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INSTITUTE OF CORROSION INC.

Corrosion Management | July/August 2014

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## Institute News

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**Evaluation of Stress Corrosion Cracking Resistance of Ni-based Alloys using a Creviced Four-Point Bend Device**

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The President Writes

At The Institute’s AGM in November this year my period of 2 years as President will come to a close. However it is not truly the end, there were two years as Vice President, two years as President and there follows two years as Immediate Past President; through this continuity of tenure goals can be set and a consistent strategy followed, to keep The Institute moving forward and constantly able to face the challenges and changes presented in these demanding and modern times. I have over the past four years taken a keen interest in how other corrosion related professional bodies manage their activities and affairs. Some have a core of permanent staff, i.e. the Australasian Corrosion Association (ACA) and the National Association of Corrosion Engineers (NACE) in the US, both of whom have strong support from permanent staff. These capable staff members do good work in organising general strategy, education programmes and conferences plus many other useful and worthwhile tasks. ICorr has also developed relationships with these organisations and I have visited their conferences and met with the senior officers to exchange ideas and discuss goals and direction. I have also met with European corrosion groups, e.g. CeoCor and the European Federation of Corrosion (EFC); these two groups have smaller staff numbers and like ICorr rely upon volunteers from among their membership to support the activities in the main. I attended the Board of Administration (BOA) of EFC in March and the CeoCor conference in Weimar in May this year and I was impressed by these organisations and what they have both been able to achieve. From the structure of the various bodies and how they operate, either having permanent staff or volunteers, and how things progress more rapidly with some concentrated full time effort or less so when those doing the work also have the day job to consider, it appears the results are similar, similar in that they all bring the message to the individual membership and to one another. This was most recently achieved in June this year when after a lot of hard work and planning a group made up of volunteers from ICorr and NACE UK ran a joint conference at the Royal Over Seas League in London; the conference title was “Energy Security, Corrosion Matters”, the Keynote was given by Lord Oxburgh, a recognised figure in the field of energy and energy conservation. The conference attracted delegates from a wide spectrum of academia and the related energy industry, it was a great success. This was a small scale event held over two days but had the same impact as much larger and similar events in that it brought an interesting mix of subjects and presentations to the fore on a diverse range of energy and corrosion related subjects; but what really impressed was how the great effort required to organise this event was delivered by a small group of volunteers from two different corrosion related organisations working seamlessly together for the benefit of all, my thanks and admiration to all involved.

Whether as an organisation we are large or small, we can have an impact when we deliver interesting and topical events to our members, the members of other like organisations, to industry and to members of the public. This work benefits all, it builds relationships, expands knowledge and encourages others to become involved in the interesting and absorbing subject of corrosion and corrosion control and The Institute plans more jointly run events, meetings and conferences. In addition ICorr will again be running the successful Young Engineer Programme in 2014, this will start in November with the presentation phase and the case studies being presented in late 2015. We hope you can take part in some of these events, possibly by volunteering to assist with organisation or maybe providing a presentation, if so I look forward to hearing from you or to seeing you again at a future branch meeting or event.

Trevor Osborne,
President of the Institute of Corrosion

Midlands ICorr at Sherwin Williams

On Tuesday 24 June The Midlands Branch of ICorr attended a tour at specialist coatings manufacturers Sherwin Williams in Bolton. Malcolm Morris conducted a very informative tour of the facilities showing how the coatings were produced, as well as of the lab facilities which are responsible for quality of the incoming and outgoing materials according to various standards. Members were also treated to lunch and tea/coffee followed by a presentation by Carl Flavell on the history of the Leigh Paints and new owners Sherwin Williams. Our thanks to David Horrocks for organising the visit and to Sherwin-Williams for their hospitality.
LONDON BRANCH NEWS

GOLF DAY

Once more the weather was kind for the London Branch Golf Day, held again at Silvermere in Surrey with 9 teams taking part. The morning Texas Scramble competition for the Denso Trophy was won by the Doornbos Equipment team, scoring 27.8, with the International Paint team II runners up, scoring 29.2. The afternoon prize of the Len Townsend Trophy for the stableford contest was won by the International Paint team I, with second prize of the ICorr Shield being presented to International Paint team II. The best individual score (37 points) was achieved by James Ward representing International Paint team I, and the longest drive was hit by Graham Sanders from SPC. David Mobbs, playing for International Paint, was nearest the pin on the 17th.

ICorr CP Level 1 Course in Russia

In May 2014 engineers and technicians from ExxonNeftegas attended the Institute of Corrosion Level 1 Cathodic Protection Course in Sakhalin. The course was held at the PKT training centre, operated by Petrofac, in Yuzhno Sakhalinsk, Russia. The personnel, who attended, as shown above, were from the Operations and Operations Technical departments of ExxonNeftegas and all have some responsibility for cathodic protection routines or specialist works. The course was for the buried pipeline Sector of cathodic protection.

The course was facilitated by Corrosion Control Associates Ltd and was delivered at site by John Thirkettle. The course was the Institute of Corrosion course, slightly supplemented to suit local conditions. The examinations were the normal Institute of Corrosion examination.

Following the implementation of the course and the examinations, all of which were held in Yuzhno, the examination papers were carried back to the UK for assessment by the Institute of Corrosion course providers, Argyll-Ruane Ltd. In one case part of the examination was carried out remotely by ARL to accommodate rotation duties in Russia.

The Institute of Corrosion has an established cathodic protection engineering training programme which comprises Levels 1, 2 and 3 all in accordance with BS EN 15257; Certification of Competence requires a combination of education, specialist training and experience. The specialist training is generally carried out at the ARL facilities in Rotherham, UK or at another suitable venue, as was the case for ExxonNeftegas.

It is a pleasure to record that the course and the examinations were carried out successfully and that all personnel who attended achieved a full pass of the Level 1 Examination. It is hoped that all the candidates will now apply to the Institute of Corrosion for full Certification in accordance with BS EN 15257; this involves an assessment of the experience of the candidate by ICorr.

Thanks are due to all in ARL and ICorr who have enabled this exciting new venture overseas.

Brian Wyatt & John Thirkettle

TO ADVERTISE IN CORROSION MANAGEMENT please contact Jonathan Phillips or Debbie Hardwick at: Square One, Tel: +44 (0)114 273 0132 Email: enquiries@squareone.co.uk
The Royal Overseas Club in London’s Mayfair was the venue for the first Institute of Corrosion and NACE (UK) joint two-day conference entitled Energy Security – Corrosion Matters.

The event attracted a global audience, with over 50 industry professionals listening to a range of speakers from academia and within the industry.

The first day was overseen by ICorr president, Trevor Osborne, with the plenary speaker, Lord Oxburgh, President of the Carbon Capture and Storage Association, Lord Oxburgh set the scene for the two-day event with his thought provoking, although non-controversial keynote presentation.

The first session of the conference was chaired by Dave Shaw from Bechtel, and Ibrahim Al-Saieg of CB&I who introduced presentations on the theme of Renewable Energy Sources.

Director of Innovation at Sgurr Energy, Alan Mortimer, opened with a renewables overview and analysis by technology, from which he concluded that a global renewables revolution is underway, while wind and solar dominate new capacity additions and biomass, geothermal and marine will be important in the future.

Sigrun N Karlsdottir, delivered her presentation on corrosion challenges in a geothermal environment in Iceland, after flying in for the day from the University of Iceland. She described the use of geothermal energy as supply of power in Iceland and the propensity for corrosion due to presence of H2S, CO2, and H2. Sigrun then described the Icelandic Deep Drilling Project (IDDP) in some detail. Here, energy available was ten times the conventional geothermal source, but from the testing carried out, even the most corrosion resistant materials tested have localised corrosion damage after testing in the IDDP-1 steam at 360°C. Also the increase in temperature to 450-500°C could be expected to increase the rate of formation and propagation of corrosion pits and cracks. The results also indicated that carbon steel can be used at 360°C for equipment where no steam condensation occurs - in line with operational experience.

Ramboll’s Peter Moller covered developments in offshore wind turbine foundations. He described the various types of foundations currently used and their corrosion protection systems. For example, turbine monopiles are sensitive to corrosion and fatigue issues, but the causes of this are well understood and he described design adjustments that have been made to reduce the problem.

He was followed by Peter Fraenkel of Fraenkel Wright Ltd, who talked about tidal current turbines for electricity generation and likened them to underwater windmills. He described the first full-size tidal current turbine machine and the first commercial turbine installed in the Strongford Narrows, in 2008, which has generated >7GWh to date. The design
and operation of these turbines was then discussed, along with new designs intended to increase energy output. Corrosion mitigation was briefly discussed and was being carried out by cathodic protection and coatings, both sacrificial anodes and impressed current were addressed.

After lunch, the second session, Power Generation, chaired by George Frank of Quantum Factor Services Ltd, started with Tony Fry’s (NPL) talk on carbon abatement in traditional power generation. Tanvir Hussain’s (Nottingham University) presentation on corrosion in pulverised fuel biomass boilers was next and he found that HVOF/ plasma sprayed coatings and laser claddings show promising results in combating fireside corrosion in pulverised fuel boilers. However, the cost-benefit of surface engineering needs to be understood.

He added initial studies show that higher Cr content coatings are more resilient in boiler environments and that highly efficient fossil-fuel fired power plants will be needed to meet the fluctuation demand due to renewable energy generation.

The last presentation of the day was David Gorman (NPL) who discussed oxidation of the alloy IN617. At the end of each session there was a panel discussion with all the presenters taking part, the first day finished with a networking session over drinks and canapés.

Day two, was overseen by Dave Shaw on behalf of NACE (UK), with the third session focusing on Field Life Extension being chaired by Don Harrop (ICorr/NACE). Durham University’s Professor Jon Gluyas opened with a presentation entitled Squeezing the Barrel: extending the life of UK oil and gas fields. This was followed by Andrew Duncan from the Health and Safety Executive discussed the findings from KP4 - HSE’s offshore ageing and life extension programme, more information can be found on this at http://www.hse.gov.uk/offshore/ageing/kp4-programme.htm. Steve Paterson (Shell) and Bill Hedges (BP) both gave separate presentations on corrosion management, prior to the panel session.

