Surface Profile Measurement

The Surface Profile Probe, part of Fischer’s materials testing range, measures blasted surfaces, enabling the user to prepare the substrate, select the cleaning method and apply the right amount of coating.

The probe is interchangeable with Fischer’s coating thickness probes and used with the FMP series of measurement handhelds to provide quick and repeatable measurements.

For coating thickness and surface profile precision and accuracy on tough jobs, turn to a Fischer instrument.

For more information, call 01590 684100
www.fischergb.co.uk
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ISSN: 13 55 52 43
I can start my article for this, the September/October 2016, issue of Corrosion Management by confirming that the ICorr office has been successfully moved from the Newton Building at the University of Northampton to our new location at Barratt House on Kingsthorpe Road in Northampton. My grateful thanks are due to Denise Aldous and Gwynneth Moore who organised and supervised the move, and our IT Support providers as they moved the desks, book shelves, computers, printers, etc. into the new office.

The office was closed at five o’clock on Thursday 1st September, the movers worked on Friday 2nd September and the office re-opened at 9.00 a.m. on Monday 5th September. The details of the new address and an early photograph can be found elsewhere in this issue.

There is still some work to complete in the new office but this can be accommodated when routine office activity allows. We now have a separate meeting room which can accommodate about 30 people and the next meeting of the ICorr Council will be held there at the end of September, so the facilities will be well tested. We have access to a good sized car park and the building security has already been christened as like Fort Knox by the removal team.

It would be remiss of me not to also thank Trevor Osborne for his work in identifying this property and making the arrangements for us to have a 12 month lease with an option on a further 12 months while we explore other options in the Northampton area.

Congratulations are due to Brian Goldie for his first issue of Corrosion Management. We have had a number of positive comments and there are further changes (improvements) planned for the next few issues.

Finally we are fast approaching the AGM, which will be held in the Birmingham City Council Chamber on 30th November 2016. I encourage ICorr members to attend this meeting if possible. The Midland Branch will be putting on a half-day event in the afternoon. More details are given below.

John Fletcher
President of the Institute of Corrosion

THE ICORR OFFICE MOVE 2016

In 2015 the University of Northampton told the Institute of Corrosion that we would have to vacate the offices we had been occupying for more than five years. They had decided that the development of the University required that the whole of the Newton Building where the ICorr offices were located would be required for the University Administration.

After some months of careful planning, the move from the Newton Building to Barratt House was successfully completed on Friday 2nd September 2016.

There is still some work to do to reorganise storage and set up the new meeting room before we can call Barratt House our new home but the office is fully functional again.

The meeting room will be used for ICorr and Correx meetings, for example for ICATS Training Seminars.

Please contact the ICorr Office for details, should you wish to hold a meeting in this facility.

The new postal address is:
ICorr, Barratt House, Kingsthorpe Road, Northampton, NN2 6EZ

The new telephone number is:
01604 438222

The ICorr website address remains as www.icorr.org

MIDLANDS BRANCH

The programme has been announced for the Branch half-day event on 30th November, to be held in the Chamberlain room & main chamber of Birmingham Council House.

Starting at 12.30 with lunch and an opportunity for networking, there will then be three technical presentations, “Pipeline coatings past and present”, Patrick Lydon, IACS Corrosion Engineering Ltd; “Managing stray current from UK rail systems”, David Buxton, Intertek Production and Integrity Insurance; and “Pipeline AC Corrosion, examples and latest thinking”, William Whittaker, Cathodic Protection Engineering Ltd. These will be followed by the Society of Environmental Engineers 2015 award for the best PRI interview for registration as a Chartered Engineer.

The day will be rounded off by the ICorr AGM between 16.40 and 18.00.

CEO COR 2018
Save the Date

The annual CEOCOR Congress in 2018 will be organised by ICorr. It has been agreed this will be held in the Crowne Plaza, Stratford upon Avon, on 15 – 18th May. A working group has been set-up to co-ordinate the Programme, the Exhibition and Sponsorship; further details will be published in up-coming magazines.
INSTITUTE NEWS

NEW SUSTAINING MEMBER

Firesafe Services (NE) Ltd specialise in the onsite application of intumescent coatings, sprayed industrial decorative coatings, floor coatings, firestopping, air sealing, soffit insulation & fireline boarding, working nationally and throughout Europe.

The whole workforce, with over 30 years of practical and theoretical experience, knowledge and expertise within the fire protection & coatings industry, is CSCS, IPAF & PASMA certificated and management are accredited with Construction Skills SMSTS, SSSTS & IOSH certificates.

COLLABORATIVE PROJECT BETWEEN SELLAFIELD LTD AND THE SUPPLY CHAIN TO HELP LOCAL UNEMPLOYED PEOPLE

Livingstone Surface Treatments Limited is working in collaboration with employability service West Cumbria Works to provide a pilot project that delivers Industrial Coating Applicator Training Scheme (ICATS) training to local unemployed people to help develop their skills, confidence and motivation.

West Cumbria Works, initiated by Sellafield Ltd, helps unemployed and underemployed people in the local area acquire the skill and experience required to find work and make the most of the career opportunities created by the tidal wave of investment and development that is set to hit West Cumbria over the next 15 years.

There are now 12 newly qualified ICATS applicators and are being given advice, input and practical help from West Cumbria Works and Eddie Blackmore, MD at Livingstone Surface Treatment.

The group received their ICATS certificates at a celebration event in August attended by representatives from Sellafield Ltd along with painting contractors including Hertel, Morgan Sindall and Kaefer who were invited to meet the individuals and talk about employment prospects.

ABERDEEN BRANCH

The next meeting of the London Branch, which is joint with The Welding Institute (TWI), is on 10th November 2016, when the speaker will be Richard Pargeter, Technology Fellow, Ferritic Steels and Sour Service, Metallurgy, Corrosion, & Surfacing Technology Group, TWI, who will talk about, “Testing in aggressive environments - a multidisciplinary approach”.

The performance of materials and joints in applications which combine challenging mechanical loading with damaging environments can be difficult to predict, and testing is often required. Providing advice, designing tests and interpreting the results requires a multi-disciplinary approach, and this presentation will cover aspects of stress corrosion, fatigue and fracture mechanics testing in aggressive environments, such as those which include hydrogen gas, sour (H₂S containing) and sweet (high CO₂) corrosive environments at a range of temperatures and pressures, hot HNO₃, HF, and combinations of these. Understanding the environments, metallurgy, welding and fracture mechanics combined with properly designed testing, allows reliable data to be generated.

As usual, the meeting will be held at the Skempton Building, Imperial College, London SW7 2BB, starting at 18.00, with light refreshments, and the presentation at 18.30 and networking at 19.30.

