AESSEAL®
ENVIRONMENTAL TECHNOLOGY

ORACLE

April 2009 Issue 22 Oil & Gas Special Edition

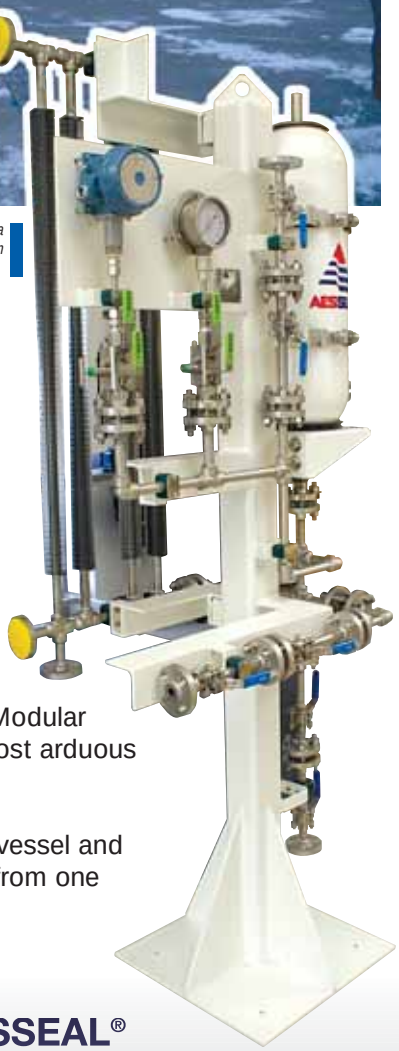
Institution of MECHANICAL ENGINEERS Best Practice RELIABILITY CONFERENCE

Improving the world through engineering

Dry Gas Compressor Seal refurbishment in the USA

In the summer of 2008, AESSEAL® refurbished two John Crane Type 28XP dry gas compressor seals in just 6 weeks. In the same month the dry gas seals were flown to an offshore exploration platform in Alaska where the local service partner, ProSeal, installed them. *See page 5*

(above) Bruce McCartney, ProSeal, going onto offshore application in Alaska
(right) Plan 53B System



Patent Pending Modular Oil & Gas Systems

In January 2009 AESSEAL® launched a new range of Patent Pending High End Modular Seal Support Systems targeted at the most arduous applications in Oil and Gas.

This unique design permits hundreds of vessel and instrument permutations to be supplied from one modular fabricated construction.
See page 6

ACHEMA 2009 Frankfurt am Main/Germany 11.–15. 5. 2009

Visit AESSEAL® at Achema 2009, 11-15th May Hall 8, Stand A21 / A22

Chairman of Shell UK opens AESSEAL® new 110,000 sq. ft. facility

On Friday 14th November 2008, James Smith, Chairman of Shell UK, officially opened the Phase IV development of the Global Headquarters of AESSEAL® at Mill Close, Rotherham, UK.

The £7m extension ($10.2m / €7.7m) completes the development of over 100,000 sq. ft. of prime space for manufacturing and the research and development of mechanical seals, systems and bearing protection.

The development has been designed to complement the extensive green credentials of AESSEAL® by incorporating living green roofs, which supports biodiversity, helps filter pollutants from the air and improves insulation. Rainwater from the roofs also feeds into the established on-site wildlife wetlands sanctuary, which was created in 2005.

From left to right: James Smith; Chairman of Shell UK, Chris Rea; Managing Director AESSEAL®, Rt.Hon.William Hague MP: non-executive Director AESSEAL®

AESSEAL® is one of only 2 preferred **suppliers to ITT Goulds - Globally**

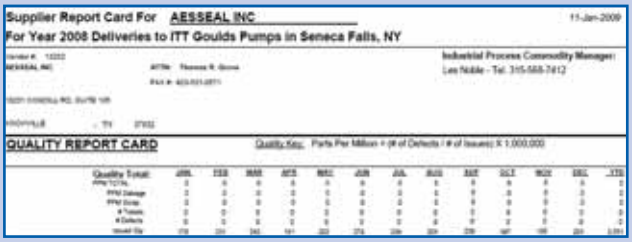
Preferred Supplier Agreement

Globally, AESSEAL® is one of two preferred suppliers to Goulds Pumps for mechanical seals.

As a preferred supplier, in February 2009 John Pedder (Business Development Manager AESSEAL®) met IK Kim (General Manager), Jeon (Engineering Manager) and Julia (Applications Manager) from the Goulds Korean team (pictured below) with a view to extending the AES-Goulds global relationship at their two Korean plants.

Goulds Korea - IK Kim, Julia and Jeon with John Pedder

News Flash:
In 2008 AESSEAL® achieved a supplier report card for ITT Goulds showing ZERO supply defects and 99.83% on-time deliveries.


Supplier Report Card For AESSEAL INC
For Year 2008 Deliveries to ITT Goulds Pumps in Seneca Falls, NY
QUALITY REPORT CARD

Oil and Gas **UK Reliability Conference**

Global headquarters, Mill Close, Phase IV extension and wetlands

On the 29th and 30th of April 2009, AESSEAL® hosted the UK's Best Practice Reliability Conference, sponsored by the IMechE (Institution of Mechanical Engineers) – the UK's leading forum of Mechanical Engineering Professionals.

Over 125 customers from around the world attended the two day event located at the global headquarters of AESSEAL® in Rotherham, England.

The participants discussed and shared best practice concepts to improve uptime for rotating equipment.

Alan Roddis would like to thank the nine guest speakers, who gave up their time to help spread their success stories and share best practice concepts.

Contracts Update

Arjo Wiggins:

On 11th of February 2009 Martin Lister, AESSEAL® European Contract Manager, signed a Preferred Supplier Agreement with Arjo Wiggins in Aberdeen. This agreement is open to any other site throughout the Arjo Wiggins Group.

Croda:

AESSEAL plc and Croda have extended the Mechanical Seal Asset Management Agreement to include all repairs of gas seals which will be executed at the AESSEAL Derby repair facility.

