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The President Writes

For those who don't know me I will provide a little background: I have worked in materials and corrosion for most of my life, starting off in welding and fabrication where I observed at first hand the impact of corrosion and its safety and economic implications; I was smitten and fascinated by it in equal measure. Then while studying part-time, I had the good fortune to be offered a job with Solus Schall working in their cathodic protection department with, among other industry luminaries of the time, the late Tim French-Mullen. Tim had inspired many to become involved with corrosion and its control and I was one of those fortunate people. The work was absorbing and I still consider those times to be among the happiest of my working life. I particularly enjoyed the combination of practice and theory while working on projects in the field and studying in between.

As I progressed through the various levels, working my way up from the bottom, the combination of practical knowledge and education brought the reality of what we do in corrosion control into sharp focus. It made me understand that when specifying and designing we need to take into account those who have to implement what we hand to them. It is all very well to sit behind a desk and to design and specify or to hand down instructions but such work should in the end provide the required result, i.e. corrosion mitigation that operates as required through life. In this regard I was privileged in having the opportunity to work with some of our industry’s best people who encouraged me to question, enquire and to read, and I now see how this experience shaped my everyday working life, and future. I have always known that education and training is of great importance in any industry but it is particularly so in ours where corroding assets have such profound safety and economic impact. So, with this in mind I will be making training, the dissemination of information and closer co-operation with other learned bodies of like mind among the key objectives during my two-year tenure as President.

The Institute offers a variety of outstanding courses and provides certification, to ensure that training is up to date, and that we are meeting the needs of all that take advantage of what we have available, the Institute constantly reviews and updates training courses and introduces new material. I want this to continue and furthermore to be the subject of continuous improvement so that others in the industry can also have the opportunities to do what I did and be able say in the future that they also, once having entered the corrosion control industry, have not looked back, enjoyed every minute, and given the opportunity would do the same again.

I count myself very fortunate to have progressed through the industry and to have arrived at the point where I now take up the presidency of the Institute of Corrosion, it is a great honour and I am grateful to all who have supported me in attaining this goal. In preparing my first ‘The President Writes’ for Corrosion Management I have read many of my predecessors articles and there seems to be a common thread in their first piece, i.e. a sense of pride at having attained the highest office the Institute has to offer. Like those that have filled the post before me I am also proud and will work to further the aims of the Institute and to bring the abilities in day-to-day workings for the benefit of the membership. After all, the Institute is its members first and foremost and without these worthy people we would not be the Institute of Corrosion.

Trevor Osborne,
President – Institute of Corrosion

LONDON BRANCH NEWS

The 11th October meeting of London Branch at The Naval Club was joint with the London Materials Society when a packed audience of 64 Members and guests were enlightened and entertained by guest speaker Professor Don Harrop as he accounted his globe-trotting activities in the world of corrosion control, accompanied by excellent photographicillustrations. His subject was ‘Corrosion engineering—the career with a past and a future’, and he began by relating the then pioneer researches of BP in 1917 to solve the problem of the waxing of oil in cold climates. Among others, Don covered such subjects as the corrosion of steel reinforcement in concrete, the Great Man Made River Project, events at Sullom Voe, corrosion under insulation, as well as the importance of understanding realistic design life. He mentioned the difficulties of inspection in cold climates where comfortable temperatures for working might only be available from May to August. Among the changes in the realm of off shore installations near to home is the integrity of the North Sea Forties pipeline which is fed by about 50 separate pipelines – all of which depend upon the Forties for reliable distribution. Don accentuated how different the oil and gas business is now in comparison to the past, with much more advantageous automation but increased difficulties in abstraction from sources in ever deeper water off shore, with associated dangers and added expense. He emphasised how environmental demands are becoming less and less ‘negotiable’ which adds responsibility to all in the industry with an increasing ‘blame game’ mentality. Don concluded by mentioning the importance of modern technology and the necessity to be aware of changes – and from his experiences he was confident that there is a very definite future for the corrosion engineer.
THE LONDON BRANCH GOLF DAY 2012

In June of this year The London Branch of the Institute of Corrosion held their annual golf day at the regular venue, Silvermere Golf Course in Surrey. The weather was kind, the organisers must have had a direct line to the chief controller of weather to arrange such a dry and sunny period for this important event in a summer of such wet and variable forecasts. 11 teams of 4 played the course beginning after the normal fare of Bacon Rolls, tea or coffee with a Texas Scramble for the Denso Cup (actually a very attractive trophy in bronze depicting a bag of golf clubs). In the afternoon and after lunch players took to the course for the second part of the day to play for The Len Townsend Trophy, The ICorr Shield, the Ameron Tray and prizes for the longest drive and nearest the pin. The Len Townsend Trophy as many will know is an attractive glass trophy commemorating the late Len Townsend, Len having been a stalwart of London Branch committee for many years and still very fondly remembered.

The organising ably lead by Derek Hoskins and Mike Moffat made the day a special and enjoyable event and thanks must also go to Jim Glynn for his prodigious efforts with the raffle and to Adrian Coulman for keeping us on track with the scoring in the absence of Geoff and Dawn white.

And what did the Vice President do? Well we must all do that to which we are best suited, he enjoyed the good company, the warm weather, oh and presented the prizes, all in all another very enjoyable event at Silvermere.

The winning teams and individual were:

**Texas Scramble**
- The Denso Cup: JPV Ltd.
- 18 Hole Team Stableford
  - First prize (Len Townsend Trophy): Doornbos Ltd.
  - Second prize (ICorr Shield): Asphaltic Ltd
- Best Individual Score
  - The Ameron Tray: Dave Willis (International Paints)

**Longest Drive**
- At the 8th Hole: Malcolm Gaffing (Jotun Paints Ltd.)
- Nearest the Pin
  - At the 17th Hole: Mark Hitch (Meronden Ltd)
- Consolation Prize:
  - SPC Inc.

Dear Editor

During yet another attempt to reduce the contents of my loft I came across “Metallic Structures: Corrosion and Fouling and their Prevention” by J. Newman, published in 1896.

The final chapter ends on a lighter note with a meeting between two sub-contractors meeting over a drink. One of them (rather unlikely?) breaks into song.

> Three cheers for oil and lead I say,
> They give me smoke and beer each day.
> We buy it cheap to lay on thick,
> And add some oil if’t will not stick.
> Don’t ask of what the lead is made,
> Or how much we, for it have paid,
> Or if there’s acid in the oil.
> You should not ask this son of toil.
> The driers, turps and all the rest,
> Of course are just the very best.
> We mix them till we cannot stand,
> And all the skin comes off our hand.
> We dab it on as it will go
> And thin it out to make it flow.
> Yes! On it goes, and so it must
> For we don’t care for dirt or rust.
> It’s nought to is of rust breaks through,
> For we don’t care for dirt or rust.
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Of course are just the very best.
We mix them till we cannot stand,
And all the skin comes off our hand.
We dab it on as it will go
And thin it out to make it flow.
Yes! On it goes, and so it must
For we don’t care for dirt or rust.
It’s nought to is of rust breaks through,
In pits or flakes in year or two.
Or paint falls off by night and day,
That is if we are miles away.
We care not how the paint is made,
So long as we are nicely paid.
And it has got a lovely gloss,
For that is sure to please the boss.

— Brian Tunnard
ICORR ABERDEEN BRANCH MEETING WITH THE WELD AND JOINING SOCIETY SEPTEMBER 2012

The first branch meeting of the 2012/2013 term was held as a joint meeting hosted by the Welding and Joining (WJS). Bryn Roberts of the WJS welcomed members and after a brief on safety, he introduced the guest speaker of the night. With over sixty (60) delegates in attendance, Ed Wade of Metal Ecosse stated that his presentation will cover a description of exploration/production wells, compare materials used for downhole and topside applications, describe a methodology for selecting materials and challenges facing the industry.

Ed started with a schematic drawing showing a typical configuration of downhole facilities and wells. He discussed the properties of downhole materials and compared them with equivalent topside materials. He continued by explaining the sources of downhole water and key water chemistry parameters that could influence corrosion characteristics. He expertly described typical changes in fluid properties as downhole conditions evolve from early field life to late field life and explained the differences in water wetting characteristics between oil and gas wells at various depths.

Ed explained that the application of carbon steels for low value wells was still common. He presented illustrative diagrams showing sour, mixed and sour regimes. Then using a Schaeffler chart, he explained typical considerations made for material selection in different regimes and emphasised the role economics played in the decision making process. He went on to outline limitations of models and with photographs, he presented case studies from some downhole material failures. At the end of his presentation, members from the audience asked various questions relating to use of nickel alloys, cladding, effect of erosion, high temperature and high-pressure applications etc.

The WJS chairman thanked the speaker for his presentation and reminded members of upcoming technical presentation sessions. PET booklets, Corrosion Management magazines and continuous professional development certificates were distributed to members immediately after the meeting. For information about the Aberdeen branch activities please contact our branch Secretary, Muhammad Ejaz, 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.

PRO’S & CON’S OF CURRENT OILFIELD BACTERIAL MONITORING TECHNIQUES ABERDEEN BRANCH MEETING OCTOBER 2012

Michael Horne of Intertek was the guest speaker at the October 2012 branch meeting. He started by explaining the cost implications of microbial activities in various industries and related bacteria activity to everyday observations. In relation to the oil and gas industry, he emphasised the importance of quantifying the risk of failure due to Microbiologically Influenced Corrosion (MIC) and identified sampling as a way of monitoring the system for bacteria.

Michael noted that one of the most common sampling/analysis technique used in the oil industry was the Most Probable Number (MPN) method and outlined the types of bacteria that could be identified using this technique. He explained the differences between planktonic and sessile samples explaining the importance of both. He went on to describe other culturable techniques used for quantifying bacteria populations outlining the advantages and disadvantages of various techniques. He also covered some rapid methods for identifying various microbial species. He emphasised key features of various types of molecular methods including RNA and DNA based methods such as Fluorescent In Situ Hybridization (FISH), qPCR, DGGE and pyrosequencing. He concluded his talk by outlining the positives and negatives of these techniques. A lively question and answer session followed with topics related to symptoms of MIC, mitigation techniques, external monitoring (mainly soil) etc.

Frances Chalmers thanked delegates for attending and reminded members of the Intertek microbiology and chemistry laboratory tour scheduled for March 2013. PET booklets, Corrosion Management magazines and continuous professional development certificates were distributed to members immediately after the meeting. For information about the Aberdeen branch activities please contact our branch Secretary, Muhammad Ejaz, 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.
Technical Topics No.39:
UK REPRESENTATIVES TO EFC WORKING PARTIES AND THE ICORR LIBRARY
By Douglas J Mills, Technical Secretary

A call has been put out by the EFC for technical representatives. The European Federation of Corrosion (EFC) runs over twenty working parties. At present the UK is under-represented on these working parties. We need MORE people.

The working parties with their numbers are as follows (I put the simpler name that I tend to use in brackets):

1) Corrosion and Scale Inhibition (inhibitors)
2) Corrosion by Hot Gases and Combustion Products (high temperature)
3) Nuclear Corrosion (nuclear)
4) Environment Sensitive Fracture (cracking)
5) Corrosion Mechanisms (mechanisms)
6) Computers and Education (education)
7) Electrochemical Methods (methods)
8) Marine Corrosion (marine)
9) Microbial Corrosion (microbial)
10) Corrosion of Steel in Concrete (concrete)
11) Corrosion in Oil and Gas production (oil and gas)
12) Corrosion in the refinery industry (refinery)
13) Cathodic Protection (CP)
14) Automotive Corrosion (automotive)
15) Tribo-corrosion (tribo)
16) Corrosion of Polymer materials (polymers)
17) Corrosion and Corrosion Protection of Drinking Water Systems (drinking water)
18) Corrosion of Archaeological and Heritage Artefacts (conservation)

So if your specialist interest is in any of these areas please volunteer! (Note that this (finding UK reps) is actually the responsibility of the Corrosion Coordination Group which currently has just two members IOM3 and ourselves. In respect of IOM3, The Corrosion Division of the Surface Engineering Group (current chair Bob Akid) will also be putting out a call for volunteers.

