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August is traditionally a quiet time in many walks of life in UK primarily driven by summer holidays and closure of schools. My e-mail in box today (1st August) thus far has been virtually empty; the snail mail post was small and the telephone has only rung once. Does this mean that I am going to catch up on all the stuff in the pending tray? I doubt it. I cannot believe how busy I have been since retiring from my ‘day job’ indeed as many retired will tell you they don’t know how they found time to go to work. So what have I been doing lately?

In June there was a meeting with representatives of the Science Council to consider our re-instatement as a Licensed Body as a result mainly of the work of past president Stuart Lyon a recommendation was put to the Science Councils Board and confirmed at its meeting in July. We are now again licensed to accredit Chartered Scientist status and we hope that a number of Fellows of the Institute will consider taking this up as by their registration as a Fellow they are almost certainly pre-qualified. At the end of June I was a guest at the BINDT Council meeting this was agreed as part of the build-up to the MOU between ICORR & BINDT. Whilst obviously the detail of what was discussed should remain confidential I was struck by the similarity of the issues facing our two Institutes. In mid July there was a meeting between representatives of ICORR with the Senior Director of Strategic Initiatives of NACE, Del Doyle. The meeting was a good opportunity to air historical issues between our two bodies and then explore ways we can try to work together in harmony for the future, watch this space.

And so to the future. At the end of August there is a meeting planned with visitors from Korea, the first of September is the next meeting of PDTC. On the 5th & 6th of September it is the Corrosion Science Division Symposium in Bath. BINDT have arranged for ICORR to have a small stand at Materials Testing 2011 the BINDT exhibition which will be held at The International Centre, Telford on September 13-15. Our stand will be manned from Midland Branch members and I hope you will be able to stop by if you are attending. I know that a number of ICORR Sustaining Member companies are exhibiting and a flier is included with this edition of Corrosion Management giving fuller details. November is time for CORREX more details elsewhere.

Meanwhile I have some work to do on the bathrooms and associated plumbing at home which if it is not given priority could lead to serious sanctions from ‘she who must be obeyed’ and restriction of my commitment to our Institute.

Have a good summer.

The President Writes

LONDON BRANCH SUSTAINING MEMBERS’ EVENING

Twenty two members and guests attended the London Branch Sustaining Members’ evening on 5th May. The event was sponsored by two of our Sustaining Members – Quill International and Deepwater Corrosion Services (UK) Ltd and having met at Piccadilly Circus, we soon left its busy hubbub to join the quiet streets of East Mayfair, led by our Blue Badge Guide Ingrid Wallenborg. There were many points of interest along the way, including a visit to Albany Courtyard; to distinguish it from possibly being thought of as a pub, it deliberately does not have the definite article. The somewhat exclusive residences there are known as sets rather than apartments or flats. This was followed by a visit to the courtyard of The Royal Academy of Arts and a walk through Burlington Arcade. There was a refreshment break in Mill Street and then further wanderings with more interesting scandalous and amusing stories from Ingrid before completing the evening’s socialising at The Naval Club to enjoy a hot chilli supper. Thanks are due to John O’Shea and to the sponsors for organising the event.
The London Branch Golf Day was held on 1st June at Silvermere GC, Surrey. We were lacking some teams this year because of work commitments but the nine teams who took part enjoyed pleasant weather and London Branch Chairman Brian Goldie attended to present the trophies at the end of proceedings. The morning nine hole Texas Scramble was won by John Burton, Brian Dunsterville, Terry Capps and Barry Tunnell comprising the team from Winn and Coales and they were presented with the Denso Cup for their score of 29.3 net. The afternoon 18 hole team Stableford was won by Malcolm Hyde, Nobby White, Andrew Sheppard and Darren Richardson of the JPV 2 team with 80 points and they were duly presented with the Len Townsend Memorial Trophy Rose Bowl. The prize for best individual score went to Paul Spallan of JPV 1 for 38 points; Gary Carter of JPV 1 hit the longest drive and Carl Powell of PPG was nearest the pin. Thanks are due to Mike Moffat, Derek Hoskins, Jim Glynn and Geoff White for organising the event and to Dawn White for officiating with scores and results.

MAJOR COATINGS INDUSTRY SEMINAR TO BE HELD AT SURFACE WORLD & CORREX 2011

SURFACE WORLD & CORREX 2011 – 1st to 3rd November, NEC, Birmingham, UK

‘Proskills & the BCF - working together on behalf of employers to promote and support the coatings industries within the skills system’ is the title of a major British Coatings Federation seminar, which will run alongside this year’s SURFACE WORLD & CORREX exhibition at the NEC in early November.

By 2020, the number of jobs that require higher level (4+) skills in the coatings industry is expected to double. The most frequently predicted future skills gaps are in technical areas, and will be driven by innovation in products and the adoption of new technology. The BCF seminar will cover the role of Proskills, as the Sector Skills Council, and the BCF, as the trade body, and the work that they do together with employers to support and improve skills within the coatings and allied industries, to attract new talent and to ensure that the sector is recognised as a vital contributor to the UK’s economy.

The event is being held at the NEC Birmingham on the 2nd November from 11.00 hrs to 13.00 hrs. The full seminar programme can be uploaded as it becomes available from www.coatings.org.uk/Events_BCF/Coatings_Industry_Training_Seminar.aspx but in the meantime please email alison.brown@bcf.co.uk for further details.

SURFACE WORLD & CORREX 2011 is the only international exhibition staged in the UK dedicated to product finishing, surface engineering, coatings and advanced surface treatments, together with corrosion management and control. It will run from November 1st to 3rd this year at the NEC Pavilion.

The exhibition will showcase the latest technologies, products and services embracing protective, decorative and functional coatings of all kinds, component cleaning and degreasing, surface pretreatments, electroplating and allied processes, abrasive blasting and mechanical finishing, plus state-of-the-art techniques in the testing and measurement of coatings and surface integrity, advanced methods of corrosion control, environmental control and energy conservation.

These processes play vital roles in the design, production and the maintenance of countless components, products, fabrications and structures, and many important new developments will be featured that will be of major interest to design, production and maintenance specialists working in all sectors of industry – from construction engineering to aerospace.

SURFACE WORLD & CORREX 2011 is sponsored by Surface World & Product Finishing magazine, the leading UK publication in the surface engineering and finishing industry, and is organised by Hill Media Ltd.

A limited number of stands are still available at the exhibition – for exhibitor and visitor information, log onto www.surfaceworldshow.com or contact Nigel Bean at Hill Media Ltd.
Surface World 2011 will run alongside Correx - the national corrosion conference and exhibition.

Correx 2011 will be a major event in the UK corrosion industry - aimed at everyone interested in coatings and cathodic protection: engineers, specifiers and practitioners.

Conferences, workshops, courses and seminars will run in tandem with the exhibitions.

It’s the finish that helps sell your product - come and see the UK’s only international showcase for the product finishing, surface engineering and for the first time the corrosion control markets. All the leading surface finishing suppliers all under one roof over 3 days.