After lunch, the final session, Unconventional wells, was chaired by George Winning from Premier Oil, who introduced Joel Price’s (San Leon Energy) paper which posed the question: Does unconventional change everything in a well? Price concluded that unconventionals, which he had simplified as shale gas in the presentation - do not require a step change in terms of materials or application.

Material issues in carbon sequestration was the topic discussed by Mike Billingham (Wood Group), who found that the composition of the supercritical CO₂ may be different depending upon its source and may have aggressive trace constituents. He added that wetting of the bottom of the well is almost inevitable and highly corrosive, whilst repair or replacement of the well equipment may be less acceptable and so higher integrity designs may have to be selected.

Shila Pauln (TWI) was given the honour of having the final presentation on corrosion in supercritical CO₂.

After the panel discussion, the President of The Institute, Trevor Osborne, gave the closing address on the two-day event focusing on what was learned? The President said that no one would go away from this event without having learned something and that the two days had been thought provoking and informative, he thanked the speakers and all who had assisted in organising the event and expressed his pleasure at the way ICorr and NACE (UK) had worked seamlessly together to bring this conference to fruition by acting with team spirit and hard work.
ICORR ABERDEEN JOINT MEETING WITH THE NATIONAL ASSOCIATION OF CORROSION ENGINEERS
NEW APPROACHES AND TECHNOLOGIES TO MANAGE CORROSION AND CUI

The May 2014 meeting was a joint session with the National Association of Corrosion Engineers (NACE). Carlos Caicedo Martinez of Shell was guest speaker for the night and stated that his talk will focus on Shell’s experiences in managing key threats related to atmospheric corrosion with specific focus on corrosion under insulation (CUI). He mentioned that his talk would cover the “what”, “when”, “how”, “where” and “whom” in relation to activities required to control these corrosion threats.

Carlos started by outlining the various facilities operated by Shell in the North Sea which includes fixed & floating offshore and onshore installations. He explained that the following were essential for good management of atmospheric corrosion and CUI: A good technical understanding of the condition of the fabric in the installation and the associated risks were essential to mitigating corrosion (WHAT); Knowledge of an acceptable project execution window for fabric maintenance (WHEN); An organised, aligned and well optimised plan of how the required scope will be executed (HOW); Identification of priorities, potential show stoppers and accessibility constraints (WHERE) and a clear definition of roles, responsibilities and required competences communicated to all stakeholders (by WHOM).

With illustrative photographs, Carlos went through visible corrosion degrees used by Shell stating that the FM deterioration scale was based on standards such as the European Scale of Degree of Rusting and ASTM D 610. He
went on to explain the Shell risk management approach including sensitivity analysis and execution strategies. As demonstration of the work process, Carlos described the Gannet make-it-safe make-it-work campaign, explaining that the project was massive with up to 200 man hours lasting over four (4) months.

The next part of the presentation covered various technologies used in combating atmospheric corrosion. Among the technologies covering was Mascoat thermal insulating paint used to mitigate CUI with illustration of how it has successfully applied on the Nelson. Another technology presented was “Rig View” used to identify the location of various equipment and modules on the platform. Finally, the PINOVO vacuum blasting and STOPAQ sealing technique was presented with illustration of projects where Shell has used these techniques with substantial benefits.

Questions were on inspection prioritisation, life of assets, risk ranking technique, technologies presented among others.

Continuous professional development certificates were distributed to members immediately after the meeting. For information about the Aberdeen branch activities please contact our branch secretary, Frances Chalmers, ICorrABZ@gmail.com. Alternatively a calendar of local events of interest to corrosion professionals in the Aberdeen area and the opportunity to sign up to the branch mailing list is available at https://sites.google.com/site/icorrabz/home.

ICORR ABERDEEN CORROSION NETWORKING EVENING

On Friday 20th of June 2014, members of the Institute of Corrosion Aberdeen branch attended a corrosion networking evening at the Sunset Beach Boulevard. The evening started with drinks at the bar and networking followed by dinner at the Sunset bar.

After a tasty meal, members swapped forks and knives for ten pin bowling balls. Members competed fiercely in what was a very entertaining bowling session with some eye catching “strikes” and “spares” on show. Ten pin bowling was followed by a slower pace but equally competitive mini-golf session to wrap up the evening. Members had lively discussions throughout in what proved to be a very entertaining evening.
Technical Topics No.46:

CONSERVATION, PARTICULARLY OF REINFORCED CONCRETE

By Douglas J Mills, Technical Secretary

Following on from the successful CED meeting held at the Royal Armouries (report in the last issue of CM) in Leeds, I would like to pick up on the topic of conservation of historical artefacts. One of the talks at that meeting was by Nyssa Mildwaters who works in the Conservation department at the RA and she discussed this, particularly the role of coatings (this lecture should be available in the CED section of the website).

An interesting problem that they have experienced at the RA is that steel items in their stores have sometimes suffered what is known as concentric (or tree) ring corrosion. There is no very obvious explanation for this. And it is the intention of the University of Northampton (myself and Steve Mabbutt) to run a student project on it with the aim of throwing some light on this subject. A couple of explanations spring to mind: one is that the objects that suffer this may have been formed originally (many hundreds of years ago) by a beating process that induces circular stresses. So an anode might form due to condensation of water in a high stress area. Then a cathode forms. Then another anode; and so on. But alternatively it could be something cyclical in the environment leading to alternate corrosion and passivity (summer/winter possibly - more moisture and SO\(_2\) in winter?) Anyway some analysis will be done and hopefully in a year’s time we might know a little bit more about it.

A major project that I have been involved with this last year is the preservation of an historical monument (outdoor museum), specifically Auschwitz. This receives about a million visitors each year. Most of the structures were built in the 20s and 30s and are now in a bad state. And some of them are reinforced concrete which is corroding. The picture shows one of the items. The principal with conservation is of course not to change (or only very minimally change) the appearance of the structure; while at the same time preventing it from further attack.

I am sure most readers are aware that the reason concrete itself is not aggressive to steel (allowing even initially rusty rebar to be used) is that the pH of the water inside the concrete is quite alkaline (12-13). And this passivates the steel. What happens over time is the concrete itself can change (eg become carbonated) and no longer has alkaline properties which then allows the steel to corrode. This is exacerbated if there are any chlorides present. The work on conservation of Auschwitz is being headed up by the Materials Engineering and Corrosion Department at the Technical University of Gdansk which the Engineering Department at University of Northampton has been collaborating with for a number of years now through the Erasmus exchange programme. This last year a Masters student from Gdansk (Justyna) has worked on this under my direction. The overall aim is to find out what would be the most effective remedial measure. CP is a possibility (this can be done discreetly with external anodes); applying transparent water resistant coating to the outside of the concrete is another and application of inhibitors to the outside is a third.

Justyna and I went to have a discussion about all this with Paul Lambert in Sheffield who was very helpful. There is of course a second factor. That is, assuming you put some prevention (or conservation) method in place, how can you tell if it is working? The reinforcing bar is below the surface. So some electrochemical monitoring method is attractive. Potential (voltage) tells you something. In general higher potential indicating passivity and lower potentials will indicate a situation that might be corroding. But there are other more quantitative methods including Linear Polarisation Resistance (LPR), Electrochemical Impedance Spectroscopy (EIS) and the Electrochemical Noise Method (ENM).

So part of the project was to investigate which electrochemical technique was best. The actual work Justyna did involved making up small concrete samples (she made these herself) with a thin rod of rebar encased in what was basically a mortar. These were immersed in varying concentrations of sodium chloride which simulated sea water, a moderately aggressive atmospheric environment and a benign environment. The results showed that apart from potential (which seemed to be quite reliable in these laboratory tests) the noise method (ENM) held a degree of promise as it looked like it also had the ability to pick up pitting corrosion. To test a conservation method a waterproof coating was applied to the outside of some samples and this reduced the rate of corrosion and increased the potential. Interestingly, although transparent, it did change the appearance of the concrete as after a “rain” shower the surface looked quite different (this may or may not be a critical factor!). Certainly there is plenty more work to be done here eg on real concrete samples taken from the site. But the lab work was a promising start and Justyna’s report is available if anybody is interested.

What else is there to discuss? Well there is EuroCorr coming up (Pisa, Italy, 8th-12th September). I represent UK on the coatings working party. But also because of my increasing interest in this area I want to attend the archaeological corrosion working party. Let me know if there is anything you would like me to raise at either of these working party meetings. As usual at Douglas@harrbridge.freeserve.co.uk

Note: thanks to Paul Lambert for checking this article and also for providing one of the pictures. His useful review provides more information on this topic “Modern solutions to historic problems - advanced materials & techniques in heritage applications ” P. Lambert & A.R. Foster STREMAH 2009 Eleventh International Conference on Structural Repairs and Maintenance of Heritage Architecture, Tallinn, Estonia,July 2009
Denso Australia has had the opportunity to supply the 420km GLNG gas pipeline with over 70,000 litres of Protal 7200 Liquid Epoxy for 42” (1088mm) field joints on the main line, along with Petrolatum and Butyl tape systems on upstream field joints.

Santos is a major upstream producer in Queensland’s onshore Surat and Bowen Basins. Sanctioned in January 2011, the Santos-operated GLNG project is a joint venture between Santos and three of the world’s largest energy companies, PETRONAS, Total and KOGAS and is underpinned by 20-year sales contracts with PETRONAS and KOGAS. The design stage of this pipeline also included a 50 year intended design life, in contrast to many of Santos’ competitors preceding with 30 year design plans.

Map of pipeline route - Queensland

Pipeline Induction Heat UK were subcontracted by the construction company Saipem Australia to apply Protal 7200 on the field joints using bespoke automated equipment. The PIH Auto-coat equipment was an innovation to the Australian pipeline construction industry as traditionally Australia has designed gas pipelines using smaller diameter pipe from 10” to 24” (250mm to 600mm). The pipeline was connected to Curtis Island Gas Liquefaction plant at Gladstone.

