

# AIM

STORK MAGAZINE 2018

## Celebrating 150 years of innovation and growth

Connecting from  
Australia to the Americas

Taking steps in renewables

Data drives efficiency

**STORK**

*A Fluor Company*

PLUS

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# CONNECTING, THE KEY TO SUCCESS!

Dear reader,

This year, Stork celebrates a significant milestone: 150 years ago the Stork brothers opened their new machine factory in Hengelo, the Netherlands. Stork boilers, steam machines and steam engines began finding their way around the world for a wide variety of applications. In addition to embracing new technology, the company also fostered a close relationship with its workforce understanding that a company is only as good as what its people deliver.

Such a milestone makes you reflect on where you came from - what was important, what is still important and what has changed. Reading the articles submitted by our colleagues from around the world, I am struck by the continued passion for finding solutions, increasing productivity, and of course applying technology. This has not changed, nor has our company's commitment to employee wellbeing. Safety is a core value (p.32). What has changed is the pace and how we go about delivering increased value to our clients. A facet which has become increasingly important is connecting. And so we asked Erica Dhawan, a leading authority on Connectional Intelligence to share insights on connectivity in large organizations (p.8).

A number of articles in this issue of AIM illustrate how we are connecting with clients and others, transforming from being primarily an equipment or services provider to collaborating for solutions. There is a deeper degree of sharing goals and capabilities - from integrated teams on Shell's Brent Bravo platform (p.16) to joint innovation and improvement workshops with Santos in Australia (p.15) and Friesland Campina's willingness to be a launching customer for CO<sub>2</sub> reducing technology (p.21).

Connectivity within Stork and with other Fluor companies is creating integrated custom solutions for our clients, such as at the five SunCoke Energy sites in the USA (p.12), applying first-of-a-kind techniques in Malaysia with the support of our UK expertise (p.14) and combining Fluor's design capability with Stork's local resources to address greenfield and brownfield scopes in Trinidad and Tobago.

Connectivity is fertile ground for innovation as well. We have embraced the renewables industry as a new sector, using skills and knowledge developed for oil and gas on bio-oil boiler installations, hydropower plants, geothermal stations (p.29) and to enhance food and feed production (p.31).



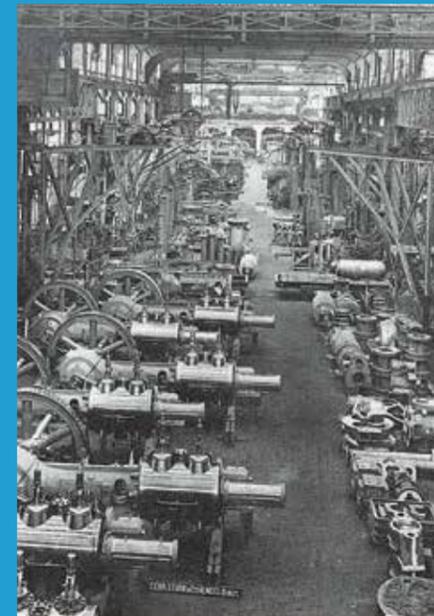
“ Delivering increased value to clients has always been part of Stork's DNA ”

Finally, enhancing data-driven decision-making allows for better collaboration, enabling quicker and better informed decisions. To help embed data in daily practice, we have adopted a life-cycle framework with six key aspects of digitalization (p. 22). As we continue to develop data capture and analysis, insights will not only boost efficiency, but also enhance the ability to perform asset specific predictive and preventative maintenance. This issue of AIM includes examples that are already applied in the field.

So, on this special anniversary, I am happy to note that much remains the same in our focus and beliefs. We are still solutions-driven, value people and embrace innovation. And I am excited about the future, as we connect even more to secure our clients' productivity goals at an even higher pace.

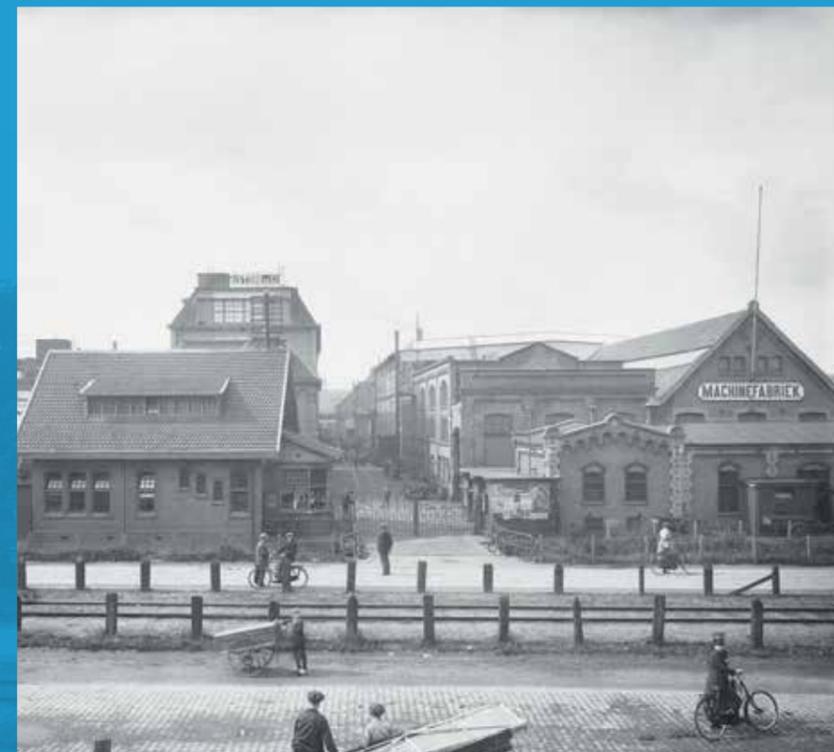
Enjoy reading, let's connect and stay safe.

**Taco de Haan,**  
President Stork



## STORK: 150 YEARS OF INNOVATION AND GROWTH

Exactly 150 years ago, Charles Theodorus Stork opened Stork's machine factory in Hengelo on 4 September 1868. Thanks to this important milestone, the city of Hengelo - and the entire Twente region in the east of the Netherlands - has grown into a thriving metal working hub. For Stork, 1868 marks the start of expansion into a worldwide organization.





Annual production report from 1928

#### HOW IT ALL BEGAN

In 1835, at only 13 years of age, Charles Stork had already started his career as an industrialist and entrepreneur under the business name 'Weefgoederenfabriek C.T. Stork & Co'. This led to the opening of an iron foundry annex machine workshop in 1859. Then, in 1865, Charles, his brother Jurriaan Engelbert Stork, and brother-in-law Hendrik Jan Ekker, founded Gebr. Stork & Co.

In 1868, Gebr. Stork & Co. opened a new machine factory in Hengelo. Located on the Twente Canal and equipped with a new railway line, this city offered an excellent logistical site for Stork and its larger factory hall.

#### FULL STEAM AHEAD

What began with repair work quickly grew into much more. Stork began constructing equipment to support the flourishing Twente textile industry, that adopted steam engines to power spinning and weaving machines. In the second half of the 19th century, Stork began looking for new markets, manufacturing steam boilers and steam machines for pumping stations (including the Woudagemaal in Friesland, the Netherlands, which is still in operation).

At the World Exhibition in Paris in 1878, Stork's horizontal compound steam engine was presented with an award, leading to additional international trade. The booming cane sugar industry offered a promising new market for Stork in countries such as Indonesia and Cuba. In 1918, Charles' descendants, Dirk and Coen Stork, were also involved in the founding of the 'Koninklijke Nederlandse Hoogovens en Staalfabrieken', now known as Tata Steel Europe.