All this will ensure that Surface World 2011 with Correx 2011 will be the biggest event in the surface treatment, coatings and finishing industry for many years.

For more information contact Nigel Bean on:
Tel: +44 (0)1442 826826
E-mail: nigelbean1@aol.com
or visit the website at: www.surfaceworldshow.com

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Technical Topics No.32: “SCIENCE COUNCIL & HOW TO REMEDY (& PREVENT) WATER LINE ATTACK ON COATED STRUCTURES”

by Technical Secretary, Douglas J Mills

Just under a year ago the Science Council, in their regular review of our procedures to award the Chartered Scientist designation found them wanting in some ways. In particular, they were concerned about the low numbers of chartered scientists that we registered. Consequently our license to award CSci was suspended pending the introduction of new, simplified, application procedures. Recently the Science Council re-visited us in Northampton to discuss lifting the suspension and I am pleased to report that they are now satisfied that our new proposals met all their concerns. They were also most impressed with the premises at Northampton and the commitment of our support team, Denise and Gwynneth. So the good news is that we will have our licence renewed. In connection with the main point (how to make becoming a Chartered Scientist more attractive to our members), it has been decided to approach all the ICorr Fellows offering them the chance to apply in a simplified process. The assumption is that if you are adjudged sufficiently estimable in the corrosion field to be a Fellow and you are applying some science in your work (and most Fellows probably do) then you are worthy of becoming a Chartered Scientist. On the financial side Council have agreed to subsume the extra annual cost of Chartered Scientist registration into the annual subscription for Fellow (i.e. it would not cost an individual Fellow who got CSci through the Institute any more money). This seems to be a good deal and so your Technical Secretary has decided to apply for Fellowship himself! (normally he eschews these sort of things – all the accolades in the world + all the money in the world, he would trade for a stroll down Kings Parade in Cambridge with Claudia Schiffer (or, if unavailable, Mrs Mills on his arm!). Anyway watch this space. We will outline the procedures and the advantages of becoming a Chartered Scientist in the next edition of CM.

On the technical front, I thought I would pick up on what was talked about in the last CM ie accelerated low water corrosion (ALWC). But this time instead of uncoated steel piles, the problem has occurred on coated supports. This arises from a trip to Poland (Gdansk area) that I made last week. The reason for my trip was unconnected (we have an Erasmus exchange programme with Gdansk University of Technology involving exchange of staff and students). But I was made aware of it while I was there. The main place with a problem is a pier in Cydnia (however as tourists we observed a quite similar situation on a pier in Sopot - a major resort town near Gdansk on the Baltic sea with the reputedly longest pier in Europe). The Baltic sea is interesting in having less chloride in it than normal sea water (about 0.5% I was told). But as you can see from the pictures that does not stop it being aggressive particularly at the water line. The challenge is how do you remedy the situation? It appears that this waterline area had the same thickness of paint (about 150μm) as the rest of the structure. Ok for a car body but probably too thin for a steel structure exposed to a chloride environment. So how do you get the extra paint on? Removing the supports is not an option. So the remedial work has to be done in situ. There are coatings (epoxy mastic) that can be put on under water. But then there is the need to get the old system fan off (could be application for waterjetting which as regular readers will know I am a big fan off) I passed on the information to the people in Gdansk about the interesting LATREAT process discussed at the CED meeting in May and covered in the recent CM (luckily I’d taken my May/Jun copy of CM to Gdansk and David Nuttall’s report proved useful). It was felt that although the process was very interesting, the nature of the structure (circular coated supports) probably made it unlikely that it would be applicable. Could this problem have been identified earlier ie before it got to this stage. My view is it could. Obviously paint inspectors would have picked up the lack of thickness. But the lack of protection being afforded could also have been picked up by an electrochemical technique eg by making annual or biannual measurements using eg Electrochemical Noise (or Electrochemical Impedance) methods (in situ measurements on coated structures are also of great interest to the group in Gdansk). You measure at one time and it is IE9 ohms-cm2, the next time it is IE8, the next time 1E7. You can then assume the paint system is going to soon reach a point when it will no longer be affording protection. But before that you get an extra coat on!

As usual any comments on this months TT please send to: Douglas@harrbridge.freeserve.co.uk

Acknowledgement: Thanks are due to Andrzej Miszczyk (GUT) for the pictures and to both to him and Zbigniew Klenowicz for discussions relating to the technical part of this article.
SELECTIVE PLATING OF METAL MATRIX COMPOSITES ON TITANIUM ALLOYS

Haiming Xiao and Sid Clouser  SIFCO Applied Surface Concepts, Independence, Ohio, USA

Abstract

Metal matrix composites were deposited onto the surface of titanium alloys by selective brush plating. The adhesion of the composites to the titanium alloys is good due to a unique surface preparation applied by brush plating. The metal matrix deposits examined include chromium carbide in a cobalt metal matrix also applied by a unique brush plating process. Data showing the improvement in surface properties due to the composite coating is presented.

Introduction

Titanium and titanium alloys have been widely used in aeronautics & aerospace industries primarily due to their exceptional strength to weight ratio, elevated temperature performance and corrosion resistance. However, a wider use of the titanium and titanium alloys is limited by their poor tribological properties such as poor abrasive wear resistance, poor fretting behavior and high coefficient of friction. Attempts to improve the tribological properties (especially the wear resistance) of titanium alloys have been made for a long time, but this problem remains a pressing one.

Electroplating is an effective and convenient method for applying a coating onto a metal. Our earlier work indicated that an adherent metallic coating was able to be applied to the surface of titanium 6Al-4V alloy by brush plating after electrochemical removal of the oxide layer and rapid application of a nickel strike. This offers opportunities of applying a desirable coating to the titanium alloy through brush plating.

It is known that a metallic-ceramic or metal matrix composite (MMC) can offer superior hardness, wear resistance and oxidation protection at high temperatures. A MMC seems an ideal candidate coating material for titanium and titanium alloys to improve their surface tribological properties. A Co-Cr$_3$C$_2$ metal matrix composite plated on various substrates has been widely used for coating some turbine engine components. Selective brush plating has some obvious advantages such as it operates more flexibly and conveniently. The present work is to apply a MMC coating onto titanium 6Al-4V alloy by selective brush plating and then examine the performance of the coating on the surface.

Experimental

Titanium 6Al-4V sheets 1.1 mm thick were obtained from Tico Titanium. The sheets were mechanically finished as part of the surface preparation process using wet abrasion with red 3M Scotch-Brite®. The chemicals used to formulate surface preparatory solutions and plating baths were technical grade without further purification. Deionized water was used for solution makeup and rinsing. The nickel strike layer was applied using an acid nickel sulfate plating solution, SIFCO 2080/5600. The process for preparing, etching, activating, and plating a titanium alloy is described in reference 1. Briefly, following mechanical surface preparation the titanium alloy surface was anodically etched in an acid nickel chloride solution followed by immediately reversing polarity of the power supply to cathodically activate the surface. While the surface was under cathodic potential control the nickel strike plating solution was introduced into the inter-electrode gap to replace the activating solution and commence deposition. Plating was carried out at ambient temperature.