As usual, the meeting will be held at the Skempton Building, Imperial College, London SW7 2BB, starting at 18.00, with light refreshments, and the presentation at 18.30 and networking at 19.30.

The second meeting of the season will be on the 25th October, when the speaker will be, Eugenia Marinou - Centrica/LR, who will give a presentation on “Water Quality and Impact on Corrosion Control Decisions”.

This presentation will provide a high-level summary of the challenges associated with obtaining good quality water samples. It is not always appreciated that when a water sample is supplied for analysis numerous factors could be contributing to an erroneous composition. Case studies will be presented so as to increase awareness and encourage a more critical assessment of provided information, as the implications on corrosion control of using inaccurate water chemistry can be highly significant.

The November meeting will feature a presentation by Ian Taylor - Shell & Fraser Selfridge – TAQA, on “Failure Analysis - Don’t be let down by Corrosion!”, Paper 1 - A History of Surface Casing Failures (Shell) and Paper 2 - A Leak on a Riser within the Platform Leg – Analysis, Resolution and Lessons Learnt (TAQA).”

Both evenings start at 18.00 with the presentation at 18.30 at the usual venue, the Palm Court Hotel, 81 Seafield Rd, Aberdeen AB15 7YX.

Your local Branch meetings provide a means of staying up-to-date with what’s happening in the industry and current technology and its important that you support them. Some detailed information about up-coming meetings is given on these pages and further details can be found on the diary page and on the ‘conferences and events’ section of the Institute’s website.
The Corrosion Science Symposium for 2016, hosted by Swansea University, was held in the new Bay Campus on 5th and 6th of September.

This was the 57th Corrosion Science Symposium organised by ICorr’s Corrosion Science Division (CSD) and it was well attended with over 60 delegates from a broad group of Universities who are conducting research in the field of corrosion.

The welcome Reception and Registration took place in the Great Hall on Sunday 4th September and proved to be an excellent ice breaker. The following two days were occupied with 30 individual papers including the plenary lecture by the 2015 UR Evans Award Winner, Professor Gangloff, and a poster session.

The UR Evans Award engraved sword was presented to Professor Gangloff by the current ICorr President John Fletcher. Professor Richard Gangloff is Professor Emeritus of Material Science and Engineering at the University of Virginia. Richard Paul Gangloff (Rick) was born in Pittsburgh and educated at Lehigh University in the early 70’s. He then went to work in a research role for the General Electric Company and then Exxon Research and Engineering before moving back to university life at the University of Virginia in the mid 1980’s. Since 2005 he has been the Ferman W. Perry Professor of Engineering. His primary interest has been in the field of cracking in high performance metallic alloys due to fatigue, stress corrosion, hydrogen embrittlement and elevated temperatures.

His impressive academic CV lists more than 140 peer reviewed papers, 7 books that he has edited, 26 sets of conference proceedings to which he has contributed and he has been involved in 30 consultancy projects for a number of important organisations. He has also advised 30 MS and PhD students, several of whom are leading contributors in fatigue and fracture.

Rick has a distinguished list of awards and it is expected that the UR Evans award will find a place of prominence.

**NEW SUSTAINING MEMBER**

**VECTOR CORROSION TECHNOLOGIES LIMITED**

Vector Corrosion Technologies, a member of the Vector Construction Group, is a leading full-service supplier of corrosion mitigation products and services for reinforced concrete and masonry structures including bridges, car parks, general buildings, marine structures, masonry steel framed buildings and industrial facilities.

Vector’s expertise has been developed from over 50 years of providing innovative solutions to its clients. Through an on-going focus on research and development, the company has received numerous patents and industry awards for innovation.

Vector takes pride in offering technically advanced cost effective solutions for steel corrosion, and currently has offices in the UK, Canada, and the United States. For more information, please visit www.vector-corrosion.eu

**NEW SUSTAINING MEMBER**

**FIRESAFE SERVICES (NE) LTD**

We would like to take this opportunity to introduce our company to you.

Firesafe Services (NE) Ltd specialise in the onsite application of Intumescent Coatings, Sprayed Industrial Decorative Coatings, Floor coatings, Firestopping, Air Sealing, Soffit Insulation & Fireline boarding.

Our Managing Director, Managers and workforce have over 30 years of practical and theoretical experience, knowledge and expertise within the UK fire protection & coatings industry.

We at Firesafe Services (NE) Ltd pride ourselves in providing our clients with a first class bespoke service unparalleled within the industry.

Working nationally and throughout Europe our workforce have successfully carried out many small, medium and large projects to the satisfaction of our clients, as well as working on a sublet basis to other subcontractors within the industry who do not specialise in our field of expertise.

Firesafe Services (NE) Ltd is a very pro-active company, working hand in hand with our clients ensuring the smooth running of site operations and assisting with any technical aspects of our business.

All our workforce is CSCS, IPAF & PASMA certificated and our management are accredited with Construction Skills SMSTS, SSSTS & IOSH certificates. We ensure that all compliance is met, without compromise and with clear understanding from management level to on site operatives.
Dear Member,

The Trustees and Council of the Institute would like to invite you all to the 2016 AGM to be held on 30th November 2016 at the Council Chambers Birmingham in conjunction with a half day Midlands Branch meeting.

**Midland Branch Meeting**
12:30 - 13:25 Lunch served
13:30 – 14:40 Presentations by industry experts
15:40 – 15.10 Refreshment Break
15:50 – 16:15 Panel Discussion
16:15 – 16:30 Break.
16:30 to 16:40 Award Presentation.

**ICorr AGM**
16:40 – 18:00 ICorr AGM

**AGM Agenda**
1 Apologies for absence
2 Minutes of the previous AGM November 2015
3 President’s report
4 Treasurer’s report
5 Elections
7 Any other business

The Trustees and members of Council will be available before the meeting to answer any questions you may have regarding the Institute and its future.

Again as in the case of 2015, the Institute’s accounts, and the minutes for the November 2015 AGM, will be available via the ICorr website (www.icorr.org). Please examine them and the website in general as we would appreciate your feedback. The website will continue to be influential in increasing the Professional Membership; the perspective of non members of ICorr and as a major means of communication with membership.

Your confirmation of attendance or apology for absence at the 2016 AGM will be appreciated preferably by e-mail to admin@icorr.org

We look forward to seeing you there.

Yours faithfully,

Dr Jane Lomas
Institute of Corrosion
Honorary Secretary
Over the past two months, several new standards of relevance to our industry have been issued by ISO, and three more are under revision.

The new standards include:
- ISO 1514. Paints and varnishes – Standard panels for testing
- ISO 3248. Paints and varnishes – Determining the effect of heat


Full details can be found on the ISO website or from BSI.