Among ICorr members (presumably most people reading this!) please can you let me, the Technical Secretary, know in the first instance (eg via e-mail) if you would like to participate. I personally have been a member of the the coatings working party (taking over from Jack Mayne) for some fifteen years, have found it very rewarding and have got to know a nice bunch of people (very kindly they ALL speak English i.e I don’t have to learn French, German etc (or more tricky Polish or Hungarian))

In terms of what this might entail it would obviously be good if you are elected to make an effort to attend the annual meeting of the working party (NOTE it is within the remit of the working parties to organise specialist technical meetings themselves from time to time eg the coatings working party has been running a successful series of workshops on Advances in Application of Electrochemical Technique to Organic Coatings (AETOC) every two years since 1999 (next one in Emmetten, Switzerland in April 2013).

There would be some support (travel costs) for nominated delegates to attend the working party meetings which normally occur within EuroCorr (it is negotiable that you get a free pass for one day at the meeting).

To other matters. In some ways it has been a sad summer with the loss of Paul McIntyre and David Scantlebury both to cancer. These two fine gentlemen were good friends of mine. Very different types of people: David an academic, Paul more of a dissemination man but both dedicated to discovering more about corrosion and how to protect against it. Stuart and I wrote about them in the last issue of CM and our thoughts go out to their families (they were both strong family men) who will still of course be grieving their loss.

On a positive note Paul’s widow Helen has very kindly donated over eighty of Paul’s technical books to the Institute of Corrosion and the institute of Materials. I have these in my possession at present (they include the Burstein-Jarman edition of Shreir and Uhlig’s Corrosion Handbook as well as number of copies of 50 years of the EFC green book)

The intention would be to make the corrosion books available at what may be a well kept secret ie the Institute of Corrosion’s small library held at Head office in Northampton. Of course these days everybody can access everything on the internet. However some people still prefer the real thing and it is the intention to include a list of the books in the Institute’s library on the web site. I should also point out that the IOM3 is based at Carlton House Terrace in central London and has an excellent library. Because the ladies at Head office do not have time to dispatch books, I think a personal pre-arranged visit to Northampton to pick up and return books would be required. Well that is it for this month. I will return to more specific technical matters in the New Year. Any comments (and particularly if you would like to represent UK on an EFC working party) please contact Douglas@harrbridge.freeserve.co.uk
This course was arranged in order that National Workers on site could receive training and gain certification in Passive Fire Protection (PFP) inspection. The course is available as a two-day version for candidates who have no qualification in painting inspection and as a one-day course for those who hold valid paint inspection certification. The course embraces both intumescent and cementitious passive fireproofing technology and deals with the materials and methodology used both on and offshore. Whilst the course covers surface preparation and material application techniques and standards, the emphasis is on quality control and the role and duties of the PFP Inspector. The ICorr Fireproofing Inspector certificate is gained only by those who pass the dedicated ‘closed-book’ examination.

At Karimun, the candidates all had painting inspector certification and attended the one-day course, sitting the PFP examination the following day.

Richard Green, the senior ICorr PFP Inspection Tutor after conducting the course said “It was good to see the enthusiasm of the candidates and I am sure all appreciated the opportunity that the KJV/Saipem initiative had given them”

The training was organized by the Argyll-Ruane Ltd, the ICorr Scheme provider to the Institute of Corrosion. The Scheme embraces an essential range of courses related to protective finishes and cathodic protection.

A company that plans to employ up to 5,000 workers in Indonesia, has requested that local administration improves business infrastructure for Karimun in Indonesia, including highways, power capacity and ports in order to help boost the company’s efficiency.

The Governor of the Riau Islands said that the project signaled the revival of the foreign direct investments in the province.

The PT Saipem fabrication yard in Karimun, Indonesia

This Fabrication Yard has joined the Gorgon Downstream Project, commencing work in Karimun.

September of last year Saipem opened their doors.

The yard hosts one of the smallest project teams, with seven KJVG team members in the yard. However, fabrication is not that small – nor is the work that the yard is completing. Covering a massive 1.6 million square metres, the recently built yard has been contracted to fabricate four jackets and four decks for the LNG Load Out jetty for Barrow Island, Australia.

Barrow Island is a well-protected nature reserve and is very well maintained. Most of the wild life there is unique and it is protected to the highest level.

The 2.15 km jetty is starting to emerge off Barrow Island with the first of 56 caissons now safely positioned on their foundations.

Most of the Deck Structure will be coated with intumescent Epoxy High Build (PFP) coatings 14 mm – 16 mm thick. It is essential that the Contractor and the Client Inspectors are Certified PFP Coating Inspectors

“I’d like to congratulate the KJV/Saipem Inspectors for achieving this English Language qualification for Passive Fire Protection successfully”.

Mark Anthony Smith
www.marksmithinspectionservices.com

Endi Siswanto
Nace Level-2 Coatings Inspector - KJV/G
Riau Islands Province, Indonesia.

For a long time I wanted to take the certification for Fireproofing inspector and Insulation Inspector under ICorr Certification Scheme. I did not know where to go, until I met Mr. Mark Antony Smith TMIET, TICorr. In Indonesia ICorr never conduct training and exams for painting inspection, insulation inspection or fireproofing inspection. There is great sense of pride for those Indonesians who pass these exams.
For all the latest news, events and debates join us on LinkedIn

Fire protection performance and pre-fire durability are critically dependent on the correct application of the systems. The Inspectors role is vital to assist applicators and Supervisors on the correct methods and correct procedures as per TMDS, MSDS. All Manufacturers of PFP have there company Inspectors that does not make them liable for malpractices. Its essential that the Applicators Inspectors are qualified to inspect PFP.

Pre-requisites for attending this course:
ICorr or an approved Painting Inspector Certification (any level) if ICorr examination is required.
Report on Eurocorr 2012

“SAFER WORLD THROUGH BETTER CORROSION CONTROL”

By Douglas J Mills

A fuller report on this conference can be found in the next four issues of the journal, Corrosion Engineering, Science and Technology published by Maney.

This year’s Eurocorr was held at the Sheraton Maslak Hotel several miles north of the centre of Istanbul. However it was readily accessible from the centre (Taksim district) using the modern metro line. The title was ‘Safer world through better corrosion control’, and it ran from the 9th to 13th September. The number of delegates was 655 which was an excellent number bearing in mind the “edge of the (European) world” location (Asia is just across the Bosphorous). There were around 360 papers orally presented and about 125 posters on display. There were twenty seven separate sessions: twenty one by working parties, one task force, one course, two workshops and two joint WP sessions. The lunches (included in the conference fee) provided on the first three days of the conference were excellent! All the active EFC held working party meetings (your correspondent attended the coatings working party meeting on the Tuesday evening representing UK). The EFC General Assembly (GA) took place during the conference on the Monday evening and your correspondent represented ICorr at that meeting. The EFC is in good state both financially and technically - the job of scientific secretary, previously held by the late Paul McIntyre, is to be split between marketing/publicity side (probable person Juliet Ippolito) and the technical side (position available). The President of the EFC is still Philippe Marcus and the incoming President (taking over in 2013) will be Lorenzo Fedrizzi (Lorenzo has been the chair of the coatings working party up to now so is well known to your correspondent). Social events included a reception on the Sunday evening, an enjoyable poster party on the Tuesday evening (your correspondent attended the coatings working party meeting on the Tuesday evening representing UK) produced by Kasia Schaefer and the conference dinner was held on a boat while cruising the Bosphorous on the Wednesday evening. Istanbul is an absolutely fascinating place to visit: people, location of the city, weather, atmosphere and architecture are all first rate. The conference was opened on the Monday by A F Cakir who was followed by Philippe Marcus. The latter gave a warm tribute to the late Scientific Secretary, Dr Paul McIntyre. After this the Cavallaro medal was presented to Yuriy Kuznetzov from the A N Framkin Institute of Physical Chemistry, Russia. He then gave short lecture followed entitled “New possibilities of inhibition of metal corrosion by organic heterocyclic compounds”. This was followed by the presentation of the Kurt Schwabe prize (best researcher under the age of 35) to R. Solmaz from Bingol University, Turkey. Dr. Solmaz gave a short address based on two lectures he was to deliver later on in the conference covering Protection of copper surfaces against acid corrosion and Investigation of thiadiazole Schiff bases as corrosion inhibitors for mild steel. This was followed by an invited plenary lecture by K. Nisansioğlu from the Norwegian University of Science and Technology, Trondheim, Norway, the title of which was, ‘Nano-film segregations in localized corrosion of aluminium alloys’. Later in the conference there were two other plenaries. The one on Tuesday was ‘Istanbul - How old is SHE – from a geochronological point of view?’ given by O. Algan from the Institute of Marine Sciences and Management, Istanbul University. Not too much corrosion (in the normal sense of the word) in this lecture but it was interesting nevertheless! And on Thursday, the plenary lecture was given by H. Terryn from Vrije Universiteit, Brussels, Belgium. His talk was entitled, ‘Interfacial bonding and deadhesion of corrosion protective coatings on metals’. This is very much in your correspondent’s field and was full of fascinating insights into this “difficult to study” area. Moving back to the conference in general, big sessions were mechanisms and methods, and coatings (your correspondent presented papers in both of these, the one in the latter session possibly being the last paper he will give at Eurocorr) with significant (larger than normal) numbers of papers in Microbial and Archaeological and Heritage artefacts sessions. Additionally, there were two workshops (Aerospace and Marine Renewable Energy), a task force on CO2 corrosion, a course on tribo-corrosion and two joint WP sessions, one on mechanisms of environmentally assisted cracking and coatings for high temperatures. Apart from the oral papers there were many very good Posters displayed (the ROM does not distinguish posters from orals). The papers from all these sessions appear on the ROM available from Dechema. There will be session reports in the first five issues of CEST coming out in 2013. Note that the next EuroCorr is being held in Estoril in Portugal from 31st August to 4th September 2013.
The Institute of Corrosion was delighted to launch its new website in November. The site has had a complete face lift offering an enhanced visitor experience for members and visitors. The design of the new site has focused on ensuring that information is easy to locate. It will also be more interactive with links to the Institute’s Linked-in group and the on-site news section which is prominently featured on the home page.

The site will be kept up to date with much more news from the Corrosion industry. Stories will be published on a regular basis ensuring that our members are kept up to date with everything that is current within the industry. These regular updates will also be posted on the Linked-in group to bring both platforms closer together. This means that members of the Linked-in group will receive an email update every time an article is published so you will never miss out on news and updates. The Linked-in group will be a vital tool in communicating with members giving us the facility to publish news and announcements instantly.

The news archive on the new website has been enhanced so visitors can now search for every article that has ever been published on the ICorr website going back to 2009. You can also submit articles for publication in either the magazine or the website by uploading a file.

We have added more functionality to the forum including the ability to quote previous posts and attach files.

The members area has been upgraded. Members who register and login can access archive issues of Corrosion Management as well as download documents, minutes and conference papers. Existing user names and password will continue to function. If you have not already registered we strongly recommend that you do so in order to take full advantage of these new services for members.

We would also welcome any feedback on the new site along with any suggestions on anything you would like to be included. We hope you enjoy using the new site and look forward to your comments.
COATING INSPECTION DATA UTILISING CLOUD COMPUTING

J F Fletcher, Elcometer Limited, Technical Support Manager

Until recently there have been two different streams of computing procedures, one for industry and another for consumers. For example, design data could be transferred using CAD-CAM systems for industry and the Internet could be used for e-commerce with consumers buying and downloading books and music. The differences between these two streams have now become blurred with the introduction of Cloud Computing, which allows file sharing to any location for very affordable fees.

The history of coating inspection processes in the field shows that seventy years ago the industry was totally dependent on skilled individuals and their ability to visually inspect for defects in the coating process. Sixty years ago, mechanical, magnetic coating thickness gauges were introduced making measurements of thickness possible in the field. These were followed by electronic gauges, initially analogue designs with moving needle meters indicating the thickness and then digital designs with the thickness displayed as a numeric value.