A cobalt plating solution containing 80 g/l Co$^{2+}$ added as cobalt sulfate heptahydrate and sulfuric acid at pH 1.2 was made using technical grade chemicals followed by filtering through activated carbon. Ceramic powders, chromium carbide Cr$_3$C$_2$ of particle size of 1 - 6 μm were added to solution as received. The concentration of Cr$_3$C$_2$ in the solution was controlled between 300 and 500 g/l.

Cr$_3$C$_2$ particles were insoluble in the cobalt solution and normally settled to the bottom of the reservoir because of high mass density (6.70 g/cm$^3$). A suspension of the particles was achieved by ultrasonic agitation and gas stirring. A peristaltic pump was used to circulate the electrolyte solution to the gap between the anode and the cathode. Stagnation of the ceramic particles along the route was prevented by a funnel or sloped pan to induce particle movement back to the solution reservoir for recirculation. The MMC plating was conducted at room temperature and up to 40°C. The current density was tested in the range of 0.3 – 1.20 A/cm$^2$.

A SIFCO rectifier, Model CP-II 60-25, supplied adjustable plating current and was capable of switching between anodic and cathodic polarities rapidly upon sequence requirement. Figure 1 shows a setup for brush plating a MMC onto a panel. Other geometrical shapes were plated with a similar setup.

Separate anodes were used for the titanium surface preparation and the MMC deposition though the construction of both anodes was similar; a noble metal coated titanium mesh supported by a polypropylene or graphite block, figure 2. Holes drilled through the block allow solution (or suspension) to flow through the anode structure onto the work piece. Anode cover materials with different porosities were employed in the tests. The anode to cathode distance was determined by the thickness of the anode cover material, which was approximately 5 mm.

The measured characteristics of the MMC deposit on the titanium alloy surface were adhesion, surface finish, hardness, Taber wear index, and residual stress. The adhesion tests included tape-pull, repeated bend, and machining. The surface finish (i.e. roughness) was measured using a Mahr profilometer (Pocket Surf PS1), the hardness with a Vickers hardness tester, and Taber wear following ASTM D4060-95. Residual stress was measured using X-ray diffraction by Proto Manufacturing. The cross-sectional analysis was conducted using optical and scanning electron microscopy. X-ray florescence was used to determine the concentration and distribution of the carbide in the deposit. Some MMC deposit properties were measured on a steel substrate.

![Figure 1. Diagram of the process of brush-plating MMC onto a metal surface](image-url)
Results and Discussion

Figure 3 shows a cross-section of a brush plated nickel coating on a Ti-6Al-4V coupon. The interface between the titanium and nickel is free of bulk oxide. Figure 3 shows the smooth surface of the original titanium was microetched during pretreatment. Nickel plated readily into the microroughness features. The adhesion was checked by tape and bend tests. The nickel deposit did not separate from the titanium alloy substrate during tape or bend tests. Thin panels of Ti-6Al-4V and Ti-6Al-6V-2Sn broke in one, 180 bend without separation or peeling of the deposit. Grade 2 titanium can be bent a full 180° without breaking. The bend test was more rigorous in revealing low adhesion than the tape test.

Adhesion – The adhesion to Ti-6Al-4V of nickel plated and layers overplated on nickel was tested by several methods. The adhesion was acceptable when checked by the tape and chisel tests in AMS 2451A. The bend test of ASTM B571 showed the Ti-6Al-4V substrate broke before adhesion failed. Adhesion was satisfactory in heat/quench (250° C into RT water), scribe, and chisel-knife test given in B571. The nickel to Ti-6Al-4V tensile adhesion was > 6,000 psi measured according to ASTM C633.

The adhesion of cobalt chromium-carbide composite deposits to Ti-6Al-4V and steel substrates was enhanced by an intermediate nickel bonding layer. The MMC deposit on Ti-6Al-4V alloy and other materials (e.g. steel) passed tape, bending and machining tests with good adhesion.

The MMC did not flake off the base after ten thermal cycles between room temperature and 800° C. This could be attributed to a small difference between the thermal expansion coefficients of the coating and the base materials.

Mechanism – The electrochemical deposition reactions in the cobalt sulfate based electrolyte are:

\[ \text{H}_2\text{O} \rightarrow \frac{1}{2}\text{O}_2 + 2\text{H}^+ + 2\text{e}^- \text{ on the anode} \]
\[ \text{Co}^{2+} + 2\text{e}^- \rightarrow \text{Co on the cathode} \]

Chromium carbide powder did not dissolve in the solution to form ions (cations or anions). The carbide particle was electrophoretically co-deposited along with cobalt on the cathode. These particles were small, in the range of 1 – 6 μm. Such small particles normally tend to agglomerate to each other. Therefore, it is important to use right agitation or stirring to break or prevent agglomeration and keep the particles highly suspended and dispersed in the solution for electrophoresis.

Particle Distribution – The distribution of carbide particles throughout the metal matrix was examined using optical micrographs and SEM images of cross-sections of plated parts. A uniform distribution of ceramic particles in the metal matrix is shown in Figures 4 - 6. The rounded or squared asperities are chromium carbide particles encased in metallic cobalt. The micro-etched deposits are as polished, without a microetch.

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<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Material</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Abrade</td>
<td>Scotch-Brite®</td>
<td>Wet with Etch/Activate Solution</td>
</tr>
<tr>
<td>2</td>
<td>Etch</td>
<td>Etch/Activate</td>
<td>14 V anodic, 10 seconds</td>
</tr>
<tr>
<td>3</td>
<td>Activate</td>
<td>Solution</td>
<td>4 – 8 V cathodic, 1 minute</td>
</tr>
<tr>
<td>4</td>
<td>Strike Plate</td>
<td>Acid Nickel</td>
<td>8 - 18 V cathodic, 0.078 A*hr/cm²</td>
</tr>
</tbody>
</table>

The surface of the as-plated composite had a matte grey appearance. X-ray fluorescence analysis of the distribution of Cr₃C₂ across the deposit was uniform within ±3 wt.% The Cr₃C₂ content in the deposit was as high as 50 wt.%. The carbide content was controlled between 10 and 50 wt.% through adjusting deposition parameters. Since different end use applications may require different content of Cr₃C₂, the feasibility of controllable Cr₃C₂ content is important.
Hardness – The presence of the cobalt chromium carbide coating on the titanium alloy increased the surface microhardness from 330 HV to over 400 HV as deposited. Pure chromium carbide, known to be very hard with 1200 VHN (Vickers hardness number) contributed to the increase of the hardness. The carbide particles in the metal matrix serve as the aggregates contributing to the higher hardness whereas the metal matrix functions like a carrier for the hard aggregates. The higher concentration of the chromium carbide content in the deposit the harder the deposit should be. However, this trend did not always appear in the brush-plated deposits. The size of the carbide particle may have had a role in contributing to the hardness.