PIH Bespoke Autocoat Machine

For further information contact: Winn & Coales (Denso) Ltd., Chapel Road, London SE27 0TR Tel: 020 8670 7511 Fax: 020 8761 2456 e-mail: mail@denso.net website: www.denso.net

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GLASS FLAKE EPOXY – A PROVEN SUCCESS, BUT WHY?

By Sarah Vasey and Neil Wilds International Paint

Epoxy glass flake technology has been used in the offshore industry for over 30 years to protect the splash zones of offshore assets. Its favour grew rapidly during the North Sea oil boom in the 1980s encouraged by UK yards, which valued the improved ease of application compared to other technologies. At the time they had to apply high VOC multi-coat systems. By switching to high solids glass flake epoxies, productivity was increased as fewer coats were needed. Oil majors also began to see the performance benefits of choosing epoxy glass flake coatings. Today many projects still rely on such products for corrosion protection. Epoxy glass flake coatings can deliver outstanding performance, which is well documented, with recent inspections of offshore assets demonstrating their excellent long term performance.

Epoxy glass flake coatings have been extensively tested to offshore standards including NORSOK M-501 System 7A and 7B, and perform very well. The inspection of the now decommissioned Hutton TLP demonstrates a good correlation between performance in the NORSOK M-501 tests and what is seen in the field.

“It is clear after almost 30 years offshore, the glass flake epoxy selected on the Hutton TLP is still performing very well” Chris Jordan (former Coatings Manager for ConocoPhillips, Hutton TLP)

Differences in glass flake epoxies

Selecting a glass flake epoxy can be confusing with such an apparent large choice available in the market. Broadly speaking these can be categorised into those with low levels of glass flake and those with high levels present in the dry film. It is the high level glass flake coatings with a high aspect ratio (or lamellar glass flake) which are used for long term protection. The purpose of the glass flake is to add to the mean path distance of ion migration through the dry film. So the higher the aspect ratio, the greater the ion migration distance through the coating. Thus it is clear that an optimum level of high aspect ratio glass flake is required to afford ultimate anticorrosion performance. At too low a level, the anti corrosion properties will be diminished and at too high a level, the coating will become brittle. Examples of offshore assets protected with this technology, are numerous, (table 1).

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The importance of protecting offshore splash zones

Offshore splash zones are subjected to the highest rates of corrosion due to its alternating wet and dry atmosphere (figure 1). In addition, splash zones also experience high impact and abrasion which can easily wear, penetrate or rupture a coating that does not contain glass flake.

Figure 1 – Steel loss on offshore assets is at its greatest in the splash zone area.

<table>
<thead>
<tr>
<th>Year</th>
<th>Owner</th>
<th>Project</th>
<th>Platform Type</th>
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</thead>
<tbody>
<tr>
<td>1979</td>
<td>ConocoPhillips</td>
<td>Murchison</td>
<td>Offshore platform</td>
</tr>
<tr>
<td>1983</td>
<td>ConocoPhillips</td>
<td>Hutton</td>
<td>TLP</td>
</tr>
<tr>
<td>1985</td>
<td>Marathon</td>
<td>Brae ‘B’</td>
<td>Offshore platform</td>
</tr>
<tr>
<td>1989</td>
<td>BP</td>
<td>Arbroath</td>
<td>Offshore platform</td>
</tr>
<tr>
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<td>Amethyst</td>
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<td>1995</td>
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<td>Offshore platform</td>
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<td>2007</td>
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<td>Gjoa</td>
<td>Semi-submersible</td>
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<tr>
<td>2014</td>
<td>Songa Offshore</td>
<td>Songa#1</td>
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</table>

Table 1 – Glass flake epoxy coatings with high levels of lamellar glass flake in their dry film have proved very popular for splash zone protection.
Performance testing available to support the selection of glass flake epoxies

With so many glass flake coatings on offer, it’s often unclear how to choose between them. In some instances, people turn to NORSOK M-501 (based on ISO 20340) for guidance, which under system 7A, uses a set of prequalified tests specifically for splash zone areas. NORSOK M-501 does not offer a coatings lifetime performance guarantee; it merely provides a performance standard. Thus, whilst glass flake coatings may pass this standard, it is also useful to turn to in-service performance before making a coating selection. The 30 year in service track record of Glass Flake Epoxy as applied to the Hutton TLP, is a perfect example of a coating meeting the requirements of NORSOK M-501 and of proven performance in the field.

The importance of the type and level of glass flake present in a coating

A coating will always require careful formulation to ensure it meets high end performance needs. Coating manufacturers have two options available to them in formulating glass flake epoxies:

- Add glass flake to increase the coating’s performance
- Add glass flake to ensure the coating meets the requirements of a specification phrase such as “glass flake epoxy”

There is a big difference between the two options. Screening of commercial glass flake epoxies can reveal a wide variance in the levels of glass flake present within the dry film.

To meet both of these options, coatings manufacturers may choose between different types of glass. For instance, lamellar glass flake will add a long ‘tortuous’ path for ions and water molecules to migrate through the dry film (see figure 3) providing an excellent barrier. Alternative glass flake epoxies can use micronized glass, but this may not significantly improve anticorrosion performance. Micronized glass flake has a low aspect ratio and this is why such coatings perform poorly in comparison to some lamellar glass flakes such as that, found on the Hutton TLP.

Surface preparation for glass flake epoxies

It is well known that the level of surface preparation undertaken prior to the application of a coating can have a profound impact on the coating’s lifetime. Therefore, it is always recommended that carbon steel is prepared to a Sa2.5 level of cleanliness with an angular surface profile of 50-75 μ (2-3mm). This allows a good mechanical lock to take place between the steel substrate and the newly applied coating. The same is true of glass flake epoxies; maximum performance is achieved from a Sa2.5 surface preparation with an angular profile. If this surface preparation level cannot be achieved then coating lifetime will be reduced.

Why the Hutton TLP glass flake epoxy coating worked so well over its 30 year time span

In summary, it is no surprise that Glass Flake Epoxy has performed so well after almost 30 years. Being high build with a high level of lamellar glass flake in the dry film (>30%) Interzone® 1000 provides excellent damage and corrosion resistance. This makes it ideal both for use in heavy duty yards where coating impact is common and for long term in-service anticorrosion performance. It is no wonder coatings such as Glass Flake Epoxy still prove popular today and are sure to do so for many years to come.

Reference: 1. NACE Paper 09009 – 2009 “Heavy duty glass flake coatings for arduous anti-corrosive service”
SHERWIN-WILLIAMS
THE ROYAL ALBERT BRIDGE

In terms of preserving important, historic landmarks, the task of protecting the Royal Albert Bridge spanning the River Tamar presented a number of challenges, not least the number of rivets, back to back angles and the chains.

Designed by Brunel and completed in 1859, the bridge provides the only rail connection between Cornwall and the rest of England.

Opened by His Royal Highness Prince Albert, this industrial looking structure with spindly piers and beefy tubular arches, retains a period elegance and appeal, while still providing the route for modern rail transport.

The bridge presented a number of painting challenges: the tubular arches are made up of many riveted plates and the internal surfaces of the chains required special attention.

The environment is aggressive due to the relatively high levels of humidity and salinity from the tidal river below so the specified protective system had to provide a protective envelope that will give 25 years anti-corrosion protection to first major maintenance.

Solution:

Based on the successful application of glass flake epoxy systems used to repaint the Forth and Tay Rail Bridges, Network Rail decided to continue along these lines and specified a glass flake epoxy system. The Principal contractor, Taziker Industrial, selected Sherwin-Williams Protective & Marine Coatings as its paint supplier.

The existing paintwork was totally removed by abrasive blast-cleaning. The coating system comprised Metagard L674 Epoxy Blast Primer at 50um minimum dry film thickness (mdft), Epigrip C123 Glass Flake Epoxy at 400um mdft and Resistex C137V2 Acrylic Urethane Finish at 50um mdft. A stripe coat of Epigrip C123 Glass Flake Epoxy was applied at 250um mdft between coats 1 and 2 to all rivets, sharp edges and joints, etc. A total minimum dry film thickness of 500um was applied.

Working over a live railway, the applicators applied the stripe coat by brush to all rivets and sharp edges. The internal surfaces of the chains were coated using brush and roller, all the other coats were applied by airless spray.

Damian Smith, of the contractor Taziker Industrial, said: "This was a particularly challenging project, especially with the chains and rivets we had to treat, and we ended up applying this part of the coating using an adapted roller system. All in all, this was both effective and impressive in its application."

Summary:

Originally developed to protect offshore structures from the severe marine environment in North Sea oil and gas applications, the epoxy glass flake resin system adapted well for this purpose.

The system eliminated the need for ongoing maintenance, significantly reducing environmental impact, saving on repair costs and extending asset life.

The three-coat preventative maintenance coating system provides excellent adhesion and anti-corrosion properties and acts as a powerful barrier against the harsh weather conditions in this aggressive marine environment.

This technology - first used to famously complete the painting of the Forth Rail Bridge in 2001 to 2011 - has put glass flake epoxy-based systems at the forefront of bridge painting.

The benefits to customers of adapting this system to the bridge and highways sector comes in terms of labour costs, lower energy usage and volumes of paint required. In addition, the higher volume solids used in the coatings system mean that fewer volatile organic compounds (VOCs) were emitted during the process.

Sherwin-Williams’ glass flake epoxy coatings now feature in a number of other large bridge and highway projects, including 47 bridges across the M6 Toll Road, the Tay Rail Bridge and Blackfriars Bridge.

Using glass flake technology to provide a thicker dry film in a single coat, the coatings system can be modified to meet the requirements of the customer in terms of cost effectiveness, application and finish. The selected paints typically consist of a higher build blast primer, an epoxy glass flake build coat and an acrylic urethane finish, as well as a stripe coat of epoxy glass flake.

Dawn Welsh, of Network Rail, said: “This project means the bridge can continue to be used for years to come without further major coatings maintenance. We’re especially pleased with the combination of the protection and the finish this has given to the bridge.”

