topic being water & wastewater, be sure to read Wim Moors' article on dewatering pumps (page 24).

In addition, Pump Engineer recently attended the Valve World Americas Expo & Conference which took place in Houston, Texas on June 20th and 21st. A total of 4,141 professionals attended the event, including nearly 450 conference delegates from all over the world. Here are some snapshots from the two-day event, which proved to be a huge success.

I hope you enjoy this issue and I encourage you to contact me should you have any questions or comments. Contact me at **d.morgan@kci-world.com**

Yours sincerely,

Deirdre Morgan

Deirdre Morgan

Editor, Pump Engineer

Product developments

CheckPoint Pumps & Systems has launched the Series HDA electric diaphragm chemical injection pump, which comes equipped with a diaphragm dosing head to allow for efficient, environmentally safe injection. It is designed for use in remote or unmanned areas.

SKF has introduced the Electric Cartridge Pump ECP. Developed to lubricate bearings and linear guides in small machines, this pump includes an integrated pressure-relief valve that enables its use in single-line lubrication systems such as SKF MonoFlex.

SJE-Rhombus® has expanded the NEX Series® control panel product line to include single phase duplex models designed to alternately control two 120, 208 or 240 VAC pumps in water and sewage applications. The control panel alternately controls two single phase pumps. If an alarm condition occurs, an alarm switch activates the audible/visual alarm system. This system is designed to provide override control should either pump fail.

Grundfos Singapore recently launched SCALA2, a fully integrated water booster pump. The pump, motor, tank, sensor, drive and non-return valve have been built into one unit. It features a built-in sensor, which constantly measures the discharge pressure.

Quattroflow™ has launched the EZ-Set Pump Chamber Replacing System for its Single-Use pumps. The EZ-Set is designed to enable users to replace a Single-Use pump chamber in 30 seconds by hand without the use of special tools or torque wrenches. The EZ-Set is available for Quattroflow Single-Use pump chamber sizes 150 and 1200 – QF150SU, QF1200SU, QF1200SU-CV and QF1200SU-HT – and is also retrofittable on existing drives.

Global highlights

Pump industry represented at Valve World Americas Expo & Conference 2017

Valve World Americas Expo & Conference 2017 took place in the George R. Brown Convention Center in Houston, TX on June 20th – 21st. Among the more than 300 exhibitors at the event was QVC Chemical Equipments, a pump and seals manufacturer based in Gujarat, India. Vishwas Sheth was onsite to speak with visitors about the company's industrial process pumps and their variety of replacement parts, such as impellers, gaskets, o-rings, bearings and more.

ARO VP appointed to Hydraulic Institute Board of Directors

Oakley Roberts, Vice President (VP) and General Manager for ARO, a leading global manufacturer of fluid management products, has been appointed a director of the Hydraulic Institute Board of Directors and Officers for a three-year term. With nearly 20 years of experience, Roberts has demonstrated his leadership with roles in product management, sales, marketing and engineering.

Tenders

Iran: Reconstruction and Equipping of Pumping Station
Description: *Sewage pumping station construction work*
Contact point: *Tel: +98 333-50582/86/87*
Time limit for receipt of tenders or requests to participate: *Sept 4th, 2017*
Language: *English*

France: Dredging and Pumping Works for Water Treatment Plant Installations
Description: *Dredging and pumping works for water treatment plant installations*
Contact point: *Tel: +33 545-386-984, Email: marche-public@grandangouleme.fr*
Time limit for receipt of tenders or requests to participate: *Aug 31st, 2017*
Language: *English / French*

Bangladesh: Centrifugal Pumps
Description: *Purchase of centrifugal pump*
Contact point: *Fax: +88 031-741173*
Time limit for receipt of tenders or requests to participate: *Dec 4th, 2017*
Language: *English*

Norway: 3 Pumping Stations for Storm-Water Flood Protection Facilities
Description: *Water pumps and pumping station construction work*
Contact point: *Tel: +47 229-59709*
Time limit for receipt of tenders or requests to participate: *Sept 1st, 2017*
Language: *English*

Netherlands: Dredging and Pumping Works
Description: *Dredging and pumping works*
Contact point: *Tel: +31 517-492-222, Email: inkoop@harlingen.nl*
Time limit for receipt of tenders or requests to participate: *Sept 1st, 2017*
Language: *English / Dutch*

PROJECTS & TENDERS
For flow control industries.

To subscribe to the Projects & Tenders Newsletter please contact Peter Bulmer **(p.bulmer@kci-world.com)**.

To submit a project or tender please contact Deirdre Morgan **(d.morgan@kci-world.com)**.

Tycon Alloy is committed to investing in people, expansions and future development

In recent years the city of Shenzhen, China has experienced a significant growth in urbanization. As a result, Tycon Alloy Industries Co., Ltd., has focused its efforts on relocating to a new and improved plant in Zhongshan, Guangdong province. Along with this relocation, Tycon has implemented a plan to fully upgrade and increase its offering to customers, including the availability of mechanical equipment, technical advancements in products & services, a focus on energy conservation and emission reduction, competent staff and more.

Pump Engineer had the pleasure of speaking with Michael Lo, Head of Operations, Ronald Mak, Business Development Manager, and CY Leung, Continuous Improvement Manager, to learn more about Tycon's focus on its customers, and its strategies for upgrading and future development.

By Hong Wang and Deirdre Morgan

Tycon Alloy was established in 1995 and has been continuously expanding ever since. Not only is the company a professional casting foundry, producing highly precise and complex casting components, but it also provides value added machining services. Dedicated to being a trustworthy strategic partner with the objective of providing top quality products and services, and creating long term partnerships with customers, Tycon is proud to operate under a stringent quality assurance system.

Optimizing production for the pump industry

Providing customized, top quality casting solutions to customers worldwide has always been the priority mission for Tycon. Therefore, the company continuously redefines its mission statement in order to keep up with new and emerging trends and to meet customer requirements. "Valves and pumps have always been our traditional advantage industries and will be given

priority among priorities in the future," says Michael. "We utilize advanced technological practices & developments to manufacture high precision and high value special alloy casting. We aim to be the industry leader, transcend immediate interest and focus on forward-thinking ideas."

Presently, approximately 50 percent of Tycon casting products are valves, while pumps account for about 30-35 percent of the production. In the future, the company intends to continue its focus on the production of valves, while increasing its investment in pumps. In particular, a high importance will be placed on investing in nuclear power, gas turbines and ocean engineering.

Over the past number of years, in order to meet the demand for customized orders, Tycon has made major improvements in developing pump and pump related products, and has been able to respond quickly and efficiently to their customers' specific requirements. For example, they have elaborately developed several pump products for power generation. "Pumps for power generation require extremely high complex impellers," says Ronald. "Certain pump manufacturing requirements can only be achieved with the aid of special production techniques. For example, manufacturers often use ceramic cores developed by Tycon which achieve the surface finish required to improve pump efficiency. This technique has been used in production for several years, but has undergone huge improvements and refinements year on year in order to meet the market demands for increased pump efficiency and complexity. With this method, Tycon can attract high-end market customers."

"In our mind, customized service means to achieve the specified product requirements in a limited time, including making a new mold and sample, and exceeding the customer's overall expectations," adds Michael.

Tycon is committed to being a global leader in the casting engineering solutions of stainless steel and special alloys. Following years of investing in research and development and using their extensive experience and technical expertise, Tycon has evolved into an internationally recognized enterprise with advanced manufacturing capabilities, including investment castings, sand castings, precision machining and numerous technical services. Michael states: "We can advise customers on casting designs and engineering, and our internal quality standards are in stringent compliance with international accreditation such as ISO9001, Norsok M650, TUV Rheinland Certification AD2000-Merkblatt WO and 97/23/EC and Marine Society Approvals, to name but a few."

Industrial upgrading

After over two years of careful preparation, not just in its relocation, Tycon will upgrade factory production and overall management of both its software and hardware. Covering safety and employee care, process reengineering, continuous improvement, environmental protection, energy saving, building a digital factory and improving product quality through process control and advanced ideas, Tycon is focused on excelling in all aspects of production.

"People are always of the utmost importance to a foundry. Therefore, when planning for the new

"People are always of the utmost importance to a foundry. Therefore, when planning for the new Zhongshan plant, we consider safety *as the most important factor."*

CY Leung - Continuous Improvement Manager

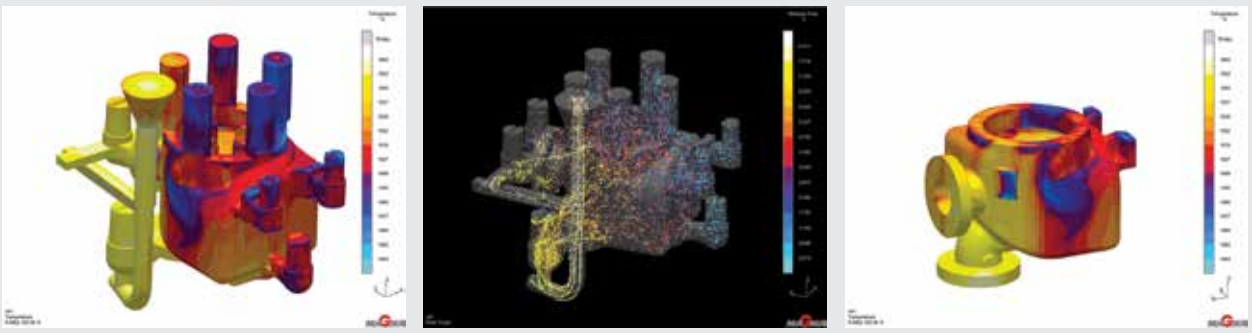
Zhongshan plant, we consider *safety* as the most important factor. This will help us to build a solid foundation while achieving our mission," explains CY. "In relation to production management, we have introduced several effective concepts, such as Lean, Six Sigma and TOC, which all contribute to improving quality, reducing cost, optimizing internal processes, stabilizing supply and enhancing customer satisfaction."

In order to establish a successful, environmentally friendly foundry, safety, emission reduction, energy saving and recycling are all critical factors which need to be taken into account. However, due to high cost and technical restrictions, companies seldom like to invest in this aspect of business. In addition to the planned foundry relocation, Tycon has also paid special attention to environmental design and its process of equipment selection for the Zhongshan plant. The company's goal is to deal with the most serious issues, such as noise and dust pollution, energy consumption, ventilation and waste. CY elaborates: "As a company we strive to recycle waste wherever possible. For example, we have deployed a special environmental company to deal with the spent sand from the sand casting process. In the Zhongshan plant, we will install thermal sand reclamation equipment for the regeneration of used foundry sand. Through its use, 98 percent of waste sand can be reused."