The thermal stability of the Co-Cr₃C₂ composite was tested by heat treatments at a series of temperatures up to 815°C, Table 2. Hardness measurements indicated the Co-Cr₃C₂ composite was thermally stable. Typically after heating a pure metal to an elevated temperature the hardness of the metal decreases. The hardness of the composite did not decrease after heating to elevated temperatures, in fact a somewhat higher hardness was measured after heat treatment.

Table 2. Hardness (VHN) of Co-Cr₃C₂ deposit after 1 hour heat treatment.

<table>
<thead>
<tr>
<th>Cr₃C₂ wt%</th>
<th>As deposited</th>
<th>Heat Treatment Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>400°C</td>
<td>750°C</td>
</tr>
<tr>
<td>12 - 15</td>
<td>442</td>
<td>505</td>
</tr>
<tr>
<td>25 - 30</td>
<td>418</td>
<td>485</td>
</tr>
</tbody>
</table>

Normally a metal coating is oxidized upon exposure to high temperatures. The MMC Co-Cr₃C₂ coating exhibited a strong oxidation resistance at high temperatures. The MMC Co-Cr₃C₂ plated parts after exposure to 800°C for 30 hours did not show any sign of being oxidized. A Ti-6Al-4V panel showed yellow dust indicating some extent of oxidation occurred after 1 hour at 800°C. Interestingly, a steel panel was severely oxidized after exposure to 800°C for one hour.

Taber Wear Index – The Taber wear tests were performed following ASTM Test Method D 4060-95. The wear index (μg/cycle) is calculated as follows:

\[ \text{Wear index} = \frac{(A - B) \times 1000}{C} \]

where A is the weight of test specimen before abrasion, mg, B is the weight of the test specimen after abrasion, mg, and C is the number of cycles. A 1000 g load was applied to the CS-17 abrasive wheel.

Figure 7. Taber wear index measured for MMC Co-Cr₃C₂ and Ti-6Al-4V.

Table 3. Residual stress of Co-Cr₃C₂ and Co coatings on Ti-6Al-4V alloy determined by XRD.

<table>
<thead>
<tr>
<th>Coating</th>
<th>Stress, kpsi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-Cr₃C₂</td>
<td>31 ± 3</td>
</tr>
<tr>
<td>Co</td>
<td>33 ± 3</td>
</tr>
</tbody>
</table>

Key Characteristics – Table 4 summarizes the surface characteristics of the cobalt-chromium carbide brush plated composite. The key characteristics of Ti-6Al-4V alloy were improved by a brush plated MMC coating. The MMC improvements are more significant than those of a Co metal plated coating especially after exposure to high temperatures. The improved surface characteristics should lead to increased resistance to fretting, adhesive wear, and abrasive wear.

Future Work

Future work should investigate the cause of the high residual stress. The chemistry of the cobalt plating solution and the deposition parameters should be examined for their contribution to internal stress.
First presented as Surfair Biarritz, France 10-11 June 2010.

### References


### Table 4. Key characteristics of the brush plated metal-matrix composite Co-Cr₃C₂ coating on titanium alloy compared to brush plated cobalt.

<table>
<thead>
<tr>
<th>Property</th>
<th>Brush Plated Co-Cr₃C₂ (wt. %)</th>
<th>Brush Plated Co-Cr₃C₂ (wt. %)</th>
<th>Brush Plated Co-Cr₃C₂ (wt. %)</th>
<th>Brush Plated Co-Cr₃C₂ (wt. %)</th>
<th>Brush Plated Co-Cr₃C₂ (wt. %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cr,C₂ (wt. %)</td>
<td>10 – 50</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Uniformity of Cr₃C₂ (wt.%)</td>
<td>± 3%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Hardness (VHN)</td>
<td>360 – 500</td>
<td>360 – 390</td>
<td>330 – 340</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardness change after</td>
<td>&gt; + 10 %</td>
<td>&gt; - 10%</td>
<td>&gt; -5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400°C exposure</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Taber wear index (μg/cycle)</td>
<td>8.0</td>
<td>17</td>
<td>21.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taber wear index after</td>
<td>4.0</td>
<td>---</td>
<td>21.5</td>
<td></td>
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<tr>
<td>400°C exposure (μg/cycle)</td>
<td></td>
<td></td>
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<tr>
<td>Surface finish as deposited,</td>
<td>0.5 - 1.5</td>
<td>0.5 - 1.5</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ra (μm)</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Residual stress (kpsi)</td>
<td>31 ± 3</td>
<td>33 ± 3</td>
<td>---</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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BEASY has been providing support to engineers to solve corrosion challenges for in excess of 30 years. It has developed a team experienced in understanding the problems faced by industry, and in demonstrating how modelling can provide information of direct practical value.

BEASY tailors its galvanic corrosion modelling services to address the specific requirements of each individual project.

Applications include both offshore facilities (eg jackets; FPSOs; associated sub-sea structures; pipelines; wind turbine support structures; docks; jetties etc), and onshore structures (storage tanks; well casings; pipelines etc). The modelling can be provided at both macro (eg overall oil field), and micro (eg specific structure or section of the structure within that oil field) levels in order to address the specific project objectives.

The capability can be applied flexibly to assist engineers with CP responsibility to:

- Assess the impact of alternative ‘what-if’ scenarios, providing data to assist selection of an optimized CP system design
- Identify the behaviour of structures over the design life, and the implications for the CP system
- Evaluate and understand the behaviour of structures arising from proposed retrofit implementations to extend the life of the asset, and to understand the impact of alternative design solutions
- Provide valuable inputs to assist with definition of the timing and scope for asset inspection (survey) and maintenance programmes
- Improve understanding of interference effects, and evaluate alternative remedial solutions

Sacrificial, impressed and mixed CP systems can be accommodated (or purely galvanic effects assessed i.e where there is no CP system in use), and the modelling takes account of the appropriate IR drops in the structure and CP system.

Data provided includes, for example, protection potentials and current densities on the surfaces of the structure; potentials at reference electrode locations; and remaining anode mass/life.

For further information contact:
t.froome@beasy.com

SEASHIELD PASSES 22 YEARS SERVICE ON SCOTTISH BRIDGE PILES

This year marks the 40th anniversary since Winn & Coales Denso SeaShield marine pile protection systems have been increasingly used in some of the most harsh environments on the planet. An opportunity to see how effective SeaShield has been over 22 years recently came up at the Kyle of Tongue bridge, when the Highland Regional Council had to remove a SeaShield 200 system to replace the cathodic protection system. The replacement scheme was carried out by Concrete Repairs Ltd, whose main Scottish base is in Falkirk.

