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READER ENQUIRY SERVICE

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Winter is fast approaching despite the very pleasant temperatures in the Midlands through much of October. The Crundwell household has heating and hot water again but there is still much to do to finish the bathroom project.

At the last Council meeting we discussed amongst many things, a letter I received earlier this year from the Institute of Materials Malaysia in which they offer ordinary membership in their society to members of recognised professional bodies in other countries for a nominal payment of 40 Ringgit (£8). I have responded positively and anyone wishing to take up this offer can get the form from Denise at the ICorr office.

Surface World/CORREX 2011 is now behind us and I quite enjoyed my involvement on both the Tuesday and Thursday. The stand went together in less than half an hour in the midst of a considerable amount of mayhem as some very large plant and displays was positioned on other stands at the NEC. I am sure that there will be a detailed account of the CORREX activities elsewhere in this edition of Corrosion Management so I will restrict my comments to the exhibition and visitors to the stand. I was impressed by the total number of visitors both to the exhibition as a whole and also to the stand. Interest in ICorr included a number of potential individual memberships as well as sustaining memberships, general enquiries and a number of people with specific corrosion problems some of which I could help with and some I was able to refer to others.

I have attended two Science Council meetings on behalf of the Institute recently one a general meeting of the Council and one for Chief Executives both meetings were of interest but I was again struck by the similarities in the issues facing member organisations to those we face, not least recruiting and retaining membership. At one of the meetings we were addressed by Richard Noble director of the Bloodhound SSC programme and holder of the world land speed record 1983-1997 who spoke on engaging young people whilst still in the early stages of education and developing an interest in science and technology which can be nurtured and grown. The project website www.bloodhoundssc.com is intended to keep individuals, classes and schools up to date with progress toward the goal of 1000 mph in a wheeled vehicle driven by a person. Over 3000 schools are engaged so far I encourage you all to go onto this site and see for yourselves and then tell others about it especially young people.

The AGM of the Institute is planned for January 12th at a London Branch meeting at the Naval Club again more details elsewhere. I look forward to seeing you there.

Seasons Greetings, Bob Crundwell

The Editor,
Corrosion Management
I was interested to read in the May/June issue the reminiscences of his contemporaries by Peter Gilbert. But there will be a later generation who will in turn remember him.

In the mid 1950’s, when I was a young undergraduate, Dr Gilbert (as he was known to me) agreed to provide me with six weeks vacation experience in his laboratories in Leeds. I must have contributed very little to his organisation but in that short time my knowledge of corrosion of copper alloy tubes increased from absolute zero to “quite good” (My perception – not his!).

It was to be several years later that pitted tubes began to enter my life and I was able to build on that early experience for help in solving problems.

By then I was using British Standards numbers and had to forget my still retained memory of Yorkshire Imperial Metals alloy trade names!

Yours Faithfully,
Brian Tunnard
CORREX 11 OVERVIEW

Correx Ltd ran two seminars at the recent Correx 11 exhibition. Both Correx and the Institute of Corrosion had stands at the event.

The first seminar explored with the ICATS member companies the possible formation of a trade association to represent industrial painting contractors. Chairman of the session Dick Frost has been in the protective coatings industry for many years and until recently was with W&J Leigh, he is now Managing Director of FBI Solutions. Dick is a very passionate supporter of the proposed initiative and arranged presentations outlining initial ideas that had been discussed. Dick welcomed feedback from the audience and a very productive debate followed. The seminar was well attended and agreement was reached to proceed with the initiative and explore how the association would be formed. Dick would welcome any ideas or indeed assistance on the formation of the new trade association and can be contacted through the Correx office.

The second seminar was an ICATS trainers day where a number of new initiatives were rolled out including a demonstration of the new training software and the Supervisors specialist module. ICATS has very recently been through a re branding and review exercise and the new image was unveiled by scheme coordinator David Eyre. The new logo that can be used by all member companies and is now available from the Correx office. David also launched the new Supervisors Module and the feedback from the audience was very positive. It was felt that the module was needed and will only serve to enhance ICATS. The first dates for the Supervisors Module course will be on the website very soon.

A demonstration on the usability of the new ICATS training disc by Brendan Fitzsimons was particularly well received by the delegates. The new software is faster than the previous DVD and has a number of enhanced features. The new disc contains not only the ICA module but also the two specialist modules, Abrasive Blast Cleaner and Spray Painter. New discs will be sent to all trainers at the end of November.

Mr Stephen Hankinson, Group Chief Executive of the Hankinson Painting Group addressed the meeting with an excellent presentation on the benefits of membership to the National Highways Sector Scheme 19A. Stephen is an enthusiastic member of the SS19A committee and has brought his experience from a contractors prospective to meetings. Stephen clearly outlined how being a member of the scheme has benefited his own company and encouraged others to join. He did say somewhat tongue in cheek that ‘this would of course increase competition for his own company’.

The seminar was attended by nearly 50 trainers.

David Eyre, ICATS Coordinator

NEW SUSTAINING MEMBERS PROFILE:

DRH COATINGS LIMITED

DRH Coatings Limited was founded in November 2010; although we are a new company we have a wealth of experience and expertise within our field.

We will consider any project and should it be within our capabilities, we will tackle it with unparalleled level of professionalism.

All our projects from the largest to the smallest are given the highest level of customer service and attention to detail from Tender stage to Site Quality Control, ensuring peace of mind and confidence in all our clients and our dedicated supervision team and skilled work force will guarantee you a high level of workmanship every time.

All our operatives are ICAT trained to carry out a variety of industrial preparation systems, including shot blast cleaning, manual preparation and the application all types of industrial protective coatings.

At DRH Coating we take health and safety extremely serious and therefore our workforce regularly undergo relevant medical screenings, like blood lead, lung function and skin tests, and receiving regular toolbox talks and activity briefing, ensuring our operatives work at a high level of safety awareness at all times.

For further information contact: Suite 5, 3 Shawcross Industrial Estate, Ackworth Road, Portsmouth, Hampshire, PO3 5JP
Telephone: 02392 666165 Email: garydeeks@drhcoatings.co.uk

CHARTERED SCIENTIST

by Douglas J Mills

I have become a Chartered Scientist! If you are already a Fellow it is a remarkably painless process. Apart from finding one referee you just need to fill in what you have done in relation to CPD in the last TWO years. You get a nice certificate (illustrated) and it does not cost any money (again assuming you are already a Fellow). Head office send back my cheque! (neither return being required).

I would encourage others to follow my lead. I will make the offer that if anybody has had some correspondence with me e.g. through Technical Topics (and there are quite few of you in that position out there!); or if I know them personally, then I would be happy to assist you e.g. by acting as referee (I would probably want to have a chat on the phone with people I had only corresponded with by e-mail). And also I might be able to offer some assistance with filling in the CPD section (incidentally you do have to maintain CPD if you are going to remain a Chartered Scientist with, in theory anyway, an annual return being required).