With the utilisation of microprocessors in the design of hand-held gauges in the late 1970’s, improved measurement accuracy was coupled with the ability to collect batches of data and print the results. Further computer-like features soon became available and were developed until the modern gauge with the large memory for readings in multiple batches, wireless data communication via Bluetooth® and data management software support became common place. These types of electronic gauges now cover a broad range of measurement parameters such as surface profile, climatic conditions, coating thickness, material thickness, gloss, viscosity, etc.

However, the provision of Cloud Computing via the Internet has again revolutionised the way data can be shared, making remote communication without a network, or even a computer, extremely simple and cost effective.

It is already clear that in the emerging markets such as Turkey and Indonesia, Africa and Europe are not far behind in making that digital switchover, as are fast-growing internet markets such as Turkey and Indonesia.”

“Games developer Rovio, which claims a billion downloads for its original Angry Birds game, had 100m downloads for its latest sequel after just three months – figures rarely attained in the history of mobile gaming.”

A method for sharing inspection data using mobile devices is required to speed communication and decision making and this can now be achieved using the Elcometer ElcoMaster™ 2.0 software. This software enables simple and quick communication between gauges and either computers running the software or mobile devices operating with Android systems and utilising the ElcoMaster for Android programme.

The Cloud allows data to be transferred, stored and accessed through an Internet provider’s hardware, without the need for a local computer. There are a number of providers such as Dropbox, Amazon Cloud Drive, Google Drive, Skydrive, etc. and these services can be accessed using both personal computers and mobile Internet capable devices.

Imagine an Inspector working at a remote site with no access to a computer network, or a number of inspectors working at different places on a large site or even on different sites, all needing to quickly communicate data to a central point. It would even be practical for several inspectors at several sites in different countries with a client in yet another country to communicate quickly and simply using the cloud drive as a commonly accessed database resource.

The inspection measurements can be taken on the structure and stored in the memory of the gauge. These readings can then be transferred from the gauge to any Smart phone or tablet using Android via the Bluetooth® communications and using the Android-based ElcoMaster™ Mobile software. This data can be e-mailed to the Cloud. The specific Cloud drive can then be accessed by any authorised device in any country on any continent to share the information, quickly, accurately and at a low cost.

Using these techniques allows inspection information to be shared instantly and therefore reporting time and costs are greatly reduced. Decision making, based on good quality information can be timely and accurate, particularly when re-working is indicated. At the end of a coating process, approval for the next stage can be quickly made, even when the client is at the other side of the world.

Bluetooth® has been preferred to Wi-Fi for the ElcoMaster™ 2.0 application because it does not suffer from the requirement to dedicate the communication link to a single task such as data transfer from a gauge to a suitable device. For example, if Wi-Fi is used to transfer data to a Smartphone with the intention of sending it to the Internet, all other Wi-Fi connections on the Smartphone, such as to a Wi-Fi hub or to a Wi-Fi headset or to a Wi-Fi hands-free system, must be completely disconnected until the transfer is complete.
The link to the Internet from the Smartphone then has to be re-established before the Cloud can be accessed. Bluetooth® can be used for multiple communications simultaneously and is password protected for security. It is also the case that the current consumption of a Wi-Fi connection in a battery powered hand-held gauge is very significantly higher than that of a Bluetooth® connection.

For protective coating inspection there are three key electronic gauges that now have Bluetooth® communications capability, the Elcometer 224 Surface Profile Gauge, the Elcometer 319 Dewpoint Meter for climatic monitoring and the Elcometer 456 Coating Thickness Gauge.

The Elcometer 224 Surface Profile Gauge is now available with a separate probe option as well as the well-known integral probe and recently a special separate probe designed for measurement on convex surfaces such as blast cleaned pipes and tank walls has been added to the gauge options.

The Elcometer 224 Surface Profile Gauge measures relative humidity (rh), air temperature (Ta), surface temperature (Ts) and calculates the dewpoint temperature (Td) and the difference between the surface temperature and the dewpoint temperature (ΔT). For safe painting of steel structures the temperature of the substrate (surface temperature) should be at least 3°C above the dewpoint temperature to ensure that water vapour from the atmosphere is not condensing on the surface of the substrate.

The Elcometer 456 Coating Thickness Gauge sets the highest standards in coating thickness measurements. Available in a range of models measuring dry film thickness on ferrous & non-ferrous metal substrates, the Elcometer 456 is even more powerful, rugged and easier to use than ever before.

For more information on ElcoMaster™ 2.0, the Elcometer 224, the Elcometer 319, the Elcometer 456 or any of the other products in the Elcometer range, contact Elcometer at sales@elcometer.com or visit our website at www.elcometer.com

About Elcometer

Elcometer is a leading manufacturer of high quality inspection equipment, with specialised divisions dedicated to coatings inspection, NDT inspection, concrete inspection and metal detection.

For information on our full range of products visit our website at www.elcometer.com or www.elcometerndt.com
ABSTRACT

During the implementation of a ‘Transits and Penetrations’ review on the Maersk Oil operated DUC fields in Denmark, the authors jointly undertook a review of the state of the industry through informal communications with a number of Asset and Maintenance Engineers from several offshore operators, discussions with Transit Seal manufacturers and also through the medium of a literature review of the subject.

It was recognised that a number of oil, gas and utility operators have reported failures and near-miss experiences on high-criticality pipework due to external corrosion, where the pipework transits through decks and bulkheads. Anecdotal evidence suggests that other Operators have experienced this too, though it has remained either ‘officially’ un-reported or considered of low significance within their management performance indicators.

This paper is based on our experience during the detailed survey of more than 1100 transit and penetration fixtures and the pipes within, including pipes from many different service types, substrate metallurgies and transit construction formats.

During the survey the authors identified more than 13% of pipework in these transit fixtures presenting an external corrosion condition beyond that considered acceptable. This condition, if allowed to continue to degrade, could result in potential loss of area or pipe contents containment, service availability or even catastrophic failure of the components.

As an indicator for other Operators or Asset Managers we have extrapolated our findings. Our suggestion is that, based on the above percentage, between 13 and 78 transits on each mature asset in the North Sea (not recently inspected) may be at significant risk of failure due to external corrosion on pipes within transits.

INTRODUCTION

The term Transits and Penetrations is most often utilised to describe the mechanism (and equipment) used to allow a service or utility (pipe or cable for example) to pass from one discrete area of a plant to another.

Typically, the term ‘Transit’ is used to describe this passage through a bulkhead and the term ‘Penetration’ to describe passage down through a deck or up through a deckhead.

Some, though not all, Transits & Penetrations have a fixture or a framework attached to the bulkhead/deck/deckhead, whilst others do nothing more than allow a pipe or other utility to pass from one area to another with no fundamental requirement for sealing or containment and without the benefit of a fixture.

For the purposes of this document we have abbreviated all further references to Transits & Penetrations to T&P.

Some of these T&P fixtures are fitted with a seal on one or both sides, the purpose of which is often to prevent fire, toxicity or water spread between discrete areas of the plant.

During early development of Strategic Corrosion Management’s RISCM toolset the authors spent considerable time analysing other management systems currently available. Some had shown limited success, and others appeared to manage only a sub-set of the integrity data we considered essential for effective and efficient asset integrity management.

In RISCM, it was therefore decided to incorporate tools to manage as many aspects of the corrosion challenge facing Asset Managers and Integrity Authorities as possible and pay specific attention to where those other systems had shown limited success.

This meant that, in addition to the typical integrity management of, for example, pipework, vessels and structure, RISCM should manage:

- Pipe Saddles & Hangers
- Flanges and Bolting
- Valves
- CUI (Corrosion Under Insulation)
- Transits & Penetrations
- Temporary Repairs

RISCM was to ensure that this data was recorded in a way that allowed complete integration with the overall management process, with full traceability and the potential to define and determine corrosion threats to the plant and allow 'intelligent' reporting that was easy to apply by all disciplines involved in corrosion, plant maintenance and asset management.

It has been a long process to bring RISCM to fruition, some of the design of which was undertaken jointly by SCM and Maersk. During its development we became aware of a huge void between what many Asset Managers believed they knew about the corrosion situation of their plant and its actual condition. In the case of T&P’s, in many instances, plant operators believed they had a safe, corrosion free (or corrosion-risk free) facility, yet in reality inspection demonstrated some very worrying results.

In the case of the Maersk DUC plant (more than 60 offshore structures), there was acceptance that pipes in transit fixtures were potentially a corrosion risk, yet there was no statistical or experiential support for a full scale review of their condition. After an initial industry review and a pilot survey of more than 100 pipe / transit fixtures the Maersk integrity management were convinced that the ‘potential’ corrosion challenge was a reality, and a broad survey of these fixtures was implemented in mid 2011.

Where T&P are sealed for whatever purpose (and in some instances simply ‘bunged’), they are thereafter rarely opened or exposed. Some suppliers of these seals have wrongly fostered the idea that they are fit-and-forget,
and this attitude, often supported by the simple design and fitting process of the seals, can easily result in unnoticed corrosion within the hidden-space of the T&P for long periods of time, up to 20+ years in the experience of the authors.

A review of the results of our findings, summarised in this paper, suggests some easily applicable basic criteria enabling operators to determine if they should have significant concerns about the T&P’s on their plant, and thereafter invoke a prioritised survey and inspection programme for confirmation and maintenance.

During the implementation of a T&P survey on a number of facilities, covering several offshore operators, it was noted that more than 10% of pipes associated with a high criticality and within T&P fixtures were in a condition beyond that deemed acceptable by the operators’ own engineering specialists and Asset Authorities. These conditions included extensive surface wastage, pitting corrosion, crevice corrosion and massive build-up of corrosion products on the substrate surface.

It should be noted that the risk associated with corrosion on pipes within T&P’s is not limited to high-criticality services, since any pipe that displays corrosion, corrosion-product build-up or substrate defects may ultimately have an effect on the T&P seal (if fitted), perhaps eventually destroying the integrity of any containment – possibly with catastrophic results.

The design, construction and installation of T&P fixtures or seals can themselves create the conditions for corrosion to occur and in some circumstances be accelerated. The mechanical task of inserting coated pipes into transit fixtures, attaching clamps, seals and bolted fitments to them and the T&P fixtures is fraught with the possibility of mechanical damage to the substrate or corrosion-preventative coatings. When that substrate is then closed away from view behind a seal or within an insulated box, for example, the potential for an integrity issue to arise during the T&P lifetime is immense.

In T&P’s, any corrosion is essentially unseen until it causes a problem and in some respects can be considered in the same way as corrosion under insulation (CUI). Both have the potential to result in corrosion-induced failure or remain unseen for long periods. T&P’s are out-of-sight and very often out-of-mind.

However, the challenge of corrosion on pipes within T&P’s is even more problematic than with CUI. With CUI there is already a body of knowledge about the mechanism and the possibility/probability of its occurrence. Additionally once the CUI is identified, the inspection of the substrate for wall thickness, for example, is ‘typically’ relatively easy and there is no real safety implication in the repair/mitigation techniques to be applied.

Despite some similarities between CUI and T&P’s, the corrosion challenge posed by T&P’s is therefore different in several ways. For example, to inspect the pipe within a T&P it must first be fully or partially dismantled and, in doing so, where the purpose of the T&P is fire protection or toxicity control, there is an extra and immediate cause for concern.

DANGERS IN INSPECTION AND MAINTENANCE PLANNING

Most plants have hundreds if not thousands of T&P’s and opening one-at-a-time is often impractical, especially where fabric maintenance or temporary/permanent repair on the pipes within is required. Planning and resourcing of the maintenance team may take some time, and the closing/re-opening of the T&P between inspection and maintenance may not then be cost-effective.

In this latter case there is often the need to have between 3 and 10 or more seals open at one time. Very careful risk management is essential to ensure that the configuration of open T&P’s will not contribute to a dangerous situation developing or negatively influence safety in any other ways, in the event of a fire, leak or flood on the plant.

Additionally, the mode of inspection of pipes within a T&P can be problematic - for example, in the case of a pipe passing through a sleeve welded to a bulkhead where the sleeve has an internal diameter of 6” and the pipe has an outer diameter of 4”. Further, if the sleeve is 10” in length with 4.5” or so protruding on each side of a single skin bulkhead, it is apparent that the inspection of the circumference of the pipe surface is difficult at best.

