

# AIMM

January 2014 – Relation magazine of Stork

## ONE PARTNER FOR LIFE

Using BIG DATA on the way to condition based maintenance

When gas demand is high, the PEAKSHAVER is ready

Adding value through SAFE OPERATIONS

Customer response makes the difference on CURTIS ISLAND, Australia

Stork's Innovative Solutions with Composite Wrap and Radiographic Inspections

**STORK**

# Contents

6-7-8-9

BIG DATA: How can we make better use of data analysis for asset optimisation and asset integrity? We talk to prof.dr.ir. Leo van Dongen, professor of Maintenance Engineering at the University of Twente.



10-11

WHEN GAS DEMAND IS HIGH, GASUNIE'S PEAKSHAVER IS READY. Stork has been working here since the beginning of 2013 as main contractor for both project-based and daytoday maintenance.

20-21

SEATOOTH, An innovative solution to an age old problem



23

THE IMPROVEMENT TOOLBOX. The ITB enables change and improvement, both in ourselves and in the organisation, so we can meet our customers' needs and values.

4

ARNOLD STEENBAKKER, CEO Stork: "We believe that creating a win-win environment is achieved by working closely together with our clients; one partner for life"



14-15

CHALLENGES ON CURTIS ISLAND: The APLNG Project on Curtis Island off the coast of North-East Australia, as well as on the mainland. The specific challenges of providing services at multiple, widely separated locations.

16-17

NEWS from the world of Stork



18-19

INNOVATIVE SOLUTIONS. Development programmes, innovations and technology enable Stork to constantly extend and optimise its range of products and services. Composite Wrap is a good example of how that works in practice.

5

"GLOBAL EXPERTISE THROUGH REGIONAL KNOWLEDGE". A Colombian delegation from Ecopetrol and Equión visits the GLT-PLUS Project in the Netherlands. Gas production in the province of Groningen makes such a strong impression that Stork MASA gets the order to do the same for the Equión Energía project in Colombia.



12-13

ADDED VALUE THROUGH EXCELLENT SAFETY PERFORMANCE. Thanks to the focus on safety through our REACH programme, the Stork team on BP's Mad Dog platform in the Gulf of Mexico have already worked more than 34,000 man-hours without any safety incidents.



22

REDUCING DOWNTIME by fabricating and testing modules for use off the Shetland Isles (UK) in Kuwait. How Stork's radiographic specialists avoided production delays at Sullom Voe using the innovative SafeRad technology.

# ONE PARTNER FOR LIFE

Arnold Steenbakker, CEO Stork Technical Services:  
"We believe that creating a win-win environment is achieved by working closely together".

I am pleased to present to you the first edition of AIM 2014.

The theme that we have chosen for this issue is 'ONE Partner for Life'. Stork believes that creating a win-win environment is achieved by working closely together. In this issue of AIM we present you examples where partnering with our customers creates value; eg in Colombia we introduced a new way of working contributing to the asset reliability and in the Netherlands we work in an alliance with multi-disciplinary teams to increase the efficiency.

I am proud to say we serve brands such as Shell, BP, Ecopetrol, Talisman, Sabic, CB&I and BG. During my first half year at Stork I have had the pleasure to meet with several of our customers who shared their appreciation for the value and dedication our employees add to their business. It also became apparent that our customers, large or small, work according to the highest standards and expect the same from their business partners, making this Stork's number one priority.

We have secured substantial work around the globe, from existing and new customers. This work allows us to transfer knowledge, to develop innovations and to create a solid base for further expansion. To continue this improvement process and to

maintain our competitiveness in the market, we will continue to further optimise our way of working to keep up with the latest developments and respond to increasing market demands. This greatly benefits the work we do in our growth regions: Latin America, UK, Middle East and Australia.

Safety continues to be our number one priority. You will read about the activities and personal approach we are taking through the targeted safety REACH campaigns. We are on course with our goal of a 5% year-on-year improvement on lost time and recordable frequency rates.

Our strong market position, developed on a solid customer base, reputation and track record in HSSE and our drive to respond to market developments are critical components to continue to build Stork as a tier one maintenance provider.

I look forward to continue to work with our clients and all Stork employees on current and future projects.

**Arnold Steenbakker**  
CEO, Stork Technical Services

We are proud to present to you the updated Stork logo. This new logo represents the Stork business being a maintenance partner for the oil and gas industry. The new logo will reflect the independency from Fokker which has been established since the separation Stork Technical Services and Fokker Technologies last year. We will roll-out this powerful new Stork logo as of 2014.



## Equión and Ecopetrol in Colombia choose Stork

# GLOBAL EXPERTISE WITH REGIONAL ROOTS



**Stork Technical Services has significantly strengthened its position on the South American market. It recently started work on a five-year contract with Equión Energía, a joint venture between Ecopetrol and Talisman, which produces 100,000 barrels of oil and 10 million m<sup>3</sup> of gas per day. As main contractor Stork is responsible for maintenance, running the energy plants and some operational aspects – in particular compressors – at a number of oilfields in Casanare, Colombia.**

### Quick wins

Equión and Ecopetrol chose Stork MASA because of its local knowledge in combination with Stork's global asset integrity expertise.

