

Offshore coatings Why fail when you can succeed?

High-quality offshore coatings can cost thousands but save millions.

Gunnar Ackx and Howard Jess are ideally-placed to know. They have delivered successful QA- or QC- coating-inspection-services for more than 1,100 wind energy-related offshore structures since 2000.

Together, they provide expert management for thousands of square metres of well-prepared bare metal. Less diligent operators have discovered that even a few neglected square centimetres can lead very quickly to €-multi-million repair costs, lost production time, logistical nightmares and extended legal wrangles.

Howie and Gunnar head up the highly-experienced Howard Jess Solutions/ SCICON Worldwide bvba partnership. Their mission is to prevent such catastrophes on major projects. Both step in regularly to minimise losses when things go wrong!

NEW PAPER ANALYSES HOW TO SAVE 'MILLIONS'

The three very typical real-life case-studies below show how due diligence during sophisticated coating processes can avoid problems, while also keeping repairs costs and disruption low when mistakes are made.

GETTING IT RIGHT FIRST TIME

In the worst case scenario of repairs and replacements at sea, the team works to meet tight access, safety regs, paperwork, timeframes and adverse weather window requirements on operating assets.

Far better, say Glasgow-based Howard Jess Solutions Ltd and Bruges-based SCICON Worldwide bvba, to grab 'the one chance of doing it right in the first place'.

Things go wrong for many reasons, explains Gunnar. Poor surface preparation and application, bad specification changes along the supply chain and poorly-selected coating materials are common causes.

"People tend to manage risks based on the actual coating work costs," he says. *"When operational risks are severe, budgeting must cover the massive potential cost of things going wrong, often for very trivial reasons."* he adds. *"Every € spent on onshore corrosion protection can multiply up quickly by a factor of 50, 100, or more if the problem moves offshore."*

Gunnar is a second generation coatings-inspector & consultant with 23 years of corrosion-protection experience. As MD of SCICON worldwide bvba, he holds an SSPC PCI Level III-, SSPC PCS (Protective Coatings Specialist) & NACE CIP Level III Certification.

Howie, a FROSIO Level III Coating Inspector, multiple-patent holder and former Technical Director of a UK paint manufacturing company, notes cost factors.

"Actual paint costs are relatively small compared to onshore construction phase application costs," he explains. *"If contractors get it wrong and have to correct things offshore, the paint costs to application costs ratio is astronomical – reaching 0.1 to 99.9 (1:999) in one case study. Using the wrong paint is that expensive!"*

"We stop small problems becoming large expensive problems by putting the right quality assurance and quality control in place early."

WHICH RISK SCENARIO APPLIES TO YOU?

The paper's case studies cover common offshore and marine problem/solution/benefit corrosion-protection scenarios.

Project A

Involved no initial QA inspections but included failure-analysis and repair consultation following premature offshore coating failures.

Project B

Full-time QA coating inspectors working for the main contractor avoided €-multi-million repair work.

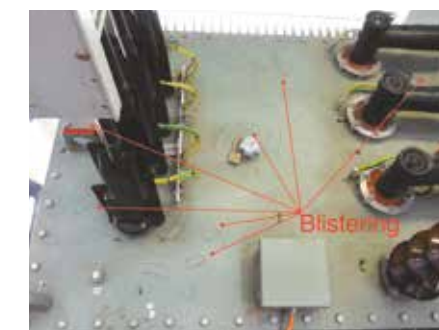
Project C

A joint-venture between two sub-contractor steel construction companies. Sub-Contractor 1 covered 58% of the new-build structures; Sub-Contractor 2 42%.

Sub-Contractor 1, SCICON worldwide bvba and Howard Jess Solutions provided a full team of certified and experienced QC-inspectors with full stop/go-authority. No claims were made in the first two years.

Sub-Contractor 2, which hired two separate freelance inspectors under its own QC-department (with no training/certification), was less fortunate.

PROJECT A 'BAND OF BLISTERS' OFFSHORE WINDFARM



Blistering problems on circa 6m² of two substation transformer covers after two years at sea highlighted the difficulty of allowing small components subbed out and then subbed out again, to slip through the QA net. Original client specifications are easily lost or diluted down the supply chain.

Remedial work cost circa €100,000. Investing a couple €-thousand in fully-trained, qualified and certified coating-inspectors before and during the original coating application would have avoided the whole problem. Specifically, the covers of two auxiliary transformers passed so far down the supply chain that although the coated area was minimal, specifications, procedures and quality-control were lost.

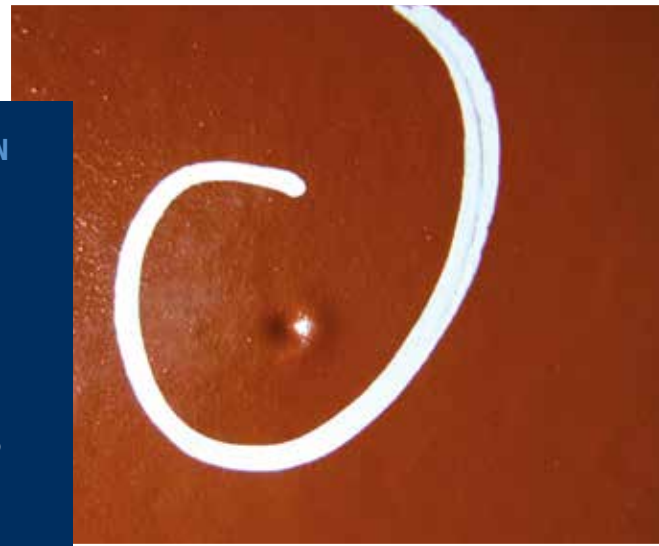
In the first year offshore, white zinc-salt formation under a coating applied onto Thermal Sprayed Zinc (TSZ) caused blistering. Failure analysis revealed the ultimate coating-system not complying with ISO 12944, or the client's original specification.