Italian contract signed with Exxon

AESSEAL plc has been appointed as an approved supplier to the Exxon Group for a 3-year period.

The AESSEAL® vendor number is 337651.

Confirmation of Inclusion on the **Sasol Technology (Pty) Ltd. Supplier Database**

On 11 June 2008 AESSEAL Pty Ltd received confirmation that it was included on the Sasol Technology (Pty) supplier database for the supply of the following products under Vendor Number 5401.

- *Mechanical seals*
- *Mechanical seal support systems*
- *Bearing isolators*
- *'O' rings*

For further information please contact Rob Waites, AESSEAL Pty Ltd at rwaites@aesseal.co.za

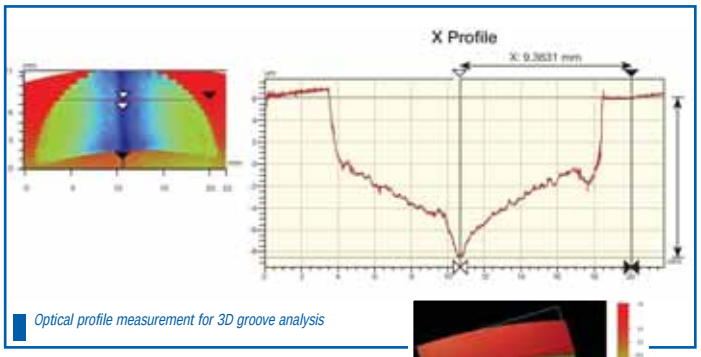
Dry Gas Seal Refurbishment

AESSEAL® provides a comprehensive dry gas seal refurbishment program, specifically for non-AES designs.

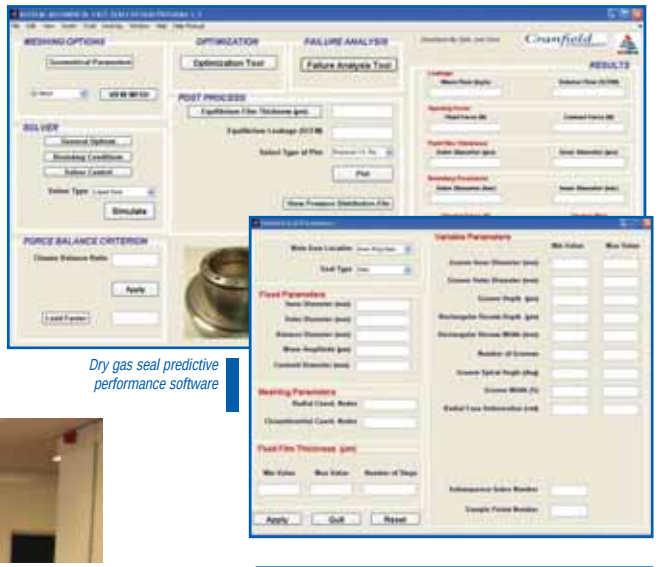
Service options include the following:

- Test regime to API 617, (dynamic tests use dedicated test equipment)
- Refurbishment lead times in less than 8 weeks
- All types of groove profiles can be refurbished
- Computerized face analysis
- Polymer or 'O' Ring secondary seal designs
- Full certification pack including video test surveillance
- Post test inspection reports

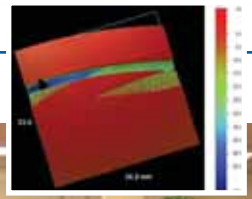
For further information contact Dr. Chris Carmody chris.carmody@aesseal.co.uk or Jim Williams jim.williams@aesseal.co.uk (AESSEAL plc, UK)



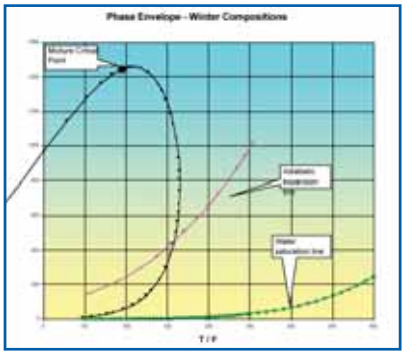
Optical profile measurement for 3D groove analysis



Dry gas seal predictive performance software



Test House Facility, Global Headquarters, Mill Close



Full Gas condition analysis

Examples of **Refurbished Dry Gas Seals**

High Pressure Seals

OEM : John Crane
Arrangement : Tandem Type 28 XP
Operating Speed : 11,441 rpm
Direction of Rotation : Uni-Directional
Pressure Static : 206 barg (3000 psig)
Pressure Dynamic : 148 barg (2146 psig)
Size : 6.125"
Temperature : 60°C

Seals returned for repair after scheduled shut down. Seal faces and polymer seals were replaced.

Large Diameter Seals

OEM : John Crane
Arrangement : Tandem Type 28 AT
Operating Speed : 11,441 rpm
Direction of Rotation : Uni-Directional
Pressure Static : 96 barg (1400 psig)
Pressure Dynamic : 47.6 barg (690 psig)
Size : 7.125"
Temperature : 60°C

High Speed Seals

OEM : Burgmann
Arrangement : Single CDGS
Operating Speed : 32,000 rpm
Direction of Rotation : Bi-Directional
Operating Pressure : 60 barg (870 psig)
Size : 2.685"
Temperature : 150°C (300°F)

Total of 7 seals returned for repair or health check including Silicon Carbide, Silicon Nitride and Diamond like Carbon coatings replaced where appropriate.

Barrier Seals

OEM : John Crane
Arrangement : Tandem Type 82
Operating Speed : 11,441 rpm
Size : 6.693"

AESSEAL® Refurbished Dry Gas Seal **Installation in Alaska, USA**


fig. 2


fig. 1

After completing a rapid refurbishment of two John Crane Type 28 seals a customer requested emergency help on a Dresser-Rand compressor dry gas seal. The requirement was for the removal of the John Crane Type 28XP and the re-installation of a refurbished seal of the same type to the non-drive end of the equipment. Seth Short and Bruce McCartney from ProSeal, the AESSEAL® service provider in Alaska, went to the site to accomplish this task the next day. Seth and Bruce, directors of ProSeal, are two rotating equipment and seal technicians with over 40 years combined experience.

