



GALVO-STRING HANGING GALVANIC ANODE RETROFIT SOLUTION

CAPABILITIES STATEMENT

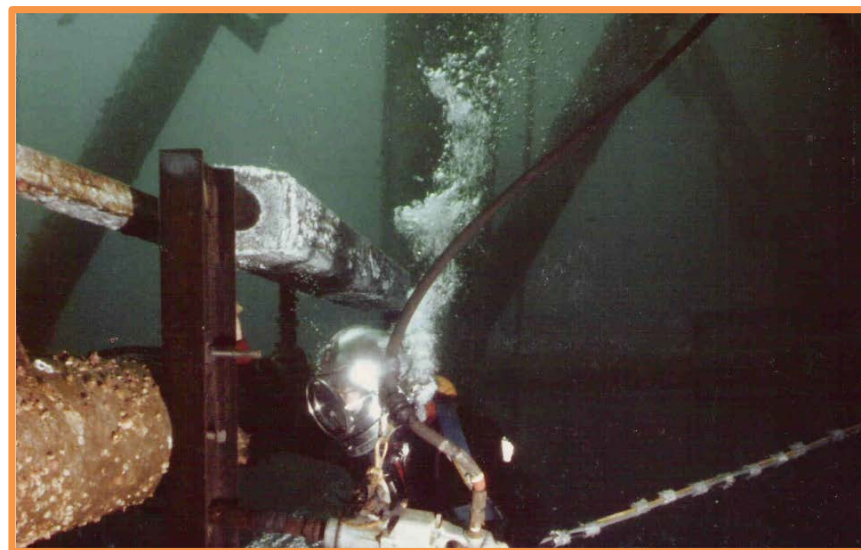
In collaboration with **ECS**



WHY GALVO-STRING ?



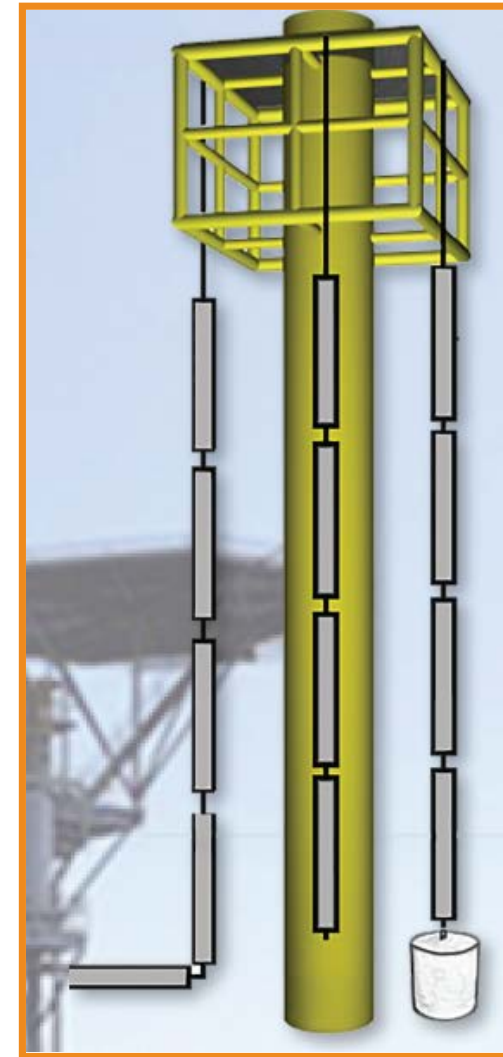
- Average design life of sacrificial anodes is 20 years and as operators extend life of offshore platforms, it is essential that the life of the cathodic protection system is also extended.
- Traditional methods of CP life extension such as anode retrofit clamps or sleds usually require intervention by divers or ROV, a costly subsea operation.
- Galvo-String was developed to **remove all underwater intervention** and rely only on riggers/welders to deploy the anodes, thus **eliminating vessel-based ROV or diving operation**, and downtime associated with subsea services.
- Galvo-String offers savings in excess of 50% compared to conventional methods and is part of the **DIVERLESS CP RETROFIT** solutions offered by the **Galvotec-IEV Strategic Alliance** to operators of offshore structures



