In this issue:

London Branch News – Pages 5-7
Technical Topics – Page 10
Company News – Pages 15-18
APPROVED COURSES
FOR ICORR CERTIFICATION

Argyll-Ruane Ltd
Learning & Development

Argyll-Ruane Ltd offers training courses that are approved by the Institute of Corrosion:
- Painting Inspector (Level 1, 2 & 3)
- Pipeline Coatings Inspector (Level 2)
- Cathodic protection of re-inforced concrete structures (Level 1 & 2)
- Insulation Inspector (Level 2)
- Hot Dip Galvanising Inspector
- Fire Proofing Inspector (Level 2)
- Cathodic protection of buried and submerged structures (Level 1 & 2)

For more information and to book a course:
www.imeche.org/arl
Contact:
T: +44 (0)17 0956 0459
E: arl@imeche.org
F: +44 (0)17 0956 7798

Arl is delighted to announce its acquisition by IME Ltd, a wholly-owned subsidiary of the Institution of Mechanical Engineers, the fastest-growing professional engineering institution in the UK. Our mission - to provide the best quality training, consultancy and certification services to our clients and members worldwide.

MITIGATE INDUCED AC VOLTAGE

Zone 1 and Zone 2 products certified to ATEX and IECEx requirements

- Isolate cathodically protected structures from grounding systems or other equipment
- Ground cathodically protected structures for lightning & AC faults
- Products featuring solid-state, maintenance-free construction
- Third party certifications

Contact our UK based agent:
DC Materials Supply • +44 (0)1798 860975

Dairyland Electrical Industries
www.dairyland.com • marketing@dairyland.com
CONTENTS

Institute News
The President Writes 4
London Branch News 5-7
CED Coatings Group Meeting 6
North West Branch News 7
Aberdeen Branch News 8-9
ICorr Membership Subscription 9
Technical Topics 10

Technical Article
The Evolution in Our Understanding of Stress Corrosion Cracking in Hot Water 11-14

Company News
Spencer Coatings Ltd 15
Corroserve 15
Winn & Coales (Denso) Ltd 16-17
Plant Integrity 17
Surface Technology 18

Sustaining Members 19-27
ICATS Registered Companies 28-31
Diary and Branch Contacts 32
The President Writes

ICorr President, John Fletcher.

This is my third President’s article for the Corrosion Management magazine and it is noticeable that the time is passing with increasing speed. It does not seem more than a few days since I wrote my piece for the January/February issue and that is because much has happened since the start of the year.

February was notable for the SSPC Conference and Exhibition in Las Vegas and I am pleased to report that the presentation to the SSPC Board on ICorr and its activities was received well and there may well be a basis for the two organisations to develop a working relationship. A contact has been established at Director-level and more discussions will take place in the next few months.

February also witnessed the first ICorr Council meeting with me in the Chair. One significant development that we were able to discuss is the re-activation of the Yorkshire Branch. For many years this Branch was very active with many events each season, particularly dealing with surface preparation, blast cleaning and related issues. However, in recent times many of the Branch Committee have move on either to well-earned retirement or to other jobs, sometimes outside the corrosion prevention industry. This has resulted in the Yorkshire Branch becoming dormant until Nigel Petersen-White, now of ARL, offered to become Secretary and he is now organising an Extra-Ordinary General Meeting to elect a new Branch Committee with the objective of establishing a new program of events for the 2015/2016 season.

More details can be found on the back cover of Corrosion Management and I would like to encourage as many members in the Yorkshire region as possible to attend the meeting on the 21st May, even though it is being held on the wrong side of the Pennines at Elcometer in East Manchester. I am planning to be there and I hope to see some of you there. I am still keen to visit all the ICorr Branches, so I you are planning an event and would like me to attend please contact me and I will see if I can fit it in.

Another item covered by the Council Meeting is the completion of the new agreement with ARL Group for the provision of several ICorr Painting Inspection Courses. This new agreement includes the transfer of the preparation and delivery of the documents that ARL used to produce on the completion of the courses and the examinations. It was intended that the transfer of this work from Rotherham to Northampton would be completed by the first working day in 2015. In the event, this work was completed early in December and the ICorr office, prompted by information from ARL, is now producing all of these documents and maintaining the relevant database.

The evident success of this project and its early completion is due to the work of Dave Griffiths and Bob Crudewell and Denise and Gwynneth in the ICorr office. I offer my thanks to all involved in this enterprise. Team work is a very powerful tool.

March has already seen my President’s Lecture delivered to the London Branch AGM where, as always, I was made very welcome. It is notable that I will be the last President to speak to London Branch at the Naval Club as the plan to move London Branch events to Imperial College in October 2015 is now in place. The Naval Club has had difficulties in accommodating some of the large events and London Branch now has access to accommodation for 100 people at Imperial College. More information on the location and the logistics will be sent to branch members in the next few weeks.

My attention is now focused on the NACE Corrosion Conference in Dallas, which I will have attended and returned to the UK by the time this article is published. As I said in the last President Writes article, I will be representing both Elcometer and ICorr at this conference and meetings have now been arranged with NACE, the Australian Corrosion Association (ACA) and the World Corrosion Organisation (WCO) during the conference. Between these, the Elcometer papers and time on the Elcometer stand it promises to be a busy week for both me and the handful of ICorr members who are attending the NACE event and keeping the UK flag flying.

A further reminder that the Knowledge Transfer - Corrosion Matters Workshop will be held on 10th and 11th June 2015 at the Royal Overseas League in London. Details of the program and a booking form have now been published and are in general circulation so sign up as soon as you can as I expect this event to be very popular.

Thanks to the huge support of a key group of ICorr members, Institute activity is high and my diary seems to fill without any prompting from me. I encourage you all to get involved in these events in order to get the best from your membership of ICorr.

John Fletcher
President of the Institute of Corrosion

visit the new ICorr website
www.icorr.org
LONDON BRANCH NEWS

IMPRESSION 17TH CENTURY
RE-ENACTMENT PRESENTATION

On 12th February 2015, London Branch was treated to a presentation at The Naval Club, Mayfair, based on re-enactment of the English civil war. Under the Chairmanship of John O’Shea, the presentation was given by David Dore of Quill International and long time member of the London Branch committee.

David began by making a dramatic and impressive entrance ‘stage right’, fully dressed in a 17th Century re-enactment costume of a mounted civil war soldier of Oliver Cromwell’s army, complete with pistol and sword. David described the various components of the costume; passing to the audience for ‘technical’ examination, his sword and battle helmet. All present were impressed with the effectiveness of both items.

David mentioned his involvement on the film sets, of both ‘The Battle of Hastings’ and ‘Gladiator’, at which, he assured us, he had been within a sword’s length of Russell Crowe! The presentation then continued with a journey back through time, where David explained and fully illustrated his involvement in various important conflict re-enactment events, including the 1914-1918 World War, the 1899-1902 Boer War, the 1815 Battle of Waterloo and the 1645 Battle of Naseby. All of these, David explained, involved travel to the actual battle sites to stage the events.

The presentation was brought to a close with a description of a forensic examination of both pistol and sword damage to a stone pillar within the village church of Normanton Le Heath. David explained that the damage was from the time of the Civil War and this conclusion was supported by a videoed re-enactment of the likely fight between a ‘stray’ Royalist and Cromwellian soldier.

The only disappointment expressed by the audience on the presentation, was that it was a shame that The Naval Club was unable to accommodate David’s trusty horse! Nevertheless, on behalf of all present, a vote of thanks to David was given by Branch Committee Member Brian Goldie ; after which, all enjoyed the traditional hospitality of London Branch.

Please refer to the ICorr website, for future Branch technical meetings at The Naval Club, 38 Hill Street W1J 5NS, 17.45 for an 18.15 start.

LONDON BRANCH NEWS

MEDIA, MYSTERY & MEDICINE - AN INTOXICATING WALK FROM ODIOUS OXFORD CIRCUS TO MELLOW MAYFAIR

Thursday 30th April 2015. Meet at 17.45 in front of Boots, 302 Regent Street, London W1 (100m North of Oxford Circus U/G, East side)

Once again, London Branch are pleased to invite members of the Institute, with their family and friends, to an informative and educational conducted evening walking tour. As usual, The tour will be led by Ingrid M Wallenborg, a London Blue Badge tourist guide

On this walk we shall be meeting with some of the great and fearless personalities of London while negotiating some very exclusive addresses. Hear of the speech that changed a nation and the dinner giving birth to literary master pieces. Pass by the luxury hotel home to scandals and the home of the formidable Prime Minister’s wife more vilified than Cherie Blair! You will learn enviously about the most hedonistic wine shop in the UK, nay perhaps the world!! and there will be a murder attempt along the route although plenty of drugs to calm your nerves. But of course if that doesn’t help there will be the customary stop for refreshments in a hostelry not far from Bond Street. Do join us again on 30th April in our never-ending search for insalubrious details in and around Mayfair.

The tour will terminate at the Naval Club for well deserved refreshments, including hot chilli and rice, with an opportunity for a convivial analysis of the evening’s experiences. There is no charge for this annual event, but it is important to be at the starting location in good time.

Further information is available on the ICorr website and from John O’Shea who is the Evening Co-ordinator.
On 12th March 2015 The London Branch met for their traditional March meeting at The Naval Club, Mayfair. The evening proceedings commenced with the London Branch AGM and reports were presented by outgoing Branch Chairman, John O’Shea and Branch Treasurer, Mike Allen. Reports confirmed that the Branch was in good health and had completed through last year, a full and successful meetings programme which included both technical and social occasions. Mike Allen provided details of the Branch accounts which indicated judicious use of the monies allocated from Sustaining Membership fees and healthy surpluses arising from the Annual Golf Day and Christmas Lunch.

The Branch accounts were accepted nem com, John O’Shea handed the Chairman’s badge of office to Jim Glynn and the Branch Committee was encouraged to continue in the same vein for the next year. The Committee is made up of, Chairman, Jim Glynn, Hon Treasurer, Mike Allen, Hon Secretary, Paul Brooks, Mash Biagioli, David Deacon, David Dore, Brian Goldie, Derek Hoskins, David Mobbs, Trevor Osborne, John O’Shea, Sarah Vasey, Geoff White, George Winning and Polina Zabelina. After completion of the AGM, Branch awards for long service on the committee, were presented to Mike Moffat, Geoff White and Mash Biagioli.

Subsequently, under the Chairmanship of Jim Glynn, attendees were treated to a presentation by John Fletcher, recently elected President of ICorr. John’s presentation detailed the various aspects of his life at present, from ‘The Day Job’ as Technical Support Manager at Elcometer Ltd, his involvement on various standards committees, ‘The Hobby’ as President of ICorr and his personal interests.

On the technical side, John described the range of equipment manufactured and developed at Elcometer which covered: field testing, laboratory testing, NDT-ultrasonics, concrete inspection, metal detection and associated specialised software. Special mention was made of the first instrument, Elcometer 101, a magnetic coating thickness gauge, made since 1947 which had proved particularly popular overseas, not least because it can be used underwater.

John detailed his involvement with ASTM and CEN standard committees and his history with ICorr; being a member since 1985, a Fellow since July 2009 and Chartered Scientist since May 2013, as well as being Chair of PDTC and the NW Branch.

On behalf of the attendees, a vote of thanks to John was then given by Past President and Branch committee member, Trevor Osborne and appropriately, the meeting then adjourned to enjoy the traditional hospitality of the London Branch.

The next Branch technical meeting (joint with NACE) on 9th April, will be the last meeting to be held at The Naval Club, 38 Hill Street W1J 5NS. Future meetings (from October 2015) will be held at Imperial College as detailed in the magazine diary and ICorr website. All are welcome, and enquires can be sent to the Branch using the email address icorrlondon@gmail.com.