Dave Bottomley, of Sherwin-Williams Protective & Marine Coatings, said: “Frequently subject to harsh environments, including high winds and salt laden sea mists, the ongoing maintenance of many bridges carries significant costs and environmental implications.

“By transferring our innovative coatings technologies across markets, the need for service and maintenance has been reduced and the asset life extended.

“The difference to the Royal Albert Bridge can be seen by everyone, and the protection offered will make sure that it can stand proudly for many years to come.”

For further information contact: Tower Works, Kestor Street, Bolton, BL2 2AL, UK Tel: +44 (0)1204 521771 www.sherwin-williams.com/protectiveEMEA
EVALUATION OF STRESS CORROSION CRACKING RESISTANCE OF NI-BASED ALLOYS USING A CREVICED FOUR-POINT BEND DEVICE

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1R. Morana was at CSM when the work was performed, and is now with BP Exploration, Sunbury on Thames.

Summary

In this study an accelerated four-point bent beam (FPBB) test was developed, utilising a crevice former on the surface under tension to minimise the incubation period for stress corrosion cracking. The stress corrosion cracking (SCC) resistance of two Ni-based alloys, N09925 and N09935, was assessed via FPBB and creviced fourpoint bent beam (CFPBB) tests under NACE level VII conditions. No failures of either alloy were observed in standard FPBB tests with test durations of up to 90 days. The alloy with the higher Ni content (alloy N09925) passed all of the CFPBB tests for test durations of up to 90 days. Failure of alloy N09935 was observed in one of the CFPBB tests after 90 days exposure, although it passed a separate 180 day FPBB test. These results indicate that the use of creviced specimens could potentially lead to reduced test durations when qualifying Ni-based alloys for service, although further tests are required to confirm this.

1. Introduction

Qualification of corrosion resistant alloys (CRAs) for use in oil and gas production often requires very long test durations. For constant strain/load tests, crack initiation times between 3 and 12 months have been reported, whilst test durations of up to 3 years have been employed [1,2]. This reflects the need to take into account the incubation period for the development of precursors to stress corrosion cracking (SCC), such as localised corrosion and pitting. Obviously there is considerable advantage in developing a technique that can minimise these long test durations. One potential approach is the use of creviced test pieces, which can promote localised corrosion and crack initiation, thus causing failure in a shorter time [1,2].

In this study the standard four-point bent beam (FPBB) test was modified by the insertion of a crevice former to minimise the incubation period for stress corrosion cracking. This modified test method was used to compare the SCC resistance of two Ni-based CRAs (UNS N09935 and UNS N09925) exposed to NACE level VII environmental conditions, i.e. a severe high pressure high temperature sour environment. The results were compared to those obtained using standard FPBB tests, with exposure periods of 30 days and 90 days. Finally, the effect of extending the test duration to 180 days was investigated for the N09935 alloy, using both creviced and noncreviced specimens.

2. Materials and Experiments

For the test program, two Ni-based CRAs in the precipitation hardened condition (solution annealed + aged) were obtained, i.e. alloys N09925 and N09935. These alloys have similar yield strengths (800 MPa) but different specified chemical compositions. The main difference is the Ni content, with alloy N09925 having a higher Ni content (38 wt% to 46 wt%) than alloy N09935 (34 wt% to 38 wt%) [3].

From as received forged round bars, appropriate FPBB specimens were machined with the specimen length parallel to the bar length. For testing in the corrosive environment, specimens were mounted in test jigs. The detail of the setup for specimens with an imposed crevice is shown in Figure 1. The Hastelloy® plate together with the specimen surface in tension forms the crevice site.

Before testing, all specimens were subjected to a bending deflection in air at room temperature, corresponding to 100% of the measured (‘actual’) yield strength of each alloy. The required deflection was obtained by performing calibration tests on FPBB specimens fitted with strain gauges. The crevice former was attached to the loading jigs while immersed in the test solution in order to avoid the formation of air pockets within the crevice. The autoclave was then sealed, brought to the test temperature, deaerated and finally saturated with the test gas mixture. NACE level VII conditions were used [3], with a temperature of 205°C, CO2 partial pressure of 3.5 MPa, H2S partial pressure of 3.5 MPa and Cl- concentration of 180000 mg/l.

Tests were initially conducted on both alloys for two exposure times: 30 days and 90 days. All tests were performed in duplicate. Additional tests were performed on alloy N09935 with an extended test duration of 180 days. After exposure, specimens were removed from the autoclave and examined visually for cracks. A more detailed search for cracks was performed via optical microscopy on sectioned and mechanically polished samples. The ‘through thickness’ area was examined by sectioning at one third and two thirds of the specimen width - in the case of the CFPBB tests using the part of the specimen that had been located under the crevice former.

Figure 1: Detail of test jig for creviced four-point bent beam (CFPBB) tests.
3. Results and Discussion

Representative optical micrographs obtained on sectioned specimens of both alloys after 30 days exposure to NACE level VII conditions are shown in Figure 2. Note that the surface in tension is towards the top of each image. No cracking was observed in either alloy. Occasional small defects or pits were evident (circled in red), although their dimensions were very small (maximum 20 μm in depth).

Optical micrographs from the 90 day tests are shown in Figures 3 and 4. No cracking was observed for alloy N09925 in either standard or creviced specimens. For alloy N09935 the standard FPBB tests also revealed no cracking. Occasional defects or pits, with maximum depth less than 10 μm, were observed (Figure 3). As shown in Figure 4, one of the creviced alloy N09935 specimens exhibited cracking almost completely through the thickness of the specimen (5 mm). Apart from the main crack, numerous side branches can also be seen. Etching and examination at higher magnification revealed that the side branches propagated mainly through grain interiors, i.e. transgranular cracking was favoured. However, the second creviced specimen for this alloy revealed no cracking after 90 days exposure. Furthermore, no cracking of alloy N09935 was observed in the extended 180 day tests (Figure 5). One creviced specimen did reveal a surface defect or pit, with a depth of 20 μm. The results of all tests are summarised in Table 1. Note that, for each condition, tests were conducted in duplicate. The discrepancy between the 90 day and 180 day tests suggests that reproducibility of the crevice geometry may be an issue. Nevertheless, the results suggest that the use of creviced specimens can lead to shorter test durations, although further tests are required to confirm this.

Figure 2: Optical micrographs of sectioned specimens following 30 days exposure. All markers on figures 2-5 are 50 microns.

Figure 3: Optical micrographs of sectioned specimens following 90 days exposure.

Figure 4 (left): Optical micrographs of sectioned specimens following 90 days exposure (alloy N09935 with crevice).

Figure 5 (above): Optical micrographs of sectioned specimens following 180 days exposure (alloy N09935).
Concerning the mechanism of failure, above about 100°C the stress corrosion cracking failure of Ni alloys in Cl⁻H₂S environments is governed by anodic dissolution. At the test temperature of 205°C, the surface is no longer a passive oxide film, but rather a sulphide tarnished film. Pitting then occurs on this altered surface [1]. SCC initiates at such pits or crevices, and crack propagation is normally via a transgranular path, with branching – as shown in Figure 4 [1].

Considering the difference in behaviour of the two alloys investigated in this work, reference can be made to the influence of alloy composition on stability of the surface film, i.e. resistance to localised corrosion. In Ni-based alloys, resistance to SCC in Cl and Cl⁻-H₂S environments is shown to improve as the levels of Ni, Mo and Cr are increased [1,4,5]. For Ni-based alloys in such environments, the resistance to SCC, given by a parameter Σ is [1]:

$$\Sigma = Ni + 2Mo + 0.5Cr$$  \hspace{1cm} (1)

where elemental compositions are in wt% and the Mo content is above 2.5 wt%. Use of Equation 1 leads to Σ = 60 for alloy N09925, and Σ = 53 for alloy N09935. The lower value for N09935 implies a reduced resistance to SCC in comparison with N09925, due to the lower Ni content.

4. Conclusions

- No failures of either alloy were observed in standard FPBB tests with test durations of up to 90 days.
- Alloy N09925 passed all of the CFPBB tests for test durations of up to 90 days.
- Failure of alloy N09935 was observed in one of the CFPBB tests after 90 days exposure, although it passed a separate 180 day CFPBB test, which implies that reproducibility of the crevice geometry may be an issue.
- The results suggest that the use of creviced specimens may potentially lead to reduced test durations for qualifying Ni-based CRAs, although longer term tests and/or more repeat tests are needed to confirm this.
- Failure of the creviced N09935 specimen was consistent with anodic SCC, with a transgranular cracking mode observed.
- The apparent higher susceptibility to SCC of alloy N09935 was attributed to the lower Ni content compared with alloy N09925, which gives a less stable surface film and a lower resistance to localised corrosion and crack initiation.

5 References


Table 1: Summary of results from SCC testing of Ni alloys.

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<td>30</td>
<td>FPBB</td>
<td>Pass</td>
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<td>90</td>
<td>FPBB</td>
<td>Pass</td>
</tr>
<tr>
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<tr>
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<td>90</td>
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<td>Fail*</td>
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<td></td>
<td></td>
<td>180</td>
<td>CFPBB</td>
<td>Pass</td>
</tr>
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*Cracks were observed in one of the two specimens tested (see Figure 4).
DENSO STEELCOAT PROTECTS EDINBURGH’S WATER SUPPLY AQUEDUCT

A £2.6 million upgrade of sections of the 45 km-long Talla aqueduct used by Scottish Water to supply most of Edinburgh’s water has been completed by contractor George Leslie Ltd, with Jacobs being the Consulting Engineers. Built in Victorian Times, the aqueduct takes raw water from the Talla and Fruid reservoirs in the Scottish Borders to Edinburgh’s modern Glencorse water treatment works.

For most of its length the aqueduct runs as a tunnel, split by several bridges and siphons. It is capable of taking up to 127 megalitres of water per day. Following visual inspection of the tunnel and its associated chambers Scottish Water identified the need to carry out work to refurbish parts of the tunnel and chambers, including installing new valves in the chambers.

