Institute of Corrosion Training & Certification Scheme

Approved Courses

- Painting Inspector Level 1, 2 & 3
- Pipeline Coatings Inspector Level 2
- CP Technician Levels 1 & 2
- Insulation Inspector Level 2
- Fire Proofing Inspector Level 2
- ICATS Trainer Courses

The ICATS Scheme for training of industrial coating applicators is gathering momentum such that additional two day Training Courses for those wishing to qualify as ICATS Trainers have been arranged for:

9th & 10th February 2009
9th & 10th March 2009
5th & 6th May 2009

For further information or administrative details, costs and bookings for courses and examinations or detailed information packages free of charge, please contact:

Martin Dawson of David Betts tel: +44 (0)1709 560459 fax: +44 (0)1709 557705
Email: enquiries@ruanetpo.com
Website: http://www.ruanetpo.com

Technical and eligibility enquiries can be made direct to

Dave Grimths the ICorr Scheme Manager tel: +44 (0)1709 550999

Ruane & T P O’Neill
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The President Writes...

Happy New Year. I trust you all had a pleasant and relaxing Christmas break. In a moment of weakness, and driven by a desire to briefly escape Ant and/or Dec and the third iteration of the turkey, I went off with my family to Prague for a few days between Christmas and New Year. The photo is of my good self up the Petrin Tower with Prague Castle behind me, bravely resisting the -6°C temperatures. The tower itself is of interest to ‘we corrosion types’. It was built in 1889, having been inspired by the Eifel Tower at the 1889 Paris Exhibition. It was refurbished in the late 1990’s to make it presentable to the tourists and most of the original 174 tonnes of metalwork has survived the century-plus since its construction relatively unscathed. I would recommend a visit if you’re ever in Prague.

Of course, the reason I can still clamber up the 299 steps and look down on the 100 spires is because through material selection, design and probably above all regular painting, a succession of dedicated people have been able to keep corrosion under control. We, as a rule, do not make enough fuss about our contribution to conservation. Granted, much of the groundwork was done long before there was a formal approach to corrosion control. But then again, we’ve had to match or better their achievements with more onerous health and safety requirements and a considerably more expensive albeit better trained workforce.

Of course, it is not just ferrous materials where we can help to preserve and protect our heritage. Lead, brass, bronze and even the occasional elderly aluminium artefact benefit from the methods and materials of corrosion engineers, scientists and technicians.

Leighton Buzzard Admin Team Is Re-Organised and Strengthened

The new President, Paul Lambert made it clear at the acceptance of his office, that he would not be able to be involved in the day to day running of the Institute’s administration and required the admin team to be pro-active and provide, not only a fast response service to the membership, but also to clients and the public.

The past year has seen a change of the offices and the relocation to the new premises in Leighton Buzzard High Street and the inevitable disruption to services that relocation can involve.

Gill Inwood, as Officer Manager and Cerri Begley (nee Sweet) have continued their specific roles for both the Institute and its subsidiary, Correx Ltd and with the retirement of Heather, who ran the sustaining membership on a part-time basis, we have now appointed Denise Aldous on a full time basis, to provide a service to the sustaining membership, which the size of this section of the Institute’s membership deserves. Sustaining Member representatives and companies can now receive information and answers to queries on a full time basis from the new co-ordinator, Denise.

We also do ourselves down with respect to that relatively new hot topic, sustainability. Ever since it was decided that we humans, particularly the rich crowd over our side of the sphere, were wasting resources hand over fist to the detriment of all, everyone has been jumping on the sustainability bandwagon. The thing is, we’ve always been ‘doing sustainability’. Every time our actions have extended the service life of a lump of metal we have been actively shrinking the carbon footprint.

Now, I personally think it is about time we let the rest of the world know about this. We’ve been helping save the planet for decades, it’s just no one cared until relatively recently. Yes, they cared when their pipeline leaked or ship sank. Yes, it mattered when their bridge was deemed unsafe to use. But how to put it right was dominated by cost, not carbon equivalent.

So as we enter into the Institute’s 50th year, let us remind both ourselves and others of the huge contribution we jointly make to prevent the fruits of the industrial revolution from simply turning to mush. I never really cared for built-in obsolescence. Let’s welcome everyone to our world of designed durability. More turkey, anyone?
The Lifetime Achievement Award made to David Deacon CSci, FICorr (Hon) FTSC

Last April, at the London Branch, joint meeting with OCCA, held at the Bath House in Soho, David Deacon was presented with a sword on an engraved plinth. The sword was chosen as a symbol of David’s lifelong crusade against corrosion. This crowning presentation was made by Brenda Peters, then President of ICOR, to mark David’s significant and influential contributions to the Institute over 40 years. As David is a Fellow of both ICOR and OCCA, this was a fitting occasion for members of both Societies to congratulate him and share in his jubilation.

It was initially recommended that David should be the recipient of an Honorary U R Evans Award as this is the most prestigious Award given by the Institute. Following widespread discussions however, it was decided that David’s Award should be unique, in view of his continuous unrivalled commitment and contributions over many years. It was recognized that the survival of the Institute on more than one occasion, was due to his personal intervention. It was therefore agreed to create a unique one-off decoration to be known as the Lifetime Achievement Award, for David Deacon.

Many will know David as the Senior Consultant of the Steel Protection Company (SPC) where his everyday portfolio includes carrying out coatings / corrosion surveys and making recommendations for the protection of a vast range of new and existing structures and buildings. The most well-known of these include the Forth Rail and Road Bridges in Scotland, and Thames Barrier, Tower Bridge, the Cutty Sark, the London Eye and both the old and new Wembley Stadia in London. He has been involved with the Eden Project, Croke Park in Dublin and the Reebok Stadium in Bolton. His expertise has also extended to encompass offshore Oil, Gas and Wind Turbine platforms and many major pipelines including the sea water intake in Abu Dhabi.

The Mersey, the Dartford and the Channel Tunnels, have all benefitted from his professional engagement as have 104 bridges in the Himalayas and 18 viaducts for Indian Rail as well as structures in 54 countries worldwide. On all these projects, he has tirelessly promoted our Institute and you may well now be an ICOR member because of such an encounter.

David’s career started in 1957 when he joined the British Aluminium Coating Research Laboratories. He became a member of OCCA in 1959 and gained qualifications in Paint Technology and Polymer Chemistry, before joining the British Iron and Steel Research Association, (BISRA) as their first Paint Technologist in 1964. Three years later he was appointed as the Chief Corrosion Technologist with Burmah/Castrol.

In 1970, David formed BIE Anti-Corrosion Company and when this was sold in 1981 he became the Managing Director of the newly formed ITI Anti-Corrosion Inspection Company. Then in 1992, David founded his present consultancy company, the Steel Protection Consultancy (SPC), now based at Leighton Buzzard and in which his son William, is a fully qualified ICOR level 3 painting inspector and is a Senior Member and Director of SPC.

Being so active and pre-occupied with his professional career, it is almost unbelievable to appreciate the remarkable managerial support and influence he provided to the development and stability of the Institute, since being appointed the Technical Committee Secretary in 1972, for ease of reading and reference, some of his major ICOR contributions are tabulated below.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>JOINED ICOR S&amp;T IN ASSOCIATE GRADE</td>
</tr>
<tr>
<td>1972</td>
<td>ELECTED TECHNICAL COMMITTEE SECRETARY</td>
</tr>
<tr>
<td>1976</td>
<td>TECHNICAL COMMITTEE CHAIRMAN + COUNCIL MEMBER</td>
</tr>
<tr>
<td>1977</td>
<td>UPGRADED TO PROFESSIONAL MEMBER - MICORR S&amp;T</td>
</tr>
<tr>
<td>1979</td>
<td>FORMED CCEJV - WITH NACE, USA</td>
</tr>
<tr>
<td>1980-83</td>
<td>ORGANISED UK CORROSION AND CORREX EXHIBITIONS</td>
</tr>
<tr>
<td>1984</td>
<td>ARRANGED OFFICE MOVE, LONDON TO IMF BIRMINGHAM</td>
</tr>
<tr>
<td>1985</td>
<td>CCEJV CLOSED BY NACE, CEA FORMED, MADE DIRECTOR</td>
</tr>
<tr>
<td>1986-88</td>
<td>APPOINTED CHAIRMAN OF COUNCIL</td>
</tr>
<tr>
<td>1989</td>
<td>MOVED OFFICES FROM IMF TO LEIGHTON BUZZARD</td>
</tr>
<tr>
<td>1990-92</td>
<td>TOOK ON HONORARY PART TIME EXEC SECRETARY</td>
</tr>
<tr>
<td>1992</td>
<td>MADE HON LIFE FELLOW FOR SERVICES TO ICORR</td>
</tr>
<tr>
<td>1994</td>
<td>APPOINTED VICE PRESIDENT (RESIGNED AFTER 1 YEAR)</td>
</tr>
<tr>
<td>2001/02</td>
<td>APPOINTED VICE PRESIDENT AND TRUSTEE</td>
</tr>
<tr>
<td>2002/04</td>
<td>ELECTED AS PRESIDENT</td>
</tr>
<tr>
<td>2005</td>
<td>AWARDED CHARTERED SCIENTIST BY SCIENCE COUNCIL</td>
</tr>
<tr>
<td>2005/09</td>
<td>MANAGING DIRECTOR OF CORREX LTD. (ICORR SUBSIDIARY) AND TRUSTEE OF ICORR</td>
</tr>
</tbody>
</table>

Of particular note is his magnanimous decision in 1990 to take on the part-time role of Executive Secretary for two years when the Institute was almost insolvent. During this time, he was able to re-establish the organization and place it on a sound financial footing.