A visit to the GLT Plus site in Groningen, the centre of natural gas production in the Netherlands, proved to be decisive. Equión was impressed by the innovative way in which this gasfield is operated and maintained, and found Stork the right partner to help it improve efficiency of the plants, minimise costs and raise safety standards. The main focus in introducing this new working approach is on asset reliability and rolling out Stork's industry-leading LISTO (REACH) safety programme. Stork is also implementing long-term planning methods to enable it to do more with fewer personnel. These spearheads are scheduled to be achieved by end-2013.

Stork is responsible for asset management, which as well as the regular plant maintenance also includes availability and reliability. Techniques like reliability engineering and analysis of production losses and failures form the basis for proposals to improve the maintenance processes and plant performance. The ultimate goal is to optimise asset availability and the productivity of the Equión plants.

### Benefits for the local community

The majority of the 350-strong personnel have been recruited from the local community – a prime consideration for both Stork and Equión and Ecopetrol is that the community must clearly benefit from the joint activities. Not only in the form of employment and the local economy, but equally in terms of knowledge transfer through the close collaboration and learning from Stork's international professionals.



prof.dr.ir. Leo van Dongen

**B**y following Twitter you can already 'see' who's going to win an election. Google knows exactly what we're looking for, and can even predict how a flu virus will spread based on search results. Supermarkets and webshops, too, benefit from the predictive value of patterns in people's behaviour. That means the data is there for the taking, and the techniques for doing that are already operational. So why does the process industry make so little use of 'big data'? Why is preventive maintenance still standard practice? And why is action still taken either too often or too late? In other words, how can we make better use of data mining for asset optimisation and integrity management? AIM asked prof.dr.ir. Leo van Dongen, professor of Maintenance Engineering at the University of Twente and director of NedTrain, the maintenance organisation of NS, the Dutch Railways.

## BREAKTHROUGHS WITH 'BIG DATA'

# Using data mining on the way to Condition Based Maintenance

## Concrete results

NedTrain has already found out exactly what benefits Condition Based Maintenance can deliver. In a pilot study, the technical status of a number of trains was monitored in real time using data from onboard sensors. By better prediction of the right maintenance times and needs, and as a result better planning of the maintenance process, unplanned downtime was cut by 12% and the repair times for two common fault types were reduced by as much as 35%. As well as these concrete results, the pilot also produced a number of valuable learning points. The first is focus: to start with, we should aim for gains in the most critical systems. For NedTrain, avoiding unplanned downtime is a key priority.

## Watch out for overkill

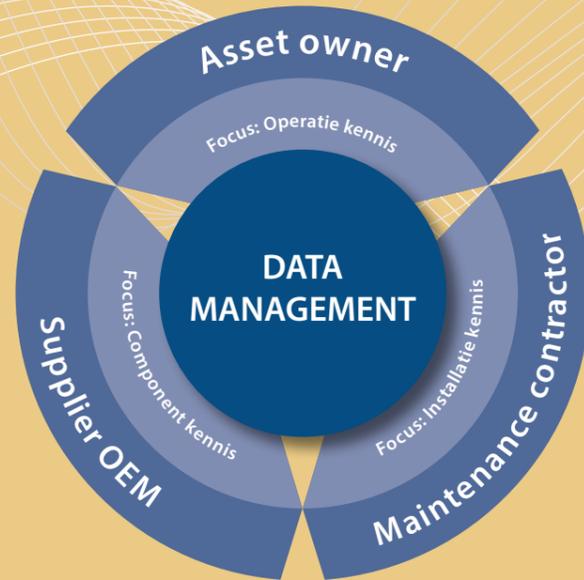
Especially when you're using big data, it's important to keep things simple and clear,

according to Van Dongen: "You have to improve step-by-step. Don't confuse the organisation with more ideas than they can handle, and make sure your action plans are in line with operational reality. In our case, that means you have to know what your workshop can do and you have to keep that in mind. The knowledge is in the data, but it's also in people. That's why we use integrated rolling stock teams, in which our engineers and asset managers work together with the people who have to get the job done on the shop floor. Which means you need people who can think in practical terms, and who can work with the statisticians in business intelligence to carry out the right analyses and make the right choices. But that's also a process of trial and error. So you have to expect some mistakes along the way. As a company you have to accept that, and be prepared to make the right capacities and skills available when they're needed."

#### Dynamic maintenance planning

Of course you have to be prepared for the impact that will have on your organisation. "For example all our technicians have an iPad for rapid access to the data they need. And it's a big challenge to get the underlying logistics processes up to speed. We already have the system for dynamic maintenance planning, so now we also need to carry it out dynamically." In concrete terms, NedTrain intends to set up a number of strategically located technical centres that will be ready for Condition Based Maintenance. Also vital is the willingness to share data, both inside and outside our own organisation. Van Dongen gives a good example of what that means in practice. After extensive downtime caused by flat spots on wheels, it was decided to monitor the wheels using Gotcha, a system developed by ProRail, the government organisation responsible for the rail network infrastructure. This system now measures the status of each axle, so corrective action can be taken with the right degree of urgency on the

*"As a company you have to be prepared to make the right capacities and skill available when they're needed."*



wheelsets that need it, and not on those that don't. This process avoids unnecessary downtime of rolling stock.