The 2.7 km long suspension bridge, the longest span in Turkey (the 4th longest in the world, and 2nd longest in Europe), has been constructed in an active seismic zone. To protect, and secure safety of the bridge, involved some unique solutions.

The bridge, which opened on June 30, is 64 metres above the Marmara Sea, between Europe and Asia, and Turkey’s most active fault line is reported to pass directly through its abutments. These abutments, which rise from the water, are exposed to chloride attack which can cause severe corrosion to the reinforced concrete structure. However, according to the Construction Chemicals division of BASF, they specially developed solutions to help protect the bridge, including grout, structural repair mortar, adhesives and injection mortar to help it withstand the environmental and seismic pressures. The mortar products contained corrosion inhibitors to help defend the bridge’s reinforced concrete and the grout products assisted in securing the structure’s abutments.

The bridge was designed by COWI A/S based in Lyngby, Denmark, with earthquake resilience in mind, and ArcelorMittal Galati, located in Romania, supplied the 34,000 tons of steel required for the construction of the bridge. The bridge is named after the founder and first sultan of the Ottoman Empire, and is part of a 420-kilometre (about 261-mile) highway project that shortens the distance between Istanbul and the northwest city of Izmir by about 140 kilometre (86.9 miles) and cuts a 70-minute drive around the Izmit Gulf to just six minutes.

For all the latest news, events and debates join us on LinkedIn.
THREE STANDARDS HAVE RECENTLY BEEN UPDATED BY SSPC: THE SOCIETY FOR PROTECTIVE COATINGS

SSPC-PA 1, “Shop, Field and Maintenance Coating of Metals,” provides basic requirements for best practices for application of industrial/marine protective coatings to coated or uncoated metallic substrates. This guide is intended as a reference for specifiers and contractors in regard to the coating application and process control procedures. The scope of this standard includes specific as well as general requirements for the application of liquid coatings applied by brush, spray or roller. The main revisions include, an expanded scope that includes coated or uncoated metallic substrates in addition to steel, and a brief discussion of the importance of a contractor’s work plan as a method of project oversight and quality assurance, with supplementary resource information.

Additionally, a section has been added to address pre-application requirements clarifying that the contractor is responsible for documenting resolution of ambiguous or conflicting requirements prior to beginning the application process, verifying that the prepared surface meets project requirements for cleanliness and surface profile prior to coating application, and ensuring that ambient conditions comply with project requirements prior to coating application.

SSPC ACS-1 Standard Practice/NACE No. 13, “Industrial Coating and Lining Application Specialist Qualification and Certification,” can be used to validate or assess a candidate’s or employee’s knowledge and skills level based on qualification in a certification program. It was designed for use by personnel involved in developing such education and certification programs.

Important revisions include, adjustments to Level I, II and III qualification requirements, including demonstration of abilities, work experience and training options, and exam completion, and requirements to maintain qualification status.

SSPC-CS-23.00, “Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc, and their Alloys and Composites for the Corrosion Protection of Steel”, is a joint standard, issued by SSPC, AWS (the American Welding Society) and NACE International. It is designed for use by facility owners and specifiers, inspectors and contractors in applications of thermal spray coatings.

Also classed as AWS C2.23 and NACE No. 12, the standard establishes minimum requirements for surface preparation before thermal spray application; application of thermal spray coatings; and applications of sealers or topcoats over thermal spray coatings.

The 2016 revision of this standard includes a reorganization of the previous 2003 version, as well as the revision of requirements that have been updated since 2003. New appendices also describe optional procedures for verifying adhesion and thermal spray coating thickness, referring to SSPC-PA-2. Appendices that described or applied to procurement and contract requirements were removed in the new version of the standard.

MIDDLE EAST BASE FOR KANSAI

A Japanese paint company has announced its intentions to buy a Saudi Arabian protective coatings firm as a step to gain access to the Persian Gulf area’s energy and infrastructure industries.

Osaka-based Kansai Paint Co. Ltd. has announced that its Kansai Paint Middle East (KPME) division and subsidiary Kansai Paint Saudi Ltd. (KP Saudi) will acquire the stock of the Saudi Industrial Paint Company (SIPCO). SIPCO, located in Dammam, has a 34-year history as a protective coatings supplier and is said to be one of the largest Saudi Arabian-owned manufacturers of high-quality paints, sealants, adhesives and construction chemicals in the country.

ELCOMETER SA MOVES TO NEW PURPOSE BUILT OFFICE

Elcometer is moving its Belgian sales, service and repair centre to purpose built offices in Awans, where they will also offer technical advice and product certification.

The new address is

107 Rue Jean Lambert Defrene, 4340 Awans, Belgium.

DYCOMET OPENS NEW COLD SPRAY LABORATORY FACILITY

The first facility in the UK designed to provide application research in the developing field of cold spray technology is now fully operational. Dycomet UK Ltd, has now opened a dedicated laboratory at its Manchester site, offering services that include development consultancy and validation trialling which will enable companies to explore the advantages of the technology alongside its suitability for their own precise process requirements.

“Both our low pressure and high pressure systems provide an accurate and extremely effective means of achieving repairs, restoration, sealing and corrosion protection,” says Nick Gilfillan, Dycomet UK’s Managing Director. “In particular, the technology offers advantages where thinner, lighter and more complex components are utilised and overcomes issues such as stress, distortion and porosity that are often associated with traditional welding and thermal spraying.”

CREATING NEW BARRIERS WITH GRAPHENE

According to Applied Graphene Materials (AGM), independent testing has shown that the addition of their graphene nanoplatelets (A-GNPs) to epoxy coatings has demonstrated performance enhancements in standard anti-corrosion and barrier tests. Very small additions of A-GNPs decreased water vapour transmission rates by up to 95% and extended time to initial corrosion by more than 500%.

AGM reports that it has already entered several product development programmes and these latest results highlight the technical and commercial viability of this technology.
Corrosion Management | September/October 2016

ICONSIC STEAMSHIP BEING RESTORED TO ITS FORMER GLORY

Restoration work has started on an iconic steamship regarded as the vanguard of 1930s Scottish engineering. TS Queen Mary is being transformed into one of the UK’s largest interactive maritime exhibits with help from AkzoNobel’s Marine Coatings business.

Built in 1933 and the last of its class in the world, the 252ft vessel is set to become a five-star visitor attraction which will make a major social contribution to the City of Glasgow.

“We are proud to be involved in restoring such an iconic vessel,” said Oscar Wezenbeek, Managing Director of AkzoNobel’s Marine Coatings business. “The Queen Mary is a legacy of Scotland’s great shipbuilding industry and will be a world class example of maritime heritage conservation.”