#### THE TIES THAT BIND

For many years, Stork has been at the forefront of social policy and employee benefits. The ties between the company and its staff have always been very close. In 1881, Stork was one of the first companies in the Netherlands to set up a pension scheme for its employees. The personal contribution amounted to 3% of the total wages. At age 65, Stork employees were entitled to a pension that equaled 60% of their fixed wages. With the foundation of 'De Kern' – a forerunner of the current works council – in 1883, employees were able to benefit from an early form of employee participation. Investing in people began early. At this time, boys were able to follow courses at the Stork School. By 1900, 60% of the profits went directly to the worker's trust, which included benefits for the disabled, orphans and widows.

#### HOME IS WHERE THE HEART IS

Charles Stork also believed that his employees had the right to adequate housing, and growing industry led to significant expansion of available housing in Hengelo. Stork founded the Hengelo Building Association in 1867. By 1888, Stork had opened a bathhouse. Between 7:00 p.m. and 9:00 p.m. staff members and their families were able to make free use of the facilities. The working boys, in particular, were encouraged to take their weekly baths: there were penalties for failing to show up twice in a row.



Transportation by water through the Twente Canal.

At the beginning of 1900, under the direction of Charles Stork's son Dirk-Willem, the Tuindorp 't Lansink district was completed. This housing district was built for Stork employees on a 15-hectare (37-acre) estate. It became a neighborhood that reflected the population of the factory. It welcomed all walks of life and featured large gardens and numerous playgrounds. Today, 't Lansink is a protected national landmark in Hengelo.

#### CHANGE IN DIRECTION LEADS TO GROWTH

In the prosperous years after the Second World War, Stork became highly successful in the market for heavy capital goods. The vulnerability of this market led management to completely change course in the second half of the 20th century. Stork began to target new markets for industrial production equipment, focusing on primary needs such as clothing, food, energy, water/air and transport, and technical maintenance services for industrial equipment and building installations. A series of acquisitions, sales and business transactions followed before Stork began to focus primarily on maintenance. This started in 1999 with the acquisition of Cooperheat, an international company specializing in heat treatment equipment.

In 2007, the acquisition of MASA, a Colombia-based service provider in the field of Operations & Maintenance (O&M) and asset management services, added significant business in the Americas. RBG Limited, the British supplier of services in inspection, assessment and repairs for the oil and gas industry joined Stork in May 2011.

In September 2015, Stork's activities were expanded with its strategic acquisition of the Australian industrial maintenance company, Giovenco Industries.

Further growth required a step change. In 2015, Stork began talks with global Engineering, Procurement & Construction (EPC) powerhouse Fluor Corporation. On 1 March 2016, Fluor's



Fluor Corporation acquired Stork in 2016 to strengthen its O&M capabilities.

acquisition of Stork became a reality. The combination of Stork with Fluor's Operations & Maintenance organization has transformed Stork into a truly global market leader in the field of operations, maintenance, modifications and asset integrity.

#### HENGELO IS STILL STORK

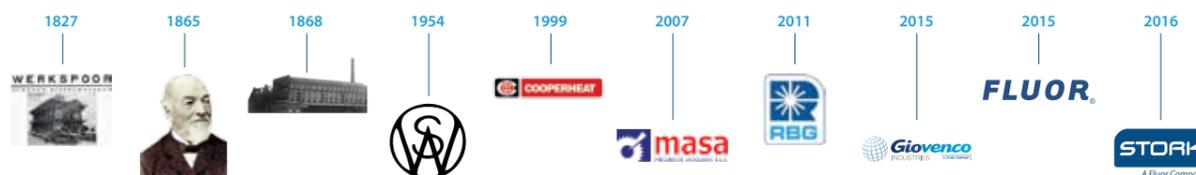
In addition to the international expansion, Stork's activities in Hengelo have also continued to develop. In 1982, 'Stork Ketels' started as an independent division of Stork. With activities specifically focused on the production of boiler systems and burners, the company has now gained a dominant market position in the (industrial) energy sector. In 1996, Stork Thermeq was launched as a producer of components for deaerators, burners and boilers. Today, these companies, together with Stork Turbo Services and Rotating Equipment, form the Stork Power Services Division. Stork Power Services provides service, maintenance and overhaul work across the globe, especially for producers in the energy industry.



Currently, the majority of Stork's workforce is located outside of the Netherlands, for example in Colombia and the U.S.



In 2015, Stork Thermeq moved from the old town center of Hengelo to its new purpose-built facility along the Twente Canal. The move represented a new chapter in the history of Stork in Hengelo.



# CONNECTING FOR CHANGE

Today, Stork is active in over 100 countries, with 18,000 employees supporting more than 4,000 clients. Just like in every other global organization, collaboration is key to fully optimizing our collective strength. Erica Dhawan is a leading authority on Connectional Intelligence. She teaches innovative strategies that improve businesses, and is the co-author of the bestselling book: *Get Big Things Done: The Power of Connectional Intelligence*. We asked Erica to provide AIM with her insights on connectivity in large organizations.



## YOU ADVOCATE CONNECTIVITY AND COLLABORATION 'TO GET BIG THINGS DONE'. HOW CAN LARGE INDUSTRIALS OPTIMIZE INNOVATION AND BUSINESS RESULTS?

In large organizations, operational efficiencies depend on effective coordination between all the various parts. Improving collaboration and connectivity is not only an advantage but a 'must-have' for 21st century industrial organizations.

Internal connectivity can help identify operational issues that front-line employees can often resolve with greater speed, agility and empowerment than traditional processes allow. It also reduces the heavy reliance on senior leaders and formal structures to address minor issues.

This results in increased throughput and improved risk management. Most large industrials have structured standup meetings, check-ins and something resembling the Six Sigma suite. These exist to improve collaboration.

However, through formal processes, red flags don't always flow to the people who need that information. Internal connectivity can ensure we can get the right people on the front lines with the knowledge they need at the right time to improve safety and ensure that defects found in one area are eliminated from the entire chain.



## HOW CAN LARGE INDUSTRIALS USE INFORMAL NETWORKS THAT EXIST OUTSIDE OF THE MANAGEMENT SCOPE?

Informal networks help uncover the cutting-edge groups of entrepreneurial and innovative thinking – which management can then turbocharge. So, great things can come from informal networks!

But alone they are not sufficient. Strong, effective collaboration is led by established collaboration initiatives. For large multinationals, it's best to first get the basic architecture correct: accountability, reporting, performance management and target-setting. Afterwards, you can:

**1. Identify your super-connectors.** Not the most senior people, but those who have high informal influence. They're the go-to person for collaboration efforts inside and outside their own teams, and can be critical to change efforts.



*Internal connectivity can ensure we can get the right people on the front lines with the knowledge they need at the right time, states Erica Dhawan.*

**2. Develop specific, centrally-mandated connectivity initiatives** that address business priorities. Ensure there is clarity on the behaviors required and incentives to encourage high-value connectivity behaviors.

**3. Measure collaboration efforts** with formal accountability and empowerment. Having a collaboration scorecard or non-controversial targets is very beneficial for sustained success.



## HOW CAN YOU TAP INTO THE COLLECTIVE INTELLIGENCE OF EMPLOYEES IN GENERAL?

First, learn the best practices of high-performing employees, and then develop ways to make them sustained and scalable. A few years ago, the CFO of a leading law firm noticed many associates were billing fewer hours than usual. They discovered that the team had created their own Twitter peer network to help each other solve cases faster. The firm then created a 'Twitter at work' initiative to maximize peer-to-peer knowledge-sharing.



## DOES CONNECTIVITY STILL APPLY WHEN WORKING REMOTELY, LIKE ON OFFSHORE PLATFORMS?

Of course. But remote communication can distort things. To perform at the highest levels, remote teams have to find new and better ways to maintain connectivity. Remember:

**1. Brevity doesn't always mean clarity:** To be efficient, we sometimes use fewer words. But don't be so brief that your messages require interpretation. Take the time to communicate with ultra-clarity.

**2. Don't bombard your team:** Do you follow up on a task by email, text and phone? Do you ask people if they got your previous message? Abusing those access points can feel like harassment. Every medium demands time from the receiver. Using all of them for the same message is ineffective (and annoying).