CED COATINGS WORK GROUP MEETING
TUESDAY 21ST MAY IN BIRMINGHAM

The coatings work group will hold a meeting at the Council Chambers in Birmingham on Tuesday 19th May starting at 2pm. (This is pre-meeting before the CED day in Aberdeen on 26th May). This work group is quite active and becoming more so. If you are involved in coatings on the practical side, we need your help both in suggesting where documents are required and in producing them. So if you would like to attend the Birmingham meeting (it is free of charge) or become a member of the work group, please contact the secretary, Douglas Mills (Douglas@Harbridge.freeserve.co.uk) or the chairman, David Horrocks (David.Horrocks@BAMNuttall.co.uk).
The seed for this letter were sown and germinated at our Branch AGM in 2012. The lack of a busy lecture/symposium programme generated an active discussion resulting in Ken Dyes, our popular Chairman asking me to submit a thought provoking letter to Corrosion Management.

Ken, be careful what you wish for! One action generated was a joint lecture between ICorr Midlands and Manchester section O.C.C.A., organised by Brenda Peters and held at O.C.C.A.’s venue, Woodthorpe Hotel, Heaton Park, Prestwich. Many thanks Brenda.

I myself have a draft format for an afternoon meeting entitled ‘The A-Z of metallic coatings, from aluminium to zinc, via the gold standard. As I am retired I need support from ‘Industry’ to organise the above afternoon meeting. Whilst the North West Branch can look back for being involved in producing many ‘Corrosionists’ and ICorr Presidents that have studied at UMIST, Manchester University, Corrosion Centre. I bear testimony to the above and as a member of the P.A.C I witness a steady flow of membership applications, membership grade change, on an international scale.

Historically the North West Branch has focused (partially) on corrosion in concrete, with the expertise of Mott Macdonalds. On the same eastern geographical parallel, we have the Yorkshire Branch (they used to focus on Abrasives) are declaring a ‘State of Emergency’. I have applied to attend the ‘Reformation’ meeting at Elcometer Ltd on the 21st May 2015.

There is an urgent need to discuss, debate, decide and change the perceived concept that ICorr exists mainly South of Watford. To this end, we need to support our new President, John Fletcher.

Barry Windsor F.I.Corr Csci F.T.S.C

---

**NEW VENUE FOR LONDON BRANCH**

After 26 years of holding it’s regular Winter/Spring programme of Technical Evening meetings at The Naval Club, Mayfair, increasing attendance figures mean that we have outgrown the facilities currently available. The London Branch Committee has decided that a change of venue is necessary.

Our first meeting of the new season will be held on the evening of Thursday 8th October 2015 at Imperial College, London, in South Kensington, SW7. It can be reached directly by an underground walkway from the nearby Tube Station.

Presentations will be made in the Skelton Building of the Civil Engineering Department, which offers excellent meeting facilities and state-of-the-art presentation equipment. Up to 100 members and guests can be accommodated in pleasant and comfortable surroundings.

Our tried and tested format of complimentary pre-presentation refreshments as well as post presentation drinks and sandwiches will be available in the Assembly Foyer adjacent to the Lecture Room. As usual, there will be no charge for these meetings. All ICorr Members, guests and visitors are most welcome. The dress code will be Smart Casual and Members will be encouraged to wear their Institute ties.

Further details of the programme, location and directions can be found on the ICorr website, and will be included in the regular monthly London Branch newsletters.

We look forward to an exciting future programme of evening technical Meetings held in this prestigious venue on the second Thursday of the month, starting in October 2015.

Mash Biagioli, Deputy Chairman, London Branch

---

**IS THERE A NORTH/SOUTH DIVIDE? DON’T BE RIDICULOUS...**

The Imperial College, London.
ICORR ABERDEEN BRANCH JANUARY MEETING

THE USE OF FRICTION WELDING FOR CORROSION CONTROL IN THE OFFSHORE OIL AND GAS INDUSTRY

Dave Gibson of Proserv was the guest speaker during the January 2015 branch meeting. He gave a brief overview of Proserv’s history and breadth of services offered then set the stage by outlining the content of his presentation.

Dave started by summarising ways frictional welding could be used for subsea and topside applications. With photographs, he explained the portable frictional welding process covering key parameters such as welding configurations, weld characteristics and expected mechanical properties. “Hydrogen is not evolved or absorbed in significant concentrations during frictional welding” Dave observed as he explained the advantages of frictional welding.

Dave Gibson further focused on the improved fatigue strength of friction welds which he demonstrated by presenting results from publications and test results from various project experience and research work done by reputable companies such as TWI, DNV, Genesis etc.

He went on to explain the various friction welding tooling systems and technological advancements for subsea applications especially in hydraulics and integration with Remote Operated Vehicles (ROVs). He touched on applications of friction welding for Cathodic Protection (CP) with projects examples such as anode attachment to a Floating Production and Storage vessel hull with an ROV, anode sled connection to subsea assets and anode attachment to a live subsea pipelines.

Dave covered friction welding for topside applications explaining how it provided an option when hot work was not allowed. He also covered Pneumatic Friction Welding System and Stud welding in zoned areas. He finished the presentation by giving some project examples such as anode attachment in ballast tanks, sensor attachment in a live pipeline system, other pipeline and structural applications.

There was a lively discussion on various aspects of the presentation at the end of the session. 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 BRANCH FEBRUARY MEETING

CATHODIC PROTECTION MODELLING: A PRACTICAL SOLUTION

Svenn Wigen of Deepwater gave a presentation on Cathodic Protection (CP) Modelling during the February branch meeting. He started his talk by giving a brief history for CP modelling covering three methodologies for numerical analysis- Finite Difference Method (FDM), Finite Element Analysis (FEM) and Boundary Element Method (BEM).

He highlighted two important criteria for successful modelling- efficiency and accurate...
Svenn covered linearisation of potentials and current density curves used for static CP simulation solving numerical problems using equations such as the Butler–Volmer equation. He presented the advantages of 3D simulation highlighting the ability to build models from scratch.

Using pictorial representations of modelling results, Svenn went on to present a series of case studies where CP modelling has been used to solve engineering problems. For a Liquefied Natural Gas (LNG) offloading port in Russia, a 3D modelling was carried out to verify protection and optimise locations for Impressed Current Cathodic Protection (ICCP) anodes. For an Artic Gravity Based Structure (GBS) located in shallow waters, the 3D model generated base on structural/anode distribution drawings was used to validate CP design based on the DNV standard RP B401. He explained that potential and current density loggers were used to accurately validate the model results for a platform jacket sacrificial anode CP system located in West Africa.

Svenn also explained how CP modelling was used to optimise anode configuration by minimising sacrificial anode interference for an Offshore wind Mono Piles during design.

Svenn concluded that that CP modelling allows efficient and trustworthy verification of general CP design, optimise retrofit and lifetime extensions CP projects, improve of inspection planning, system fault finding applications and general CP performance prediction.

The Question and Answer (QA) session after the meeting covered stray current issues on a jetty, modelling feedback to CP codes, design applications and other aspects of CP modelling. 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.

### MEMBERSHIP SUBSCRIPTION RATES 1st July 2015

<table>
<thead>
<tr>
<th>MEMBERSHIP CATEGORIES</th>
<th>ANNUAL RATE from 1 July 2015</th>
<th>REGISTRATION FEES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MEMBERSHIP CATEGORIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>*Free</td>
<td>*Free</td>
</tr>
<tr>
<td>Ordinary Member</td>
<td>£73.50</td>
<td>£15.00</td>
</tr>
<tr>
<td><strong>PROFESSIONAL CATEGORIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technician</td>
<td>£84.00</td>
<td>£15.00</td>
</tr>
<tr>
<td>Professional Member</td>
<td>£105.00</td>
<td>£15.00</td>
</tr>
<tr>
<td>Fellow</td>
<td>£130.00</td>
<td>£15.00</td>
</tr>
<tr>
<td><strong>SUSTAINING MEMBERSHIP</strong></td>
<td>The annual rate from 1st July 2015 is £375.00 (plus VAT)</td>
<td></td>
</tr>
<tr>
<td><strong>&quot;GOLD&quot; SUSTAINING MEMBERSHIP</strong></td>
<td>The annual rate from 1st July 2015 is £725.00 (plus VAT)</td>
<td></td>
</tr>
</tbody>
</table>

*Requires proof of enrolment as a full-time student at an approved science or engineering based study programme.
Technical Topics No.49: CORROSION IN WATER AND SEWERAGE SYSTEMS

By Douglas J Mills, Technical Secretary

Much of the pipe system carrying water and sewerage in the UK dates back 100 years or more. Mains sewers can be up to 4 Metres in diameter. And although failure of these is rare when it occurs it can be catastrophic. An infrastructure replacement programme was initiated after a government report in 2010. But different water companies approach this differently. The monitoring of the state of corrosion is of course important. Too often a failure is only recognised by loss of water. Locating that is not trivial. It might be done by excessive moisture being detected in the ground around where the pipe is. Note that 90% of failures are from the inside out rather than the other way around.

Plastic pipes e.g. Polyethylene and PVC are in use. But although not corroding in the usual sense of the word nonetheless these have problems being more prone to embrittlement leading to mechanical failure. And on occasions they can also undergo chemical attack. These sort of pipes are unlikely to be able to have a guaranteed life of 60 years, the current asset design life. Some pipes in use today in the world were put in the ground 4000 years ago. And in the UK there are Roman brick based sewer systems still in use.

So what materials are typically used in the systems? And what is being put in when pipes fail? Well it is very much the old stalwarts that are used as replacements: iron, sg iron and low carbon steel. But in normal water containing oxygen corrosion can occur according to the simple equations: anode $2Fe = 2Fe^{++} + 4e$ and, cathode $O_2 + 2H_2O + 4e = 4OH$. So some sort of coatings eg epoxy are generally employed (note the lifetime of these is likely to be a lot less than the operation time). Concrete lined pipes are now also in use and generally give the least trouble. A sewer pipe faces a much more severe environment. There are alternative oxidising reactions e.g. if $O_2$ is low, for the cathode reaction. Also there is the possibility of acid attack $2H^+ + 2e = H_2$ particularly under deposits. There are also a wider range of types of corrosion available including hydrogen embrittlement, erosion corrosion, pitting corrosion, microbiological corrosion, acidic corrosion, crevice corrosion. The system of sewer pipes in UK is very old and the protection systems in use are generally inadequate.

So what needs doing? Well the mechanisms of corrosion in sewer systems is a poorly investigated area. It may be unpopular and a Cinderella area. BUT it is necessary if progress is going to be made to stop the problem or at least to reduce it. There is also the problem of reduced cross sections of pipes due to deposits (see picture). Development of effective coatings and protective measures really rely on this fundamental mechanism work. Looking at these measures, apart from internal coatings, Cathodic Protection (CP) is an obvious approach. CP systems are commonly used to prevent attack on the outside of pipes. Coupled with paint coatings they can be very effective. Also the monitoring of these systems is well established particularly if using impressed current e.g. when the current demand gets too high it may be economical to try to locate the defective areas and recoat. It is normally possible to locate these defective areas. But using CP to protect the INSIDE is more difficult. Where do you put your anodes? How do you monitor them? Etc. Adding inhibitors is another approach although again what sort of inhibitors at what sort of dose? For sewers it is not easy to see how any ‘normal’ inhibitor could cope with the conditions. For mains water the inhibitors would have to be off an approved drinking water inspectorate list of substances. Galvanising cannot be used.

There are also 33,000 pumped rising mains of which there are at least 3000 in UK. Many of these undergo corrosion. Although their location is known they are not very accessible because the pipes are under pressure. So much effort is needed to get the corrosion of these pipes under control.