Specialist coatings supplied by International Paint are being applied to the ship at dry dock in Greenock. When the work is complete, she will be berthed on the River Clyde at the heart of Glasgow’s Finnieston hub. Visitors will then be able to experience the heritage, design and culture of the art deco 1930s.

ARC ENERGY RESOURCES ACQUIRES CLG ENGINEERING

Gloucestershire-based Arc Energy Resources, the weld overlay cladding and fabrication specialist, has acquired precision machining company CLG Engineering, based in Stonehouse, Gloucestershire.

CLG Engineering provides CNC milling, CNC turning and assembly services to, amongst others, the oil and gas, automotive and rail industries. It is certified to ISO 9001 and has over 40 years’ engineering experience.

The acquisition means that Arc Energy Resources’ 80 employees are supplemented by CLG Engineering’s 14, to create a stronger team with a wider mix of skills. Both companies are supported by teams of experienced project managers, inspectors and welding engineers, with access to a wide range of auxiliary processes in-house, including heat treatment, NDT and CMM inspection.

COATINGS TECHNOLOGY CONFERENCE

The 12th International Scientific/Technical Conference, ACT ‘16, will be held on 8-10 November at EXPO SILESIA Exhibition Centre, Sosnowiec Poland.

The topics covered include:
- Raw Materials: polymers (resins and binders for coatings), novel pigments and fillers, colour aspects of coatings, new generation of additives and modifiers for coatings including legislation aspects
- Advanced Technologies and Environmental Aspects: waterborne, powder
- Nanotechnologies, functional coatings, rad-curing.

Applications: anticorrosive coatings, architectural coatings, automotive coatings, wood coatings

The conference will be conducted in English/Polish, with both the presentations of papers and discussions simultaneously interpreted into Polish/English.

60 papers and 10 posters will be presented by specialists from leading companies involved in coatings industry and scientists from academia and R&D institutions coming from 16 countries.

For further information contact, Ms. Anna Pajak – Chairperson of the Organising Committee, e-mail: a.pajak@implib.pl

SAVE THE DATE

PDA Europe 10th Annual Conference

7-9 November 2016

Hyatt Regency Nice Palais de la Méditerranée

Contact us
info@pda-europe.org
www.pdaeuropeconference.com

NICE IS THE PLACE TO BE THIS NOVEMBER!

Maximise your presence and increase your visibility thanks to our sponsorship and exhibit opportunities. Table top bookings benefits from one free registration.

Book your room by 6 October 2016!

PDA Europe is organising its 10th annual conference on 7-9 November 2016 in the Hyatt Regency Nice Palais de la Méditerranée in France.

The applications of Polyurea are widespread and the technology keeps on innovating and improving. This conference is a unique forum in Europe for all stakeholders of Polyurea and has been designed to discuss and present all its facets.

Three days packed with presentations, education courses, table top exhibition and networking moments!

This year parallel sessions will be organised in French.

Registration open on 1st August!

Join our LinkedIn page & help us to promote the conference on social media!
PDA Europe 10th Annual Conference
7-9 November 2016

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Contact us
info@pda-europe.org
www.pdaeuropeconference.com

Join our LinkedIn page & help us to promote the conference on social media!
Cross-country pipelines are buried for most of their length and are externally coated and provided with permanent cathodic protection (CP) systems. The provision of CP is given in several Standards, for example, ISO 15589-1 (1), BS 7361(2) and NACE SP0169 (3), and these also briefly cover cased crossings when pipelines have to cross obstacles. ISO/FDIS 16440 Petroleum And Natural Gas Industries - Pipeline Transportation Systems Design, Construction and Maintenance of Steel Cased Pipelines (presently under development) will also address the use of cased crossings filled with various materials, including cementitious grout, to support the pipeline and to provide a path for cathodic protection.

Historically, HDPE, PVC, steel and concrete casings (sleeves) have been used where the pipelines had to cross fixed obstructions, such as roads and railways. Design requirements for cased crossings / micro-tunnels to protect the carrier pipe from outside interference and to facilitate construction are given in the above Standards and also in IEGM/TTD/1 (4) and API 1102 (5). Where steel casing is used, this would be fully electrically isolated from the steel carrier pipeline, and where non-metallic (i.e. plastic) casings are used, local CP has to be applied within the casing to the steel carrier pipe. However, the use of any casing can cause operational difficulties, particularly in maintaining any seals and a non-corrosive environment within the enclosed annular space.

The current preferred method for such crossings is to use a well-coated thick-wall carrier pipe and no casing. However, construction constraints, and some Local Regulations, still require the use of casings into which the carrier pipe is inserted. The selection of the annular fill is determined with respect to the requirements for external corrosion control of the carrier pipe within the casing sleeve, plus any special requirements of the local authorities. Sealed ends with an air fill, a nitrogen fill, or a cementitious grout fill have been used where appropriate.

According to reference (4), the use of concrete casing and a cementitious grout annular fill will give the least problems in achieving external CP of the pipeline within the cased crossing. The annular space should be carefully filled with grout to avoid air voids, and prior to insertion in to a casing, holiday testing should be carried out to confirm that the external coated surface of the steel carrier pipeline is of high integrity and any coating defects have been repaired. The carrier pipe is supported on suitable spacers and pulled into the casing. The external coating on the carrier pipeline is considered to be the first line of corrosion control for the pipe within a cased crossing. Cementitious grouts are also considered to restrict the corrosion of steel because of their high pH. The presence of a cementitious grout would, therefore, be considered the second line of external corrosion control for the pipe within a cased crossing. As noted above, buried pipelines are also provided with a permanent CP system. The Design Codes allow for the CP current to be conducted across the grout layer to the external surface of the pipelines within a grouted casing, but the likelihood of current flow would depend on the cementitious grout having a suitable electrical conductivity (the inverse of electrical resistivity). The provision of external CP would be considered the third line of external corrosion control for the pipe within a cased crossing.

This article discusses an assessment of the resistivity of several samples of grout, which are used or may be used for infill at pipe crossings, and concrete as to their ability to maintain the CP current. As most cementitious material mixes are electrically conductive, then pumpability and flow become important, so the material needs to be of the correct viscosity and consistency or one ends up with voids and areas where the grout does not flow. Quality of product is important when doing this (for example 5km of fill in a three metre diameter tunnel can be a difficult thing to do correctly unless control of grout mix is exercised).