In 12 different structures and locations Winn & Coales Steelcoat 100/400 was used to give protection to some 350 linear metres of pipe and various joints and couplings. This follows its successful use last year by George Leslie in a similar refurbishment of Scottish Water’s Loch Katrine aqueducts which serve Glasgow.

In each case the Winn & Coales Steelcoat system comprised of: Denso Hi-Tack Primer, Denso Profiling Mastic, Denso Hi-Tack Tape, Denso Ultraseal Tape and Denso Acrylic Topcoat. It was applied by George Leslie’s own work force following initial site training on the application methods by Winn & Coales representatives, who also made site visits to monitor application and advise as necessary.

WINN & COALES COATING PROTECTS POWER STATION HEADER BOXES

Universal Heat Transfer Ltd (UHT) of Atherston, Warwicks, are heat exchange and transfer specialists in supplying equipment and services to industry. One of their latest projects involved the manufacture of header boxes and channel heads for the refurbishment of four hydrogen coolers for a power station generator cooling system.

UHT’s customer specified Winn & Coales (Denso) Ltd’s Archco-Rigidon 403D to give “fit and forget” corrosion protection of the carbon steel substrate from the coolant inside the header boxes for a minimum of ten years. Winn & Coales checked the specification for both suitability of Archco-Rigidon 403D and also for the method of application, given that the coating had to be applied in normal engineering workshop conditions. UHT say that the coating arrived in a timely manner, which was appreciated due to the tight deadlines they had to meet.

The glass flake vinyl ester Archco-Rigidon coating was inspected by UHT’s customer’s Quality Assurance consultants and found to be more than adequate in terms of finish and film thickness, including Holiday detection readings, to provide the required protection.
Corrosion in the Water industry comes at a huge cost to the industry as a whole. Corrocoat has consistently developed Polymer Glassflake technologies over 35 years ensuring long term corrosion protection in the most hostile environments. Vinyl Ester Glassflake lined environments ensure long term protection from corrosive environments where downtime increases costs to operator. Corrocoat lining are designed to protect these environments for over 30 years with little or no maintenance. Materials are easily repairable and where damage does occur, this remains localised.

A large Water Water Treatment facility required protection for a large diameter treated water discharge line. The design life of 30 years was required.

Corrocoat Vinyl Ester glass flake technology was chosen by United Utilities for the Waste water treatment facility. The spools are made up of Carbon Steel 1.6m NB up to 2.2m NB. United Utilities required a lining where life expectancy requirements exceed 30 yrs and it was decided to utilise Corrocoat’s proven long term lining capabilities where Polyglass VEF has a proven track record for long term corrosion protection.

Internal Lining Polyglass VEF at 1500 micron. External Coating – Zipcoat at 400 micron. Together this system ensures long term protection against corrosion of this valuable asset.
ARGYLL-RUANE LTD. – THE TRAINING & CERTIFICATION SCHEME

Argyll-Ruane Ltd., the Training & Certification scheme provider to the Institute of Corrosion is pleased to announce that Nigel Peterson-White has joined the Company as Trainee ICorr Tutor.

Nigel already held ICorr Painting Inspector L2 certification and has served Yorkshire Branch as Secretary for a number of years.

Formerly in Technical Sales with Akzo Nobel, and more latterly Technical Director of a major industrial coatings applicator, Nigel brings a considerable ‘hands-on’ experience of both supervision and inspection of numerous protective treatments to his new role.

Enthusiasm and experience carried Nigel through the ARL selection process relatively quickly and Richard Green, ICorr Senior Protective Treatment Tutor at ARL said “It is great that Nigel is bringing his fresh, vibrant personality to the team. I am sure he is going to make an important contribution to our Scheme development plans.

Nigel will be based at the ARL training facility at Rotherham.

For further information contact: enquiries@argyllruane.com

MAJOR PAINTING PROGRAMME COMPLETED AT SOUTHMEAD HOSPITAL

Bagnalls has just completed a major painting programme to Southmead Hospital in Bristol, after winning the opportunity through competitive tender in 2011. The hospital brings together services from Frenchay and Southmead to form one of the largest hospitals in the UK.

The specialist painting contractor applied the decorative coatings and specialist hygiene finishes to this £430m new build, 877 bed hospital. Bagnalls were on site for approximately two and a half years, working in partnership with main contractor, Carillion and paint manufacturer, Johnstones.

Up to 70 painters were working on site at peak times, applying coatings to a PPG Johnstone’s paint specification. In total, 240,000 sqm of walls and ceilings were coated with PPG Johnstone’s Microbarr Acrylic Matt range and a further £200,000 of CS Group Hygiene Coatings were applied.

More than 32,000 litres of Johnstone’s Microbarr Acrylic Matt in Brilliant White were used to deliver the hospital’s commitment to infection control. The Microbarr range helps prevent the spread of harmful bacteria which can lead to a rise in harmful ‘superbugs’ such as MRSA and E.Coli.

Paul Curry, Regional Director for Bagnalls, said: “This project was a massive undertaking for Bagnalls. Excellent project management and quality workmanship from our painters resulted in a finish we are very proud of. We had the continued support of both Carillion and Johnstone’s throughout the project and together achieved an excellent finish in terms of colour, quality and infection control”.

He added, “Furthermore, as part of the company’s commitment to corporate social responsibility, we recruited a new apprentice from the workforce of Blue Sky. Where possible we like to offer work opportunities to individuals who are seeking employment in the communities in which we are working. The individual concerned had achieved her Diploma 2 in painting, but had no practical site experience. I am glad to say, she is now working towards her NVQ level 2 in painting and decorating with our support”.

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Altrincham, Cheshire WA14 1ES
Tel: 0161 926 4000  Fax: 0161 926 4103
Email: paul.lambert@mottmac.com  www.mottmac.com

Paint Inspection Limited
Milton House, 7 High Street, Fareham PO16 7AN
Tel: 0845 4630680
Email: ian@paint-inspection.co.uk  www.paint-inspection.co.uk

Plant Integrity Management Ltd
1st Floor Office, Woodburn House, Woodburn Road, Blackburn BB1 0RX
Tel: 01224 798870  www.pim-ltd.com
Email: maraneda@pim-ltd.com

SCALED SOLUTIONS LTD
INDEPENDENT LABORATORY SERVICES
Tel: 01506 439994
Email: enquiries@scaledsolutions.co.uk  www.scaledsolutions.co.uk

SONOMATIC LTD
Dornoch House, The Links, Kelvin Close, Birchwood, Warrington WA3 7PB
Tel: 01925 414000
Email: info@vsomatic.com  Website: www.sonomatic.com

NATIONAL OILWELL VARCO PTE LTD
161 Pioneer Road, Singapore, 639604
Tel: (65) 62643400
Fax: (65) 6262 1853

STEEL PROTECTION CONSULTANCY LTD
PO Box 6386, Leighton Buzzard, Beds. LU7 6BX
Tel: 01525 852500  Fax: 01525 852502
Email: david.deacon@steel-protection.co.uk
Website: www.steel-protection.co.uk

TOPLINE LIMITED
40 Birabi Street, GRA Phase 1, Port Harcourt, Rivers State, Nigeria
Tel: 084 46238
Email: info@toplinelimited.net  Website: www.toplinelimited.net

WOOD GROUP INTEGRITY MANAGEMENT
Compass Point, 79-87 Kingston Road, Staines, Middlesex, TW18 1DT
Tel: 01708 417225  Fax: 01784 417283

FORTH ESTUARY TRANSPORT AUTHORITY
Forth Estuary Transport Authority
Forth Road Bridge
Administration Office, South Queensferry, EH30 9SF
Tel: 0131 319 1699  Fax: 0131 319 1903
Email: customer.care@forthroadbridge.org

SSE Ltd
Grampian House, 200 Dunkeld Road, Perth PH1 3GH
Tel: 01738 456000  Fax: 01738 456647

BREWERS PROTECTIVE COATINGS
Reform Rd, Maidenhead, Berkshire SL6 8DA
Tel: 01628 784964  Fax: 01628 672578
E-mail: info@brewersprotectivecoatings.co.uk  www.brewersprotectivecoatings.co.uk

THE PROTECTIVE COATINGS PROFESSIONALS™
UK Office & Warehouse
Unit 26, Craftsmans Way, East Goscote Industrial Estate, East Goscote, Leicestershire LE9 3JA
Tel: +44 (0) 116 269 7777
Aberdeen Office
23 Rubislaw Den North, Aberdeen AB15 4AL
Tel: +44 (0) 1224 329 098
www.carboline.com

CHEMCO INTERNATIONAL LTD.
INNOVATIVE RUST & WET-TOLERANT, SOLVENT-FREE COATINGS
East Shawhead Industrial Estate, Coatbridge, Scotland, UK
Tel: 01236 606060  Fax: 01236 606070
Email: sales@chemcoint.com  www.chemcoint.com
INTERNATIONAL PAINT LIMITED

Stoneygate Lane, Felling, Gateshead, Tyne & Wear NE10 0JY
Tel: 0191 469 6111 Fax: 0191 496 0676
Email: sarah.vasey@akzonobel.com
Website: www.international-pc.com

JOTUN PAINTS (EUROPE) LTD.