So please get applying. It is not arduous. And if you are already a Fellow it is free. It helps to raise your own profile. But it also good for the Institute to have as many CScis as we can!
Technical Topics No.34: PITTING CORROSION AND REPORT ON EUROCORR
by Technical Secretary, Douglas J Mills

I was of a mind to give Technical Topics a miss this month and just concentrate on doing a report on EuroCorr. But then Dr Stephen Mabbutt one time secretary of the Institute and colleague at the University where I show up from time to time, sent me couple of his holiday snaps. Knowing how my readership like the “vulture” type pictures more than anything else, I thought I would include these. And say something about them. Also during this last month a visit by myself to the pier in Gdynia which was suffering from corrosion of the painted legs (see TT no 31) has taken place and I have confirmed the problem. So we have a picture of me on the pier. Anyway to Steve’s pictures: this is a newly replaced handrail at Sheringham sea front which appears to be suffering pitting corrosion on one photo and course it is more dangerous form of corrosion than general corrosion. The obvious example is brake pipes on cars made from copper alloys which can under certain circumstances pit. Also pipes in domestic water systems. The raison d’etre seems to be “where corrosion starts that is where it continues”. In many cases that relates to the chemical environment, produced as a result of corrosion, catalysing further attack. Other localised forms of attack include crevice corrosion and stress corrosion cracking. The latter of course is a very extreme example of pitting where there is sometimes no visible attack at all. Detection of pitting is a fascinating area where electrochemical techniques, particularly ENM (Electrochemical Noise Measurement), have an important role to play. Normally pitting occurs when the metal is on the borderline of being protected e.g. with common metals like carbon steel when “dangerous” anodic inhibitors are used. Or with passive metals (like stainless steel, aluminium, titanium) that rely on an intact oxide film for their good corrosion resistance. I am guessing that the material used for this handrail is some sort of low alloy steel? Possibly cutlery steel? Not 18-8 stainless steel surely as that should survive a bit of chloride! Anyway better not say more as there may be legal case pending between Sheringham CC and the handrail provider!

So onto EuroCorr

The meeting was held at the International Fairs congress centre a few miles south west of the centre of Stockholm and readily accessible using the excellent public transport system that Stockholm offers. The title was “Developing solutions for the Global Challenge” and it ran from the 4th to 8th September. There were over 800 delegates which gave a vibrant feel to the congress. It is interesting though that despite the proximity to UK the number of UK delegates only just exceeded 30. ICorr council member Bob Cottis was present (he runs a working party on Education) Don Harrop (past President) Chris Googan (good to see him), Simon Rose (ex Northumbria) and myself. After from them delegates from UK were mainly students and a few industrialists. There were over three hundred papers oral presentations and over 130 posters on display. There were 28 sessions: 18 run by working parties, 6 joint sessions and 4 workshops. The conference venue was spacious with a good sized exhibition area and close to this the posters were displayed and coffee was served. All the active EFC working parties (total 18) organised sessions as well as holding working party meetings. Your correspondent attended the coatings WP (along with some thirty others - it is popular working party). The EFC General Assembly (GA) took place before the conference (unusually) on the Sunday evening. Nothing too dramatic happened at that. The EFC is expanding its membership base to include companies and individual members (Note that if you are a member of a Society that is a Member of EFC (like Institute of Corrosion is) you are automatically an EFC member. However not every country that “does” corrosion has a member society. The President of the EFC is still Philippe Marcus. Social events included a tour of and banquet in the City Hall on the Monday evening. The City Hall where the Nobel prizes are given out every January and is an amazing place inside. This event was excellent and thanks must be expressed to Sandvik for laying it on free of charge. There was also an enjoyable poster party sponsored by Swerea on the Tuesday and on the Wednesday the Congress dinner was held at the Ostermalms Saluhall. The technical part of the conference was opened on the Monday by Ingegerd Annagen from Swerea Kimab who were hosting the event. She handed over to J-O Nilsson from Sandvik (the main sponsor) who gave a short talk on the uses and the history of stainless steel (invented by Bradley in Sheffield in 1912). Then Philippe Marcus, the President of the EFC came on stage to present the recently retired Scientific Secretary, Dr Paul McIntyre with an Honorary Life Fellowship of the EFC. Paul had to retire a year ago because of ill health so it was extremely good that he managed to get to Stockholm to accept the award in person. The European Corrosion Medal was presented to Gunter Schmitt who went on to give an excellent talk about inhibitors entitled Corrosion Inhibition and Flow. This included an analogy with freak waves - it appears Inhibitors can act to reduce the height of
freak events There was then a lengthy contribution from Kevin Ogle from Chimie ParisTech, Paris, France entitled “Atomic Emission Spectroelectrochemistry: A new look at the corrosion, dissolution and passivation of complex materials”. He gave many examples from the pickling in acid of mild steel to pitting corrosion of aluminium. Other plenaries (at the start of each day were “Trends and drivers in the development and use of stainless steels” by P Samuelsson, Outokumpu Group, Stockholm and “Long term damage to metallic heritage” by Peter Brimblecombe, from the University of East Anglia, Norwich, UK. In connection with latter talk Peter told us that although improvements to overall rates of urban corrosion in the developed world have accompanied fuel change and clean air legislation during the 20th century have to some degree been offset by the potential risks posed by novel pollutants and a sharply changing climate in the 21st century. The final plenary was “Acts of Secrecy-The DC-3 that disappeared” by Christina Tengnér from the Army Museum, Stockholm. A Swedish military radio surveillance aircraft, shot down into the Baltic Sea by a Soviet Mig Fighter in 1952 had been salvaged in 2004 from a depth of 125 meters outside the island of Gotland. The paper focussed on the conservation process of this modern marine archaeological museum object. Apart from the 18 working party sessions, there were special workshops on Corrosion in Natural Environments, Corrosion and Corrosion Protection in the Aerospace Industry, and on Nanotechnologies. The papers from all these sessions together with the eighteen working party run sessions appear on the ROM available from Dechema. Or if you want one or two specific papers you can also try contacting your Technical Secretary! As usual any comments on the TT part please send to: Douglas@harrbridge.freeserve.co.uk

Thanks are due to Dr Stephen Mabbutt for provision of the Sheringham handrail pictures and for providing some comments on them.
The inaugural ICorr Aberdeen branch meeting was held as a joint session with the Welding and Joining (WJS) at the Palm Court hotel, Aberdeen. The meeting started at 6.30pm but by 6pm the entrance to the conference hall was already buzzing with activity as chattering institute members caught up on summer events in between bites of sandwiches/light snacks and sips of their drinks.

At 6.30pm prompt, Mr Alistair Seton who is the current chair of ICorr Aberdeen branch welcomed members back from the summer break, reminded attendees of the objectives of the institute and discussed some of the planned events of the year. After a short brief on safety, he introduced the speaker of the night Mr Dan Vu of Subsea 7 limited.

The topic of “The Principles of Epoxy Repair Shell to Reinstate Damaged Offshore Structures and Subsea Pipeline” was delivered to the thirty six (36) members in attendance and proved to be very interesting. Mr Dan Vu started by introducing Subsea 7 and gave a brief description of the services which they provide. He gave a bit of history on pipelines and explained the importance of pipelines in meeting the world’s energy demands. He proceeded to outline the various threats pipelines face in service such as upheaval buckling, 3rd party damage, corrosion etc which he said could ultimately lead to a leak or rupture of the pipeline if not controlled/addressed. He explained that various methods can be used to prevent/address leaks or reduction in pipeline pressure retaining capacity. He singled out clamp repair as an effective method to ensure temporary or permanent repairs. He distinguished between epoxy based and cement based clamp repairs explaining that for a short shutdown period, epoxy would be a preferred option due to short ‘cure’ time. After which he introduced the Subsea 7 epoxy based clamp repair technology. He went into details on the design of the epoxy resin sleeve repair solution, how it is applied in practice and talked about the various critical parameters considered during assessment to select the right solution. The parameters he mentioned included depth of pipeline, length of defect/clamp length required, grout thickness, pipeline surface finish etc. Finally, he described various qualification tests that have been performed in the development of the technology and outlined the limitations of the epoxy resin sleeve repair.