The scope of work was first of all to decouple and gag the compressor shaft at the drive end and remove all bearing components and instrumentation from the non-drive end. Once this was done the barrier cartridge seal and main gas seal were removed and replaced with a newly refurbished John Crane Type 28XP seal with barrier cartridge. All bearings were then replaced (radial and thrust, tilting pad bearings) and finally all the instrumentation was replaced to complete the job. The complete tear down and rebuild was completed within 18 hours. Equipment start up was exceptionally smooth and the entire process was completed without any incident. Result: one very happy customer.

Saudi Arabia MTBF Improvements


fig. 3

In 2008, AESSEAL Saudi Arabia team received a call from one of the largest petrochemical plants in Saudi Arabia regarding a severe problem in one of the most important applications for the plant.

The problem started 15 years ago where the existing seals leaked at start up and failed within 2-3 weeks from installation. The machine was a Nash Compressor model HP8 used as a HTC Vent compressor pumping Ethylene Dichloride.

After a full RCA was conducted, the root cause behind these frequent failures was that the compressor suffered from high vibration due to operating conditions. The existing back to back seal was unbalanced and incorporated a uni-directional pumping scroll with a standard grade of Carbon at the outboard side. The Carbon suffered from blistering due to the high heat generated. In addition, the barrier fluid used was not suitable for this application.

A 4.250” CAPI-TXS™ dual was used to replace the existing seal and a suitable barrier fluid was selected. The new seals have been running leak-free since 14th January 2009. The customer is very pleased with this dramatic MTBF improvement and has now ordered a further 6 seals.

An Exotic CAPI™ Type A has been fitted to a Goulds API pump in a Filtered Water application at one of the largest oil producing fields in Saudi Arabia. The Plan 11 CAPI was installed in January 2008 and is currently running leak free. The previous (non-AES) seal lasted for only 10 months and suffered from springs clogging and corrosion attack.

The features of the CAPI™ seal have improved MTBF in this application despite the harsh and dusty running environment and the excessive vibration of the pump.


fig. 4

The design of the CAPI™ with springs outside the product has helped to overcome the clogging problem and use of Alloy 20 for all of the metallic parts helped eliminate the corrosion problem. The seal was also supplied with a double row clamp ring and nickel coated grub screws for improved stability.

The seal is still running and the customer has ordered another 3 seals and standardized the CAPI™ for these pumps.

Fig. 1 & 2 - dry gas seal installation. Fig. 3 - Nash Compressor installation. Fig. 4 - CAPIs installed on Goulds pump

Systems made as simple as learning your A, B, C

The AESSEAL® Complex Systems Division has established an innovative method of developing API Plan 53B Systems. Plan 53B systems have been viewed as an “engineering challenge” around the world, often with long lead times.

AESSEAL® has combined internal research, design and production with the specialist knowledge of its engineering teams to develop modular components which will dramatically reduce product lead times and improve the quality of Plan 53 Systems.

This approach reflects the AESSEAL® ethos towards product development and the relationship between function, technology and design to create an innovative product.

this award winning modular approach has been taken towards product design to guarantee exceptional product quality with short lead times

API 53B Simplicity for You

Located in Rotherham, England, the Complex Systems Division has eliminated the complexities within the API 53B manufacturing process with its innovative approach to the design of these systems.

The Complex Systems Division’s team encompass all the necessary elements of design, fabrication, engineering and customer service to guarantee a seamless flow for customers from inception through to specification and delivery of quality 53B product.

Over 5,000 Dedicated Man-Hours Delivers 53B Clarity and Assurance

The Complex Systems Division’s research and development team has dedicated over 5,000 man-hours to examining and deciphering the finer details of API 682, ASME VIII Div 1, 2007, 2008a and PED 97/23/EC. These man-hours have been invested to create a Plan 53B manufacturing process that will guarantee quality product and short lead times. Also, by breaking down the complexities of the design and certification requirements, our sales and customer service teams are fully qualified to provide detailed support through all aspects of the Plan 53B order process.


fig. 1

53B Quality through Modularity and Standardisation

The innovative modular concept permits 12 modular options to be applied to create an API 53B System for any application. This modular process facilitates efficient stock control which in turn provides AESSEAL® API 53B Systems with rapid delivery times. Modularity eases the production of documentation for each Plan 53B product and also makes it easier to determine the correct solution for the application.
Other innovations for 53B systems include:-

Compact design – The small footprint of the product enables its installation in areas with restricted space.

Lower Centre of Gravity – Allows a variety of larger accumulator options to be applied within the modular design. Designed to take into consideration the details of API 682 4th Edition.

Lifting Eye – Enables efficient and safe installation of the product.

Earthing Boss – Enables efficient and safe installation of the product.

Paint work suitable for On & Offshore - Every 53B System AESSEAL® produced will be suitable for the environment in which it is installed.

Export quality packaging as standard – AESSEAL® understands the importance of secure and effective packaging and guarantees that all customers will receive fully protected product to their sites.

Attention to Detail

With the design, processing and manufacturing of API 53B Systems taking place in-house within the Complex Systems Division, AESSEAL® maintains control on quality standards during each stage of the supply process through its meticulous procedures.