#### Sharing of data and interests

Big data can often be found in data held by third parties, especially when the purchase of new equipment is involved. It's often preferred not to share that information for reasons of competition, Van Dongen points out. Which is why he warmly advocates the Rhineland model, involving open and transparent collaboration with suppliers. In the most recent tenders for new trains, his system engineers have direct contact with the manufacturer's technical staff. He regards this as an extremely positive development. "It means, for example, that maintainability can also be taken into account in the solution, and forms part of the overall negotiations." He believes this principle should be followed much more often. "The challenge is to work together with respect for each other's expertise, efforts and interests, and always to put the performance of the equipment first. That may mean slightly higher costs in the tender stage, but that will be well worth while in terms of the total life-cycle costs because you get a better product and a better maintenance process. The big question is who's going to take that role as the 'vital link'."

In the coming years Van Dongen sees plenty of opportunities to make maintenance more dynamic: "By using data mining we'll be able to make big improvements in the availability and reliability of critical assets."



Paul Casteleijn

## BIG DATA Condition Based Maintenance in the world of Stork

At Stork we're convinced that big data offers tremendous opportunities to further improve the availability of assets and to reduce the total life-cycle costs. That requires intensive cooperation with asset owners and manufacturers. Which is why we're participating in CAMPI (Coordinated Advanced Maintenance and Logistics planning for the Process Industries), a project run by Dinalog, the Dutch Institute for Advanced Logistics. In a consortium of eight companies, the universities of Eindhoven, Groningen and Tilburg and the Dutch Institute World Class Maintenance, we're researching the pros and cons of Condition Based Maintenance and its impact on logistics. Key themes are the benefits of data sharing within and between companies, and minimising stops by clustering the maintenance activities.

Mathon Erps, Knowledge Manager at Stork, emphasises the importance of the interaction between science and industry: "It's all about how you can combine production, engineering and maintenance data to optimise your asset performance. There's a clear need in practice for new maintenance strategies, because companies use their assets much more dynamically than in the past. With gas turbines we sometimes see as many as twenty starts per month, instead of just a few per year. Then you're obviously going to find different fault patterns." In Erps' view, data mining can help to define the right asset strategy. He refers to the urgent problem of assets: "A lot of process equipment is approaching end-of-life. But the question of course – especially in today's economic conditions – is where exactly is the limit? That's also important for safety reasons. It's a big help if you can take well founded decisions about

maintenance and investments, on the basis of concrete data about the integrity of your assets." He believes the CAMPI project is in many ways innovative, especially because hardly any research has been done on the benefits of combining data and shared maintenance planning.

Paul Casteleijn, Principal Consultant at Stork and also involved in the World Class Maintenance and CAMPI research projects, says Groningen Long Term is the proverbial exception that proves the rule. At the Groningen Support Centre, Stork has for years been working as construction and maintenance contractor in a single team with Jacobs Engineering and the OEMs Siemens and Yokogawa, together with NAM, the asset owner and operator of the gas production clusters. "The main reason why we do that is so we can use the huge amounts of information generated by numerous sensors since the renovation of the twenty clusters."

*"Using statistical methods, we've translated failure patterns into predictable models for process-critical installations, so we can take planned action in time to prevent unplanned stops. That saves an average of 28 days of production per year."*

It's a good example of co-creation, according to Casteleijn: "What's also unique is that we've really developed the present installations together. You can only do that if you exchange data openly. Which is something that we at Stork are also ready to do in other projects."

# When gas demand is high, the Peakshaver is ready

Gasunie's Peakshaver is used to safeguard energy supplies to the West of the Netherlands. This LNG plant ensures that ample gas supplies are available when needed, especially at peak times when demand for energy is extra high.

The Peakshaver is put on standby when the effective daily temperature in De Bilt – where the Royal Dutch Meteorological Institute (KNMI) is based – falls to -2°C or lower.



*On the Maasvlakte industrial area in the Port of Rotterdam is the Peakshaver owned by Gasunie, the Dutch natural gas infrastructure and transportation company. This LNG plant has a capacity of 1.25 million m<sup>3</sup> per hour, and serves as a buffer for the natural gas grid.*

*The Peakshaver is vitally important for Dutch natural gas supplies and for the country's economy as a whole. Stork Technical Services has been working here since the beginning of 2013 as main contractor for both projectbased and day-to-day maintenance. We discuss how that works in practice with Peter Göttker, coordinator of mechanical and civil works at Gasunie, and Nikki Schutte, who coordinates the on-site works for Stork.*

#### *Fast response*

Everything here is focused on being available on standby when the weather turns cold. The storage tanks are full from 1 November so the plant is ready to supply gas when it's needed to meet peak demand and if the pressure drops in the gas grid. That's why major maintenance projects are always scheduled for spring and summer. This limited period means there's a varying need for technical personnel, which was an important reason for Gasunie to increase the flexibility in its maintenance capacity. "Stork works closely together with our own maintenance teams, and is ready to act when necessary", explains Peter Göttker. "Not only on mechanical works, piping and E&I, but also for cleaning and civil works." That goes without saying, according to Nikki Schutte, because the aim is to proactively take care of any possible problems for Gasunie. "We act as main contractor, and where necessary we bring in outside specialists. The big advantage is that we know the plant, the applicable regulations and – not least – each other." Nikki is based permanently on the Peakshaver location. Göttker is pleased with the resulting direct lines of communication. "She's our constant point of contact, with a fixed core team of specialists,

which enables us to act quickly when necessary. We can respond much faster and more effectively because of the fixed agreements we've made. That was the reason why we first set up this system."