As discussed earlier monitoring is important. And again lab work is required to establish how best to monitor in the case of inside out corrosion. Electrochemical techniques like LPR (Linear Polarisation Resistance), EIS (Electrochemical Impedance Spectroscopy) and ENM (Electrochemical Noise Measurement) could all be used to help here. Note this article has NOT discussed domestic water systems. In those the materials are normally copper, brass, iron and galvanised iron; also magnesium for anodes. This area is also of course very important and not free from corrosion problems. But discussion must wait for another article!

So plenty of work needs to be done to develop coatings and other protection approaches as well as monitoring methods that will combine to protect our sewers and water infrastructure through the rest of this century and into the next.

Ending on a positive note the Corrosion Engineering Division of the Institute of Corrosion is holding its annual meeting in Aberdeen on 26th May 2015. It is open to the idea of setting up a work group in this area. But such a work group needs personnel! If you are interested in being part of this (you don’t have to be a member of the Institute to be member of the work group) then please contact douglas@harbridge.freeserve.co.uk

Thanks are expressed to Phil Clisham from Mouchel Group and to Kevin Harvey from UUplc for help in compiling this article.
THE EVOLUTION IN OUR UNDERSTANDING OF STRESS CORROSION CRACKING IN HOT WATER

Peter L. Andresen (pictured right), GE Global Research Center, One Research Circle CE2513, Schenectady, NY 12309.
Peter L. Andresen was the recipient of the 2014 UR Evans Award.

Abstract

The last fifty decades highlight the importance of stress corrosion cracking (SCC) in high temperature water systems, exemplified by concerns for reliability and safety associated with innumerable incidents of SCC in structural materials. While SCC was undoubtedly experienced centuries ago, it developed into a major problem during the industrial revolution, most notably with the proliferation of steam boilers. To address this, boiler and pressure vessel codes were created with a focus on mechanical issues, with highly quantitative guidance on fatigue and overload. By contrast, limited progress has been made on SCC, which is often viewed as mysterious and complex, and the codes address it primarily by insisting that the design ensure SCC won’t occur. This has fostered the concept of SCC immunity, although most of the supporting evidence was obtained in relatively simple, short term testing. Detailed studies and long term plant operation reveal that immunity to SCC growth does not exist in most and probably all cases. This paper summarizes the key developments that have led to a more sophisticated understanding of SCC, identifies some of its dependencies and interdependencies, and provides examples where SCC has been quantified and used predictively.

Introduction

SCC is an insidious form of material degradation in which fine cracks develop and can produce catastrophic failure, even in unaggressive environments at static load below the yield strength. While SCC undoubtedly occurred centuries ago, failures tended to be dominated by and/or attributed to simpler phenomena, such as overload and fatigue, and indeed overload was often involved. As an understanding of these simpler, mechanical phenomena developed and designs were optimized (e.g. to reduce cyclic loading but increase static loading), there was an increase in SCC. Amazingly, as steam boilers became common in the mid nineteenth century, the number of deaths from steam boiler failures rose to >50,000 per year in the U.S.A. alone in the 1850s [1]. Some of these failures undoubtedly involved a combination of fatigue, crevice corrosion, overload, etc., but because little was known about SCC in that period, few failures were directly attributed to SCC. Subsequent research leaves little doubt that SCC played a major role in most failures.

In response, steps were taken to develop design codes, and later life evaluation codes to address the growth of cracks that were detected. This was a slow process, and a little over a half-century later, the first boiler and pressure vessel codes were released [2]. Over the next century it became clear that many failures occur by corrosion fatigue and SCC, which are unfortunately not as ‘one-dimensional’ as fatigue and fracture in terms of being treatable through the lens of a single discipline (mechanics). While some simple approaches such as ‘offset curves’ have been introduced to address corrosion fatigue, SCC is primarily addressed by insisting that the designer ensure it won’t happen. This has fostered an increasing imbalance between the highly codified fatigue and fracture rules, and avoidance / silence on the issue of SCC and its dependencies. Certainly the multiplicity of disciplines and overall complexity of SCC make it more challenging to address, but after ~160 years, more progress could be expected. A parallel scenario could be imagined if electrochemists had developed highly quantified relationships between SCC and electrochemical parameters, then merely shifted curves upward a bit to account for "high stress" or "cyclic loading", as if these categories captured all the effects and nuances of mechanics.

SCC in the Nuclear Industry

While SCC affects many industries, the concern for safety and the need for long-term reliability has made the nuclear power industry fertile ground for sustained research and experimental sophistication. The structural materials used in BWRs and PWRs (Figure 1) are few and broadly similar. Low alloy pressure vessels are fabricated from SA-533, Type B, Class 1 plate and SA-508, Grade 2, Class 1 forgings. Almost all wetted surfaces are weld clad with stainless steel, typically type 308/308L. Some feed water and steam lines are made of carbon steel. Most other structural components are made from wrought or cast austenitic stainless steel or Alloy 600 (more recently, Alloy 690 with higher Cr), with dissimilar metal welds made using Alloy 182 or 82 weld metal (more recently, Alloy 152 or 52 with higher Cr).

Extensive SCC was detected (often by coolant leakage) in structural materials since the early operation of nuclear steam turbines, boiling water reactors (BWRs), pressurized water reactors (PWRs, Figure 1) and other high temperature water systems [3-6]. In early LWR designs, SCC developed within months. As the most susceptible materials and conditions were eliminated, the time to cracking was extended incrementally (e.g., to one to two to five years), although in many cases variant incidents continued to occur (e.g., cracking of small then medium then larger diameter piping). And SCC began to be observed in components and materials and environments where it had not previously. Examples of these progressions are many (Table 1). For example, in BWRs, bulk cold worked stainless steels failed in months, and were eliminated from future designs. Then SCC developed in creviced stainless steel components, and...
crevices were eliminated. Then SCC occurred in furnace sensitized stainless steel... Then in weld sensitized stainless steel of small diameter piping, then medium diameter piping, then large diameter piping... Then in low-carbon stainless steel welds that didn’t sensitized, and in irradiated stainless steel, etc. Rather than recognizing that stainless steels aren’t immune to SCC and quantifying key vulnerabilities and dependencies, there was misplaced optimism that each new occurrence was unique, or that a new material or process or water chemistry would yield SCC immunity. In PWRs, the situation was no different, and the optimism that SCC will never occur in some variant condition continues to prevail. Proactivity to address future degradation is widely discussed [7], but research efforts are small and address only a tiny fraction of identified concerns.

**Experimental Techniques**

In the early years of evaluating SCC in hot water (1950s, 60s and 70s), few experiments combined good control of water purity, dissolved gases, metallurgy, mechanics, temperature, etc. Most tests were simplistic U-bend immersion or slow strain rate tests, without in-situ crack monitoring. Once cracking was detected, experimental sophistication steadily improved in the area of SCC growth, with most laboratories employing reversing DC potential drop to monitor cracking in fracture mechanics specimens using autoclaves with recirculating water. Early in operation, some power plants did not control water chemistry well, and some early materials (e.g., sensitized stainless steel in BWRs) were very susceptible to SCC. Under those conditions, experiments could be relatively crude and still readily observe intergranular (IG) SCC, which is characteristic of SCC in austenitic materials. However, reproducibility was rarely good, even in systems that controlled the nominal test conditions and metallurgy, in part because of the assumption that SCC would readily develop from machined notches or fatigue precracks by simply applying a fixed load. Thus, it was common to conclude that even moderately susceptible materials were immune to SCC, a conclusion reinforced when crack length resolution is poor.

Among the many special aspects of SCC is that cracks are not externally driven as they grow through the low K regime. While K approaches zero, so does SCC growth rate. Proposed K values agree that as K approaches zero, so does SCC growth rate, but corrosion fatigue dependencies are under fatigue loading, and most experts believe that the stress/strain redistribution that occurs as a crack grows also provides the dynamic deformation near the crack tip that sustains SCC. This synergy between deformation and SCC advance can be disrupted locally or along the entire crack front, yielding a spectrum of growth rates below the steady-state, reproducible value. While some origins of scatter are real, large scatter in growth rates confounds the quantification of individual parameters like water chemistry, corrosion potential, temperature, stress intensity factor, metallurgy, etc., since it is not possible to quantify with confidence a 5 – 10X effect of a variable in 500 – 1000X scatter in the data.

**SCC Immunity vs. Dependencies**

Dozens of thresholds (regions of immunity) have been historically claimed, such as SCC won’t occur below a critical corrosion potential, or in ultra pure water, or without grain boundary Cr depletion, or below a critical temperature, or below a critical neutron dose, or below a critical stress intensity factor (KSCC). Figures 2 and 3 show sustained SCC growth in annealed and cold worked stainless steel even in very high purity water, both with and without dissolved O₂, clearly showing an absence of SCC immunity for unsensitized stainless steel, at very low corrosion potential, and in very high purity water. KSCC is the biggest challenge to evaluate, because everyone agrees that as K approaches zero, so does the SCC growth rate. Proposed KSCC values have steadily decreased to 40, 30, 25, 20, 15, 10, 5... MPav/m as sustained growth has been demonstrated in sophisticated experiments [4,5,8]. Of course, almost all plant cracks by growing through the low K regime. While K is not the ideal descriptor parameter in the small crack regime, this is in fact the primary application for KSCC.

Similarly, for decades it was widely believed that Alloy 690 was immune to SCC, but in the last decade there are hundreds of growth rate observations, even in fully annealed and thermally treated Alloy 690 (although at low growth rates) [9]. Low growth rates can often be synonymous with pragmatic or engineering immunity, but from both a scientific and engineering perspective, it is key to differentiate immunity from slow growth, especially when there are vulnerabilities that can change low-growth-rate into high-growth-rate situations.

**Quantifying SCC Dependencies**

No one would consider quantifying fatigue crack growth rates using only ΔK and not, for example, frequency, but corrosion fatigue...
and stress corrosion cracking are often quantified based on a very limited subset of the parameters that control the growth rate. SCC is affected by dozens of primary parameters (and hundreds of secondary parameters), including corrosion potential (dissolved $O_2$ and $H_2$), water purity, cold work/yield stress, temperature, flow rate, irradiation, grain boundary Cr depletion (and other grain boundary characteristics), $K_{max}$, $\Delta K$, frequency, strain rate, etc.

A key issue in developing integrated models for corrosion fatigue or SCC is interdependencies. It is not that difficult to identify the effects of corrosion potential when all other parameters are held constant, but its effect varies as other parameters are changed. In general, as one parameter is changed, the effect of all other parameters changes. This makes empirical approaches intractable, because to look at 12 primary variables at 5 levels each is not impossible if each acts independently, but requires millions of (good) experiments if there is inter-dependence. Thus, the basis for the variable interaction must be hypothesized, confirmed and evaluated.

This complex process is described elsewhere [4,5], and conceptually involves considering the crack tip system rather than the external bulk conditions. For example, many water chemistry parameters (corrosion potential, $O_2$ / $H_2$ concentrations, water purity, flow rate) combine with temperature and in some cases MnS precipitates in the alloy that can dissolve to define a crack tip chemistry, which is a primary, fundamental influence on SCC growth rate.

Critical tests can confirm the validity of these interactions. For example, high SCC growth rates are observed in fully deaerated water if the bulk chemistry is made correspondingly more aggressive. Crack tip micro-sampling can be used to confirm the crack chemistry, as well as sample at high rates to draw bulk water into the entire crack to show that the presence of pure water with $O_2$ at the crack tip does not yield high growth rates – that is, the availability of cathodic current (which is increased by the presence of dissolved $O_2$) does not control SCC; rather, it is the crack chemistry.