Experimental

The air temperature during the test programme ranged from 14-20°C. Volume electrical resistivity was measured using a Nilsson ‘Soil Resistance Meter’. A ‘four-pin’ Wenner type arrangement was used, generally in accordance with ASTM G57(6). The resistivity of the tap water and a 3.5% sodium chloride solution (1.30 ohm.m, and 0.31 ohm.m respectively) was measured in a MC Miller large ‘Soil Box’, of dimensions 220 mm by 40 mm by 32 mm, with an inner pin spacing of 128 mm (a proprietary make of soil resistivity measuring device used in conjunction with an earth Megger, which allows soil resistivity to be directly measured without the need for conversion or calculation). A soil box of this dimension gives a direct read out of resistivity in ohm.cm. These results were used to quantify and verify the measurements taken in the test plastic sample containers (see below), using tap water. A correction factor of 10.4 was applied to reflect the dimensional differences between the standard soil box and the grout test container.

For the grout and concrete testing, oval containers of dimensions, 180 mm by 120 mm...
23 mm of water had evaporated in 84 days and 32 mm had evaporated at the end of 112 days of the test.

**Grout and Concrete Types Tested**

Four types of mix were tested for resistivity, namely:

- Tarmac "GM4", a pre-blended cementitious grout with good pumpability properties—samples A1 to A3 (cube strength of 10 N/mm² after 28 days)
- Tarmac SP/C3 a gel-modified cementitious grout, also with good pumpability—samples B1 to B3 (cube strength of 15 N/mm² after 28 days)
- ‘Lean’ concrete mix (one sample) – sample C
- ‘Rich’-concrete mix (one sample) – sample D

The grout samples were mixed with the requisite amount of potable tap water and placed in to their respective containers. As specified by the manufacturer, the initial water content of the grout samples was 0.4 by weight.

The ‘rich’ mix concrete consisted of a normal Portland cement-aggregate ratio by weight of 1:4.5. The ‘lean’ mix concrete consisted of a cement-aggregate ratio by weight of 1:9. The aggregate used consisted of two parts ‘10 mm’ gravel to 1 part soft sand by weight. 160 g of tap water was added to 1,204 g of the ‘rich’ concrete mix (251 g cement) to give a workable mix. 122 g of water was added to 1,183 g of the ‘lean’ concrete mix (129 g cement) and gave a slightly dry mix (the ‘rich’ and ‘lean’ mixes were intended to cover the range of concrete mixes possible).

**Test Programme**

As part of the testing programme, the effect of progressive moisture loss was assessed for a period of up to 84 days. For this, three test regimes were used:

- Sample kept enclosed (container lid kept on) – samples A2 and B1
- Sample dried by evaporation - container lid removed after 7 days – samples A3, B3, C and D
- Sample enclosed then dried by evaporation (container lid removed after 28 days) – samples A1 and B2

In a longer term testing programme, the effect of further progressive moisture loss and reintroduction of moisture was assessed for a period of between 435 days and 730 days (2 years). For this, three test regimes were used:

- Sample kept enclosed (container lid kept on) – samples A2 and B1
- Sample kept wet – container lid removed – samples A3 and B2
- Sample kept part moist - removed from mould and placed on wet sand – samples C, D, A1 and B3

The seven and twenty eight days were chosen to reflect typical reporting times for concrete cube strength testing. By keeping the lid on a sample, it was assumed that the rate of water loss by evaporation would be much decreased and this could approximate to a grout in a concrete casing that was installed below ground level near the water table. The re-wetted samples were expected to be indicative of a grout in a concrete casing installed at, or below, the water table for a buried pipeline. The samples placed on wet sand were expected to be indicative of a grout installed just above the water table where the moisture in the grout would come from absorption.

After 84 days (except for samples A2 and B1), the samples were all flooded with tap water and the effect of moisture uptake was measured periodically up to 435 days. ‘Out-gassing’ was initially visually and audibly evident for all the re-wetted samples. Any excess water was drained off prior to taking the resistance readings and then poured back in to the container once the resistance reading had been taken. After 435 days, some samples were removed from their plastic mould and placed on top of wet sand, that is, water could evaporate from the side and top surfaces and could be absorbed via the sample base.

**Results and Discussion**

The results of the grout and concrete resistivity testing are given in figure 3 (up to 28 days) and in figure 4 (full results). Results are briefly summarised in Table 1.

For the first seven days, the resistivity values of the three samples of each grout type remained similar.

When the lid was removed from the relevant samples after seven days, the resistivity of the samples increased immediately when compared to that of the reference samples (lid kept on). This is presumed primarily to be due to water loss by evaporation.

When the lid was removed from the second samples after 28 days again the resistivity
of the samples began to increase when compared to that of the reference samples (lid kept on) and again this is presumed primarily to be due to water loss by evaporation.

Re-wetting the samples had an immediate effect. This is taken as being indicative that the resistivity of the grout is controlled to a large extent by its water content.

Placing the grout samples on wet sand led to a marked increase in resistivity. This is presumed primarily to be due to water loss by evaporation through the upper and side surfaces and that the rate of water absorption through the base of the sample was not sufficient to offset the overall water loss. The concrete samples were not much affected by being placed on wet sand. Presumably, they have a much better rate of water absorption.

The results of the present testing were similar to those published elsewhere (6,7,8 and 9). The resistivity of the grout samples, particularly those that were kept moist, was relatively low and all would be considered acceptable from a pipeline CP perspective.

### Conclusions

1. The resistivity of two types of grout, and the effect of moisture availability, have been assessed by testing over a 730 day (two year) period.
2. The drying out of samples led to an increase in resistivity. The addition of water to dried-out samples immediately acted to decrease the sample resistivity by significant amounts. The rate of water absorption by the grout samples placed on wet sand was not sufficiently high to maintain a low resistivity.
3. From an electrical resistivity viewpoint, the tested 'standard' and 'gel modified' grout materials would be considered acceptable for use as an annular fill on cathodically protected cross-country pipelines provided they were kept moist.