#### *Innovative solutions*

Stork's multidisciplinary strengths are also valuable in the projects. "We recently replaced a number of drainage pumps and carried out some overhaul works on the tanks", says Göttker.

*"When they have 40 or 50 maintenance people working here on-site, you can see that shutdowns like this are everyday business for Stork."*

"As well as that, they think along with you on how best to approach projects, how to work in a smarter way, and how to cause as little disturbance as possible to our operations. For example today we're laying a number of new power cables, using Stork's offshore rope access expertise. Before that, we always had to build full scaffolding for a job like that. This new working method really does save us a lot of time and money."

#### *Excellent basis*

Operations and Stork make a good team, in Göttker's view. Although as far as he's concerned it's still a pilot, he's sure it will form the basis for a long-term partnership. "As the trust grows, we can work together on optimising our asset integrity. And we don't just measure the benefits of working together in terms of money alone. Performance and safety are just as important. We're talking here about a location with a high risk profile." He appreciates Stork's high level of involvement, and its sense of responsibility for the overall operation. "We'd both like to see even better use being made of this added value by already involving Stork in the preparation and project planning stage. That's what we're going to work on next."

The Peakshaver is very important for energy supplies in the West of the Netherlands. Especially in cold periods, the plant makes sure businesses, industry, institutes and families have sufficient gas supplies, even at times of high peak demand. "We're working together here on a responsible task", says Göttker. "There's no sustainable future without a stable backbone, and the Peakshaver makes an important contribution to that".

# ADDING VALUE THROUGH SAFE OPERATIONS

AIM January 2014

AIM January 2014

Stork strives to add value for clients by focusing on a safe working environment, on every project. From Aberdeen to Azerbaijan, and Continental Europe to Colombia, we have partnered with operators for many years to deliver our integrated services with an unrivalled focus on safety.

This approach has helped Stork's BP Mag Dog team to work more than 34,000 manhours this year with '0' lost time incidents.

### Scope of work

In the Gulf of Mexico, USA, Stork has worked on BP's deepwater Mad Dog asset since commissioning in 2005, and now delivers key projects on all four assets - Mad Dog, Atlantis, Nakika and Thunderhorse. The scope of Stork's work has evolved from mechanical and construction support to a wide range of maintenance and integrity services including :

- ▶ Conventional and specialist non-destructive testing
- ▶ Fabric maintenance coating applications and repairs
- ▶ Process piping installation and demolitions
- ▶ Lifting and rigging solutions
- ▶ Electrical & utility installations
- ▶ Bolting Services
- ▶ Confined space entry management and rescue services
- ▶ In-service Inspections

### Focus on safety

Delivering and maintaining a safe work approach is critical and requires the focus of all involved in the planning and execution of workscopes. The entire Stork team across the BP assets take an active involvement in ensuring safety is a priority by:

- ▶ Ensuring safety bulletins are posted throughout living quarters and other social areas. These are derived from REACH safety campaigns.
- ▶ Hosting weekly town hall meetings for the whole platform, to clients and other contractors.
- ▶ Participating in safety meetings for the entire platform.
- ▶ At the end of each shift, the Stork supervisors do a Lessons Learned regarding all activities completed by the company that day.
- ▶ Utilising the REACH safety tools including LMRA, rescue plans, toolbox talks and safety campaigns.
- ▶ Members of our Stork team have joined the platform's safety committee team.

### Case study - Safe operational delivery

Stork recently provided a multi-disciplined rope access qualified team to perform at height conventional non-destructive testing utilising Ultrasonic Thickness and Shearwave inspections onboard Mad Dog for the Rig Replacement project involving a significant platform upgrade. This work was successfully and safely executed over the course of several months and led to the award of additional workscopes including rigging and lifting, inspection and verification of material quality and dimensional inspections, access solutions including scaffolding on the same project.

The scopes utilised rope access as the primary means of safe access and egress but now included rigging and lifting operations from the routine to non-routine and critical lifts. Stork managed each step of the project developing task specific risk assessments as well as managing the non-routine and critical lifts with detailed lift plans ensuring each step was conducted utilising equipment that were certified and fit for purpose, and personnel competent to conduct the tasks.

The award of these additional tasks provided Stork with the opportunity to further demonstrate its high regard for safety which the company bring to the worksite. These projects were again successfully executed with no incidents or harm to the wider environment. This led to the client providing order uplifts to maintain a full time multi-disciplined rope access team to support the ongoing construction and upgrade project.



"I am proud of the work that our guys are doing. This team has built a strong relationship with the client and truly contributes to the safety of the entire platform. In addition to our safety culture, they provide an array of quality maintenance solutions to our client. They are setting the standard for safety here at Stork and in the Gulf of Mexico".

Martha Sandia, Vice President North-America & Caribbean

"Our team has done an excellent job of utilising both REACH and BP's safety programme to ensure that a service is delivered with the utmost attention to safety and quality. At Stork, we say 'safety is our number 1 priority' and we live and breathe this in the Gulf of Mexico"

Javier Sepulveda, Supervisor for Stork



For more information visit the REACH website: [www.reachsafety.com](http://www.reachsafety.com)





### Proactive approach wins prospects and recruits

Stork Technical Services is contributing to the Australia Pacific LNG project by providing services on Curtis Island – off the coast of Queensland in North-East Australia – as well as on the mainland. Working at a number of widely separated locations brings with it some specific challenges as Gary Lloyd, Stork’s Operations Manager for Eastern Australia, explains.