For the manufacturing industry, digital technology is the most important factor to consider when completing industrial upgrading. With the installation of a data acquisition module management system, Tycon will be capable of receiving real-time data from automation equipment, human performance detection devices and other various management systems. This data management system will also comprehensively collect all information about the condition of the production equipment and production schedule, operation efficiency, technological parameters, etc., which will provide sufficient basis for follow-up scheduling, control and analysis.

"Nowadays, most foundries focus more on post inspection instead of prevention and process control. Tycon will focus on the latter," explains CY. "Tycon plans to establish its own digital factory in order to find the key point of every risk, monitor technological parameters and prolong the life of the equipment through real-time data analysis." In addition, the entire new plant will introduce Manufacturing Execution Systems (MES) together with their own SAP (System, Applications & Products in Data Processing) and MRP (Material Requirement Planning), which will increase the coordinated development between the online workshop management and production scheduling systems.

With the rapid development and focus on technological advancements in recent years, manufacturing enterprises put a lot of effort into enhancing the quality of their products in order to stay ahead of the competition in a challenging market. Quality management should be treated as the vital part of a company's management structure. However, the fundamental factor to consider for maintaining product quality is process control. Tycon is committed to strengthening basic skills management for its



Casting simulation.

Productivity target

	Shenzhen Plant (old)	Zhongshan Plant (new)
Total Area	35,500 square meters	75,000 square meters
Staff number	1,100	1,000
Weight range (Investment Casting)	Max. 100kg (220lb)	Max. 100kg (220 lb)
Weight range (Sand casting)	Max. 1 ton (2200lb)	Max. 2.5 tons (5500lb)
Productivity (Investment casting)	3,600 ton/annum	5,000 ton/annum
Productivity (Sand casting)	2,200 ton/annum	5,000 ton/annum

production team, consistently focusing on the conscious education of process control and strict quality management. At the same time, Tycon extensively popularizes the reasonable and effective production materials and processes involved in its raw material, fabrication facilities and operation management.

In relation to the new relocation project as a whole, Michael comments: "It's actually all about technical transformation. In fact, most companies are incapable of solving a number of issues at one single time. We, however, have spent a large amount of time mapping out our strategic direction, such as reserving space for R&D initiatives, developing 3D printing and Ceramic Core technologies, building professional technical teams for further development, arranging cross training, etc." In the future, Tycon plans to broaden its product offering. This will mean active involvement in more market segments, such as petroleum, natural gas, coal and China's nuclear power market; developing high temperature resistant materials such as fully austenitic heat resistant steel; and increasing the weight of sand castings from 1 ton to 2.5 tons.

Prioritizing people

With a rising demand for customization, pump and foundry industries are no longer 'product focused'. Therefore, Tycon has adjusted its strategies toward customer requirements as it considers this to be of the utmost importance. Tycon strives to excel in customer service by providing more information in a speedy manner. In addition, Tycon shortens the development cycle to better adapt to their clients' strict demands, for any kind of customized order.

While mechanized production and intelligent management is clearly the top priority for Tycon's current and future development, during the interview Michael Lo repeatedly emphasizes the importance of 'people'. "The biggest challenge with a plant relocation project is the 'people'," he says. "We have been investing a lot in personnel training and will also adjust personnel allocation according to the overall development requirements of the new Zhongshan plant. It is worth mentioning that from this year on, our training will be increasingly focused on automation, intellectualization and digitization. We are positive that both our customers and employees will agree with our philosophy."

To conclude, Michael highlights that when mentioning the significance of 'people', he not only refers to Tycon's employees but also Tycon's customers. "Products are created by our employees for our customers. I am reasonably sure that even in the industrial automation era, 'people' will always be our best asset."

The new Zhongshan site.

AT A GLANCE: Tycon Alloy Industries Co., Ltd.

Years in business: 22 years

Headquarters: 8/F, 22-28 Cheung Tat Road, Tsing Yi, Hong Kong

Foundry location: 17-19 Lixin Road, Danzhutou Industrial Zone, Nanwan Sub-District, Shenzhen, Guangdong, P.R.C.

Industries: Chemical, liquefied natural gas (LNG), offshore, oil & petroleum, power plants, food & pharmaceutical, ship building, instrumentation

Website: www.tyconalloy.com

Supporting capital projects with rotating equipment issues:

An interview with Alan Wilson, Mechanical Technology Associate at The Dow Chemical Company

Pump Engineer had the pleasure of speaking with Alan Wilson, a Mechanical Technology Associate who works at The Dow Chemical Company in Houston, Texas. Dow is a global producer of chemicals and plastics that was founded in 1897 by industry pioneer H.H. Dow. Although the company's headquarters are located in Michigan, USA, there are numerous Dow locations all over the world, including Africa, Asia Pacific, Europe, Middle East, North America and Latin America.

Alan offered Pump Engineer an insight into his daily duties, the diversity of the job and the significance of selecting reliable equipment. Additionally, he also spoke about the importance of industry events for young engineers, particularly Pump Summit Americas. Alan is a member of the Pump Summit Americas 2018 Steering Committee. The premier networking event for pump experts will be held alongside the Fugitive Emissions Summit Americas and will take place on June 25th and 26th, 2018 at the George R. Brown Convention Center.

By Deirdre Morgan, Editor

Alan graduated from Texas A&M University in 2002 with a Bachelor of Science in Mechanical Engineering. While at university, he was given the opportunity to interview for a Co-Op program at Dow and was luckily offered the position. After spending three different semesters working at Dow, he was then offered a full-time position at the company which he gladly accepted. Without the worry of having to search for a job, Alan was able to finish his degree knowing he was walking into full-time employment at the end of it. "I appreciated the opportunity," explains Alan. "I was able to gain some practical experience which gave me a good perspective on the industry. I finished my remaining classes with a better understanding of how engineering concepts are applied in the industry." Following this, Alan went back to school part-time so that he could broaden his education beyond engineering and be able to better apply engineering in a business environment. He received his Master of Business Administration from the University of Houston in 2007.

As a Mechanical Technology Associate, Alan's role involves supporting new capital projects with rotating equipment selection, decisions and specifications, as well as supporting existing plants with solving problems with equipment. Additionally, he is a core member of the Pump and Seal Technical Resource Network, and leads the Technical Resource Network for Process Cooling. Both of these global networks

Alan Wilson, Mechanical Technology Associate at The Dow Chemical Company in Houston, Texas.

are aimed at advancing and maintaining Dow's global specifications and supporting the Dow community with technical expertise.

Appreciating diversity

On a typical working day Alan works in an office environment that is mainly engineering focused, and he balances his time between capital projects support, responding to requests for support from plants and working on initiatives to advance Dow's global specifications. However, Alan's role can also vary as at times he has to travel to equipment

supplier shops to have technical design review meetings, or to inspect and observe the testing of equipment. "I also occasionally go out to our plants to observe the installation and commissioning of equipment, and to support the local maintenance team with troubleshooting equipment and identifying improvement opportunities. There is some travel to both the Dow plants and to equipment fabrication shops," he says.

To add to this, Alan elaborates on his experience when it comes to desk work and field work. While he enjoys being behind the desk, he offers valuable insight into the advantages of having an opportunity to experience both working environments. In order to have an appreciation for what the products (mostly being specifications, data sheets and drawings reviews) that leave his desk do, he says that: "It is helpful to go out to the field and see how these things are installed, operated and maintained. It gives me a good perspective and enables me to perform better at my desk job."

Working at Dow means Alan has the opportunity to work on a wide range of projects across the company's portfolio, enabling him to learn about prime mechanical equipment in a broad range of applications. He enjoys working for a global company where much of his time is spent interfacing with colleagues around the US and also abroad. "I have had the opportunity to travel to many different countries, depending on our project workload," explains Alan. "Lately, we have been building a lot of plants in the US, especially along the Gulf Coast. I have been to many different countries to support projects and we also have global suppliers so I have travelled to supplier shops around the world too. It's a great experience and great exposure to the engineering community abroad." However, despite the perks of travelling the world, Alan's job poses some challenges. When working on complex projects that require many people in many different roles, it can be challenging to ensure that all of the stakeholder input is being appropriately incorporated, while cost and schedule objectives are still being met. "There are a lot of different roles within Dow and we want to try to incorporate input from everybody and make the best decisions for Dow," says Alan. "Sometimes we have to juggle input from stakeholders with what the supplier's capabilities are and what our budget and schedule constraints are. There is some thought process behind how we resolve these issues."

Pumps and projects

When it comes to pump specifics, Alan explains that he works with a wide variety of pump types, ranging

"It is helpful to go out to the field and see how these things are installed, operated and maintained. It gives me a good perspective and enables me to perform better at my desk job."

from high pressure multi-stage API 610 pumps to large capacity cooling water pumps. He has also worked with ASME B73 pumps, magnetic drive pumps, canned motor pumps, small metering pumps and some positive displacement pumps. While he commonly works with API 610 and ASME B73 pumps, Alan appreciates having a broad insight into the pump industry. "I like the breadth of our job scope," he says. "Working for Dow means we have so many different types of plants that require a variety of different types of pumps. I particularly like working with the high pressure multi-stage API pumps." Alan adds that these types of pumps are mostly used in chemical applications and different types of chemical processes within Dow's plants.

Currently, Alan is working on a pipeline expansion project, where he will be installing new pipeline pump stations. This will involve some high pressure pumps that Alan is currently specifying with the engineering contractor. Often, Alan will have to juggle several projects at once which can be a challenge but he believes that making good decisions and being prepared enables him to operate efficiently in a demanding environment. "We have to have good specifications and we have to make good technology application decisions," he explains. "By making these decisions early in the project we are able to work efficiently."

As a Mechanical Technology Associate, Alan is also involved with pump selection. He outlines that while selecting pumps that will operate efficiently is a key portion of the process, reliability is just as significant.

"We need good engineering capability from our suppliers to help us arrive at good technical solutions. They need to have good manufacturing quality to ensure the products meet our objectives and so we can avoid unforeseen delays," he says.

Taking advantage of opportunities

Before the interview concludes, Alan mentions what he thinks of the 'knowledge gap' that is currently a hot topic in the industry and one that poses a threat. Although an issue, Alan believes it is good that the industry is now talking about the opportunities available to young engineers for developing in the rotating equipment industry. His recommendation is that young engineers should focus on gaining a wide breadth of knowledge of rotating equipment and have a better understanding of what resources are out there when they need to go more in-depth on a particular topic. One way of doing this, as Alan outlines, is attending industry events. He states that training is a valuable part of these events and that owner companies, engineering companies and equipment suppliers are able to come together and share their knowledge. "Events like Pump Summit

Americas are very important for keeping up with the evolving needs and offerings in the pump industry," he says. "Attendees can gain exposure to new products, participate in general training and network with other industry professionals."

Sealed vs. sealless:

Recent technological advances in magnetic drive pumps

Recent innovative advances in sealless magnetic drive pump design and instrumentation have increased both the application and advantages of this technology compared to sealed pump alternatives. This article explores the scope for sealless and the operational and environmental benefits it brings to pump processes.