In recognition, David was elected as an Honorary Life fellow in 1992, for his services to the Institute, but had to wait ten years before he received his certificate. I had great pleasure in presenting this to him in 2002 at the Conference Dinner in the Cardiff Town Hall.

When I became President in 2000, I was fully aware of the major contributions David had already made to the Institute. I was concerned that he had not enjoyed the privilege of being President of an organization, which meant so much to him. Consequently, one of my first actions was to discuss this with David. Only, after much arm-twisting and support from Gill Inwood, did David agree to accept the nomination as my Vice-President and thus became President Elect. Without question, this was one of my best achievements. David increased his patronage of the Institute (if that was possible) and enjoyed a successful, two year term as President.

More recently, he helped to form Correx Ltd, which is a wholly owned subsidiary and the commercial arm of the Institute. It undertakes such activities, as organizing, conferences and managing the Industrial Coating Applicator Training Scheme (ICATS).

I hope this short article will serve to reveal and record some of the lifetime successes and triumphs of one who has fostered and sustained our Institute over many years. This very special public acknowledgement comes with the gratitude of all our members. This Lifetime Achievement Award has been well earned by David. I only hope he does not have to wait another ten years before being presented with the accompanying scroll.

John T O’Shea, Past President
The Institute Of Corrosion - 2009
The 50th Anniversary

The Institute of Corrosion will be 50 years old in 2009. There will be a major event to be held at the Thames Barrier, London on 21st May, (the actual date of the original formation) and all members will be invited to attend by our President, Professor Paul Lambert. We will be producing a “Gold” issue of Corrosion Management, in May, to recognise this significant landmark. Each issue of Corrosion Management during 2009 will have a special section dedicated to our history.

Any member, who has any historic information, photos, documents, etc., should send them to David Deacon at the Leighton Buzzard Office or contact ICorr at admin@icorr.org.

The six sections in each issue, from Jan through to Dec will be as follows:-


The 50th Anniversary

I was particularly pleased when our President, Paul Lambert asked me to write up the history of the Institute from the early days through to the present day to mark the 50th anniversary of our Institute.

Having discussed the matter with the Trustees and the editorial team at Square One, it was agreed that the history should be set out in part in each one of the 6 issues during our 50th year and a list of the items to be covered is set out above.

David H. Deacon

The Early Days 1958 and beyond...

I appreciate the support and help that Harry Hatley has given me, since he was an original founder member of the British Association of Corrosion Engineers (BACE) and was present at the inaugural meeting, held on the 21st May 1959.

The prime mover for the formation of an Association of Corrosion Engineers, was the brainchild of Dr John Tiratsoo, who was the owner and driving force under a magazine called, ‘Corrosion Prevention and Control.’ He initially included in this magazine a section entitled the ‘Corrosion Engineer,’ which was first issued in April 1959 and he then convened the inaugural meeting on the 21st May at their offices at 97 Old Brompton Road, London. The Association was therefore formed on that date, and an announcement was made on the 29th May to the national press at a social event at the Rembrandt Hotel on the 29th May 1959.

The main theme of the announcement in 1959, which was made by Mr. H M Powell, chief Electrical Engineer of the Constructors John Brown Organization, stated,

“The objects of the Association will be generally to promote the dissemination of technical information about corrosion matters and to develop by means of social activities, the free interchange of information among members.

In due course, the Association, which is of course essentially non-profit making, will progress towards the establishment and acceptance of suitable qualifications for corrosion engineers, and a promotion of standardization in the terminology and techniques of corrosion control.

When the Association is in full operation it is intended to hold full scale meetings with papers, films and discussions, which should be of great benefit to the corrosion engineering profession as a whole and which will promote and foster its growth and develop as well as being a general service to industry.”

It is clear, that the objectives have been put into practice by the generations of corrosion engineers, who have developed that initial theme over the past 50 years.

The Institute has decided to mark the date of the 50th anniversary with a national meeting, which will be held at the Thames Barrier Conference Centre, London, and, all members of the Institute will be invited to attend by our President, Prof. Paul Lambert.

The March/April issue of Corrosion Management, will be a special edition, which will feature full details of the programme to be held on the 21st May, and it is hoped that as many members as possible will be able to attend that significant event.
Technical Topics No 19:
New Year Thoughts - Conferences etc

by Technical Secretary, Douglas J Mills

It's a few months since I did a Technical Topics column. In between we have had a report on the major and successful Corrosion conference in Edinburgh (EuroCorr 08) and also the CED day in October. Regarding the latter there is a plan for a CED Spring working day at the Health and Safety labs in Buxton on Thursday 23rd April. Hopefully more details (even a flyer) may get into this issue. Regarding EuroCorr, this years conference is in Nice from 6th-10th September. Further details can be found at (www.eurocorr.org/EUROCORR+2009). There were 160 UK delegates in Edinburgh. It would be nice if even half that number turned up in Nice!

Staying on the conference theme, in my specialty area of protection by organic coatings, there are two conferences coming up this year. One is 'Advances in Corrosion Protection by Organic Coatings' organized by David Scantlebury and Martin Kendig (details at www.manchester.ac.uk/materials/events) which will be held in Christ's College Cambridge from September 14th-18th. This is the college Darwin attended circa 1830 - this year is his 200th anniversary and his rooms are available for inspection! Interestingly it is also the 100th anniversary of the birth of a doyen of organics coatings research who worked at Cambridge - Dr J E O Mayne- we hope to have a dinner to commemorate this. The other is an AETOC (Advances in Electrochemical Techniques applied to Organic Coatings) occurring in Grado, near Venice in April 14th-17th. This is being organised by Lorenzo Fedrizzi and further details can be found (www.uniud.it/dstc/Aetoc09).

But why go to technical conferences? Isn't it possible these days to just sit down at a computer and get all the information on the web? Well I believe the answer to that question is No! (I will return to the general area of how to get information in another technical topics). Conferences offer a terrific opportunity to meet and talk with other workers in your field. Certainly if you are an academic (either working in a research organisation or a university), it is really essential to keep up with the field, by presenting your work and listening to others. With a few exceptions research is not a solo activity. Consideration of other people's work is essential. But how many ICorr members are academics? Well when I was at a Science Council meeting the other day (we were helping prepare a contribution to a government call for ideas on how to put science and engineering at the heart of government) the statistic was given that 75% of Chartered Scientists are NOT academics. Although I have not checked the figure, no doubt the Institute of Corrosion has a similar profile.

I am aware that what industry likes best is very focussed conferences, preferably on the particular topic that the person they send is mainly working on. But is that not short sighted? Should not technical people working in industry be exposed to more general papers as well? With the current economic downturn there may actually be a greater incentive (plus the time?) for companies to send their staff to conferences. The knowledge gained could well come in useful at a later date. It may also be a good opportunity for companies to review what they are doing and maybe break into new areas and ideas for that can come from conferences. Well enough on that.

Certain of my readers like to see a picture or two of corrosion so I thought I'd digress to my recent holiday in Ireland. 'The Intrinsic' of Liverpool sank in 1836 in Kilkee bay and the iron anchor was brought to the surface some 150 years later (see picture). Interestingly it was still very recognizable and had not suffered from too much corrosion. This compares with artifacts from Sir Clodgesly Shovell's fleet from which several ships sank in 1707 (admittedly somewhat earlier!). Divers retrieved material from the wrecks in 1969 which I examined at the BNF Metals Technology Centre in the mid 1970s. Anything that was made of iron (cannon etc) had corroded virtually away to nothing. Silver pieces of eight, brass, lead and copper items all survived. The exact conditions in the sea will affect the corrodbility. This is also true of the atmosphere. In Ireland it rained most of the time! However most structures we saw showed very little corrosion. Lack of pollution (aside from the somewhat acidic peat bogs) must contribute to this. I will return to this topic (atmospheric corrosion) at another time. Meanwhile although the New Year has started with some degree of doom and gloom on the economic front, I am optimistic that corrosion people will still have jobs at the end of it as it must be apparent that sustainability and conserving current resources in the present climate is essential.