# Customer response makes the difference

“Unlike other projects which usually have just one working location, APLNG is spread across seven different sites up to 100 km apart in Eastern Australia. That means we have to provide a remote site office and technical facilities at most of the locations. At present we’re still in the construction phase which will last up to another two to three years. Work on these sites is now ramping-up, in the coming year there will be dozens of new Stork employees added monthly.

#### Good reputation helps recruitment

There’s a lot of demand for skilled people in the heat treatment and NDT fields. Fortunately Stork has a good reputation in the Australian oil & gas industry, so people have heard of us and know we’re a good company to work for. It’s also important to retain people once we’ve recruited them, because of course all our competitors are trying to hire from the same basic pool of people. Our experience is we can retain around 80 to 90% of all new recruits, which means they regard Stork as their preferred employer.”

*“We can provide the full range of services from a single source with a single point of contact and responsibility. That makes project management much easier and more cost-effective for the customer.”*

APLNG focuses on producing Coal Seam Gas (CSG) from coal deposits located typically between 200 and 1,000 metres underground. After extraction, the gas is liquefied for ease of transport and shipped to users – power stations, industry and consumers – elsewhere in Australia and around the world. The APLNG project is currently Australia’s largest producer of CSG. As well as creating value through gas revenues, the project will also bring around 10,000 jobs to the Queensland region.

The main services provided by Stork on this project are heat treatment and non-destructive testing (NDT) to ensure reliability of the assets concerned. The main contractors for which Stork is working are the

engineering, construction and project management company Bechtel on the LNG trains and pipelines, and the energy infrastructure company CB&I for the LNG storage tanks.

#### Customer-focused approach

Winning these contracts underlines the value of Stork’s responsive, customer-focused approach. “Obviously price is an important factor”, says Gary Lloyd, “but that doesn’t mean the lowest bid always gets the work. Past experience and personal contacts make a big contribution, and that’s where we score at Stork.”

*“We’ve proved that we listen to our clients carefully and respond fast and flexibly to their needs, with the ability to adapt quickly when necessary. That’s vital when you’re working at remote locations, where you can’t just bring in extra people and equipment at a few hours’ notice whenever they’re needed.”*

#### Full range of maintenance services

Looking further ahead, as the construction phase is completed the various locations will gradually shift to long-term maintenance. There the emphasis will be on maintaining asset performance and integrity, so production can continue with the absolute minimum of interruptions. That will bring a lot of new opportunities for Stork, Gary points out.

“By then the customer will have a good idea of what we can do based on our track record during the construction phase. One of the big advantages that we can offer then is our ability to provide the full range of maintenance services, all from a single source with a single point of contact and responsibility. And where our competitors in many cases have to bring in specialists from outside, we have all those services available virtually immediately in-house. That saves a lot of time and trouble, and makes project management much easier and more cost-effective for the customer.”





### REACH ANNUAL SAFETY AWARDS

Celebrating outstanding performance throughout the year. This year's winners were announced at a formal awards dinner, attended by shortlisted candidates, colleagues, industry peers and clients.

The winners of the six categories were...

- **Safety leadership:** John O'Donnell, Services Focal Point - UK
- **Most promising individual:** Mansour Alrahmany, Engineer - Saudi Arabia
- **Best Safety Performance:** Cerrejón Welding Contract Team - Colombia
- **Incident Prevention:** George Hernandez, Foreman - USA
- **Best Team of the Year:** GLT+ Maintenance Team - The Netherlands
- **Safety innovation:** Scaffold Design Team - UK, for the Inertia Reel Anchor

## ExxonMobil

### EXXONMOBIL'S A-AWARD FOR STORK TURBO SERVICES

On September 16th the ExxonMobil A-Award ceremony took place. The ceremony was organised to award contractors for excellent performance on safety and execution. Stork Turbo Services made a significant contribution to the latest 2013 turnaround at the ExxonMobil Botlek location. ExxonMobil was looking for a partner who was able to cover the complete technical spectrum: Steam Turbine, Turbo Compressors, Turbo Machinery Controls, Pumps, Blowers or Auxiliary Systems. Stork revised several turbines during

the turnaround. As part of the plant drive train the turbines are an essential part of the entire production process. The turbine revision project was crucial for the client. Without turbines it is impossible to produce. Stork's pro-active safety attitude was noticed by ExxonMobil. During the turnaround no safety incidents occurred. Both the preparation and execution phases of the turbine revision project were outstanding. Because of this the Stork team was awarded with the A-Award.



### BOLT TENSIONING CONTRACT WITH TECHNIP UK LTD.

The new three year contract, with two one-year extension options, will see Stork continuing to provide Subsea Bolt Tensioning to Technip UK Ltd.

Fraser Coull, Operations Support Director for Stork Technical Services, said: "Working with Technip UK Ltd, our Subsea Bolting Tensioning services will help ensure the safe and cost-effective operations of its UK Business Units". Coull continued: "We have heavily invested in state-of-the-art equipment and are developing tailored training solutions for divers and support personnel on bolted joint integrity. We are delighted that Technip has chosen to continue the strong relationship we have developed with them over the last 5 years.