In reality, a two-coat powder-coating-system of suspect quality was used on top of a poorly-applied TSZ. The originally specification required a five-coat liquid-applied coating-system - including a zinc-rich primer, two water-based intermediate coats, plus two water-based top coats.

Repair work while the 150,000 volt transformers were live in poor weather conditions, during complex transfer operations and with stringent offshore safety certification requirements, meant a final bill of up to ± €16.666/m²! All this could have been avoided... rather easily.

CONTINUED...

PROJECT B
'HIGH TENSION' OFFSHORE
WINDFARM



The problem persisted, resulting in an intensive search for possible contamination-sources. As QA for the main contractor, we insisted on further in-depth laboratory-analysis of production samples. Several high-tension, high-level meetings followed. Fortunately, a willingness on all sides to reconfigure the production & delivery-schedule meant that

Thousands of craters found in the first coat during fabrication of three (of 43) transition piece foundations resulted in €100,000+ worth of fabrication-shop re-blasting and re-painting work per transition piece. The alternative would have been an estimated €2.25 million bill if the problem was left to develop further offshore! Initial coating-manufacturer and coating-contractor reassurances that a limited problem could be remedied by an extra intermediate layer to compensate for local under-thicknesses proved wrong.

suspect coating-batches & transition-pieces were quarantined pending lab test-results. Careful analysis revealed the basic problem stemmed from an 8% silicon contaminant added in error to the coating. A full 'Norsok qualification lab-test cycle' then proved that one batch failed the Cathodic Disbonding test miserably. The coating-manufacturer ultimately concluded that the offshore coating-failure risks were too high. Reblasting/recoating was the only sensible solution.

A small side-issue - proper registration of coating-batch-numbers - also showed that non-qualified QC-staff use is "an accident waiting to happen". Unnecessary repair-costs could have been even higher. Full diligence from the outset could have prevented the whole problem. We helped save the contractor in excess of €2 million.

PROJECT C
'MINOR DETAIL – MAJOR PROBLEM'
OFFSHORE WINDFARM

Poor coating & QC practice on 5,400 overlooked stainless steel grating-studs on carbon steel structures for 30 out of 71 widely-dispersed offshore wind turbines turned a minor detail into a significant problem.



Most studs were not treated properly to Norsok M-501 standards; an average corroded area of 17cm² per stud, times 180 studs per foundation, times 30 foundations was the result. Offshore remediation costs mushroomed quickly to €1.5 million.

The project was overseen by two joint-venture contractors with no in-house QA/QC skills or certifications.

Contractor A hired 3 to 4 certified coating-inspectors from Howard Jess Solutions/SCICON Worldwide to act as an independent QC with stop/go authority over the coating of 41 foundations.

Meanwhile, Contractor B used two separate freelance inspectors to survey the production of 30 foundations under their own QC-department.

Two years after offshore-installations, ALL 30 Contractor B foundations showed corrosion-breakthrough around some

5,400 main platforms & resting-platforms grating-studs. Opening the coating showed substantial areas of surrounding carbon steel corroding due to 'galvanic corrosion'. Clearly, these studs and especially the 'mixed weld', had not been treated to Norsok M-501 standards. Coating-thickness on the studs was less than required. Masking-tape was found under paint. Some surface-profiles were poor.

No similar coating-breakdown was found on the 41 foundations produced by Contractor A under the watchful eye of our QC-inspectors.

Although Contractor A made a higher investment in proper Quality Control, clearly Contractor B paid out circa five times Contractor A's initial budget – a 500% advantage, even on a single project.

Full QA/QC control could have prevented a minor infringement becoming a major calamity from the start.

CONCLUSIONS

There are no corrosion-protection shortcuts. Premature coating-failures offshore can increase in-house coating-budgets by ten or even a hundred-fold.

All parties, from owner to main-contractors and sub-contractors, must make sure Quality Control & Assurance is a top priority at all times. Small details in large numbers can escalate offshore repair-costs rapidly.

When large figures are at stake, the price-difference between well-trained, certified coating-inspectors with sound offshore corrosion-protection experience and less qualified inspectors often drawn from industries with little offshore experience, is "penny-wise, pound-foolish".

If hiring experts seems expensive, try hiring amateurs!



Gunnar Ackx



Howard Jess



Jon Herbert

INTERVIEW

Jon Herbert talks to Howard Jess and Gunnar Ackx.

ED'S NOTE

This is an abridged version please see the complete article 'Offshore coatings – Failure or Cost-saving Opportunities?' By using this link.



INSPECTION COMPANY SELECTION CHECKLIST

Successful coating depends on inspection-company and the coating-inspectors competence and experience. Owners need to ask themselves...

- Does the inspection company provide inspectors with proven Level III NACE, SSPC and/or Frosio qualifications?
- Do they understand offshore challenges?
- Are the appropriate industry standards referenced correctly in client specifications?
- Does the inspection company have these standards; are they familiar with them?
- Does it carry professional liability insurance?
- Does it have professional accident insurance?
- How many inspectors are available & how flexible are they?

