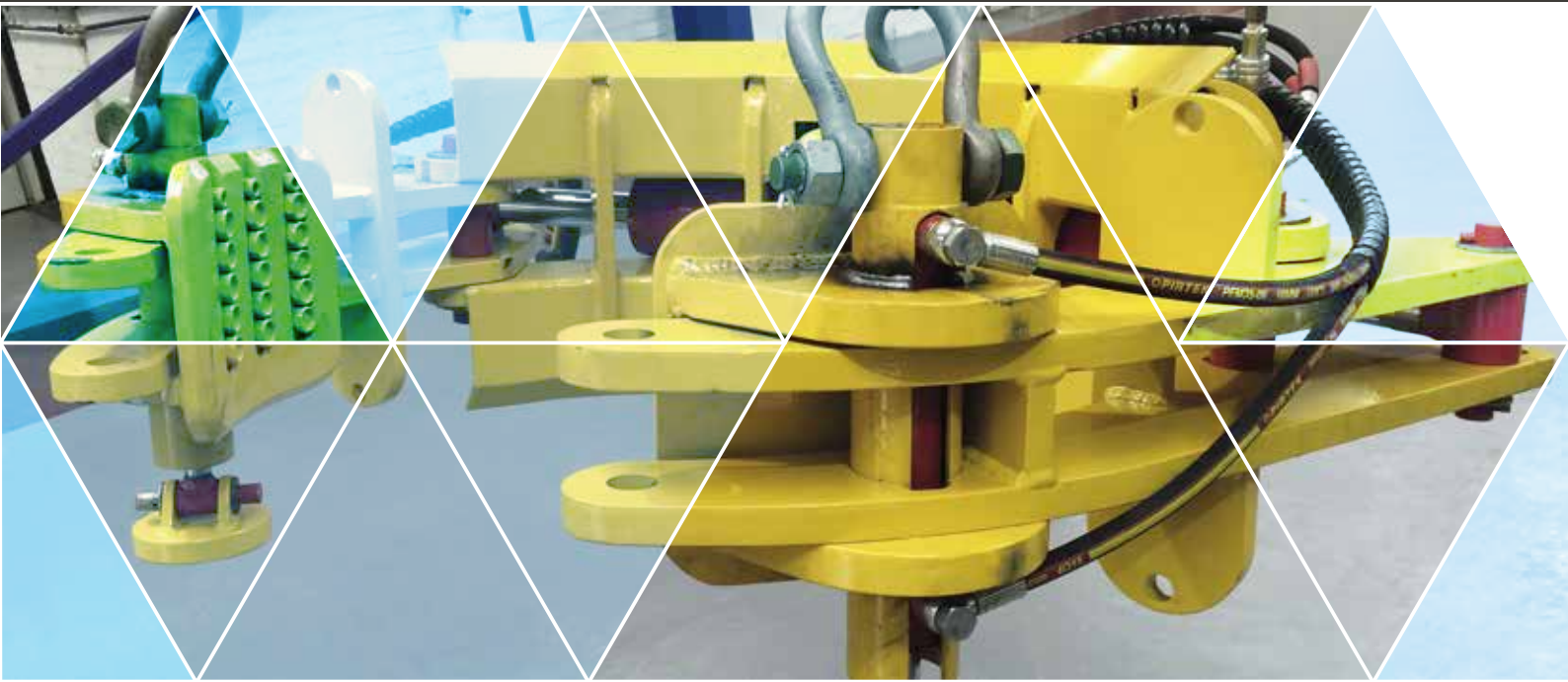


## QV Conductor Integrity Range



**UNITY HAS DESIGNED AND ENGINEERED ITS OWN RANGE OF ROBUST, COST EFFECTIVE AND VERSATILE CLAMPS TO ENSURE THE INTEGRITY OF OFFSHORE OIL AND GAS WELLS AROUND THE WORLD. THESE CLAMPS ARE USED TO REPAIR DAMAGED CONDUCTORS WHICH ARE OFTEN SUBJECT TO THE REPETITIVE, DAMAGING EFFECTS OF AGE, HEAVY LOADS, MOVEMENT, FRETTING AND HARSH ENVIRONMENTAL OPERATING CONDITIONS.**

This range of clamps will protect damaged parts of the well from the seabed to the wellhead and provide reinforcement and integrity to enable continued production into the future, avoiding costly downtime in repairing sections of casing strings, conductors or associated parts.