After the presentation, a properly charged and obviously interested audience asked various questions such as how gap of clamp was calculated, service life/shelf live of the technology, how to inspect once the repair has been installed etc. Mr Dan Vu answered the questions and in some instances a lively debate ensued.

To close the session, the branch chairman thanked the speaker for a marvellous presentation and introduced new members of the branch committee. He urged new/intending members to contact the committee members for more information about ICorr. PET booklets, Corrosion Management magazines and continuous professional development certificates were distributed to members immediately after the meeting.

For information or queries about the Aberdeen branch activities please contact our branch Secretary, Frances Blackburn, ICorrABZ@gmail.com. Alternatively a calendar of local events of interest to corrosion professionals in the Aberdeen area and the opportunity to sign up to the branch mailing list is available at https://sites.google.com/site/icorrabz/home.

**ICORR ABERDEEN BRANCH MEETING WITH THE WELD AND JOINING SOCIETY- SEPTEMBER 2011**

**AGM 2011**

12th January 2012, 18.05pm

The Naval Club, 38 Hill Street, Mayfair, London W1J 5NS

*See enclosed leaflet for further information.*
On the 25th of October, ICorr Aberdeen held the monthly branch meeting at the Palm Court hotel in Aberdeen. After a brief safety instruction, the branch chairman Mr Alistair Seton introduced the speaker of the night Mr Kjetil Rosvåg of Pinovo.

Mr Kjetil Rosvåg introduced the topic of the night as “The Next Generation of Surface Preparation Technology”. He started by describing the problem that led to the initiation of the technology development. He mentioned that in 2005 Exxon Mobil and Shell indicated that they needed a method to perform surface preparation in a more effective way and also prevent hazardous debris emission which was typical with existing surface preparation techniques. Mr Kjetil explained that the concept of the technology developed to solve this problem was based on a blasting/ vacuum suction mechanism which was 100% pneumatic. He illustrated with diagrams/pictures that the typical equipment consisted primarily of two (2) components called PISYS and PICO with subcomponents such as cyclones, air compressor, filters, suction compartments etc. He described the working process of the technology, explaining that grit is propelled to the metal surface using air from compressors and simultaneously debris together with used grit is taken back into the equipment by vacuum suction. Debris is directed into the cyclones where grit and rust/ metal particles separation occurs by density separation based on different specific weights. Grit is reutilised in handling, debris separation and decompression mechanisms were the basis of some of the questions asked by members of the audience in what was an interesting session.

The ICorr branch chairman thanked the speaker for his presentation and urged new/ intending members to contact the committee members for more information on ICorr. PET booklets, Corrosion Management magazines and continuous professional development certificates were distributed to members immediately after the meeting.

More information about the Aberdeen branch activities can be got from the ICorr Aberdeen branch Secretary, Frances Blackburn, 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.
Corrosion Protection with Nanoscale Anticorrosive Pigments in Coatings

By Marc Entenmann, Heinz Greisiger, Roman Maurer, Thadeus Schauer Fraunhofer Institute for Manufacturing Engineering and Automation, Germany.

First presented at the European Coating Conference, Berlin, 6-7th September 2011.

Abstract

For the efficient corrosion protection of metals with primers, the release and transport of active species to the metal surface is of great importance. In the present study, nanoscale corrosion protective phosphate derivatives, obtained by a top-down approach, were compared with their conventional microscale counterparts to determine the influence of particle size on the working mechanism and efficiency of the corrosion protection of steel substrates. Using SEM images of cross sections of the primer layers, the pigment particle distribution was visualized and it could be evidenced that the finer particles were able to more closely approach the metal surface. A short time test, combined with electrochemical measurements and outdoor weathering experiments confirmed that the nanoscale corrosion protection pigments are of advantage producing efficient corrosion protection of metals.

Experimental

A nano-mill equipment was used for the milling experiments with the conventional corrosion protective pigments Heucophos SAPP and ZMP. With the use of wetting and dispersion agents the best results, after 3 hours of milling, were obtained for a pigment dispersion at 25% w/w in i-butanol. The nanoscale anticorrosive pigment pastes were added to a conventional epoxy primer formulation consisting of Araldite GZ 7071X75 and Aradur 423. Millicarb BG and Talkum 10M2 were added to the formulation as fillers. Typical compositions of a primer formulation with 10 vol. % of standard and nanoscale corrosion protective pigments are given in Table 1 for SAPP and ZMP.

After air spray application of the primer formulations with a dry layer thickness of 60 µm on steel (DC04B) with different surface roughness, the samples were dried in an oven for 30 min at 80°C. For steel panels a fine (Rz = 25 µm), medium (Rz = 55 µm) and rough surface (Rz = 80 µm) was produced using a sand blasting device. The particle size distribution was characterized with MASTERSIZER 2000E from Malvern Instruments, according to a dynamic laser light scattering (DLLS). The barrier properties of the primer layers were determined on free coating films with permeability testers from PBI Dansensor. For water permeability measurements the permeability tester Lyssy LBO-500 was used at a relative humidity of 10% to 14% and a temperature of 38°C. The oxygen permeability testing was performed at 23°C using the oxygen permeability tester Lyssy OPT-5000. The pigment solubility of the ZMP and SAPP pigments was determined by means of metal ion detection, using an inductively coupled plasma optical emission spectrometry ICP-OES device. For the analysis, 1 g of pigment was dispersed in 400 g distilled water and a dialysis in distilled water was performed for the duration of 4 weeks. The obtained solubility was calculated in % w/w with respect to the original pigment. Corrosion tests were performed by thermocyclic loading of painted panels in contact with a Harrison solution (35 g/l (NH4)2SO4 and 5 g/l NaCl) and impedance measurements. Impedance

<table>
<thead>
<tr>
<th>Component</th>
<th>Amount w. %</th>
<th>Component</th>
<th>Amount w. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Araldite GZ 7071X75</td>
<td>18.6</td>
<td>Araldite GZ 7071X75</td>
<td>17.7</td>
</tr>
<tr>
<td>Aradur 423 (60%)</td>
<td>15.3</td>
<td>Aradur 423 (60%)</td>
<td>14.5</td>
</tr>
<tr>
<td>Millicarb BG</td>
<td>20.4</td>
<td>Millicarb BG</td>
<td>19.3</td>
</tr>
<tr>
<td>Talkum 10M2</td>
<td>6.8</td>
<td>Talkum 10M2</td>
<td>6.4</td>
</tr>
<tr>
<td>Heucophos SAPP</td>
<td>9.7</td>
<td>Heucophos ZMP</td>
<td>12.7</td>
</tr>
<tr>
<td>BYK 052</td>
<td>0.2</td>
<td>BYK 052</td>
<td>0.2</td>
</tr>
<tr>
<td>Anti-Terra U</td>
<td>0.5</td>
<td>Anti-Terra U</td>
<td>0.5</td>
</tr>
<tr>
<td>Thixatrol ST</td>
<td>1.0</td>
<td>Thixatrol ST</td>
<td>1.0</td>
</tr>
<tr>
<td>Xylene</td>
<td>2.0</td>
<td>Xylene</td>
<td>2.0</td>
</tr>
<tr>
<td>Solvent mixture</td>
<td>25.6</td>
<td>Solvent mixture</td>
<td>25.6</td>
</tr>
</tbody>
</table>

Table 1. Compositions of a primer formulation with 10 vol. % of corrosion protective pigment.
data at 0.1 Hz were used for the evaluation of the corrosion protection. These data were compared with results of a salt spray test according to DIN EN ISO 9227 using a rust grade evaluation according to DIN EN 4628-3 and with results of weathering trials at Helgoland Island.