Product build quality is an area that takes precedence. AESSEAL's in-house welders are fully certified therefore guaranteeing that all joints, whether Butt Weld or Socket Weld, are made to ASME IX specifications. Following completion of all welding, the necessary Non Destructive Examination (NDE) is completed for quality assurance.

fig. 2

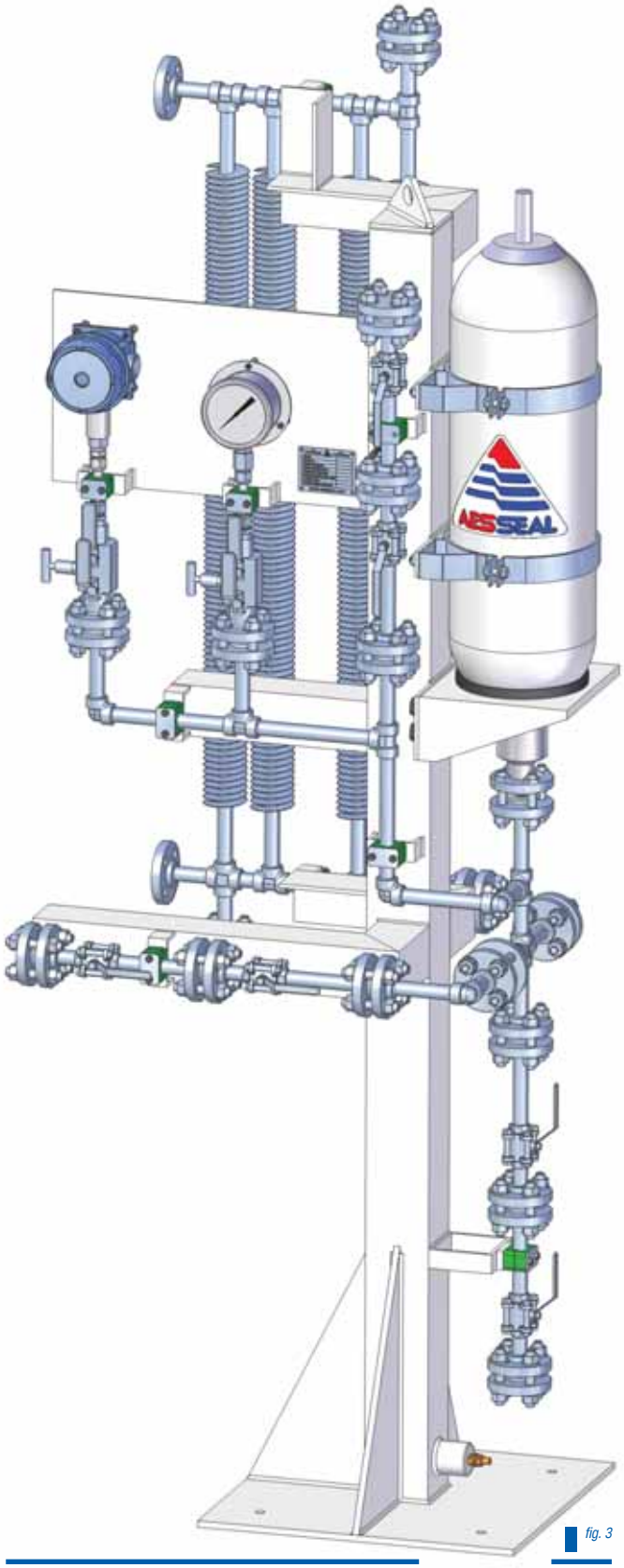


fig. 3

This modular process facilitates efficient stock control which in turn provides **AESSEAL® API 53B Systems with rapid delivery times.**

Fig. 1 *- 600 lb, Single Block, Socket Weld Flange, 37 litre Accumulator 53B System.*
Fig. 2 *- 300 lb, Single Block, Socket Weld Flange, 20 litre Accumulator 53B System.*
Fig. 3 *- 600 lb, Double Block, Socket Weld Flange 53B System, 20 litre Accumulator 53B System c/w Heat Exchanger.*

AESSEAL® Reliability Conference held in Vizag, India

In March 2008, over 125 customers attended a reliability seminar in Vizag, India, hosted by AESSEAL India Pvt.

Engineers, plant managers and reliability professionals gained an insight into best practice reliability concepts – and the pitfalls of some technology currently available in the market place.

Reliability Conference, Vizag, India, March 2008. Presented by Alan Roddis, Engineering Director, AESSEAL plc (Inset top)

HP Machine Cell sets new Delivery Benchmark

Two NINE Axis Machines installed and running at Mill Close, with 300 tool stations per machine

In just a few months since its introduction, the AESSEAL® dedicated Hydrocarbon Processing machine cell is manufacturing a complete range of complex and bespoke products in just a fraction of the time achieved by conventional machines.

With 300 tool stations per machine, each machining centre eliminates the need for lengthy machine tool set up times typically associated with conventional machine tools.

The most important aspect of this AES investment, however, is the continuous advancement in manufacturing process capability towards 6 sigma best practice. With technology such as this, customers get peace of mind as even the most complicated mechanical seal components required by the Hydrocarbon industry can be manufactured consistently to the exacting tolerances required by the API 682 specification.

Exploration & Extraction **In Argentina**

Andrés de la Fournière from AESSEAL Argentina has been working in Patagonia in the exploration and extraction sites at Petrobras UTE and Puesto Hernandez.

Petrobras has around 300 Vertical Netzsch pumps, models ND-H020 and DH 20-HB. Petrobras had severe oil contamination with the pumps that work with the standard lip seals. AESSEAL Argentina has installed LabTecta models SE (upper) and FS (lower) on the vertical shaft . In order to vent any excess pressure, a Bearing Expansion Chamber was installed. The installation required minor modifications in the lower area and in December 2008 the installation of the unit took place.

Pablo Nogues, AESSEAL Argentina, said, “Over the past 8 months Petrobras has been extremely happy with our service and given us two additional Netzsch models to revamp in the same manner”.
Pablo continued, “Furthermore, AESSEAL® has been very happy with León Industrial’s involvement in this project. AESSEAL Argentina has been working very closely with León Industrial in the technical education of field staff and training them in the service centre in addition to providing support in the sourcing of sealing opportunities that the upstream market has to offer”.