Whilst not insurmountable with the use of endoscopy for example, problems arise when visual inspection detects scale, corrosion products or, more importantly, gross metal loss on the pipe. In such circumstances a more definitive method of inspection is necessary, particularly to measure wall thickness though we must note that these methods can be far from reliable given the difficulty of access.

DO YOU HAVE CONTROL?

We understand that there are a number of Asset Managers who recognise the challenges T&P conditions may pose, having in place robust, logical and very efficient procedures to mitigate any corrosion.

However, of the UK North Sea Operators with whom we discussed these challenges (combining more than 200 plant assets in total) only 2 had given significant long-term consideration to T&P’s as an immediate corrosion concern, and only Maersk DUC had implemented an integrated management process, bringing the handling of T&P’s under a similar priority, selection and planning process as all their other integrity systems.

The authors were unable to identify a single Operator who had implemented a ‘harmonised’ procedure to prioritise or manage the T&P challenges across its business units or operating companies. Where processes were in place to manage T&P’s it was generally considered a local issue rather than a corporate concern and one that stands apart as a ‘specialist’ process rather than to be integrated with the overall Asset Integrity Management scheme.

For many Asset Managers, this paper may therefore bring the surprising realisation that the issue of T&P conditions is an urgent one, whilst for others it will simply be a ‘nudge’ in the direction in which they were intending to move anyway.

Financial and logistical constraints can easily sidetrack the most essential of projects so it is unsurprising that so many refineries, offshore facilities and process units have yet to recognise this particular corrosion challenge as a priority for review.

OUR SURVEY FINDINGS

The survey of T&P’s on both relatively new and more mature offshore assets in the Maersk DUC fields has been ongoing for more than 9 months (at the date of writing). Initially, the authors predicted that the survey would identify between 3% and 10% of pipes in T&P with a high criticality factor and presenting poor external corrosion condition.

Image showing the narrow gap between a T&P fixture and pipe.
However, our survey identified that there were 13.03% of high criticality pipe-fixture combinations where the condition was below that considered acceptable by the Maersk management.

The survey data considered in this paper was generated from three platforms, one from each of the fields Dan F (DFC), Gorm (GOC) and Tyra East (TEA). In total, 1192 transit fixtures, 1097 discrete pipe identities, and 1351 pipe-in-fixtures made up the actual substrates reviewed. The table below shows the calculated results and the chart shows the findings graphically.

<table>
<thead>
<tr>
<th>Criticality</th>
<th>SCFM</th>
<th>% of Line in Transit Entities</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>High</td>
<td>13.03</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
<td>52.18</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>4.66</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>9.92</td>
</tr>
<tr>
<td>Other Negligible Criticalities and Unclassified SCFM Conditions made up the remaining %</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Criticalities for Maersk are considered as a 1 to 6 classification with 1 indicating the most severe classification and 6 considered as negligible risk. All criticalities in this analysis have been developed by Maersk from a Risk Based Assessment approach. The SCFM (Surface Condition & Failure Mode) is a text based classification used to quantify the condition of the exterior of the surface. The classification runs from 0 suggesting Intact Coating Protection to 9 Corroded, Heavily Pitted (Advanced Corrosion, and finally to 10 recognising the surface as beyond recovery by the application of Fabric Maintenance techniques. The full chart is available as an appendix to this text.

These figures could be further broken down to define the types of service, process or containment areas where the risk to plants or safety would be more or less considerable, therefore allowing a much more targeted prioritisation for the survey and review of T&P’s. This type of data decomposition would be plant-specific and the authors have therefore elected not to demonstrate it in this paper.

The authors believe that these statistics will be representative of the industry in general. The Maersk facilities selected as the starting point for this survey are in no way unusual though Maersk have deployed a more in-depth integrity process than many others offshore. Operators with a less robust asset integrity regimen may find their plants at greater risk.

**WHY ARE T&P’S A CHALLENGE?**

Our experience has shown that replacement of T&P is typically considered to be the end of the inspection and maintenance process; we have seen few inspection programmes where there was an actual, ‘thorough’, planned and scheduled T&P survey.

During the ‘normal’ inspection cycles prevalent on offshore facilities, where a T&P is showing rust staining or is obviously damaged or broken, integrity personnel will often take an opportunistic approach and inspect it with follow-up maintenance where appropriate. However, where sealed T&P’s look to be in good condition from the outside – perhaps they have been painted in the last maintenance round – it is very easy to assume they are in good condition throughout.

Without the benefit of an ‘integrated’ asset management system where T&P’s are considered alongside all other facility components, their condition will continue to pose a significant threat to plant integrity.

It is easy to assume that if a fire-seal is ‘fire-safe’ there is little in the way of moisture or atmospheric contamination that can enter and contribute to possible corrosion, but that is an incorrect assumption. Often, seals are tightly attached around a pipe on one side of a transit yet completely open to the atmosphere on the other side.

This partially-open scenario can be further exacerbated when insulation, foam or silicone has been used as a ‘bung’ in the non-insulated side. Typically used to simply fill the T&P fixture this has the effect of initially allowing contamination and then trapping it in place. This is only one possible scenario and there are many others!

In some T&P’s, the use of certain substrate metallurgies, coating materials or insulation, on either the fixtures or the pipes, can create an ideal environment for CUI. This is especially so where process temperatures are within the range for possible corrosion, or temperature cycles within that range. However, because they are cosseted in a T&P they are often not even considered in a CUI inspection regimen; sometimes as a result of ignorance and at other times because the fitments and materials used are not known, undocumented or not properly understood by the asset personnel.

We have experienced many situations where T&P’s were considered a ‘factory fitment’ and, once in place, not to be touched again or at least not for many years!

Regardless of the type of T&P it is essential to ensure that it is both suitable for the service intended and that its construction is acceptable.

Further consideration should be given to the construction materials to ensure that these are not actively promoting corrosion on the T&P substrate itself, or on substrates passing through it (for example, bulkheads/decks/pipes) and, just as importantly, that the T&P seal (where fitted) retains its effectiveness, even in its current condition.

From the external condition of these seals one can see that although they appear intact they are harbouring ongoing corrosion.

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1 Removal of insulation may interfere with the process but typically has no direct effect on the safety of the plant during maintenance works – other than potentially making hot surfaces open to personnel touch or the maintenance effects of working on live lines. In some instances the ability to insert inspection equipment such as an Endoscope is feasible; however, the seal is typically broken when this is done. 2 SCFM relates to the external corrosion condition of a substrate as described in the SCFM ‘Surface Condition & Failure Mode’ chart. Appended.
We have seen a number of situations where a T&P seal looked to be in a sound condition, only to discover upon dismantling that the corrosion condition of the fittings or the transiting pipe had breached the seal and destroyed its integrity.

These types of seal-integrity breaches are often impossible to detect externally and, even though the seal may be intact, the potential for it to fail is increased simply because of the corrosion products generated within it!

This concern that the T&P seal may be damaged from the inside is especially important when an RBI or criticality-based approach is used as criteria for which items are inspected and when. This inside-out degradation scenario may be experienced even on low criticality pipe substrates, resulting in failure of the T&P seals and potentially a very much unanticipated consequential catastrophic failure of the area or pipe contents containment.

T&P's are not only about seals, however. There are a number of T&P's where there is no intrinsic value in sealing the pipe/gap interface except for the purposes of preventing water drips or continuing insulation on the bulkhead/deck or pipe itself. Some pipes also transit in some very difficult-to-reach locations – these may or may not display degradation from the available inspection vantage points.

Seals can add an extra dimension to the management and operability considerations of T&P's but they should not be considered outwith those other T&P's which may, initially, seem more mundane and less worthy of close attention.

UNDERSTANDING THE T&P

In addition to the consideration seals demand, the T&P fixture itself needs to be understood. Other than those T&P’s mentioned above (transiting area boundaries without the benefit of seals or fixtures), it is easiest to think of a T&P as a hole in a deck or bulkhead, with some type of frame or sleeve attached. The purpose of the frame or sleeve is often reinforcement of the hole or substrate it passes through. In addition, it creates an attachment point for seals if required and provides a 'kick-plate' on deck T&P's.

Some T&P will have insulation on the frame, deck/bulkhead and perhaps on the pipes as they also lead up to it. Insulation fitted to the T&P may have multiple roles including preventing the spread of fire, heat or cold to the surrounding surfaces, maintaining temperatures on the transiting pipes, personnel protection or noise control.

As a result of this design, a T&P fixture 'itself' may fail through corrosion, outwith any degradation affecting the transiting pipes. T&P seals fall into 5 broad types: Although these are the 'typical' seal types, they are not the only type of transit 'filling' that can be found. Often, T&P are discovered with unusual and/or inappropriate materials filling the gaps between pipes and fixtures, including those shown in the two images below. In these instances intumescent or cementitious materials have been used to fill the pipe/fixture gaps.

A pipe transiting from one discrete area of a plant to another without a T&P fixture.

Examples of corrosion associated with T&P's

Each seal type (and filling) can pose its own challenge with regard to potential corrosion degradation.

This paper is not exhaustive in terms of possible corrosion presentations in T&P's, rather it is based on our experience in recent surveys and, additionally, we have limited our comments to carbon steel pipes, structure and T&P fixtures.

10 Suitability of a T&P seal for a specific service is defined by the manufacturer (for example, fire, water or pressure). 11 However, some T&P have no fixture as such and no frame for support. 12 There are more types of seals available including some custom designed and fitted, but the author discusses those 'typically' found on modern plant. 13 This list is not exhaustive and there may be other presenting corrosion challenges not discussed here. 14 Capillary action is the ability of a liquid to flow in narrow spaces without the assistance of, and in opposition to, external forces like gravity.
There are much broader concerns involving potential substrate degradation when adding stainless steel, aluminium, Durasteel or fire-safe materials to the discussion and the authors have elected not to expand on these aspects in this paper.

Some of the corrosion failures we have seen presented or which can be anticipated include. 13

Crevice Corrosion:

On many seals and fillings there are bands (some installations call them clamps) attached to both the pipe and the T&P box or frame. In both these instances there is typically a small gap where the seal meets the substrate and, even when that seal is tight, there is sometimes a sufficient gap for moisture, atmospheric products and soluble salts to enter (by capillary action)\(^{14}\).

The gap between clamp and pipe is often not tight due to, for example, the nature of the shapes of the components and the obstruction of previously applied coatings. Where flexible seals or gaskets are used, the deformation during tightening the retaining clamp can lead to a small gap opening at the mouth of the seal.

Even tight clamps may become loose over time due to settling and movement of the substrates, shrinkage and aging of the gasket material, coatings degradation on the substrates and stretching of the clamp materials. This can breach the integrity of the seal itself and, in addition, allow atmospheric ingress to the sections within.

Where filler materials have been applied, any gross movement of the pipe can either fracture the filler or slightly pull the filler from the top sealing edges, resulting in the same type of gap as found with loose seals, and the possible ingress of moisture and chlorides.\(^{15}\)

The potential for crevice corrosion is high in these instances and more probable where fitting of the seal or clamp may have caused mechanical damage to the pipe or dislodged/damaged the corrosion-preventative coating originally applied.

Scale & Pitting:

Pitting can occur on both the pipes and the T&P fixture. It is often observed in the same areas as crevice corrosion and typically develops for the same reason (the condenser effect)\(^{16}\). However, this is not the only area where scale & pitting may pose a problem. Our experience shows, in this context, that pitting corrosion is primarily centred on spots of insulation contact and is also often associated with ‘field welds’\(^{17}\) which sometimes appear on pipes within the T&P fixture.

The starting point for much of this type of corrosion presentation appears to lie in damage to the corrosion preventative coatings applied to pipes originally. During the insertion of coated pipes into the transit the surface can often become damaged by, for example, scrapes and hitting the transit frames.

Scale and pitting is important to recognise during the survey process, especially where previous corrosion protection coatings have been less than optimal (with repairs undertaken during fitting or later during maintenance). We have observed that scale and pitting corrosion can advance at a very fast rate, resulting in unacceptable degradation in as little as 18 months in some instances.