**Results**

For both commercially available anticorrosive pigments after milling the original d50 values of approx. 3 µm were reduced to values between 100 and 200 nm, as shown in Figure 1. In Figure 2 SEM micrographs for the original and milled anticorrosive pigment are given. From both Figures it can be concluded that nanoscale anticorrosive pigments can be obtained by a top-down approach with a suitable milling equipment and appropriate stabilisation of particles.

Because of the nanoscale character and the relatively large surface area, the availability of anticorrosive active species for the corrosion inhibition of the metallic surface should be improved with nanosized pigments. The possibility to closely approach the metal surface, despite a roughness hindrance should also be better for nanoscale pigments. Both, the smaller surface distance as well as the increased availability of corrosion inhibitive species should lead to better corrosion protection of a metal substrate. In Figure 3 a proposed schematic model for the distribution of pigment particles in a coating is compared with real SEM micrographs, obtained for primers with standard and nanoscale corrosion protective pigments. With these micrographs the closer approach of nanoscale pigment particles to the metallic surface is evidenced.

The influence of a nanoscale character of ZMP and SAPP on the barrier properties of the primer coating and pigment solubility was also tested. Table 2 summarises the obtained results. Even the determined values are different and the solubility of the nanoscale SAPP pigment is slightly increased, no great influence of the particle size of the corrosion protective pigment on solubility and barrier properties of the primer layer against water and oxygen permeation could be observed.

The improved anticorrosive action of the nanoscale anticorrosive pigments of ZMP and SAPP after thermocyclic loading with Harrison solution could be confirmed with impedance measurements for primers on steel substrates with a different surface roughness. In Figure 4, impedance data at 0.1 Hz as a function of load duration are shown for coated samples with standard and nano ZMP. The smaller decrease of impedance during thermocyclic loading for the samples with nano ZMP in comparison with standard ZMP can be regarded as an evidence for enhanced corrosion protection properties of a nanoscale pigment. Furthermore, the difference in impedance between nano ZMP and standard pigmented primers are minimal for steel substrates with a higher roughness of Rz = 80 µm, due to very low starting impedance values.

### Table 2. Barrier properties of coatings and solubility of standard and nanoparticulate pigments.

<table>
<thead>
<tr>
<th>Anticorrosive pigment</th>
<th>Pigment solubility Zn/Sr [w/w %]</th>
<th>Water permeability of coating film [g/ (m² * day)]</th>
<th>Oxygen permeability of coating film [ml/(m² * day)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>standard ZMP</td>
<td>0.29</td>
<td>11.5</td>
<td>183</td>
</tr>
<tr>
<td>nano ZMP</td>
<td>0.26</td>
<td>10.2</td>
<td>169</td>
</tr>
<tr>
<td>standard SAPP</td>
<td>0.33</td>
<td>14.5</td>
<td>194</td>
</tr>
<tr>
<td>nano SAPP</td>
<td>1.29</td>
<td>11.3</td>
<td>197</td>
</tr>
</tbody>
</table>
In Figure 5 the impedance data for standard and nano SAPP are shown. Similarly as for ZMP, the nano SAPP pigmented samples on steel with medium and low surface roughness also showed a smaller decrease of impedance during thermocyclic loading. The difference in impedance between nanoscale and standard pigmented coatings are maximal for steel substrates with a medium roughness of $R_z = 55 \mu m$, whereas for substrates with a higher roughness ($R_z = 80 \mu m$) the impedance values are low from the very beginning of measurements. For the primers on steel substrates with high surface roughness, the sample with nano SAPP showed lower impedance values as in the case of the standard pigment. This result can be explained by the higher solubility of nano SAPP, as it is shown in Table 2 and the release of ions, acting as charge carrier during the loading of the sample with Harrison solution.

In each case, the samples with low surface roughness were more stable against corrosion, so the difference in the corrosion protection between the samples with the nanoscale and the standard pigments was also less pronounced. These findings were confirmed by the results of the atmospheric weathering of samples. Regarding the dry layer thickness of the primer layer of 60 $\mu m$ and a surface roughness of 80 $\mu m$, it is obvious that in this case the metal surface is not covered completely with a primer coating and less barrier effects for water and oxygen diffusion are present.

In Table 3 the impedance data for primers on steel panels with $R_z = 25 \mu m$ and $R_z = 55 \mu m$ are compared with results of the atmospheric weathering, performed on Helgoland Island and results of the salt spray test, according to DIN EN ISO 9227 with a rust grade evaluation according to DIN EN 4628-3. The data for the tested samples are benchmarked for their efficient (green) and less efficient (red) corrosion protective action. The data in Table 3 generally confirm that the nanoscale pigments of SAPP and ZMP exhibit a more efficient corrosion protection than their conventional counterparts.

SEM and EDX analysis of samples exposed to atmospheric weathering at Helgoland Island clearly confirm the better corrosion protection with nano ZMP (Figure 6) and nano SAPP (Figure 7). In both cases of weathered samples with the nanoscale anticorrosion pigment, strontium or zinc was detected on the steel surface, whereas no zinc or strontium was found on the surface of samples with ZMP and SAPP standard pigmented primer. Additionally, more iron was
detected for primers with standard pigments, which indicates a more intense corrosion of the steel substrate in these cases.

Conclusions

1. Nanoscale corrosion protective pigments of zinc or strontium phosphate type provide a more efficient corrosion protection of steel in comparison to standard micrometer sized products. The nanoscale pigments can be obtained by a top-down approach with proper milling equipment and efficient particle stabilizing additives.

2. The superior corrosion protection with nanoscale pigments was evidenced by short time thermocycling using impedance characterization, salt spray test and weathering at Helgoland Island.

3. EDX analysis on samples after weathering revealed an enhanced concentration of zinc or strontium on the metal surface in primers with nanoscale pigments and more iron in primer layers with standard pigments. Both results are indicative of a better corrosion protective performance with nanoscale pigments.

4. Regarding the mechanism of action, it could be stated that in case of nanoscale pigments a better availability of active species in the close vicinity of a metal surface and the action due to the principle “release on demand” explain the better corrosion protection.

Acknowledgements

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Figure 6. SEM micrographs and EDX data for primers with standard and nano ZMP after weathering at Helgoland Island.

Figure 7. SEM micrographs and EDX data for primers with standard and nano SAPP after weathering at Helgoland Island.