To be efficient, we sometimes use fewer words. But don't be so brief that your messages require interpretation. Take the time to communicate with ultra-clarity, Erica Dhawan explains.



**3. Establish communication norms:** Remote teams need to create new norms that establish clarity in communication. Companies like Merck have created acronyms for their digital communications like 'Four-Hour Response (4HR)' and 'No Need to Respond (NNTR)' that bring predictability and certainty to virtual conversations.

**WHAT'S THE ROLE OF TECHNOLOGY WHEN BOOSTING CONNECTIVITY AND COLLABORATION?**

Technology can be a powerful enabler. But there are three kinds of distance in collaboration: physical (place and time), operational (team size, bandwidth and skill levels) and affinity (values, trust, and interdependency). The best way to drive team performance is to reduce the affinity distance. Regular video calls are better for establishing rapport and creating empathy than emails or calls. And virtual team-building gives people the opportunity to interact regularly and practice their collaboration skills. Technology can create space for those who might be less inclined to speak out.



**MILLENNIALS INTERACT IN AN ENTIRELY DIFFERENT WAY. HOW SHOULD LEADERSHIP ENGAGE WITH THEM?**

It's not about how to 'understand millennials'. It's about taking a more profound look at how young people are thriving in a work environment led by connectivity and collaboration, and the implications this has for all of us. It isn't about a new generation – it's about a new work mindset that's here to stay.

New approaches to connectivity and collaboration amplify diverse voices, ideas and opinions – next-generation women and men can bypass traditional norms and share their voices. It prioritizes process over programs, questions over answers, and influence over control. This mindset is status quo for millennials. It is critical to develop enabling structures for this rising generation to thrive in the 21st century organization.

**WHAT'S YOUR ADVICE FOR ORGANIZATIONS THAT WANT TO INCREASE THEIR INTERNAL CONNECTIVITY?**

Most companies can implement these tips relatively quickly:

- 1. Empower the front line.** Focus on front-line learning and sharing and cultivate an approach for employees to take ownership in their success.
- 2. Design an improved method of coordination** between 'interfaces'. Make your collaborative meetings short and effective and re-design structures for different siloes to share information through monthly lunch and learns or webinars.
- 3. Drive clear targets, clear goals, and clear accountability.** What gets measured gets done, and there is only effective collaboration if it is measured.

Participants in Fluor's Innovation Unwrapped event discuss opportunities to expand solutions for clients into the wider project execution and O&M space.



# COLLABORATION IS A GIVEN AT FLUOR

"Our clients are not looking for another interface to manage, but rather a cohesive team that can draw on each company's respective strengths to bring predictable execution to their capital and maintenance project programs," says Jason Kraynek, Fluor's global lead of business transformation and innovation, on the topic of collaboration.

After the Stork acquisition in 2016, Fluor gained access to a joint O&M workforce of 18,000 colleagues worldwide. And according to Kraynek, this contributed to Fluor's value proposition. "The best way to illustrate this is to look at the results. Fluor and Stork have captured clients' interest in the EPC and O&M integrated solution model, with each company highlighting its complementary strengths. Each project is unique and requires close collaboration between the Stork and Fluor pursuit and execution teams for successful project delivery."

Kraynek points out that collaboration is a given at Fluor. "Fluor understands that our ability to deliver projects safely, on time, on budget and with quality, every time, depends on effective collaboration with our clients and partners. Fluor has the 'infrastructure' required to capture lessons learned and project experiences and pass them along to future pursuits and projects. Our focus is squarely on the

implementation of those solutions which we believe is a significant differentiator. Our clients don't want to see "PowerPoint innovation". They want to see implemented solutions to give them confidence that we will deliver on our commitments and maximize their capital efficiency."

But Fluor also uses knowledge transfer to further optimize efficiency, Kraynek explains. "We're always challenging the effectiveness of innovative, differentiated solutions to confirm that what we're putting out there improves our ability to deliver projects predictably. We know that getting a great idea implemented on one project is manageable (and expected). But activating that same idea on 10 or more projects, that's the challenge. We need to ensure we're utilizing our capital and human resources effectively."

Collaboration is not limited to the boundaries of one's own organization. It stretches across the entire value chain. Kraynek says: "That is best illustrated with Fluor's annual innovation catalyst event called 'Innovation Unwrapped', during which we address industry challenges sponsored by our clients. Fluor has hosted the event for the past three years with client executives from NAM, Amgen, LyondellBasell and Freeport-McMoRan participating in the 2017 event. Effectively connecting with clients allows us to expand solutions to our featured challenge(s) into the wider project execution and O&M space."



# TEAMING UP TO DELIVER INTEGRATED SERVICES TO SUNCOKE ENERGY

For just over a year, Stork's North American group – contracted and operating as Fluor – has provided integrated services to SunCoke Energy's five U.S. domestic coke facilities, located in Illinois, Indiana, Ohio (two), and Virginia. SunCoke produces high-quality coke for use in blast furnace steelmaking. The five-year maintenance contract allows us to perform services as a nested contractor and includes general contractor services, maintenance, engineering for small and large capital projects, outages, small capital construction and emergency project services. With the support of six Stork and Fluor divisions, the SunCoke account team provides custom solutions for a wide range of needs.

*“ Working collaboratively with our client, we have and continue to identify areas where the Stork/Fluor team can enhance value to SunCoke Energy. This approach has led us from a contractual relationship to a partnership that allows more freedom to problem solve with a focus on the client's goal of safe and reliable operation of their coke-making facilities.”*

Mike Huffer, account director, Stork North America

The Stork/Fluor team transitioned onto the SunCoke sites in early March of 2017 and currently assist SunCoke employees through execution of maintenance support and capital project execution. The team numbers more than 250 salaried and craft employees with a peak of nearly 350 during outage season.

What began as a relationship with the Operations & Maintenance group has grown into an opportunity to offer complementary services from the larger body of Stork and Fluor offerings. Multiple groups within the Stork and Fluor family have united to provide integrated solutions to SunCoke.

#### EQUIPMENT SUPPLIED BY AMECO

As part of the initial contract, we engaged AMECO, Fluor's wholly-owned equipment division, to provide the SunCoke sites with craft tooling, consumables,

personal protective equipment (PPE), scaffolding, support vehicles and other miscellaneous equipment. Given the quick project conversion, as well as the dynamic approach required to support the SunCoke operations, the team depends on AMECO's ability to adapt to the changing needs with a client-centric approach.

#### DEVELOPING TEAMS AND TRAINING

Another important aspect to supporting SunCoke is the need for properly trained and qualified welding professionals and craft. With this in mind, the team employed Fluor's Construction Technology team to oversee the development and implementation of a weld program which meets the demands of the SunCoke environment. With the critical need to process the oven flue gas, the client utilizes heat recovery steam generators to complement their environmental

stewardship program. As such, the robust weld program facilitates quick repair of these code vessels which is a crucial component of success. This program also addresses other structural and piping needs throughout the facilities.

#### IN-HOUSE PARTS FABRICATION

An additional identified need of potential support was in the realm of critical parts documentation and fabrication. With this need in mind, the SunCoke account has engaged the scanning technology of Stork's Ithaca Power Services group. Stork's laser-based scanning technology provided the ability to measure crucial dimensions systematically and allowed for transfer directly to a drawings file as well as fabrication map. The process begins with a scan of a component, followed by a 2D rendering that is converted to a model creation. Once a dimensional overview for sizing is

done, the component's developed model is compared to the original scan and is referenced for engineering to develop the final component for manufacturing. Currently, the scanning of trial parts has been completed with the intent to identify new components to scan where parts are critical to the operational needs of the sites.

#### QUALITY-DRIVEN, STRATEGIC APPROACH

Asset Management Technology and Plant Engineering Services round out the groups included in the strategic approach to the SunCoke account. The goal is to continue to focus on the client's changing needs and offer support where the Stork/Fluor team can add value. This also includes bringing vendors and suppliers to the table to provide our client with a safe, efficient, and quality-driven approach.