The effects of various types of mechanical loading, e.g., from fatigue to slow strain rate to constant $K$, can be integrated in terms of the dislocation dynamics at the crack tip, often referred to as the crack tip strain rate (Figure 4). If two materials or environments are compared, the growth rate dependencies are not parallel, but diverge, and this leads to more complex relationships for factors-of-improvement for changes in materials or water chemistry. It also leads to the
Conclusion that for maximum effectiveness, plants should always implement mitigation strategies yesterday and not tomorrow.

Predictions (Figure 5) not only explain observed SCC incidents and the effects of poor water chemistry early in plant operation, but also have predicted SCC occurrences years in advance of the first observation [4,5]. Key to this capability is the ability to address time-varying phenomena such as radiation hardening, segregation and relaxation, and plant operating conditions along with crack-depth-varying phenomena such as weld residual stress fields, the effect of crack depth on K, through-wall sensitization, etc.

Conclusions

Degradation of structural materials in LWRs by SCC has been extensive, and there are many commonalities in the pattern of the appearances and dependencies. The multiplicity of factors that affect SCC make it challenging to quantify, but the alternative of relying on simple, short-term tests and the concept of immunity is demonstrably inadequate. Both plant experience and sophisticated experiments show that immunity to SCC growth is rare if not nonexistent, and it has led to over-optimism that single improvements, e.g., to materials or water chemistry will provide adequate life. An understanding of the vulnerabilities to and dependencies of SCC can lead to optimum designs and materials specifications that can confidently provide >> 60 year lifetimes, but this requires that we adjust to the realities of SCC and related degradation phenomena.

References

2. ASME Boiler and Pressure Vessel Code, Sections III and XI, ASME, NY.
ACOTHANE UPGRADES DRINKING WATER CERTIFICATION

Acothane solvent free polyurethane has over thirty years proven track record for coating and lining water retaining structures.


Acothane has been used for all the above applications since 1982 including over 50,000 litres applied to the London Thames Ring main during its construction in the late 80’s and early 90’s.

Applications included storage and surge vessels, penstocks, pipework and GAC storage vessels.

In addition to drinking water service Acothane DW is also suitable for process and waste water including sewage and sludge with excellent chemical resistance to the various chemicals used in water treatment and resistance to hydrogen sulphide encountered in sewage processing plants.

A truly universal coating for steel and concrete it also has the same long term proven track record in the pipeline industry for oil, gas and water. Off shore and marine structures and bridges and structures in aggressive environments.

Many of the coating applications carried out over the last thirty years have been independently surveyed and inspected with confirmation of maintenance free performance over this time and forecasts of a further twenty years before any remedial maintenance may be required.

For further information contact:
Ray Sams at ray@raysams.co.uk
Spencer Coatings Ltd, Blackwell Road, Huthwaite, NG17 2RL
Tel: 01623 510585

A FRESH COAT FOR CORROSERVE

Since 1974 Corrocoat has been renowned for providing corrosion protection. This successful 40 year track record has led them to operate from offices in 30 locations across five continents and made them the name you can trust to protect metals, machinery and more.

It’s all change, though. Whilst Corrocoat is still the name for the Leeds-based company’s specialist paints and coatings division, they have now rebranded as Corroserve.

The change better describes the full range of services which they offer – in particular, corrosion engineering and application technology.

The exciting rebrand doesn’t stop there either. The company is also launching Corrolabs, the new name for their research & development division.

All three brands stand on their own, yet work together to cover all aspects of corrosion protection and engineering services. It’s a unique offering in the industry; one which confirms the company as first choice for performance, reliability and value for money.

Charles J. Watkinson, Corroserve CEO & Technical Director, expressed his delight at the rebrand, and what customers can come to expect:

“As Corroserve, we provide an industry-leading selection of corrosion protection and engineering services. With our new brand structure, we are in a unique position to offer long-term protection to all.”

“It’s going to benefit our customers – some of the biggest names operating in power generation, oil & gas, petrochemical and more. By using a single point of contact, they will notice a reduced carbon footprint and time to market, plus an overall reduction in their supply chain.”

For further information contact: Corroserve, Forster Street, Leeds, West Yorkshire LS10 1PW United Kingdom. T: +44 (0)113 2760 760 F: +44 (0)113 2760 700 E: info@corroserve.com www.corroserve.com
Engineering solutions provider Costain is nearing completion of a £20 million contract to update the Severn Trent Frankley Water Treatment Works. This is part of several projects being carried out by Severn Trent Water to maintain the quality of its customers’ water supply. The major part of the Costain Group project was the new contact tank, which has the capacity of several Olympic-sized swimming pools. The treated water is held here before being pumped to some of Severn Trent’s 1.4 million customers in and around Birmingham.

A key protection role was supplied by Winn & Coales (Denso) Ltd’s Densoclad system and profiling mastic, which has been applied to bolted flanged joints on all 1.1 and 1.6 metre diameter water mains and associated pipework related to the new contact tank.

Densoclad is available as a medium to heavy-duty tape, designed for anti-corrosion protection of medium and large diameter pipes, welded joints, bends and fittings and is applied over Denso primer. Where required profiling mastic is also first applied to obtain a smooth surface. Densoclad’s extremely tough PVC backing combined with polymer bitumen adhesive ensures complete protection and exceptional resistance to damage by impact or aggressive ground conditions.

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
DENSO STEELCOAT PROTECTS SOUTH STAFFS PIPEBRIDGE

Winn & Coales Denso Steelcoat 100/400/700 system has again been chosen by South Staffs Water to give long-term protection to one of its pipebridges. This was for a 30 metre pipebridge running alongside the road bridge over the river Churnet at Rocester, Staffordshire.

Contractors for this project were again Deborah Services Ltd, Industrial Services Division – head office in Wakefield. After removal of the residue of the previous coating, hand preparation was carried out to St2 standard using scrapers, wire brushes and emery cloth. The water pipe was then protected with Denso Steelcoat 100 and 400 Tape Wrap systems. The Denso Steelcoat 400 consisted of: Hi-Tack Primer, Denso Profiling Mastic, Hi-Tack Tape, Ultraseal Tape, followed by a final two coats of acrylic topcoat.

Denso Steelcoat 700 system, consisting of Denso ST Epoxy followed by a top coat of Denso Weathershield, was applied to the pipebridge’s concrete stanchions.

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

PLANT INTEGRITY LTD IS DELIGHTED TO ANNOUNCE THE OPENING OF A NEW OFFICE IN NORTH AMERICA

Plant Integrity’s flagship product, Teletest Focus+, is a technologically advanced non-destructive testing device capable of accurately detecting flaws in pipelines and tubular structures. It is particularly useful for detecting flaws in difficult-to-reach areas and has seen widespread adoption by the oil and gas industry.

In response to local demand, and to make access to its world-leading Teletest Focus+ testing equipment easier for American companies, the company has set up a new base in Houston.

The office, supported by a dedicated agent, provides equipment rental and expert training in long-range ultrasonic inspection. Plant Integrity shares the premises with parent company TWI, whose North American operation was founded in the city in 2010.

The opening of the new office gets 2015 off to an exciting start for Plant Integrity, which in 2014 enjoyed one of the most successful years of its 18-year history. As well as making a record number of sales and delivering a series of fully booked training programmes, it was also presented with a Frost & Sullivan Product Leadership Award.

The accolade was given to Plant Integrity in recognition of the excellence of its Teletest Focus+ equipment, which was identified as being a market leader in the area of guided wave testing. Judges described it as ‘an extremely well-crafted product with advanced features and robust design’ that ‘has clearly set the benchmark in the industry for innovation’.

Plant Integrity at Corrosion 2015

In the coming months Plant Integrity will be carrying out activities to raise awareness of its services in the area, including exhibiting at NACE International’s annual conference and expo, Corrosion 2015, the largest corrosion-related event in the world.

Corrosion 2015 is taking place at the Kay Bailey Hutchison Convention Centre in Dallas from 15 to 19 March. Plant Integrity will be one of more than 400 companies promoting its services at the event, which is expected to attract an international crowd of more than 6000 attendees.

If you or your company will be represented at the exhibition, be sure to visit Plant Integrity’s stand (booth 16046) to find out more about its services.

For further information visit: www.plantintegrity.com. If you wish to enquire about the company’s service in North America, contact Mauricio Vargas on +1(832) 914 7217 or e-mail mauricio@gvt.com.mx
LEADERS IN SURFACE FINISHING CREATE DYNAMIC FORCE IN COATINGS TECHNOLOGY

Norman Hay plc has created a new specialist Coatings Group incorporating SIFCO Applied Surface Concepts (ASC) and Surface Technology providing a single global access point in surface coating technology.

SIFCO ASC, which was acquired by Norman Hay in 2012, is the world leading supplier of selective plating services, chemical solutions and equipment as well as creator of the renowned SIFCO Process®. Sister company, Surface Technology offers an extensive range of specialist surface treatments for industrial applications and by combining their technical expertise and market knowledge the group creates a new dynamic force in the coating and surface finishing industry.

The new Coatings Group will be headed by Group Managing Director Lee Shelton, who joined Norman Hay in 2000. Lee, a fluent Japanese speaker, started working for Norman Hay in its impregnation business, Ultrasel International, as Director of International Business, based in Japan. Following several years in key business development and leadership roles for Norman Hay in the Asia Pacific region, Lee relocated to the US in December 2012 as MD of SIFCO ASC.

Lee explained: “Since acquiring the SIFCO ASC business in 2012 and bringing the business into the Norman Hay Group, a number of synergies have emerged. The leadership team at Norman Hay feel that now is the right time to formalise this collaboration by bringing some of the best talent in the industry together under one umbrella. In doing so, we will identify new applications and ways of working which will ultimately benefit our customers’ processes.”

Based in Cleveland, Ohio, SIFCO ASC has operations in three further US states, the UK, Sweden and France as well as partners in Europe, South America, Canada and Asia. Surface Technology, headquartered in Coventry, covers the whole of the UK through seven sites and has plants in Australia and China. In addition to helping the two businesses expand into new locations, the creation of the Coatings Group will also ensure the company maximises its reach in existing markets such as oil & gas, automotive, aerospace and power generation.

Well proven for enhancing, repairing or refurbishing critical components, the SIFCO Process® can now be easily adopted into manufacturing production lines thanks to the company’s recent investment in developing workstations to automate the SIFCO Process®. Lee believes that with the support of Surface Technology, a wider scope of opportunities can be established, providing manufacturers across many industries the opportunity to meet their goals of both increasing quality and productivity and consolidating their supplier base.

When asked what differentiates Norman Hay’s Coatings Group from competitors, Lee said: “Our knowledge and expertise are unrivalled. The industries in which we are most prominent are heavily regulated, such as aerospace, automotive and also oil & gas. Customers in these sectors need reassurance that they are dealing with suppliers who are technical experts driven by the most robust standards and processes to meet highly demanding specifications. We now have more engineers and Quality Managers in our group than ever, with a combined service of 243 years.”

Significant investments are being made into recruitment, such as the recent appointment of a new European Sales Manager and a Design Engineer on the robotics side, along with refurbishment of existing facilities and new equipment.

Vic Bellanti, Chief Executive of Norman Hay, concluded: “We already receive requests from customers to offer a wider range of services in order to keep their supplier base to a minimum and now, through our Coatings Group, we offer an enhanced one-stop, multi-coat, capability. The team will now be selling the combined capability of the Group rather than one individual company.”