By David Clark, General Manager, Sundyne HMD Kontro

Pump engineers have traditionally opted to use mechanically sealed pump technology, when required, to handle volatile or hazardous liquids. The operation of mechanically sealed pumps requires significant levels of ongoing maintenance and the seals are always prone to leak, which may present a danger to both the operating personnel and the environment. As environmental controls become more stringent, and health and safety legislation receives greater emphasis, mechanical seals and their support systems are becoming increasingly complex. As they also become correspondingly more expensive to install and monitoring takes more effort, yet breakdowns remain as frequent, pump engineers are considering alternative technologies, such as the sealless magnetic drive pump.

Sealless pump containment shells.

Sealless magnetic drive pump technology removes the need for the dynamic seal, thus significantly reducing the complexity of the installation, ongoing maintenance and eliminating the risk of leaks or emissions. Sealless magnetic drive pumps have been around for nearly 70 years, with increasing adoption as safety and environmental legislation requirements have been refined. More and more pump engineers are recognizing the benefits that sealless pump operation offers and, consequently, the number of successfully operating installations is growing worldwide.

Sealless pump operation brings with it inherent advantages of safety, reliability, simplified maintenance and lower life-time costs. The technology continues to advance with time and there are a number of steps forward that make sealless pump selection an even more compelling choice for pump engineers.

Robust composite containment shells

The containment shell is a key feature of the sealless magnetic drive pump which acts as part of the primary pressure boundary between the two parts of the magnetic coupling. The shell is manufactured using a tough and durable, engineered composite PEEK matrix and carbon fibre reinforced material that offers high levels of process liquid compatibility. The composite containment shell eliminates the induction (or eddy current) losses associated with metallic containment shells in magnetic drive pumps, with a

significant list of benefits, including:

- reduced heating of the process liquid, which is essential when pumping volatile and heat sensitive liquids
- enhancement in the overall pump efficiency when compared to a similar sized pump incorporating a metallic containment shell
- it also makes the magnetic drive pump more robust to system upset conditions that might be experienced

Pump engineers will recognize that these features make the composite containment shell ideal for use on volatile and hazardous process pumping installations.

Bearing material upgrades

The default magnetic drive pump process lubricated bearing material of choice has become silicon carbide running against silicon carbide. In the majority of applications, this combination works well, but there are exceptions when pumping liquids with challenging properties; such as low viscosity or low specific heat. In such marginal pumped liquid applications, alternative bearing material combinations can be employed which are suited to different application conditions. Alternative bearing material combinations offer enhanced reliability, maximize process uptime and can be recommended to pump engineers when process conditions present a challenge.

Vertical in-line magnetic drive pumps

Magnetic drive sealless pumps are now available that combine the features of a horizontal sealless pump with the additional benefits of a vertical in-line configuration. These include a significantly reduced footprint and minimal requirements for piping modifications when upgrading from other in-line designs.

The footprint reduction makes the vertical in-line range ideally suited for offshore applications, retrofits or where floor space for capital equipment is at a premium. The hydraulic designs of this range incorporate radial diffusers, maximizing efficiency, and a wide variety of material or metallurgy options are available, including stainless steel, carbon steel and duplex stainless steels.

Process liquid state monitoring

Condition monitoring instrumentation utilizes non-intrusive ultrasonic technology to continually monitor the state of the process liquid inside the pump. The instrument detects the presence of gas from outside the confines of the pump pressure boundary and provides an early warning of adverse conditions that are likely

Vertical magnetic drive sealless pump with conditioning monitoring device.

to impact pump bearing lubrication, cooling of the magnetic coupling and potentially upset the process operation. One of the key features is that it is measuring and reacting to the primary cause of a potential problem and not the secondary cause, which is the case when monitoring power or temperature. Some of the benefits of this system are that it increases process uptime, provides real time data on the internal fluid, detects the early presence of gas, ensures correct priming and venting and eliminates the potential for dry running. The device can easily be retro-fitted to many existing magnetic drive pump installations, providing increased peace of mind for end users.

Bringing the technologies together

During a recent upgrade to meet current American Petroleum Institute (API) standards, a petrochemical plant in the Far East took the opportunity to review

its operation of single mechanical seal pumps in comparison to a replacement with sealless pumps. During the evaluation process, the magnetic drive pump technologies, including the technologies described above, were taken into consideration. The sealless pump technology option offered would completely eliminate fugitive emissions, reduce the initial installation costs, reduce the cost of ownership and allow full site serviceability. The selection decision for the pump engineers involved was obvious and an API-compliant magnetic drive pump upgrade was ordered to replace the previous sealed pump installation.

The magnetic drive pump package comprised of vertical inline pumps and horizontal pumps, which were supplied in accordance with the API 685 Standard 2nd edition. This pump package was installed along with a condition monitoring device on each pump, robust (high efficiency) composite containment shells and upgrades to the bearing materials.

In addition to operational and environmental enhancement, a decision to select magnetic drive pumping technology can bring significant commercial benefits. Because a magnetic drive pump installation does not require all the ancillary equipment and support systems typically associated with a mechanical seal installation, it is often a more economical design solution, requiring less intervention, fewer scheduled maintenance checks and, therefore, optimizing the valuable time of pump engineers.

About the Author

David Clark is the General Manager for Sundyne HMD Kontro Sealless Pumps, based in Eastbourne, England. He is responsible for managing all aspects of the company's specialist UK-based magnetic drive pump business, including strategic planning and activities to manufacture and promote the application of the HMD Kontro product family.

INDUSTRY OUTLOOK

Future-oriented innovative strategy of smart plant engineering: Strategies for protecting resources and the environment [Part 1]

Population growth and rising standards of living are driving up the consumption of energy and raw materials. To minimize environmental impact, it is necessary to develop and implement strategies that will ensure careful and sustainable management of our limited resources and the affected environment. The future-oriented innovative strategy of smart plant engineering plays an important role in this respect, developing facilities that are considerably more efficient when compared to today´s processes. Four requirements are essential in this respect: High safety, high recycling, higher efficiency and a much higher degree of automation.

By Dr. –Ing. Ingo Bruchhold, rapidea ® Plant Engineering and Building Trade

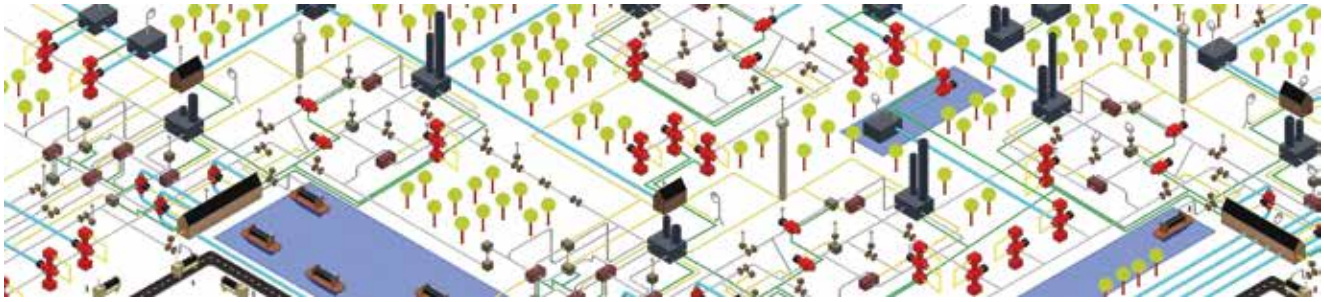


Figure A: *Future-oriented innovative smart plant engineering.*

The continuous increase in the global population together with the task of improving the people's quality of life are both linked to permanently growing demands for more energy, raw materials, products and services. In order to be able to have the needed resources available in the future and to keep the impact on our environment within limits, it is necessary to develop and implement strategies that will ensure careful and sustainable management of our limited resources and the affected environment. This means that future-oriented production and service processes must exhibit considerably better efficiencies when compared to today's processes. Less resources should be needed to obtain the same results and they should also have less impact on the environment. The following four requirements are essential with regard to the optimum choice of appropriate strategies and technologies: High safety, high recycling, higher efficiency and a much higher degree of automation [01]. The probability of damage and the associated environmental pollution will be reduced with the increase in plant technology and processing safety. Resources can be improved through the increase in recycling and better efficiency. The increase in the degree of automation will save human resources and improve the quality of life for other people through better jobs becoming available as well as possible damage being reduced by the elimination of human errors.

Future-oriented innovative strategies for smart plant engineering

In order to optimally exhaust all possibilities with regard to the development of future supply and production plants in the sense of the jobs and requirements mentioned above, it is sensible to ensure that the smart products, Industry 4.0 and the smart products plant engineering strategies are well-balanced with regard to promoting future-oriented smart plant engineering, like in Figure A.

"It is necessary to develop and implement strategies that will ensure careful and sustainable management of our limited resources and the affected environment."

The smart products strategy includes intelligent, self-monitoring, self-adjusting, user-friendly, resource-saving, energy-saving and communications-capable products. For example, in supply or production plants it can be:

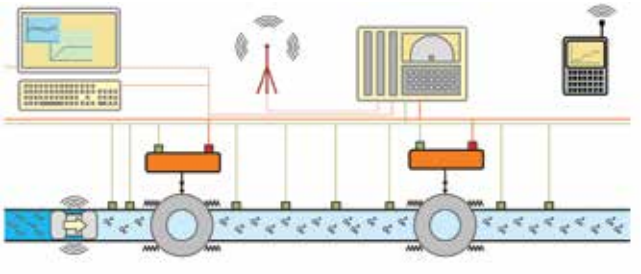


Figure B: *Communication between smart aggregates and smart central unit over a network.*

a.) smart pumps, which communicate process parameter and their states of wear over the smart data network with other aggregates and a smart central control unit

b.) smart sealing systems that automatically set-up for different operating modes and change the temperature of their matrix advantageously, and can also be partially self-repairing and request other aggregates to undergo a controlled plant shut-down in an emergency [04]

c.) smart fittings that automatically optimize themselves to meet the requirements of the different operating modes and whenever necessary, automatically reduce any leaks that occur through self-repairs

d.) smart drives that can be automatically optimized to meet the different operating mode requirements and, in the case of damaged fittings, they can be automatically traversed into their safe positions and other sections of the plant will be simultaneously informed about the relevant emergency [02], [03].

The Industry 4.0 strategy includes digitalization and networking along the entire added value chains. In supply and production plants

a.) intelligent production systems, such as factories and products as well as services, can be permanently interlinked via an IT network, and data, information, control commands and software can be exchanged over this network (vertical networking)

b.) business partners and customers, who are active in the IT network, can also be linked together (horizontal integration). See Figure B.