In 1989 an early version of Denso SeaShield 200 system was installed on a pile at the Kyle of Tongue bridge. This comprised of Denso S105 Paste, Denso Marine Piling Tape and an Outer Jacket to give mechanical protection which was attached by bolts. Concrete Repairs found that although the outer layer of the Denso Marine Piling Tape had partially dried out over the 22 years, the inner layer still exhibited good protective properties. (see photo 1)

Furthermore, the steel on the pile under the tape did not exhibit any signs of corrosion. (see photo 2)

When compared with the condition of an adjacent pile which did not have the SeaShield 200 protection, there was notably less corrosion on the protected pile. The unprotected pile had significant corrosion, particularly in the area exposed above the high water mark. (see photo 3)
**DENSO TAPE CORROSION PROTECTION FOR BRIDGE TIE BARS**

Winn & Coales Denso Tape was specified by main contractors Jackson Civil Engineering to protect bridge abutment tie bars on the £16m Sittingbourne, Kent, Northern Relief Road at Church Wharf. Application of the Denso Tape to tie bars giving support to sheet piled walls was carried out by Dywidag Systems, who manufacture and supply the tie system incorporated in the bridge construction over the estuary at Milton Creek, Sittingbourne.

This latest 1.4 km single carriageway road section will give direct access to the A249 from the Eurolink Estate, and connects two sections of the relief road already built by the developers. Completion is scheduled for the end of this year.

Denso Tape is a non-woven synthetic fibre fabric impregnated and coated with an adhesive compound based on petrolatum.

**40 YEARS AND STILL GOING STRONG**

Winn & Coales (Denso) Ltd are very proud to announce in 2011 that their Denso SeaShield marine pileprotection systems have now been effectively working in some of the most harsh and demanding environments on the planet for over forty years. This is no small achievement and Winn & Coales (Denso) Ltd can now officially rank these systems in the same league as other enduring Denso products, some of which have now been in service for over 80 years. Anyone who has used Denso products will know that they are not in the business of supplying temporary fixes to corrosion prevention problems and pride themselves on providing long-term, cost effective solutions. The SeaShield range of systems have been developed with this purpose in mind to protect marine structures where corrosion is a major problem in splash zones, inter-tidal and subsea environments and the difficult area where the jetty pile meets the jetty platform. These areas are extremely vulnerable due to the constantly changing mixture of air, temperature and chloride laden water; all of which are the perfect mixture for severe corrosion. The result of this will cause structures to become unsafe over time and extremely costly to repair. SeaShield Systems now have a 40 year proven track record, providing totally effective protection for steel, wood and concrete jetty piles in highly corrosive environments. This long term protection is achievable irrespective of cylindrical, hexagonal or square structure pile designs. Winn & Coales (Denso) Ltd, originally established in 1883, are well known for the reliability, efficiency and longevity of their products and have built an enviable reputation based on problem solving for their customers. Apart from the UK, they also have subsidiaries in America, Canada, Australia, New Zealand and South Africa as well as a global network of over 70 agents making the products available virtually anywhere in the world. Just a Drop in the Ocean for Denso - 40 Years of Worldwide SeaShield Marine Pile Protection and Still Going Strong.
FASTER TANK CLEANING USING LESS WATER WITH PTFE NOZZLE

A new tank washing nozzle made from PTFE which delivers a slow-moving, high impact spray action against internal surfaces of tanks and vessels for effective removal of scum rings, or tougher residues, has been introduced by BETE Ltd. The HydroWhirl Poseidon™ tank washing nozzle is an important addition to the HydroWhirl range, and is ideally suited to cleaning and wash down applications in food and beverage industries, general processing, chemical and pharmaceutical industries.

The HydroWhirl Poseidon nozzle benefits from a simple, yet innovative nozzle head design which provides reliable flow-through of water and cleaning solutions through a rotating head at the tip of the assembly. The combination of the spray pattern and the impact with a slow and nearly constant speed rotation, results in a targeted, highly effective cleaning action which quickly breaks up and washes away contamination, even for stubborn residues.

The nozzle is designed for complete 360º omni-directional coverage and requires lower pressures and therefore uses less water compared to conventional, static tank washers. It is also designed for quick and easy disassembly, inspection and reassembly using basic hand tools, so downtime is minimised.

The HydroWhirl is made from FDA-approved materials for use in Clean-in-Place (CIP) applications and is ideal for anyone who needs a polymer nozzle for reliable, efficient cleaning of tanks, vessels and other interior spaces.

For further information contact: Ivan Zytynski, BETE Ltd, PO Box 2748, Lewes, East Sussex, BN8 4BA, UK Tel: +44 (0) 1273 400 092 Fax: +44 (0) 1273 401 220

VALVE POSITIONERS DESIGNED FOR TOUGHEST CHALLENGES

Where industrial applications demand the highest levels of safety and reliability process control systems need to be able to withstand the effects of the most challenging potential threats. Series 3731 explosion-proof valve positioners from SAMSON CONTROLS are housed in a rugged enclosure which, even if an explosive atmosphere forms inside the enclosure and ignites the enclosure will withstand the explosion preventing the passage of flames out to the explosive surroundings.

In addition to their exceptional durability these intrinsically-safe positioners provide outstanding accuracy and are easy-to-operate, a single rotary pushbutton is all that is required for start-up; turn to select parameters and push to activate them. This convenient method of operation is still possible in hazardous areas because the shaft design of the rotary pushbutton through the housing is explosion-proof. Also, the design of the enclosure with its separate terminal compartment, allows direct cable entry or connection without spark barriers for cable conduit systems.

An easy-to-read liquid crystal display ensures that relevant data is visible at a glance and regardless of the valves mounting position, data is never displayed upside down because the display can be rotated by 180° at the push of a button.

The analogue control helps the positioner achieve outstanding positioning accuracy which allows the microprocessor to concentrate on other tasks. The positioners can be conveniently configured on-site, or by using HART communication, while the additional option of fully integrating EXPERT valve diagnostics into the positioner, provides all the necessary information for predictive maintenance.

For further information contact: Samson Controls, Redhill, Surrey, RH1 5JQ, UK www.samsoncontrols.co.uk Tel: 01737 766391 Fax: 01737 765472
BAC ACHIEVES ATEX CERTIFICATION FOR CATHODIC PROTECTION TRANSFORMER RECTIFIERS

Leading cathodic protection (CP) provider, BAC Corrosion Control Ltd (BAC) from Telford, UK has launched a new range of transformer rectifier (TR) developed for use in potentially explosive atmospheres and certified to ATEX 94/9/EC.

The units have been developed so that they are suitable for installation into Zone 1 and Zone 2 hazardous areas.

The units are oil cooled, thyristor controlled power supplies capable of operating in either manual or automatic potential control. As with all Zone 1 and Zone 2 electrical equipment, the design and integrated management systems were independently audited and certified by SIRA Certification Services, a notifying body for ATEX.

Jason Peters, the assigned ATEX responsible person and Electrical Engineering Supervisor at BAC commented “In the ever increasing competitive world that BAC operates, we are working hard to build on the advantages and unique range of our products. We are now licensed to both build and place on to the market Zone 1 hazardous oil filled transformer rectifiers”.

The certified units will allow BACs client’s and our own engineers more flexibility in CP system design by allowing the TR units to be placed in hazardous areas. Additionally systems can be provided where before it might have been difficult to provide an acceptable solution.