## UK EXPERTISE DEPLOYED IN MALAYSIA

The RAPID Integrated Petrochemical Complex is the largest oil and gas hub being constructed in Malaysia. It is due for completion by 2024. As part of the project, Winteco, a subcontractor, had to carry out Post-Weld Heat Treatment (PWHT) of two sphere tanks that were 32.8m (108 feet) in diameter. Stork teams from Malaysia and the UK joined forces to implement a proven solution that was entirely new for the region.

Winteco was eager to benefit from Stork's expertise as a one-stop solution provider that could support it with the Finite Element Analyses (FEA), procedures, method statement, insulation installation management and jacking processes.

### FEWP, FIRES AND FUEL

Several challenges arose during project execution. First, a Fixed Elevated Working Platform (FEWP) was used instead of scaffolding inside and outside the tank. PWHT of spheres with FEWP had never been attempted in Malaysia before, so this caused serious concern for the Project Management Consultant. Winteco's client was especially focused on the material grade, which was used as the bracket, welded

to the sphere shell. A second concern was safety. Particularly, the potential fire hazard if the tarpaulin weather protection caught fire, due to its close proximity to the shell and the narrow space between the tarpaulin and shell (1 meter or 3 feet), which affects the people working on it. Also, there was an internal hanging inspection platform that weighed 22 tons (24 short tons) and hung from the sphere's internal roof. Thirdly, large volumes of liquefied petroleum gas (LPG) were required to complete each PWHT at a constant pressure. It was piped up 40 meters (131 feet) to the top of the sphere, where the control equipment is located. Fourthly, unpredictable weather conditions were also a serious concern.



### SOLUTIONS THAT SATISFY

The excellent collaboration between the Stork Malaysia and UK teams, as well as flawless cooperation with the contractors, helped Stork to solve all the challenges and ensure the PWHT was completed on the spheres successfully. Since an FEWP was used on the project, our UK team verified Winteco's load calculation and assured that the platforms were stable and safe to use during peak temperature of 600° C (1,112° F). Winteco also made design changes to include some material pads welded onto the sphere shell under the FEWP bracket.

As the internal inspection hanging platform weighed 22 tons (24 short tons), there was a concern about stability during peak temperature of 600° C. Hence, Stork suggested the removal of gratings, after which the weight of the platform was reduced to 11 tons (12 short tons). FEA was conducted to measure stability during peak temperatures. The LPG required for the project was supplied from a 30 KL (6600 imperial gallons) bulk tank, which was installed on-site in accordance with Malaysia governing laws and local regulations. In total, 45 tons (50 short tons) of LPG were

needed to complete the project. To cope with the sudden weather changes, Stork proactively organized reinforced weather protection.

Comprehensive and well-detailed project management, and the support of engineering calculations, ensured that the client was very satisfied with Stork's professionalism and quality of service. Our past achievements in completing PWHT for several large-diameter tanks in the Middle East region were also a good reference point for the client. Good preparation ensured that the client's changing schedule was not an issue, and Stork completed the project with zero safety incidents. We met our target of 'first-time right' and safe completion of the work.

### CLIENT BENEFITS

- One-stop solution provider
- Comprehensive and detailed project management supported with engineering calculations
- Experience and professionalism
- Proven, reassuring end-to-end service
- Safe service delivery
- Zero incidents, injury or harm to the environment

### PROJECT FAST FACTS

- Project: PWHT on 32.8m-diameter sphere tanks
- Client: Winteco
- Location: Malaysia
- Services: Post-Weld Heat Treatment (PWHT)
- Date: November 2017 to January 2018

## COLLABORATION IS KEY IN SANTOS CONTRACT

The spotlight was on the Stork team in Australia during the mobilization phase of an integrated contract for Santos, one of the leading independent oil and gas producers in the Asia-Pacific region. Stork will supply inspection and integrity services to Santos' assets in South Australia.

The team was confronted with various challenges, including geographic, personnel, systems and remote management issues. At the heart of the mobilization story was the effective on-boarding of the onsite personnel from the previous contractor. Careful and collaborative planning was critical to preventing disruption during the transition of the contract to Stork.

To prove Stork's track record and ability to undertake the works, Stork participated in an 'Innovation and Improvement Workshop', during which participants addressed key

operational and engineering challenges that the client's assets are facing. Stork embraced this opportunity to showcase the breadth and depth of its experience and worldwide capabilities, supported by local industry partners and knowledge groups.



Inspection services executed for Santos in Australia.

# GENERATING MAJOR COST SAVINGS FOR SHELL'S BRENT BRAVO TOGETHER

As part of a pilot project from the UK's Engineering Construction Industry Training Board (ECITB), Stork, Wood Group and Shell are working closely together on the decommissioning of Brent Bravo, an oil platform in the North Sea. Reducing project costs by 40%.



Stork has a strong track record of decommissioning activities.

## BUNDLING STRENGTHS

In the UK, members of the ECITB have pooled their experience in the oil and gas industry. On the basis of this expertise, they have laid out a framework that facilitates effective and broader collaboration between various parties. This helps to achieve a more effective and consistent project implementation. The project framework consists of four phases:

1. Generating a collaborative environment.
2. Defining a collaborative project.
3. Implementing the collaborative project.
4. Conclusions and lessons learned.

## STREAMLINING FOR SYNERGY

The ECITB pilot is being implemented on the decommissioning phase of Shell's Brent Bravo asset, specifically the removal of the topside. The project team is a unique joint effort between the three companies. Their aim is to not only work alongside each other, but to truly collaborate to implement the project. For example, instead of each company providing its own project manager or health, safety, environmental, quality (HSEQ) manager, there is now only one person responsible for each project discipline, selected on the basis of his/her knowledge and expertise. That could be someone from Stork, Shell or Wood Group.

## MULTIPLE COMPONENTS, ONE END GOAL

Project teams are comprised of employees from all three companies. Each team's composition and size can be adjusted as and when required, which helps to prevent unnecessary waste of time or personnel.

Moreover, all pilot participants are working together as one team, one organization, from one location. Project reports, working methods and procedures are all identical.

## TANGIBLE SUCCESS

The pilot project has been running for more than a year, and has proven to be very successful. When compared to similar decommissioning work in the past, the project has realized a more than 40% cost savings on specific work and a 20% reduction in project team size.

This collaborative method provides significant advantages not only for the contractors involved, but also (especially) for Shell. The client has one point of contact and benefits from enhanced structure, avoiding inefficiencies surrounding personnel, and benefitting from a quick decision-making process. In short: outcomes that achieve significant savings in cost, time and efficiency.



HVACR system check by Stork engineers in Azerbaijan

# COOLING DOWN THE CASPIAN REGION

Stork has a long history of delivering operational excellence within the Caspian region of Azerbaijan, Georgia and Turkey (AGT).

One specific partnership dates back to October 2015, when Stork was awarded the Heating, Ventilation, Air-Conditioning, and Refrigeration (HVACR) maintenance contract for all of its client's assets within the AGT region. Providing these services is monumentally important to ensuring the safety of the personnel working on the assets. Their maintenance services are essential to everyday operations.

## WITHSTANDING THE HEAT

For this particular client, much of the electrical equipment is temperature- and humidity-sensitive. They have an automatic shutdown temperature lower than the heat outside. The critical nature of the HVACR systems on-board means that breakdown and repair actions are closely monitored, leading to additional workload for Stork's HVACR engineering teams.

Stork's dedication to maintaining the HVACR systems has been highly commended. Since the beginning of this relationship with the client, Stork has successfully improved the performance of HSEQ training, cost efficiency, nationalization and localization, which has produced positive outcomes for both the client and Stork.

## MEETING THE CHALLENGE

In October 2017, Stork's HVACR team was commissioned to support the HVACR systems for newly constructed buildings in Georgia. This project was delivered during the summer months, with temperatures reaching in excess of 42° Celsius (107.6°F). This means that the cooling and air conditioning systems for accommodation, the electrical switch room, control and commination compartments were essential for operation and were closely monitored.

