



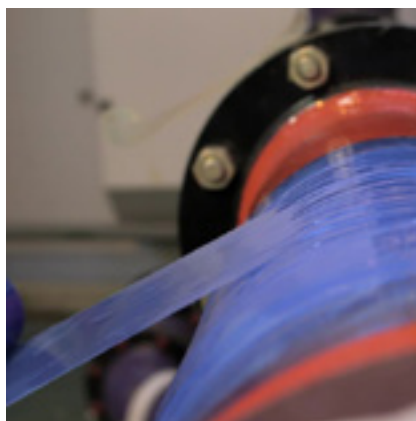
# COMPOSITE REPAIR SOLUTIONS

THE EXPERT PROVIDER OF ASSET OPTIMISATION  
AND INTEGRITY MANAGEMENT SERVICES TO  
THE GLOBAL OIL & GAS ENERGY INDUSTRIES.

ASSET INTEGRITY PARTNER

**STORK**

# ASSET INTEGRITY PARTNER



## COMPOSITE REPAIR SOLUTIONS

Today, ageing asset infrastructure requires expensive maintenance and repair. Pipe corrosion in particular is a big industry problem. Stork is committed to developing and extending its range of technologies and solutions to ensure value is added throughout the asset lifecycle.



WITH THE AGEING INFRASTRUCTURE IN THE NORTH SEA AND MANY OTHER REGIONS, MAINTAINING ASSET INTEGRITY IS A CHALLENGE WHICH INDUSTRY MUST TAKE SERIOUSLY. STORK'S COMPOSITE REPAIR SOLUTIONS OFFER A PROACTIVE AND SAFE APPROACH WHICH CAN BENEFIT CLIENTS; SIGNIFICANTLY REDUCING COSTS, RISK AND OPTIMISING THE PERFORMANCE OF THEIR ASSETS.



**Composite Repair Technical Authority**  
Stork



Stork launched its range of composite repair solutions in 2013 to complement its fully integrated asset integrity led portfolio.

A wide range of products specifically designed to provide flexible, efficient and cost-effective repairs to piping and infrastructure components is now available. Stork PowerSleeve and Stork AquaWrap innovations can also be used to restore structures and vessels from internal and external wall loss.

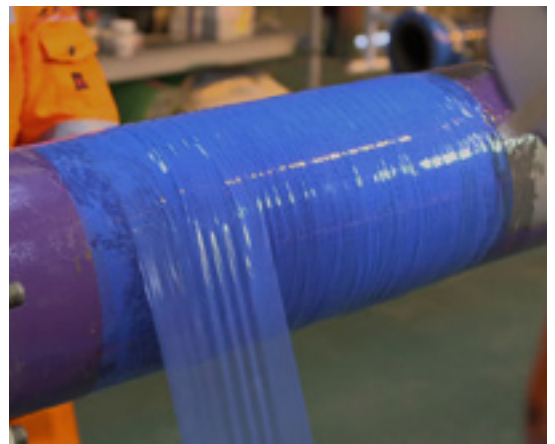
Stork's pipe encapsulation; and the containment and reinforcement of both flat, irregular, and complex curved surfaces. With exceptional adhesion properties, it is proven in extreme climates and harsh chemical environments.

Custom pipe repair solutions including stainless steel clamps, bossed pipe service saddles, under-pressure tees and mini/snap clamps are also available. All calculations for pressure containment and structural integrity are carried out in-house by Stork's corrosion specialists; offering flexible bespoke composite repair solutions within short lead times.

Stork's composite repair solutions offer significant cost savings for clients and deliver the widest range of composite repair products available on the market. Stork can offer a one-stop-shop approach to bespoke pipe repair solutions, eliminating the need for multiple contractors.

# POWERSLEEVE SOLUTIONS

Stork's PowerSleeve is a high strength, field-applied composite system that is used for structural reinforcement and leak repair.



It is used to encapsulate internal corrosion and act as a barrier against future through wall conditions in piping repairs. PowerSleeve is a wet layup, or field-prepped, fibre-reinforced polymer (FRP) system that consists of custom blended epoxy and unique fibre reinforcements tailored for piping repair. A broad line of unique epoxy matrix systems and fabrics are available to handle a wide variety of applications including high heat applications, harsh chemical environments, and cool installation temperatures.

Five different epoxy systems and dimensions are available. The most common system is Stork's high strength W-11 substrate, which is an E-glass premium fibreglass roving, alloyed with Kevlar®, in a stitched, tri-axial, non-crimped, fabric. This fabric is radically different than common fibreglass in a woven configuration. The standard W-11 tri-axial fabric is designed for application to straight piping systems. Being factory pre-treated, PowerSleeve ensures absolute microfibre matrix saturation. Alternate custom alloy and carbon fibre are also available for special applications.

Stork's PowerSleeve underwent numerous field trials, in-house testing, and third party testing. These tests have demonstrated that it possesses those performance qualities required for the repair of corrosion damage, both internal and external. The material can be applied both circumferentially and helically along the pipe. Its low profile enables use in tight locations, within an inch of an obstruction in some cases.

This innovative composite solution is effective in a variety of applications including leak repair, pipe encapsulation, complex curved and irregular surfaces above and below the waterline.

## PIPE REPAIR

Stork also fabricates, supplies and installs under pressure tees (UPTs), pipe repair clamps, flange adaptors, universal coupling and studed flange converters to meet your specification.

# AQUAWRAP SOLUTIONS

Stork's AquaWrap is a Moisture Cured Urethane Pre-impregnated (Pre-Preg) high strength system used to reinforce and repair piping.