BAC have been awarded the EC type Examination certificate: SIRA07ATEX7168.

For further information contact: BAC Corrosion Control tel: +44 (0) 1952 290321 fax: +44 (0) 1952 290325 email: sales@bacgroup.com www.bacgroup.com

TOP AWARD FOR INNOVATIVE CORROSION TREATMENT PROCESS

The innovative corrosion treatment system LATreat™ – developed and patented by BAC Corrosion Control and Mott MacDonald – has won the Research, Studies and Consulting Award at the Association for Consultancy and Engineering (ACE) Engineering Excellence Awards.

ACE represents the interests of the UK consultancy and engineering industry and is the leading business association in this sector, with around 650 members. Their Engineering Excellence Awards showcase the finest achievements of consultancy and engineering firms and the innovation that makes the industry crucial to local, national and global economies.

Winner of the Research, Studies and Consulting Award, LATreat™ is a highly innovative, environmentally friendly treatment that uses only the components of seawater to sterilise and then deposit a protective coating to marine steel structures affected by accelerated low water corrosion (ALWC). ALWC can cause premature perforation of unprotected steel and if untreated can lead to premature failure of a structure.

The LATreat™ process involves passing a phased electrical current through seawater. It takes about five days and does not require port closure. It requires no materials, creates no waste, and needs no costly ongoing maintenance. All equipment used is removed on completion of treatment with no requirement for permanent installation of expensive control equipment or long-term monitoring. LATreat™ is also significantly cheaper than cathodic protection systems, particularly when lifecycle costs are taken into account. Overall cost savings can be in the order of 50%.

In 2006 the Technology Strategy Board – the UK government’s national innovation agency – presented the project team with the opportunity to fully develop LATreat™ as a commercial product. Mott MacDonald put together a consortium comprising BAC Corrosion Control, Aberdeen Harbour Board, Port of London Authority, Shoreham Port Authority and Hutchison Ports to develop and test the effectiveness of LATreat™ under real conditions. Manchester University joined the team as its academic partner and carried out research to fully optimise the process. BAC Corrosion Control also developed and manufactured enhanced electrical current apparatus used during the process.

Full scale site trials have been carried out at UK ports over several years. These have demonstrated the effectiveness of LATreat™ in dealing with ALWC in operating port facilities and producing a sustainable, durable and cost-effective treatment.

The ACE Engineering Excellence Awards ceremony was held at the newly reopened St Pancras Renaissance Hotel in London. Mott MacDonald’s Group chairman Keith Howells and LATreat™ project director Neil Henderson were present to receive the award.

Dr Henderson said, “We’re thrilled to have won this award, which recognises over a decade of research and development. The involvement of UK ports to undertake full-scale site trials has been a major step in demonstrating the effectiveness of the process under real conditions. We’re now looking forward to using LATreat™ as a commercial product. As ALWC has been identified at over 90% of UK ports and throughout Europe, the USA, Canada, the Caribbean and Japan, the potential benefits of LATreat™ to the global ports sector are huge.”
Solent Protective Coatings Limited (SPC) recently purchased additional metal spraying equipment from Metallisation in order to fulfill another contract win. SPC has been a customer of Metallisation for around two years and is a huge fan of metal spraying. The company purchased a new MK73 Flamespray system and arranged additional training for its operators to enhance their existing skills.

Solent Protective Coatings won a contract to metal spray a new footbridge to be installed over a railway track at Hilsea in Portsmouth. All components of the footbridge were metal sprayed including two 12 metre stair sections, the 20 metre long main bridge deck, weighing 10 tons, and the support columns. The surface of the bridge sections were grit blasted to SA 3 before being thermal sprayed with aluminium to 100 microns, using the Metallisation MK73 Flamespray system. An epoxy sealer was then applied to a maximum of 25 microns dry film thickness. A final primer and topcoat were applied to complete the project.

Metal spraying involves the projection of small molten particles onto a blast prepared surface. Upon contact, the particles flatten onto the surface, freeze and mechanically bond, firstly onto the blasted substrate and then onto each other, as the coating thickness is increased. To create the molten particles, a heat source, a spray material and an atomisation/projection method are required.

In the Flamespray process a wire is fed by a driven roller system through the centre of an oxygen-fuel gas flame where it is melted. An annular air nozzle then applies a jet of high-pressure air, which atomises and projects the molten material, in this case aluminium, onto the bridge section surfaces. A video of this application can be seen on the Metallisation website www.metallisation.com and is entitled ‘Flame Spray TSA on Footbridge’.

Solent Protective Coatings Limited, based in Southampton, is a well established company specialising in surface preparation and protective coatings. Key services include blasting, steel preparation, protective coatings and UHP water blasting. Metallisation Limited is the global leader in metal spraying equipment and consumables. Metallisation also provides specialist training for its customers, ensuring maximum effectiveness of the metal spraying equipment and consumables.

David Skeates, Managing Director at Solent Protective Coatings, says: “We have a great relationship with the Metallisation Team. At Solent we are committed to building strong working relationships with our customers and partners. Metallisation shares these beliefs and provides an excellent service to us. I wouldn’t hesitate in recommending them to any company needing metal spraying equipment, consumables or training.”
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Tel: 01236 442391 Fax: 01236 702875

Website: www.torishima.eu
DOORBONE EQUIPMENT
Tel: 01642 673391 Fax: 01642 673210
Email: sales@doorboneyquipment.co.uk
Website: www.doorboneyquipment.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
Tel: 01606 836233 Fax: 01606 836610
www.gmagarnet.co.uk

STORK TECHNICAL SERVICES UK LTD
1 Minto Place, Altens Industrial Estate, Aberdeen, AB12 3SN
Tel: 01224 898282 Fax: 01224 898202
Email: info@stork.com
www.storktechnicalservices.com

INTERTEK COMMERCIAL MICROBIOLOGY LTD
Tel: 01224 706062 Fax: 01224 706012
Email: cmlenquiries@intertek.com
Website: www.intertek.com

JETCHEM SYSTEMS LIMITED
Cuba Industrial Estate, Stubbins, Ramsbottom, Lancashire BL0 0NE
Tel: 01706 828 888 Fax: 01706 828 000
Email: sales@jetchem.com Website: www.jetchem.com

METACOR
External Corrosion Management Ltd, Suites 5 & 6, 221-229 Union Street, Aberdeen AB10 6BQ
Tel: 00 44 1224 621915 (ext119) Fax: 00 44 1224 621215
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
Tel: 01469 574715 Fax: 01469 571644
Email: sales@scangrit.co.uk Website: www.scangrit.co.uk

RECIPECAL ORGANISATIONS
ELSEVIER SCIENCE LTD
The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GD
Tel: 01865 843000 Fax: 01865 843010

INSTITUTE OF METAL FINISHING
Exeter House, 48 Holloway Head, Birmingham B1 1NQ
Tel: 0121 6227387 Fax: 0121 666316
Email: exeterhouse@instituteofmetalfinishing.org
www.uk-finishing.org.uk