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The Keighley Labs Test House, which includes a dedicated CNC machine shop for producing test samples, is staffed by around fifteen qualified technicians, trainees and graduates, maintaining formal in-house training procedures and a programme of CPD (continuous professional development) to ensure competency standards are preserved across all disciplines.

Its experienced metallurgical consultants are available for failure and fracture investigations, reverse engineering analysis and forensic-type examinations, providing full documentation and, where appropriate, remedial advice for preventing further problems. Unusually, the Test House services also include expert witness work in such areas as personal injury, accidents at work and welded joint failure, these specialised provisions often saving clients the considerable expense of litigation.

Independent metallurgical testing is widely employed to demonstrate meeting particular material specifications, as a customer requirement or legal obligation, and to identify why components have failed in service, so it is vital that the chosen test laboratory has the people, facilities and track record for producing valid and accurate data. That is why UKAS accreditation is important for Keighley Labs and its clients, since it demonstrates the technical competence of its personnel and availability of sufficient resources, as well as the impartiality of its advice and knowledge transfer. Indeed, the company regularly updates its comprehensive scope of UKAS accreditation, which can be viewed online at www.keighleylabs.co.uk/accreditations www.keighleylabs.co.uk/accreditations.

Amongst the key functions of the Test House is the physical and mechanical testing of ferrous and non-ferrous metals and alloys to establish their mechanical properties, employing an impressive array of equipment and techniques. Impact testing, for example, measures the toughness of a material and its resistance to mechanical shock and Keighley Labs employs the two standard methods, Charpy and Izod testing, and has the capacity to prepare and machine test pieces. Hardness is the resistance of materials to permanent indentation and the laboratory offers the main Brinell, Rockwell, Vickers and Knoop microhardness and hardness testing methods, including portable instruments for evaluating in-service parts and samples too large to bring in-house.

Tensile and compression loading testing can be carried out in ambient, sub-ambient and elevated temperatures, with loads up to 1100kN; while digital equipment is used to fatigue-test components, employing resonant frequencies between 60Hx and 180Hz. Other mechanical testing techniques include proof loading, bend and fracture tests, and full metallurgical examination of fasteners. In a related sphere, corrosion testing of stainless steel, plated and painted test pieces, heat-resistant alloys and austentic materials is conducted using an array of neutral and accelerated salt spray techniques, chemical pitting tests and humidity chambers.

The Test House’s metallography facility enables examination of the microstructure of metals and alloys, to determine such characteristics as grain structure, material inclusions and cleanliness, weld quality and case depth. Macro examinations up to 10x magnification and micro analysis to 1000x are undertaken on projector and stereo binocular microscopes, with photographic and video print functions, whilst semi-automatic sample preparation enables handling even the latest generation of superalloys.

All Keighley Laboratories NDT inspectors are qualified to either PCN Level 2 or 3 and are available for in-house and on-site work, at home or overseas. This accredited service covers the most common methods of inspection, Liquid Penetrant Testing, Magnetic Particle Testing and Ultrasonic Flaw Detection, with radiography additionally provided on a sub-contract basis.

Also in the field, non-destructive ferrite meters can identify the ferrite content of welded seams in pipelines and processing plant, which could lead to a decrease in mechanical or corrosion resistance if levels are incorrect. To complement this, magnetic permeability testing enables the accurate assessment of a material’s residual magnetism, which is critical for applications where stainless steels or copper alloys must have a very low or negligible response to electromagnetic fields.

Positive material identification (PMI) or alloy verification is used to determine the composition of a variety of materials, such as mixed metal stock, critical components, in-service pipework, valves and connections, and high grade alloys. Using the latest XRF (x-ray fluorescence) analysis equipment and Spark Emission Spectrometry techniques, Keighley Labs can undertake rapid PMI verification of most ferrous and non-ferrous materials, either in-house or on-site.

The Test House customer base covers a wide variety of organisations, from high tech industries, through manufacturers using the service for live QA testing on production components, to small engineering shops verifying that parts meet required specifications. Industry sectors served include aerospace, automotive, defence, oil & gas, rail & transportation, wind power and general engineering. Test pieces are typically finished components, either new production items or parts that have failed in service, or raw materials for verifying that they are fit-for-purpose, with size usually no obstacle since Keighley Labs can either produce smaller dummy samples or undertake testing at the customer site.
An updated industry reference guide to protective coatings defects has been published for use by coatings specialists, inspectors, engineers, architects, surveyors, painting contractors and all those with an interest in protective coatings.

Fitz’s Atlas 2 provides a comprehensive review of coatings and application defects. Originally published in 1996, the guide has earned worldwide use for the identification and illustration of coating and surface defects and the provision of advice on probable causes, prevention and repair.

This new and expanded second edition of the guide is divided into a number of sections covering welding faults, surface conditions, coating and application defects, microscopy, and marine fouling. An extended technical appendix provides breakdown scales, paint characteristics, paint compatibility, calculations and formulae.

The guide has been written by coatings industry experts Brendan Fitzsimons and Trevor Parry and is supplied in a pocket sized, soft bound filofax format for ease of use on site.

Fitz’s Atlas 2 now contains 93 categories of coating defects with fully detailed descriptions, probable causes, preventions and methods of repair. Also included are over 200 high quality colour photographs of typical coating defects. A new section on failure investigation through the use of microscopy is now included with detailed descriptions and high resolution photomicrographs to give the reader an understanding of the defects and their appearance under magnification.

For international users, the text included in Fitz’s Atlas 2 is available via the web in a number of languages including Spanish and Chinese. A Fitz’s Atlas 2 “App” is also available which contains unique time lapse video simulations of a number of coating defects during their development.

For further information visit: www.fitzsatlas.com
DENSO PROTAL PROTECTS BRINE FIELDS WELD JOINTS

A Winn & Coales Denso coating has again been chosen to give protection in the saline corrosive environment at the Stublach, Cheshire, brinefields operated by Ineos Chlor; the underground Gas Storage Infrastructure on the Brinefields site is being developed by Storengy Ltd, a subsidiary of Gaz de France.

Contractors Murphy Group have used Denso Protal 7000, brush grade, to protect 36 inch butt weld joints at the Stublach double minimum offtake connection to the National Grid NTS pipeline. A main factor that determined Murphy Group’s choice of Denso Protal 7000 was that it enabled them to get a required thickness of 800 microns in one application.

Winn & Coales Denso Protal coatings give effective anti-corrosion properties by forming a firmly bound corrosion inhibiting film on the metal surface, which is covered with a thick, effective physical barrier against air and moisture and which remains permanently flexible. The brush grade can be applied by plural Hydrocat spray.

ARCHCO-RIGIDON PROTECTS PETROPLUS CAUSTIC TANK

Contractors E.G.Lewis were recently contacted by Petroplus at its Coryton refinery to apply a new protective coating to a caustic soda tank, which is part of the process in the refinery’s cracking plant. Because of the highly corrosive conditions, which are aggravated by the high temperature of the cracking process, E.G.Lewis approached Winn & Coales (Denso) Ltd for its recommendation of the most suitable protective coating.