A complementary range of support and inspection tools have also been developed by Unity to ensure the best results are delivered to our customers on time every time.

## ENSURING WELL INTEGRITY IN HARSH ENVIRONMENTS

**Currently around 70% of global oil production is extracted from mature fields. Ever increasing productivity and field life is enabled by impressive advances in oilfield technology and innovation. Nevertheless, ageing well and surface infrastructure, which is often operating long past its originally intended lifespan, can cause significant integrity challenges for operators.**

There is a substantial risk of failure for ageing equipment in these brownfield regions, particularly when operating in harsh offshore environments. Wave action, seabed subsidence, marine growth, seawater and chemicals all take their toll, creating leaks, scale, corrosion and wellhead and conductor movement.

For example, corrosion, buckling or seabed subsidence can cause the well to sag or drop, creating the need to stabilise the well and support its load. In other cases, excessive lateral movement can make the well unstable. Conductor guides can rub against the conductor causing the metal to wear thin and eventually crack or split and conductor connectors can be damaged from the expansion and contraction of the well over its lifetime. This strain can cause conductors to part if not addressed, potentially exposing the inner casing strings to sea water, leading to corrosion damage.

All these factors place repetitive stresses on equipment, eventually causing damage and potentially resulting in catastrophic failure, major safety implications and the costly process of shutdown and replacement.

The cost of dealing with well integrity failures is estimated to be a staggering \$1 billion per day, so operators are understandably keen to adopt a proactive approach.

Unity is dedicated to ensuring well integrity and productivity through the provision of a range of services and innovative technology solutions.