Throughout the project, Stork has consistently ensured that all regulations were met, not only to the in-country standards, but to match all European legislation for both operational and HSEQ needs. The client presented the Stork HVACR project team with a commendation for their services and dedication to the project.

Even with the added pressures of trying to maintain the HVACR equipment during the hottest months of the year, Stork's HVACR team continuously goes above and beyond to remain professional at all times, working hard to quickly resolve any issues and ensuring client expectations are not only met, but surpassed.

The HVACR solutions that Stork offers range from simple maintenance packages to full design, upgrades and installations. Stork ensures that each system is designed to meet all the latest legal requirements, as stated by both HSE guidelines and Control of Substances Hazardous to Health (COSHH) regulations.

Stork supplies clients with complete HVACR-tailored packages to suit any application. It also supplies full detailed reports, covering the work completed and all necessary and required certification, documentation and test sheets. This ensures that a complete history of each system is maintained from the date Stork begins participating in any project.



# EQIN'S PROMISING NEW MARKET ENTRY

What started at the end of 2017 with the request to supply 12 30 KVA aggregates for offshore usage, developed into a large award in one of EQIN's, Stork's equipment rental division, new target markets: the renewable energy sector.



80 kilometers (about 50 miles) north of the coast of the Dutch town of Eemshaven, a new wind park called Merkur is being constructed. This wind park consists of 66 Haliade 6 Megawatt wind turbines, which produce 396 Megawatts of electricity. Enough to supply 500,000 households.

Prior to construction, the various wind turbine parts were shipped to the Eemshaven harbor for onshore pre-assembly. During this process, EQIN, Stork's rental and sales division, supplied power and storage facilities, as well as personal protection equipment. On a weekly basis, EQIN's supervisor evaluates the supply and demand of the required equipment and the potential need for additional materials. EQIN's site-based service engineer provides a weekly check-up of the installed power aggregates.



In March 2018, the transportation vessel Seafox 5 shipped the first wind turbine parts from the Eemshaven harbor to the new North Sea wind park. EQIN supplies the temporary onboard power needs, using innovative aggregates with load-sharing modes, for remote system readouts. This allows EQIN to manage peaks in electricity production, as well as to secure backup when the power drops or is cut off completely.

# STORK PARTNERS IN BIOMASS RENEWABLE

Stork has joined Clean Energy Generation (CEG), Momentum Capital and Carrier to produce biofuel in the renewable energy sector. Working with its partners, Stork will build and maintain plants that transform biomass – mainly wood feedstocks – into biocoal pellets through a process known as 'torrefaction'.

"CEG has already piloted the commercialization of biocoal using its propriety technology in a plant in Derby, United Kingdom. The pilot proves biocoal's commercial application," says Erik Huis, chief executive officer of CEG. "We are now ready to take the next steps towards further standardization of the process for sustainable commoditization of biocoal."



Torrefaction installation in CEG's test plant in the United Kingdom.

"Stork's capabilities and experience allow us to supply and maintain large-scale renewable energy facilities," explains Tony van Velzen, vice president of Stork's Power Services business. "Working with our partners, Stork will integrate the CEG torrefaction process into a large-scale biomass processing facility. It will take on the construction of the plant, as well as operations and maintenance services during production of biocoal."

Technology Collaboration Program, run by the International Energy Agency, identified biomass torrefaction as a promising technology for scale-up. Biocoal provides a direct, sustainable alternative to fossil coal in the generation of electricity without the need for large capital expenditure investments to transform energy plants.

"Stork will also use its boiler and burner solutions to produce clean energy and heat during the biomass process. By bringing back generated energy into the biocoal production process, the torrefaction installation will perform efficiently on a climate-neutral level," van Velzen adds. The Bioenergy

"As the energy sector transitions to new resources, Stork can support plant owners to adapt core processes quickly, alongside the optimization of operations and maintenance schedules," concludes van Velzen.



# CONTRIBUTING TO A SUSTAINABLE GAS SUPPLY



NAM site in the north of the Netherlands.

It's clear that volatilities in oil price and demand have had their effect on today's gas production. In the Netherlands, for instance, NAM (a Shell/ExxonMobil joint venture) supplies 75% of the natural gas required by companies and households. In addition to market dynamics, governmental rulings have forced NAM to gradually reduce production.

GLT-PLUS is a Stork, Siemens, Jacobs and Yokogawa consortium. Since 1997, GLT-PLUS has been supporting 29 of NAM's gas production and storage facilities. The consortium assists NAM as it adapts to these changes and achieves substantial cost savings. By carefully reviewing strategies, plans and schedules, Stork focuses on improving the effectiveness and efficiency of the maintenance scope without compromising on quality or continuity.

Condition-based monitoring, drones and camera inspections, smart loop testing and automation have already contributed to an approximately 35% reduction in maintenance costs. This resulted in savings of more than €20 million (\$24 million) in total since 2015. In close cooperation with consortium



Flare tip inspection using drones saves time and costs.

partners, Stork applied these innovative asset integrity solutions to ensure that NAM maintained a high level of quality while improving competitiveness. In this way, Stork plays a key role in safeguarding a sustainable gas supply to almost every Dutch household.

Stork's 25 Megawatt thermal integrated pyrolysis oil-fired burner and boiler system for FrieslandCampina.

## FIRING UP THE FUTURE OF RENEWABLE FUELS

Driven by climate and CO<sub>2</sub> objectives, many industries are looking for renewable resources to fulfill their energy needs. To support this energy transition, new technology is required and already available, as Stork showcased at FrieslandCampina, a client in the Dutch dairy sector. By further developing its thermal energy-generation systems, Stork's boiler installations are now fully equipped to produce steam in an eco-friendly way: using CO<sub>2</sub>-neutral bio-oil.

FrieslandCampina aims to carefully balance the company's growth objectives with its goal to neutralize its environmental impact. For its facility in Borculo, the Netherlands, FrieslandCampina chose pyrolysis oil, a liquefied biomass product, to replace the use of natural gas to generate steam and heat for its industrial processes. However, use of this renewable fuel required a new approach to generating steam.

To benefit fully from the use of pyrolysis oil, Stork's R&D team developed a dedicated burner and a fit-for-purpose boiler design to fire this new type of biofuel. Multiple tests in Stork's own burner-test facility in Hengelo, in cooperation with bio-oil supplier Empyro, led to the first integrated burner and boiler system, capable of firing both pyrolysis oil on this scale, and natural gas when needed. In 2015, this system was delivered to FrieslandCampina, which acted as the launching client. To date, the new process has reduced the client's CO<sub>2</sub> output by 16,000 tons (17,637 short tons) per year, as it eliminated the annual need for 10 million cubic meters (353 million cubic feet) of gas.

In addition to a new technology to apply pyrolysis oil in industrial processes, Stork was also involved in realizing the world's first pyrolysis production plant for Empyro in the Netherlands. Stork's thermal equipment solutions are part of the 25 MWth poly-generation installation, which produces more than 20 million liters (5 million gallons) of pyrolysis oil annually.

## REVITALIZING A HYDRO-POWER STATION IN AUSTRIA

In March, Stork successfully completed a contract for Austrian Ennskraftwerke AG to refurbish a single phase generator in its hydropower plant in Weyer, Austria.

The main scope was to engineer and to renew the complete stator winding consisting of 304 pieces of high-voltage roebel bars and the complete rotor winding of 14 poles. Additionally, the existing excitation had to be changed to a completely new static system. The Weyer hydropower station produces 117 GWh of clean energy and is now upgraded to a sustainable, low-maintenance hydropower plant.



# DRIVING EXCELLENCE THROUGH DATA



**Business-as-usual is not an option in answering tomorrow's challenges and opportunities. Embracing digitalization is an enabler to improve operational performance and competitiveness throughout the value chain. A data-driven way of working provides suppliers and clients with better decision-making capabilities. These capabilities maximize productivity whilst allowing all parties involved to continuously share, learn and adapt to new findings in a fast and reliable way.**

The use of data is an important element to raise standards in the technical service industry and to drive excellence in asset management strategies, lifting asset performance to a higher level.