Stather Road, Flixborough, Scunthorpe, North Lincolnshire DN15 8RR
Tel: 01724 400 125 Fax: 01724 400 100
Email: decpaints@jotun.co.uk
www.jotun.co.uk

SHERWIN-WILLIAMS®

Your Asset Protection Partners
T: +44 (0)1204 521771
W: sherwin-williams.com/protective-EMEA

PPG PROTECTIVE & MARINE COATINGS

Unit 3 Maises Way, The Village, Carter Lane, South Normanton, Derbyshire DE55 2DS
Tel: +44 (0) 1773 814520 Fax: +44 (0) 1773 814521
Web: www.ppgpmc.com

SPENCER COATINGS LTD

6 York Street, Aberdeen, AB11 5DD
Tel: 01224 288780 Fax: 01224 2111070
Website: www.spencercoatings.co.uk

SPECIALTY POLYMER COATINGS INC

64 Tudor Avenue
Worcester Park
Surrey KT4 8TX
Tel: 020 8337 4953 Fax: 020 8337 4953
Website: www.spc-net.com

STORK TECHNICAL SERVICES (RGB) LIMITED

Norfolk House, Pitmedden Road, Aberdeen AB21 0DP
Tel: 01224 722888 Fax: 01224 723406
Email: robert.grainger@stork.com
Website: www.storktechnicalservices.com

TINSLEY SPECIAL COATINGS

Enterprise House, Durham Lane,
Eaglescliffe TS16 0PS
Tel: 01642 784279 Fax: 01642 782891
Email: enquiries@tinsleyspecialproducts.com
### ICATS REGISTERED COMPANIES