## INNOVATIVE SOLUTIONS

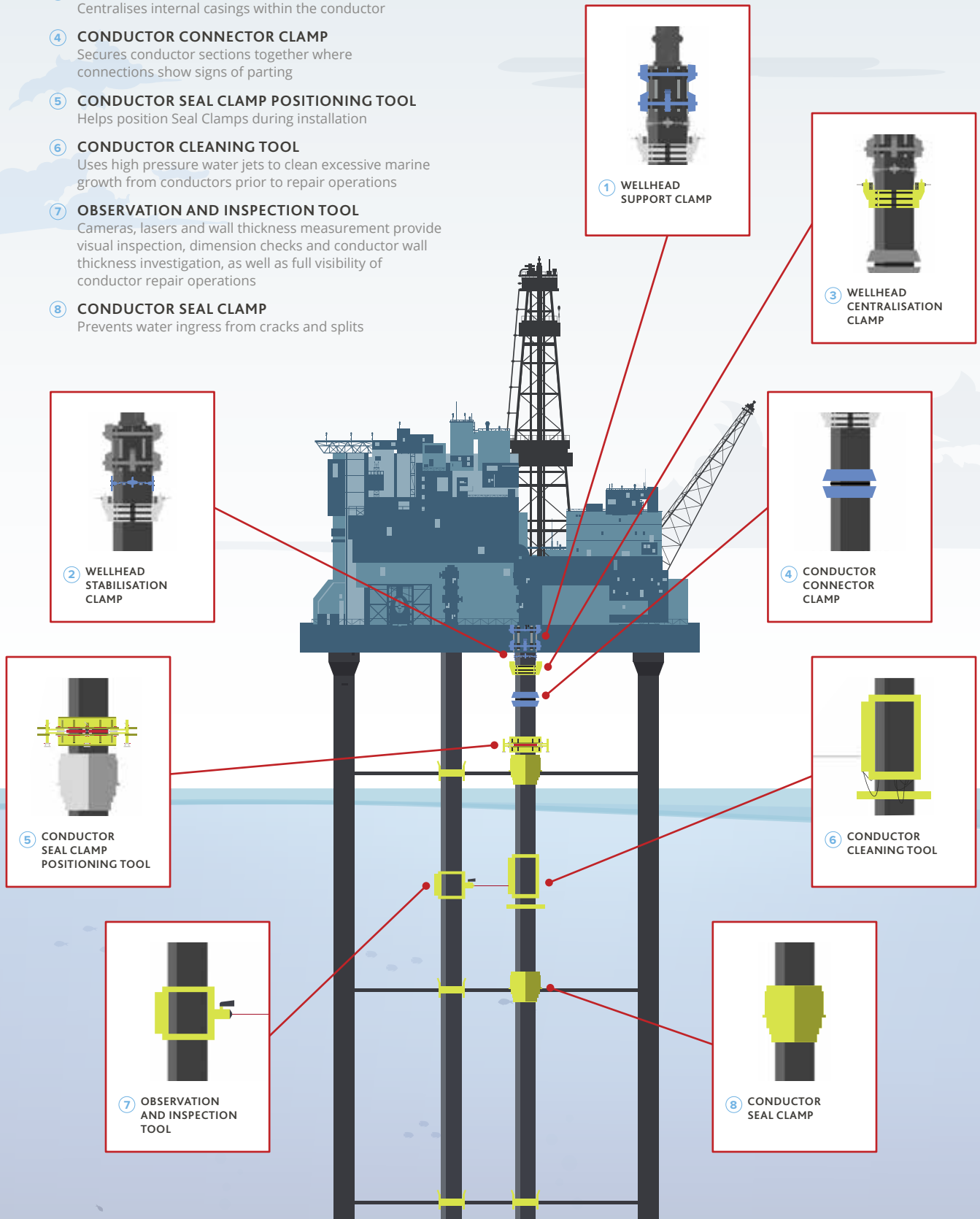
Utilising highly skilled in-house engineering expertise, Unity has designed, built and installed a number of wellhead and conductor repair clamps. The designs are used to alleviate movement, provide load bearing support and stability and prevent seawater ingress. Designs are modified to suit the specific well, including the operational specifications and challenges presented by the surrounding environment. This alternative solution, to replacing part of the conductor, can save significant costs, especially in non productive down time.

Unity's solutions can reduce the cost of wellhead and conductor repair by over £500,000 by mitigating the need for conductor replacement. Operations to install our solutions usually take days as opposed to weeks or even months in some cases, providing additional savings in crew and equipment costs. Operators can rest assured the integrity of their assets above the mudline will allow their wells to continue generating additional hydrocarbon revenue for years to come. This is just one area of many that Unity can help the industry maximise well integrity and production performance.



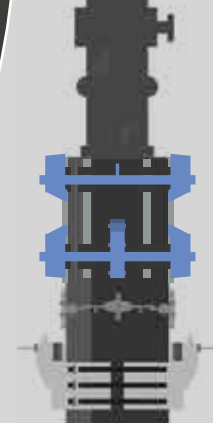
## QV CONDUCTOR INTEGRITY RANGE

- ① **WELLHEAD SUPPORT CLAMP**  
Prevents excessive vertical movement of wellhead equipment into the conductor
- ② **WELLHEAD STABILISATION CLAMP**  
Prevents excessive lateral movement of the conductor
- ③ **WELLHEAD CENTRALISATION CLAMP**  
Centralises internal casings within the conductor
- ④ **CONDUCTOR CONNECTOR CLAMP**  
Secures conductor sections together where connections show signs of parting
- ⑤ **CONDUCTOR SEAL CLAMP POSITIONING TOOL**  
Helps position Seal Clamps during installation
- ⑥ **CONDUCTOR CLEANING TOOL**  
Uses high pressure water jets to clean excessive marine growth from conductors prior to repair operations
- ⑦ **OBSERVATION AND INSPECTION TOOL**  
Cameras, lasers and wall thickness measurement provide visual inspection, dimension checks and conductor wall thickness investigation, as well as full visibility of conductor repair operations
- ⑧ **CONDUCTOR SEAL CLAMP**  
Prevents water ingress from cracks and splits