At Stork, data is treated as a strategy, both towards working with our clients as well as organizing our activities internally. By promoting a culture of data-driven decision making and process digitalization, we work to continuously improve our services, tools, and expertise. Every day and everywhere.

To achieve this goal, we have adopted a life-cycle framework for data in which six key aspects of digitalization are targeted:

- 1. Collect** - Which data will be collected from equipment installed in the field? And from the people operating these installations?
- 2. Connect** - How and when will data be transferred to the available systems and hardware?
- 3. Model** - How will data from the field be used in reliability and performance models?
- 4. Analyze** - What does the gathered data tell us about asset and workforce performance?
- 5. Visualize** - How to visualize data insights in reports to support the planning of priorities?
- 6. Act** - How to filter the appropriate information to enable immediate action in operations?

By looking at our Digital Solutions portfolio through this framework, we are able to pave new ways of delivering more

reliable, predictable and cost-effective solutions to our clients. Stork's existing in-house knowledge and technologies empower us to expand and connect our capabilities. This will increase the operational effectiveness and efficiency at client sites as it improves the planning and execution of maintenance.

## DATA ENABLES PREDICTIVE MAINTENANCE

Waiting for an asset to fail has traditionally been a common strategy. However, reactive maintenance leads to unnecessary process interruption and the high costs involved. By learning from failure patterns, organizations can move towards maintenance models to better anticipate moments when assets may require attention in general.

As these preventive models do not identify earlier-than-expected failures, a focus on understanding the links between equipment-failure causes and their effects paves the way to condition-based maintenance. This approach looks at an asset's actual state as the deciding factor in its need for maintenance.

As the next step, predictive maintenance is an example of a data-driven decision-making service. Via the application of sensors and algorithms, it is possible to extract insights into an asset's performance to deliver asset-specific maintenance strategies up front.

Continuous insight and analysis of the installation's status allow asset owners to focus their maintenance strategies on improving uptime. By investing in digital solutions, owners can easily assess parameters to predict, with reasonable accuracy, what will happen to their assets.

The only step to be taken is applying an integrated approach both in terms of partnership and technology towards shaping optimal asset management strategies.

## DATA SOLUTIONS IN PRACTICE

As an example of the use of data in our daily activities, Stork's UK organization is embedding collaborative technologies and improved productivity methodologies throughout its regional inspection activities.



"Our digital advancement journey is structured around efficiently establishing the current condition of an asset, preparing the right inspection and remediation program, and effectively executing," Donald Brown, asset integrity director explains.

"We aim to re-work the established processes that have become outdated in a digital world, apply wired and wireless sensor technologies to challenging or labor-intensive locations and build the next generation of digitally enabled 'Inspectioning' practitioners," Brown continues.

Stork's regional capability is centered on accessing, revealing, remediating and improving the condition of client assets in a value-adding, safe and responsible manner. Brown says: "Our ambition is to digitally enhance and advance our Assess, Inspect and Repair (A.I.R.) methodology, which is already embedded in our work. We also aim for a more integrated service offering: enhancing the fundamental way in which we operate."



# APP ENABLES FASTER, MORE EFFECTIVE PROJECTS

PRINCE is Stork's software solution to manage large complex projects, like turnarounds. To simplify and increase usability of PRINCE on location, an app version of the solution has been launched. This app enables for live reporting of activities, and improves response time when immediate decisions have to be made.

The PRINCE app can be used on ATEX tablets, suitable for use in the oil and gas and chemical sectors. A 4G connection makes it possible to connect with the PRINCE backbone at the central project location.

Effective use of the PRINCE app can begin as early as the preparation phase of the project. After defining and approving the scope, work packages are digitized and stored in a central database. This makes it possible to remotely access these digital work packages, to consult details promptly and to immediately report and share the progress of the individual project parts.

The head supervisor has a real-time overview of the status of all planned activities. Specific points of attention will surface on the spot, and immediate action can be undertaken to minimize potential delays. One of the PRINCE app features that makes this possible is the option to take and share pictures. This enables project supervisors to assess the situation rapidly, without first needing to visit the site.

The PRINCE app is an intuitive tool that can be used without a manual. A screen at the central project location provides a clear overview of the status of the various project parts. This complete solution saves time, which results in a faster and more effective project execution.

# BOREALIS MAINTENANCE IS HOTT

Hands-on Tool Time (HoTT) is a practical method for increasing the transparency of maintenance organization and production losses. HoTT measurements immediately identify practical improvements in areas such as work processes. Since 2012, the Borealis petrochemical group has been carrying out HoTT measurements for turnarounds and daily maintenance at 10 locations in Europe, for both planned and corrective maintenance. The measurements give Borealis a clear picture of where profits could be made.



"Factories all over Europe are aging, and require additional maintenance activities. We have been looking into ways to improve efficiency and help prevent budgets from escalating," explains Jef Lodewijckx, group expert maintenance efficiency at Borealis. He is responsible for the business processes pertaining to daily maintenance, shutdowns and turnarounds. "All our European locations have had at least one HoTT measurement performed. We used the analyses to compose a maintenance execution efficiency roadmap," he says.

### SUPPORT FROM STORK

Ben Thiehaten, senior consultant at Stork, supports Borealis in its implementation of HoTT: "During regular maintenance work, we take a look at measurements," he says. "Turnarounds are different. In that case, you want to determine whether

preparation work was done efficiently and if people were able to start with their work on the first day(s). We then combine the figures with our observations, and perform an in-depth examination of the causes and effects together with the client."

### QUICK WINS AND LONG-TERM BENEFITS

HoTT reports provide an outline of productive and non-productive time. It also highlights 'avoidable' loss of time. During a turnaround, the focus is on quick wins that can be applied immediately. Towards the end of the turnaround, improvement activities or other goals are determined for the long term. Lodewijckx: "Stork reports are used to achieve ongoing improvements throughout the organization."





Since June 2017, Stork has been providing operations and maintenance services for Ecopetrol's oil fields in six different regional departments (Santander, Norte de Santander, Antioquia, Bolivar, Cesar and Arauca). Stork not only lends operational support for all water treatment plants, but also guarantees well monitoring in six major oil production fields.

To do this, Stork supplies more than 180 vehicles and provides more than 540 technicians and professionals, working in various maintenance activities. Due to operational client needs, staff mobilizes by land, river or air in an area of more than 50,000 km<sup>2</sup> (19,300 square miles).

**THE STORK DIFFERENCE**

Mobilizing all these resources across six geographical regions is not a barrier for Stork. The team has the essential local expertise and engages with local communities.

Stork has an established and well-positioned community management system in Colombia and for this particular contract, Stork constantly meets with the Union Sindical Obrera (trade union) and various community leaders to anticipate conflicts and resolve any potentially impactful matters.

More than 759,000 man-hours have been executed since the beginning of this contract, and Stork has been able to keep the client's assets running continuously for the first time in its history.



**SERVICES OFFERED BY STORK IN THIS CONTRACT:**

- Instrumentation
- Mechanics
- Electricity
- Welding
- Plant & station operations (water, gas and crude)
- Operation of heavy equipment (telescopic cranes and hydraulic arms, major maintenance, overhauls)
- Planning and execution of turnarounds
- Reliability engineering
- Condition-based monitoring

# MOBILIZING MANPOWER AND MACHINES FOR ECOPETROL IN COLOMBIA

Stork differentiates itself from the competition with the quality of its services, engagement of communities and the value it adds to client operations. In the oil and gas industry, that includes providing the people, high-quality equipment and tools, and logistics services that help a client sustain effective operations. Stork is able to mobilize one specialist or hundreds of craft and vehicles to execute a project. This is precisely what Stork has been doing for Ecopetrol.