MPI GROUP
Peel House, Upper South View, Farnham, Surrey GU9 7JN
Tel: 01252 732220 Fax: 01252 732221
www.protectivecoatingseurope.com

QUALITY CONTROL

TRAINING AND COATING INSPECTORS
ARGYLL-RUANE LTD.
Meadowbank Rd, Rotherham, South Yorkshire S61 2NF UK
Tel: +44 (0)1709 560459 Fax: +44 (0)1709 557705
E-mail: enquiries@ruanetpo.com
Website: www.ruanetpo.com

ELFALOCATION
ICATS REGISTERED COMPANIES

ICATS REGISTERED COMPANIES WITH QUALIFIED APPLICATORS

Alltask Limited
Alltask House, Commissioners Road, Strood, Kent, ME2 4EJ
T: 01634 298000

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

APB Construction (UK)
Unit 3, Bramley Way, Hellaby Industrial Estate, Hellaby, Rotherham, S. Yorkshire, S66 8QB
T: 01709 541000

APB Group Limited
Ryandra House, Ryandra Business Park, Brookhouse Way, Cheadle, Staffs, ST10 1SR
T: 01538 755377

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

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

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

Briton Fabricators Ltd
Watnall Road, Hucknall, Notts, NG15 6EP
T: 0115 963 2901

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

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

Coating Services Ltd
Partington Street, Mumps Bridge, Oldham, OL1 3RU, UK
T: 0161 665 1998

Coastline Preservation Ltd
Tredegar Wharf, Marine Parade Southampton, Hants, SO14 5JF
T: 02380 221480

Collins Engineering Railway Contracts
Salcombe Road, Meadow Lane Industrial Estate, Alfreton, Derbyshire, DE55 7RG
T: 01773 833255

Community Clean
11 Old Forge Road, Ferndown Industrial Estate, Ferndown, Wimborne, Dorset, BH21 7JR, UK
T: 0845 6850133

Corrocoat
Forster Street, Leeds, LS10 1PW
T: 01132760760

Denholm Industrial
21 Boden Street, Glasgow, G40 3PU
T: 0141 445 3939

Dyer & Butler Ltd (Rail)
Mead House, Station Road, Nursling, Southampton, SO16 0AH, UK
T: 02380 667549

ENC (Yorkshire) Ltd
Unit 3B Rotherham Road, Dinnington Sheffield, S25 3RF
T: 01909 567860

F A Clover & Son Ltd
Bardolph Road, Richmond Surrey, TW9 2LH
T: 0208 948 6321

Finclene SKJ Ltd
Waterloo Industrial Estate, Pembroke Dock, Pembrokeshire, SA72 4RR
T: 01646 622407

Forth Estuary Transport Authority
Forth Road Bridge, Administration Office South Queensferry, EH30 9SF
T: 0131 319 1699

Harrisons Engineering Lancashire Ltd
Judge Wilmey Mill, Longworth Road Billington, Clitheroe, Lancashire, BB7 9TP
T: 01254 823993

Herrington Industrial Services Ltd
Crown Works, Crown Road, Low Southwick, Sunderland SR5 2BS
T: 0191 5160634

H&H Painting Contractors Ltd
4 Hamilton Gardens, Mutley, Plymouth, PL4 6PQ
T: 07837 382619

Hunter Steel Coatings Ltd
4Pinfold Lane, Alltami, Mold, Flintshire CH7 6NZ
T: 01244 541177

Hyspec Services Ltd
Unit 3 Meadowfield Industrial Estate, Cowdenbeath Road, Burntisland, Fife, KY3 0LH
T: 01592 874661

Industrial Coating Services
5 Danesbury Crescent, Kingstanding, Birmingham, B44 0QP
T: 0121 384 2266

Industrial Painting
48-49 RCM Business Centres, Sandbeds Trading Estate, Dewsbury Road, Ossett, WF5 9ND
T: 01924 272606

Interserve Industrial
Unit 2, Olympic Park, Poole Hall Road Ellesmere Port, Cheshire, CH66 1ST
T: 0151 3737660

Jack Tighe Coatings
Sandall Lane, Kirk Sandall, Doncaster, DN2 1QR
T: 01302 880360

Jack Tighe Ltd
Redbourne Mere, Kirton Lindsey, Gainsborough, Lincs, DN21 4NW, UK
T: 01652 640003

25
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<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, Chestprow, Monmouthshire NP16 SYL</td>
<td>01291 623801</td>
</tr>
<tr>
<td>Merseyside 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, Tyne &amp; Wear, 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>Orrmac 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 2H</td>
<td>01902 870637</td>
</tr>
<tr>
<td>Paintel Ltd</td>
<td>26 St George’s Road, Saltash, Cornwall, PL12 6EH</td>
<td>07730 691227</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>02980 777070</td>
</tr>
<tr>
<td>Pyeroy Limited</td>
<td>Kirkstone House, St Omers Road, Western Riverside Route, Gateshead, Wear, NE11 9E2</td>
<td>0191 4932600</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>Rowecord Engineering</td>
<td>Neptune Works, Lusk Way, Newport, South Wales, NP20 2SS</td>
<td>01633 250511</td>
</tr>
<tr>
<td>Shutdown Maintenance Services Ltd</td>
<td>Kingsnorth Industrial, Hoo, Rochester, Kent, ME3 9ND</td>
<td>01634 256969</td>
</tr>
<tr>
<td>South Staffs Protective Coatings Ltd</td>
<td>Bloomfield Road, Tipton, West Midlands, DY4 9EE</td>
<td>0121 522 2373</td>
</tr>
<tr>
<td>Supablást (1984) Ltd</td>
<td>Jubilee Estate, Gorsey 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>Walker Construction</td>
<td>Park Farm Road, Foskete, DA9 9RR</td>
<td>01322 387000</td>
</tr>
<tr>
<td>Wardle Painters Ltd</td>
<td>Unit 5, Wimborne Building, Atlantic Way, Barry Docks, Glamorgan, CF63 3RA, UK</td>
<td>01446 748620</td>
</tr>
<tr>
<td>W G Beaumont &amp; Son</td>
<td>Beaumont House, 8 Bernard Road, Romford RM7 0HX</td>
<td>01708 749202</td>
</tr>
<tr>
<td>William Hare Ltd</td>
<td>Braileside House, Brandleholme Road, Bury, Lancs, B8 1JJ, UK</td>
<td>0161 609 0000</td>
</tr>
<tr>
<td>Abrasion Ltd</td>
<td>1 Montague House, 74 Bryantwood Road, London, N778B</td>
<td>07949 130168</td>
</tr>
<tr>
<td>E &amp; P Painting Contractors</td>
<td>Rossfield Road, Rossmore Trading Estate, Ellesmere Port, Cheshire, CH65 3AW</td>
<td>0151 9558141</td>
</tr>
<tr>
<td>Fairhurst Ward Abbotts</td>
<td>225 London Road, Greenhite, Kent, DA9 9RR</td>
<td>01322 387000</td>
</tr>
<tr>
<td>Gemini Corrosion</td>
<td>Broomhill Road, Spurrierhillock Industrial, Stonehaven, Aberdeen, AB39 2NH</td>
<td>01569 765488</td>
</tr>
<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>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,Billingham, TS23 4BX, UK</td>
<td>01642 371850</td>
</tr>
<tr>
<td>P C Richardson &amp; Co</td>
<td>Courville House, Ellerbeck Court, Stokesley Business Park, Stokesley, TS9 5FT, UK</td>
<td>01642 714791</td>
</tr>
<tr>
<td>Solent Protective Coatings Ltd</td>
<td>Tredgear Wharf, Marine Parade, Southampton, SO14 5JF</td>
<td>023 80221480</td>
</tr>
</tbody>
</table>
ICATS REGISTERED COMPANIES