As usual any comments on this months column please contact Douglas@harbridge.freeserve.co.uk
News From CORREX

CORREX Ltd has continued actively over the past year, with the main emphasis being on the development and promotion of the ICATS Scheme. There are now approaching one hundred registered contracting companies within the scheme and as at the end of 2008 almost one thousand painting operatives are being processed for qualification.

CORREX Ltd have organised, training and ICATS publicity courses across the country during 2008 and details of these events have been mailed to over 4,500 contacts, for which our gratitude goes to Corus for their assistance with this marketing exercise. Over 200 delegates have attended these events, to learn about advances in corrosion protection of structures and in particular the beneficial impact that the ICATS Scheme is having on the industry. (Our picture shows the speakers L-R D Eyre, B Fitzsimons, R Hudson and D Deacon)

Our main efforts during 2009 will be concentrated on the re-launch of the Correx Exhibition and Conference CORREX 2009, to be held at Birmingham NEC on the 27th 28th and 29th October. The exhibition will be held in conjunction with the successful Surface World exhibition and also, InterBuild the highlight of the construction industry. Hill Media, who Correx have appointed as the contractors for organising this event have already received a significant number of bookings from a diverse range of companies, who will be exhibiting their anti-corrosion products and services at this major National Event.

A small specialist Working Group is drawing up the conference and workshop programme and the two themes of the event will be Coatings and Cathodic Protection.

The conference will be split into two separate parallel events, alongside the exhibition and will comprise a conference programme and a series of workshops. This is designed to provide Architects, Engineers, Specifiers and contractors with the latest updates on Corrosion Prevention with Coatings and CP Systems, through the conference programme. The Workshops will provide a practical input to delegates who wish to have a more hands on approach of these two major themes.

In addition to the workshops there will be an ICATS programme and it will include a Trainers Refresher course to ensure that the ICATS scheme is continually updated and maintained at the initial high standards.

CORREX have put together, in conjunction with Management Risk Solutions Ltd (MRS) an Insurance Backed Guarantee scheme, for coating contracts, where ICATS registered companies and qualified ICATS Operatives are employed to carry out the work on the project, details of this Insurance scheme will also be covered at the conference.

Further details of the conference and workshop programme, a list of exhibitors, timings and programmes will be covered in further editions of Corrosion Management, as the working party produces a more detailed programme, however it is important that all those interested in Corrosion Protection by Coatings and Cathodic Protection, put these dates in their diary early, to avoid disappointment of missing out on the event.

In conjunction with the re-launch of CORREX 2009, Correx Ltd have retained Hill Media, who are putting together a new National Corrosion Handbook and Directory, a document, which has not been available since the last edition was published in 1999. This new Handbook will be widely circulated, not only to the membership, but also on a national basis, through a major publicity campaign and will be available in September, one month prior to CORREX 2009.

The Directory will include a comprehensive list of all suppliers of products and services and will contain technical articles on a wide range of subjects and will fill a much, needed gap in the information chain for Specifiers and Contractors. Hill Media will be circulating widely, detailed information and application forms for all companies to be able to submit details and to be included in this important publication. It is appropriate that this is being launched together with CORREX 2009, during the 50th anniversary year of the Institute of Corrosion.

ICATS News

2008 has been a very significant year in the development of ICATS. David Eyre, scheme coordinator and the team at Correx Ltd have been busy ensuring that both Company and painter registrations were processed as smoothly as possible. Below are some significant matters that were finalised during 2008.

CSCS recognise ICATS

A significant breakthrough was made when CSCS (Construction Skills Certification Scheme) agreed to allow painters who have completed the ICATS basic module to apply for a CRO (Construction Related Occupation) card. CSCS would only grant this once ICATS had demonstrated that the basic module delivers skills requirements to a minimum of NVQ level2. Mr Gordon Jenkins CSCS scheme manager commented ‘We are impressed with the level of skills that ICATS delivers and that this can only raise standards of safety and workmanship on construction sites’. Previously it has been very difficult for industrial coating applicators to apply for a card as the scheme only recognises formal qualifications. ICATS qualified applicators can apply for their CSCS card via the CSCS website.
ICATS News Continued...

Lloyds Register audit ICATS

Correx Ltd is pleased to announce the appointment of LRQA to audit ICATS registered companies. Every ICATS registered company will be audited on an annual basis to ensure that ICATS is delivered in line with the schemes requirements document. The first ICATS audits were successfully carried out in October.

Highways Agency SS19A

ICATS is now included in the new Highways Agency sector scheme document 19A. The document requires that ALL companies who tender for contracts that include the protection of ferrous structures must be ICATS registered and use ICATS qualified applicators for the projects. Correx Ltd assisted the Highways Agency during the roll out of sector scheme 19A and will continue to work with other sector schemes such as the Highways Electrical Academy to ensure that the skills required to carry out painting projects are catered for.

Network Rail

Network Rail mandated that all applicants wishing to carry out the application of coating systems on their infrastructure must be trained to a minimum of the ICATS basic module. This requirement came in to place on the 7th June 2008.

Hampshire County Council

Hampshire CC have decided that their 2009 tender list for bridge painting will only include companies that are ICATS registered and have applicants trained to a minimum of the ICATS basic module. Tenders for 2009 contracts will be issued to the qualifying companies soon.

ICATS Specialist Modules

Late in 2008 the specialist modules for Spray Painters and Blast Cleaning Operatives were launched at trainers seminars held in Harrogate and Bristol. The first specialist trainers have been appointed and training in these disciplines is now taking place. It is expected that the first ICATS specialist modules will be awarded in February 2009.

David Eyre, ICATS coordinator, commented ‘2008 has been a very significant year for ICATS and recognition of the schemes importance not only as a training resource but also a quality control tool is widening’ in addition ‘We will be looking to ensure that more major structure owners and project managers understand the benefits of using an ICATS registered company in 2009’. Should you require additional information contact David Eyre at Correx Ltd. Tel: 01525 851771 Mail: admin@correx.org

ICorr London Branch Update 2009

At the London Branch meeting in January, a good attendance enjoyed a presentation about DCVG (direct current voltage gradient) surveys on buried steel structures.

Our speakers, Graham Dowling of Petrofac, Alex Delwiche of Hockway and Raju Narayan of PML were steered by Trevor Osborne of Deepwater Corrosion Services (UK) as the techniques of the surveys were described and what such surveys can achieve – and what they cannot achieve. In a lively question and answer session at the close, despite the obvious benefits of DCVG surveys, it became clear that the jury is still out regarding the interpretation of the results regarding how they indicate the seriousness or otherwise of indicated coating defects prior to excavation for inspection.

Nearly 50 members and guests of London Branch travelled to watch the annual Oxford Vs Cambridge rugby match at Twickenham on 11th December. Cambridge had won the previous three matches so betting was heavy on them. Although the day was cold, the game was a ding-dong affair with Oxford dominating the first half and they ended up winners by 33 points to 29 in a hard fought game. The match was thoroughly enjoyed by everyone and the chilli con carne supplied afterwards at The Naval Club was rapidly devoured.

Twentieth Annual Christmas Luncheon

About 150 members and guests of London Branch attended the twentieth annual Christmas Luncheon at The Brewery, Chiswell Street, London on 4th December, where seemingly a good time was had by all. After lunch there was a brief address from our new President Paul Lambert. With John O’Shea’s retirement imminent at the end of 2008, David Deacon presented him with a tankard in recognition of his sterling services to the Institute and the gas industry over many years. We were then entertained by our main speaker, Frank Higgins, who related many amusing incidents and anecdotes from his varied career. Our thanks go to Mike Allen for organising the event once more.
Deepwater Retrofits Cathodic Protection on Two Deep Water Subsea Field Developments in Three Days

In February, Deepwater Corrosion Services performed anode retrofits on 2 subsea development systems in 73 hours. These deep water installations, located in water depths ranging from 775 to 1,750 feet, consisted of:

• 4 flowlines, ranging in length from 3 to 9 miles, each
• 4 well trees
• 2 flowline manifolds
• 2 umbilical termination units

The CP system consisted of 19 RetroPods paired with standard and customized RetroClamps. The installation was accomplished utilizing a DP-equipped ROV Support Vessel equipped with two ROVs. An ROV essentially watches the RetroPod craned down to the seabed, adjacent to the asset, and sets the RetroClamp onto the target member or pipeline. Electrical continuity and CP measurements were monitored using Deepwater’s Polatrak Deep-C Meter and ROV II Probe.

The CP design was optimized in a manner that minimized the number of installation sites, but allowed for maximum flexibility with anode array placement. This design feature enabled the installation team to quickly alter the game plan when they encountered a major escarpment at one lay-down site.