The smart products plant engineering strategy covers technologies that are in the position to change the components, modules and aggregates integrated in the plants during on-going production as necessary due to pending operating pressures and these components, modules and aggregates. In addition, the materials can be transported over long distances to different stations in the plants and systems that are networked together. For example, in supply or production plants it is possible to use:

System	Task	Task description
Primary pipeline system	Handling	Transporting of media from the producer to the consumer
	Fractioning	Pigs for separating and transporting different fractions
	Cleaning	Transporting cleaning pigs and cleaning agents into impacted sections
	Extinguishing	Extinguishing agents transported into the fire areas and endangered sections
	Cooling	Coolant transported to overheated sections and discharged afterwards
	Testing	Transporting pigs, sensors and transmitters into the sections to be tested
	Heating	Hot medium transported into cooled-down sections and discharged afterwards
	Flushing	Medium transported for rinsing as well as releasing and extracting impurities
	Sealing	Sealant transported for emergency sealing of sections (blowouts, leaks)
Secondary pipeline system	Transportation	Carriers for holding and transporting the function pigs
	Change	Function modules transported to or from module change systems
	Pigs	Transporting pigs from or to loading and unloading stations
	Cleaning	Transporting cleaning pigs and cleaning agents to impacted sections
	Extinguishing	Extinguishing agents transported into the fire areas and endangered sections
	Cooling	Coolant transported to overheated sections and discharged afterwards
	Sealing	Sealant transported for emergency sealing of sections (blowouts, leaks)
	Heating	Hot medium transported into cooled-down sections and discharged afterwards
	Flushing	Medium transported for rinsing as well as releasing and extracting impurities
Tertiary pipeline system	Testing	Undertakes testing of the primary pipelines in module change sections
	Conditioning	Additives transported to and fed into production sections
	Lubricating	Lubricants transported to sliding surfaces, bearings and sealing systems
	Heating	Hot medium transported into cooled-down sections
	Rinsing	Medium transported for rinsing as well as releasing and extracting impurities
	Extinguishing	Extinguishing agents transported into the fire areas and endangered sections
	Cleaning	Transporting cleaning agents to impacted sections
	Sealing	Sealant transported for emergency sealing of sections (blowouts, leaks)

Figure C: *Task descriptions for the primary, secondary and tertiary pipeline systems.*

a.) smart module change systems [05] [06] for changing function modules

b.) pipeline networks, consisting of primary, secondary and tertiary smart pipeline systems (See Figure C) for transporting media and function modules [07], [08], [09].

Read Part 2 of Dr. –Ing. Ingo Bruchhold's article in Pump Engineer's October, 2017 issue.

About the Author

Dr. -Ing. Ingo Bruchhold studied Mechanical Engineering and graduated from the TU in Berlin in "recycling-favorable connection technology". He founded rapidea® Plant Engineering and Building Trade, a business consulting company, in 1996. More info can be found at: www.rapidea.de

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Changing pumps saves Entek thousands in energy costs

By Bryan Orchard, UK-based Journalist specializing in fluids handling technology

The issue:

Entek, a global leader in designing and manufacturing lead acid battery separators and providing battery manufacturers with products for SLI, start-stop, deep cycle, motive and stationary batteries, was experiencing poor economic performance and breakdowns with submersible pumps for several years. Its production lines, which run on a 24/7 basis, continually mix and extrude materials at an elevated temperature into continuous polyethylene sheets, which are then subjected to specialized process treatments.

Fundamental to production is the constant availability of cooling and chilling water which is held in cooling towers and pumped around the plant. Historically, water circulation had been performed using submersible pumps located inside the towers. However, modifications to the plant had resulted in the pumps having to deliver flow rates far in excess of their original design specification. In this situation, it was inevitable that the pumps would suffer, with many of the problems being related to cavitation and vibration, plus the ensuing costs of pump removal.

The solution:

Pump distributor and maintenance company AxFlow had first-hand experience of the problems being faced by Entek as it was their Durham Service centre that was regularly being called in to carry out the repairs. They started by looking at the manufacturer's pump curves for the existing pumps and this revealed that the pumps were delivering far more flow than was necessary and that the level of liquid above the pump was too low. Essentially, the pumps could pump out more than they could get in. This situation was causing pump cavitation and excessive vibration. The decision was made to remove the submersible pumps and replace them with Aturia NE Series pumps, all of which would be located externally and connected to each tower by new pipework.

The Aturia NE Series is a high performance horizontal long coupled centrifugal water pump that offers a maximum flow of 2,000m³/hr. Fitted with dynamically balanced impellers without balancing holes that are susceptible to blockage, they are robust and offer high pumping efficiency, IE3 motors, low NPSH requirements and which can be maintained much more easily.

Installation involved core drilling the tower bunds and inserting valves and pipework, followed by installation of the Aturia pumps and variable speed drives.

Total energy savings of 816,000kW/year have been achieved, giving an energy saving of GBP £79,000. This resulted in approximately a 5 percent reduction in total site energy use.

Q&A | Fluctuations in barrier fluid pressure

Pump Engineer is proud to present Q&A: Sealing Solutions. This section will address common questions and challenges faced in sealing centrifugal pumps. Readers are encouraged to submit questions for consideration in future editions. Please submit your questions to the Editor at ***d.morgan@kci-world.com***

By Michael Huebner, Principal Engineer, Flowserve Corporation

Q: I am operating a dual pressurized seal with a Plan 53A piping plan. Why does the barrier fluid pressure fluctuate over time?

A: A dual pressurized Arrangement 3 seal is a common sealing solution that can improve seal reliability and eliminate process emissions to atmosphere. One of the fundamental conditions for proper operation is that the barrier fluid be maintained at a pressure greater than the seal chamber pressure. In this way, both the inner and outer seals are operating on barrier fluid and process fluid is prevented from leaking into the barrier fluid or to atmosphere.

There are a number of options for pressurizing the barrier fluid including a Plan 53A (pressurization from an external gas source), a Plan 53B (pressurization from a bladder accumulator), a Plan 53C (pressurization from a piston accumulator) and a Plan 54 (pressurization from an external source). Each of these have strengths and weaknesses which were previously discussed in Pump Engineer magazine (See August and October 2015 issues).

Of these options, the Plan 53A is often considered capable of providing one of the most stable operating pressures due to the constant supply pressure from the pressure regulator. There are, however, a number of factors in a Plan 53A which can cause fluctuations.

Nitrogen supply pressure

In a Plan 53A, the barrier fluid is pressurized from an external gas. In most plants, the source of this gas is a Nitrogen header in the plant. This is selected due to the almost universal availability of Nitrogen in most plants, the reliability of this supply and the inert nature of Nitrogen in the majority of applications. The Nitrogen header is required to be at a pressure greater than the required barrier fluid pressure, and the pressure will be controlled with a pressure regulator in the supply line.

If the barrier fluid pressure drops below the set pressure of the regulator, there is a possibility that the supply pressure in the Nitrogen header may be lower than expected. In some cases, this is a temporary condition caused by unusual Nitrogen demand from other processes or activities in the plant. This includes operations such as blowing down a tank. If the barrier fluid pressure drops below the set pressure and then returns back to normal, check the header pressure to determine if there was a problem with the supply pressure. If this problem reoccurs, it may be necessary to select another source of Nitrogen or a different seal piping plan.

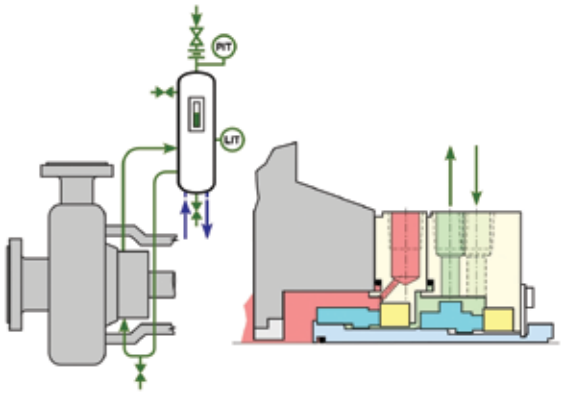


Figure 1. *Piping Plan 53A.*

Pressure regulator

A Plan 53A requires that the pressure regulator is functioning properly. A malfunctioning regulator can provide erratic pressures and this can only be corrected by repairing or preplacing the regulator. There is, however, another commonly misunderstood characteristic about regulators which may be contributing to the pressure fluctuations.

Regulators are available in two basic designs - a relieving regulator and a non-relieving regulator. A relieving regulator will maintain the pressure downstream of the regulator at a constant value. If the pressure downstream drops below the set pressure, the regulator will add gas to bring it back to the correct value. If the downstream pressure increases above the set pressure, the regulator will bleed gas off (often to atmosphere) to reduce the pressure back to the correct value.

A non-relieving regulator will add gas to the downstream system to increase the pressure back up to the set pressure. It does not, however, have the capability to reduce downstream pressure by releasing or relieving

gas from the system. This is the most common regulator selected for Plan 53A systems since it adds a layer of protection to prevent process fluid or vapors from being released to atmosphere. Because the pressure downstream of the regulator may be higher than the set pressure, the fluctuations seen in your system may be the result of a normally operating system.

Refilling

One of the operations which may increase the Plan 53A pressure is adding additional barrier fluid to the system. The pressure regulator will continue to provide gas into the reservoir as the barrier fluid level drops during normal operation. When barrier fluid is added back into the system to increase the level back up to the maximum level, the trapped gas at the top of the reservoir will be compressed and the system pressure will increase. Some operators will manually vent the reservoir to reduce the pressure back to the set value but this is not done in most installations.

Thermal expansion

As the barrier fluid temperature increases from static ambient conditions up to its steady state operating temperature, the barrier fluid will increase in volume due to the thermal expansion of the barrier fluid itself. This will also compress the gas volume in the reservoir and increase the pressure. This effect is minor in most systems but may be noticeable in systems with a large barrier fluid volume, a small gas volume in the reservoir and a significant barrier fluid temperature rise during commissioning.

Nitrogen temperature

The pressure in the Nitrogen volume at the top of the reservoir will fluctuate not only with changes in volume but also with changes in temperature. As the temperature of the Nitrogen increases, the pressure will also correspond by increasing, independent of the volume. The Nitrogen gas temperature can be impacted by a number of factors.

As the barrier fluid temperature increases, the gas temperature in contact with the barrier fluid can also increase. In most reservoirs, there will be a natural buoyancy induced stratification where the highest temperature barrier fluid will rise to the top of the reservoir and be in contact with the gas. The temperature of the shell of the reservoir will also increase as a result of the internal barrier fluid temperature. This will heat the reservoir in the area of the gas and can also impact the temperature, resulting in an increase in pressure.