Stork has delivered a consistently high standard of service and looks forward to building on this in the future".



### MAINTENANCE CONTRACT DUTCH STREETCAR COMPANY

The project for HTM (Public Tram Transport Company in The Hague, Holland) consists of the revision of 56 trams (type Alstom Regio Citadis. This is a long-term project involving multiple business lines from Stork, including Rotating Equipment and E-machinery. The contract includes the overhaul of 112 motor bogies and 112 trailer bogies of the companies' tram wagons. (A bogie is one of the wheel carriages underneath the tram)



### CB&I: CARTAGENA REFINERY EXPANSION PROJECT

Stork MASA in a consortium with KENTZ and GMP has won in Colombia one of the most important projects for Electrical and Instrumentation Installation with CB&I in the area known as 'Block B at the Cartagena Refinery Expansion Project.

Stork MASA has a lot of experience in Colombia doing similar projects and knows all details about this kind of operations (among others; personnel and communities management, local suppliers. Kents wanted an ally with all the local knowledge that they don't have because this is the first contract they execute in this country and they want to expand their business. They found in Stork- MASA their perfect partner.

### STORK@EVENTS

Stork has showcased its integrated integrity service offerings and industry-leading technologies on many events.

Offshore Europe is still one of the world's premier events for the Oil & Gas industry. This year saw another successful exhibition with 63,000 people attending the four-day show from around the globe. Stork had a very strong presence at the show. All our objectives; lead generation, customer retention, brand strengthening and showcasing some of our innovations such as the Hot Bolt Clamp and our Composite Wrap Solutions were achieved.

In November Stork was present at the ADIPEC exhibition in Abu Dhabi (UAE). We demonstrated multi-award winning innovations, whilst showcasing new technologies and providing live demonstrations such as the Snap Ring Joint; which is a

response to the industry concerns about welding in an environment where the source of ignition is a hazard and the need for light and strong pipe connections with a small footprint.



## STORK DELIVERS ON ITS AMBITIONS: MULTIPLE MAINTENANCE ORDERS IN OIL & GAS GROWTH REGIONS

*By winning multiple new orders Stork Technical Services is showing the success of its strategic focus on the oil & gas industry. Stork has won major new projects from both new and existing customers, especially in its strategic growth regions of Latin America, the UK, the Middle East and Australia. Stork's order book continues to grow in the oil & gas industry, in which it operates globally. On the publication of its latest figures Stork announced that it would strengthen its focus on the oil & gas growth regions, with the aim of generating sustained turnover growth. By winning a number of new orders for both maintenance and new building projects in these regions, Stork is confirming that it has made the right strategic choice.*

In Latin America, in major projects for CB&I, Equión and Ecopetrol, Stork is working on Operations and Maintenance contracts. Most of these projects have a contract duration of several years, generating revenues of several hundred million euro.

A number of orders have been gained in Australia, including an order from Bechtel for the 'Australia Pacific LNG Project'. Stork is already working as subcontractor on this project for CB&I.

In Continental Europe, Q8 has again awarded contracts for E&I and Automation works to Stork Belgium for its new lubricating oil production unit in the Port of Antwerp. The

E&I division of Stork South Netherlands has received an order from Heerema Fabrication Group to provide E&I services for the Siemens Helwin-2 HVDC platform in the North Sea. The contract value of both these projects is around 20 million euro.

In the UK, Stork has secured a number of contracts with major international Operators, amounting to over 45 million euro. A range of worksopes are being delivered from Mechanical, HVACR, Integrity solutions to Fabric Maintenance. Some of these contracts will provide clients with a standalone service whilst others will deliver an integrated offering; utilising many of Stork's in-house capabilities

# Stork has indeed got it wrapped!

*At Stork we are committed to continually developing our products and services through innovation and technology. With development programmes and strong relationships with key suppliers, Stork's innovations improve the health, safety and performance of the company, its operatives and client operations.*

In September, Stork officially launched a range of composite wrap solutions designed to support and facilitate asset life-extension programmes. Stork's composite wrap solutions are specifically designed to provide flexible, efficient and cost-effective repairs to piping and infrastructure components. Stork AquaWrap and Stork PowerSleeve can also be used to restore structures and vessels from internal and external wall loss.

• **Stork AquaWrap** – a high-strength composite system used to halt and encapsulate external corrosion and restore structural integrity in wet or underwater conditions. It is made in varying lengths and widths to accommodate all pipe sizes and wall thicknesses. It is non-toxic, easy to apply and is suitable for a variety of pipeline applications.

• **Stork PowerSleeve** – a field-applied composite system that consists of fibreglass fabric and high-performance epoxy, which results in a powerful piping reinforcement product. The innovative composite solution is effective in a variety of applications including leak repair, piping encapsulation, complex curved and irregular surfaces above and below the waterline.

Please visit [www.stork.com/wrap](http://www.stork.com/wrap) for more information on Stork's Composite Wrap solutions.