100 Oil & Gas professionals turn up to the AESSEAL® reliability conferences in Egypt

In January 2009, AESSEAL® and HYDROTECH (AES partner in Egypt) hosted two Reliability conferences; one in Cairo and one in Alexandria.

Both events attracted over 100 customers from the Oil and Gas industry—all eager to learn about best practice reliability improvements for rotating equipment.

After both events, John Visser, resident country seal manager for AESSEAL® commented, “the customer response from both events has been exceptional. We have been inundated with many enquiries and orders for products and services ranging from bearing seals to dry gas seal repairs”.

Application solution: **CAPI™ Type A Single**

AESSEAL® has retro-fitted seals from its CAPI™ range of certified API 682 mechanical seals. This modular range of API seals has inherent benefits when compared to the existing seal design.

2.635" CAPI™ fitted to multi-stage pump in Nigeria

The seals in question for Nigeria were manufactured so that no modifications to the pump and flush plan pipework were required. The oil company in Nigeria tested four AESSEAL® seals in 2001 in a head-to-head comparison with other seal manufacturers. The AESSEAL® CAPI™ design was successful and far outlasted the competitors, so much so that another 40 identical seals were installed in 2005 and all 100 pumps (200 seals) have been earmarked for upgrade.

CAPIs in Canada

In 2008 AESSEAL® supplied seven 1.687" CAPI™ Type A single seals for Pentane pumps operating from vacuum to 4300 kaPa (absolute) at -36 to 49°C (-33 to 120°F) in a Power Plant in Western Canada.

The customer generates power from a natural gas pipeline compressor station but uses the waste heat generated by the gas turbines (jet engines) to drive the compressors. They use a similar process to the water cycle in a traditional power plant but use pentane rather than water because of the lower temperatures.

Following a number of start up problems with the OEM installed seals (non AESSEAL®), the customer was referred to AESSEAL Canada because of the growing reputation for outstanding service by AESSEAL®. The bespoke seals were delivered in days by AESSEAL® and resolved the plant's problems.

EIGHTEEN CAPIs for Offshore Platform

During 2008, AESSEAL® received orders for a total of 18 identical CAPI™ seals to be installed on the Power Water Pumps onboard a North Sea Platform operating in the Captain field.

The existing seals fitted by the OEM in 1999 were proving unreliable. The operators of the platform were going through dosing trials with Magnacide. This involves injecting the liquid into the wells to prevent scaling and marine growth, amongst other things. During the dosing trials the existing seals did not prevent emission of a pungent odour, which prevented maintenance staff working in the vicinity of the pump units. After much discussion with the operator's Rotating Equipment Engineers it was decided that a dual seal was required. Due to space constraints and the timescales involved in carrying out such modifications, the agreed solution was to install a dual segmented bush arrangement at the back of a single seal.

The seals were designed and manufactured in only 6-8 weeks in spite of their complex nature and use of exotic materials and have been operating successfully since September 2008. The pumps, manufactured by Weir Pumps, are large barrel type units (API 610 BB5) with a 102mm shaft in the sealing area. They discharge produced water at a pressure of 303 Bar downhole to drive a submersible water turbine, which in turn drives a submersible multiphase pump and provides artificial lift to the oil field. The power water fluid merges with the crude oil as it arrives at the surface and is then separated by the onboard processing system. The water is skimmed off in separators and then recycled and pumped back into the well for driving the submersible pump again.

Sand - MOL Centrifugal Pump Problems

Sand has been one of the main sources of problems with Main Oil Line (MOL) Pumps. Due to the critical importance of these pumps, their efficient operation is of prime importance for major oil operators.

The problems have mainly been as a result of the speed of the unit as well as the close tolerances required on wear rings. These rings typically wear out quickly and this leads to a severe drop in performance.

The MOL booster pumps feeding the MOL pumps have not escaped the destructive effects of sand either. The sand also causes considerable erosion damage to the components of these pumps. In certain applications, pump casings can wear away to such an extent that hydrocarbon media is released to the atmosphere. Clearly, this is undesirable and examples of such wear are shown below.

Damage to the stuffing box of a multistage centrifugal MOL Pump

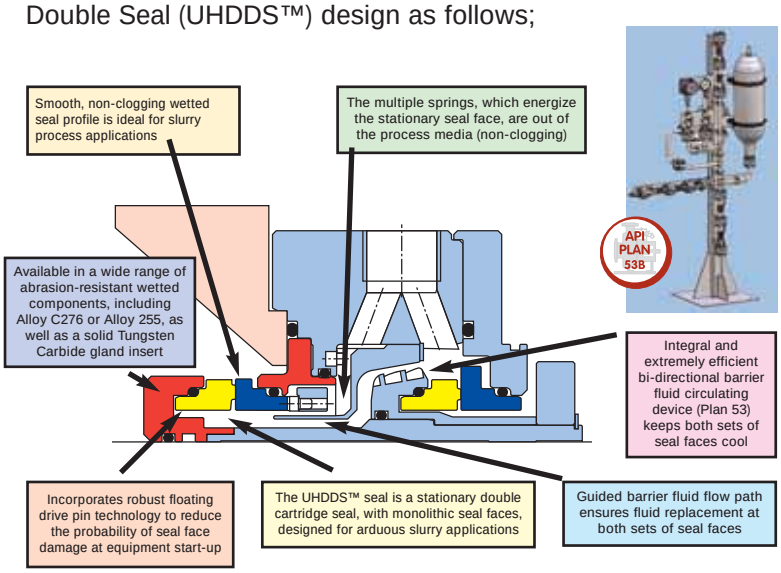
A worn volute casing caused by sand erosion on an API 610 OH2 MOL booster pump

There are other applications such as Closed Drains, Flare Drum, Test Separator, Surge Drum, Produced Water and Recovered Oil Pumps that are also prone to severe sand erosion.