Changes in ambient temperature can also affect the gas temperature in a reservoir. Many seal reservoirs are water cooled and the barrier fluid temperature is regulated within a tight range. The cooling water temperatures however can be higher on hot days resulting in an increase

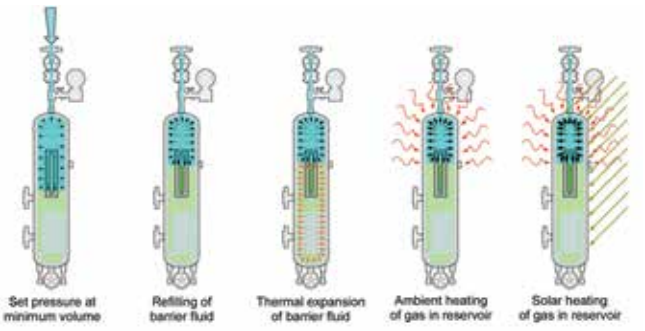


Figure 2. *Factors impacting barrier fluid pressure.*

in barrier fluid and gas temperatures. In moderate environments, some end users will rely on air cooling by convection from the reservoir directly to the ambient atmosphere. In these cases, the gas temperature can be directly impacted by changes in ambient temperature, resulting in pressure fluctuations.

Finally, solar heating of the reservoir will occur if the sun can directly shine on the reservoir. This can add additional heat to the reservoir and add to the pressure fluctuations.

In the past, most Plan 53A systems were instrumented with a low pressure switch. This would alarm only if the barrier fluid pressure dropped below some nominal value (e.g. < seal chamber pressure + 1.4 bar). The pressure fluctuations that normally occurred in these systems were not seen by the operator. In more modern Plan 53A systems, the pressure is monitored by a pressure transmitter and the operators can now see these fluctuations.

The good news is that these variations may be natural functions of the system and do not necessarily represent a problem with the system design or operation. It is critical to maintain the pressure of the barrier fluid above the seal chamber pressure. It is also critical that the maximum pressures do not exceed the pressure ratings of the seal or any other sealing system components. Outside of that, some fluctuations in the Plan 53A barrier fluid pressure will not negatively impact the performance of the seals. Your seal supplier can provide additional support in reviewing your specific application.

About the Expert

Michael Huebner is a Principal Engineer at Flowserve Corporation in Pasadena, Texas. He has over 30 years of experience in the design, testing and application of mechanical seals both in the USA and Europe. He has authored numerous articles and lectured extensively around the world. He has a BS in Engineering Technology from Texas A&M University.

Dewatering pumps: Making the right choice between electric or diesel

Electric or diesel? When it comes to the choice of power sources, whether for road vehicles or construction equipment, it is a debate that is becoming increasingly prevalent. Equally, it is a decision that applies to the choice of dewatering pump technologies for operations within the construction, mining, utilities and municipal arenas.

However, unlike the automotive debate, it is not a contest of technical supremacy to establish an outright winner. It is a common-sense selection process based on matching equipment performance and capability to all aspects of dewatering applications. Any decisions should take into account critical factors such as required volume, flow/head specifications and the constitution of water and materials to be pumped. Pump capability has to encompass the variables of operational conditions, site access, project duration, environmental issues, equipment autonomy and much more.

By Wim Moors, Vice-President for Pumps, Atlas Copco Portable Energy

Diesel powered centrifugal pumps

Sturdily built for endurance and reliability, centrifugal pumps are designed for handling high volumes of water discharge. The operating flow range is typically between 50 to 830 m^3h with a head of up to 51 meters.

Capable of coping with a wide range of applications, fully automatic self-priming centrifugal pumps are considered the ideal solution for transporting or raising water with abrasive solids in suspension; such as in construction and mine site dewatering, floodwater, stream diversions and municipal applications. They can work with water that is clean or dirty as well as handle trash and fibrous materials. Their solids handling capacity can reach up to 76 mm in size thanks to features such as semi open impellers and abrasion-resistant pump casings. Discharge connection diameters typically range from 75 – 200 mm.

They are the de facto choice for delivering fast dewatering solutions to sites where an alternative power source, such as a mains feed or generator output, is not available. In addition, these pumps are able to operate in a high variable speed range, which enables them to cover different applications and flow/head combinations.

Together with average fuel autonomy of up to 47 hours, continuous drainage is made possible even with significant volumes of air (snore conditions) thanks to an oil-free diaphragm vacuum pump's automatic priming. Cooler capacity enables continuous and safe operation even at high ambient conditions. With the exception of replacing wear parts and engine filters, maintenance is easy and simple. Part of this type of equipment's appeal to rental organizations is the inclusion of advanced controllers with data monitoring capacity.

Diesel-powered centrifugal pumps are designed for handling high volumes of water discharge.

In addition, some pumps can be equipped with an extra-large fuel tank that allow them to run for longer periods without refuelling. Transportation and storage handling at remote sites is simplified if pump units feature forklift slots and a built-in lifting eye.

Electric submersible pumps

Electric submersible dewatering pumps offer portability, easy handling and are generally available in a power rating and capacity range that make them well suited to mining, construction and ground water control applications. This includes emergency duties, such as flooding, construction and mining sites or instances where a pump with a small footprint is needed, such as when draining a sediment tank. They are also useful for applications where diesel pumps cannot be used, for example underground mining or where emissions are not allowed.

Providing hours, and even days, of unattended dewatering pump operation, submersible pumps can

The operating flow range of centrifugal pumps is typically between 50 to 830 m³h.

meet the demanding requirements of raising water from great depths or lowering water tables even in the toughest environments, with some models capable of running for up to 2,000 hours without attendance. As they are sub-surface units they can continue working under ice in freezing conditions, as long as the pump is completely submerged. Where appropriate to the task, electric pumps offer environmental compatibility. For instance, quiet running is an essential feature of their performance when they are sited in populated areas or employed in night-time operations.

Extreme durability is also guaranteed as electric submersible pumps offer high-wear resistance. Meanwhile, the modular construction of these types of pump provides for simplified maintenance procedures. Some models can also be equipped with on-site servicing and parts replacement kits, including seals and impellers.

Current manufacturers' medium to large capacity ranges offer maximum power ratings in the region of 54 kW and can typically manage flows from 225 to 16,500 litres per minute with a maximum head of 85 meters. These are the typical range, however, some higher-head pumps are available on the market. In addition, electric submersible dewatering pumps used in the toughest applications should be equipped with hardened impellers in order to handle suspended solids.

In conclusion

It all comes down to the nature of the application and questions such as: where is the site; how deep is the access point; what is the nature of the water/material mix to be pumped; and how long will the equipment need to run to complete the operation?

Diesel powered centrifugal pumps can offer:

- Versatile applications
- Self-priming capability and high hydraulic efficiency
- Large discharge and high flow rates
- Ability to handle large solids up to 76 mm in suspension
- Remote site operation (subject to fuel-dependent autonomy)
- Robust construction
- Easy maintenance
- Sophisticated control with optional data monitoring

Electric submersible pumps can offer:

- Continuous operation in all types of weather – with water temperature at up to 40°C
- Compact dimensions, low weight and portability
- Ability to handle abrasive materials and solids up to 12mm
- High head capability
- Environmental compatibility – quiet running in populated areas and night operations
- Wide range of output power and low to high head specification options
- Cost effective solution

Electric submersible dewatering pumps offer portability & easy handling.

Making the correct pump selection will depend upon the physical parameters - the static head height, the required hose length and its diameter. It will need interpretation of equipment manufacturers published flow rate vs. head height performance curves to find the BEP (Best Efficiency Point), and thus the pump best rated to deliver this performance. What's more, there are also considerations to be made of friction losses and cavitation issues. So, overall, making the right choice is not a simple issue but with expert guidance from equipment suppliers or renters it can be achieved satisfactorily.

About the Author

As Vice-President for Pumps at Atlas Copco, Wim Moors is responsible for driving growth through coordinated sales and marketing alignment worldwide since February 2016. He has held leadership positions across operational and general management, including leading the Swedish team as General Manager. He has a Master of Science, Electromechanical and Mechanical Engineering degree from Katholieke Universiteit Leuven and an International MBA from Vlerick Business School.

Note: *Many of the values shown in the above are average values. Actual specifications of products offered may differ between manufacturers and geographic regions.*

Procurement in the O&G industry:

An interview with Andre Gafford, Sr. Partner, DeLeon Business Consulting Group

A repeat contributor to Pump Engineer, Andre Gafford has built a reputation for hard work, extensive know-how in the oil & gas (O&G) industry and a propensity for diversity. "I've done as much as possible so that I always have options, especially when faced with industry uncertainty," he says. With 19 years of experience in the O&G sector and a broad-spanning portfolio that includes procurement and strategic contracting onshore and offshore, midstream and at the refinery level, Andre understands the realities of a fluctuating market in addition to the needs of a growing business. Be it pumps, valves, hose & fittings, flanges or specialty alloy pipes, Andre has the connections and experience to source the right material for the job and the crews to install it.

By Melanie Gogan and Sarah Bradley

A graduate of the University of Houston Downtown with a B.B.A. in Marketing, Andre began his career in procurement, working for oilfield services companies Baker Hughes and Saipen, a subsidiary of Eni. In search of a new challenge and the opportunity to be more hands-on, he decided to move in a new direction, providing strategic contracting services at various levels of pipeline and facility off-and-onshore development. The experience Andre gained in this capacity, working for such companies as Shell, Hess, Marathon and Statoil, eventually led to a unique opportunity as an independent consultant for Statoil. He elaborates: "The last contract role I had was with Statoil. The company was going through a reorganization but I was asked to stay on. I consented to stay on but only if I could work under my own company. So that's what I have been doing for the last couple of years."

Andre understands the ever-changing needs of the industry and has built his career on resilience. "When oil was bad in '98 I ended up going into electricity and power generation for a couple of years," he explains. "I have dealt with every part of construction, including feasibility, pre-construction, commissioning… everything. That was me saying I needed to be as well-

rounded as possible so that the next time the oil goes bad, I will have options."

Building the plant

Andre appreciates the challenges that come with managing large construction projects. He says: "I have executed brownfield and greenfield projects; going from nothing to revamping an old plant. That means we're changing out everything or we're buying completely new equipment."

Understanding that people are prone to adopting their own way of doing things, he emphasizes the importance of reinforcing the common best interests of the company by ensuring that project engineers are always on the same page. Thinking in terms of the company's best interests also means providing a mix of skilled workers, according to Andre, and providing service options, based on availability, time and preference.

"I have always been in the advisory position – these are the guys we should be doing business with because they have the top notch products, awesome delivery and they can service their own equipment," he explains.

Choosing AMLs backed by reputation

When choosing the right pump manufacturer, Andre stresses the importance of opting for a supplier with deep-rooted industry presence. "I create AMLs (Approved Manufacturers' Lists) and I usually look for size. I usually deal with very large companies, like Statoil and Marathon. The name carries its own weight. I want someone that has been around and also has their name on the line," he states.

"You have to have a name that resonates. Big companies are slow movers in times where oil is unstable. You have thin margins on the gas – they are slow on new projects and some are even slower on using new technologies," he adds.