# BRIDGING PLATFORMS IN TRINIDAD AND TOBAGO

The BP Trinidad and Tobago (bpTT) portfolio includes a mix of mature fields and new projects, currently targeting a production plateau of 2.1 bscfd (billion standard cubic feet per day) by 2032. Gas production from 131 wells flows to multiple manned and unmanned installations, and onwards to three collection hubs Cassia, Amherstia, and Mahogany. From these manned hubs, gas is exported to shore via free-flow. To make this happen, Stork executed the brownfield engineering scope of the project in partnership with Fluor.

As part of the scope, the bpTT project will install 50 Megawatts of compression at the Cassia hub, which is planned to begin operations in the first quarter of 2020. The offshore compression will reduce wellhead pressures to maintain gas production at current levels. Export pressure will not be increased above current operating levels. The project is split into greenfield and brownfield scopes.

## COVERING THE SCOPE

The greenfield scope will include a new Bridge-Linked Platform (BLP) and bridge. The new platform, Cassia C, will be located to the east of the Cassia complex. It will host three trains of gas-turbine-driven centrifugal compressors, condensate export pumps and associated support systems. An approximately 260-foot bridge will connect Cassia C to Cassia B, and a new steel jacket will be placed at a depth of approximately 67 meters (220 feet) underwater.

The brownfield scope will include piping and vessel modifications to facilitate low-pressure operations. Structural modification to accommodate the bridge landing and pipe support installation will also take place. As part of this scope, all equipment will be reinstated, and all systems across Cassia A, B and C will be integrated.

## COMPLETING THE FEED

Fluor was awarded the front-end engineering and design (FEED) contract for both brownfield and greenfield scopes. The company leveraged resources from its engineering and design unit in Stork Trinidad for the brownfield scope, which allowed for easier interaction, data-gathering and communication with the client at local levels.

Approximately 10 full-time and 15 part-time resources – consisting of engineers (all disciplines), designers and construction specialists – worked over 15,000 man-hours in a six-month period to successfully complete the FEED engineering scope of work.

Not only did this engineering/construction planning effort allow for the local Stork entity to showcase its diversity and integration since becoming part of Fluor, but it has also given rise to the client continuing to engage with the local project team for further brownfield engineering assessments of and construction planning for the facility, together with other impacted offshore facilities within the Cassia Field. Stork has been invited to submit a tender for the next phase of the project, which includes executing the brownfield modifications on the Cassia B platform.



# STORK EXCELS AT CAISSON MANAGEMENT



Critical to an asset's operations, caissons can face challenges from constant water exposure, which leads to stress, fatigue, increased corrosion and failure through cracking and wall defects. Stork offers more than 20 years of experience in delivering safe, reliable and cost-effective caisson management solutions throughout the UK Continental Shelf. Stork has a long track record of successfully delivering a holistic approach, from a project's commencement to its completion. As caisson condition continuously deteriorates in an aging asset, Stork offers a full-service and a fully in-house solution to reinstate caisson structural integrity.

## CUTTING-EDGE REPAIR TOOLING

In the past, supplies related to caisson repairs have been difficult to obtain in the supply chain. However, Stork has brought an integrated, state-of-the-art solution to the marketplace. Through significant research, investment and resources, Stork has developed swage repair tooling, which has been manufactured locally and is fully DNV approved. Furthermore, full Finite Element Analysis (FEA) testing and analysis results are available to further demonstrate the proven repair solution. Stork's unique swaging technology delivers a complete caisson management package: Assess, Inspect & Repair (A.I.R.).

- **ASSESS:** Starting with a full assessment, Stork's in-house integrity engineers provide data-driven integrity assessments, prioritization and planning packages to meet the needs of the specific client. Fully assessing the caissons' history, the engineering team will define what, when and where inspections should take place.
- **INSPECT:** The inspection phase then commences with an initial camera inspection, followed by high-pressure cleaning and additional camera surveys. Finally, ultrasonic thickness (UT) measurements are taken.
- **REPAIR:** Stork's repair offerings ensure full caisson integrity can be restored in the most optimal and cost-effective way. If required, Stork's experienced team can carry out the repair, utilizing the new swage repair tooling.

## STORK SWAGE REPAIR SOLUTION

### Innovation

- Improved swage technology through forging
- Cost reduction for required liners

### Assurance

- Independently assessed
- Risk-based inspection planning and implementation

### Features

- Improved efficiency of swage: effectively swage a range of caisson thicknesses without needing to vary liner section thickness and grade
- Pressure-driven, retractable centralizers: the tool is fully concentric with the liner throughout swaging
- Both digital and manual monitoring and tracking of pressure/volume: this controls the swage quality

### Safety

- Fully function- and load-tested
- Approved by accredited registrar: DNV-GL

### Knowledge

- Front-end engineering FEA was performed through Optimus (Aberdeen) Ltd. and was based on common North Sea caisson sizes from a range of 20" - 36"
- Proven track record in the management of caisson repairs

### Benefits

- Fast and effective repair method
- Multi-disciplined team, reducing personnel on board, while delivering to the highest quality standard
- Availability of tool for the work scope can be controlled in-house
- Full connection strength of each swage repair proven by manual and FEA calculations
- Competitive, low-cost solution
- Strong HSEQ culture ensures safe working practices
- Environmentally friendly and pollution-free
- Single interface and overall cost reduction



Stork's pressure-driven swage tool fixates new parts into damaged caissons.



# INTEGRATED SOLUTIONS FROM STORK

Our clients' assets – throughout their entire lifecycle – are at the heart of everything we do. Stork's solutions, services and resources, supported by our core values, strengthen our clients' competitive position. Efficiently, sustainably and safely.

## OUR SOLUTIONS

Stork offers fully integrated solutions to support the start-up of new facilities, to increase asset performance, and to optimize operations and maintenance strategies while fully embracing Industry 4.0 opportunities.

## OUR SERVICES

Stork takes on the responsibility of planning, scheduling and supervising all activities from continuous site presence to

large projects. We unburden our clients by applying our industry-proven work processes and supportive automation tools.

## OUR RESOURCES

People and tools are the foundation of all our services and solutions. Whether you need one specialist or hundreds of craft personnel to execute a project, Stork can quickly augment the resource pools that you require.

Visit us at [www.stork.com](http://www.stork.com) and learn more about how Stork can support your competitive edge.



Stork recovered energy from a 430 kW/hour air compressor to heat up process water.

## SOLUTION SAVES ENERGY IN CHOCOLATE PRODUCTION

In Veghel, the Netherlands, the famous company Mars produces some of the world's most popular chocolate treats. To transport the chocolate through the process inside the factory, Mars uses compressed air.

In 2015, Stork signed a three-year contract to perform maintenance on the installed compressed-air system. One of the largest air compressors, which runs every day of the year, consumes an average of 430 kW/hour in electrical power.

### HARNESSING THE POTENTIAL

In 2017, Stork began an investigation to see if this compressor could be adapted to recover energy during operation. At the same time, Mars was looking for a solution to another issue. It was using boilers to heat water to 53° Celsius (127° F). The water was used for various parts of production, including bacteria control. Mars wanted to increase the temperature in an energy-efficient way.

Stork developed a plan to do both. By upgrading the compressor's existing air coolers to a new design, returned water temperatures can be increased from 38° C (100° F) to 67° C (153° F). This heated return water feeds Mars' warm water exchanger. Instead of 53° C (127° F), the water needed for production now reaches temperatures of 63° C (145° F).

### STORK'S SINGLE-SOURCE SOLUTION

For this upgrade, Stork modified the existing compressor control system, embedding its own compressor controller and hardware. Supported by the mechanical expertise from Stork's location in Veghel, necessary changes to the piping and valve installation will also be executed.

In addition to enjoying an integrated solution from a single source, the client is also benefitting from a reduction in energy consumption. The new solution will reduce the energy needed to an equivalent of 119kW/hour.