# Wellhead Support Clamp

1



**WELLHEAD SUPPORT CLAMPS PROVIDE A MEANS OF SPREADING THE WELLHEAD LOAD ACROSS THE CONDUCTOR AND CASING STRING IN ORDER TO PROVIDE ADDITIONAL SUPPORT AND ENSURE OPTIMUM WELL INTEGRITY.**

Seabed subsistence and damaged casing can cause wells to experience excessive vertical movement. In these situations, wells require additional support to evenly spread loads and enable continued safe production. Our Wellhead Support Clamps allow for normal expansion and contraction of the well over time as temperatures and production rates vary, whilst preventing excessive movement outside these accepted parameters.

## Benefits:

- Easily fitted, removed and maintained, requiring less than a day of operational downtime to carry out the repair
- Enables safe rig-up of equipment to carry out interventions, helping to reinstate or increase production
- Save hundreds of thousands of pounds in casing repair costs
- Downtime and manufacture lead times significantly reduced when compared with replacing parts of inner casing strings



## Features:

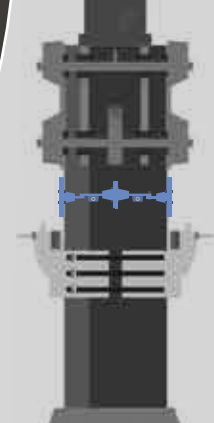
- Allows for expansion and contraction of the well during production
- Loads are shared between the conductor and casing
- Easy installation within a restricted work area around the wellhead
- Includes a means of quantitatively surveying the well for potential excessive movement around the casing and conductor
- All required calculations and analysis completed to ensure the design is capable of withstanding required forces
- Short delivery times for design and manufacture. Approximately 6-8 weeks
- Designs can be adapted to suit client specific requirements





## Wellhead Stabilisation Clamp

2



**WELLHEAD STABILISATION CLAMPS ARE USED IN CASES WHERE WELLS ARE SUBJECT TO EXCESSIVE MOVEMENT DUE TO DAMAGED CONDUCTORS. THE CLAMPS ENSURE THAT EQUIPMENT CAN BE RIGGED UP SAFELY AND THE WELL CAN CONTINUE PRODUCING.**

Harsh offshore environments can have damaging effects on wells. It is not uncommon for conductors to part, causing excessive lateral movement. This movement means it is difficult and often unsafe to rig-up equipment onto the xmas tree but our products provide the ideal solution.

### Benefits:

- Limits movement preventing further damage
- Easily fitted, removed and maintained, requiring less than a day of operational downtime to carry out the repair
- Enables safe rig-up of equipment to carry out interventions, helping reinstate or increase production
- Avoids the huge cost of replacing parts of the conductor and centralisers
- Downtime and manufacture lead times are significantly reduced when compared with replacing other parts of the conductor



### Features:

- Incorporates removable wear pads to prevent metal to metal contact
- Does not interfere with existing equipment
- Can be designed to fit into tight wellhead areas
- All required calculations and analysis completed to ensure the design is capable of withstanding required forces
- Provides a safe environment for equipment to be rigged up onto Xmas trees
- Quick and simple installation by two technicians in under a day
- Short delivery times for design and manufacture. Approximately 6-8 weeks
- Designs can be adapted to suit client specific requirements



## Wellhead Centralisation Clamp

3



**WELLHEAD CENTRALISATION CLAMPS ENSURE THAT THE WELL'S CASING STRING IS CENTRALISED WITHIN THE CONDUCTOR. IF THEY ARE OFF-SET, FOR INSTANCE WHEN INTERNAL CENTRALISERS HAVE BECOME DAMAGED, THE CASING STRING CAN START TO RUB AGAINST THE DAMAGED CENTRALISERS OR THE CONDUCTOR.**

This can cause further damage, requiring repair or replacement parts. Our clamps will centralise the casing string, prevent further damage and negate the need to replace damaged centralisers or sections of the conductor.