Referencing the O&G industry and the low cost of oil in recent history, Andre points to the increased importance of competitive pricing. He explains: "Price is more important now than it was two to three years ago. Back then price would have been third or fourth on my list. Now the order is quality, pricing and efficiency."

Listed below are the key factors to consider when choosing a preferred vendor, according to Andre:

- Quality (incident ratings, failure rates, accidents)
- Pricing
- Efficiency (technological advancement)
- Availability
- Production numbers

A message to manufacturers

In Andre's experience, pump manufacturers and distributors are usually willing to work with clients,

like himself, to improve their products and services. He says: "Everyone has always been really good with reaching out to me and selling me their products. I've done surveys and what pump suppliers want to know is: who are we using, what are we using and what is driving those decisions."

What can manufacturers do to best support customer needs? In response to that question, Andre suggests a straightforward approach to sales that promotes service options. "It's important for suppliers to provide more description of their products and a better array of all their packages," he explains. "Also, let potential customers know up-front if they have the ability to service their products. It happens a lot that you might have to get someone in to service something; that service needs to be a part of the warranty. That's something I need to know. Because when it's not, those turn into hidden costs. Hidden costs impact the true costs of an item and service."

Knowledge transfer - what can the industry do?

Acknowledging a definite knowledge gap in the industry today, Andre says: "You have the older guys who were pushed out when the industry went bad, and then we have guys who are two to three years in the business. One obvious solution is that more mentoring

"I've done surveys and what pump and field service suppliers want to know is: who are we using, what are we using and what is driving those decisions."

needs to take place. It's a concept that is always talked about but rarely happens."

Andre suggests instead that individuals take on the responsibility of diversifying their skills, to ensure their place within an ever-changing market. He asserts: "It's up to individuals to refrain from getting pigeonholed and to move themselves around. People often crave comfort. Instead, I fight against it. If you're too comfortable you don't grow as much. Staying active in different arenas allows me to stay prepared."

Getting in-tune with the industry cycle

Today, Andre wears many hats. An independent contractor for Statoil and Senior Partner for DeLeon Consulting Group, he is taking his skills to a new market, devoting a large part of his time to mechanical and construction projects in and around Houston, Texas. Whether he's working on an onshore project for Statoil, or investing time in his company, handling construction, project management, engineering equipment, health care and wellness matters, Andre Gafford is always on the go. If all that wasn't enough, he also has his own insurance company.

When asked his advice on surviving the ups and downs of the oil and gas industry, he responds: "We are coming out of a slow time right now. It happens about every eight years. If you start doing your research, you will see that you can predict the trends and begin reaping the benefits of it. The key is to anticipate the need, then fill it. Be efficient, while at the same time being a low-cost provider with a 'Get'er Done' attitude. We as customers will ask for the impossible, so be prepared to make it possible."

Andre Gafford, Sr. Partner for DeLeon Consulting Group based in Houston, Texas.

Industry 4.0 and emerging technologies in the industrial equipment market

"If you went to bed last night as an industrial company, you're going to wake up today as a software and analytics company," Jeff Immelt, Chairman and CEO of industrial titan GE, proclaimed in 2014.

The industrial world is undergoing a fundamental metamorphosis that has been in the making for quite some time. As industrial productivity and efficiency plateaued in the early part of the previous decade, manufacturers started utilizing a variety of new technologies such as the internet, wireless connectivity, pervasive sensing and ubiquitous computing to improve operational efficiency. While at the start they were disparate new technologies, companies started to realize that the power of the technology lay in combining them. Thus, Industry 4.0 was born.

By Anand M Gnanamoorthy, Industry Manager, Process Equipment Team, Frost & Sullivan

Industry 4.0, in the broadest sense, implied utilizing the confluence of various technologies. Moreover, Industry 4.0 is a platform that enables the unification of information amongst participants in the entire value chain – from product inception to design, manufacturing, services and even refurbishment. The end result will be a grand system in which all processes are completely integrated and will exchange information in real time. This revolution will transform the manufacturing processes in sync with the speed of change in customer needs – which implies making the production process flexible without taking excess time.

As noted below, Industry 4.0 includes a variety of technology and, while the impact of Industry 4.0 is clear at the overall level, the impact at process and product level is still vague. Varying process requirements of end users create the need for customized solutions. Each technology finds itself attuned to a particular set of end users.

Upstream oil and gas - predictive analytics

With oil prices still around USD $50 per barrel, the oil and gas industry continues to face turmoil. As the oil price falls, there is an acute need to reduce operational cost. Oil and gas end users are thus finding better ways to manage their assets. Pump jacks and ESPs (Electronic Stability Program) form the majority of solutions used in oil and gas. It is paramount to ensure that they are working efficiently and, currently, maintenance personnel have to regularly visit all the pumps to ensure they are properly serviced and running. While they are visiting a perfectly working pump, some other pump might fail. This increases labor costs and leads to increased equipment downtime.

"In the new era of low oil price, it is pertinent that oil and gas operators are able to contain cost of operations," opines Nav Dhunay, CEO of Ambyint. "Analytics could help oil and gas companies improve efficiency by 10 percent to 15 percent." Nav and many other enterprising entrepreneurs have started using technology to solve challenges in oil and gas. Analytics is one of the areas that forward-thinking oil and gas companies are looking at as they seek to improve how they operate their businesses and deliver their capital projects.

Up to now, there has been no way to predict when and how a particular pump is going to fail. A better understanding of when a given pump might fail will allow maintenance personnel to ensure they are addressing the critical issues to drive pump uptime. Predicting how a well and the associated pump will perform has been considered impossible. "That's where years of analysis comes into play," quips Dhunay. "Based on the data collected, we can predict how a well is expected to perform. Based on a combination of various factors, we can predict when the pump is expected to fail. This helps drive equipment uptime and end users save on labor cost." For example, analytical systems optimize ESP's pumping speed to enable the highest production. Based on the proprietary algorithm, these systems enable reduced mechanical loadings and higher efficiency leading to over 30 percent reduction in energy cost.

In the next few years, more and more companies will be deploying predictive analytics to optimize every facet of their enterprise.

Oil and gas refineries – IIoT and predictive maintenance

A smart world of connected things, devices and users exchanging information in real time to perform assigned tasks is already a reality in the industrial space. IIoT enables the unification of information amongst participants in the entire value chain. The end result will be a grand system in which all processes are completely integrated and will exchange information in real time.

"The biggest challenge to IIoT is the effective aggregation of data. Engineers are spending too much time extracting and aligning data from various sources," said Ben Blanchette, Director of Product Marketing of Honeywell Process Solutions' Digital Transformation business. "Paramount for successful IIoT implementation is a smart and secure collaboration system that can provide you with secure access to data that is being collected. Once you aggregate the data and analyze it, then domain experts such as Flowserve can plug-in, benchmark the equipment data and provide performance tools."

Honeywell, a leader in the global automation market for process industries, is able to collect and analyze the data through its DCS (distributed control system) infrastructure. Flowserve, a leader in flow control solutions, is able to provide actionable insights through transformative service capabilities that lead to more powerful decision-making and process optimization. Ultimately, through collaborations companies will leverage the IIoT to help customers minimize unplanned shutdowns, maximize output, minimize safety risk and optimize supply chain strategies.

"The success lies in collaboration. That is how customers can get better performance and lifecycle out of their equipment," says Ben.

Smart field services

In North America, there are millions of business fleet vehicles, remote field workers and pieces of remotely-placed portable equipment operating outside of a company's four walls and invisible to management. Integrating such products with IoT remote monitoring capabilities allows service organizations to leverage real-time data provided by their field assets. The data from connected devices/equipment will move field service departments from a reactive break/fix model to a proactive—even preventative—level of service delivery. IoT integration adds sensors and remote monitoring to take the place of customers' eyes and ears, identifying issues before a serious equipment problem occurs and escalates. Potential benefits include lower labor costs (quicker time to first fix), greater customer satisfaction and retention and increased revenues via new service offerings.

When a service technician does need to be deployed, wearables can help increase that technician's

productivity by providing easy access to needed information. Some service organizations may choose to engage in the custom integration work required to provide an Augmented Reality solution to their field service teams. Organizations that have already deployed tablets, or other mobile computing, to their service teams may prefer adding a secondary head-mounted display instead. These solutions can be deployed immediately to any existing solutions using a standard connection, such as HDMI. "Having access to the necessary diagnostic information and schematics through mobile computing is already transforming field service," said Josh Hardt, Sr. Director of Strategic Planning at Brother International Corporation. "The next leap is to use a head-mounted display to place this information in front of your eye. If you don't have to turn away from your task to consult reference materials you can be more efficient and deliver a higher quality outcome for the customer."

Process industries – simulation, AR (Augmented Reality) and VR (Virtual Reality)

The process industries, such as oil and gas and power industries, are a high growth segment in the simulation market. While these industries face an issue of shortfall in capacity, they must also grapple with the aging workforce factor. Recent statistics compiled by the Bureau of Labor highlight the broadening gap between the retiring and newer workforce. This gap is expected to widen at a faster pace in the coming years. As a result, there is a shortage of trained process operators, engineering and maintenance crews. This shortage is driving the increased adoption of simulation solutions for the process industry. "Hands-on-training is a luxury that many industries can't afford, as it is cost prohibitive to shut down a production process or take one of the equipment offline," suggests Mark Cheben, Global Marketing Director at EON Reality. "On the other hand, most critical equipment are too expensive to be dedicated solely for training purposes."

Another key area of focus is process simulation. Recent developments in low cost processing power and reductions in software development costs mean that simulation solutions are being increasingly used in improving plant profitability. Although there is a demand for simulation solutions for process optimization and improving the bottom line, many simulation solutions and providers do not supply the necessary attributes end users require, offering just the software and leaving end users to struggle with optimizing the software and their processes.

EON Reality created a system, the AIRNET Industrial Planner, for a leading compressor manufacturer. The company needed its salesperson to select, plan and optimize a compressor installation in real-time to shorten the sales cycle. The system was able to analyze thousands of catalog product and multiple data points (such as various critical design parameters), and optimize the layout to evaluate the technical performance and create a full customized quotation.

AiRScouter WD-200B Head-Mounted Displays by Brother International Corporation.

Next stage in the technology evolution

There are multiple challenges in implementation, not just that the technology adoption in process equipment (especially pumps) is slow but in addition, the fragmented vendor landscape and lack of unified standards is affecting implementation. Evolution of a unified standard is essential to success. Security always seems to be an after-thought in industrial applications. Given the recent cyber-attacks, both individual and state sponsored, it is critical to build a secure and robust infrastructure. Finally, the aging workforce and talent crunch may bottleneck the adoption curve.

There has been much progress on developing new technologies and enterprising entrepreneurs are finding new solutions to solve tomorrow's problem. Dhunay aptly summed it up, saying: "The process equipment industry is being disrupted daily. Buzzwords are changing constantly. In the next few years, there will be several revolutionary ideas and it is very exciting to be on the cusp of change."