Waisting\(^{18}\) - Wall Thickness Loss Around Girth:

Waisting of a pipe wall thickness (the narrowing of a pipe at a point all or most of the way around the circumference of the pipe), is often seen in mature T&P where the pipe is tightly wrapped in insulation. It can also be seen where a seal or clamp fitment was applied too loosely or has become loose due to corrosion product build-up. Removal of circumferential clamps which have been encased in insulation materials can also result in a high degree of wall thickness loss around the girth of a pipe.

Bolts can also be narrowing, particularly on, for example, pipe clamps, frame boxes, plates with gaskets and seal clips/clamps.

Dissimilar Metal:

The potential for dissimilar metal corrosion has, in most cases, been overcome by modern T&P and seals. However, seals on mature plants may use clamps, bolts, frame boxes and seal gaskets made of metal dissimilar to the T&P fixtures or the pipes within. In these instances, the integrity of the seal, the substrate or both may be compromised in light of, for example, the services and processes of the components, the operating conditions and the likelihood of surface wetting effects.

Gaskets Failing:

Gaskets on the T&P or seals can fail in a number of ways. Where there is metal content in the gaskets they can often be seen to be corroding, and where there is an opportunity for moisture or atmospheric pollutants and salts to creep under the gasket, corrosion products sometimes deform or break the gasket altogether.

CUI:

CUI is an insidious form of corrosion. In T&P’s where insulation has been used for any purpose, and the T&P/pipes/fittings are of carbon steel, some consideration should be given to the possibility of active CUI being discovered.

There are factors that limit the formation of CUI in any particular T&P and some are suggested below as a basic starting point for inspection prioritisation. However, in many instances, the content or condition of the T&P is unknown until it is exposed, so CUI should be considered an ever-present possibility in such cases.

Although we have discussed carbon steel in this section about CUI, consideration should also be given to those circumstances where the substrates are stainless steel and insulated. This is outside the scope of this paper but readers should feel free to contact the authors for further information.

Un-insulated Bands, Missing Gaskets etc.:

On many aged T&P fixtures, the gaskets, clamps and other items are poorly fitting. Often, clamps have become lose because of movement in the structure or pipes, clips have become corroded and snapped, or bolts have wasted to the point of being useless for their intended purpose. In these cases the corrosion of the parts, or fitments, in addition to the corrosion of the T&P or pipes, may cause the T&P to fail in their primary purpose.

Corrosion products develop, gaps appear and before too long the T&P no longer perform as originally designed or currently expected.
Prioritisation of inspection of the T&P can get very sophisticated indeed. On some plants the statistical results of previous inspections can offer guidance and on others there is such a deep understanding of the plant processes that this knowledge indicates the most logical and effective inspection prioritisation.

Maersk Oil in Denmark elected to begin the T&P survey on the oldest platforms and platforms where both Process and Accommodation are found. This prioritisation on the basis that failures from pipe corrosion may display the greatest impact to safe operations in these locations.

On other plants, there are some very basic criteria that Asset Managers can apply to begin to decide where they should direct their attention and which T&P’s should be inspected or reviewed and in what order.

Prioritisation is essential, after all, it may not be welcomed by plant management if T&P ‘a’ is being inspected first only to find T&P ‘b’ fails at the same time with disastrous consequences!

There is almost always a way to decide whether inspection prioritisation of T&P ‘a’, ‘b’ or ‘c’ would be most beneficial to asset integrity and safe, continued process operations.

The basic criteria suggested here is only an initial starting point and excludes outside influencing factors such as the number of facilities to be considered and the nature of the various processes etc. The authors recommend a robust holistic review plant should be implemented before prioritisations are defined.

The quickest approach, though not necessarily the most efficient, cost-effective or appropriate for all plants, is to develop a matrix showing all of the T&P’s on the plant, with further columns for the basic criteria listed below. Obviously prioritisation of T&P’s that have a pipe (or conglomeration of pipes if there is more than one in the T&P) of the highest corrosion-criticality assessed for the plant will be one target and possibly the most efficient starting point for a review. However, it should be remembered that, where even low-criticality pipes in T&P are fitted with a seal, if the degradation is sufficient to interfere with the seal, this will constitute a significant risk of area or pipe contents containment failure.

T&P fixtures should be considered one at a time and both areas where the T&P is located (both sides of a bulkhead for example) should initially be considered together, but also subsequently in groups of areas where multiple fixtures will be opened concurrently. There may be a significant risk to plant operations or safety by having a number of seals open simultaneously.

The matrix can then be completed using the following criteria as column headers:

I. Criticality of Pipework: Perhaps the most important basic criterion is the corrosion-criticality, assessed against the line within the T&P. For example, where a transiting pipe has a criticality 1 (most severe), this should have an effect on where attention is directed when considered with all of the other criteria presented in the matrix.

II. Area Containment Risk: The potential for even low-criticality pipework to corrode to the point where the seals of the T&P are compromised suggests the possibility of multiple T&P’s becoming breached simultaneously. In addition, the possibility of multiple T&P’s being opened simultaneously in the normal course of survey or inspection demands that the relationships between T&P’s be considered – and some weighting be appended to the combination of open risks (risks can easily become compounded in this scenario).

III. Not Inspected in 5 Years: Where the specific T&P has not been ‘thoroughly’ inspected within the last 5 years, confidence in the condition of that T&P should be considered LOW!

IV. Previous Inspection Confidence: Where the T&P or substrates have been inspected or surveyed in the last 5 years, some consideration of confidence in that data should be recorded. For example, where only external visual examination was performed (without the benefit of endoscopy or other tools to penetrate the inards of the T&P), confidence factors should be considered low. Similarly, where no QA or QC verification is available from initial fitting of the T&P or subsequent maintenance then, again, confidence should be considered low.

V. Temperature Ranges: It is considered most likely that corrosion will be ongoing in the temperature range of 0c to 100c – within this range the temperature allows moisture to exist on the substrate. In most circumstances (in Europe at least), corrosion would be expected to be minimal outside this temperature range.

VI. Temperature Cycling: Where a substrate is operating generally above 100c or below 0c, but the temperature is cycling through temperatures within that range, that substrate may also be at risk, and this criteria should have its own column in the matrix.

VII. Insulation on Pipe/T&P internal: Where substrates are known to be covered in insulation materials and, especially if those materials are made up of mineral wool types, the risk of accelerated corrosion is increased. A condenser effect may have allowed any moisture penetrating the seal to soak the insulation many times over, depositing large amounts of salts and other contaminants on the substrate. This should form 2 columns in the matrix, the 1st to indicate the component is insulated and the 2nd to indicate that mineral wool type of insulation has been used.

VIII. Coated with Inorganic Materials: Where the above is shown to be true (insulated substrates) then where the substrate was known to be originally coated with inorganic material (for example zinc), the potential for accelerated corrosion on the substrate should be anticipated. The phenomena of ‘polarity reversal’ is often observed where zinc-coated carbon steel is kept in a soaking environment – making the carbon steel sacrificial to the zinc – and resulting in accelerated corrosion and rapid wall thickness loss.

IX. Carbon Steel Substrate: As indicated earlier, this document primarily considers T&P and pipe substrates of carbon steel. Where other substrate metallurgies may be under review, carbon steel would be a column header as a prioritisation consideration.

Criteria Weighting

Of course, not all of the criteria suggested for this matrix will, nor should they, have the same weighting.

For example, the fact that a pipe substrate is carbon steel should be considered of less importance than criticality criteria – and therefore have a lower weighting; criticality already takes account of the consequences and probability of failure (from other risks

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19 The author has used the term ‘waisting’ to describe the circumstance where a pipe has a reduced wall thickness uniformly around its circumference, much as the waist of a person is narrower than their trunk. This term is well-known in some circles but may not be in widespread use. 20 Temperatures are noted in degrees centigrade.
Almost all plants will already have some documentation on these factors – often historical records of previous maintenance or those developed through risk-based assessments. PAS 55: 2008 ‘Asset Management’ is a Publicly Available Specification published by the British Standards Institute (BSI) the development of which was led by The Institute of Asset Management (IAM). It is anticipated that ISO 55000 documentation will replace PAS 55 during 2012/13.

Key: L = Low; H = High; Y = Yes; N = No.

Failure of T&P’s or the pipes within can have a potentially disastrous effect on plant operation and safety.

The authors’ findings may be considered surprising to some asset managers, with over 13% of high-criticality pipework in T&P fixtures demonstrating surface corrosion beyond that considered acceptable on plants typical of North Sea facilities.

Perhaps even more surprising are pipes classified with low criticality yet presenting gross external corrosion degradation and the condition of which may void the containment factors of any seals in place.

MOVING FORWARD

The authors anticipate that this paper and our findings may precipitate a response from other facility operators who currently do not have in place a program of review and inspection to manage this potential threat to facility integrity.

We believe that a ‘robust’ planned inspection regimen and a thorough understanding of the risks associated with T&P’s is essential to remain corrosion-risk-free for both new and mature plants.

However, T&P condition is only one aspect of plant integrity and it is not the intention of the authors to suggest that this should be the ‘one area of concern’ to Asset Managers, merely that without careful consideration the effect of failed T&P’s or pipes within them may be considerable.

An integrated approach to integrity and asset management is by far the most cost-effective and transparent strategy to demonstrate ‘objective evidence’ of corrosion control. That means a fully joined-up method of determining where and when challenges will occur or have occurred, and their position on a priority scale for inspection, maintenance or repair.

When all aspects of the plant integrity can be considered together (in one integrated tool) it becomes a much simpler matter to apportion time, resources and budgets to the most beneficial tasks and areas of investment, in the knowledge that there is no other missed priority waiting to ‘bite’ the unwary Asset Manager.

Ongoing developments in the concepts and methodologies being developed by SCM and adopted by Maersk in the 360 integrity approach appear to offer management opportunities most likely to succeed in the process of integration, based on the 3 key principles of the framework:

• Information
• Integration
• Intelligence

All aspects of component, corrosion and fabric maintenance can be integrated and considered as part of a homogeneous approach, offering huge benefits in terms of the management of corrosion, safety and operations and the target of becoming corrosion-risk-free.

This type of integration offers the best opportunity to implement a PAS 55: 2008 ISO 55000) compliant integrity management system with objective evidence of true corrosion control.

The authors have further identified, and in several cases tested, products to control corrosion in sealed spaces and mechanisms to manage single-sided seals and environmental containment.

Maersk Oil Denmark have introduced a ‘Comfort Seal’. This is based on the design of a Gaiter style fire-seal, to be fitted as an enclosure on a T&P opposite a ‘Fire Seal’. The Comfort Seal is made from flame retardant tarpaulin and has the double benefit of protecting the pipe in the T&P from water and dirt ingress and allows the application of other corrosion prevention techniques such as the inclusion of corrosion inhibitors etc.

<table>
<thead>
<tr>
<th>T&amp;P ID</th>
<th>Corrosion Criticality</th>
<th>Area Containment Risk</th>
<th>Inspected &gt; 5 years</th>
<th>Previous Inspection Confidence</th>
<th>Temp Oc – 100c</th>
<th>Temp Cycling</th>
<th>Insulated</th>
<th>Mineral Wool</th>
<th>Inorganic Coatings</th>
<th>Carbon Steel Substrate</th>
<th>Priority (1–6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC123</td>
<td>3</td>
<td>L</td>
<td>Y</td>
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<tr>
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<td>1</td>
<td>H</td>
<td>Y</td>
<td>L</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>1</td>
</tr>
</tbody>
</table>

Comfort Seal To be fitted to a pipe / T&P on the opposite side to a ‘Fire Seal’ where there is no requirement for a second Fire Seal.
The choice of materials with which to replace seals is changing rapidly. However, there are some methodologies of sealing which, by the nature of their format or content, have been seen to exacerbate the corrosion issue, even whilst appearing to offer cheap and effective seals in the short term.

When selecting replacement seals and materials, consideration should be given to future mechanisms of inspection and repair. For example, when removing filler materials, it is necessary to ask about the likely consequence to any corrosion protection coatings previously applied and how the filler residue will affect the inspection results or limit the inspection techniques that can be applied.