The innovative RetroClamp system, allows the anode array to be clamped and electrically connected to a member of any shape or size, completing the circuit necessary for the cathodic protection system to begin polarizing the structure or pipeline. The RetroClamp can be installed by diver or ROV (ROVs in this case). For more information about the RetroPod or RetroClamp systems, please visit www.stoprust.com

ROV disconnecting crane rigging from RetroPod

Custom clamp engaging the member of an Umbilical Termination Assembly
MIC Myths: Avoiding Common Pitfalls in the Practice of hydrotesting and likelihood of Microbial Induced Corrosion

Reza Javaherdashti, PhD
Principal Materials and Corrosion Engineer, Subsea & Pipeline Division
Xodus Group, Perth, WA, Australia

Introduction:

Hydrotesting (HYD) is an industrial practice that is of frequent use in industry. The main characteristic of hydrotesting is that it is a “leak” and “strength” test. One important point of HYD is that, while it is of frequent use in different industries, its’ practice can actually render the system tested vulnerable to corrosion, especially microbiologically influenced corrosion (MIC) (1).

There are many factors that contribute to increasing the risk of MIC. For example, if we take a buried pipeline, the likelihood of MIC increases with factors such as: the choice of material, the type of coating and its condition, the environment around the pipe (pH, oxygen concentration) etc. If, for instance, the pipe is located below the water table or is locate in a waterlogged soil, the corrosion inducing bacteria (CIB) will have an increased chance of colonising the pipeline and causing corrosion.

The risk of MIC will also increase, if the following conditions arise:

1. The buried pipeline is located in a damp soil (thus having a fair population of micro-organisms including CIB).
2. The material of the pipe is an ordinary carbon steel (note: numerous field examples and laboratory studies have shown that it is one of the most vulnerable materials to MIC).
3. There is no adequate cathodic protection (to partly prevent MIC).
4. The pipe is subject to poor HYD practice.

Figure 1 shows a schematic illustrating the inter-related factors (including HYD) affecting MIC.

As indicated, one of the “methods” that can cause MIC is the practice of hydrotesting itself. While the exact mechanism of MIC resulting from HYD is not always known, two possible mechanisms may be considered and in this respect hydrotest practices can be classified into two categories: a “wrong hydrotest” where the water used as the hydrotesting medium is not treated therefore it is a “wrong” water, and “incomplete hydrotest” where the practice of draining and drying have not been carried out completely (2). If the bacteria can find their way into the system by either wrong or incomplete hydrotesting, they can stay there and, literally, wait until the environmental conditions become favourable for their growth and activity. Where bacterial colonisation does take place a local environment capable of producing localised corrosion (pitting) can develop. Figure 2 presents an example of pitting arising from hydrotesting. Kobrin in late 1990s’ reviewed several cases of MIC that had occurred as a result of hydrotesting (3). In this review, some of the common features of all the cases reported were:

- The water flow through the horizontal pipelines was low
- Water had been used as ballast for settling purposes
- Water had been used for emergency use (such as fire extinguishing) with no provisions for continuous circulation
While some alternatives to water for the hydrotest media have been suggested and implemented [4], e.g., demineralised water or high-purity steam condensate, different combinations of water with other chemicals have also been applied. Some examples are, but not limited to [5], methanol/fresh water, methanol/Kinetic Hydrate Inhibitors (KHiS), methanol/anti-agglomerate low dosage hydrate inhibitors (AA LDHiS), brine-only solutions, e.g., KCl, NaCl or CaCl2 brine.

Although HYD is often critical for industries, the possible link between HYD an MIC is frequently ignore.

Of world-wide importance and practicality, especially in the oil and gas industry, are the so-called DNV (Det Norske Veritas) standards. The main standard which is consulted with regard to pressurizing and hydrotesting of off-shore pipes is DNV-OS-F101 (Oct.2007), "Submarine Pipeline Systems". Sections 6 and 10 of this standard are mainly related to the quality and required treatment of the fluid to be used for this purpose.

Examining the content of these standards shows us that the relevant items (relating to MIC) to be considered in the DNV standard are:

i. Item O403 in Section 10 recommends that “The water should...be filtered to remove suspended particles larger than 50µm”.

ii. Guidance note of Section 6, D302, states that “Use of freshwater should be considered or seawater treated to a pH of 9 minimum.

With regards to the likelihood of MIC, one apparent drawback in the standard (item i) is that by filtering, the likelihood that bacteria will be separated is extremely small. As previously noted the average size of bacteria is about 1µm and therefore as such, they can easily pass through a 50 µm filter. It is further assumed (item ii) that by limiting the food for bacteria or making the environment too alkaline, the possible impact of corrosion can be reduced.

DNV[6] are aware of such issues and recognise that; “bacteria normally exist in fresh water (their activity being dependant on actual contents of dissolved salts and organic matter which can be controlled if ‘fresh water’ is to be used for hydrotesting) and in seawater with pH above 9. However, the bacterial growth is then much less intense and is not expected to cause any corrosion damage to the pipeline during the limited time of exposure to the hydrotest water (This is based on practical experience).”

Whilst DNV’s comments are taken on board the risk of MIC remains. The following section addresses some of the aspects which increase the risk of MIC.

Biofilm formation and corrosion

We will explain some mechanisms that if ignored can easily lead to a misunderstanding (myths) and consequential underestimation of the risk of MIC.

There are mainly two important concepts that need to be reviewed and understood:

1. Biofilm formation and the dynamic nature of its formation

2. The ability of bacteria to resist environmental adverse conditions

The dynamics of biofilm formation can be described by very simple stages, as illustrated in Figure 3:

The biofilm is not a structure fixed in time and place: it is often continually moving and it is alive. Biofilm formation evolves during several phases: Phase 1, the bare metal is itself exposed to the environment that contain Cl. The free-floating bacteria (planktonic bacteria as they are called) begin to settle on the surface of the metal and become relatively motionless or sessile. The main factors contributing to this change of phase from planktonic to sessile have been discussed elsewhere (1).

When the bacteria become settled, they start to build a structure that is known (wrongly!) as the biofilm. Most of the material in this structure is actually non-biological, hence bacteria make up a relatively low percentage of the dry weight of the so-called biofilm. It is very difficult to say how much contact time is required to allow the attachment of the bacteria. It has been reported [8] that biofilm formation, depending upon the aqueous environment within which the metal has been immersed, may take minutes to hours. This uncertainty of the time required for bacterial attachment has implications for whether or not post hydrotest treatments should be carried out.

As the biofilm starts to grow and become thicker and thicker, the biofilm begins to act as a diffusion barrier to oxygen and nutrients. The implication of this is that some types of bacteria lying within the inner layers of the film may die. This in turn may lead to detachment via flow and mechanical impact that produces shear forces strong enough to overcome the adhesive forces developed by the biofilm. This phase is important because, whilst some detachment takes place the whole biofilm will not be removed completely leaving a patchy network of biofilm, the extent of this network depending on physical, biological and chemical factors. The result is that this patchy structure can allow re-growth of new biofilm. The practical importance of this phase is that if biofilms are not removed completely, re-colonisation may occur on subsequent contact with an aqueous phase within in a relatively short time.

It is inferred in the standards that when the pH of the hydrotest environment becomes alkaline, the bacteria become “inactive”. This does not mean the bacteria are “dead”. Therefore, although a high pH can serve to make the bacteria inactive, as soon as bacteria are "nestled" within the internal wall of the system (say a pipeline), they can go on "fasting", thereby lowering their energy requirements through mechanisms such as reduction in size [2]. An important factor here is the possibility that spore-forming bacteria are introduced during hydrotesting. This type of bacteria e.g., Clostridia, are capable of resisting many environmental adverse conditions. Therefore, making the environment highly alkaline or cutting the nutrients may not always work.

Another “myth” found in many industries is that SRBs are the most important organism contributing to MIC. This myth may have arisen from previously reported studies [10], which have cited the studies started with Hamilton’s work[11] addressing MIC being wherein it is quoted that “MIC is most commonly associated with sulphate-reducing bacteria”.

However, in addition to SRBs there are many other types of organisms (including bacteria) that can be effective on corrosion. These organisms can include fungi, algae and also other bacteria other such as iron oxidising bacteria (IOB), iron reducing bacteria (IRB), sulphur oxidising bacteria (SOB), etc. Table 1 identifies some of these bacteria. More detailed data in this regard has been given elsewhere [12], [13]. In addition, it is reported (1) that new strains of SRB with different mechanisms of electron transfer.
have been identified (1). This can certainly add complexity when considering the development of MIC by SRB highlighting that not only are there different types of CIB, but that there is diversity among SRB themselves. Under natural circumstances, it is highly likely that mixed cultures of bacteria will be found, of which SRB may only be a certain fraction. Some experimental studies using mixed cultures (14, 15) have documented the corrosive effects of such environments.

