DEEPWATER
Offshore Wind Corrosion Control

Svenn Magne Wigen
Managing Director
swigen@stoprust.com
Phone: +47 90758956
Cathodic protection, remote monitoring and control services

Offshore wind farms
Offshore wind farm foundation structures

- Monopile
- Tripod
- Floating
- Jacket
- Gravity

Current technology
Onshore wind turbine

Shallow water
0 – 30M

Transitional depths
30 – 50M

Deep water
50 – 200M
Offshore wind farm foundation structures

 Increased complexity requires greater competence and knowledge.
Offshore wind farm foundation structures

Monopile

- Most common
- Often got wrong
Sacrificial anodes

• Safe for new construction on simple, shallow foundations, but:
  
  – Difficult to pre-install on some structure types; location / elevation is critical.
  
  – Some post-install options have been flawed.
Novel sacrificial anode solutions
Seabed-mounted anodes
RetroMat: Stabilisation & CP combined
RetroMat – CP

- **Why:**
  - Most rugged seabed anode array available
  - Provides CP and stabilisation / scour protection

- Cost effective – high local content
- Low ground resistance
- Leveraged installation
- Electrically isolates
RetroMat – CP

Where:

Offshore wind farms
  Export cable protection
  Scour protection
  Foundation CP
Pipeline C.P. life extension
New-build pipeline sleds
RetroMat – CP
RetroMat cathodic protection
RetroMat – CP
RetroMat cathodic protection
Novel sacrificial anode solutions - RetroLink internal CP for monopiles
Suspended anode modular retrofit C.P. systems

- **RetroLink**
  A simple suspended anode solution, designed and engineered for long-term durable service by engineering out many of the failure points of similar “one off” applications.
RetroLink system components

- Structural grounding mount
- Splash zone leader system
- Active anode links
Anode links
Impressed-current solution
Seabed mounted anode for shallow water (self-burying)
VSE anode system

- The Vaulted Seawater Envelope
- Traps envelope of water sub-bottom in a Teflon-lined vault
- ICCP anodes operate at much higher current density: 8X vs. buried.
Vaulted Seawater Envelope (VSE) anode system
Vaulted Seawater Envelope (VSE) anode system
Vaulted Seawater Envelope (VSE) anode system
Vaulted Seawater Envelope (VSE) anode system
Vaulted
Seawater
Envelope
After self-burial
CP monitoring

Automated monitoring
Typically hundreds of structures

Remote monitoring options
- SCADA
- Line of sight
- Read on structure

No subsea inspections!
CP monitoring

Monitoring / control

Single-instrument system (DR2-CD) will control ICCP system and will give CP status signal for either ICCP or sacrificial systems.

No need to check unless alarm is received.

Allows offsite system surveillance if hooked to local data management system.
PolaTrak V-String reference electrode

For offshore platform and pipeline monitoring

Polatrak DR-2

Dual-element reference electrode for permanent subsea attachment
Certification & approvals

Deepwater have 25 years of developing innovative methods of corrosion control. Our equipment spans the globe and our clients include most of the world’s major and national oil and gas companies.

We work to the highest standards and with all classification and certifying authorities.