## STORK UK ATTAINS INVESTORS IN PEOPLE SILVER AWARD

Investors in People is an internationally recognized accreditation that provides a standard to define what it takes to lead, support and manage people well and achieve sustainable results.

The Investors in People standard is made up of nine indicators, each sitting under one of three performance headings:

- Leading: creating purpose and motivating employees.
- Supporting: fostering customer focus and agility.
- Improving: making small changes with big impact.

Organizations are then assessed on how closely they meet these criteria through a performance model of progression. Stork is proud to be part of this standard, and our UK organization successfully received a Silver Award at the start of 2018. Peter Russian, Investors in People chief executive in Scotland, presented the award, which recognizes Stork's progress in developing each of the indicators.

Stork's work towards attaining the Investors in People Silver Award shows great dedication to continuous improvement, devotion to attracting new talent, and commitment to developing and retaining our current employees. Alongside the award presentation, Stork's Aberdeen, UK office also held an employee engagement day, featuring a number of interactive stands that allowed visitors to hear and see the great work that is being done throughout the region.



## NEW WELDING TECHNIQUES FOR FOOD, FEED AND BEYOND

Stork is expanding its capabilities with a new range of specialized welding techniques, focusing on stainless steel and aluminum products and/or semi-finished goods. This will allow Stork to increase the service it offers to the food, feed and dairy industries. With this expansion, Stork is now also able to offer specialist products to clients from the (semi-) nuclear industry. Initial projects will take place in the Netherlands.



# SAFETY IS NOT A PRIORITY AT STORK. IT'S A CORE VALUE.

How many times have we heard the phrase 'safety is our top priority'? Well at Stork, safety is not a priority – it's a core value. There is a small – but very important – difference. Every day, on the work site or in the boardroom, we each have a list of things to do. Every day, our priorities change as the outside world influences what must be rescheduled or compromised. Global HSE director Jim McQueenie explains how Stork creates a mindset for safety.



"At Stork, safety just isn't like that. Safety at Stork is a core value, and values never get rescheduled or compromised. We work safely, or we don't work. Especially since organizations with excellent safety performance are reliably top performers in productivity and quality. Safety isn't a priority. It's one of the ways we help our clients perform better.

Making sure we all go home to our families, friends and communities in the same or better shape than we arrived at work is what we all strive for. It's for the good of our people, and the benefit of our clients.

#### THE MEANING BEHIND ZERO

To build on our core value of safety, we have the vision we call REACH Beyond Zero. First of all, it is based on the concept of 'zero accidents'. That's where the first mindset change is required. Are accidents inevitable or preventable? Stork believes they are preventable.



Secondly, and this is the 'reach beyond zero' part, we believe that safety is about people and processes, not about the resulting accident statistics. Low or zero accident rates can be achieved through excellent people and processes. It is true that low accident rates can also be achieved through luck, normal variation in occurrence, manipulation of reporting practices and post-accident management. REACH Beyond

Zero is about having great people, the right culture, robust processes and leading technology in place so we can be assured of great safety outcomes. When it comes to safety, we do not rely on luck!

#### TAKING TO THE STREETS

For example, driving is one of our key high-risk activities. In Colombia in 2017, we took a closer look at driving safety. Did we focus on in-vehicle monitoring, driver training, vehicle selection, journey management? Yes, we did. But we also restructured our driving activities to reduce our driving exposure by three million kilometers (1.8 million miles) per annum. An intrinsic change that brought benefits for our clients and improved our safety performance.

Of course, safety excellence comes from both large-scale and small-scale actions. We have been focusing on high potential near-miss events: situations in which no actual harm was caused, but had we not been alert, it could have been. For example, by going through pre-job safety checks, one of our U.S. colleagues identified live electrical power on his job site and used his stop-work authority to ensure his colleagues' safety – preventing a potentially life-threatening incident.

At Stork, our dedication to safety is not a priority. It's a core value and a mindset. And it's the responsibility of every single person in our organization. Ensuring our clients' top performance means making sure we protect our people, every step of the way".



# WAIRAKEI-PROOF TURBINE BLADES

For many countries with a lot of thermal activity, geothermal power is a major - and sustainable - source of energy. New Zealand, for instance, operates 15 geothermal power stations, providing more than 13% of the country's electricity. The stations use the heat extracted from the ground to drive their turbines.

How does it work? Using a drilled water well, hot water is pumped up from a geyser and used to drive the turbine with its low-pressure steam of about 180° Celsius (356° F). As the steam cools, it turns into water, which is pumped down into the well again.

The Wairakei station, near the famous Wairakei geyser, is one of the oldest sites to produce geothermal power. It has been operating since 1958. Since the Wairakei steam conditions are poor, these stations need to change out their turbine blades more frequently than other power stations. Most recently, the operator turned to Stork Turbo Blading to manufacture new blades. To increase the durability of these turbine parts, Turbo Blading engineered them from special steel that is



*New Zealand's famous Wairakei geyser has provided geothermal power since 1958.*

more resistant to corrosion than the original material. During the summer overhaul, Stork successfully replaced all of the low-pressure blades on time. As a result, additional assignments and future projects are in scope.

## KNPC AND SAUDI ARAMCO RECOGNIZE STORK'S SKILLS



Stork recently participated in KNPC's Annual Contractor's Day in Kuwait. The local team presented its specialty services to KNPC's management and contracts team. KNPC showed interest in Stork's non-destructive testing services.

KNPC also recently acknowledged Stork's leak sealing teams for their excellent and swift support. Specifically, for stopping leaks in critical pipelines in some Kuwaiti projects. Saudi Aramco also sent appreciation from its base in Saudi Arabia, as the Stork leak sealing team had also helped prevent shutdowns for them.

## TURBO BLADING JOINS DUTCH INNOVATION CLUSTER



Stork Turbo Blading is the newest member of the Dutch Innovation Cluster Drachten. Turbo Blading uses technologies such as 3D reverse engineering to reproduce turbine engine blades. This advanced technology makes the production of comparable components possible, and redesign helps to improve the original parts.

The Innovation Cluster Drachten is the link between 18 international and highly innovative high-tech companies in the north of the Netherlands. High-tech is one of the industry growth sectors in the Netherlands' northern region.

# EDUCATING THE NEXT GENERATION

Founded in 1991, the Next Generation Program is a community engagement initiative by the Petroleum Club of Western-Australia and Perth's Curtin University. The program's objective is to educate students about the oil and gas industry and the important role energy plays in our society, and to provide information about the diverse career options available. All in a fun, interactive and educational environment.

Every year, the Next Generation committee works closely with teachers and mentors to continue to expand and develop the program. Their aim is to keep it current, interesting and of added value to the students' education by providing information on career pathways that may not be easily accessible to them.

Last year, Stork joined the program with an offer to develop a strong mentoring relationship with the students before the concluding event – a careers open day at Curtin University. Each school is matched with an industry mentor, giving students first-hand access to someone working directly in

the industry. This program, and Stork's participation, provides an opportunity to inspire the next generation and promote the oil and gas industry to our future workforce.



## GIRL POWER IN TECH



The annual Girls Day, initiated by the Dutch National Expert Organization on Girls/Women and Science/Technology (VHTO), aims to generate interest in technology and IT studies specifically with girls, aged 10-15. Stork's electrical and instrumentation division, Istimewa, opened up its doors to girls from the Bishop Ernst grammar school in Goes, the Netherlands. Under the guidance of Professor Rainbow, the young participants got acquainted with static electricity, learned about protons and neutrons and tested dry ice applications. After a fun morning in the workshop, Stork colleagues hope to inspire a new generation of female strength in the technology sector.

## CONNECTING COMMUNITIES

Stork understands that a region's development goes hand-in-hand with its people's progress. In Puerto Triunfo and the Indigenous Reserve of El Tigre, Colombia, internet access is not always a given. That's why Stork Colombia donated computers that will connect these communities with Stork's local, online Public Service Employment Unit platform. By doing so, Stork helps ensure that the jobs we generate in the region are available and visible to its inhabitants, further stimulating employment there.





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