Another “myth”, related to SRB, is that “there is a relationship between the numbers of SRB and the rate of corrosion; the higher the number of SRB, the more severe the corrosion”. Here, we see that the probable source of this prognosis is the work by Ronay et al. (20) where it is stated that if the number of SRB per gram is less than $5 \times 10^5$, there is no risk of MIC whereas a count of $10^6$ or more of SRB per gram of soil, can lead to a severe case of MIC. Whilst this analysis has some value it should only be adopted provided that we know to which bacteria we are applying it:

One of the ways by which CIB such as SRB can affect corrosion, is by affecting the electrochemistry of the environment (27). Therefore, theoretically, even a small population of bacteria can alter the chemistry of the system to render it corrosive. In this sense, this is in contrast to what bacteria such as sulphuric acid producer sulphur oxidising bacteria (SOB) do. It is obvious that the more SOB, the greater is the potential for more acid production leading to a more and more corrosive environment. A study (18) has shown that microbial sulphate oxidation was occurring and that the rates of this activity could be enhanced by increasing the population of sulphur oxidising bacteria in the samples. While research show that there is no relationship between the number of SRB and corrosion rate (19), these numbers can be useful when it comes to monitoring the system. Two examples of such situations are (I) indicating the possibility of producing more sessile bacteria and (II) the effect of biocide application in a closed system containing stagnant water. Therefore the reduction in the number of planktonic bacteria, measured by most ‘quick’ tests, shows either they have been killed, are no longer swimming around or they have been transformed to sessile bacteria (20).

As seen from the above, there is not just one type of bacteria available in the water that can be used for HYD. Also, if the bacteria are capable of forming biofilm, this will prevent (or delay) the ingress of biocides deep into the biofilm. An example of such is shown in Figure 4 where, as the biofilm becomes thicker and thicker, more bacteria start to become resistant to the biocide. This also emphasizes the fact that biofilm monitoring is an essential matter and without an effective corrosion management program that also considers the importance of MIC in place, just adopting the standards may not always guarantee prolonged lifetime, post hydration.

Conclusions:

Hydrotesting is a practice routinely carried out in industry that has the potential to induce corrosion-inducing bacteria. Hence there is a serious need for all involved in either preparing standards or applying them with regards to the recognition that poor hydrotest practice may have important implication for the formation of MIC.

There appear to be certain misunderstandings and “myths” which lead to an underestimation of the impact of the presence of bacteria during hydrotesting and the subsequent increase in risk of MIC.

The current industry standards provide some advice on the necessary precautions required when conducting hydrotesting. However these standards are somewhat ‘generic’ and do not fully inform the user of the implication of the procedure on the potential problem of MIC. It is recommended that such standards are revised.

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6. Private communication with the Section for Materials Technology & Failure Investigation, Det Norske Veritas, 29/10/2008.


Putting an End to Coating Disbondment: Viscous-Elastic Coatings for Transportation Pipelines

Introduction:

Pipelines whether in the oil and gas, petrochemical, water or other industries, represent a huge investment and are required to operate continuously and safely for their entire design life. Anything that detracts from this goal is totally undesirable and every endeavour must be made to prevent all occurrences that might jeopardise the safe and efficient running of the pipeline operation. Corrosion is one of those occurrences that will affect the safe and efficient running of the pipeline with the costs for shut down, lost production, product loss, environment contamination and loss of customer confidence running into millions of pounds. Coating degradation problems that lead to the creation of a corrosion risk within the design life of a pipeline can mainly be attributed to one of the following causes:

- an inappropriate specification for the coating material and/or coating process
- poor surface preparation and/or application
- interaction with the operating environment like humidity, salts, winds, temperatures

Poor surface preparation and coating application continues to create problems with premature degradation, particularly loss of adhesion resulting in disbondment.

Low Mobilization Cost Approach

The viscous-elastic coating system is an extremely low cost innovative approach for rehabilitation and coating of field joints. This superior anti-corrosion system based on visco-elastic technology has been developed for use as the external coating of pipelines. This technology has been designed and tested specifically to fit the special field application requirements of buried oil and gas pipelines, Figure 1, and it exhibits properties that are contrary to traditionally specified systems and in most cases far exceeding them. The visco-elastic product’s characteristic are fully amorphous and inert and can be tailored to meet the specific soil and temperature requirements of the end-user.

Market Acceptance

The viscous elastic coating has been utilised in pipeline rehab and field joint projects worldwide and is widely specified by many major oil and gas companies. It is not an unusual situation with new technologies that it takes time to be adopted and the period of time from development to acceptance is a standard obstacle typical to most industries. Several obstacles have limited the wide acceptance of this technology so far. These obstacles included lack of norms enabling to compare the visco-elastic coatings, cost effectiveness of the systems compared to traditional coatings and resistance to the new technology by companies promoting traditional coatings.

Extensive Test Program

Several international coating specifications have been published for field joint coatings such as heat shrink sleeves and tapes but they do not cover the specific material and corrosion protective properties of the viscous-elastic coating system. Therefore the technical assessment was performed according to a product specific specification prepared by Polymer Service Centre Groningen (PSCG), The Netherlands [1]. The extensive test program performed during the technical assessment [5] was used to set the limits of the viscous-elastic coating system for application and operational purposes and it will also be used to justify the suitability of the specification.

Trends

The principal obstacles have been overcome. Visco-elastic coatings will be added to the new ISO norm to be published in 2008: ISO 21809-Part 3 for field joint coatings [2]. The cost is currently extremely attractive to end users when compared to traditional coating systems. Due to the trend of outsourcing technical control and inspection by major companies and the lately field repair costs, demand for failure proof systems is high and resistance from competing products is being eroded by a growing acceptance by end-users. It is common knowledge that no traditional anticorrosion system is completely meeting the needs of the end-user. Traditional products are specified because they are deemed to be the ‘best that are available’. What’s more, the use of many traditional coating products is being maintained due to a failure of the end users to properly research and investigate the newer technologies available.

Success of a Coating is no Longer Dependent on Surface Preparation

The facts are that the newer visco elastic coating technologies can provide end users with anti-corrosion coatings for pipeline rehab systems with much stronger physical properties providing the end user with longer investment, less maintenance and reduced costs over time, reduced instance of damage during service due to self-healing properties.
highest levels of corrosion resistance, higher levels of chemical resistance, higher process temperature ranges, faster and easier application and installation without need for special equipment and operator skills, better field joining methods and above all lower surface preparation and application costs.

Operational Excellence

Anti-corrosion coating failures are a significant factor in reduced operational life of pipelines. The failure of a pipelines coating system accelerates corrosion and can result in leaks requiring repair, cleanup and in some cases replacement of the pipeline. The costs of repair and replacement are significant, as are costs associated with spill containment and cleanups. The cost, environmental impact and negative publicity associated with failures are something every major oil and gas company seeks to avoid. The overwhelming evidence of this data clearly shows that traditional coating systems commonly utilised are not performing over the design life of the system, exhibiting consistently high failure rates resulting in either major repair works or replacement of expensive distribution systems.

Self-Healing Patented Coating Technology

This new visco-elastic polymer technology exhibits physical properties that meet, and in most cases exceed, the properties of traditional coating systems like tapes, liquid coatings and other corrosion prevention systems. This is especially true in regards to limiting damage during service. This innovative patented technology is competitive and is available worldwide. It provides the pipeline owner a trusted and proven system which does not need any “looking back”.

Laboratory Testing by a Major Oil Company

The viscous elastic coating system with PVC outer wrap, described in the Shell report [3], and applied as field joint coating and rehabilitation coating on carbon steel pipes with Fusion Bonded Epoxy (FBE), Polyethylene (PE) and Polypropylene (PP) line pipe coating is approved to be used to a maximum operating temperature of 60 °C for buried and water immersed conditions (Shell DEP 30.10.02.12-Gen, April 2003) [4] and this dictates the maximum operating temperature of the full coating system. The viscous-elastic coating system is suitable for application in cold areas with environmental temperatures down to minus 45 degrees Celsius, due to its visco elastic behaviour. The wet and dry ageing procedures had no negative effect on the coating properties. This indicates that the long-term performance of the material is sufficient.

Field joint Coating Performance Check

An extensive test and evaluation program [5], see Table 1, was executed to obtain sufficient information on the performance of the viscous-elastic coating system to be able to assess the functionality of this new type of coating system for its specified purpose. In order to determine the effect of ageing on the viscous elastic material, several coating properties were measured after ageing under dry conditions (100 days in air at 90 ·C) and ageing under wet conditions (100 days in tap water at 90 ·C).