### Benefits:

- Avoids the huge cost of replacing parts of the conductor and centralisers
- Limits movement preventing further damage
- Enables safe rig-up of equipment to carry out interventions, helping reinstate or increase production
- Downtime and manufacture lead times are significantly reduced when compared with replacing other parts of the conductor
- Easily fitted, removed and maintained, requiring less than a day of operational downtime to carry out the repair



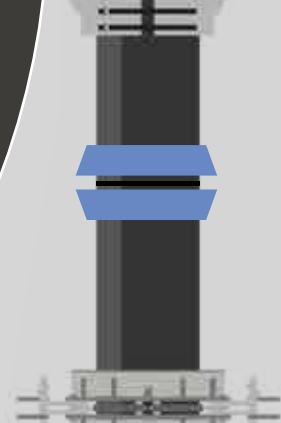
### Features:

- Does not interfere with existing equipment
- Can be designed to fit into tight wellhead areas
- Incorporates removable wear pads to prevent metal to metal contact
- Provides a safe environment for equipment to be rigged up onto Xmas trees
- Designs can be adapted to suit client specific requirements
- Quick and simple installation by two technicians in under a day
- All required calculations and analysis completed to ensure the design is capable of withstanding required forces
- Short delivery times for design and manufacture. Approximately 6-8 weeks



## Conductor Connector Clamp

4



**CONDUCTOR CONNECTOR CLAMPS ARE DESIGNED TO GRIP CONDUCTOR SECTIONS EITHER SIDE OF THEIR CONNECTORS, PROVIDING ADDITIONAL SUPPORT.**

Conductor connectors can experience damage by the expansion and contraction of the well over its lifetime. This strain can cause conductors to part, potentially exposing the inner casing strings to seawater and leading to corrosion damage. Unity's clamps ensure conductor sections remain connected and are sealed against any water ingress.

### Benefits:

- Secures conductor sections together where connections show signs of parting
- Prevents water ingress and the resulting corrosion repair or replacement of casing sections
- Enables the continued use of existing conductor sections
- Shorter design and manufacturing lead times than new conductor sections enable production to be reinstated more quickly
- Easier and quicker to install than new conductor sections
- Prevents further damage, and the associated repair costs, restraining axial and bending forces across the damaged connector

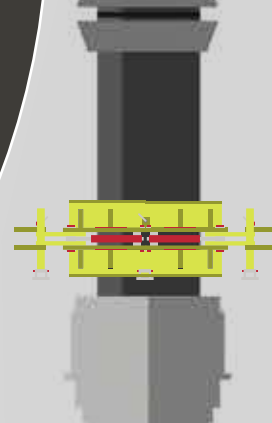
### Features:

- Designs can be adapted to suit specific conductor sizes and degrees of damage
- Split sleeve, clamp style arrangement, built in two halves so it can be installed in-situ
- Installed using rope access
- Internal slip and packer arrangement restrains axial and bending forces across the damaged connector
- Clamping force generated from a number of heavy hex studs and nuts tightened using standard torquing equipment for connectors above the water line and a hydraulic setting mechanism for any connectors below the sea level
- All required calculations and analysis completed to ensure the design is capable of withstanding required forces
- Designs are adapted to suit the dimensions of client conductors



## Conductor Seal Clamp Positioning Tool

5



**THE CONDUCTOR SEAL CLAMP POSITIONING TOOL ASSISTS WITH THE INSTALLATION OF CONDUCTOR SEAL CLAMPS SHOULD THERE BE AN ISSUE MOVING THEM INTO POSITION DURING INSTALLATION.**

Due to marine growth and the type of damage frequently experienced within the conductor guides, Conductor Seal Clamps can require additional force to push the clamps into the correct position. Our Positioning Tool grips onto the conductor directly above the Conductor Sealing Clamps and pushes it into position using powerful hydraulic rams.