Winn & Coales’ Archco-Rigidon 423D coating system was chosen, which is based on glass flake vinyl ester. In order to remove the 15-year-old former coating and to give good mechanical key for the Archco-Rigidon coating, the caustic soda tank interior was first shotblasted to Swedish Standard S.A.2.5 near white metal to achieve a minimum profile depth of 70 microns. The tank was then tested for chlorides before applying Archco Rigidon PD2 primer.

Petroplus is Europe’s leading independent refiner of petroleum products, with five refineries in Europe of which Coryton is the flagship and largest, E.G.Lewis & Co are a South Wales based company and are the resident painting contractors for the refinery and have been for the past eight years.
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Tel: 01642 784279 Fax: 01642 782891
Email: enquiries@tinsleyspecialproducts.com

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

Reader Enquiry: CM015
**ICATS REGISTERED COMPANIES WITH QUALIFIED APPLICATORS**

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alltask Limited</td>
<td>Alltask House, Commissioners Road, Strood, Kent, ME2 4EJ</td>
<td>T: 01634 298000</td>
</tr>
<tr>
<td>Alfred Bagnall &amp; Sons</td>
<td>6 Manor Lane, Shipley, West Yorkshire, BD18 3RD</td>
<td>T: 01302 853259</td>
</tr>
<tr>
<td>APB Construction (UK)</td>
<td>Unit 3, Bramley Way, Hellaby Industrial Estate, Hellaby, Rotherham, S. Yorkshire, S66 8QB</td>
<td>T: 01709 541000</td>
</tr>
<tr>
<td>APB Group Limited</td>
<td>Ryandra House, Ryandra Business Park, Brookhouse Way, Cheadle, Staffs, ST10 1SR</td>
<td>T: 01538 755377</td>
</tr>
<tr>
<td>Armourcote Surface Technology Plc</td>
<td>15/17 Colvilles Place, Kelvin Industrial Estate, East kilbride, Scotland, G75 0PZ</td>
<td>T: 01355 248223</td>
</tr>
<tr>
<td>Austin Hayes Ltd</td>
<td>Carlton Works, Cemetery Road, Yeadon, Leeds, LS19 7BD, UK</td>
<td>T: 0113 250 2255</td>
</tr>
<tr>
<td>Beaver Limited</td>
<td>Little Coldharbour farm, Tong Lane, Lamberhurst, Kent, TN3 8AD, UK</td>
<td>T: 01892 890045</td>
</tr>
<tr>
<td>Briton Fabricators Ltd</td>
<td>Watnall Road, Hucknall, Notts, NG15 6EP</td>
<td>T: 0115 963 2901</td>
</tr>
<tr>
<td>Cape Industrial Services</td>
<td>Cape House, 3 Red Hall Avenue, Paragon Business Village, Wakefield, WF1 2UL</td>
<td>T: 01224 215800</td>
</tr>
<tr>
<td>Cleveland Bridge UK Ltd</td>
<td>Cleveland House, Farm Road, Darlington, DL1 4DE</td>
<td>T: 01325 502345</td>
</tr>
<tr>
<td>Coating Services Ltd</td>
<td>Partington Street, Mumps Bridge, Oldham, OL1 3RU, UK</td>
<td>T: 0161 665 1998</td>
</tr>
<tr>
<td>Coastline Preservation Ltd</td>
<td>Tredegar Wharf, Marine Parade Southampton, Hants, SO14 5JF</td>
<td>T: 02380 221480</td>
</tr>
<tr>
<td>Collins Engineering Railway Contracts</td>
<td>Salcombe Road, Meadow Lane Industrial Estate, Alfreton, Derbyshire, DE55 7RG</td>
<td>T: 01773 833255</td>
</tr>
<tr>
<td>Community Clean</td>
<td>11 Old Forge Road, Ferndown Industrial Estate, Ferndown, Wimborne, Dorset, BH21 7RR, UK</td>
<td>T: 0845 6850133</td>
</tr>
<tr>
<td>Corrocoat</td>
<td>Forster Street, Leeds, LS10 1PW</td>
<td>T: 01132760760</td>
</tr>
<tr>
<td>Denholm Industrial</td>
<td>21 Boden Street, Glasgow, G40 3PU</td>
<td>T: 0141 445 3939</td>
</tr>
<tr>
<td>Dyer &amp; Butler Ltd (Rail)</td>
<td>Mead House, Station Road, Nursling, Southampton, SO16 0AH, UK</td>
<td>T: 02380 667549</td>
</tr>
<tr>
<td>ENC (Yorkshire) Ltd</td>
<td>Unit 3B Rotherham Road, Dinnington Sheffield, S25 3RF</td>
<td>T: 01909 567860</td>
</tr>
<tr>
<td>F A Clover &amp; Son Ltd</td>
<td>Bardolph Road, Richmond Surrey, TW9 2LH</td>
<td>T: 0208 948 6321</td>
</tr>
<tr>
<td>Finclean SKJ Ltd</td>
<td>Waterloov Industrial Estate, Pembroke Dock, Pembrokeshire, SA72 4RR</td>
<td>T: 01646 622407</td>
</tr>
<tr>
<td>Forth Estuary Transport Authority</td>
<td>Forth Road Bridge, Administration Office South Queensferry, EH30 9SF</td>
<td>T: 0131 319 1699</td>
</tr>
<tr>
<td>Harrisons Engineering Lancashire Ltd</td>
<td>Judge Wilmey Mill, Longworth Road Billington, Clitheroe, Lancashire, BB7 9TP</td>
<td>T: 01254 823993</td>
</tr>
<tr>
<td>Herrington Industrial Services Ltd</td>
<td>Crown Works, Crown Road, Low Southwick, Sunderland SR5 2BS</td>
<td>T: 0191 5160634</td>
</tr>
<tr>
<td>H&amp;S Painting Contractors Ltd</td>
<td>4 Hamilton Gardens, Mutley, Plymouth, PL4 6PQ</td>
<td>T: 07837 382619</td>
</tr>
<tr>
<td>Hunter Steel Coatings Ltd</td>
<td>4Pinfold Lane, Alltami, Mold, Flintshire CH7 6NZ</td>
<td>T: 01244 541177</td>
</tr>
<tr>
<td>Hyspec Services Ltd</td>
<td>Unit 3 Meadowfield Industrial Estate, Cowdenbeath Road, Burntisland, Fife, KY3 0LH</td>
<td>T: 01592 874661</td>
</tr>
<tr>
<td>Industrial Coating Services</td>
<td>Industrial Coating Services 5 Danesbury Crescent, Kingstanding, Birmingham, B44 0QP</td>
<td>T: 0121 384 2266</td>
</tr>
<tr>
<td>Industrial Painting</td>
<td>Industrial Painting 4B-49 RCM Business Centres, Sandbeds Trading Estate, Dewsbury Road, Ossett, WF5 9ND</td>
<td>T: 01924 272606</td>
</tr>
<tr>
<td>Interserve Industrial</td>
<td>Unit 2, Olympic Park, Poole Hall Road Ellesmere Port, Cheshire, CH66 1ST</td>
<td>T: 0151 3737660</td>
</tr>
<tr>
<td>Jack Tighe Coatings</td>
<td>Sandall Lane, Kirk Sandall, Doncaster, DN3 1QR</td>
<td>T: 01302 880360</td>
</tr>
<tr>
<td>Jack Tighe Ltd</td>
<td>Redbourne Mere, Kirton Lindsey, Gainsborough, Lincs, DN21 4NW, UK</td>
<td>T: 01652 640003</td>
</tr>
<tr>
<td>Company Name</td>
<td>Address</td>
<td>Telephone</td>
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</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, Cheshaw, Monmouthshire NP16 SYL</td>
<td>01291 623801</td>
</tr>
<tr>
<td>MCL Coatings Ltd</td>
<td>Pickering Road, Halebank Industrial Estate, Widnes, Cheshire, WA8 8XW</td>
<td>0151 423 6166</td>
</tr>
<tr>
<td>Northern Protective</td>
<td>16 High Reach, Fairfield Industrial Estate, Bill Quay, Gateshead, NE10 0UR</td>
<td>0191 438 5555</td>
</tr>
<tr>
<td>Nusteel Structures</td>
<td>Lympne Industrial Estate, Lympne, Hythe, Kent, CT21 4LR</td>
<td>01303 268112</td>
</tr>
<tr>
<td>Ormac Coatings Ltd</td>
<td>Newton Chambers Road, Thorncliffe Park Estate, Chapeltown, Sheffield, S35 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>26 St George’s Road, Saltash, Cornwall, PL12 6EH</td>
<td>01708 749202</td>
</tr>
<tr>
<td>ThyssenKrupp Palmers Ltd</td>
<td>1120 Elliot Court, Herald Avenue, Coventry Business Park, Coventry, CV5 6UB</td>
<td>02476 710294</td>
</tr>
<tr>
<td>Port Painters Limited</td>
<td>Unit 3, Ringside Business, Hoel-Y-Rhosog Cardiff, CF3 2EWx</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>01911 4932900</td>
</tr>
<tr>
<td>Roy Hankinson Limited</td>
<td>Alexander House, Monks Ferry, Birkenhead Wirral, CH41 5LH</td>
<td>0870 7892020</td>
</tr>
<tr>
<td>Rhinoceros Limited</td>
<td>Huntingdon Works, East Finchley, London, NZ 9DX</td>
<td>0208 444 6165</td>
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<tr>
<td>Rowecord Engineering</td>
<td>Neptune Works, Usk Way, Newport, South Wales, NP20 2SS</td>
<td>01633 250511</td>
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<tr>
<td>Shutdown Maintenance Services Ltd</td>