Sand - one of the **premier concerns for the major oil operators**

Ultra Heavy Duty Double Seal (UHDDS™)

AESSEAL® has adapted its CAPI™ design to suit the specific application requirements of the off/onshore exploration industry by providing an Ultra Heavy Duty Double Seal (UHDDS™) design as follows;



CAPIs and Systems for Sulzer Condensate Booster Pumps

During June 2008 a North Sea Operator requested the supply of four 2.125” CAPI™ Type A Dual Seals and systems for its Sulzer Condensate Booster Pumps in the North Sea.

The CAPIs were used to replace a competitor’s gas lift containment seals which failed due to crude oil in the process.

See case reference no. 3476 for further details.

Problems associated with close clearances

Until recent times the subject of internal clearances within mechanical seals has hardly been debated in Hydrocarbon Industries. AESSEAL® cartridge mechanical seal designs have always incorporated generous internal clearances to prevent contact between rotating and stationary components. AESSEAL® is of the opinion that these features enhance safety and reliability. Many manufacturers in the mechanical seal industry today incorporate radial clearances of circa 0.5mm (0.020") within their API designs. There is now a movement to try and formalise these clearances within API standards. The justification is that the clearances will be more than adequate for an API 610 10th ISO13709 pump if it is correctly assembled and installed. The principal manufacturers also claim there are few instances of contact within mechanical seals reported and therefore clearances do not constitute a reliability or safety issue.

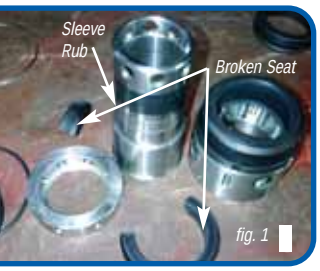


fig. 1


fig. 2


fig. 3

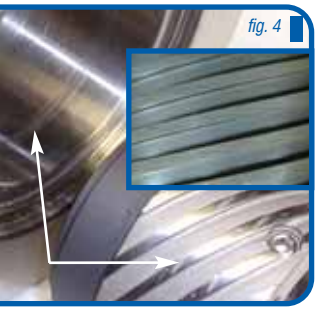


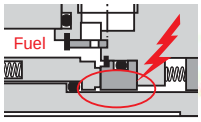
fig. 4

AESSEAL®, however, has been made aware of several contact incidents. In the United Kingdom, in a major petrochemical facility in October 2006, a seal external mating ring (seat) contacted with a rotating seal sleeve where the process fluid was gasoline. The outer seal was a dry containment seal and the contact was such that sparks were emitted from the back of the seal. Fortunately vigilant operators shut down the pump quickly and a major incident was averted. On the reliability bath tub curve this event would be recorded as a premature failure or infant mortality. AESSEAL® has since learned of a very similar influence taking place on a LNG pump in Angola. Other examples are illustrated on the left.

From the evidence illustrated above, it is obvious that internal contact within mechanical seals is occurring around the world and that contact is perhaps more widespread than commonly believed.

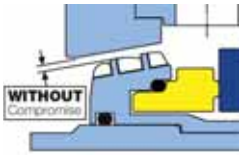
With the contact between a mating ring and a seal sleeve on the outside of a dual mechanical seal or a single mechanical seal, there is the potential for a brittle component to rub against stainless steel. On one side of this component is a fuel and on the other side of this component is oxygen in the atmosphere. With contacting components there is potential for the fire triangle to be complete.

Is this a safety issue? Whatever your view, this internal seal contact will certainly impact significantly on seal reliability.

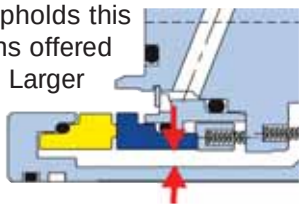


The cause of the contact in many of the instances illustrated is unknown. Incorrect installation or pump assembly, pump case distortion due to pipe strain, thermal loads or even bearing faults will all be candidates for such problems.

There is no advantage in running close clearances with mating rings. However, pumping rings or internal circulating devices for wet dual seals can operate more efficiently when running under closer clearance conditions. There has been a trend in recent years to ignore the API clause 8.6.2.3 requirement for a 1.5mm radial clearance and to operate pumping rings at a significantly reduced radial clearance of 0.5mm. The illustrated example in Texas (fig. 4) is not an isolated incident. AESSEAL® is aware of a significant number of contact issues occurring in South Africa at a major Oil & Gas facility. In these instances the contact that occurred caused premature failure of the sealing devices, having a significant impact on the reliability of the plant. AESSEAL® has developed high performance pumping ring circulating devices that operate at the full API clearance whilst providing performances that will equal or better close clearance devices.



AESSEAL® maintains significantly greater clearances than is common within the mechanical seal industry today. AESSEAL® upholds this feature on all cartridge seal designs offered for the Oil & Gas industry sectors. Larger clearances are potentially safer and are certainly more tolerant of fault conditions, thus improving plant reliability.



AESSEAL® maintains the view that incorporating larger clearances will always be better practice than smaller clearances. Users of such technology will enjoy **reliability safety benefits with no financial penalties.**

Fig. 1 - Contact between mating ring and seal sleeve. Italy Petrochemical Industry. Fig. 2 - Contact mating ring and seal sleeve. Saudi Arabia Petrochemical facility. Fig. 3 - Contact mating ring and sleeve. Upstream oil production facility West Africa. Fig. 4 - Contact pumping ring and gland plate. West Texas USA

Success Breeds Success in a USA Refinery

AESSEAL® is a world leader in rotating equipment reliability innovation. The following examples illustrate the benefit of the approach to innovation by AESSEAL® and its determination to provide reliability focused solutions which address root cause failure issues.

Steam Compressors - stage 1


fig. 1

In June 2008, an Elliott 2AYR steam turbine (fig. 1) in a USA refinery was refurbished with Labtecta-STAX.

Previously the plant personnel had to change oil every 2-3 weeks costing $400 (£273.97 / €301.37 per oil change.

Nine months since the installation of the LabTecta, the oil remains clean and the cost of 12 oil changes have been saved.