For more information on Surface Technology, visit: www.surfacetechnology.co.uk
For more information on SIFCO ASC, visit: www.sifcoasc.com
For more information on Norman Hay plc, visit: www.normanhay.com

For further information contact:
Surface Technology - Head Office, Godiva Place, Coventry, CV1 5PN United Kingdom
Tel: +44 (0)845 4500870
www.surfacetechnology.co.uk
SIFCO ASC – USA, 5708 E. Schaaf Road, Independence, Ohio 44131 Tel: 1 800 765 4131 Email: info@sifcoasc.com www.sifcoasc.com

visit the new ICorr website
www.icorr.org
CATHODIC PROTECTION AND MONITORING

**CARRPRO COMPANIES EUROPE LTD**
Corrosion Engineering, Cathodic Protection, Corrosion Monitoring
Adam Street, Bowesfield Lane, Cleveland,
Stockton-on-Tees TS18 3HQ
Tel. +44(0) 1642 614 104 Fax: +44(0) 1642 614 100
e-mail: ccel@corrpro.co.uk

**DUVINE LTD**
DC POWER SOLUTIONS
Sturmer Road, Haverhill, Suffolk, UK, CB9 7UU
Tel: +44 (0)1440 706777 Fax: +44 (0)1440 762810
e: sales@duvine.co.uk www.duvine.co.uk

**IMPALLOY LTD**
Bloxwich, Walsall, West Midlands, WS3 2XN
Tel: 01922 714400 Fax: 01922 714411
Email: sales@impalloy.com www.impalloy.com

**MATCOR**
101 Liberty Lane, Chalfont, PA 18914
Tel: 800 523 6692 Fax: 215 348 2699
Email: matcorsales@matcor.com
Website: www.matcor.com

**MCPS LIMITED**
102/2a Throckley Way, Middlefield Industrial Estate,
South Shields, Tyne & Wear NE34 0NU
Tel: +44 (0) 0191 456 0466 Fax: +44 (0) 0191 454 1066
Email: sales@mcpsltd.co.uk www.mcpsltd.co.uk

**MINE GROUP**
Materiale Metingen Europe B.V, Rietdekkerstraat 16,
PO Box 4222, 2980 GE Ridderkerk, The Netherlands
Tel: +31 (0) 180 482 828 Fax: +31 (0) 180 462 240
E: info@mme-group.com www.mme-group.com

**North East Corrosion Engineers Ltd**
West Pitmilian Business Centre Foveran,
Ellon, Aberdeenshire
Tel: +44 (0) 1358 788116 Fax: +44 (0) 1358 789828
E: sales@neceltlco.com www.neceltlco.com

**PENSPEL**
CORROSION ENGINEERING AND CATHODIC PROTECTION FIELD SERVICES
Contact: David Eyre 0208 334 2700
Email: d.eyre@penspen.com
or Lee Jones 01639 713010 Email: l.jones@penspen.com

**R & R Corrosion Ltd.**
5 Broomiesburn Road,
Broomiesburn Industrial Estate, Ellon, Aberdeenshire AB41 9RD
Tel: 01358 729644 Fax: 01358 729655
Email: info@rrcorrosion.com www.rrcorrosion.com

**SILVION LIMITED**
The Brambles, Grantham Road, Old Somerby,
Grantham, Lincs, NG33 4AB, UK
Tel: 01476 590932 Mob: 07872 857310
Email: sales@silvion.co.uk; rbritton@silvion.co.uk Web: www.silvion.co.uk

**TO ADVERTISE CONTACT SQUARE ONE**
Tel: +44 (0)114 273 0132
Email: jonathan@squareone.co.uk
COATING APPLICATORS

ALFRED BAGNALL & SONS LTD
6 Manor Lane, Shipley, W.Yorks BD18 3RD
Tel: 01274 714800  Fax: 01274 530171
Email: info@bagnalls.co.uk  www.bagnalls.co.uk

APB CONSTRUCTION (UK) LTD
First Floor Offices, Grange Business Centre
River Works, Grange Lane, Sheffield, S5 0DP
Tel: 01170 941100  Fax: 01170 941111
Email: gary.bentham@apbcon.co.uk

APB GROUP LIMITED
Ryandra House, Ryandra Business Park,
Brookhouse Way, Cheadle, Stoke on Trent ST10 1SR
Tel: 01538 755377  Fax: 01538 755010

BALISTA LIMITED
4 Westacre Gardens, Ormesby, Great Yarmouth, Norfolk
Telephone 01493 262262 (option 1)
Mobile 0044 7867518858
Email: duncan@balista.info

BLUHULL GROUP
Orange Grove, Birbal Street, Balzan
BZN 9013, Malta
Tel: +356 21445807
Email: Jborg@bluhullmarine.com

CORROCOAT CORROSIONEERING
• Specialists in anti-corrosion engineering and corrosion protection
• Fast, efficient and economical solutions to corrosion-related problems
• Combining engineering skills and coating excellence for long term solutions
• Repair and refurbishment for components from pumps, pipes and valves through to tanks and vessels
• On-site teams and workshop-based facilities

Denholm Industrial Services
200 Carmichael Street, Glasgow, G51 2QU
Tel: +44 (0)141 445 3939
Email: Damian.O’Brien@denholm-industrial.com

DRH Coatings Ltd
Suite 5, 3 Shawcross Industrial Estate,
Hilsea, Portsmouth, PO3 5JP
Tel: 0239 2666165
Email: gary.deeks@drhcoatings.co.uk

DYER & BUTLER LTD
Mead House, Station Road, Nursling, Southampton, Hampshire SO16 0AH
Tel: 02380 742222  Fax: 02380 742200
Email: enquiries@dyerandbutler.co.uk
Website: www.dyerandbutler.co.uk

F A CLOVER & SON LTD
INDUSTRIAL PAINTING CONTRACTORS SINCE 1917
Tel: 020 89486321  Fax: 020 89487307
Email: ian@cloverpainting.com

GABRE (UK) LTD
9 Holme Road, Curraghmulkin, Dromore,
Tyrone BT78 3BX
Tel: 02882897950
Email: info@gabrielhughes.com

GPL SPECIAL PROJECTS LTD
PO Box 516, Salford, M5 0BJ
Tel: 0161 745 7888
Email: ben.dobson@gplgroup.co.uk

Hankinson Blasting & Protective Coatings Division
• Blasting
• Scaffolding and encapsulation
• ISO9001 and NHSS19A accredited
• ISO14001 accredited
• Award winning safety and training standards
• National coverage

0870 789 2020  www.hankinson.co.uk
Cotton Place, 2 Ivy Street, B/Head, Wirral CH41 5EF

HERRINGTON INDUSTRIAL SERVICES LTD
Grit blasting, metal spraying & applications of specialist coatings
Crown Works, Crown Road, Low Southwick,
Sunderland, Tyne & Wear, SR5 28S
Tel: 0191 516 0634  Fax: 0191 548 1553
Email: herringtonindustrialServices@gmail.com  Website: www.herringtonindustrialServices.co.uk
COATING APPLICATORS

JACK TIGHE LTD
Redbourne Mere, Kirton Lindsey, Gainsborough, Lincolnshire, DN21 4NW
Tel: 01652 640003
Email: sales@jacctighe.com

JPV LTD
Over 30 years experience of Preparation & Coating
Abrasive Blasting, Specialist Coating Applications,
High Pressure Water Jetting
Tel: 01277 201515  Fax: 01277 201616  e: paul.jpv@btopenworld.com

KAEFER OPUS LIMITED
Ethan House, Royce Avenue,
Cowpen Lane Industrial Estate, Billingham TS23 4BX
Tel: 01642 371850  Fax: 01642 562971
Website: www.opus-services.com

KUE Group Limited
Birksland Street, Bradford BD3 9SU
Tel: +44 (0)1274 721188  Fax: +44 (0)1274 720088
Website: www.kuegroup.com

MABEY BRIDGE LIMITED
Station Road, Chepstow, Monmouthshire NP16 5YL
Tel: +44 (0)1291 623801  Fax: +44 (0)1291 625453
Email: mail@mabeybridge.co.uk

MCL COATINGS LTD
Pickerings Road, Halebank Industrial Estate
Widnes, Cheshire WA8 8XW
Tel: 0151 423 6166  Fax: 0151 495 1437
Email: info@mcl.eu.com
Website: www.mcl.eu.com

MPM NORTH WEST LTD
Marine Road, Maryport, Cumbria CA15 8AY
Tel: 01900 810299
Email: mike@mpmmnw.co.uk
Website: www.mpmmarine.co.uk

NORTHERN PROTECTIVE COATINGS LTD
16 High Reach, Fairfield Industrial Estate, Bill Quay, Gateshead,
Tyne & Wear NE10 0UR. Tel: 0191 438 5555
Fax: 0191 438 3082  Email: jack.welsh@npcoatings.co.uk
Website: www.npcoatings.co.uk

NUSTEEL STRUCTURES
Lymane, Hythe, Kent CT21 4LR
Email: simon.slinn@nusteelstructures.com
Website: www.nusteelstructures.com

ORRMAC COATINGS LTD
Newton Chambers Road, Thorncliffe Park Estate, Chapeltown
Sheffield S35 2PH
Tel: 0114 2461237  Fax: 0114 2570151
Email: orrmac@aol.com  Website: www.orrmac.co.uk

Pipeline Induction Heat Ltd
The Pipeline Centre
Farrington Road, Rosendale Road Industrial Estate
Burnley, Lancs BB11 5SW
Tel: 01254 371323  Fax: 01254 371328
Email: Sales@pih.co.uk  www.pih.co.uk

PIPERCREST LTD
T/A Halls Specialised Services
Brooklyn Farm, North Hill, Norden on the Hill, Essex SS17 8QA
Tel: 01375 361408  Fax: 01375 361448
Email: halls@btconnect.com

PORT PAINTERS LTD
Unit 3, Ringside Business Park, Heol-Y-Rhosog, Cardiff CF3 2EW
Tel: 029 2077 7070  Fax: 029 2036 3023
Email: port.painters@talk21.com

PPC LTD
10 Valiant Gardens, Hiley, Portsmouth PO2 9NZ
Tel: 0239 2612405
Email: enquiries@ppc-ltd.info

REPAIR PROTECTION & MAINTENANCE LTD
Roall Lane, Kellington, Goole DN14 0NY
Tel: 01977 663111  Fax: 01977 663222
Email: info@rpmilttd.co.uk  www.rpmilttd.co.uk
RHINOCEROS LIMITED
Huntingdon Works, Huntingdon Road, East Finchley,
London, N2 9DX
Tel: 0208 444 6165 Fax: 0208 365 2865
Email: contracts@rhino247.co.uk www.rhino247.co.uk

STORY CONTRACTING LIMITED
Burgh Road Industrial Estate,
Carlisle, Cumbria CA2 7NA
Tel: 01228 590444

SHUTDOWN MAINTENANCE SERVICES LIMITED
Tel: 01634 256949 Fax: 01634 256616
Email: smsltd@btconnect.com
Website: www.shutdownmaintenanceservices.co.uk

SPECIALIST BLASTING SERVICE LTD
Smith Quay, Hazel Road,
Southampton, Hampshire SO19 7GB
Tel: 023 8044 4455

SPECIALIST PAINTING GROUP LTD
Padholme Road East, Fengate, Peterborough PE1 5XL
Tel: 01733 309500 Email: info@spg.uk.net
Website: www.specialistpaintinggroup.co.uk

STANDISH METAL TREATMENT LTD
Potter Place, West Pimbo, Skelmersdale
Lancs, WN8 9PW
Tel: 01695 455977 Fax: 01695 728835
Email: stuart.croft@standishmetal.co.uk

SURFACE TECHNIK (OLD HILL) LIMITED
Sovereign Works, Deepdale Lane, Lower Gornal,
Dudley DY3 2AF
Tel: 01384 457610 Fax: 01384 238563
Email: peter.morris@surfacetechnik.co.uk
Website: www.surfacetechnik.co.uk