<td>Kingsnorth Industrial, Hoo, Rochester, Kent, ME3 9ND</td>
<td>01634 256969</td>
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<tr>
<td>South Staffs Protective Coatings</td>
<td>Bloomfield Road, Tipton, West Midlands, DY4 9EE</td>
<td>0121 522 2373</td>
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<tr>
<td>Supablást (1984) Ltd</td>
<td>Jubilee Estate, Colehill, Bingham, BA6 1JU</td>
<td>01675 464446</td>
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<tr>
<td>T I Protective Coatings</td>
<td>Unit 6, Lodge Bank, Crown Lane, Horwich, Bolton, LANC, BL6 5HU</td>
<td>01204 468080</td>
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<tr>
<td>TEMA Engineering</td>
<td>5-6 Curran Road, Cardiff, CF10 5DF, UK</td>
<td>0209290 344556</td>
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<tr>
<td>Walker Construction (UK) Ltd</td>
<td>Park Farm Road, Folkestone, Kent, CT19 5DY</td>
<td>01303 851111</td>
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<tr>
<td>Wardle Painters Ltd</td>
<td>Unit 5, Wimborne Building, Atlantic Way, Barry Docks, Glamorgan, CF63 3RA, UK</td>
<td>01446 748620</td>
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<tr>
<td>W G Beaumont &amp; Son</td>
<td>Beaumont House, 8 Bernard Road, Romford RM7 OHX</td>
<td>01708 749202</td>
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<tr>
<td>William Hare Ltd</td>
<td>Brandleholme House, Brandleholme Road, Bury, Lancs, BL8 1JJ, UK</td>
<td>0161 609 0000</td>
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<tr>
<td>Abrasion Ltd</td>
<td>1 Montague House, 74 Bryantwood Road, London, N77BB</td>
<td>07949 130168</td>
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<tr>
<td>E &amp; P Painting Contractors</td>
<td>Rossfield Road, Rossmore Trading Estate, Ellesmere Port, Cheshire, CH65 3AW</td>
<td>0151 9558141</td>
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<tr>
<td>Fairhurst Ward Abbotts</td>
<td>225 London Road, Greenhithe, Kent, DA9 9RR</td>
<td>01322 387000</td>
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<tr>
<td>Gemini Corrosion Services</td>
<td>Brent Avenue, Forties Road, Montrose, Angus, DD10 9PB</td>
<td>01674 672 678</td>
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<tr>
<td>HBS Protective Coatings Ltd</td>
<td>40 Manse Road, Belfast BT8 6SA</td>
<td>028 90708280</td>
</tr>
<tr>
<td>Offshore Marine Services Ltd</td>
<td>Brumphy 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, Billingham, TS23 4BX, UK</td>
<td>01642 371850</td>
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<tr>
<td>P C Richardson &amp; Co</td>
<td>Courville House, Elder Court, Stokesley Business Park, Stokesley, TS9 5PT, UK</td>
<td>01642 714791</td>
</tr>
<tr>
<td>Company Name</td>
<td>Address</td>
<td>Telephone</td>
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<tr>
<td>Solent Protective Coatings Ltd</td>
<td>Tredegar Wharf, Marine Parade, Southampton, SO14 5JF</td>
<td>023 80221480</td>
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<tr>
<td>Standish Metal</td>
<td>Potter Place, West Pimbo, Skelmersdale, Lancs, WN8 9PW, UK</td>
<td>01695 455977</td>
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<tr>
<td>Tees Valley Coatings</td>
<td>Riverside Park Road, Middlesborough, Cleveland T52 1UT</td>
<td>01642 228141</td>
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<td>ICATS REGISTERED COMPANIES</td>
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<tr>
<td>A1 Powder Coatings Ltd</td>
<td>Unit 4/5 Beta Buildings, Hazel Road Woolston, Southampton SO19 7HS</td>
<td>0238 044 6874</td>
</tr>
<tr>
<td>Abbey Gritblasting Services</td>
<td>Unit 13, Clifton Commercial Park, Clifton, Woodbridge, Suffolk, IP12 3TP</td>
<td>0191 262 0510</td>
</tr>
<tr>
<td>BAE Systems Surface Ships Support Ltd</td>
<td>Room 213, Naval Base Headquarters, Building 1/100, PP127, Portsmouth, PO1 3LS</td>
<td>023 92857279</td>
</tr>
<tr>
<td>Barrier Ltd</td>
<td>Stephenson Street, Wallsend, Tyne &amp; Wear, NE28 6UE, UK</td>
<td>0191 262 0510</td>
</tr>
<tr>
<td>BAM Consulting</td>
<td>11 Kingsmead, Nailsea BS48 2XH</td>
<td>01275 854708</td>
</tr>
<tr>
<td>BSM Nuttall Ltd</td>
<td>St James House, Knoll Road, Camberley GU15 3XW</td>
<td>0782 5798440</td>
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<tr>
<td>Carrodus Contractors Limited</td>
<td>Unit 134, Medway Enterprise Centre, Enterprise Close, Strood, Kent, ME6 4SY</td>
<td>01634 271786</td>
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<tr>
<td>Celtic Painting Consultancy Ltd</td>
<td>Rosedale, Carelicken Lane, Langstone Newport, Gwent, NP18 2JZ</td>
<td>01633 400194</td>
</tr>
<tr>
<td>Coastground Ltd</td>
<td>Morton Peto Road, Gatton Hall Industrial, Great Yarmouth, Norfolk, NR31 0LT</td>
<td>01493 650455</td>
</tr>
<tr>
<td>Forward Protective</td>
<td>Vernon Street, Shirebrook, Mansfield Notts, NG20 8SS</td>
<td>01623 748323</td>
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<tr>
<td>GABRE (UK) LTD</td>
<td>9 Holme Road, Dromore, Omagh Co Tyrone, BT78 3BX</td>
<td>02882 897950</td>
</tr>
<tr>
<td>G W Burton Ltd</td>
<td>New Court, Wooddalling, Norwich, Norfolk, NR11 6SA</td>
<td>01263 584203</td>
</tr>
<tr>
<td>Harsco Infrastructure Services Ltd</td>
<td>Unit 3 Manby Road, South Killingholme, Immingham, North Lincolnshire, DN40 3DX</td>
<td>01469 553800</td>
</tr>
<tr>
<td>Hi-Tech Surface Treatment Ltd</td>
<td>Unit B, Deacon Trading Estate, Chickenhall Lane, Eastleigh, Hants S050 6RP</td>
<td>023 80611789</td>
</tr>
<tr>
<td>H &amp; S Decorating</td>
<td>Amministration Building, Forth Road bridge, South Queensferry, Edinburgh, EH30 9SF</td>
<td>01753 654123</td>
</tr>
<tr>
<td>Hempeul UK Ltd</td>
<td>Llantarnam Park, Cwmbran, Gwent, NP44 3XF</td>
<td>01633 874024</td>
</tr>
<tr>
<td>Leigths Paints</td>
<td>Tower Works, Kestor Street, Bolton, lancs, BL2 2AL</td>
<td>01698 264271</td>
</tr>
<tr>
<td>Malakoff Limited</td>
<td>North Ness, Lerwick, Shetland, ZE1 0LZ, UK</td>
<td>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>0191 414 5700</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>NSG UK Ltd</td>
<td>Fourth Avenue, Deeside Industrial Park, Deeside, Flintshire CH5 2NR</td>
<td>01244 833138</td>
</tr>
<tr>
<td>Paint Inspection Ltd</td>
<td>Trafalgar House, 223 Southampton Road, Portchester, PO6 4PY</td>
<td>0845 4638680</td>
</tr>
<tr>
<td>Possilpark Shotblasting Co Ltd</td>
<td>Dalmarnock Works, 73 Dunn Street, Glasgow, G40 3PE</td>
<td>0141 556 6221</td>
</tr>
<tr>
<td>Radleigh Metal Coatings Ltd</td>
<td>Unit 30 Central Trading Estate, Cable Street, Wolverhampton, WV2 2HX</td>
<td>01902 870606</td>
</tr>
<tr>
<td>R.L.P. Painting</td>
<td>Heathfield House, Old Bawtry Road, Finningley, Doncaster, DN9 3DD, UK</td>
<td>01302 772222</td>
</tr>
<tr>
<td>Specialist Blasting Services Ltd</td>
<td>Smiths Quay, Hazel Road, Woolston, SO19 7CB</td>
<td>023 80438901</td>
</tr>
<tr>
<td>Sussex Blast Cleaning</td>
<td>Unit 35-37 Station Road, Hailsham, East Sussex, BN27 2ER</td>
<td>01323 849229</td>
</tr>
<tr>
<td>Tinsley Special Products</td>
<td>Enterprise House, Durham Lane, Eaglescliffe, Stockton-on-Tees TS16 0PS</td>
<td>01642 784279</td>
</tr>
</tbody>
</table>