<table>
<thead>
<tr>
<th>Test</th>
<th>Layer</th>
<th>Test Temperatures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>System</td>
<td>+23</td>
</tr>
<tr>
<td>Holiday Detection</td>
<td>System</td>
<td>+23</td>
</tr>
<tr>
<td>Dripping</td>
<td>CZH</td>
<td>-45 +23 +70</td>
</tr>
<tr>
<td>Impact</td>
<td>System</td>
<td>-45 +23 +70</td>
</tr>
<tr>
<td>Indentation</td>
<td>System</td>
<td>-45 +23 +70</td>
</tr>
<tr>
<td>Specific Electrical Insulation</td>
<td>System</td>
<td>+23</td>
</tr>
<tr>
<td>Cathodic Disbondment System</td>
<td>System</td>
<td>+23</td>
</tr>
<tr>
<td>Self Healing</td>
<td>System</td>
<td>-45 +23 +70</td>
</tr>
<tr>
<td>Peel Layer to Layer</td>
<td>Outerwrap</td>
<td>-45 +23 +70</td>
</tr>
<tr>
<td>Peel on tube</td>
<td>CZH</td>
<td>-45 +23 +70</td>
</tr>
<tr>
<td>Lap Shear</td>
<td>CZH</td>
<td>-45 +23 +70</td>
</tr>
<tr>
<td>Water Ingress</td>
<td>CZH</td>
<td>+23</td>
</tr>
<tr>
<td>Elongation + Peel</td>
<td>Outerwrap</td>
<td>+23</td>
</tr>
</tbody>
</table>

Table 1. Summary of Tests carried out for Shell Global Solutions (SGS)

100 days Hot Water Soak Test

Several international coating specifications have been published for field joint coatings such as heat shrink sleeves and tapes, but they do not cover the specific corrosion protective properties of this coating system. Also, the Shell specification for shrink sleeves [6] is not suitable to be used for the viscous-elastic coating system. It was required to prepare a product specific specification for the material. After discussions with STOPAQ Europe and Shell Global Solutions (SGS), Polymer Service Centre Groningen (PSCG) compiled a new set of requirements for this special material based on the self healing, visco-elastic and corrosion protective properties of the material and based on existing international standards for conventional field joint coating systems like tapes and shrink sleeves [1]. The set of requirements for the qualification of the STOPAQ CZH coating system is included in the specification. The outcome of this test program will also be used to justify the suitability of the specification. When the test results indicate that the test criteria are not indicative enough (positive or negative), it may be required to revise the specification. To determine the effect of ageing on the coating properties of this coating system, test samples were immersed in water at 90°C (wet ageing) for 100 days. Dry ageing of the viscous-elastic coating was performed by exposure of test samples in air at 90°C for 100 days. The temperature of 90°C was selected because the maximum temperature of the coating was set by STOPAQ Europe to 70°C and an additional 20°C is normally used to simulate a long-term effect on the coating material.

Comparison to Traditional Protection Systems

The application of the viscous-elastic coating is done manually and generally without any additional heat requirements. For field application, this gives advantages compared to coating systems which require heat treatments. Because the materials used are stable and inert, the application is less
susceptible to environmental conditions such as humidity, temperature, etc. compared to liquid coatings or materials which needs curing, drying, etc. However, to achieve a reproducible coating product, the application shall be done following the application instructions: According to the manufacturer, wire brushed steel surface (St 3) is sufficient before application. The compatibility with the existing line pipe coatings is good. According to the STOPAQ application guidelines, no pre-treatment of the line pipe coating is required, except cleaning with an appropriate cleaner, but peel testing at -45°C indicate that the adhesive strength between STOPAQ Wrappingband CZH and existing line pipe coating is highly improved (> 20 N/mm, no detachment), see Table 2, when the line pipe coating is abraded using an appropriate hand or automatic tool.

Coating Property

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Thickness</th>
<th>Coverage</th>
<th>Strength N/ mm</th>
<th>Failure Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe</td>
<td>2.0mm</td>
<td>&gt;99%</td>
<td>30</td>
<td>TB</td>
</tr>
<tr>
<td>Plant Coating</td>
<td>1.0mm</td>
<td>&gt;99%</td>
<td>20</td>
<td>TB</td>
</tr>
</tbody>
</table>

This effect is also shown during the cathodic disbonding test. The artificial coating defect is recovered with this material, reducing the current requirement to zero and no cathodic disbonding was observed. This property is also stipulated during the peel testing. When a cohesive failure of the STOPAQ Wrappingband CZH is observed, the substrate is fully covered with sufficient coating material, although the peel strength of the coating is limited compared to the peel strength of conventional coating systems. Peel testing on the weld area indicated a remaining layer thickness of less than 0.6 mm in some cases.

Table 2. SGS Peel Test to Pipe Surface and Plant Coating Results

Table 3. SGS Impact Test Results Summary

<table>
<thead>
<tr>
<th>Coating Property</th>
<th>Measured</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact Resistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requirement:</td>
<td>&gt;15 J</td>
<td>No Holidays</td>
</tr>
<tr>
<td>- 45°C</td>
<td>No Holidays</td>
<td></td>
</tr>
<tr>
<td>+ 23°C</td>
<td>No Holidays</td>
<td></td>
</tr>
<tr>
<td>+ 70°C</td>
<td>Holidays</td>
<td>No Holidays</td>
</tr>
</tbody>
</table>

This is below the requirement, but in the field an extra layer of the material is applied on the weld area to prevent a reduced coating layer thickness on the weld seam. Compared to conventional tapes, the measured peel strength is relatively small, due to the nature of this particular coating material. Actually, a peel test cannot be done on a liquid. All what has been done is peeling out the netting inside the liquid-like polymer compound, Figure 3. No adhesion failure will be found at any pipeline surface.

No Adhesion Failure

The robustness (i.e. resistance to impact, see Table 3) and indentation, see Table 4), of the total coating system is less compared to conventional field joint coating systems, but due to the self-healing properties of the viscous-elastic coating, Figure 2, the risk for

Table 4. SGS Indentation Resistance Results Summary

<table>
<thead>
<tr>
<th>Coating Property</th>
<th>Measured</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indentation Resistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requirement:</td>
<td>&gt;0.6mm</td>
<td>No Holidays</td>
</tr>
<tr>
<td>- 45°C</td>
<td>2.4mm</td>
<td>No Holidays</td>
</tr>
<tr>
<td>+ 23°C</td>
<td>1.2mm</td>
<td>No Holidays</td>
</tr>
<tr>
<td>+ 70°C</td>
<td>0.4 to 0.9mm</td>
<td>No Holidays</td>
</tr>
</tbody>
</table>

Fig. 2. Self Healing Coating coating damages is limited. The self-healing and recovering property of the coating system is a strong property of this system.

Fig. 3. Cohesive failure of CZH Wrappingband, no disbondment of coating
No Cathodic Disbondment

The self-healing and recovering properties of the coating system are strong properties of this coating system. The self-healing properties result in additional resistance against possible damaging effects of impact and indentation. Deformations made during impact tests, indentation tests and cathodic disbondment tests can be restored to its initial (undeformed) state. The self-healing performance is depending on the temperature, defect size and pressure applied by e.g. the outer layer. The self-healing test has proven to be a functional method to quantify the self-healing properties of a visco-elastic self-healing coating system like STOPAQ CZH material. No disbondment of the coating due to cathodic disbondment was observed. The artificial coating defect is recovered with STOPAQ CZH material, reducing the current requirement to zero, see Table 5. The ageing (dry and wet) has no significant negative effect on the adhesion performance of the coating system. The application of the coating with PVC Outerwrap is a relatively simple process due to the nature of this unique material. This is equivalent to a savings of about 30%. The factors that made application/installation of this system cheaper are as follows:

a) Marginal Surface Cleanliness - It requires minimal surface cleanliness (St 2/3 clean and dry) and surface profile is not an issue while liquid epoxy requires near white metal finish (Sa-2–1/2) and a surface profile of at least 75 microns.

b) No Curing Time - It does not require waiting time before backfill after its application/installation while liquid coating requires at least one day to cure properly after application before backfilling. During the cold months, the waiting time for liquid coating to cure properly could take days. Obviously, it will be a decrease in cost for at least one day, which translates to elimination of the cost of manpower, equipment and utilities for one day for each 15 meters long pipe section.

c) Less Drainage Time - As a result of the elimination of the curing time, the time needed to perform the rehabilitation work will be significantly less, making the cost of water drainage much less in return.

d) Less Drainage Cost - Since the time of excavation until backfill requires water drainage to remove water from the bellhole (excavation), the drainage cost is significantly higher in the application of liquid because of the curing time. Stopaq, on the other hand, can be backfilled just after application/installation.