## COMPOSITE WRAP Value added benefits:

- No downtime
- Non-intrusion
- Cost effective
- No hot work
- Faster than fabrication
- Wide temperature range
- Seamless repairs any length
- Less labour
- Non-hazardous
- Time saving
- Non-conductive
- Corrosion resistant
- Environmentally friendly
- Compatible with all piping
- Conformable
- Extensively tested
- No depressurisation
- Lightweight
- Chemical resistant
- Reduces need for skilled trades
- Bespoke solution

# An innovative solution to an age old problem

*As many offshore installations in the North Sea and further afield are reaching the end of their intended design life, but still capable of production, operators are spending significant capital expenditure to assure the integrity of their assets and extend their lifespan.*

*This along with other industry challenges outlined in the 2013 Oil & Gas UK annual report highlights that since 2011, production has fallen by almost 30% and last year alone, assets were on average operating at 60% production efficiency compared with around 80% just 7 years ago. Decreasing productivity, increased hydrocarbon releases combined with production costs rising 4-fold over the decade, is causing many operators difficulties.*

## BENEFITS OF SEATOOTH CP'S UNDERWATER TECHNOLOGY

*Lower commissioning, repair and maintenance costs by:-*

- operating more efficiently, reducing wasted man hours in early replacement and/or retrofit of sacrificial systems;
- providing improved data management leading to more efficient inspection and repair campaigns;
- providing warnings of potential failures will be easier to manage leading to fewer incidents as well as reducing the environmental impact of operations;
- reducing the number of subsea incidents such as leaks and spills (corrosion was recently cited as the likely cause of in an incident in the North Sea; leading to €millions in remediation costs, project delays and production lost);
- providing critical data to allow the life of subsea systems to be extended. Which will have direct cost benefits to companies operating in the North Sea and worldwide;
- analysing against long term, operational, infrastructure changes or environmentally variable issues.

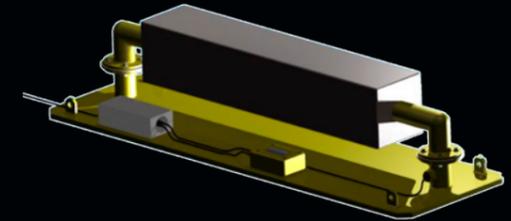
*Integrity management of ageing assets is crucial to provide operators with the assurance that their assets can operate safely and efficiently at all times.*

Where exposed to salt water, whether immersed in seawater or buried, steel structures are typically coated to protect them from corrosion. These coatings often breakdown over time, be damaged during installation or service and in many instances, it may not be possible to reach all areas requiring protection. Additional measures need to be put in place to ensure integrity and protection from corrosion, such as a cathodic protection (CP) system.

### Cathodic protection

The principle of CP was first described by Sir Humphrey Davy in 1824 with the aim of polarising a structure as quickly as possible to maintain its optimum protection. Today's CP systems have been developed to a point where they can protect any type of steel based structure, and are of particular importance to the offshore energy industry to support the integrity of installations, pipelines or vessels.

Two types of CP systems are commonly used to stop or prevent corrosion to structures; a sacrificial anode based system and an impressed current (ICCP) system. A significant benefit of using a sacrificial system is that once fitted it requires little to no maintenance, while ICCP systems are extremely effective on vessels or for onshore applications.



A sacrificial anode based CP system, does not eliminate corrosion but controls where it occurs. By electrically connecting an aluminium-based anode to steel in seawater, a galvanic cell is created and the corrosion occurs at the anode instead of the cathode (steel), where the corrosion does not damage the steel structure.

The benefits of utilising a CP system, usually in conjunction with coatings, is that it maintains the integrity of the immersed or buried structure and protects against the natural occurrence of all forms of corrosion leading to a reduction in damage to assets, unnecessary maintenance and/or shutdowns.

### Seatooth® CP

Earlier this year Seatooth® CP, an industry first innovative wireless communication CP monitoring system was introduced. Stepping away from the traditional method of data collection for passive measuring of data through a remotely operated vehicle (ROV) or diver, this technology allows each monitoring point (node) to collect many years' of data rather than a single reading during every inspection cycle.

In conjunction with WFS Technologies, a global organisation which delivers underwater wireless instrumentation and control solutions to the Offshore Oil & Gas and Renewables industries; Seatooth® CP has undergone rigorous research and development by both organisations. No other technology currently offers this capability or the potential to gather data wirelessly in real time and therefore Seatooth® CP signals a significant advance in asset integrity management.

With the ageing infrastructure of assets and maximising production across the globe maintaining asset integrity is an issue which the oil and gas industry must tackle proactively. Stork have many innovative solutions available to enable assets to continue to operate in a safe environment whilst reducing cost and risk, which can benefit the industry's growing concern to an age old problem.

# Innovative inspections in Kuwait for Shetland Isles

Oilfield service company Petrofac called on Stork's radiography specialists to cut delays and downtime by speeding the delivery of modules fabricated in Kuwait. The extensive radiography works threatened to increase production time and affect productivity in development of the Laggan Tormore gas processing plant at Sullom Voe on the Shetland Isles (UK).

Stork solved the problem with the innovative SafeRad technology.

SafeRad (Small Area For Exposure Radiography) allows simultaneous operation of multiple units in a restricted area without the need for extensive evacuation. Normally, all personnel in the wide surrounding area have to be evacuated to allow just two radiography technicians to work. With SafeRad, barriers are placed only 1 metre from the radioactive source so the works can be carried out safely without interrupting normal operations. That means work schedules can be maintained, avoiding downtime and associated loss of productivity.