This saving has been calculated by plant personnel at $4,800 (£3287.67 / €3616.44) and provided a LabTecta investment payback inside 3 months.

Atmospheric Heater Charge Pump PA-20 - stage 2


fig. 2

The refinery then wanted AESSEAL® to look at a problematic pump application.

The Sulzer pump (model HSB, fig. 2) was prone to water ingress into the bearing housings from the mechanical seal steam quench.

This is a classic Plan 62 single seal problem. Steam leaves the mechanical seal, travels under the restriction bush and is blasted directly at the bearing seal or lip seal.

The pump was also overhauled with LabTecta bearing protectors as well as Vespel wear rings and throttle bushings to the complete satisfaction of plant personnel.

Electric Motors - stage 3


fig. 3

After solving the problems with the Sulzer pump, the Refinery then wanted to tackle two 75 hp general electric motors (fig. 3) which failed because the existing OEM fitted lip seals allowed oil to enter the windings causing the bearings to run hot.


fig. 4

The motor shop installed Magtecta-OM bearing seals on the inboard and outboard sides of both bearings in each motor (fig. 4). As a result the bearing temperatures dropped to normal and the electric motors then operated in the intended manner.

Mechanical Seals - stage 4


fig. 5

Following the success of the bearing seal program, the USA refinery asked AESSEAL® to look at a problematic mechanical seal application.

The existing (non-AES) mechanical seal constantly failed on a Byron Jackson (Flowserve) Alloy 20 model SML pump, pumping 90% Fresh Sulphuric Acid on an alkylation unit.

The non-AES seal failure mode was as a result of inboard elastomer failure attributed to the small internal clearances and poor seal pumping ring performance.

The AESSEAL® 1.937" CAPI-TXS™ (Alloy 20) Type A Dual seal (SiC/SiC//Car/SiC/Kalrez) with a Plan 53B system was successfully installed (fig. 5) in 2008. The CAPI-TXS™ (GA Drg.No. 7166232) success was attributed to the seal's effective pumping ring and barrier fluid flow path, which efficiently cooled the inboard seal faces and elastomers.

The above solutions illustrate how success breeds success specifically when the service provider offers reliability focused solutions across the breadth and depth of its product range. For further information contact Brian Sawyer, Sunair (distributor in AESSEAL Pennsylvania, USA).

French Refinery Reliability Improvement

Significant AESSEAL® installations in the Oil and Gas Industry have been made in 2008 in a variety of French refineries. The following are a selection of these:-

1. 60mm CAPI™ Type A single seals replaced Flowserve Single bellows seals on a Bornemann Twin Screw Pump (W7 3Z 67), on a 80-230°C (176-446°F) Bithume application at 8 bar and 950rpm.

2. In January 2009, a 39.7mm Single CAPI-TXS™ (A2D) Seal was installed on a Dresser pump type RVC 1.25 in Petroplus Petit Couronne refinery in France. The application was a Hydrocarbon condensate at 125-170°C (257-338°F) operating at 12 bar discharge pressure and 3000 rpm. The CAPI-TXS™ cartridge seal, using API682 qualification tested seal faces replaced a Flexibox RR component seal.

3. In the same refinery, a 1.500" MagTecta-OM was fitted on the upper seal of a Sundyne Pump. For further information see AZA12034

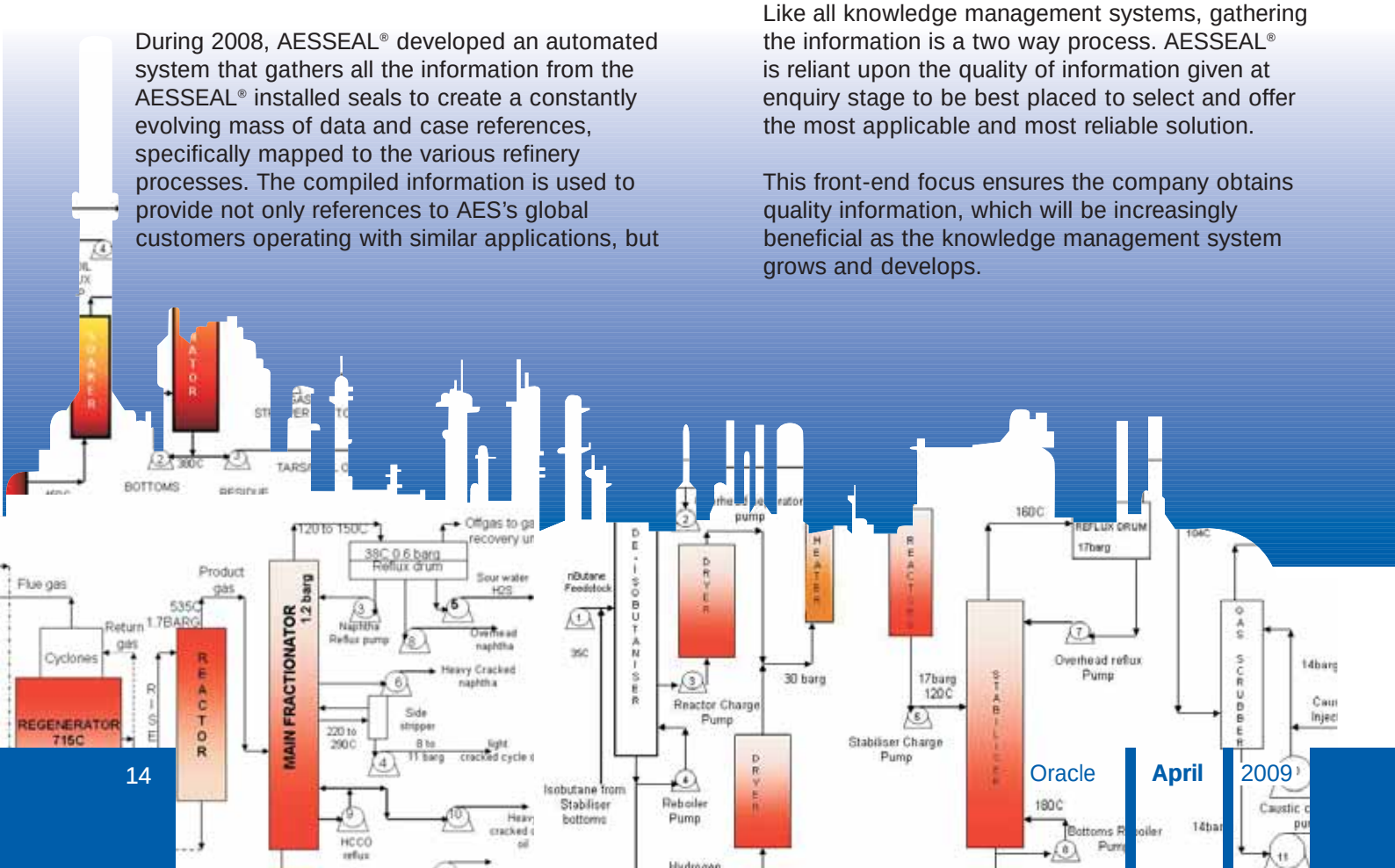
Knowledge Management System
which Maps Refinery processes