As a result of the very large workload involved in a complete and full survey of all T&P on an offshore facility, and the likely requirement for future inspections of the pipes within, the authors have developed a template process to ease the burden.

Within RISCm, the authors developed a series of templates which allow comparison of a pipe in a T&P against a known set of qualitative and quantitative criteria. This eases the inspection load and allows the process to be fast and accurate – with full reporting yet minimum document handling required from the inspection and survey personnel.

ABOUT THE AUTHORS

Ian RJ Cordingley is Managing Director of Strategic Corrosion Management and principal architect of RISCm (Risk, Integrity and Strategic Corrosion Management) with more than 30 years' experience in corrosion and corrosion prevention.

He is also the developer of the 360integrity framework with the 3 key aspirations of information, integration and intelligence.

Ian and his colleagues continue to lead a multi-disciplinary team in delivering consultancy, failure analysis, benchmarking, ‘External Corrosion Management Solutions’ and the installation of 360integrity and RISCm asset integrity control tools.

In light of our findings on typical Transits & Penetrations conditions in plants, SCM has created a set of procedures and specifications designed to make the review of T&P’s and the mitigation of inherent corrosion challenges as fast and economical as possible.

Jonathan D Madden works at Maersk Oil in Denmark, holding the position of Senior Maintenance Engineer responsible for corrosion, repair and inspection aspects of more than 60 offshore assets in the DUC (Danish Underground Consortium). Currently working in the Maersk Esbjerg base, he has more than 25 years' experience in the offshore industry, specifically in the areas of external corrosion management and development of corrosion prevention and passive fire protection coatings systems.

As a holer of FROSIO Certification, Jonathan now sits on the OGP (Oil and Gas Producers Association) coatings task force, which coordinates standards of work for external corrosion-preventative coatings in the oil and gas industry. He is responsible for Maersk Oil’s technical standards for external corrosion protection and corrosion protective coatings.

The implementation of the RISCm Transits & Penetrations management project showcases a number of aspects of integration initiated jointly between Jonathan and the SCM developers.

SOME EXAMPLE PHOTOGRAPHS

Gas tight seal apparently in good condition.

Seal removed on a PFP and insulated pipe/T&P and bulkhead.

The same pipe and T&P after the seal was removed.

Very narrow spaces.

Severe corrosion inside a T&P.

Localised mechanical damage when fitted resulting in localized accelerated corrosion on an otherwise sound pipe substrate.
The application of the SCFM standard is based on an engineering understanding of textual descriptions of substrate conditions. Each aspect of the text should be applied to the external appearance of the substrate before determining which SCFM classification is most representative of the actual condition.

Classification 0 typically relates to substrates under insulation, in transits and penetrations, under clamps and other obstructions or in locations not possible to review.

Classifications 0 – 4.9 relate to coating condition only, where there is no suggestion of corrosion (ferrous & non-ferrous substrates).

Classifications 5.0 – 5.9 relate to substrate exposure, some with metal loss (ferrous & non-ferrous substrates).

Classifications 6.0 – 9 relate to substrate exposure, with metal loss (ferrous substrates only).

Classifications 10 relates to those substrates where fabric maintenance will not restore the substrate to a usable condition without additional mechanical repair.

During the implementation of these SCFM’s it is possible (valuable) to define sub-degrees of the SCFM classification, typically applied as decimals of the main classification (shown in the above chart). For example, the difference between SCFM 7 and 8 could be classified as 7.5 (or any decimal between 7 and 7.9) where the observer considers there to be a partial progression of substrate degradation between the SCFM 7 and 8 definitions over a time period. All SCFM are intended to be degraded over a known timescale – determined by the facility, environment and maintenance mechanisms in place. The degradation from one SCFM Classification to another based on decimals (the point at which SCFM 7.x becomes automatically degraded to SCFM 8 for example) can be set form within RISCm. Further information on the application of the SCFM degree classifications is available via the SCM Surveyor Training or directly to RISCm users.

Please contact SCM for further discussion of the application of the SCFM Classifications.
DENSO BUILDS A BRAND NEW TRAINING CENTRE

Anti-corrosion and sealing specialist Winn & Coales (Denso) Ltd have just finished building and furnishing a new training centre in their London head office and factory premises.

The area comprises a highly customised workshop, primarily designed for the application and demonstration of the company’s coating and sealing products but which also includes the facility to film the demonstrations. These features are all contained within a controlled environment which is safe for visitors/spectators and can be used all year round, in any weather.

Denso are confident that the creation of this new centre will enable them to fully demonstrate the virtues of their products and systems to customers as well as being a perfect venue to hold regular training sessions for the many applicators / contractors who need to keep abreast of the latest developments in this highly specialised field.

For further information contact:  Winn & Coales (Denso) Ltd., Chapel Road, London SE27 0TR Tel: 0208 6707511. Fax: 0208 7612456 e-mail: mail@denso.net. Web: www.denso.net

ICORR COURSE PROVIDER, ARGYLL & RUANE BECOMES PART OF THE INSTITUTION OF MECHANICAL ENGINEERS

The internationally recognised non-destructive testing company ‘Argyll Ruane Group’ (ARG) has joined together with the Institution of Mechanical Engineers.

Stephen Tetlow, Chief Executive of the Institution of Mechanical Engineers said:

“Non-destructive testing is vital to an extremely broad range of engineering sectors. Aligning the world-class professional standards of our Institution with the experience and reputation of ARG in this specialist technology will bring a range of new training, inspection, certification and consultancy services both to our members and clients of ARG. I see this as not only enabling new standards and techniques across many important industries – but also helping to advance the pace of innovation in an ever-increasing range of applications”.

Martin Dawson, Founder of ARG, said:

“Merging the great strengths of the Institution of Mechanical Engineers and ARG is a strategic decision that will make our learning and development capability even stronger. As a result, we will be better able to meet the growing and changing needs of our clients in the future.

“In addition we will be able to play a wider role in the creation and sharing of knowledge to provide businesses and other organisations with leading edge, quality, technical training, consultancy and certification services in an increasingly important and universally relevant field.”

For further information contact: Ruane & T P O’Neill/Argyll-Ruane ltd. Meadowbank Road, Rotherham S61 2NF, United Kingdom Tel: +44 (0)1709 560459 Fax: +44 (0)1709 557705 Email: enquiries@ruanetpo.com web: www.argyllruane.com
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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
Beaumont House, B Bernad Road, Romford, RM7 0HX
Tel: 01708 749202  Fax: 020 85099885
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

Reader Enquiry: CM135
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>Telephone</th>
<th>Fax</th>
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<tr>
<td>ATMOS LTD</td>
<td>2136, 2138 Commercial Avenue, Perth, WA6 6JX</td>
<td>01742 333 300</td>
<td>01742 333 301</td>
<td><a href="mailto:atmos@atmosuk.co.uk">atmos@atmosuk.co.uk</a></td>
<td><a href="http://www.atmosuk.co.uk">www.atmosuk.co.uk</a></td>
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<tr>
<td>CANALWASTE</td>
<td>100 Victoria Road, Liverpool, L10 1ES</td>
<td>0151 434 4343</td>
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<tr>
<td>CERAMIC ENGINEERING LTD</td>
<td>1685, 1687, 1689 Commercial Avenue, Perth, WA6 6JX</td>
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<td>CIRCUS COATINGS LTD</td>
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<td>COATINGS INTERNATIONAL LTD</td>
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<td>COATING PROTECTION LTD</td>
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<tr>
<td>CORROSION MANAGEMENT LTD</td>
<td>21 Sedlescombe Park, Rugby, CV22 6HL United Kingdom</td>
<td>01788 816 231</td>
<td></td>
<td><a href="mailto:cox@corr-man.demon.co.uk">cox@corr-man.demon.co.uk</a></td>
<td><a href="http://www.dnv.com">www.dnv.com</a></td>
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<tr>
<td>DNV</td>
<td>Cromarty House, 67-72 Regent Quay, Aberdeen AB11 5AR</td>
<td>01224 335000</td>
<td>01224 593311</td>
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<tr>
<td>Erimus Technical</td>
<td>Erimus Technical Limited, the Study @ 62 Cirrus Drive, Shinfield Park, Reading, Berkshire, RG2 9FL</td>
<td>01843 845472</td>
<td>01843 847722</td>
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<td><a href="http://www.erimusTech.com">www.erimusTech.com</a></td>
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<td>Halcrow Group Ltd</td>
<td>Lyndon House, 62 Hagley Road, Edgbaston, Birmingham B16 8PE</td>
<td>0121 456 0644</td>
<td>0121 456 1569</td>
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<td><a href="http://www.halcrow.co.uk">www.halcrow.co.uk</a></td>
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<tr>
<td>Independent Protective Coatings Ltd</td>
<td>IPCS House, 32 Daryngton Avenue, Birchington, Kent, CT7 9PS</td>
<td>01843 845472</td>
<td>01843 847722</td>
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<td>Mott MacDonald</td>
<td>Materials &amp; Corrosion Engineering</td>
<td>0161 926 4000</td>
<td>0161 926 4103</td>
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<td><a href="http://www.mottmac.com">www.mottmac.com</a></td>
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<tr>
<td>Paint Inspection Limited</td>
<td>Trafalgar House, 223 Southampton Road, Portchester, Hampshire, PO6 4PY</td>
<td>02393 233147</td>
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<td><a href="http://www.paint-inspection.co.uk">www.paint-inspection.co.uk</a></td>
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<td>Plant Integrity Management Ltd</td>
<td>Office 7, First Floor, Newmachar Business Centre Kingseat Business Park, Newmachar, Aberdeen AB21 0UE</td>
<td>01651 863621</td>
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<td><a href="http://www.plantintegritymanagement.co.uk">www.plantintegritymanagement.co.uk</a></td>
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<td>Scaled Solutions Ltd</td>
<td>INDEPENDENT LABORATORY SERVICES</td>
<td>01506 439994</td>
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<td><a href="mailto:enquiries@ScaledSolutions.co.uk">enquiries@ScaledSolutions.co.uk</a></td>
<td><a href="http://www.scaledSolutions.co.uk">www.scaledSolutions.co.uk</a></td>
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<td>Sonomatic Ltd</td>
<td>Unit 1 Energy Development Centre, Claymore Drive, Bridge of Don, Aberdeen, AB23 8GD</td>
<td>01224 823 960</td>
<td>01224 823 871</td>
<td><a href="mailto:info@sonomatic.com">info@sonomatic.com</a></td>
<td><a href="http://www.sonomatic.com">www.sonomatic.com</a></td>
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<tr>
<td>National Oilwell Varco Pte Ltd</td>
<td>161 Pioneer Road, Singapore, 639604</td>
<td>(65) 6264300</td>
<td>(65) 6262 1853</td>
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<td>Steel Protection Consultancy Ltd</td>
<td>PO Box 6386, Leighton Buzzard, Beds. LU7 6BX</td>
<td>01525 852500</td>
<td>01525 852502</td>
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<td>Topleine Limited</td>
<td>40 Birabi Street, GRA Phase 1, Port Harcourt, Rivers State, Nigeria</td>
<td>084 46238</td>
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<tr>
<td>Wood Group Integrity Management</td>
<td>Compass Point, 79-87 Kingston Road, Staines, Middlesex, TW18 1DT</td>
<td>01708 417225</td>
<td>01784 417283</td>
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<td>Environment Agency</td>
<td>Thames Barrier Operational Area, Eastmoor Street, Charlton, London SE7 BLX</td>
<td>0208 3054146</td>
<td>0208 8547546</td>
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<td>Forth Estuary Transport Authority</td>
<td>Forth Estuary Transport Authority</td>
<td>0131 319 1699</td>
<td>0131 319 1903</td>
<td><a href="mailto:customer.care@forthroadbridge.org">customer.care@forthroadbridge.org</a></td>
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<tr>
<td>SSE Ltd</td>
<td>Grampian House, 200 Dunkeld Road, Perth PH1 3GH</td>
<td>01738 456000</td>
<td>01738 456647</td>
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<td>BREWERS PROTECTIVE COATINGS</td>
<td>Reform Rd, Maidenhead, Berkshire SL6 8DA</td>
<td>01628 784964</td>
<td>01628 672578</td>
<td><a href="mailto:info@brewersprotectivecoatings.co.uk">info@brewersprotectivecoatings.co.uk</a></td>
<td><a href="http://www.brewersprotectivecoatings.co.uk">www.brewersprotectivecoatings.co.uk</a></td>
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SUPPLIERS GENERAL