### Positive surprise for the customer

The major challenge faced in the ABJ Yard in Kuwait, where the modules are fabricated, was to mobilise 12 SafeRad crews – requiring a total of 50 expats – in just 2 weeks' time. But the Kuwait operations had full regional support from Stork's Operations Director for Integrity Solutions & Services, Ashokan Neelakandan. "Talent wins games, but teamwork and intelligence win championships", says Ashokan. "We mobilised the radiography crews, arranged the RPD approvals together with the radiography source and darkroom, all within the required time – a positive surprise for the customer! And even though SafeRad is a bit more expensive than the conventional technology, the time savings and avoidance of downtime on-site more than made the difference!"



# The Improvement Toolbox

At Stork we combine 'Thinking and Doing'. Adding value to the performance of our clients and their assets. Above all, Stork is a company of people; with technical skilled experts who are working every day on technical solutions for our customers. But we also believe in change to improve!

Our drive for improvement inspired us to create The Improvement Toolbox (ITB). ITB helps us and our organisation to change, to improve, and satisfy our customer and their values. It helps us to lift Operational Excellence to a higher level. Our dedicated ITB team brings expertise and a complete method.

### WHAT DOES ITB OFFER

Improvement Toolbox (ITB) is a structured method, to define problems and solutions, implement standards and monitor and improve the performance of our services. ITB is a combination of the best of various improvement methods. All methods represent the added value we deliver to our customers. For example; Hands on Tool Time (HOTT), Hands on Paper (HOP), various Lean principles, Six Sigma, Change Acceleration Process (CAP) and many more.

Improvement Toolbox also provides a large database of Best Practice Solutions and standards, all operational and proven at our Stork locations.

The Improvement Toolbox is based upon 5 steps to identify and resolve the challenges that we encounter. It starts with the explore phase, where the main problem is determined. From which the focus areas are defined, the problem size and root causes are determined, to finally implement and monitor the chosen solution(s). (see scheme)

Bart Geurts, Business improvement Manager Zuid-Nederland: "We have

made major improvements on site of a large chemical company by improving their administrative processes and work preparation; For example 'Hands on Paper time' increased with 8% by a standardized work preparation process, working with fixed prices and a connection between the ERP system of the customer and Stork". Continues Improvement "Give a man a fish, you have fed him for today. Teach a man to fish, and you have fed him for a lifetime." Teach him to learn and he shouldn't eat fish all day.....

We do not believe in just us solving your problem, we believe in training

and involving the entire organisation, letting them experience how easy and fun it can be to improve. Guided by a dedicated and experienced ITB lead, functioning as the training wheels. Helping you to get your business in shape and ready for continues improvement in cooperation with Stork.

Do you want more info: Contact our business improvement managers: Bart Geurts (bart.geurts@stork.com) of Marten Schmidt (marten.schmidt@stork.com)

Phase	Steps	Results
Explore	<ul style="list-style-type: none"> <li>Assess playfield</li> <li>Charter Project and Team</li> <li>Go / No-go Decision</li> </ul>	<ul style="list-style-type: none"> <li>Feeling with Business &amp; Key Customers</li> <li>Identified main problem with ITB Local Team</li> <li>Agreement on main problem to resolve</li> </ul>
Focus	<ul style="list-style-type: none"> <li>Set Focus team</li> <li>Zoom-in</li> <li>Set baseline</li> </ul>	<ul style="list-style-type: none"> <li>Main Problem split in focus areas with focus teams</li> <li>Determine problems within focus areas</li> <li>Make the focus problem measurable and determine size</li> </ul>
Determine	<ul style="list-style-type: none"> <li>Analyze available data</li> <li>Find Root Cause</li> <li>Go / No-go Decision</li> </ul>	<ul style="list-style-type: none"> <li>feasibility of the target and set improvement gap</li> <li>knowing what causes the focus problem</li> <li>Agreement on the causes to address</li> </ul>
Implement	<ul style="list-style-type: none"> <li>Generate Solutions</li> <li>Select Solutions</li> <li>Execute Solutions</li> </ul>	<ul style="list-style-type: none"> <li>A lot of possible solutions gathered</li> <li>Evaluate the possible solutions and select the best</li> <li>Eliminate or minimize the selected causes</li> </ul>
Monitor	<ul style="list-style-type: none"> <li>Evaluate results and sustainability</li> <li>Handover to business</li> <li>After care</li> </ul>	<ul style="list-style-type: none"> <li>Check sufficiency and sustainability of the solution</li> <li>End of project, solution is now "Business as usual"</li> <li>Check on sustainment and follow up by business</li> </ul>



# YOUR INNOVATION PARTNER

STORK CONTINUALLY DEVELOPS AND IMPROVES ITS PRODUCT AND SERVICE OFFERINGS WITH NEW INNOVATIONS, PRODUCTS AND SOLUTIONS WHICH IMPROVES THE HEALTH, SAFETY AND PERFORMANCE OF YOUR COMPANY.

Stork has won several major industry awards for product innovations. Delivering significant bottom-line benefits for our customers, **Stork's Hot Bolt Clamp, Composite Wrap Solutions, Online Desanding, Specialist Caisson Inspection Services, Laser Cladding** and **Smart Nozzle Scanner** demonstrate our commitment to technology innovation and delivering our expert service offering in the most efficient and safe manner.



ASSET LIFECYCLE INTEGRITY PARTNER

STORK