---

**Table 1: Summary of Grout and Concrete Resistivity Testing, ohm.m**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Condition</th>
<th>Initial Value</th>
<th>7 Day Value</th>
<th>28 Day Value</th>
<th>84 Day Value</th>
<th>435 Day Value (Re-wetted)</th>
<th>730 Day Value [Wet Sand]</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-A2</td>
<td>Lid on</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>21</td>
<td>388</td>
<td>588</td>
</tr>
<tr>
<td>G-A3</td>
<td>Lid off – 7 days</td>
<td>2</td>
<td>3</td>
<td>15</td>
<td>148</td>
<td>(55)</td>
<td>(43)</td>
</tr>
<tr>
<td>G-A1</td>
<td>Lid off – 28 days</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>88</td>
<td>(72)</td>
<td>[196]</td>
</tr>
<tr>
<td>GM-B1</td>
<td>Lid on</td>
<td>2</td>
<td>5</td>
<td>14</td>
<td>52</td>
<td>255</td>
<td>343</td>
</tr>
<tr>
<td>GM-B3</td>
<td>Lid off – 7 days</td>
<td>2</td>
<td>5</td>
<td>22</td>
<td>104</td>
<td>(41)</td>
<td>[171]</td>
</tr>
<tr>
<td>GM-B2</td>
<td>Lid off – 28 days</td>
<td>2</td>
<td>5</td>
<td>14</td>
<td>83</td>
<td>(46)</td>
<td>(44)</td>
</tr>
<tr>
<td>C-C</td>
<td>Lid off – 7 days</td>
<td>17</td>
<td>38</td>
<td>471</td>
<td>1,548</td>
<td>(64)</td>
<td>[64]</td>
</tr>
<tr>
<td>C-D</td>
<td>Lid off – 7 days</td>
<td>10</td>
<td>22</td>
<td>190</td>
<td>367</td>
<td>(9)</td>
<td>[16]</td>
</tr>
</tbody>
</table>

---

**Figure 3: Grout Resistivity Test Results - 28 Days**

**Figure 4: Grout Resistivity Test Results - 730 Days**
HAZARDS IN CLOSED PIPE WATER SYSTEMS

Chris Parsloe & Dr Pamela Simpson

Pre-commission cleaning of closed circuit pipework systems and the subsequent monitoring of water quality are essential in any building. The implications of getting these wrong can be severe. The resulting problems include disruption to occupants whilst systems are re-cleaned or, in the worst cases, complete closure of buildings whilst entire systems are replaced due to early failure. Although the risks associated with open systems (where the circulating water might come into contact with humans) are generally appreciated, there is less awareness of the problems that can affect closed systems.

A closed re-circulating water pipework system is one in which the water typically spends all of its time being heated, cooled and re-circulated and is not exposed to the atmosphere nor significantly depleted due to evaporation or draw-off.

All systems serving terminal devices from radiators to fan coil units or chilled beams are examples of closed systems.

Potential problems which can occur with these systems start during construction. In large buildings, heating and cooling circuits can include pipes that are over a metre in diameter. In an ideal world, these pipes would be installed in a clean, debris free condition but in practice, hard hats, beverage cans, plastic bags etc, have all been found inside these systems. If left undetected, when the pumps are switched on, these items can cause major damage to expensive boilers, chillers and pumps. Smaller particles can be just as bad, as some modern control valves have clearances of less than half a millimetre. This means that sand, grit, jointing material or welding slag can cause blockages and consequent heating or cooling dead spots. All of this debris should therefore be removed by dynamic flushing of the system during pre-commission cleaning.

Most closed re-circulating systems are constructed from carbon steel pipe, which although having the significant advantage of being both strong and cheap, in the presence of oxygen and water it will corrode rapidly. Thick walled steel pipe has some tolerance built into it and can retain its integrity for some time, but thin walled steel has less tolerance.

Dynamic flushing of pipework involves circulating highly oxygenated water through the pipes at high velocity. Hence, as we’re removing the problem of system debris we are potentially encouraging corrosion. As a result, following the dynamic flush, some form of chemical clean is usually essential to remove any corrosion products from the surfaces of steel pipes.

Corrosion process potentially controllable

In theory, once the system is put into operation, the corrosion process should be controllable. If there is no replacement of the water in the system, the oxygen in the water should gradually become depleted thereby stifling the corrosion. Furthermore, corrosion inhibitor chemicals can be added to further reduce the rate of corrosion. However, corrosion protection regimes can go wrong and water quality monitoring is therefore essential.

Whenever water is lost from a system, whether due to system modification or to replace a component, fresh oxygenated water is drawn in whilst water containing valuable corrosion inhibitor is lost. This combination can be sufficient to initiate corrosion. Inhibitor levels can drop even without water being taken out of the system. The active ingredients of
Inhibitors are used up in developing protective layers on pipes or reacting with oxygen in the water. Also, some inhibitors can provide a food source for bacteria, which can initiate severe damage in a closed system.

All natural sources of water (including mains water) contain many different types of bacteria, some of which may multiply and lead to problems within closed systems if they encounter suitable conditions for growth. Mild steel, stainless steel and copper are thought to be particularly prone to microbial influenced corrosion (MIC). MIC occurs when bacterial species colonise the metal surface. The extracellular material produced by rapidly multiplying develops into a biofilm (i.e. slime) which can produce both aerobic and anaerobic zones, where anaerobic bacteria such as sulphate reducing bacteria (SRB) can multiply. These SRBs metabolise naturally occurring sulphate in the water to produce sulphuric acid at sites on the metal surface. This results in accelerated, localised pitting corrosion and can eventually lead to perforation of the pipe.

Corrosion by SRB can cause significant damage in a closed system. The bacteria settle to become sessile bacteria. Their morphology changes and they start to attach to surfaces with pili. After this they exude a polysaccharide slime known as a biofilm. This biofilm traps bacteria, debris and nutrients forming a consortium of species including SRB. As flow rates vary, biofilm and bacteria will be dislodged, travel down the flow and recolonise in areas where flow is reduced eg deadlegs, pipe direction changes.

Other bacteria of concern are nitrate/nitrite reducing (NRB) and nitrite oxidising bacteria. These bacteria can cause rapid loss of nitrite-based corrosion inhibitor from the system and so increase the risk of electrolytic corrosion. Also, the ammonia produced by some of these bacteria when metabolising nitrite, can lead to stress corrosion cracking of brass fittings if present at significant levels.

At the pre-commission cleaning stage of any new build, it is therefore important to prevent microbial presence wherever possible and to avoid areas of low flow rate or dead legs where bacteria can settle, multiply and develop biofilms unhindered by circulating biocide chemicals.

Biocide wash

For many systems the precaution of a “biocide wash” is included as part of the pre-commission cleaning process. This involves

It is important therefore that pre-commission cleaning be carried out by properly qualified pre-commission cleaning or water treatment specialist contractors.

BSRIA Guides BG29/2012 Pre-commission cleaning of water systems and BG 50/2013 Water treatment for closed heating and cooling systems provide an explanation of the procedures, tests and monitoring regimes that need to be adopted. However, proper implementation of this guidance requires experts with a range of specialisms, including pipe system design, pre-commission cleaning, water treatment chemistry, corrosion and microbiology.

In addition, on-going monitoring of water quality should be carried out at appropriate intervals, and the results interpreted in a way that identifies potential risks as soon as they occur, so that any necessary remedial actions can be taken before problems occur.

About the authors

Dr Pamela Simpson

Dr Pamela Simpson is a Chartered Fellow of the Society of Biology, and has spent over eight years working in the speciality chemicals industry, initially as a Technical and European director of the Industrial Biocides Division of a major chemicals manufacturing and processing company. She was part of the Steering Group of BSRIA BG50/2013: Water treatment for closed heating and cooling systems.