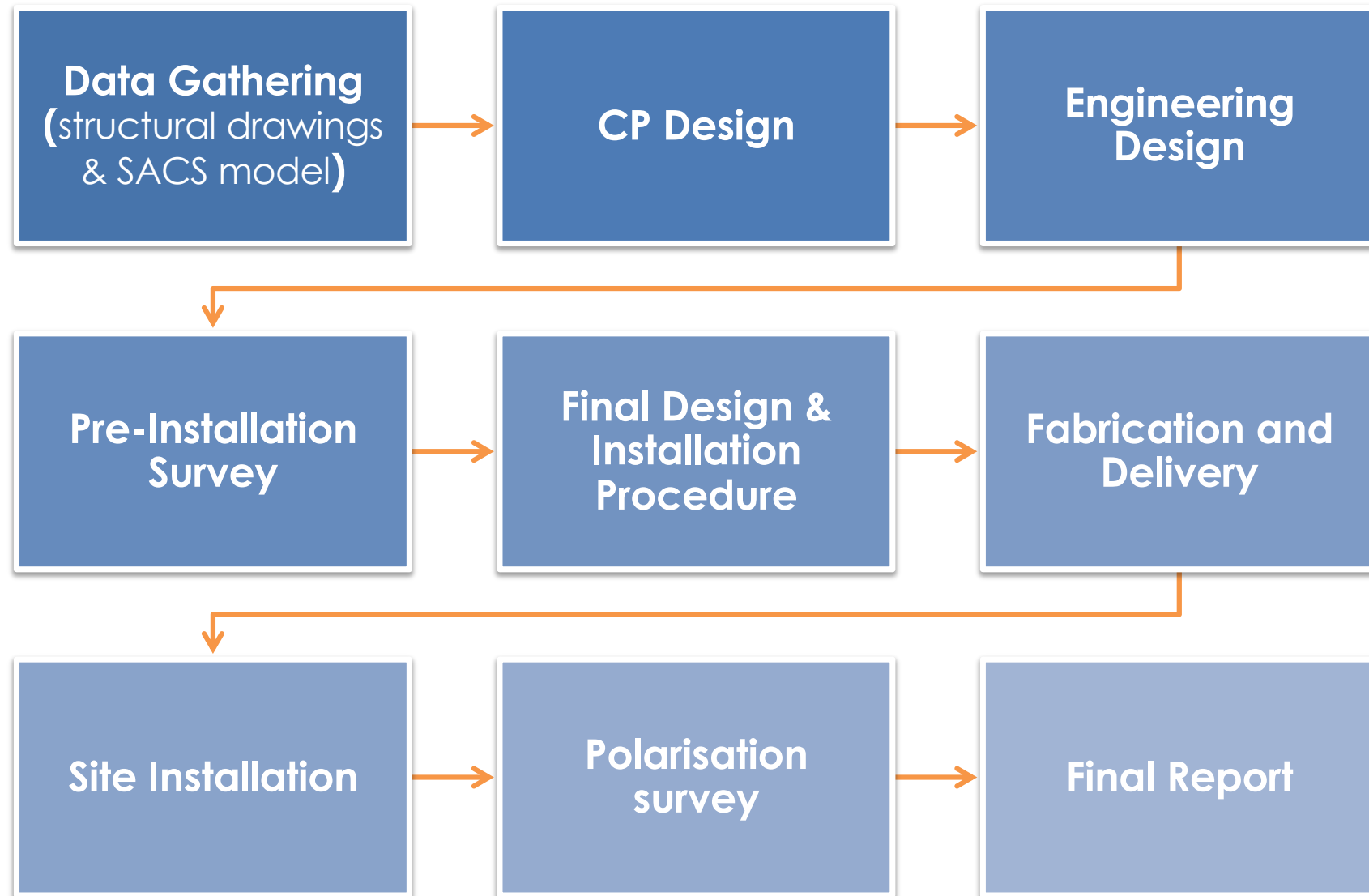
WHAT IS GALVO-STRING?



- The GALVO-STRING is a **hanging galvanic anode retrofit solution**.
- GALVO-STRING anodes are simply **shackled** together and **lowered to a desired installation** depth and can be attached to a structure with either a weld-on or clamp-on bracket.
- An ideal system for structures in water depths of **3 meter (10 ft) to 100 meters (330ft)**.
- Also ideal for short life extensions **of 5 to 10 years** duration.
- **No divers or ROV** required for installation.



GALVO-STRING PROJECT PROCESS FLOW



ANODE DESIGN



- Client supplies **drawings** for anode calculation. In the absence of detail drawings, line drawings from diver surveys can be used, or estimations can be made based upon other similar structures.
- Certain design parameters that are based upon client preference, such as **design life and desired installation type**, while other parameters are based upon the engineering design analysis of the structure.
- Current requirements are determined from the analysis of the structure using **DNV or NACE design standards**.
- Once the current requirements are determined and the design life has been confirmed, the **total anodic mass can be calculated**.
- Drawings of the **proposed Galvo-String** are made along with the **anode locations** and submitted to the client for approval.