The tool is installed using rope access and provides over seven tonnes of push force onto the 'stuck' clamp. The rams used to push the clamp provide 200mm/7.87" of travel and sufficient grip on to the conductor to resist the reaction of push rams.

### Benefits:

- Prevents operational delays, and associated costs, by ensuring Conductor Seal Clamps can be installed quickly and efficiency
- Rope access installation is more cost effective compared against the alternative option of using ROVs during subsea conductor repair operations



### Features:

- Three specially designed feet make secure contact with the Conductor Seal Clamp at pre-determined points
- Powerful hydraulic rams provide seven tonnes of push force
- Rams provide 200mm/7.87" of travel
- Powerful clamps grip the conductor and resist the reactive forces of the push rams
- Hinged clamp installation design, using hydraulic open/close rams to grip tool to conductor
- Installed via rope access using a bridle attached to 3 x 4.75 Tonne shackles, lowered down the outer diameter of the conductor to the relevant location
- 914mm/36" diameter closed clamp. 1499mm/59" diameter open clamp
- Operated from a control panel on the platform

### Specifications:

**Load Rating :** 7 tonnes push force @ 200mm travel

**Dimensions:** 0.5m tall, to suit 30" Conductor

**Weight:** 350 kg





## Conductor Cleaning Tool

6

**UNITY'S CONDUCTOR CLEANING TOOL REMOVES EXCESSIVE MARINE GROWTH FROM CONDUCTORS IN ORDER TO ALLOW INSPECTION AND REPAIRS TO TAKE PLACE. THIS INCLUDES THE INSTALLATION OF CONDUCTOR SEALING CLAMPS, CONDUCTOR CONNECTOR CLAMPS AND CONDUCTOR OBSERVATION AND INSPECTION TOOLS.**

Excessive marine growth on conductors can hinder the repair of various type of conductor issues. The removal of marine growth is an important part of pre-repair work that helps ensure operations are successful first time. Unity have designed a powerful Conductor Cleaning Tool to remove marine growth and assist in the successful repair of damaged conductors.

### Benefits:

- Aids the preparation for efficient installation of conductor repair clamps, reducing repair operation time and cost
- Cleans conductors so accurate conductor inspection and investigation can take place, ensuring full understanding of conductor issues can be assessed and appropriate solutions determined
- Cost effective rope access installation method when compared against the alternative option of using ROVs
- High pressure water jets clean conductors more effectively than alternative methods such as scrapers, ensuring an optimum repair environment

### Features:

- Clamps onto the conductor using an upper gripping clamp
- A lower ring rotates around the conductor with two powerful high pressure water jets to clean 360 degrees as the tool is lowered down the conductor
- Cameras are incorporated to provide a visual indication that the necessary area is cleaned sufficiently
- Installed via rope access using a bridle attached to 3 x 4.75 tonne shackles, lowered down the outer diameter of the conductor to the relevant location
- Operated from a control panel with video display, on the platform

### Specifications:

<b>Dimensions:</b>	1.4m height x 1.2m diameter
<b>Weight:</b>	390 kg
<b>Water Jet Pressure Rating:</b>	1500 bar
<b>Water Jet Flow Rate:</b>	40-80 LPM
<b>Cameras:</b>	1 x PTZ, 2 x fixed



## Conductor Observation and Inspection Tool

7

### UNITY'S OBSERVATION AND INSPECTION TOOL IS DESIGNED TO MONITOR CONDUCTOR REPAIR OPERATIONS AND CARRY OUT INSPECTION AND DAMAGE INVESTIGATION.

Carrying out repair work on conductors can be a challenge due to the awkward location. Obstructions can make it hard to see exactly what is going on. It is important to fully understand the extent of any damage so appropriate repair work can take place.