TORISHIMA SERVICE SOLUTIONS
Sunnyside Works, Gartsherrie Road, Coatbridge ML5 2DJ
Tel: 01236 442391
Fax: 01236 702875
Website: www.torishima.eu

DOORBOS EQUIPMENT
Tel: 01642 673391 Fax: 01642 673210
Email: sales@doornbosequipment.co.uk
Website: www.doornbosequipment.co.uk

FERNOX
MAKES WATER WORK
Cookson Electronics, Forsyth Rd, Woking, Surrey GU21 5RZ
Tel: 01483 793200 Fax: 01483 793201 www.fernox.com

FM CONWAY LTD
Conway House, Rochester Way, Dartford, Kent DA1 3QY
Tel: 0208 6368822 Fax: 0208 6368827
Email: sharon.howlett@fmconway.co.uk

GMA GARNET (EUROPE) GMBH
PO Box 9, Middlewich, Cheshire, CW10 9FD
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www.gmagarnet.co.uk

INTERTEK COMMERCIAL MICROBIOLOGY LTD
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Website: www.intertek.com

JETCHEM SYSTEMS LIMITED
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Email: sales@jetchem.com Website: www.jetchem.com

METACOR
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www.metacor.co.uk

ROLLED ALLOYS LTD
Park Works, Newton Heath, Manchester M40 2BA
Tel: 0161 9544213 Fax: 0161 2054739

SCANGRIT
Eastfield Road, South Killingholme, Immingholme, Immingham, North Lincs DN40 3NF
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Email: sales@scangrit.co.uk Website: www.scangrit.co.uk

STORK TECHNICAL SERVICES UK LTD
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Website: www.storktechnicalservices.com

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Website: www.uk-finishing.org.uk

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Website: www.intertek.com

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Tel: 01224 706062 Fax: 01224 706012
Email: cmlenquiries@intertek.com
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Email: cmlenquiries@intertek.com
Website: www.intertek.com

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www.metacor.co.uk

ROLLED ALLOYS LTD
Park Works, Newton Heath, Manchester M40 2BA
Tel: 0161 9544213 Fax: 0161 2054739
**ICATS REGISTERED COMPANIES**

**ICATS REGISTERED COMPANIES WITH QUALIFIED APPLICATORS**

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<tr>
<th>Company Name</th>
<th>Address</th>
<th>Telephone</th>
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<tr>
<td>Alfred Bagnall &amp; Sons</td>
<td>6 Manor Lane, Shipley, West Yorkshire, BD18 3RD</td>
<td>01302 853259</td>
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<tr>
<td>APB Construction (UK)</td>
<td>First Floor Offices, Grange Business Centre, River Works, Grange Lane, Sheffield, S5 0DP</td>
<td>01709 541000</td>
</tr>
<tr>
<td>APB Group Limited</td>
<td>Ryandra House, Ryandra Business Park, Brookhouse Way, Cheadle, Staffordshire, ST10 1SR</td>
<td>01538 755377</td>
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<tr>
<td>Armourcote Surface Technology Plc</td>
<td>15/17 Colvilles Place, Kelvin Industrial Estate, East Kilbride, Scotland, G75 0PZ</td>
<td>01355 248223</td>
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<tr>
<td>Austin Hayes Ltd</td>
<td>Carlton Works, Cemetry Road, Yeadon, Leeds, LS19 7BD, UK</td>
<td>0113 250 2255</td>
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<tr>
<td>B&amp;A Contracts Ltd</td>
<td>Dale Road, Hubberston, Milford Haven, Pembrokeshire SA73 3PR</td>
<td>01646 693489</td>
</tr>
<tr>
<td>BAE Systems Surface Ships Support ltd</td>
<td>Room 213, Naval Base Headquarters, Building 1/100, PP127, Portsmouth</td>
<td>0115 963 2901</td>
</tr>
<tr>
<td>BAE Systems Surface Ships Support ltd</td>
<td>100, PP127, Portsmouth, PO1 3LS</td>
<td>023 9215800</td>
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<tr>
<td>Barrier Ltd</td>
<td>Stephenson Street, Wallsend, Tyne &amp; Wear, NE28 6UE, UK</td>
<td>0191 262 0510</td>
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<tr>
<td>Beever Limited</td>
<td>Little Coldharbour farm, Tong Lane, Lamberhurst, Kent, TN3 8AD, UK</td>
<td>01892 890045</td>
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<tr>
<td>Ben Fallows Painting &amp; Decorating Ltd</td>
<td>72 Broadgate Lane, Deeping St James, Peterborough, PE6 8NN</td>
<td>01778 343391</td>
</tr>
<tr>
<td>Briton Fabricators Ltd</td>
<td>Watnall Road, Hucknall, Notts, NG15 6EP</td>
<td>0115 963 2901</td>
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<tr>
<td>Cape Industrial Services</td>
<td>Cape House, 3 Red Hall Avenue, Paragon Business Village, Wakefield, WF1 2UL</td>
<td>01224 215800</td>
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<td>Carrodus Contractors Ltd</td>
<td>Unit 134, Medway Enterprise Centre, Enterprise Close, Strood, Kent, ME2 4SY</td>
<td>01634 271786</td>
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<td>Cleveland Bridge UK Ltd</td>
<td>Cleveland House, Yarm Road, Darlington, DL1 4DE</td>
<td>01325 502345</td>
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<tr>
<td>Coating Services Ltd</td>
<td>Partington Street, Mumps Bridge, Oldham, OL1 3RU, UK</td>
<td>0161 665 1998</td>
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<tr>
<td>Collis Engineering Railway Contractors</td>
<td>Salcombe Road, Meadow Lane Industrial Estate, Alfreton, Derbyshire, DE5 7RG</td>
<td>01773 833255</td>
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<tr>
<td>Community Clean</td>
<td>11 Old Forge Road, Ferndown Industrial Estate, Ferndown, Wimborne, Dorset, BH21 7RJ, UK</td>
<td>01455 6850133</td>
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<td>Corrocoat</td>
<td>Forster Street, Leeds, LS10 1PW</td>
<td>01132760760</td>
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<td>Denholm Industrial</td>
<td>21 Boden Street, Glasgow, G40 3PU</td>
<td>0141 445 3939</td>
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<td>Donyal Engineering Ltd</td>
<td>Hobson Industrial Estate, Burnopfield, Newcastle Upon Tyne NE16 6E</td>
<td>01207 270909</td>
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<td>E P Painting Ltd</td>
<td>Rossfield Road, Rossfield Trading Estate, Elesmere Port, Cheshire CH65 3AW</td>
<td>0151 355 8141</td>
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<tr>
<td>F A Clover &amp; Son</td>
<td>Bardolph Road, Richmond, Surrey, TW2 2LH</td>
<td>0208 948 6321</td>
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<td>Ferrous Protection Ltd</td>
<td>Hanson House, Grains Road, Delph, Oldham OL3 5RN</td>
<td>01457 873419</td>
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<td>Forth Estuary Transport Authority</td>
<td>Forth Road Bridge, Administration Office, South Queensferry, EH30 9SF</td>
<td>0131 319 1699</td>
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<td>GABRE (UK) Ltd</td>
<td>9 Holme Road, Dromore, Omagh, Co Tyrone, BT78 3BX</td>
<td>02882 897950</td>
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<td>GPL Special Projects Ltd</td>
<td>PO Box 516, Salford, M5 0BY</td>
<td>0161 7457888</td>
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<tr>
<td>H&amp;H Painting Contractors Ltd</td>
<td>4 Hamilton Gardens, Mutley, Plymouth, PL4 6PQ</td>
<td>07837 382619</td>
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<td>Harssco Infrastructure Services Ltd</td>
<td>Unit 3 Manby Road, South Killingholme, Immingham, North Lincolnshire, DN40 3DX</td>
<td>01469 553800</td>
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<td>Harrisons Engineering Lancashire Ltd</td>
<td>Judge Wilmy Mill, Longworth Road, Billington, Clitheroe, Lancashire, BB7 9TP</td>
<td>01254 823993</td>
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<td>HBS Protective Coatings Ltd</td>
<td>40 Mansie Road, Belfast BT8 6SA</td>
<td>028 90708280</td>
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<td>Herrington Industrial Services Ltd</td>
<td>Crown Works, Crown Road, Low Southwick, Sunderland SR3 2BS</td>
<td>0191 5160634</td>
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<tr>
<td>Hi-Tech Surface Treatment Ltd</td>
<td>Unit 8, Deacon Trading Estate, Chickenhall Lane, Eastleigh, Hants SO50 6RP</td>
<td>023 80611789</td>
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<td>Hyspec Services Ltd</td>
<td>Unit 3 Meadowfield Industrial Estate, Cowdenbeath Road, Burntisland, Fife, KY3 0LH</td>
<td>01592 874661</td>
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<tr>
<td>Industrial Coating Services</td>
<td>5 Danesbury Crescent, Kingstanding, Birmingham, B44 0QP</td>
<td>0121 384 2266</td>
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<tr>
<td>Industrial Painting</td>
<td>48-49 RCM Business Centres, Sandbeds Trading Estate, Dewsbury Road, Ossett, WF5 9ND</td>
<td>01924 272606</td>
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<tr>
<td>International Energy Services Ltd</td>
<td>94 Awolowo, Ikoyi, Lagos State, Nigeria</td>
<td>014615636</td>
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<tr>
<td>Interserve Industrial</td>
<td>Unit 2, Olympic Park, Poole Hall Road Elssmere Port, Cheshire, CH66 1ST</td>
<td>0151 3737660</td>
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<tr>
<td>J Murphy &amp; Sons Ltd</td>
<td>Hiview House, Highgate Road, London NW5 1TN</td>
<td>01592 272416</td>
</tr>
<tr>
<td>Jack Tighe Coatings</td>
<td>Sandall Lane, Kirk Sandall, Doncaster, DN3 1QR</td>
<td>01302 880360</td>
</tr>
<tr>
<td>Jack Tighe Ltd</td>
<td>Redbourne Mere, Kirton Lindsey, Gainsborough, Lincs, DN21 4NW, UK</td>
<td>01652 640003</td>
</tr>
<tr>
<td>JPV (Painters) Ltd</td>
<td>Unit 8 Prospect Way, Hutton Industrial Estate, Brentwood, Essex, CM13 1XA, UK</td>
<td>01277 201515</td>
</tr>
<tr>
<td>Lanarkshire Welding Co.</td>
<td>82 John Street, Wishaw, Lanarkshire, ML2 7TQ</td>
<td>01698 264271</td>
</tr>
<tr>
<td>Mabey Bridge Ltd</td>
<td>Station Road, Chepstow, Monmouthshire NP16 SYL</td>
<td>01291 623801</td>
</tr>
<tr>
<td>Maclean &amp; Spiers Blasting Ltd</td>
<td>Unit D, East Fulton Farm, Darlulith Road, Linwood, Paisley PA3 3TP</td>
<td>01505 324777</td>
</tr>
<tr>
<td>MCL Coatings Ltd</td>
<td>Pickering’s Road, Halebank Industrial Estate, Widnes, Cheshire, WA8 8XW</td>
<td>0151 423 6166</td>
</tr>
<tr>
<td>NSG UK Ltd</td>
<td>Fourth Avenue, Deeside Industrial Park, Deeside, Flintshire CH5 2NR</td>
<td>01244 833138</td>
</tr>
<tr>
<td>N L Williams Group Ltd</td>
<td>Westside Industrial Estate, Jackson Street, St. Helens, Merseyside WA9 3AT</td>
<td>01744 26526</td>
</tr>
<tr>
<td>Northern Protective</td>
<td>16 High Reach, Fairfield Industrial Estate, Bill Quay, Gateshead, Tyne &amp; Wear, NE10 0UR</td>
<td>0191 438 5555</td>
</tr>
<tr>
<td>Nusteel Structures</td>
<td>Lympe Industrial Estate, Lympe, Hythe, Kent, CT21 4LR</td>
<td>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>+356214244410</td>
</tr>
<tr>
<td>Opus Industrial Services</td>
<td>Ethan House, Royce Avenue, Cowpen Industrial Estate, Burringham, TS23 4BX, UK</td>
<td>01642 371850</td>
</tr>
<tr>
<td>Ormac Coatings Ltd</td>
<td>Newton Chambers Road, Thornciffe Park Estate, Chapeltown, Sheffield, S55 2PH</td>
<td>0114 246 1237</td>
</tr>
<tr>
<td>P&amp;R Engineering Ltd</td>
<td>Unit 50/51 Cable Street, Wolverhampton, WV2 2HX</td>
<td>01902 870637</td>
</tr>
<tr>
<td>Paintel Ltd</td>
<td>Trianon, Westover, Ivybridge, Devon, PL21 9H</td>
<td>01752 719 011</td>
</tr>
<tr>
<td>PCM Nigeria Plc</td>
<td>99 Rivoc Road Trans Amadi, Port Harcourt, Rivers State, Nigeria</td>
<td>+2348055297828</td>
</tr>
<tr>
<td>P &amp; H Shotblasting &amp; Spraying Services</td>
<td>43a Drumraine Road, Castlecaulfield, Dungannon, Co Tyrone, BT70 7NY</td>
<td>028 8776 7722</td>
</tr>
<tr>
<td>Port Painters Limited</td>
<td>Unit 3, Ringside Business, Hoel-Y-Rhosog, Cardiff, CF3 2EWWX</td>
<td>02920 777070</td>
</tr>
<tr>
<td>Pyeroy Limited</td>
<td>Kirkstone House, St Omers Road, Western Riverside Route, Gateshead, Wear, NE11 9EZ</td>
<td>0191 4932600</td>
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<tr>
<td>Roy Hankinson Limited</td>
<td>Alexander House, Monks Ferry, Birkenhead</td>
<td>0870 7892020</td>
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<tr>
<td>Shutter Maintenance Services Ltd</td>
<td>Kingsnorth Industrial, Hoo, Rochester, Kent, ME3 9ND</td>
<td>01634 255696</td>
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<tr>
<td>South Staffs Protective Coatings Ltd</td>
<td>Bloomfield Road, Tipton, West Midlands, DY4 9EE</td>
<td>0121 522 2373</td>
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<tr>
<td>Solent Protective Coatings Ltd</td>
<td>Tindegar Wharf, Marine Parade Southampton, Hants, SO14 5JF</td>
<td>02380 221480</td>
</tr>
<tr>
<td>Standish Metal</td>
<td>Potter Place, West Pimbo, Skelmersdale, Lancs, WN8 9PW, UK</td>
<td>01695 455977</td>
</tr>
<tr>
<td>Stobbarts Ltd</td>
<td>Tarn Howe, Lakes Road, Derwent Howe Industrial Estate, Workington, Cumbria CA14 3YP</td>
<td>01900 870780</td>
</tr>
<tr>
<td>Supablast (1984) Ltd</td>
<td>Jubilee Estate, Corsey Lane, Coleshill, Birmingham, B46 1JU</td>
<td>01675 464446</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>TEMA Engineering Ltd</td>
<td>5-6 Curran Road, Cardiff, CF10 5DF, UK</td>
<td>020920 344556</td>
</tr>
<tr>
<td>Vale Protective Coatings Ltd</td>
<td>Building 152 - 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>
</tbody>
</table>
### ICATS Registered Companies

