Institute of Corrosion partnering with Svenn Magne Wigen, FORCE.

9th October 2020
“SUBSEA SURVEYS UTILISATION OF HIGH SENSITIVE FIELD GRADIENT SENSOR FOR OPTIMISATION OF CP LIFE EXTENSION ”

Svenn Magne Wigen
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About Me

• **Svenn Magne Wigen**

• Svenn has worked for nearly 20 years within Cathodic Protection: design, verification, modelling, inspection and CP management and carried out a large number of CP site supervision and QA/QC projects.

• High Sensitive CP Field Gradient (FG) sensor was developed and has now been in use for several years. With the data recorded by the sensor one can determine significantly higher accuracy on the CP status such as anode current output, overall potential distribution and not at least repeatedly observed current drain to adjacent structures. On mature structures it has been known for years that the true mean current demand is significantly below those recommended in the standards. Utilising the FG data from this high sensitivity FG sensor, allows documentation of these low current densities, from which a very cost efficient design basis for CP life extension can be formed.
Q&A

Selection of Questions to Svenn Magne Wigen, FORCE
Post-Presentation 09/10/2020
• Q. How long has this Field Gradient Technology been in use?
• A. The current refined technology has been used commercially since 2014.
• We had a similar type of technology with rotating sensors in the 1980 and 1990 ies.
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• **Q.** Sven, What was rge / aws anode alloy spec used? We all know T bar anodes are poor, but cracking/spalling anodes are unusual except with a particular alloy that was withdrawn due to due to a SCC issue with an age hardening alloy. NOT common with better alloys.

• **A.** It is Al-Zn-In anodes particularly. We would have to go back to original design to find out. We suspect cracking at insert interface during cooling process after filling the moulds, such that when reaching critical depletion cracks are exposed and filled with oxides breaking loose the alloy from insert
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• **Q.** Sven, how accurate are the CDs for the driven piles? How are they calculated?
• **A.** We are assessing this but looking for direction of currents etc. currents monitored to different regions. Esp. to wells.
• As a starter we assume CD by design standards, but this is balanced out with the potential profile on the jackets and direction of the current flow, especially at lower structure elevations.
Q. Have you used an AUV inspection yet?

A. Yes we have but not gone commercial yet.

Hugin and Sabertooth are tested and verified OK.
• Q. Why middle drilling platform anodes depletes faster compared to others?

• A. Mainly due to the wells.

• See also https://forcetechnology.com/en/services/cathodic-protection-cp-retrofit-life-extension-system
• Q. Were the jackets bare or coated?
• A. Coated down to – 8m.
• **Q.** Thanks for your presentation. You mentioned that it is better to select glass flake coatings on the basis of track record. With this in mind, do you have any track record on offshore wind farm foundations?

• **A.** Not as much as we would like, we have lots of structural steel references for seawater and offshore applications, we will be happy to discuss in more details.
• **Q.** Does the modelling process conform to certain international standards?

• **A.** No such standards, we are using our own.

• No formal approval of Model. Our Model inputters are competent.
• **Q.** Could this technology be used internally to pipelines to monitor CP performance?

• **A.** CP is not used internally for pipes.

• We need the seawater as electrolyte to transport the CP current.
• **Q.** Thanks for your interesting talk. Are the platinum electrodes used your field gradient sensor susceptible to bio-filming? If so, does that influence the length of time for which they can be deployed without cleaning in a survey?

• **A.** No, this is not an issue for use.

• The Platinum electrodes have improved lower resistance to seawater.
• Q. Many thanks for the presentation. Could you please confirm a. what is the maximum water depth the probe has been tested and used.

• A. Design depth of the version we use now is 2000 meter.
• **Q.** Which type of reference electrode is used for the rotating probe (apologies if these matters were responded, I joined with some delay at the start).

• **A.** This is not a reference electrode as such.

• We use Pt. elements for measurements of the relative potential difference (field gradient) between the two elements.
• Q. Electric fields are vector fields with strength (V/m) and direction, is this what you are measuring? Or is it a 3D potential map?

• A. Yes vector field strength.
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• **Q.** Thanks for the presentation Svenn. Would you like to confirm if you have used COMSOL for some of the modelling tasks, or is this combined with FORCE's in-house modelling tool?

• **A.** We have a Comsol user interface and viewer, but we have integrate our SeaCorr database and core running the analysis.
• Q. Have you also done wind farm surveys?
• A. Yes in the Baltic and in UK Sector. Yes a lot of interest for this areas.
• Issues with high tidal currents for maneuvering the ROV. Can get by with 3D scans first for Monopiles.
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