Chris Parsloe

Chris Parsloe is joint author of the initial BSRIA guide, BG29/2012: Pre-commission cleaning of water systems, and the sole author of the three subsequent revisions. Whilst working at BSRIA, he was responsible for writing application guides on pipe system design, commissioning, and pre-commission cleaning.

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HEMPEL EPOXY LININGS MAKE FOR FASTER MAINTENANCE

With the launch of its new Hempaline Defend epoxy linings, Hempel now offers a complete range of linings for challenging applications, where heavy-duty performance and a fast return to service are essential for continued production uptime.

According to the company, the new range of linings was specifically designed for the power and oil & gas industries, to provide long-term protection for assets in challenging environments, such as bulk storage tanks, process vessels and secondary containment areas. The internal linings can protect both steel and concrete from aggressive chemicals, elevated temperatures and abrasive service conditions, and the newly launched range is available with a choice of hardeners, enabling customers to select a single-coat system that allows a vessel to be returned to service in as little as 24 hours without any drop in performance.

NEW CORROSION PROTECTION COATING FOR FASTENERS

DuPont has launched a new water-based, low VOC coating based on Teflon® PTFE for fasteners to be used in highly corrosive environments. According to the company, results of salt spray testing show excellent corrosion resistance without additional pretreatment, for example, carbon steel bolts with a zinc primer at less than 10 um and the new coating at 20 -30 um have less than 10% rusting at 3,000 hours exposure. The coating is suitable for bolts and screws made from carbon steel, special steels and aluminium used in the offshore oil & gas, chemical, and water treatment industries.

NEW RESIN FOR EPOXY-SILICONE FORMULATIONS

SiVance, LLC, a subsidiary of Milliken & Company, has introduced SiVance® C2010 resin, a reactive silicone designed to create highly durable epoxy-silicone hybrid coating formulations. Specifically, this material helps extend the flexibility and impact resistance of protective coatings used in harsh operating environments such as undersea drilling, hydraulic fracturing and chemical manufacturing. Compared to coatings made with competitive products, hybrid formulations featuring the new resin enable formulators to help their customers avoid the cracking, delamination and blistering that lead to corrosion and failure of metal pipes, tanks and equipment, concluded the company.

HIGH PERFORMANCE WATER BASED COATING

Cortec Laboratories has launched Ecoshield 386®, a water-based coating which is reported to withstand a minimum of 1,000 hours salt spray at low film thickness. It is a high-gloss clear coat, based on an acrylic system containing Cortec’s Nano VpCl® non-toxic organic corrosion inhibitors and is fast drying and easily applied by spray, dip or brush. It can be used as a DTM coating, or as part of a system, concluded the company.

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PREVENTING FURTHER CORROSION IN REFURBISHED FREIGHT ENGINE DIESEL FUEL TANKS

Over the last 200 years railway networks throughout the UK have changed significantly from the original public railway to become what many of us use today. The vast majority of passenger trains that are running today have been in operation from around 1995, however some freight engines have been in service much longer. Therefore, with such an extensive service life, these engines continuously require repair and maintenance in order to keep them running. In fact, some have been left to rack and ruin after having been stored in sidings for up to 30 or 40 years, and which have succumbed to the effects of vegetation, with corrosion taking its toll, are being salvaged and repaired. Customers often come to train refurbishment companies with salvaged vehicles to repair and restore, some will be for heritage lines, but the majority are diesel-electric freight trains which are to be reinstated to continue working along our railway lines.

One UK-based company specialises in salvaging and restoring dilapidated rail vehicles, by carrying out repairs before repainting and returning them to a new condition. Not only does this provide a cheaper alternative to purchasing new rail vehicles but it also delivers a new lease of life to many of these diesel-electric engines, which are required by the many private freight train operators due to a growth in traffic.

During the refurbishment process of these engines, the company identified a recurring problem with the diesel fuel tanks. Originally, the undersides of these steel tanks were covered with fibreglass as a protective barrier against sparks flying up from the track. Critically, moisture would enter gaps between the fibreglass and the steel tank, causing corrosion of the metal; in some instances this appeared as pitting or even perforation. Their tradition repair method comprised removal of the fibreglass by grit blasting, and welding new steel plates over the weakened areas. The majority of the diesel tanks repaired are generally in a good condition, apart from the undersides. Minor repairs, such as restoring the metal work, are more economical in the long-term than having specially designed new fuel tanks manufactured, which would be time-consuming and could delay hand-over to the customer, resulting in lost revenue. However, subsequent pressure testing revealed that welding was causing further cracks or weakness in the steel around the heat-affected zones. These weaknesses were further compounded by additional weld repairs and the numerous pressure tests required before the company was satisfied with the final outcome. This proved to be both time consuming and expensive.

The company therefore looked for alternative solutions that didn’t involve hot work, such as using a high strength adhesive to bond the new metal plate over the defects. Significantly, a solution, such as this is justified over welding or replacement because of the speed with which it can be completed. No specialist tools are needed and the adhesive can be applied in-situ at room temperature, which further promotes this method over welding and replacement. Moreover, a new tank, or even a properly welded refurbished one, will eventually succumb to the same problem of corrosion occurring between the GRP and the steel. The structural adhesive can be formulated to provide increased corrosion protection and chemical resistance properties together with electrical insulation between the new and old metal, and compared to welding, negates the potential for bi-metallic corrosion at the edges of the repair, assuring the integrity of the metal tank.

Following repair with the adhesively bonded plate, the tanks were successfully pressure tested first time. Finally, the repair area was coated with GRP and painted black, to match the remainder of the tank, restoring the diesel tanks to full working condition. This method allowed the repaired tanks to be refitted onto the rail engines far quicker, whilst also offering a long-term solution to their initial problem, and this method is now standard for all diesel fuel tank repairs in the company.

When left abandoned in sidings, trains are subjected to the effects of corrosion and vegetation.

Bottom of corroded diesel fuel tank featuring pitting and holes.

Diesel tank restored using adhesively bonded plate.

Repaired diesel tank fitted on refurbished freight engine.

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HEMPEL PRODUCTS HELP PRESERVE HISTORIC AIRSHIP HANGAR

The number one hangar at the former home of British airships, and subsequently RAF Cardington, is one of only three airship hangars in Britain to have survived from the period up to 1918, and the only in situ example of an airship hangar to have survived in Europe from the same period. It was originally built in 1916-17 by A J Main and Co of Glasgow for the Admiralty, for the accommodation of the airships R31 and R32. It has served many uses since the end of airships and is now a national heritage listed building, which was identified in 2010 as being at risk and needing restoration. The frame for the hangar is constructed from 29 sections of cast iron arches, with a latticework of flat bars to provide structural strength. Most of the structural sections are held together by rivets or round-headed bolts. The previously coated steelwork had various degrees of breakdown, from sound old coating to complete breakdown, and some steel needed replacing.