e) Manual Application/Installation - The application/installation does not require costly equipment. In is installed manually in most cases. For the liquid epoxy coating, equipment such as air compressor, spray equipment, air filter and manifold are used. Furthermore, these equipment and machines need maintenance and spare part replacement, that adds up to the cost.

f) Less Skilled Manpower - The application/installation also does not require highly skilled manpower. This means less training and lower labour cost. On the other hand, the spray application of liquid epoxy requires skilful manpower to avoid massive premature failures.

g) Chlorides Removal is not a Requirement - Due to the extremely high surface tolerance of the material, sweet water washing to remove chlorides on the steel surface is not required. On the other hand, liquid epoxy coating requires sweet water washing to remove chlorides on the surface. Additionally, high pressure sweet water washing is required on substrates of pipelines buried in Subkha to ensure removal of chlorides and the FeCl2 that could form as a result of reaction of NaCl with the steel pipe. After extensive field trials and use for in excess of 7 years trials within the Subkha salt marshes it was observed that even with the presence of salt deposits, no corrosion cells were found after this period.[7].

h) Holiday Test and Repair are not a requirement - Holiday testing is not normally performed with this particular material and repair is rare, because it is easy to apply and defects are not expected during its application. It is very different with liquid coatings that require holiday and thickness tests. Also, holidays are expected with liquid coatings; therefore, repair is common.

i) Weather Condition Tests are not required - In the application of this coating system, there is no need to test for relative holiday, dew point and ambient temperature. On the other hand, these tests are needed in the application of liquid coatings.

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1. “Qualification of STOPAQ CZH by Shell Global Solutions”, Test document TD-STOPAQ062123 Version 6, January 26, 2006 by Polymer Service Centre Groningen (PSCG), The Netherlands

2. External coatings for buried or submerged pipelines used in pipeline transportation systems - Part 3: Field Joint Coatings, ISO 21809

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5. Technical assessment of STOPAQ CZH coating system as field joint coating and as rehabilitation coating. Application on carbon steel line pipe with FBE, PE and PP line pipe coating, GS.07.50454 by J.R. van Bokhorst.


7. Article “New Coating Generations offer Effective Solutions for Rehabilitation of buried Pipelines” by Dr. Moufaq I. Jafari, Dr. Fikry F. Barouky & Faisal M. Melbari with the support of Saudi Aramco and the help provided by the staff of the R&D Centre, Consulting Service Department and Pipelines Department

Author Alexander Besant is a Director of STOPAQ UK Ltd, affiliated to STOPAQ EUROPE B.V.

Field Experience

An actual study was done in the Middle East, where the water table is high. Despite the fact that this coating material cost is higher than the compared liquid epoxy coating system, they found out that when surface preparation, curing time before backfill, the time used in running the water drainage system, equipment, water rinsing, manpower, holiday test & repair, weather condition, and blasting are taken into consideration, this coating system is significantly cheaper. In that study, the use of this unique system was estimated to be cheaper than liquid epoxy coating based on a 15 linear metres 60” diameter welded buried pipe.

<table>
<thead>
<tr>
<th>Coating Property</th>
<th>Measured</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cathodic Disbondment Resistance Requirement: &lt;15 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ 23°C</td>
<td>0 mm</td>
<td>Ø 6 mm defect is healed &lt;24 hr, no disbondment observed</td>
</tr>
<tr>
<td>+ 70°C</td>
<td>0 mm</td>
<td>Ø 6 mm defect is healed &lt;24 hr, no disbondment observed</td>
</tr>
</tbody>
</table>

Table 5. SGS Cathodic Disbondment Resistance Results
Pyeroy Powers Ahead on Medway Refurbishment Contract

Protective coatings specialist Pyeroy Group has completed work on a £1.3 million contract to refurbish an offshore platform at the Isle of Grain Power Station in Kent, operated by E.ON - one of the UK’s largest power and gas companies.

The contract saw Pyeroy’s Environmental Division undertake repair and refurbishment work on the offshore cooling water intake platform, which is situated in the tidal River Medway.

The 30 year old platform protects the two intake shafts which draw water from the river to cool the power station’s electricity generating turbines and provides coarse screening to the cooling water.

Operating from two floating barges, the specially trained team, including dive and marine experts, completed the work to extend the platform’s working life for at least another 25 years.

This included shot blasting the structure using an environmentally safe garnet abrasive prior to inspecting and replacing corroded steelwork elements and applying a new hard wearing protective paint coating suitable for the aggressive marine exposure conditions.

Since this protective paint coating only protected the upper exposed sections of the platform, Pyeroy also designed and installed a sacrificial cathodic protection system to protect the submerged sections from further seawater corrosion.

Protection of the environment was a key priority for E.ON, so a specially designed and constructed suspended scaffolding system provided an appropriate work access platform.

This work platform was then fully encapsulated to prevent any potential spillage into the Medway, as well as enabling contractors to continue working in wet conditions during an English summer.

Work also needed to be carefully coordinated to accommodate the strong tidal conditions experienced (since the river rises and falls by seven metres every tide) and the heavy local river traffic.

A further complication was the location of the platform being adjacent to an operational LNG (liquefied natural gas) terminal, that imposed a 150m exclusion zone which included the west end of the platform.

LNG tankers could potentially arrive with seven days prior notice and each tanker took twenty four hours to discharge their respective load(s). This required work and material delivery scheduling to be meticulously planned to avoid all times when the gas carrying tankers were offloading.

Kevin Marron, divisional manager overseeing the contract, said: “We won the contract because of our expertise and track record in managing complex projects involving specialist protective coatings. We are now in a great position to tender for more work of a similar nature in future.”

As well as the industrial painting division, the Pyeroy Group operates specialist divisions providing marine coatings, scaffolding, construction, insulation and environmental services. The company operates a network of regional offices around the UK and Ireland from its head office in Gateshead.

More at www.pyeroy.co.uk

Densoclad 70 Protects Underground Gas Storage Pipework

More than 20km of pipeline are being used at Stublach in Cheshire to connect natural gas storage cavities that have been formed by the extraction of brine.

The installation is being carried out by main contractors Contains Oil and Gas for Ineos Chlor and Gaz de France. In order to give long-term corrosion protection in the saline corrosive environment, the pipeline sections have been totally wrapped with Winn & Coales’ Densoclad 70 and 70s, this work being carried out by Barrier Ltd of WallSEND, Tyne & Wear, before transporting to Stublach. Welded joints were wrapped on site with Densoclad 70 by Entrepone and Murphys.

Winn & Coales’ Densoclad 70 medium to heavy-duty tape is designed for anti-corrosion protection of medium and large diameter pipes, welded joints, bends and fittings, and is applied over Denso primer.

The extremely tough pvc backing combined with polymer bitumen adhesive ensures complete protection and exceptional resistance to damage by impact, poor backfill or aggressive ground conditions. Densoclad 70s has a stiffer pvc backing, which enables it to withstand greater tension when being applied on a motorised rolling rig.
Jotun Jotamastic Specified for 100 Year Old Bridge Refurbishment Project

25 years anti-corrosion protection provided

Up to 25 years protection against corrosion will be provided on a railway bridge spanning the River Medway in Rochester following the specification of Jotun Paints (Europe) Ltd’s Jotamastic high performance protective coating. The 100 year-old Network Rail-owned Rochester Rail Bridge, which carries the mainline railway from Kent to London over the Medway, has been refurbished as part of an upgrade programme to the line.

The repainting work was undertaken by specialist industrial painting contractors Shutdown Maintenance Services Ltd and has taken approximately one and half years to complete. The ornate cross-lattice and complicated structure of the four span, 220m metre long bridge made it difficult to shot blast the metalwork to the requisite SA2.5 standard to the entire surface of the bridge, (approximately 95% achieved) before painting.

Jotamastic B7 GF (glass flake) was therefore specified to ensure compliance with RT98 specifications for both SA2.5 and ST2 - in the process, providing a longer lasting, easier-to-maintain protective coating when compared to manual treatments. The decision to use Jotamastic followed trials and testing involving Jotun’s consultant Dave Butler. He said: “With the double benefit of a high quality finish and all round anti-corrosive protection, Jotamastic was the ideal solution for the application.” Quantities of Jotamastic Grey, White and Red were supplied direct from Jotun’s Flixborough manufacturing plant, together with Jotun Hardtop XP, an impact resistant polyurethane topcoat with superior gloss and colour retention. Hard wearing and durable Jotamastic GF is a surface tolerant glass flake abrasion resistant coating suitable for infrastructure applications like bridges, which have to withstand significant wear and tear from high levels of traffic and where the SA2.5 standard cannot be achieved. Glass flakes within the coating overlap, blend and bind together to provide a very tough, virtually impermeable film. Product is quick to prepare and easy-to-apply in a single coat directly to ST2 prepared surfaces, where necessary, saving time and costs.