A typical semi complex refinery has about seven hundred pumps. Seal applications, however, vary significantly depending on the location of the refinery and its processes.

During 2008, AESSEAL® developed an automated system that gathers all the information from the AESSEAL® installed seals to create a constantly evolving mass of data and case references, specifically mapped to the various refinery processes. The compiled information is used to provide not only references to AES's global customers operating with similar applications, but also to the company's engineers who will then be able to offer consistent and approved solutions in seal selection.

Like all knowledge management systems, gathering the information is a two way process. AESSEAL® is reliant upon the quality of information given at enquiry stage to be best placed to select and offer the most applicable and most reliable solution.

This front-end focus ensures the company obtains quality information, which will be increasingly beneficial as the knowledge management system grows and develops.



Should bearing housings be cooled?

Heinz P. Bloch P.E.
Independent Professional Engineer

Many refinery applications deal with flammable fluids. Safety and reliability are of foremost importance in these services and this recognition led to the development of the well-known API Standard 610.

Although not a legally binding document, API-610 covers experience-based requirements and is of great importance in severe pump applications. API-style pumps are centerline-mounted (figure 1).

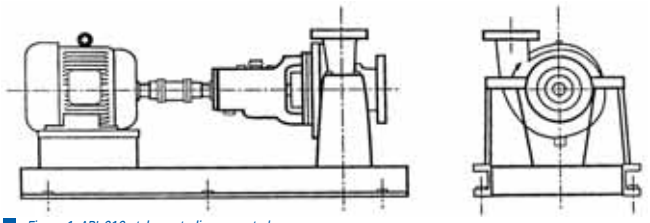


Figure 1: API-610 style centerline-mounted process pump

Yet, the oil-lubricated rolling element bearings in API-compliant pumps for even the severest services are rarely furnished with bearing cooling today. Examples would include pump applications such as “hot oil” (300°F/149°C to 850°F/399°C). Basic science will convince us that rolling element bearings will fare better without cooling (figure 2) and the underlying reasons are worth exploring. (Sleeve bearings are not covered by this rule and may continue to require oil cooling via coils).

But, first, it is acknowledged that hot services usually involve the following two critical pump conditions:

- High thermal expansion of pump components must be accommodated. The pump supports must maintain coupling alignment at these elevated temperatures. Therefore, casing centerline support, without a separate support of bearing housing, is normally used to address this problem.

- Clean oil is required. Whenever rolling element bearings are used, it should be pointed out that

  (a) rolling element bearings do not require cooling as long as a lubricant of sufficiently high viscosity is chosen (Refs. 1 through 3).
  (b) high film-strength synthetic lubricants are ideally suited for high-temperature pump bearings (Ref. 3)
  (c) since the early 1970s, many thousands of high temperature pumps have been in successful high MTBF services (often reaching 10-year bearing life) after all cooling water was removed from their oil sumps and/or from their respective cooling water jackets. Deletion of cooling water lowers the risk of causing deleterious moisture condensation (Refs. 2&3)
  (d) cooling water jackets that surround or are in close proximity to bearing outer rings, cool primarily the bearing outer ring, while the bearing inner ring remains at a lesser temperature. This causes bearing-internal clearances to vanish and the bearing will experience excessive preload. Bearings surrounded by cooling water jackets are almost certain to fail prematurely and must not be allowed (Ref. 2).

The American Petroleum Institute (API-610) contains the collective judgment of pump users and pump manufacturers. While this standard has established minimum specifications and design features required for centrifugal pumps in general refinery service, it rarely discusses trade-offs and upgrade features of interest to leading edge pump reliability professionals. This is why Corporate Standards and supplemental specifications are often found necessary. In the case of one multi-national Oil and Gas Company, its standards and specifications have prohibited cooling water on bearing housings with rolling element bearings since the mid-1970s. It had earlier been established that cooling water tends to limit the life of bearings (Ref. 3). Moreover, maintenance costs were reduced after cooling water was deleted from pumps equipped with rolling element bearings.

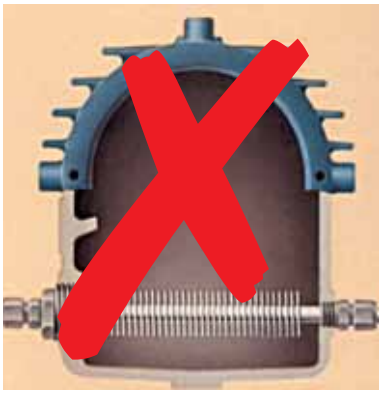


Figure 2: Typical pump bearing housing with cooling water coil. Because such cooling invites moisture condensation from the air floating above the oil, modern plants will not allow this type of cooling. They will simply use a properly selected synthetic lubricant and reduce contamination ingress by using an advanced bearing protector seal.

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