Visit the Icorr website
www.icorr.org
13th-14th December 2011
EC Conference: Construction chemicals
Berlin / Germany
www.european-coatings.com/events/ecc.cfm

12th January 2012
AGM & London Branch Meeting, Speaker: Dr. Raouf Kattan on ‘Marine Coatings’.
Meet at Naval Club, 38 Hill Street, London W1
Contact Derek Hoskins: dhoskins@waitrose.com
17.30 for 18.15 start.

24th January 2012
Cracks and their Causes Part II.
Speaker: Lammert Brantsma (MEL)
Contact: Aberdeen Branch for further details.

6th February 2012
Evening meeting, CPD The New Standards by Brenda Peters; Continuing Professional Development ‘Learning all the time’.
CPD is not just about going on courses. It’s about developing your potential and should be about benefiting the individual, their employer and society in general. Come along and find out about how you are already doing CPD in your everyday life, about the new standards and new thinking about CPD. Find out about ICorr’s CPD system, how it works, how it is assessed and methods of recording.
Venue: 6.30pm, Woodthorpe Hotel, Bury Old Road,
M25 OEG. Followed by a 2 course evening meal.
Contact: Brenda Peters
Email: brenda.peters@analysis-scientific.co.uk or 01706 871700 if you wish to attend.

9th February 2012
London Branch Meeting, Speaker: George Winning on ‘Integrity and corrosion management’.
Meet at Naval Club, 38 Hill Street, London W1
17.30 for 18.15 start.

20th February 2012
Waterproofing.
Speaker: Brian Dargan Of VolkerLaser Ltd
Sponsored buffet.
Contact: Brenda Peters
Email: brenda.peters@analysis-scientific.co.uk or 01706 871700 if you wish to attend.

28th February 2012
UK CUI Industrial Forum - 10 years progress.
John Thirkettle (Thor Corrosion).
Contact: Aberdeen Branch for further details.

8th March 2012
London Branch AGM and Meeting, Speaker: Andy Taylor, London Branch Chairman.
Meet at Naval Club, 38 Hill Street, London W1
17.30 for AGM at 18.00; meeting at 18.15

12 March 2012
Wellington Swimming Pool.
Contact: Brenda Peters
Email: brenda.peters@analysis-scientific.co.uk or 01706 871700 if you wish to attend.

12th April 2012
London Branch joint meeting with NACE, Speaker: David Harvey on ‘Cathodic protection of complex structures’.
Meet at Naval Club, 38 Hill Street, London W1
17.30 for 18.15 start.

17th April 2012
Al-Zn-In Sacrificial Anodes Manufacture and Specification.
Dr Nigel Owen (Aberdeen Foundries Ltd).
Contact: Aberdeen Branch for further details.

18th April 2012
Corrosion of Infrastructure ' Present Knowledge and Future Solutions’.
Venue: Institute of Materials, Minerals and Mining
1 Carlton House Terrace, London SW1Y 5DB
Further information along with a registration form is available to download at www.icorr.org in the conferences and events section. You can also contact Prof. Robert Akid r.akid@shu.ac.uk or Prof. Paul Lambert paul.lambert@mottmac.com

22nd May 2012
Joint NACE Meeting.
Contact: Aberdeen Branch for further details.

Details of all Branch activities, dates and venues can be found at www.icorr.org

London Branch publish a monthly Newsletter

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