TORISHIMA Surface Coatings Division
We operate a modern, state of the art coatings facility in
Glasgow
Applicators of:
• Ceramic Systems
• Primer Systems
• Rust Converters
• Tank and Pipe Linings
• Structural Coatings
• Phosphates
• Dry Film Lubricants
• Phosphate conversion coatings
• High Build Application
• CUI Rehabilitation
• Composite Pipeline Repairs to ISO/TS 24817 & ASME
PCC-2
Industries we serve:
• Wastewater
• Oil and Gas
• Food and Beverage
• Manufacturing
• General Industry
Call us today on 01326 442390 or email info@torishima.co.uk
2 Collivery Gate, Clyde Gateway East, Glasgow, G32 8BE

TEES VALLEY COATINGS LIMITED
Unit 26, Dawson Wharf, Riverside Park Road, Middlesbrough TS2 1UT
Tel: 01642 228141
Email: sales@teesvalleycoatings.com
Website: www.teesvalleycoatings.com

WALKER CONSTRUCTION (UK) LIMITED
Park Farm Road, Folkestone, Kent CT19 5DY
Tel: 01303 851111 Fax: 01303 259439
Email: admin@walker-construction.co.uk

WEDGE GROUP GALVANIZING LTD
Stafford Street, Willenhall, West Midlands WV13 1RZ
Tel: 0845 271 6082
Email: info@wedge-galv.co.uk
Website: www.wedge-galv.co.uk

W G BEAUMONT & SON LTD
Beamont House, 8 Bernard Road, Romford, RM7 0HX
Tel: 01708 749202 Fax: 020 85909885
Email: tom.costello@wgbeaumont.co.uk

WILLIAM HARE LTD
Brandlesholme House, Brandlesholme Road, Bury BL8 1JJ
Tel: 0161 609 0000 Fax: 0161 609 0468
Email: jeff.grundy@hare.co.uk www.williamhare.co.uk
MOTT MACDONALD
Materials & Corrosion Engineering
Spring Bank House, 33 Stamford Street
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 4638680  Email: ian@paint-inspection.co.uk
www.paint-inspection.co.uk

Plant Integrity Management Ltd
1st Floor Office, Woodburn House,
Woodburn Road, Blackburn AB21 0RX
Tel: 01224 798870  www.pim-ltd.com
Email: maraneda@pim-ltd.com

Safinah Ltd
21a Bridge Street, Morpeth,
Northumberland NE61 1NT
Tel: 01670 519900  Email: enquiries@safinah.co.uk

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@sonomatic.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
41 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
SUSTAINING MEMBERS

COUNTER CORROSION LTD
Formulators and Applicators of Customised Protective Coating and Lining Systems for Steel and Concrete
Tel: 01924 468559/380002 Fax: 01924 458019

Leaders in Corrosion Prevention & Sealing Technology

Winn & Coales (Denso) Ltd
Denso House, Chapel Road, London SE27 OTR
Tel: 0208 670 7511 Fax: 0208 761 2456
Email: mail@denso.net Web: www.denso.net
A Member of Winn & Coales International

Long-term Solutions for Corrosion Control

HEMPEL PAINTS UK LTD
Llantarnam Industrial Park
CWMBRAN
Gwent NP44 3XF
Tel: 01633 874024 Fax: 01633 489012
Email: sales@hempel.co.uk www.hempel.com

INDESTRUCTIBLE PAINT LTD
25 Pentos Drive, Sparkhill, Birmingham, B11 3TA
Tel: 0121 7022485 Email: sales@indestructible.co.uk Website: www.indestructible.co.uk

INDEPENDENT PROTECTIVE COATINGS SERVICES LTD
Unit 14, Hedgend Industrial Estate, Stuart Lane, St Nicholas-At-Wade, Kent CT7 0NB
Tel: 01843 845472 Fax: 01843 847722

INTERNATIONAL PAINT LIMITED
Stoneygate Lane, Felling, Gateshead, Tyne & Wear NE10 0JY
Tel: 0191 469 6111 Fax: 0191 496 0676
Email: pc.marcomms@ak20nobel.com Website: www.international-pc.com

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

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@chemcointl.com www.chemcointl.com

CARBOLINE®
The Protective Coatings Professionals™
UK Office & Warehouse
Unit 26, Craftsmans Way, East Gosclose Industrial Estate, East Gosclose, Leicestershire LE7 3XJ
Tel: ++44 (0) 116 269 7777
Aberdeen Office
23 Rubislaw Den North, Aberdeen AB15 4AL
Tel: ++44 (0) 1224 325 096
www.carboline.com

CORROCOAT
CORROSIONEERING
- Extensive range of high technology coating systems and composites
- Specific range of coating systems
- Focus on R&D and technical support
- Low VOC levels with little or no solvent content for reduced atmospheric pollution
- Effective single coat solutions available
- Increasingly specified as the industry standard

HEMPEL PAINTS UK LTD
INDESTRUCTIBLE PAINT LTD
INTERNATIONAL PAINT LIMITED

SUSTAINING MEMBERS
ICATS REGISTERED COMPANIES

ICATS is a comprehensive structured training scheme for the registration, training and certification of industrial surface preparation and coating operatives. Companies wishing to have a workforce certificated under ICATS must first register with Correx. Workplace training is carried out by ICATS certificated trainers who are qualified to train and assess operatives. Training is carried out in-house and may be undertaken by a certificated trainer employed by an ICATS registered training organisation. However it is more usual for registered companies to nominate experienced employees to ICATS for prior approval as company trainers. Subject to meeting the acceptance criteria, nominees attend a 2 day ICATS Company Trainer course held at various locations in the UK.

Successful completion of the ICATS course by operatives leads to certification by Correx. Trainers and operatives will require re-certification after 3 years and renewal after 9 years.

ICATS REGISTERED COMPANIES

A & R Painting Services Ltd
Marwood House, Riverside Park, Bromborough, Wirral, CH62 3QX
Tel: 0151 445 3589

Abbey Gritblasting Services
Unit 13, Clopton Commercial Park, Clopton, Woodbridge, Suffolk, IP12 3TP
T: 0191 262 0510

Advanced Construction and Eng Resources Ltd (ACER)
5th Floor, Horton House, Exchange Flags, Liverpool L2 3PF
T: 0161 408 0155

Alfred Bagnall & Sons
6 Manor Lane, Shipley, West Yorkshire, BD18 3RD
T: 01302 853259

AlpAccess s.r.l.
I.L. Caragiale, 21 Ploiesti, 100015, P.H. Romania
T: +44 (0) 722140858

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

APB Construction (UK)
First Floor Offices, Grange Business Centre, River Works, Grange Lane, Sheffield, S5 ODP
T: 01709 541000

APB Group Limited
Ryandra House, Ryandra Business Park, Brookhouse Way, Cheadle, Staffs, ST10 1SR
T: 01538 755777

Armourcote Surface Technology Plc
15/17 Colvilles Place, Kelvin Industrial Estate, East Kilbride, Scotland, G75 0PZ
T: 01355 248223

Austin Hayes Ltd
Carlton Works, Cemetery Road, Yeadon, Leeds, LS19 7BD, UK
T: 0113 250 2255

Aveon Offshore Ltd
Aveon Offshore Facility, Rumuolmeni, Port Harcourt, River State, Nigeria
E: dpetillion@aveonoffshore.com

B&A Contracts Ltd
Dale Road, Hubberston, Milford Haven, Pembrokeshire SA73 3PR
T: 01646 693489

BAE Systems Surface Ships Support Ltd
Room 2 13, Naval Base Headquarters, Building 1/100, PO127, Portsmouth, PO1 3LS
T: 023 92857279

BAM Nuttall Ltd
St James House, Knoll Road, Camberley GU15 3XW
T: 0788 5789440

Beever Limited
Little Coldharbour farm, Tong Lane, Lamberhurst, Kent, TN3 8AD, UK
T: 01892 890045

Bilfinger Salamis UK Ltd
4 Greenhole Place, Bridge on Don, Aberdeen, AB23 8EU
T: 01224 246499

Bluhull Marine Ltd
Orange Grove Birbal Street
Bazlan, BZN 9013 MALTA
T: +356 21445807

Border Coatings (Scotland) Ltd
Unit 7, Station Road Industrial estate, Earlston, Berwickshire TD4 6BZ
T: 01896 848919

Brightstar Shotblasting & Coatings Ltd
Newhall Works, Newhall Road, Sheffield, S9 2QL
T: 0114 2618532

Briton Fabricators Ltd
Watnall Road, Hucknall, Notts, NG15 GEP
T: 0115 963 2901

BSM Consulting
11 Kingsmead, Nailsea BS48 2XH
T: 01275 854708

Cape Industrial Services
Cape House, 3 Red Hall Avenue, Paragon Village, Wakefield, WF1 2UL
T: 01224 215800

C E Pittaway & Son Ltd
106 – 114 Flinton Street Hull HU3 4NA
Tel: 01482 329807

Celtic Specialist Treatments Ltd
Enterprise House, Herbert Road, Newport, South Wales, NP19 7BH
T: 01633 267007 (office) / 01633 215900 (workshop)

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

Chemcem Scotland Ltd
Wester Crosshill, Avonbridge Road, Falkirk FK1 3DF
T: 01324 851987

Cleveland Bridge UK Ltd
Cleveland House, Farm Road, Darlington, DL1 4DE
T: 01325 502345

Coastground Ltd
Morton Petoro Road, Capton Hall Industrial, Great Yarmouth, Norfolk, NR31 OLT
T: 01493 650455