#### W G Beaumont & Son
- Beaumont House, 8 Bernard Road, Romford RM7 0HX
- T: 01708 749202

#### William Hare Ltd
- Brandlesholme House, Brandlesholme Road, Burrys, Lancs, BL8 1JJ, UK
- T: 0161 609 0000

#### Xervon Palmers Ltd
- 331 Charles Street, Royston, Glasgow G21 2QA
- T: 0141 5534040

#### ICATS Registered Companies with Applicators in Training

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<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>E G Lewis &amp; Company Ltd</td>
<td>Suite 5, 3 Shawcross Industrial Estate, Ackworth Road, Portsmouth PO3 5JP</td>
<td>T: 01792 323288</td>
</tr>
<tr>
<td>Gemini Corrosion Services</td>
<td>Brent Avenue, Forties Road, Montrose, Angus, DD10 9PB</td>
<td>T: 01674 672 678</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>Severn River Crossing Plc</td>
<td>Bridge Access Road, Aust, South Gloucestershire, BS35 4BD</td>
<td>T: 01454 633351</td>
</tr>
<tr>
<td>Specialist Blasting Services Ltd</td>
<td>Smiths Quay, Hazel Road, Woolston, SO19 7GB</td>
<td>T: 023 80438901</td>
</tr>
<tr>
<td>Story Contracting Ltd</td>
<td>Burgh Road Industrial Estate, Carlisle, Cumbria CA2 7NA</td>
<td>T: 07730 764414</td>
</tr>
<tr>
<td>Tees Valley Coatings</td>
<td>Riverside Park Road, Middlesbrough, Cleveland TS2 1UT</td>
<td>T: 01642 228141</td>
</tr>
<tr>
<td>Woodbridge, Suffolk, IP12 3TP</td>
<td>T: 0191 262 0510</td>
<td></td>
</tr>
<tr>
<td>Advanced Construction and Eng Resources Ltd (ACER)</td>
<td>First Floor, Regus House, Herons Way, Chester Business Park, Chester CH4 9QR</td>
<td>T: 01244 893113</td>
</tr>
<tr>
<td>BSM Consulting</td>
<td>11 Kingsmead, Nailsea BS48 2XH</td>
<td>T: 01275 854708</td>
</tr>
<tr>
<td>BAM Nuttall Ltd</td>
<td>St James House, Knoll Road, Camberley GU15 3XW</td>
<td>T: 0782 5798440</td>
</tr>
<tr>
<td>Celtic Specialist Treatments Ltd</td>
<td>Rosedale, Carellcien Lane, Langstone Newport, Gwent, NP18 2JZ</td>
<td>T: 01633 400194</td>
</tr>
<tr>
<td>Centregreat Engineering Ltd</td>
<td>11/12 Wyndham Close, Brackla, Brackla Industrial Estate, Bridgend, CF31 2AD</td>
<td>T: 01656 650481</td>
</tr>
<tr>
<td>Coastground Ltd</td>
<td>Morton Peto Road, Gatton Hall Industrial, Great Yarmouth, Norfolk, NR31 0LT</td>
<td>T: 01493 650455</td>
</tr>
<tr>
<td>Excel Contractors Ltd</td>
<td>11a West End Road, Bitterne, Southampton SO18 6TE</td>
<td>T: 02380 444420</td>
</tr>
<tr>
<td>Forward Protective</td>
<td>Vernon Street, Shirebrook, Mansfield Notts, NG20 8SS</td>
<td>T: 01623 748323</td>
</tr>
<tr>
<td>Galldris Construction Ltd</td>
<td>Galldris House, Pavilion Business Centre, Kinetic Crescent, Innova Science Park, Enfield BN3 7FJ</td>
<td>T: 01992 763000</td>
</tr>
<tr>
<td>G W Burton Ltd</td>
<td>New Court, Wooddalling, Norwich, Norfolk, NR11 6SA</td>
<td>T: 01263 358403</td>
</tr>
<tr>
<td>Hempel UK Ltd</td>
<td>Llanturnam Park, Cwmbran, Gwent, NP44 3XF</td>
<td>T: 01633 874024</td>
</tr>
<tr>
<td>IDL Fabrications Limited</td>
<td>Crabtree Lane, Clayton, Manchester, M11 4GU</td>
<td>T: 0161 2306666</td>
</tr>
<tr>
<td>Interkey Services Ltd</td>
<td>2 Princewood Road, Corby, Northamptonshire, NN17 4AP</td>
<td>T: 01536 266607</td>
</tr>
<tr>
<td>JL Specialist Refurbishments Ltd</td>
<td>The Old Village Hall, Sawtry, Huntingdon, Cambridgeshire PE28 SSZ</td>
<td>T: 01536 266607</td>
</tr>
<tr>
<td>Leights Paints</td>
<td>Tower Works, Kestor Street, Bolton, Lancs. BL2 2AL</td>
<td>T: 0161 2306666</td>
</tr>
<tr>
<td>Livis Ltd</td>
<td>Livis House, SO Victoria Park, Dartford, Kent, DA1 5AJ</td>
<td>T: 01322 220058</td>
</tr>
<tr>
<td>Malakoff Limited</td>
<td>North Ness, Lerwick, Shetland, ZE1 0LZ, UK</td>
<td>T: 01595 695544</td>
</tr>
<tr>
<td>Matthew James Services</td>
<td>Unit 4, Shibdon Business, Cowen Road Blaydon, Newcastle-Upon-Tyne, NE21 5TX</td>
<td>T: 0191 414 5700</td>
</tr>
<tr>
<td>Moore Steel Developments Ltd</td>
<td>Station Road, Thorney, Peterborough PE6 0QE</td>
<td>T: 01733 270729</td>
</tr>
<tr>
<td>Paint Inspection Ltd</td>
<td>Trafalgar House, 223 Southampton Road, Portchester, PO6 4PY</td>
<td>T: 0164 4636690</td>
</tr>
<tr>
<td>Possipark Shotblasting Co Ltd</td>
<td>Dalmarnock Works, F3 Dunn Street, Glasgow, G40 3PE</td>
<td>T: 0141 556 6221</td>
</tr>
<tr>
<td>Radleigh Metal Coatings Ltd</td>
<td>Unit 30 Central Trading Estate, Cable Street, Wolverhampton, WV2 2HZ</td>
<td>T: 01902 870606</td>
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<tr>
<td>R.L.P. Painting</td>
<td>Heathfield House, Old Bawtry Road, Finningley, Doncaster, DN9 3DD, UK</td>
<td>T: 01302 772222</td>
</tr>
<tr>
<td>Taylor Engineering (UK) Ltd</td>
<td>Unit 7 &amp; 8 Curran Buildings, Curran Road, Cardiff CF10 5NE</td>
<td>T: 02920 371959</td>
</tr>
<tr>
<td>Tinsley Special Products</td>
<td>Enterprise House, Durham Lane, Eaglescliffe, Stockton-on-Tees TS16 0PS</td>
<td>T: 01642 784279</td>
</tr>
</tbody>
</table>

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Have you remembered to pay your 2012/13 subscription?
DIARY DATES 2012/2013

13th December 2012
London Branch Annual Christmas Luncheon
Venue: Royal Overseas League, Park Place, St James’s Street, London SW1A
Contact: Mike Allen
mike.allen9@btinternet.com

10th January 2013
London Branch Meeting
A panel discussion and debate on CUI and the need for coatings at temperatures above 12°C.
17.30 for 18.15 start. Venue: The Naval Club, 38 Hill Street, Mayfair, London W1J

7th February 2013
Midland Branch Evening Meeting
Nottingham University
Presentation (tbc) and branch AGM
18:00 for 18:30 start.

14th February 2013
London Branch Meeting
Speaker: Robin Wade, Technical Manager PFP International Paint on ‘Key performance considerations when selecting epoxy PFP for on-shore and off-shore oil and gas applications’.
17.30 for 18.15 start. Venue: The Naval Club, 38 Hill Street, Mayfair, London W1J

13-14th June 2013
London Branch Offshore Cathodic Protection Conference
At the Royal Overseas League in London there will be a two day Offshore Cathodic Protection conference, at this conference industry leaders will present papers on leading edge issues in this important area of corrosion control technology; this will be a must attended event. Please register your interest and to receive the early conference program at: admin@icorr.org

14th March 2013
‘Corrosion – friend or foe?’
17:30 for 18.00 start. Venue: The Naval Club, 38 Hill Street, Mayfair, London W1J
Speaker: ICorr President, Trevor Osborne

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www.icorr.org

London Branch publish a monthly Newsletter
Details of all Branch activities, dates and venues can be found at www.icorr.org

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