It can be used in wet or underwater conditions using resin impregnated fiberglass or carbon fibre fabric. 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 including – but not limited to – reinforcement, corrosion protection, abrasion protection and impact protection.

The AquaWrap is supplied “ready to use – just rip and wrap” and requires no mixing or measuring. The only requirement is a source of clean water. Each roll is supplied in a nitrogen filled, multi-layered, Mylar bag and requires no mixing or resin preparation.

Although water activated, the product is not water-soluble and works as effectively in wet or dry conditions and underwater.

Many different widths and lengths are available and AquaWrap's excellent durability resists cracking. The product range is heat resistant up to 120°C and can be applied within 30 minutes.

## 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 solutions on application



COMPOSITE WRAP

# SAFETY IS OUR CORE VALUE

Stork is dedicated to being recognised as an industry leader in HSEQ; by our employees, clients and industry peers. REACH Beyond Zero, our value driven HSEQ engagement programme, will help us to achieve this goal.

REACH Beyond Zero is our HSEQ vision, to engage all Stork employees to challenge themselves, to think and do more to improve our HSEQ culture and performance. As an organisation we REACH Beyond Zero by functioning as one team with shared values, driving action to transform our HSEQ culture and performance.

Safety is our core value and we are committed to translating our HSEQ ethos into sustainable and effective actions. REACH Beyond Zero communicates on Environmental and Quality issues in addition to Health and Safety as a fully encompassing employee-led initiative.

Our three year REACH Beyond Zero Road Map defines a measurable programme of activities to provide direction and to actively engage all of our personnel at every level and location.

Through REACH Beyond Zero, we deliver for our clients by:

- Engaging with and positively impacting their HSEQ culture
- Improving HSEQ performance on their assets
- Providing transparent HSEQ reporting
- Enhancing communication through shared information
- Leading topical HSEQ campaigns, discussions transferring knowledge and best practice

REACH Beyond Zero is built on five core values, which we seek to demonstrate at every level of our organisation.

The values are:

**Visibility** – acting as active champions of the REACH Beyond Zero values

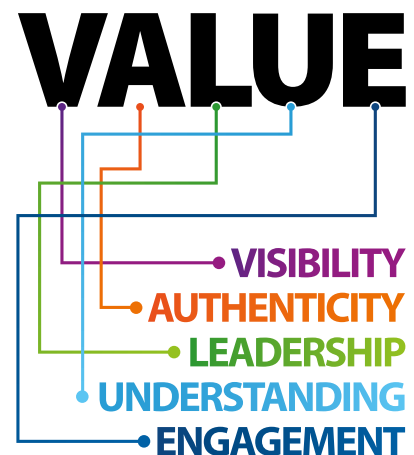
**Authenticity** - demonstrating personal commitment through action

**Leadership** - taking personal ownership and responsibility for HSEQ in the workplace

**Understanding** - understanding our HSEQ challenges and contributing to improvements

**Engagement** - feeling empowered to intervene when a situation appears unsafe

 **REACH**  
BEYOND ZERO



# CASE STUDIES

## Workscope

Stork was contracted by Wood Group PSN to reinforce the structural integrity of a two level module after severe corrosion was identified on Shell U.K.'s Brent Alpha installation. All four sides of the module showed severe corrosion and multiple through wall anomalies.

## Solution

Stork applied its innovative pipe repair system; PowerSleeve.

PowerSleeve's engineered composite reinforcement was selected because of its 100% solids epoxy impermeable barrier. This combined with the strength of its custom E-glass and Kevlar® fabric made it the best choice to encapsulate and reinforce structures on this project.

The surface of the module was hand prepared by Stork's multi-skilled rope access technicians and all voids filled with epoxy putty to smooth the surface area. All repair calculations are conducted in-house, providing the client with a fully customised rapid delivery.

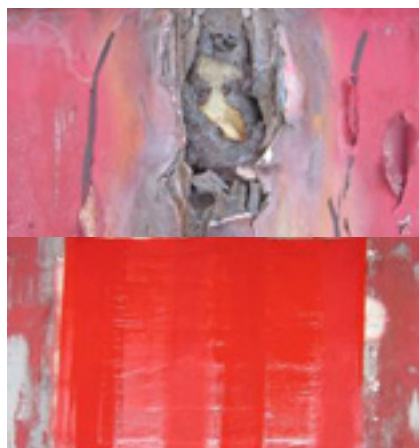
## Results

Stork's technicians were able to completely cover affected area; restoring original structural integrity.

Additional worksopes have been requested due to proven results on this workscope.

*"Stork's PowerSleeve delivered a rapid solution which has produced significant time and cost savings. The original structural integrity was completely restored and affected area covered. We found the attitude of the Stork technicians to be of an excellent standard. They displayed a safe and conscientious attitude towards the tasks they were asked to carry out and completed the scope as per the planned timeline."*

**George Rennie**  
**ISC Fabric Maintenance Lead**  
**Wood Group PSN**



## information

- **When:**  
February 2013
- **Location:**  
Shell U.K., Brent Alpha
- **Insulation conditions:**  
5 C ambient temperatures
- **Installation type/products:**  
Field wetted Powersleeve composite system
- **Materials:**  
5/20UW Epoxy Putty Stick, Power Sleeve® W-11® hybrid fabric with Standard Resin, Bio-Dur 563® Epoxy basecoat/primer and final topcoat
- **Safety:**  
Project delivered safely with no lost time incidents
- **Workscope completion:**  
The workscope was completed on time and within budget



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