Coating Services Ltd
Partington Street, Mumps Bridge, Oldham, OL1 3RU, UK
T: 0161 665 1998
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collis Engineering Railway Contracts</td>
<td>Salcombe Road, Meadow Lane Industrial Estate, Alfreton, Derbyshire, DE55 7RG</td>
<td>T: 01773 833255</td>
</tr>
<tr>
<td>Community Clean</td>
<td>11 Old Forge Road, Ferndown Industrial Estate, Ferndown, Wimborne, Dorset, BH21 7RR, UK</td>
<td>T: 0845 6850133</td>
</tr>
<tr>
<td>Corrocoat</td>
<td>Forster Street, Leeds, LS10 1PW</td>
<td>T: 01132760760</td>
</tr>
<tr>
<td>Corroless Eastern Ltd</td>
<td>Greens Road, Greens Industrial Estate, Dereham, Norfolk NR20 3TG</td>
<td>T: 01362 691484</td>
</tr>
<tr>
<td>County Building Services Ltd</td>
<td>Unit D3, Spectrum Business Estate, Anthony’s Way, Medway City Estate, Rochester, Kent, ME2 4NP</td>
<td>T: 01604 711507</td>
</tr>
<tr>
<td>Darcy Spillcare Manufacture</td>
<td>Brook House, Larkfield Trading Estate, New Hythe Lane, Larkfield, Kent ME2 6GN</td>
<td>T: 01622 715100</td>
</tr>
<tr>
<td>D&amp;D Rail Ltd</td>
<td>Time House, Time Square, Basildon Essex SS14 1DJ</td>
<td>T: 01268 520000</td>
</tr>
<tr>
<td>Denholm Industrial Services</td>
<td>200 200 Carmichael Street, Glasgow, G51 2QU</td>
<td>T: 0141 445 3939</td>
</tr>
<tr>
<td>D F Coatings Ltd</td>
<td>Unit 17, Willments Ind. Estate, Hazel Road, Woolston Southampton SO19 7HS</td>
<td>T: 02388 044 5634</td>
</tr>
<tr>
<td>Donyal Engineering Ltd</td>
<td>Hobson Industrial Estate, Burnopfield, Newcastle Upon Tyne NE16 6EA</td>
<td>T: 01207 270909</td>
</tr>
<tr>
<td>DRH Coatings Ltd</td>
<td>Suite 5, 3 Shawcross Industrial Estate, Ackworth Road, Portsmouth PO3 5JF</td>
<td>T: 023 9266 6165</td>
</tr>
<tr>
<td>Dyer &amp; Butler Ltd (Rail)</td>
<td>Mead House, Station Road, Nursling, Southampton, SO16 0AH, UK</td>
<td>T: 02380 667549</td>
</tr>
<tr>
<td>E G Lewis &amp; Company Ltd</td>
<td>Suite 5, 3 Shawcross Industrial Estate, Ackworth Road, Portsmouth PO3 5JF</td>
<td>T: 01792 323288</td>
</tr>
<tr>
<td>ENC (Yorkshire) Ltd</td>
<td>Unit 3B Rotherham Road, Dinnington, Sheffield, S25 3RP</td>
<td>T: 01909 567860</td>
</tr>
<tr>
<td>ESB Surface Engineering</td>
<td>203 Westgate Street, Gloucester, GL1 2RN</td>
<td>T: 01452 306272</td>
</tr>
<tr>
<td>F A Clover &amp; Son</td>
<td>Bardolph Road, Richmond, Surrey, TW2 2LH</td>
<td>T: 0208 948 6321</td>
</tr>
<tr>
<td>Farbuild Ltd</td>
<td>Trelawny Lodge, Vicarage Road, Wingfield, Diss, Norfolk IP21 5BR</td>
<td>T: 01379 640670</td>
</tr>
<tr>
<td>FMC Technologies NIGERIA</td>
<td>No. 22 Gerrard Road Ikoyi, NIGERIA</td>
<td>T: +234 (0) 8039740023</td>
</tr>
<tr>
<td>Focus Scaffolding Ltd</td>
<td>Meadow Road Compound, Meadow Road, Whitehaven, Cumbria, CA28 6HY</td>
<td>T: 01946 592338</td>
</tr>
<tr>
<td>Forth Estuary Transport Authority</td>
<td>Forth Road Bridge, Administration Office South Queensferry, EH30 9SF</td>
<td>T: 0131 319 1699</td>
</tr>
<tr>
<td>Forward Protective</td>
<td>Vernon Street, Shirebrook, Mansfield Notts, NG20 8SS</td>
<td>T: 01623 748323</td>
</tr>
<tr>
<td>Fountains part of OCS Group of Companies UK Ltd</td>
<td>Blenheim Court, George Street Banbury, OX16 5BH</td>
<td>T: 01295 750000</td>
</tr>
<tr>
<td>Global Energy Group (Access Coatings) Ltd</td>
<td>Unit 5, Service Base, Shore Road, Invergordon, IV18 0EX</td>
<td>T: 013468 855123</td>
</tr>
<tr>
<td>GPL Civil Engineering Ltd (Special Projects Division)</td>
<td>Kennedy House, Choltenham Street, Salford, M6 6YW</td>
<td>T: 0161 745 7888</td>
</tr>
<tr>
<td>HBH Contracting Ltd</td>
<td>8 Barnfield Hill, Exeter, EX1 1SR</td>
<td>T: 07960 090725</td>
</tr>
<tr>
<td>Haynes Engineering Services Ltd</td>
<td>Brindley Road, Off Hadfield Road, Cardiff CF11 8TL</td>
<td>T: 029 2022 6088</td>
</tr>
<tr>
<td>Harso Infrastructure UK Ltd</td>
<td>Unit 3 Manby Road, South Killingholme, Immingham, North Lincolnshire, DN40 3DX</td>
<td>T: 01469 553800</td>
</tr>
<tr>
<td>Harrisons Engineering Lancashire Ltd</td>
<td>Judge Wilmy, Mill, Longworth Road Billington, Clitheroe, Lancashire, BB7 9TP</td>
<td>T: 01254 823993</td>
</tr>
<tr>
<td>HBS Protective Coatings Ltd</td>
<td>40 Manse Road, Belfast BT8 6SA</td>
<td>T: 028 90708280</td>
</tr>
<tr>
<td>Hemple UK Ltd</td>
<td>Llantarnam Park, Cwmbran, Cwnt, NP44 3XG</td>
<td>T: 01633 874024</td>
</tr>
<tr>
<td>Herrington Industrial Services Ltd</td>
<td>Crown Works, Crown Road, Low Southwick, Sunderland SR3 2BS</td>
<td>T: 0191 5160634</td>
</tr>
<tr>
<td>Hi-Tech Surface Treatment Ltd</td>
<td>Unit 8, Deacon Trading Estate, Chickenhall Lane, Eastleigh, Hants SO50 6RP</td>
<td>T: 023 80611789</td>
</tr>
<tr>
<td>Hyspec Services Ltd</td>
<td>Unit 3 Meadowfield Industrial Estate, Cowdenbeath Road, Burntisland, Fife, KY3 0LH</td>
<td>T: 01592 874661</td>
</tr>
<tr>
<td>Industrial Coating Services</td>
<td>A1 House, Rolling Mill Street, Norton Canes, Cannock WS11 9UH</td>
<td>T: 0845 474 0007</td>
</tr>
<tr>
<td>Company Name</td>
<td>Address Details</td>
<td>Phone Number</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------</td>
<td>--------------</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, Poole Hall Road Ellersmere Port, Cheshire, CH66 1ST</td>
<td>T: 0151 3737660</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, DN21 4NW, UK</td>
<td>T: 01652 640003</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>JWM Industrial Services Ltd</td>
<td>47 Barton Road, Stretford, Manchester, M32 9PA</td>
<td>T: 0161 2825329</td>
</tr>
<tr>
<td>JTL Fire Ltd</td>
<td>24 Cove Road, Farnborough, Hants, GU14 0EN</td>
<td>T: 01252 545741</td>
</tr>
<tr>
<td>Kaefer C&amp;D Ltd</td>
<td>Riverside House, Rolling Mill Road, Viking Industrial Estate, Jarrow, Tyne &amp; Wear NE32 3DP</td>
<td>T: 0191 428700</td>
</tr>
<tr>
<td>K &amp; N Finishers (Southern) Ltd</td>
<td>Castle Trading Estate, Porchester, Fareham, PO16 5YF</td>
<td>T: 02380 869700</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>Ledwood Protective Coatings Ltd</td>
<td>Waterloo Industrial Estate Pembroke Dock, Pembrokeshire, SA72 4RR</td>
<td>T: 01646 623600</td>
</tr>
<tr>
<td>Livingstone Surface Treatments Ltd</td>
<td>Unit 4, The Energy Coast Business Park, Haile, Egremont, Cumbria, CA22 2NH</td>
<td>T: 01946 841191</td>
</tr>
<tr>
<td>Livis Ltd</td>
<td>Livis House, Springhead Enterprise Park, Springhead Road, Northfleet, Kent, DA11 8HU</td>
<td>T: 01322 220058</td>
</tr>
<tr>
<td>Mabeys Bridge Ltd</td>
<td>Station Road, Chepstow, Monmouthshire NP16 5YL</td>
<td>T: 01291 623801</td>
</tr>
<tr>
<td>Maclean &amp; Speirs Blasting Ltd</td>
<td>Unit D, East Fulton Farm, Darlshield Road, Linwood, Paisley PA3 3TP</td>
<td>T: 01505 324777</td>
</tr>
<tr>
<td>Matthew James Services</td>
<td>Unit 4, Shildon Business, Cowen Road Blaydon, Newcastle-Upon-Tyne, NE21 5TX</td>
<td>T: 0191 414 5700</td>
</tr>
<tr>
<td>Mark Smith Inspection Services Ltd</td>
<td>14 Seaham Close, South Shields, Tyne &amp; Wear, NE34 7ER</td>
<td>T: 0191 456 9925</td>
</tr>
<tr>
<td>MCL Coatings Ltd</td>
<td>Pickering’s Road, Halebank Industrial Estate, Widnes, Cheshire, WA8 8XW</td>
<td>T: 0151 423 6166</td>
</tr>
<tr>
<td>Miller Fabrications Ltd</td>
<td>Baronhall Works, Overtown Road Wishaw, Lanarkshire, ML2 8EW</td>
<td>T: 01698 373770</td>
</tr>
<tr>
<td>Moore Steel Developments Ltd</td>
<td>Station Road, Thorne, Peterborough PE6 0QE</td>
<td>T: 01733 270729</td>
</tr>
<tr>
<td>New Image Contracts Ltd</td>
<td>Ashkern House, High Street, Ashkern Doncaster, DN6 0AA</td>
<td>T: 01302 708070</td>
</tr>
<tr>
<td>N L Williams Group Ltd</td>
<td>Westside Industrial Estate, Jackson Street, St. Helens, Merseyside WA9 3AT</td>
<td>T: 01744 26526</td>
</tr>
<tr>
<td>N Steel Structures</td>
<td>Lympne Industrial Estate, Lympne, Hythe, Kent, CT21 4LT</td>
<td>T: 01303 268112</td>
</tr>
<tr>
<td>Offshore Marine Services Ltd</td>
<td>Brumby House, Jalan Bahasa, PO Box 80148, 87011 Lubuan F.T., Malaysia</td>
<td>T: +356214244410</td>
</tr>
<tr>
<td>Optimal Rail Ltd</td>
<td>Unit 5, Moorgate Crofts Business Centre Alma Road, Rotherham S60 2DH</td>
<td>T: 01709 331153</td>
</tr>
<tr>
<td>Ormac Coatings Ltd</td>
<td>Newton Chambers Road, Thorncliffe Park Estate, Chapeltown, Sheffield, S35 2PH</td>
<td>T: 0114 246 1237</td>
</tr>
<tr>
<td>Over Rail Services Ltd</td>
<td>Unit 10 Millhead Way, Purdys Industrial Estate, Rochford, Essex, SS4 1ND</td>
<td>T: 07976372866</td>
</tr>
<tr>
<td>Paintel Ltd</td>
<td>Trianon, Westover, Ivybridge, Devon, PL21 9JH</td>
<td>T: 01752 719 701</td>
</tr>
<tr>
<td>Painting &amp; Labour Services Ltd</td>
<td>Unit 1, Queens Road, Immingham DN40 1QJ</td>
<td>T: 01469 578105</td>
</tr>
<tr>
<td>PCM Nigeria Plc</td>
<td>99 Rivoc Road Trans Amadi, Port Harcourt, Rivers State, Nigeria</td>
<td>T: +2348055297828</td>
</tr>
<tr>
<td>P H Shotblasting &amp; Spraying Services</td>
<td>43a Drumraine Road, Castlecaulfield, Dungannon, Co Tyrone, BT70 3NY</td>
<td>T: 028 8776 7722</td>
</tr>
<tr>
<td>Pipeline Induction Heating</td>
<td>The Pipeline Centre, Farrington Road, Rosendale Rd Industrial Estate, Bursley B81 5SW</td>
<td>T: 01282 415323</td>
</tr>
<tr>
<td>Port Painters Limited</td>
<td>Unit 3, Ringside Business, Hoel-Y-Rhosog Cardiff, CF3 2EW</td>
<td>T: 02920 777070</td>
</tr>
<tr>
<td>Possilpark Shotblasting Co Ltd</td>
<td>Dalmarnock Works, 73 Dunn Street, Glasgow, G40 3PE</td>
<td>T: 0141 556 6221</td>
</tr>
<tr>
<td>Prestec UK Ltd</td>
<td>168 Birmingham Road, Shenstone Wood End Staffs WS14 0NX</td>
<td>T: 0121 308 8001</td>
</tr>
<tr>
<td>Prestec Uk Ltd</td>
<td>168 Birmingham Road, Shenstone Wood End Staffs WS14 0NX</td>
<td>T: 0121 308 8001</td>
</tr>
<tr>
<td>Pro Steel Engineering Ltd</td>
<td>48a Severnbridge Industrial Estate, Symondsliffe Way, Caldicot, Monmouthshire, NP26 5PW</td>
<td>T: 01291 424949</td>
</tr>
<tr>
<td>Company Name</td>
<td>Address</td>
<td>Telephone</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Radleigh Metal Coatings Ltd</td>
<td>Unit 30, Central Trading Estate, Cable Street, Wolverhampton, WV2 2HX</td>
<td>01902 870606</td>
</tr>
<tr>
<td>R H Painting Limited</td>
<td>Alexander House, Monks Ferry, Birkenhead</td>
<td>0870 7892020</td>
</tr>
<tr>
<td>R.L.P. Painting Contractors Ltd</td>
<td>Unit 1 Grange Lane, Balby, Doncaster DN4 9HB</td>
<td>01302 853077</td>
</tr>
<tr>
<td>SCA Group Ltd</td>
<td>Woolsbridge Ind. Park, Three Legged Cross, Dorset, BH2 1 6FA</td>
<td></td>
</tr>
<tr>
<td>Severn River Crossing Plc</td>
<td>Bridge Access Road, Aust, South Gloucestershire, BS35 4BD</td>
<td>01454 633351</td>
</tr>
<tr>
<td>Shirley Industrial Painters &amp; Decorators Ltd</td>
<td>Grand Union House, Bridge Walk, Acock’s Green, Birmingham, B27 6SN</td>
<td>0121 706 4000</td>
</tr>
<tr>
<td>Shutdown Maintenance Services Ltd</td>
<td>Kingsnorth Industrial, Hoo, Rochester, Kent, ME3 9ND</td>
<td>01634 256969</td>
</tr>
<tr>
<td>Sitecote Ltd</td>
<td>33 Kielder Close, Ashton in Makerfield, Wigna W4N 0JE</td>
<td>07714678719</td>
</tr>
<tr>
<td>Solent Protective Coatings Ltd</td>
<td>Tredgear Wharf, Marine Parade Southamton, Hants, SO14 5JF</td>
<td>02380 221480</td>
</tr>
<tr>
<td>South Staffs Protective Coatings Ltd</td>
<td>Bloomfield Road, Tipton, West Midlands, DY4 9EE</td>
<td>0121 522 2373</td>
</tr>
<tr>
<td>Southern Coating Contractors Ltd</td>
<td>Malmsbury House, 227 Shirley Road, Shirley, Southampton, SO15 3HT</td>
<td>0238 0702276</td>
</tr>
<tr>
<td>Specialist Blasting Services Ltd</td>
<td>Smiths Quay, Hazel Road, Woolston, SO19 7GB</td>
<td>023 80438901</td>
</tr>
<tr>
<td>Specialist Painting Group Ltd</td>
<td>Unit 3 Propser House, Astore Park, Padholme Road East, Fengate, Peterborough, PE1 5X</td>
<td>01773 309500</td>
</tr>
<tr>
<td>Stainless Restoration Ltd</td>
<td>Unit M1, Adamson Industrial Estate, Croft Street Hyde, Cheshire, SK14 1EE</td>
<td>0161 3686191</td>
</tr>
<tr>
<td>Stamford Construction Limited</td>
<td>Barham Court Business Centre, Teston, Maidstone, Kent MW18 5BZ</td>
<td>07912037033</td>
</tr>
<tr>
<td>Standish Metal Treatment Ltd</td>
<td>Potter Place, West Pimbo, Skelmersdale, Lancs, W8N 9PW, UK</td>
<td>01695 455977</td>
</tr>
<tr>
<td>Stobbarts Ltd</td>
<td>Tam Howe, Lakes Road, Derwent Howe Industrial Estate, Worthing, Cumbria CA14 3YP</td>
<td>01900 870780</td>
</tr>
<tr>
<td>Story Contracting Ltd</td>
<td>Burgh Road Industrial Estate, Carlisle, Cumbria CA2 7NA</td>
<td>017730 764419</td>
</tr>
<tr>
<td>Stream Marine Training Ltd</td>
<td>Kintyre House, St Andrews Crescent, West Campus, Glasgow International Airport, Paisley, PA3 2TQ</td>
<td>01412128777</td>
</tr>
<tr>
<td>Tees Valley Coatings Ltd</td>
<td>Riverside Park Road, Middlesbrough, Cleveland T52 1UT</td>
<td>01642 228141</td>
</tr>
<tr>
<td>TEMA Engineering Ltd</td>
<td>S-6 Curran Road, Cardiff, CF10 SDF, UK</td>
<td>020920 344556</td>
</tr>
<tr>
<td>Tinsley Special Products</td>
<td>Enterprise House, Durham Lane, Eaglescliffe, Stockton-on-Tees T516 OPS</td>
<td>01642 784279</td>
</tr>
<tr>
<td>T I Protective Coatings</td>
<td>Unit 6, Lodge Bank, Crown Lane, Horwich, Bolton, Lancs, BL6 5HU</td>
<td>01204 468080</td>
</tr>
<tr>
<td>Torishima Service Solutions Europe Ltd</td>
<td>Sunnyside Works Cartshernie Road Coatbridge MLS 2DJ</td>
<td>0123642390</td>
</tr>
<tr>
<td>Transvac Systems Ltd</td>
<td>Monsal House, 1 Bramble way Alfreton, Derbyshire, DE55 4RH</td>
<td>01773 831100</td>
</tr>
<tr>
<td>Vale Protective Coatings Ltd</td>
<td>Building 1S2 - Langar North Industrial Estate, Harby Road, Langar, NG13 9HY</td>
<td>01949 869784</td>
</tr>
<tr>
<td>Walker Construction (UK) Ltd</td>
<td>Park Farm Road, Folkestone, Kent, CT19 5DY</td>
<td>01303 851111</td>
</tr>
<tr>
<td>Wardle Painters Ltd</td>
<td>Unit 5, Wimborne Building, Atlantic Way, Barry Docks, Glamorgan, CF63 3RA, UK</td>
<td>01446 748620</td>
</tr>
<tr>
<td>Wescott Coatings &amp; Training Services Ltd</td>
<td>9b/9c Tyne Point, Shaftsbury Avenue, Simonside Industrial Estate, Jarrow, Tyne &amp; Wear, NE32 3UP</td>
<td>0191 497 5550</td>
</tr>
<tr>
<td>W G Beaumont &amp; Son</td>
<td>Beaumont House, B Bernard Road, Romford RM7 DHX</td>
<td>01708 749202</td>
</tr>
<tr>
<td>William Hare Ltd</td>
<td>Brandelsholme House, Brandelsholme Road, Burys, Lancs, BL8 1JJ, UK</td>
<td>0161 609 0000</td>
</tr>
<tr>
<td>Wood Group Industrial Services Limited</td>
<td>Kirkstone House, St Omers Road, Western Riverside Route, Gateshead, Wear, NE11 9EZ</td>
<td>0191 4932600</td>
</tr>
<tr>
<td>Xervon Palmers Ltd</td>
<td>331 Charles Street, Royston, Glasgow G21 2QG</td>
<td>0141 5534040</td>
</tr>
</tbody>
</table>