Standish Metal
Potter Place, West Pimbo, Skelmersdale, Lancs, WN8 9PW, UK
T: 01695 455977

Tees Valley Coatings
Riverside Park Road, Middlesbrough, Cleveland TS2 1UT
T: 01642 228141

A1 Powder Coatings Ltd
Unit 4/5 Beta Buildings, Hazel Road Woolston, Southampton SO19 7HS
T: 0238 044 6874

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

BAE Systems Surface Ships Support Ltd
Room 213, Naval Base Headquarters, Building 1/100, PP127, Portsmouth, PO1 3LS
T: 023 92857279

Barrier Ltd
Stephenson Street, Wallsend, Tyne & Wear, NE28 6UE, UK
T: 0191 262 0510

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

BSM Nuttall Ltd
St James House, Knoll Road, Camberley GU15 3XW
T: 0782 5798440

Carrodus Contractors Limited
Unit 134, Medway Enterprise Centre, Enterprise Close, Strood, Kent, ME6 4SY
T: 01634 271786

Celtic Painting Consultancy Ltd
Rosedale, Carelicken Lane, Langstone Newport, Gwent, NP18 2JZ
T: 01633 400194

Coastground Ltd
Morton Peto Road, Capton Hall Industrial, Great Yarmouth, Norfolk, NR31 0LT
T: 01493 650455

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

GABRE (UK) LTD
9 Holme Road, Dromore, Omagh Co Tyrone, BT78 3BX
T: 02882 897950

G W Burton Ltd
New Court, Wooddalling, Norwich, Norfolk, NR1 6SA
T: 01263 584203

Harsco Infrastructure Services Ltd
Unit 3 Manby Road, South Killingholme, Immingham, North Lincolnshire, DN40 3DX
T: 01469 553800

Hi-Tech Surface Treatment Ltd
Unit B, Deacon Trading Estate, Chickenhall Lane, Eastleigh, Hants SO50 6RP
T: 023 80611789

H & S Decorating
Amministration Building, Forth Road bridge, South Queensferry, Edinburgh, EH30 9SF
T: 01753 654123

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

Leighs Paints
Tower Works, Kestor Street, Bolton, Lancs. BL2 2AL
T: 01698 264271

Malakoff Limited
North Ness, Lerwick, Shetland, ZE1 0LZ, UK
T: 01595 695544

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

Metal Cleaning UK Ltd
Randles Road, Knowsley Business Park, Knowsley, Merseyside, L34 9HX
T: 0151 5492449

N Class Fabrication and Installation
20 Royce Road, Eastern Industry, Peterborough, PE1 5YB
T: 01733558989

N L Williams Group Ltd
Westside Industrial Estate, Jackson Street, St. Helens, Merseyside WA9 3AT
T: 01744 26526

NSG UK Ltd
Fourth Avenue, Deeside Industrial Park, Deeside, Flintshire CH5 2NR
T: 01244 833138

Paint Inspection Ltd
Trafalgar House, 223 Southampton Road, Portchester, PO6 4PY
T: 0845 4638680

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

Radleigh Metal Coatings Ltd
Unit 30 Central Trading Estate, Cable Street, Wolverhampton, WV2 2HX
T: 01902 870606

R.L.P. Painting
Heathfield House, Old Bawtry Road, Finningley, Doncaster, DN9 3DD, UK
T: 01302 772222

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

Sussex Blast Cleaning
Unit 35–37 Station Road, Hailsham, East Sussex, BN27 2ER
T: 01323 849229

Tinsley Special Products
Enterprise House, Durham Lane, Eaglescliffe, Stockton-on-Tees TS16 0PS
T: 01642 784279
DIARY DATES 2011

6th-7th September 2011
EC Conference: Anti-corrosive coatings III
Berlin / Germany
www.european-coatings.com/events/ecc.cfm

5th-7th October 2011
CEPE - Annual Conference & General Assembly 2011 Embracing Sustainability in a Feasible Way
Dublin / Ireland
www.european-coatings.com/cepe

10th-14th October 2011
NACE Basic Corrosion Course: A route to NACE certification
Aberdeen
Contact p.sidky@cmc.ltd.uk

11th-12th October 2011
EC Conference: Coil and can coatings
Berlin / Germany
www.european-coatings.com/events/ecc.cfm

13th October 2011
London Branch joint meeting with London Materials Society
Speaker on 'Bacteriological corrosion'
Naval Club, 38 Hill Street, London W1
17.30 for 18.15 start

15th November 2011
Corrosion of Infrastructure “Present Knowledge and Future Solutions”
Conference Themes:
• Keynote: Longevity & reliability of infrastructure
• Expert systems for assessing transport infrastructure
• Ensuring the life of power generation facilities
• Condition monitoring of buildings
Contact: IOM3 : Prof. Robert Akid: r.akid@shu.ac.uk
ICorr: Prof. Paul Lambert: Paul.Lambert@mottmac.com

15th-16th November 2011
EC Seminars on
- Rheology Workshop
- Dispersing pigments and fillers
- Understanding easy-to-clean
- Anticorrosive coatings
Amsterdam / the Netherlands
www.european-coatings.com/events/ec-seminars

22nd-23rd November 2011
EC Conference: Adhesives for wind and solar technology
Berlin / Germany
www.european-coatings.com/events/ecc.cfm

24th-25th November 2011
EC Conference: Automotive Coatings
Berlin / Germany
www.european-coatings.com/events/ecc.cfm

1st December 2011
London Branch Annual Christmas Luncheon
Royal Overseas League, Park Place, London SW1A
Contact: Mike Allen: mike.allen9@btinyernet.com

8th December 2011
London Branch annual visit to the Varsity Match at Twickenham
Meet at Naval Club, 38 Hill Street, London W1
Contact: Derek Hoskins: dhoskins@waitrose.com

13th-14th December 2011
EC Conference: Construction chemicals
Berlin / Germany
www.european-coatings.com/events/ecc.cfm

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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Email: info@galcosteel.ie

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Email: BrianPCE@aol.com

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Oliver Lewis
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Tel: 0161 306362

CED Division:
Nick Smart
Tel: 01635 280385