Unity have designed an Observation and Inspection Tool, which enables crews carrying out conductor repairs greater visibility on the work they carry out and provides the ability for users to fully understand the extent of the damage they are dealing with in order to plan the most suitable corrective maintenance.

#### Benefits:

- Using cameras, our tool provides complete visibility of conductor repair operations, assisting in the success of operations first time
- Multi-function inspection, including laser dimension measurement, wall thickness measurement and video display, providing full inspection capabilities on conductors of concern
- Enables users to understand the full extent of conductor damage in order to plan the most suitable corrective maintenance
- Employs a cost effective rope access installation method, compared against the alternative option of using ROVs during subsea conductor inspection and monitoring operations

#### Features:

- Clamped onto adjacent conductors to those being repaired to provide a full view of the repair work
- Clamped onto conductors requiring repair, for full inspection and investigation
- Clamps onto conductors using a powerful gripping clamp
- Cameras provide clear views of the inspection point or repair work
- Wall thickness and laser measurement incorporated for accurate dimension checks
- Installed via rope access using a bridle attached to 3 x 4.75 Tonne shackles, lowered down the outer diameter of the conductor to the relevant location
- Operated from a control panel with video display, on the platform



## Conductor Seal Clamp

8

**CONDUCTOR SEAL CLAMPS PROTECT CONDUCTORS THAT HAVE BEEN DAMAGED BY WELL MOVEMENT. THE MOVEMENT CAUSES RUBBING BETWEEN THE CONDUCTOR GUIDES AND THE CONDUCTOR LEADING TO EXCESSIVE WEAR, THINNING OF THE METAL AND EVENTUAL CRACKING OR SPLITTING. THIS DAMAGE LEADS TO WATER INGRESS AND CORROSION OF INTERNAL CASING STRINGS.**

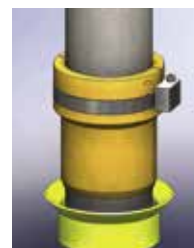
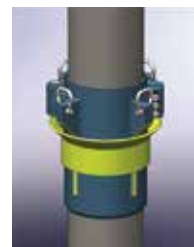
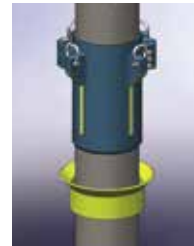
Our Sealing Clamps are installed above the conductor guide and slid into position between the conductor guide and conductor, preventing entry of seawater and protecting against further damage.

### Benefits:

- Prevents corrosion to inner casing strings from water ingress, negating the need to replace casing sections
- Enables the continued use of existing conductor sections
- Short design and manufacturing lead times enable repairs to be carried out more quickly than fitting new conductor sections

### Features:

- Robust design prevents damage from fretting and rubbing
- Upper and lower inserts ensure oxygenated seawater cannot enter through the damaged section of conductor after installation
- Hinged split sleeve, clamp style arrangement, built in two halves so it can be installed in-situ
- Installed via rope access using a bridle attached to shackles, lowered down the outer diameter of the conductor to the relevant location
- Clamps are set by tightening heavy hex studs and nuts using a hydraulically activated system or using a ratchet type gearbox to provide drive for tightening a clamping band
- Can be designed to alleviate shear, axial and moment stresses
- Designs are adapted to suit the particular dimensions of the conductor and guide





Client specific requirements for variations of these products can also be discussed.

### **Aberdeen**

Wellheads Crescent, Dyce, Aberdeen, AB21 7GA, UK

T: +44 (0) 1224 937600

### **Esbjerg**

Øresundsvej 11, 6715 Esbjerg North, Denmark

T: +45 7370 9550

### **Great Yarmouth**

Bessemer Way, Great Yarmouth, Norfolk, NR31 0LX, UK

T: +44 (0) 1493 653555

[enquiries@unitywell.com](mailto:enquiries@unitywell.com) [www.unitywell.com](http://www.unitywell.com)