Visit the ICATS website [www.icats-training.org](http://www.icats-training.org)
Tuesday 21st April 2015
ICorr Aberdeen Branch Meeting
(Joint with MCF)
Venue: 5.30pm-7.30pm Palm Court Hotel, Aberdeen.

Thursday 30th April 2015
London Branch Media, Mystery & Medicine
See page 5 of this edition of Corrosion Management for further details.

Tuesday 21st April - Friday 24th April 2015
Corrosion Control in the Oil and Gas Industry
Contact: +442030867082 or training@mobilityoilandgas.com

Monday 27th April 2015 - Friday 1st May 2015
ICorr Insulation and Passive Fireproofing Inspector training & certification courses
Argyll-Ruane Ltd. The Training and Certification Scheme Provider to the Institute of Corrosion is conducting ICorr Insulation Inspector and Fireproofing Inspector training courses 11th – 15th May, 2015 at Abu Dhabi. Both courses prepare the candidates to take the examinations at Level 2 at the end of the training programme. The combined event is organised by the ICorr International Assistant from whom further details may be obtained from icorrinter@gmail.com

Thursday 21st May 2015
ICoating Work Group Meeting
Venue: Council Chambers, Birmingham. Starting at 2pm.
Contact the secretary, Douglas Mills (douglas@hanbridge.freeserve.co.uk) or the chairman, David Horrocks (David.Horrocks@BAMNuttall.co.uk).

Thursday 21st May 2015
Afternoon visit to Elcometer Limited and Reformation of ICorr Yorkshire
This will be a fascinating opportunity to visit the worldwide head office, manufacturing and research facility with a tour of the manufacturing and demonstration areas. This visit will be followed by an Extraordinary General Meeting to reform the ICorr Yorkshire Branch committee.
Venue: Elcometer Limited, Edge Lane, Manchester M43 6BU, 1.30pm - 5pm approx.
Contact: Nigel Peterson-White
07793 710559
Email: n.peterson-white@imeche.org

Tuesday 26th May 2015
CED Working Day and Symposium on Corrosion Aspects of Asset Integrity Management and Lifetime Extension
Venue: Palm Court Hotel, 81 Seafield Road, Aberdeen, AB15 7XW
To register please complete the enclosed leaflet.

Tuesday 2nd June - Friday 5th June 2015
CECOR 2015
CECOR brings together specialists from universities, research centres, institutes and companies within:
• water, gas and oil distribution
• pipe producers and manufactures
• waste water collecting and treatment systems. The congress consists of on site and oral presentations as well as an exhibition.
Venue: The congress will take place at www.thepalmcourthotel.com
To register please complete the registration form.

Monday 11th May - Friday 15th May 2015
ICorr Insulation and Passive Fireproofing Inspector training & certification courses
Argyll-Ruane Ltd, the Training and Certification Scheme Provider to the Institute of Corrosion is conducting ICorr Insulation Inspector and Fireproofing Inspector training courses 11th – 15th May, 2015 at Abu Dhabi. Both courses prepare the candidates to take the examinations at Level 2 at the end of the training programme. The combined event is organised by the ICorr International Assistant from whom further details may be obtained from icorrinter@gmail.com

Thursday 21st May 2015
CED Working Day and Symposium on Corrosion Aspects of Asset Integrity Management and Lifetime Extension
Venue: Palm Court Hotel, 81 Seafield Road, Aberdeen, AB15 7XW
To register please complete the enclosed leaflet.

Wednesday 10th June - Thursday 11th June 2015
Knowledge Transfer – Corrosion Matters Workshop
The aim of the workshop is to provide delegates with an understanding of how information flows within industries, and how they can take other industry practices and deploy them in their own fields. This can be within a project, within industry sector or across industries.
Venue: Royal Over-Sea League (ROSL), London
To register contact: admin@icorr.org

Tuesday 7th July - Friday 10th July 2015
Corrosion Control in the Oil and Gas Industry
Details of courses:
Mobility Oil & Gas Petroleum Engineering.
Consultancy & Technical Training Services (upcoming course).
Venue: London
Contact: +442030867082 training@mobilityoilandgas.com
Mobility Oil & Gas is accredited by the British Accreditation Council for Independent Further and Higher Education as a Short Course Provider.

Monday 20th July - Friday 24th July 2015
Advanced Cathodic Protection
Details of courses:
Mobility Oil & Gas Petroleum Engineering.
Consultancy & Technical Training Services (upcoming course).
Venue: Aberdeen
Contact: +442030867082 training@mobilityoilandgas.com
Mobility Oil & Gas is accredited by the British Accreditation Council for Independent Further and Higher Education as a Short Course Provider.

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