About the Author

Anand M Gnanamoorthy is the Industry Manager for Frost & Sullivan's Process Equipment team, analyzing new trends and disruptions within the pump industry. He can be reached at **anandg@frost.com**.

Specialist chemical manufacturer increases productivity and reduces batch rejections with a seal support system

By Rebecca Clubbe, Marketing Communications Manager, AESSEAL®

Background:

London-based Makevale Group produces bead polymers for a variety of industries, including biomedical, industrial, cosmetic, dental and more. The polymers are manufactured in the company's own reactors, aiming to ensure that each batch is consistent and of a high quality.

The issue:

The company was having problems with carbon black entering its reactor vessels. Upon investigation it was discovered that this was as a result of dry running of the original equipment manufacturers' installed mechanical seal. End product quality is key and any contamination results in the product batch being rejected, therefore costing the company thousands in revenue.

One of the main factors causing problems was the failure to identify the correct components in the system. The seals that were originally supplied were believed to be non-contacting dry running seals. The seal was connected to a seal support system vessel containing compressed air, but upon investigation it was found that the seals were in fact contacting seals. The installed seal support system was unable to provide proper lubrication to the seal faces and this led to overheating and breakdown of the seal faces, thus resulting in carbon black entering the vessel.

The solution:

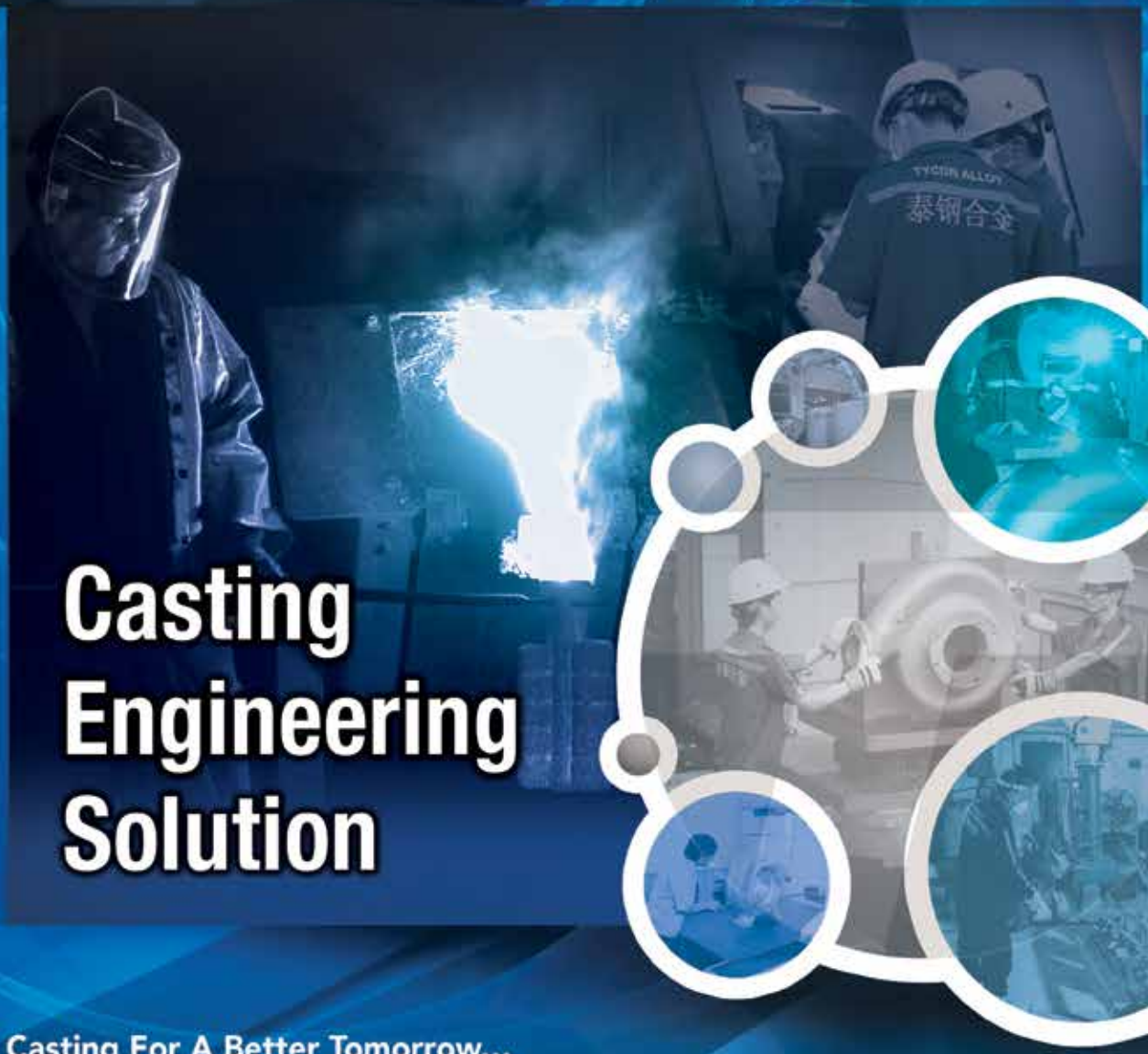
With all of this in mind, the company turned to AESSEAL® for assistance. They conducted an in-depth evaluation of the application and recommended that a Mixmaster VI mechanical seal, along with an EasyClean™ seal support system pressurised with water, should be fitted to the three reactors on site. Since installation there has been no further issues with carbon black, and due to the smooth operation of the Mixmaster VI the consistency of the product is now very 'smooth'.

Dr Samit Ahir, Chief Executive Officer of Makevale Group, says: "The elimination of carbon black has saved the company thousands of pounds in lost (rejected) product and helped protect our reputation."

New seal installed on reactor vessel.

EasyClean seal support system.

TYCON ALLOY
(HONG KONG)



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New marketing environment for pumps in the chemical industry

The way pumps are purchased in the chemical industry is changing. Large companies are increasing their share of purchases through mergers and acquisitions. The pending Dow/Dupont merger is a prime example. Additionally, global sourcing is becoming common. Industry 4.0 and IIoT (Industrial Internet of Things) are generating continuous analyses of pump performance. As most pumps become integrated in IIoT, data analytics systems purchasers will have the ability to buy based on known lowest total cost of ownership (TCO) parameters. This availability of lowest TCO information will raise the revenues and profits for those pump companies with the best products.

By Robert McIlvaine, President & Founder, The McIlvaine Company

The sales of pumps to the chemical industry in 2016 totaled USD $3.5 billion. The top four chemical companies' pump purchases totaled USD $190 million.

1. BASF is the largest chemical producing company in the world with 2016 pump purchases of USD $64 million. The German company, headquartered in Ludwigshafen, Germany, is focused on industry grade chemicals used in the automotive, construction and pharmaceutical industries. The company is investing heavily in Industry 4.0. As a result, it will be able to monitor the pump performance at all its plants around the world. This will facilitate determination of the pumps and systems which provide the lowest total cost of ownership. It has a system for vendor interaction and strategic procurement powered by SAP Ariba. It is creating a center for expertise in Ludwigshafen which guides the component choice at their plants around the world. The magnitude of this effort was chronicled in three articles in the KCI sister publication, Valve World, last year.

2. Dow: When the merger is final, Dow /Dupont will be the largest chemical company in the world with pump purchases of close to USD $70 million. Dow Chemical and DuPont said their merger's end date was being pushed back but added it was still on track as DuPont moved forward with plans to divest assets, a condition of European Union approval for the deal. The companies now expect the deal to close in August 2017, after being delayed by intense regulatory scrutiny. When the deal was first announced in December 2015, it was expected to close in the first half of 2016.

3. Sinopec has total yearly pump purchases of close to USD $300 million. However, less than USD $50 million is generated in the chemical industry. The most downstream of China's big three energy companies (alongside CNPC and CNOOC), Sinopec is more a producer of petrochemicals, fuels and lubricants than an exploration and production company. It is the world's largest purchaser of flow and treat equipment services.

In March 2017 Sinopec paid almost USD $1 billion for a 75 percent stake in Chevron Corp's South African assets and its subsidiary in Botswana to secure its first major refinery in Africa. Sinopec is Asia's largest oil refiner. The new assets include a 100,000 barrel-per-day oil refinery in Cape Town, a lubricants plant in Durban as well as 820 petrol stations and other oil storage facilities.

Sinopec Group's key business activities include: industrial investment and investment management; the exploration, production, storage and transportation (including pipeline transportation), marketing and comprehensive utilization of oil and natural gas; the production, marketing, storage and transportation of coal; oil refining; the storage, transportation, wholesale and retail of oil products; the production, marketing, storage, transportation of petrochemicals, natural gas chemicals, coal chemicals and other chemical products; the exploration, design, consulting, construction and installation of petroleum and petrochemical engineering projects.

4. SABIC (also known as the Saudi Arabia Basic Industries Corporation) is a chemical producing company in Saudi Arabia and is the largest company in the Middle East. Pump purchases in 2016 were USD $34 million. The company is currently the largest producer of polycarbonate and granular urea and is the second largest producer of ethylene glycol in the world.

SABIC was founded by the Saudi royal family in 1976 as an oil refinery. The creation of the company spurred the growth of the neighboring area transforming Yanbu from a fishing village to what is now one of the biggest industrial cities in the world.

For the large international pump suppliers, these 200 companies represent a big market and one less likely to be made unattractive by local competition. The number of decision makers at these companies is small enough that most sales activity can be with direct employees and not agents.

Pump companies can address the new marketing environment with the following initiatives

- Meet global sourcing with global sales. For a particular project the plant which will use the pumps may be in one location. The decision makers in the operating company may be in a different location. The architect engineer and EPC may also be located elsewhere. The pump supplier can interconnect all the sales and application engineering people in a manner to insure the maximum sales opportunity.