ENGINEERING DESIGN



OPERATING LIMITS

- Stringent structural engineering calculations are carried out to define the operating limits of the standard Galvo-String in differing **combinations of water depth and wave height**. Specific designs are carried out for applications outside the standard operating envelope.

STRING LOAD ANALYSIS

- Maximum load acting on the pad eye and attached member is computed using **ORCAFLEX**.
- Pad eye fatigue analysis can be carried out for known specific site conditions.
- **Member Unity check** is performed for all members with attached anode strings. Joint fatigue can also be carried out for specific site conditions.

ENGINEERING DESIGN



STRING DEFLECTION ANALYSIS

- Deflection is calculated throughout the length of the anode string.
- This information is used to **position** anode strings on structures and **avoid contact** between the string and adjacent members at all horizontal bracing levels under storm conditions.

CLUMP WEIGHT MOVEMENT ANALYSIS

- Analysis is carried out to calculate possible **movement** of clump weight under extreme storm conditions.
- Clump weight design is performed to not only optimise its weight but also **eliminate any possible movement, especially for shallow water structures.**

PRE-INSTALLATION SURVEY



A **Pre-Installation Survey** is conducted to ascertain the following;

- **Water depth** soundings/video survey at installation locations
- Condition and location of the **crane lifting capacity**
- Material and Equipment **storage locations** on upper deck.
- Lower level layout and **requirements for access**
- Identify **rigging** locations for pulleys and blocks needed to lift anode string sections



GALVO-STRING FABRICATION



- The Galvo-Strings are fabricated into **segments** comprised of a certain number of anodes
- This keeps Galvo-String in shorter segments to **reduce dis-assembly** to facilitate **easier handling**
- Assembling segments before shipping **reduces the installation time** once on-site.
- The pad-eyes and suspensions are also **pre-shackled together** to facilitate faster installation times.



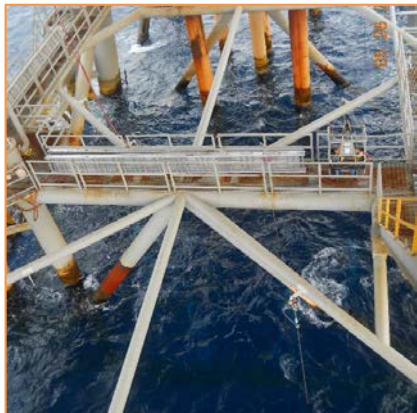
GALVO-STRING INSTALLATION



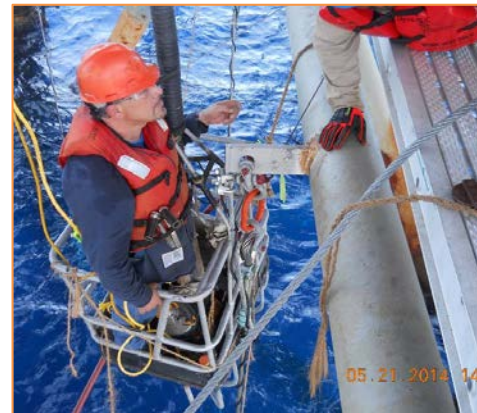
The Galvo-String is shipped in pellets pre-set with all the required hardware for immediate deployment



At the platform, each section is connected to the topside pad-eye and lowered into the water



Installation is complete. Full polarisation is expected to be complete within a week



Top of Anode String Connected to Pad Eye To Complete Installation of Galvo-String Assembly



Connecting string sections together to form total length of string and then connecting the top suspension of string to the pad eye

WHY IEV-GALVOTEC ?



We **combine** experienced **CP design and fabrication** with in-depth **structural analysis** and offshore installation services.

We **eliminate traditional vessel-based Diving/ROV** CP Retrofit solutions to offer **significant cost savings**

We offer a **Complete Product**, from Design to Fabrication, Installation and Commissioning

QHSE is our **main priority** and culture

We provide **detailed operation and installation procedures and reports** as standard

We take part in your planning meetings to ensure **full project participation**

We have **proven capabilities** in diverless CP retrofit

We make use of **local resources** for installation services

We meet all **international standards** for both CP and API.

NEED MORE INFORMATION?



For further information on;

- 👉 **How to apply Galvo-String to your specific offshore facilities;**
- 👉 **Bespoke applications (i.e newly-built jackets, hybrid design, etc.);**
- 👉 **Track-record and Case Studies;**
- 👉 **Scada monitoring, and**
- 👉 **Budgetary quotation**

Reach out to us at : info@iev-group.com or contact us at our offices listed in the next page.

“COMBINING DISRUPTIVE TECHNOLOGIES AND PROVEN ENGINEERING CAPABILITIES”



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