**ICATS REGISTERED COMPANIES WITH QUALIFIED APPLICATORS**

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>Telephone</th>
<th>Email</th>
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</thead>
<tbody>
<tr>
<td>Alfred Bagnall &amp; Sons</td>
<td>6 Manor Lane, Shipley, West Yorkshire, BD18 3RD</td>
<td>01302 852359</td>
<td><a href="mailto:alpaccess@btconnect.com">alpaccess@btconnect.com</a></td>
</tr>
<tr>
<td>AlpAccess s.r.l.</td>
<td>I.L. Caragiale, 21 Ploiesti, 100015, P.H. Romania</td>
<td>+44 (0) 722140858</td>
<td></td>
</tr>
<tr>
<td>APB Construction (UK)</td>
<td>First Floor Offices, Grange Business Centre, River Works, Grange Lane, Sheffield, S5 ODP</td>
<td>01709 541000</td>
<td></td>
</tr>
<tr>
<td>APB Group Limited</td>
<td>Ryandra House, Ryandra Business Park, Brookhouse Way, Cheadle, ST10 1SR</td>
<td>01538 755377</td>
<td></td>
</tr>
<tr>
<td>A &amp; R Painting Services Ltd</td>
<td>Marvwood House, Riverside Park, Bromborough, Wirral, CH62 3QX</td>
<td>0151 445 3589</td>
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<tr>
<td>Armourcote Surface Technology Plc</td>
<td>15/17 Cavelis Place, Kelvin Industrial Estate, East Kilbride, Scotland, G75 0PZ</td>
<td>01355 248223</td>
<td></td>
</tr>
<tr>
<td>Austin Hayes Ltd</td>
<td>Cartfon Works, Cernetary Road, Yeadon, Leeds, LS19 7BD, UK</td>
<td>0113 250 2255</td>
<td></td>
</tr>
<tr>
<td>B&amp;A Contracts Ltd</td>
<td>Dale Road, Hubberston, Millford Haven, Pembrokeshire SA73 3PR</td>
<td>01646 693489</td>
<td></td>
</tr>
<tr>
<td>BAE Systems Surface Ships Support Ltd</td>
<td>Room 213, Naval Base Headquarters, Building 1/100, P127, Portsmouth, PO1 3LS</td>
<td>023 92857279</td>
<td></td>
</tr>
<tr>
<td>Barrier Ltd</td>
<td>Stephenson Street, WallSEND, Tyne &amp; Wear, NE28 6UE, UK</td>
<td>0191 262 0510</td>
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</tr>
<tr>
<td>Beever Limited</td>
<td>Little Coldharbour farm, Tong Lane, Lamberhurst, Kent, TN3 8AD, UK</td>
<td>01892 890045</td>
<td></td>
</tr>
<tr>
<td>BluHull Marine Ltd</td>
<td>Orange Grove Birbal Street, Baslan, BZN 9013 MALTA</td>
<td>+356 21445807</td>
<td></td>
</tr>
<tr>
<td>Border Coatings (Scotland) Ltd</td>
<td>Unit 7, Station Road Industrial estate, Earlston, Berwickshire TD4 6Z</td>
<td>01896 823106</td>
<td></td>
</tr>
<tr>
<td>Briton Fabricators Ltd</td>
<td>Wainall Road, Hucknall, Notts, NG15 6EP</td>
<td>01115 963 2901</td>
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</tr>
<tr>
<td>Cape Industrial Services</td>
<td>Cape House, 3 Red Hall Avenue, Paragon Business Village, Wakefield, WF1 2UL</td>
<td>01224 215800</td>
<td></td>
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<tr>
<td>C E Pittaway &amp; Son Ltd</td>
<td>106 – 114 Flinton Street Hull HU3 4NA</td>
<td>01482 329007</td>
<td></td>
</tr>
<tr>
<td>Chemcem Scotland Ltd</td>
<td>Wester Crosshill, Avonbridge Road, Falkirk FK1 3DF</td>
<td>01322 851987</td>
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<tr>
<td>Cleveland Bridge UK Ltd</td>
<td>Cleveland House, Yarm Road, Darlington, DL1 4DE</td>
<td>01325 302345</td>
<td></td>
</tr>
<tr>
<td>Coating Services Ltd</td>
<td>Parrittng Street, Munmp Bridge, Oldham, OL1 3RU, UK</td>
<td>0161 665 1998</td>
<td></td>
</tr>
<tr>
<td>Collis Engineering Railway Contracts</td>
<td>Saltcombe Road, Meadow Lane Industrial Estate, Alfreton, Derbyshire, DE5 1RG</td>
<td>01773 833255</td>
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<tr>
<td>Community Clean</td>
<td>11 Old Forge Road, Ferndown Industrial Estate, Ferndown, Wimborne, Dorset, BH21 7RB, UK</td>
<td>01461 6850133</td>
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<tr>
<td>Corrocoat</td>
<td>Forster Street, Leeds, LS10 1PW</td>
<td>01132767060</td>
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<tr>
<td>D&amp;D Rail Ltd</td>
<td>Time House, Time Square, Basildon Essex SS14 1DJ</td>
<td>01268 520000</td>
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<tr>
<td>Denholm Industrial</td>
<td>21 Boden Street, Glasgow, G40 3PU</td>
<td>0141 445 3939</td>
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<tr>
<td>Donyal Engineering Ltd</td>
<td>Hobson Industrial Estate, Burnopfield, Newcastle Upon Tyne NE16 6EA</td>
<td>01207 270009</td>
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<tr>
<td>DRH Coatings Ltd</td>
<td>Suite 5, 3 Shawcross Industrial Estate, Ackworth Road, Pontefract PO3 5J</td>
<td>023 9266 6165</td>
<td></td>
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<tr>
<td>Dyer &amp; Butler Ltd (Rail)</td>
<td>Head House, Station Road, Nunsling, Southampton, SO16 0AH, UK</td>
<td>02380 667549</td>
<td></td>
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<tr>
<td>ENC (Yorkshire) Ltd</td>
<td>Unit 38 Rotherham Road, Dinnington Sheffield, S25 3RF</td>
<td>01909 567860</td>
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<tr>
<td>Excel Contractors Ltd</td>
<td>11a West End Road, Bitterne, Southampton SO18 6TE</td>
<td>02380 444420</td>
<td></td>
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<tr>
<td>F A Clover &amp; Son</td>
<td>Barfdolph Road, Richmond, Surrey, TW9 2LH</td>
<td>0208 948 6321</td>
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<tr>
<td>Farbuild Ltd</td>
<td>Trelawn Lodge, Vicarage Road, Wingfield, Diss, Norfolk IP21</td>
<td>01379 640670</td>
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<tr>
<td>Forth Estuary Transport Authority</td>
<td>Forth Road Bridge, Administration Office South Queensferry, EH30 9SF</td>
<td>0131 319 1699</td>
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<tr>
<td>GABRE (UK) LTD</td>
<td>9 Holme Road, Dromore, Omagh Co Tyrone, BT78 3BX</td>
<td>02882 897950</td>
<td></td>
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<tr>
<td>GPL Civil Engineering Ltd (Special Projects Division)</td>
<td>Kennedy House, Cheltenham Street, Salford, M6 6VY</td>
<td>0161 745 7988</td>
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<tr>
<td>Harso Infrastructure UK Ltd</td>
<td>Unit 3 Manby Road, South Killingholme, Immingham, North Lincolnshire, DN40 3DX</td>
<td>01469 533880</td>
<td></td>
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<tr>
<td>Harrisons Engineering Lancashire Ltd</td>
<td>Judge Wilney Mill, Longworth Road Billington, Chelmsore, Lancashire, BB7 9TP</td>
<td>01254 823993</td>
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<tr>
<td>HBS Protective Coatings Ltd</td>
<td>40 Manse Road, Belfast BT8 6SA</td>
<td>028 90708280</td>
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<tr>
<td>Herrington Industrial Services Ltd</td>
<td>Crown Works, Crown Road, Low Southwick, Sunderland SR5 2BS</td>
<td>0191 5160634</td>
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<tr>
<td>Hi-Tech Surface Treatment Ltd</td>
<td>Unit B, Deacon Trading Estate, Chickenhall Lane, Eastleigh, Hants SO50 6RP</td>
<td>023 80611789</td>
<td></td>
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<tr>
<td>Hyspec Services Ltd</td>
<td>Unit 3 Meadowfield Industrial Estate, Cowdenbeath Road, Burntisland, Fife, KY3 0LU</td>
<td>01592 874661</td>
<td></td>
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<tr>
<td>Industrial Coating Services</td>
<td>A1 House, Rolling Mill Street, Norton Canes, Cannock WS11 9UH</td>
<td>01845 474 0007</td>
<td></td>
</tr>
<tr>
<td>Company Name</td>
<td>Address</td>
<td>Contact Information</td>
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<td>ICATS Registered Companies</td>
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<tr>
<td>N L Williams Group Ltd</td>
<td>Westside Industrial Estate, Jackson Street, St. Helens, Merseyside WA5 3AF</td>
<td>T: 01744 265262</td>
<td></td>
</tr>
<tr>
<td>Northern Protective</td>
<td>16 High Reach, Fairfield Industrial Estate, Bill Quay, Gateshead, Tyne &amp; Wear, NE10 0UR</td>
<td>T: 0191 438 5555</td>
<td></td>
</tr>
<tr>
<td>Nusteel Structures</td>
<td>Lyminge Industrial Estate, Lyminge, Hythe, Kent, CT21 4LR</td>
<td>T: 01303 268112</td>
<td></td>
</tr>
<tr>
<td>Offshore Marine Services Ltd</td>
<td>Bumby House, Jalan Bahasa, PO Box 80 148, 870 11</td>
<td></td>
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<tr>
<td>Ormac Coatings Ltd</td>
<td>Newton Chambers Road, Thorncliff Park Estate, Chapelstown, Sheffiel, S35 2PH</td>
<td>T: 0114 246 1237</td>
<td></td>
</tr>
<tr>
<td>Over Rail Services Ltd</td>
<td>Unit 10 Mill Headway, Purdy's Industrial Estate, Rochford, Essex, SS4 1UN</td>
<td>T: 07976 378266</td>
<td></td>
</tr>
<tr>
<td>Paintel Ltd</td>
<td>Tisran, Westover, Ivybridge, Devon, PL21 9JH</td>
<td>T: 01752 719 701</td>
<td></td>
</tr>
<tr>
<td>PCM Nigeria Plc</td>
<td>99 Rivoc Road Trans Arndit, Port Harcourt, Rivers State, Nigeria</td>
<td>T: +23408055297828</td>
<td></td>
</tr>
<tr>
<td>P H Shot Blasting &amp; Spraying Services</td>
<td>43a Drumanney Road, Castlecaulfield, Dungannon, Co Tyrone, BT70 3NY</td>
<td>T: 028 877 7722</td>
<td></td>
</tr>
<tr>
<td>Pipeline Induction Heating</td>
<td>The Pipeline Centre, Farrington Road, Rosendale Rd Industrial Estate, Burnley BB11 5SW</td>
<td>T: 01282 415323</td>
<td></td>
</tr>
<tr>
<td>Port Painters Limited</td>
<td>Unit 3, Ringside Business, Heol-Y-Rhosog Cardif, CF3 2EWx</td>
<td>T: 02920 777070</td>
<td></td>
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<tr>
<td>PPC Ltd</td>
<td>Unit 2, Oyster Industrial Estate Jackson Close, Drayton, Portsmouth PO6 1QH</td>
<td>T: 023 9221 5957</td>
<td></td>
</tr>
<tr>
<td>Pyreoloy Limited</td>
<td>Kirkstone House, St Omers Road, Western Riverside Route, Gateshead, Wear, NE11 9EZ</td>
<td>T: 0191 4932600</td>
<td></td>
</tr>
<tr>
<td>Roy Hankinson Limited</td>
<td>Alexander House, Monks Ferry, Birkenhead Wirral, CH41 5LH</td>
<td>T: 0870 7892020</td>
<td></td>
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<tr>
<td>Severn River Crossing Plc</td>
<td>Bridge Access Road, Aust, South Gloucestershire, BS35 4BD</td>
<td>T: 01454 633351</td>
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<tr>
<td>Shutdown Maintenance Services Ltd</td>
<td>Kingsnorth Industrial, Hoo, Rochester, Kent, ME3 9ND</td>
<td>T: 01634 256969</td>
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<tr>
<td>Solent Protective Coatings Ltd</td>
<td>Tredgear Wharf, Marine Parade Southampton, Hants, SO14 5JF</td>
<td>T: 02380 221480</td>
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</tr>
<tr>
<td>South Staffs Protective Coatings Ltd</td>
<td>Bloomfield Road, Tipton, West Midlands, DY14 3EE</td>
<td>T: 0121 522 2373</td>
<td></td>
</tr>
<tr>
<td>Specialist Painting Group Ltd</td>
<td>Padholme Road East, Fenton, Peterborough PE1 5X</td>
<td>T: 01773 305500</td>
<td></td>
</tr>
<tr>
<td>Standish Metal Treatment Ltd</td>
<td>Potter Place, West Pimbo, Skelmersdale, Lancs, WN8 9PW, UK</td>
<td>T: 01695 455977</td>
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<tr>
<td>Stobarts Ltd</td>
<td>Tam Hove, Lakes Road, Derwent House Industrial Estate, Worksington, Cumbria CA14 3Y</td>
<td>T: 01900 870780</td>
<td></td>
</tr>
<tr>
<td>T &amp; T Protective Coatings Ltd</td>
<td>Unit 6, Lodge Bank, Crown Lane, Horwich, Bolton, Lancs, BL6 5HU</td>
<td>T: 01204 468080</td>
<td></td>
</tr>
<tr>
<td>TEMA Engineering Ltd</td>
<td>S-6 Curran Road, Cardif, CF10 5DF, UK</td>
<td>T: 020920 344556</td>
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<tr>
<td>Vale Protective Coatings Ltd</td>
<td>Building 152 - Langar North Industrial Estate, Harby Road, Langar, NG13 9HY</td>
<td>T: 01949 869784</td>
<td></td>
</tr>
<tr>
<td>Walker Construction (UK) Ltd</td>
<td>Park Farm Road, Folkestone, Kent, CT19 5DY</td>
<td>T: 01303 851111</td>
<td></td>
</tr>
<tr>
<td>Wardle Painters Ltd</td>
<td>Unit 5, Wirremble Building, Atlantic Way, Barry Docks, Glamorgan, CF63 3RA, UK</td>
<td>T: 01446 246020</td>
<td></td>
</tr>
<tr>
<td>Wescott Coatings &amp; Training Services Ltd</td>
<td>The Quadras Centre, Woodstock Way, Boldon Business Park, Boldon NE35 9PF</td>
<td>T: 0191 5197380</td>
<td></td>
</tr>
<tr>
<td>W G Beaumont &amp; Son</td>
<td>Beaumont House, B Bernard Road, Romford RM7 0GH</td>
<td>T: 01708 749202</td>
<td></td>
</tr>
<tr>
<td>William Hare Ltd</td>
<td>Brandleish House, Brandleish Road, Bury, Lancs, BUL 1J, UK</td>
<td>T: 0161 609 0000</td>
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<thead>
<tr>
<th>Company Name</th>
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<th>Contact Information</th>
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<tr>
<td>Industrial Painting</td>
<td>48-49 RCM Business Centres, Sandbeds Trading Estate, Dewsbury Road, Ossett, WF5 9ND</td>
<td>T: 01924 737260</td>
</tr>
<tr>
<td>International Energy Services Ltd</td>
<td>94 Awolowo, Ikoyi, Lagos State, Nigeria</td>
<td>T: 014615636</td>
</tr>
<tr>
<td>Interserve Industrial</td>
<td>Unit 2, Olympic Park, Pool Hall Road Elesmere Port, Cheshire, CH66 1ST</td>
<td>T: 0151 3737660</td>
</tr>
<tr>
<td>J Murphy &amp; Sons Ltd</td>
<td>Hiview House, Highgate Road, London NW5 1TN</td>
<td>T: 020 7267 4366</td>
</tr>
<tr>
<td>Jack Tighe Coatings</td>
<td>Sandall Lane, Kirk Sandall, Doncaster, DN3 1QR</td>
<td>T: 01302 880360</td>
</tr>
<tr>
<td>Jack Tighe Ltd</td>
<td>Redbourne Mere, Kirton Lindsey, Gainsborough, Lincs, DN2 1JN, UK</td>
<td>T: 01652 640003</td>
</tr>
<tr>
<td>JVP (Painters) Ltd</td>
<td>Unit B Prospect Way, Huttoon Industrial Estate, Brentwood, Essex, CM13 1X, UK</td>
<td>T: 01727 205155</td>
</tr>
<tr>
<td>KAEFER Opus Ltd</td>
<td>Ethan House, Royce Avenue,Cowpen Industrial, Estate, Billingham, TS23 4BX, UK</td>
<td>T: 01642 371850</td>
</tr>
<tr>
<td>Keep Protective Coatings Ltd</td>
<td>Unit 4, James Park, Mahon Road, Portadown, County Armagh BT62 3EH</td>
<td>T: 02838 338151</td>
</tr>
<tr>
<td>Lanarkshire Welding Co.</td>
<td>82 John Street, Wishaw, Lanarkshire, ML2 7TQ</td>
<td>T: 01698 264271</td>
</tr>
<tr>
<td>Mabay Bridge Ltd</td>
<td>Station Road, Chepsthow, Monmouthshire NP16 5YL</td>
<td>T: 01291 623801</td>
</tr>
<tr>
<td>Maclean &amp; Speirs Blasting Ltd</td>
<td>Unit D, East Fulton Farm, Darluth Road, Linwood, Paisley PA3 3TP</td>
<td>T: 01905 324777</td>
</tr>
<tr>
<td>M&amp;F Decorators Ltd</td>
<td>26 Jail Lane, Biggin Hill, Westerham Kent TN16 3SA</td>
<td>T: 01770 2051729</td>
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<tr>
<td>MCL Coatings Ltd</td>
<td>Pickernings Road, Halebank Industrial Estate, Widnes, Cheshire, WA8 8XX</td>
<td>T: 0151 423 6166</td>
</tr>
<tr>
<td>NSG UK Ltd</td>
<td>Fourth Avenue, Deeside Industrial Park, Deeside, Flintshire CHS 2NR</td>
<td>T: 01244 833138</td>
</tr>
</tbody>
</table>
Xervon Palmers Ltd
331 Charles Street, Royston, Glasgow G21 2QA
T: 0141 553 0440

ICATS REGISTERED COMPANIES

Abbay Gritblasting Services
Unit 13, Clapton Commercial Park, Clapton, Woodbridge, Suffolk IP12 3PF
T: 0191 262 0510

Advanced Construction and Eng Resources Ltd (ACER)
5th Floor, Horton House, Exchange Flags, Liverpool L3 9PB
T: 0161 408 0155

A McKie Building & Engineering Ltd
19 Kyle Road, Irvine, Ayrshire, KA12 8JX
T: 01294 279586

B&M Consulting
11 Kingsmead, Nailsea BS48 2XH
T: 01275 854708

Celtic Specialist Treatments Ltd
Rosedale, Carellieken Lane, Langstone, Newport, Gwent, NP18 2JQ
T: 01636 400194