The top 20 pump companies purchased 14.5 percent of the world's chemical pumps in 2016

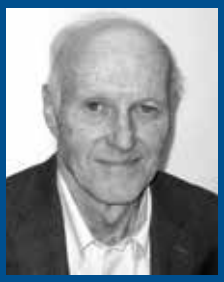
Rank	Company	Pump Purchases 2016 - $ millions	Percent of Total Pump Purchases	Cumulative Total
1	BASF	$63.7	1.8	1.8
2	Dow Chemical	$48.8	1.4	3.2
3	Sinopec	$43.8	1.3	4.5
4	SABIC	$34.3	1.0	5.5
5	Formosa Plastics	$29.2	0.8	6.3
6	Ineos	$28.5	0.8	7.1
7	ExxonMobil	$28.1	0.8	7.9
8	LyondellBasell Industries	$26.7	0.8	8.7
9	Mitsubishi Chemical	$24.3	0.7	9.4
10	DuPont	$20.7	0.6	10
11	LG Chem	$18.2	0.5	0.5
12	Air Liquide	$17.3	0.5	1.0
13	Linde	$16.8	0.5	1.5
14	AkzoNobel	$16.5	0.5	2.0
15	Toray Industries	$15.5	0.5	2.5
16	Evonik Industries	$15.0	0.4	2.9
17	PPG Industries	$14.2	0.4	3.3
18	Braskem	$14.2	0.4	3.7
19	Yara	$13.9	0.4	4.1
20	Covestro	$13.4	0.4	4.5

The top 200 companies purchased 39 percent of the world's chemical pumps in 2016

Rank	Pump Purchases 2016 - $ millions	Percent of Total Pump Purchases	Cumulative Total
1-10	$348	10	10
11-20	$155	4.5	14.5
21-30	$140	4.0	18.5
31-40	$106	3.0	21.5
41-50	$77	2.0	23.5
51-100	$250	7.1	30.6
101-200	$300	8.6	39.2

- The availability of lowest total cost of ownership data will challenge both end user and supplier to take advantage of it. In a large chemical plant with many processes and thousands of pumps the challenge to understand the implications will be substantial despite the best analytics.

- There will be too much available information for generalization. There will be an evolution toward niche experts within both the supplier company and chemical manufacturer.
- Some of this niche expertise will be provided by both large consulting companies and independent experts who will work with both suppliers and owners.
- Pump companies will need to determine the right mix between in-house expertise and paid outside expertise. Large pump companies may be pleasantly surprised regarding the in-house expertise which is available or can be developed.
- This understanding of processes and the lowest total cost of ownership product for each requirement within the process is what McIlvaine calls the Industrial Internet of Wisdom (IIoW). Those pump companies which can best leverage IIoW will be the most successful.
- Unique collaboration strategies will be available to pump suppliers. Smart pumps can incorporate sensors and controls designed by the pump supplier or they can be supplied in collaboration with a controls supplier.
- To address global sourcing for all the pumps for a plant from one source, the pump supplier can be the main supplier and include pumps from his competitors or he can be just one of the suppliers.The new marketing environment for pumps in the chemical industry offers big opportunities for those pump companies who best anticipate the rapid changes taking place.



About the Author

Robert McIlvaine is the President and Founder of The McIlvaine Company, which publishes reports across worldwide pump and valve markets. He was a pollution control company executive prior to 1974, when he founded The McIlvaine Company. He oversees a staff of 30 people in the USA and China.

A safety perspective on pumps in chemical services:

An interview with George Gaskill, Systems Engineer, BioSafe Systems, LLC

A graduate of the Georgia Institute of Technology, George Gaskill boasts an impressive career that spans a number of platforms. From process engineering in the environmental and utilities arenas, to plant upgrades and demolitions, Gaskill has worked in various roles – both in the plant and at corporate levels – for such companies as Rohm and Haas, Dow Chemical, Morton International, 3M, Nalco Chemical and more. He holds particular expertise in process engineering for specialty chemical manufacturing, be it for batch or semi-continuous types of operations, with an extensive background in safety protocols and procedures.

Pump Engineer had the pleasure of meeting with George Gaskill at his home in Murfreesboro, Tennessee, USA, to discuss his experience working with pumps and seals in the chemicals industry, his recommendations when working with vendors and his thoughts on the future of the industry as a whole.

By Melanie Gogan and Sarah Bradley

Now semi-retired, Gaskill assumes a part-time role for BioSafe Systems, LLC, based out of Hartford, Connecticut. The company provides bio-based solutions to the agricultural, industrial and consumer markets. In his role, Gaskill provides process and production engineering support and consulting for various BioSafe operations. Whether he is putting in environmentally-friendly acetic acid storage tanks or a herbicide plant, Gaskill's experience in plant processes and chemical systems helps ensure successful outcomes, geared towards environmental responsibility and safety.

In describing what he enjoys most about what he does, Gaskill explains: "I enjoy troubleshooting: trying to figure out problems throughout the day, analyzing them and being able to solve them. If you are going into a refinery, you may be the guy that tracks the catalyst

usage and you may do that day in and day out. It may be worth millions of dollars and provide increased production from the catalyst before you have to change it out, but it can be monotonous at times."

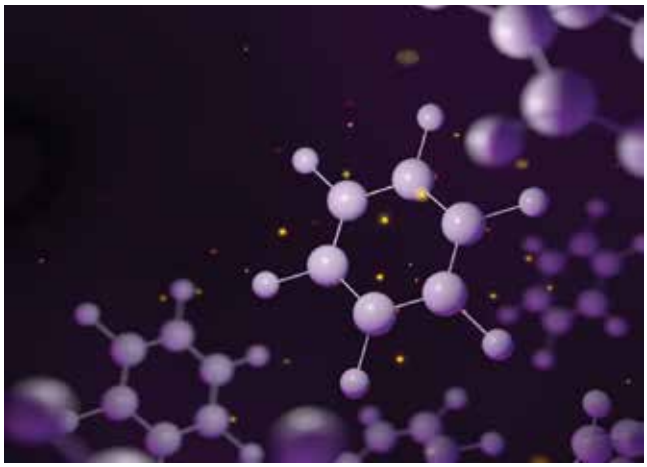
Gaskill embraces the challenges associated with working with specialty chemicals. "The thing about specialty chemicals is that they give you a little bit of a break. It may be considered frustrating at times because you are doing a lot of things at once. Sometimes, you must relearn something or learn things for the first time, but they give you a change from the monotony," he adds.

To seal or not to seal

Gaskill has worked with various pumps throughout his career, from large centrifugal pumps to small chemical feed pumps, and everything in between. In addressing the issue of seals as a primary point to consider when choosing the proper pump for an application, Gaskill points to the advantages of a sealless pump. He says: "With environmental regulations, you have to be careful. At BioSafe we spec out all anti-mag or inter-mag type pumps to avoid seals." He notes that sealless pumps not only avoid mechanical seal problems, but are also ideal for containing toxic, dangerous and/or valuable fluids. Gaskill further adds that cam pumps, while their passages are generally very small, handle solids well and are practical because they do not have seals.

The VFD and AO pump advantages

Gaskill notes that at BioSafe a majority of the pumps are small 2 x 1 ½ inch pumps with 7.5 horsepower, many of which are VFD-driven (Variable Frequency Drive). The advantage of maintaining size consistency across several different plants, he explains, is that if one malfunctions or shuts down, a replacement pump can be easily located and shipped in a timely fashion. The nice thing about VFD, he adds, is that these types of pumps are practical for a lot of varying applications. "With a VFD you put in the least amount of power you have to and you can use it for various applications. It really corrects a lot of the engineer's mistakes," he says. By adjusting the pump speeds, operators are able to avoid the limitations of a fixed speed that may in fact be too great for a given application, requiring them to use a valve to throttle the speed back to regain control of the process.



"You want to hit it right in that sweet spot, so you design your pumping system and your piping with high accuracy. You want to achieve the highest efficiency with the least amount of power being used..."

Ideal for handling materials that are very viscous, such as polymers, Gaskill recommends the flexibility offered by AO (Air Operated) pumps. He explains: "They are very forgiving in applications. I have used them for pulling vacuum reactors into things. There is a lot of flexibility in the things you can do with them; they can handle multiple application designs."

Pumps and chemical processes

Whether it's at the refinery pumping crude oil or at a specialty chemicals facility, Gaskill stresses the importance of designing a pumping system that is able to produce the ideal rate of flow, at the right level of efficiency. He explains: "You want to hit it right in that sweet spot, so you design your pumping system and your piping with high accuracy. You want to achieve the highest efficiency with the least amount of power being used in order to satisfy a very tight operating margin. With special chemicals the operating margin is only a little bigger." If this "sweet spot" is not achieved, Gaskill explains, the risks can be both costly and dangerous. The two most common causes of pump failure, in Gaskill's opinion, are a result of trash or contamination coming through the system and misapplication. Avoiding these common failure points is key.

Approved manufacturers' lists

Most well-established companies have a Preferred Vendor Alliance Agreement (PVAA), explains Gaskill. This allows companies to establish certain parameters, regarding favorable pricing, exclusivity rights and servicing versus replacement criteria. He explains: "All of those agreements are very attractive to companies and to the vendor because it establishes themselves a baseline customer load. We get treated very fairly in pricing, while saving us the time of renegotiating contracts. It costs money to go out and interview vendors and make those decisions. It is not something that is free."

"In the chemical industry, you do not send your bid out to anyone who you are not willing to give your business to," says Gaskill. Unlike in the public realm, he adds, there is rarely a need in the chemical industry to accept a low bid. With such high stakes at hand, he refers to the importance of choosing vendors with whom you have past experience and trust, and developing a list of contractors, pump manufacturers and distributors that offer quality and reliability.

Future of the chemical industry

When asked about his thoughts on the future of the industry, Gaskill presents a fascinating perspective – one that once seemed like science fiction, but is developing every day to redefine our relationship with industrial processes. "I think the industry is going towards nanotechnology and small processes as opposed to big ones. In the chemical industry, usually you do a lot of big batches, for optimum output. From a safety standpoint though, it is much better to build a small process and do it continuously," he says.

He points to the potential of nanotechnology – the manipulation of matter on an atomic, molecular and supramolecular scale – to reduce the inventory of hazardous materials that are reacting with each other at any time. With his history of environmental awareness and safety, combined with his innate understanding of the lucrative chemical manufacturing business, Gaskill concludes: "I see a lot of advantages to smaller, continuous production operations in their ability to minimize the environmental footprint, while keeping production levels stable or even increasing them. While some of these processes must remain gigantic in nature, some of them can be reduced in size and still produce the same outcome, with less inventory of hazardous materials and more flexibility."

George Gaskill, BioSafe Systems, LLC.

Pump manufacturer saves time and cost by installing bushings ordered from South African polymer manufacturer

By Leandro Panzini, Director, VesArg

A global fluid-handling equipment company has saved time, cost and effort by installing a total of 12 Vesconite Hilube line-shaft bushings and two Vesconite Hilube stuffing box bushings in two 18m-length pumps. The bushings are to be included in water pumps that provide water in Buenos Aires, Argentina.

The bushings were 300mm long but, after two hours in dry ice, the pump manufacturer fitted the bushings by hand without any assistance. If the company that installed the bushings had used bronze bushings, a press fit would have been required. In addition, it would have taken more effort to cool bronze bushings and the pump manufacturer may have needed special clamping to assist with holding the pipe sections in place, therefore saving the company additional costs. Because thermoplastics harden and soften with temperature, freeze fitting is particularly useful when installing large polymer bushings, bushings with thin walls or bushings where the length is greater than the shaft diameter.

Besides the ease of installation, thermoplastic bushings are often preferred to bronze bushings in pump applications since they are self-lubricating, contain no lead and are hard-wearing.

Pipe sections with Vesconite Hilube bushings.

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