As part of the restoration programme, which started in June 2012, Hempel was selected to protect the internal steelwork structure. Parts of the external cladding were removed to give access to the internal steelwork prior to the steel skeleton being repainted. The painting contractor high pressure water washed, prepared and painted all the structural steel in compliance with English Heritage requirements.

The specification, both for the external and internal steelwork called for oil and grease to be removed by emulsion cleaning, followed by high pressure fresh water washing. Rusty and damaged areas were mechanically cleaned to ST3, according to ISO 8501-1. For the exposed external supporting members, 2 coats of Hempadur 45143, a self-priming, two-pack, polyamide cured epoxy were applied at 75 micron DFT each, followed by a 50 micron DFT glossy topcoat of Hempathane 55210, a two-pack, aliphatic isocyanate cured, acrylic polyurethane. The interior members, including staircases and roof steelwork, also had two coats of the same 2-pack epoxy at 100 micron DFT each and the polyurethane topcoat.

The refurbishment is now complete and the hangar looks as good as new and should stand for another 100 years.
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<td><strong>HBS Protective Coatings Ltd</strong></td>
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<td>T: 0191 5160634</td>
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<td><strong>Hi-Tech Surface Treatment Ltd</strong></td>
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<td>T: 023 80611789</td>
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<td>Lanarkshire Welding Co.</td>
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<td>Maldon Painting Company Ltd</td>
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<td>Specialist Painting Group Ltd</td>
<td>Unit 3 Proser House, Astore Park, Padholme Road East, Feggate, Peterborough, PE1 5XL</td>
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<td>Unit 9 The Joiners Shop, The Historic Dockyard, Chatham, Kent, ME4 4TZ</td>
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DIARY DATES 2016

Tuesday 25th October 2016
Aberdeen Branch Meeting
Chemistry - Water Quality and Impact on Corrosion Control Decisions
Palm Court Hotel (81 Seaford Rd, Aberdeen AB15 7YX) joint Meeting with TWI. Event starts at 18.00.

Tuesday 1st November 2016
Advanced Cathodic Protection Course
Presented by Dr Markus Büchler
Director of The Swiss Society for Corrosion Protection. Venue: Holiday Inn, Stratford Upon Avon, CV37 6YR.

Thursday 10th November 2016
London Branch Meeting
joint meeting with The Welding Institute (TWI)
Venue: Imperial College, Skempton Building, London SW7 2BB. Topic: Testing in aggressive environments - a multidisciplinary approach. Speaker: Richard Parrot Technology Fellow at TWI. Timings: 18.00 - Reception with light refreshments, 18.30 - Talk, 19.30 - Social and networking. Refreshments provided, 21.00 Finish. For further information please contact: icorrlondon@gmail.com or george.winning@element.com

Tuesday 22th November 2016
Aberdeen Branch Meeting
Failure Analysis (Special Event) Don’t be let down by Corrosion! Paper 1 - A History of Surface Casing Failures (Shell). Paper 2 - A Leak on a Riser within the Platform Leg – Analysis, Resolution and Lessons Learnt (TAGA). Palm Court Hotel (81 Seaford Rd, Aberdeen AB15 7YX) joint Meeting with IOM3. Event starts at 18.00.

Thursday 8th December 2016
London Branch Christmas Lunch
To be held at ROSL, London, SW1A 1LR, (The Royal Overseas League Club is situated behind the Ritz). Details to be announced.

Tuesday 31st January 2017
Aberdeen Branch Meeting
NDE - Application of Acoustic Emission to detect Corrosion and Cracking
Palm Court Hotel (81 Seaford Rd, Aberdeen AB15 7YX). Event starts at 18:00.

Tuesday 28th February 2017
Aberdeen Branch Meeting
CM - Monitoring High Temperature Corrosion Attack: correlation between Crude Corrosiveness and results from online Corrosion Monitoring.
Palm Court Hotel (81 Seaford Rd, Aberdeen AB15 7YX). Event starts at 18:00.

Tuesday 28th March 2017
Aberdeen Branch Meeting
Industrial Visit – Cosasco HQ (BOD). Latest Advances in Real-Time Monitoring and Safe Retrieval.
Cosasco at Bridge of Don, Aberdeen. Details to be advised separately. Event starts at 18.00.

Tuesday 25th April 2017
Aberdeen Branch Meeting
Cathodic Protection - Using Simulation Techniques to Help Assess CP Current Output of Buried Subsea Pipeline Anodes from Field Gradient Measurements.
Palm Court Hotel (81 Seaford Rd, Aberdeen AB15 7YX). Joint Meeting with MCF. Event starts at 18.00.

Tuesday 30th May 2017
Aberdeen Branch Meeting
Palm Court Hotel (81 Seaford Rd, Aberdeen AB15 7YX). Joint Meeting with NACE. Event starts at 18.00.

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ICORR AGM 2016
The Trustees and Council of the Institute would like to invite you all to the 2016 AGM to be held on 30th November 2016 at the Council Chambers Birmingham in conjunction with a half day Midlands Branch meeting.
Your confirmation of attendance or apology for absence at the 2016 AGM will be appreciated preferably by e-mail to admin@icor.org

Wednesday 26th October 2016
Marine Corrosion Forum meeting
Venue: Holiday Inn, Stratford Upon Avon, CV37 6YR. Presented by Dr. Markus Büchler Director of the Swiss Society for Corrosion Protection. Description: The course will cover the basics of chemistry and electrochemistry and introduce new insights into the mechanisms of CP. The presentations will be interspersed with practical exercise, including CP design and measurement.

The Course is intended for senior cathodic protection engineers active in the design, specification and performance assessment of cathodic protection systems, and will be limited to 20 attendees. For further details, and a registration form go to: www.icor.org

Wednesday 30th November 2016
EC Seminar – Anti-corrosive Coatings
Venue: Amsterdam, the Netherlands
Topics:
- How does corrosion occur?
- What surface preparation is necessary for an endurable coating?
- Which ingredients do a coating comprise and what are their roles?
- What are the current trends in corrosion protection coatings?
- What distinguishes water-borne from solvent-borne systems?
- How do self-healing coatings work?
Website: www.europen-coatings.com/Events/European-Coatings-seminars-2016/Anti-corrosive-coatings
Contact: Kristin Heuer – Kristin. heuer@vincentz.net
T: +49 511 99 10 272

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