Centregreat Engineering Ltd
11/12 Wyndham Close, Brackla, Industrial Estate, Bridgend, CF31 2AD
T: 01656 650481

Coastground Ltd
Morton Peto Road, Gapton Hall Industrial, Bexhill, East Sussex TN42 1AB
T: 01430 861628

Corroless Eastern Ltd
Greens Road, Greens Industrial Estate, Dereham, Norfolk NR20 3TG
T: 01362 650873

Darcy Spillcare Manufacture
Brook House, Larkfield Trading Estate, New Hythe Lane, Larkfield, Kent ME20 6CN
T: 01622 715500

D F Coatings Ltd
Unit 17, Willmington Ind. Estate, Hazel Road, Woolston, Southampton SO19 7HS
T: 0238 044 5634

E G Lewis & Company Ltd
Suit 5, 3 Shawcross Industrial Estate, Ackworth Road, Pontefract PO3 5JF
T: 01792 323288

FMC Technologies NIGERIA
No. 22 Gerrard Road Ikoyi, NIGERIA
T: +234 (0) 8039740023

Forward Protective
Vernon Street, Shirebrook, Mansfield, Notts, NG20 8SS
T: 01623 748323

Gemini Corrosion Services
Brent Avenue, Forties Road, Montrose, Angus, DD10 9PB
T: 01674 672 678

Galdiris Construction Ltd
Galdiris House, Pavilion Business Centre, Kinetic Crescent, Innovia Science Park, Enfield EN3 7FJ
T: 01992 763000

Global Energy Group (Access Coatings) Ltd
Unit 5, Service Base, Shore Road, Invengord, IV18 0EX
T: 013648 855123

Hayes Engineering Services Ltd
Brindley Road, Off Hadfield Road, Cardiff CF11 8TL
T: 029 2022 5088

Hempel UK Ltd
Llantarnam Park, Cwmbran, Gwent, NP44 3XF
T: 01633 874024

Kaefer C&D Ltd
Riverside House, Rolling Mill Road, Viking Industrial Estate, Jarrow, Tyne & Wear NE32 3DP
T: 0191 428700

Livis Ltd
LLivis House, Springhead Enterprise Park, Springhead Road, Northfleet, Kent, DA11 8HU
T: 01322 220058

Malakoff Limited
North Hess, Lerwick, Shetland, ZE1 0LZ, UK
T: 01959 695544

Matthew James Services
Unit 4, Shilbton Business, Cowen Road, Blaydon, Newcastle-Upon-Tyne, NE21 5TX
T: 0191 414 5700

Mark Smith Inspection Services Ltd
14 Seaham Close, South Shields, Tyne & Wear, NE34 7ER
T: 0191 456 9925

Moore Steel Developments Ltd
Station Road, Thorney, Peterborough PE6 0QE
T: 01733 270729

Optimal Rail Ltd
Unit 5, Moorgate Crofts Business Centre, Alma Road, Rotherham, S60 2DH
T: 01709 331153

Paint Inspection Ltd
Milton House, 7 High Street, Fareham PO16 7AN
T: 0845 4638680

Painting & Labour Services Ltd
Unit 1, Queens Road, Immingham DN40 1QH
T: 01469 578105

Parks Fabrication Ltd
Park Farm, Holme-upon-Spalding-Moor, York, Y043 4AG
T: 01430 861628

Possilpark Shotblasting Co Ltd
Dalmarnock Works, 73 Dunn Street, Glasgow, G40 3PE
T: 0141 556 6221

R.L.P. Painting
Heathfield House, Old Bawtry Road, Finningley, Doncaster, DN19 3DQ, UK
T: 01302 772222

SCA Group Ltd
Woodbridge Ind. Park, Three Legged Cross, Dorset, BH21 6FA
T: 01202 820820

Sherwin-Williams Protective & Marine Coatings
Tower Works, Kestor Street, Bolton, Lancs. BL2 2AL
T: +44 (0)1204 521771

Shirley Industrial Painters & Decorators Ltd
Grand Union House, Bridge Walk, Ackess’s Green, Birmingham, B27 6SN
T: 0121 706 4000

Siteseal Ltd
33 Kielder Close, Ashton in Makerfield, Wigna, WN4 0JE
T: 07714678719

Specialist Blasting Services Ltd
Smitho Quay, Hazel Road, Woolston, SO19 7GB
T: 023 80438901

Stainless Restoration Ltd
Unit M1, Adamson Industrial Estate, Croft Street, Hyde, Cheshire, SK14 1EE
T: 0161 3686191

Stamford Construction Limited
Barham Court Business Centre, Teston, Maidstone, Kent MV18 5BZ
T: 07912037033

Stream Marine Training Ltd
Kintyre House, St Andrews Crescent, West Campus, Glasgow International Airport, Paisley, PA3 27Q
T: 0141 212 8777

Story Contracting Ltd
Burgh Road Industrial Estate, Carlisle, Cumbria CA2 7NA
T: 07730 764414

Tinsley Special Products
Enterprise House, Durham Lane, Eaglescliffe, Stockton-on-Tees TS16 0PS
T: 01642 784279

Torishima Service Solutions Europe Ltd
Sunyside Works Garthmerrie Road Coatbridge ML5 2JD
T: 01216242309

Transvac Systems Ltd
Monsal House, 1 Bramble way Stanningley, Alfreton, Derbyshire, DE55 4RH
T: 01773 831100

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DIARY DATES 2014/2015

**Monday 11th - Friday 15th August 2014**
**Advanced Cathodic Protection**
Mobility Oil & Gas Petroleum Engineering Consultancy & Technical Training Services upcoming course.
Venue: Aberdeen
Contact: +442030867082 or info@mobilityoilandgas.com

**Tuesday 19th - Friday 22nd August 2014**
**Corrosion Control in the Oil & Gas Industry**
Mobility Oil & Gas Petroleum Engineering Consultancy & Technical Training Services upcoming course.
Venue: Aberdeen
Contact: +442030867082 or info@mobilityoilandgas.com

**Monday 15th - Wednesday 17th September 2014**
**Corrosion Control in the Oil & Gas Industry**
Learn to Anticipate and Control Corrosion Problems in a Regulatory Environment.
Venue: Amsterdam
For further details contact: Colin Britton, cbrit79727@aol.com, Tel: +44 (0)1480-860943

**Monday 15th - Friday 19th September 2014**
**Corrosion Control in the Oil & Gas Industry**
Learn to Anticipate and Control Corrosion Problems in a Regulatory Environment.
Venue: Amsterdam
For further details contact: Colin Britton, cbrit79727@aol.com, Tel: +44 (0)1480-860943

**Monday 15th - Friday 19th September 2014**
**Insulation Inspector and Fire Proofing Inspector Training & Certification Course**
As a part of it's overseas development programme, Argyll-Ruane Ltd is planning to conduct an ICorr Insulation Inspector and Fire Proofing Inspector training & certification course. Argyll-Ruane Ltd is the ICorr Certification Scheme provider to the Institute and is committed to making the Scheme available on a worldwide basis.
Venue: India
More information from: Dave.Griffiths@argyllruane.com

**Sunday 12th - Thursday 16th October 2014**
**Advanced Cathodic Protection**
Mobility Oil & Gas Petroleum Engineering Consultancy & Technical Training Services upcoming course.
Venue: Dubai
Contact: +442030867082 or info@mobilityoilandgas.com

**Sunday 2nd - Thursday 6th November 2014**
**Call For Papers - 19th International Corrosion Congress**
Venue: Jeju Island, Korea
For more information visit: http://www.19thicc.com

**Monday 15th - Friday 19th September 2014**
**Advanced Cathodic Protection**
Mobility Oil & Gas Petroleum Engineering Consultancy & Technical Training Services upcoming course.
Venue: Houston
Contact: +442030867082 or info@mobilityoilandgas.com

**Tuesday 16th - Friday 19th September 2014**
**Corrosion Control in the Oil & Gas Industry**
Mobility Oil & Gas Petroleum Engineering Consultancy & Technical Training Services upcoming course.
Venue: Houston
Contact: +442030867082 or info@mobilityoilandgas.com

**Thursday 9th October 2014**
**London Branch joint meeting with LMS**
Speaker: Dr Fred Parrett FRSC; 'Dead and alive – what’s in the air we breathe'.
Venue: Naval Club, 38 Hill Street, London
17.45 for 18.15 start

**Thursday 11th December 2014**
**London Branch Christmas Luncheon**
Venue: Royal Over-Seas League, Park Place, St James Street, London, SW1A
Contact: Mike Allen mike.allen9@btinternet.com

**Monday 8th - Wednesday 10th December 2014**
**Corrosion Control in the Oil & Gas Industry**
Learn to Anticipate and Control Corrosion Problems in a Regulatory Environment.
Venue: Naval Club, 38 Hill Street, London
17.45 for 18.15 start

London Branch publish a monthly Newsletter; to be included on the circulation list please contact Sarah Vasey sarah.vasey@akzonobel.com

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**CSD Division:**
Nick Stevens
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**CED Division:**
Nick Smart
Tel: 01635 280385

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**Thursday 8th January 2015**
**London Branch meeting**
Speaker: David Dore; '17th Century murder in the church – a forensic examination of an English Civil War crime.'
Venue: Naval Club, 38 Hill Street, London
17.45 for 18.15 start

**Thursday 12th February 2015**
**London Branch meeting**
Speaker: John Fletcher, ICorr President’s Lecture
Venue: Naval Club, 38 Hill Street, London
17.45 for 18.15 start

**Thursday 12th March 2015**
**London Branch meeting and AGM**
Speaker: John Fletcher, ICorr President’s Lecture
Venue: Naval Club, 38 Hill Street, London
17.45 for 18.15 start

**Thursday 9th April 2015**
**London Branch joint meeting with NACE (GB)**
Speaker: Geoff White; 'Case study – measurement of line current as an aid to solving cathodic protection problems.'
Venue: Naval Club, 38 Hill Street, London
17.45 for 18.15 start

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For more information visit: http://www.19thicc.com