The product is also part of NORSOK approved systems currently in use on offshore structures in the North Sea. The Protective Coatings Division of Jotun Paints (Europe) Ltd is part of the Norway-based Jotun Group, one of the world’s leading manufacturers of paints, coatings and powder coatings. The Group has grown substantially over the last 80 years and today operates 67 companies and 40 production facilities across five continents. Employing 5,300 people (184 in the UK), sales income in 2006 was in excess US$ 1.2 billion. In the UK, it provides protective coatings for the offshore, cathodic and industrial sectors, marine coatings and decorative paints sectors. This is supported with a technical advice service as part of its ongoing commitment to customer service. This includes the preparation of specifications, site survey and product training at its purpose-built centre. Information sheets and colour cards are available from the Jotun national network of stockists or at www.jotun.co.uk
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We are currently seeking to recruit an experienced Corrosion Prevention Engineer to design and manage cathodic protection systems on pipeline assets in the UK.

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SPECIALTY POLYMER COATINGS INC
64 Tudor Avenue
Worcester Park
Surrey KT4 8TX
Tel: 020 8337 4953 Fax: 020 8337 4953
Website: www.spc-net.com

STOPAQ UK LTD
Court House Farm Units, Court House Farm
Berretton, Cheshire CW11 1RL
Tel: 0845 071 0688 Fax: 0845 071 0689
Email: info@stopaq.co.uk Website: www.stopaq.co.uk

CIVIL & MARINE LTD
Abrasives Works, Gibson Lane, Melton,
North Ferriby, East Yorkshire, HU14 3HN
Tel: 01482 633305 Fax: 01482 634835
Website: www.civilandmarine.co.uk

DOORBOS EQUIPMENT
Ultra High Pressure Water Pumps Specialists
High Pressure Pumps available for rent on a daily/weekly/monthly basis
Pumps Available from 3,000 to 40,000psi!
Output flows available up to 40 litres/minute from one pump at 2800bar
Single or Multi Hand-held Lance or Automatic Crawler Units
Silenced Trailer or Container Units
Cold Abrasive Cutting up to 2800bar
Tel: 023 8064 3388 Fax: 023 8064 3399
Email: sales@doorbosequipment.co.uk
Website: www.doorbosequipment.co.uk

DRYAIR UK LTD
96 Huddersfield Road, Brighouse, Yorkshire HD6 3RD
Tel: 07921 908851 Fax: 01484 717614
Email: mbiggens@dryairuk.com Website: www.dryairuk.com

FERNOX
MAKES WATER WORK
Cookson Electronics, Forsyth Rd, Woking, Surrey GU2 1SR
Tel: 01483 793200 Fax: 01483 793201 www.fernox.com

F M CONWAY LTD
Conway House, Rochester Way, Dartford, Kent DA1 3QY
Tel: 0208 636 8822 Fax: 0208 636 8827
Website: www.fmconway.co.uk

GMA GARNET (EUROPE) GMBH
PO Box 9, Middlewich, Cheshire, CW10 9FD
Tel: 01606 836233 Fax: 01606 836610
www.gmagarnet.co.uk
ICATS REGISTERED COMPANIES

**ICATS REGISTERED COMPANIES WITH QUALIFIED APPLICATORS**

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>APB Construction (UK)</td>
<td>Unit 3, Bramley Way, Hellaby Industrial Estate, Hellaby, Rotherham, S. Yorkshire, S66 8QF</td>
<td>T: 01709 541000</td>
</tr>
<tr>
<td>Cameron Limited</td>
<td>Queen Street, Stourton, Leeds, LS10 1SB, UK</td>
<td>T: 0113 276 4389</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, Yarm Road, Darlington, DL1 4DE</td>
<td>T: 01325 502345</td>
</tr>
<tr>
<td>Fairfield Mabey Ltd</td>
<td>Station Road, Chepstow, Monmouthshire, NP16 5YL</td>
<td>T: 01291 623801</td>
</tr>
<tr>
<td>Hayes and Horne</td>
<td>Rear Barn, Wivenhol Industrial, Plymouth, PL9 8AA</td>
<td>T: 01752 401234</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>Paintel Ltd</td>
<td>26 St George's Road, Saltash, Cornwall, PL12 6EH</td>
<td>T: 01752 842720</td>
</tr>
<tr>
<td>Port Painters Limited</td>
<td>Unit 3, Ringside Business, Hoel-Y-Rhosog, Cardiff, CF3 2EW</td>
<td>T: 02920 777070</td>
</tr>
</tbody>
</table>

**ICATS REGISTERED COMPANIES WITH APPLICATIONS IN TRAINING**

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyeroy Limited</td>
<td>Kirkstone House, St Omer's Road, Western Riverside Route, Gateshead, Tyne &amp; Wear, NE11 9EZ</td>
<td>T: 0191 493 2600</td>
</tr>
<tr>
<td>Roy Hankinson Limited</td>
<td>Alexander House, Monks Ferry, Birkenhead, Wirral, CH41 5LH</td>
<td>T: 0870 7892020</td>
</tr>
<tr>
<td>T I Protective Coatings</td>
<td>Unit 6, Lodge Bank, Crown Lane, Horwich, Bolton, Lancs, BL6 5HY</td>
<td>T: 01204 468080</td>
</tr>
<tr>
<td>Wardle Painters Ltd</td>
<td>Unit 5, Wimborne Building, Atlantic Way, Barry Docks, Glamorgan, CF63 3RA, UK</td>
<td>T: 01446 749620</td>
</tr>
<tr>
<td>Abrasion Ltd</td>
<td>Unit 1 B, OJ Industrial Park, Claybank Road, Portsmouth, PO3 5SX, UK</td>
<td>T: 02392 661023</td>
</tr>
<tr>
<td>Alltask Limited</td>
<td>Alltask House, Commissioners Road, Strood, Kent, ME2 4EJ</td>
<td>T: 01634 298000</td>
</tr>
<tr>
<td>Beever Limited</td>
<td>Little Coldharbour Farm, Tong Lane, Lamberhurst, Kent, TN3 8AD, UK</td>
<td>T: 01892 890045</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>Concrete TS Ltd</td>
<td>Unit B2 (2), Moss Industrial Estate, Leigh, Lancs, WN7 3PT, UK</td>
<td>T: 01942 261909</td>
</tr>
<tr>
<td>Corrocoat</td>
<td>Forster Street, Leeds, LS10 1PW</td>
<td>T: 01132760760</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>F A Clover &amp; Son Ltd</td>
<td>Bardolph Road, Richmond, Surrey, TW9 2LH</td>
<td>T: 0208 948 6321</td>
</tr>
<tr>
<td>Gemini Corrosion</td>
<td>Broomhill Road, Spurrihillock Industrial, Stonehaven, Aberdeenshire, AB39 2NH</td>
<td>T: 01569 765488</td>
</tr>
<tr>
<td>Industrial Coating</td>
<td>370 Farm Street, Hockley, Birmingham, B19 2UA, UK</td>
<td>T: 0121 551 1984</td>
</tr>
<tr>
<td>Merseyside Coatings Ltd</td>
<td>Pickernings Road, Halebank Industrial Estate, Widnes, Cheshire, WA5 8XW</td>
<td>T: 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, UK</td>
<td>T: 0191 438 5555</td>
</tr>
<tr>
<td>Palmers Ltd</td>
<td>1120 Elliot Court, Herald Avenue, Coventry Business Park, Coventry, CV3 6UB</td>
<td>T: 02476 710294</td>
</tr>
<tr>
<td>P C Richardson &amp; Co</td>
<td>Courville House, Ellerbeck Court, Stokesley Business Park, Stokesley, TS9 5PT, UK</td>
<td>T: 01642 714791</td>
</tr>
<tr>
<td>Rowecord Engineering</td>
<td>Neptune Works, Usk Way, Newport, South Wales, NP20 2SS</td>
<td>T: 01633 250511</td>
</tr>
</tbody>
</table>
ICATS REGISTERED COMPANIES

Shutdown Maintenance
Kingsnorth Industrial, Hoo, Rochester, Kent, ME3 9ND
T: 01634 256969

Site Coat Services Ltd
Unit 11 Old Wharf Road, Grantham, Lincs, NG31 7AX
T: 01476 577473

Strada Contractors Ltd
Unit 9, Portland Enterprise, Quartemaine Road, Portsmouth, PO3 5QT
T: 02392 666109

Supabrite Nationwide
Jubilee Estate, Gosney Lane, Coleshill, Birmingham, B46 1JU
T: 01675 464446

T & T Coatings Ltd
Snowdon House, Snowdon Road, Middlesborough, TS2 10Y, UK
T: 01642 247972

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

Denholm Industrial
King George V Docks, Glasgow, G5 1SD
T: 0141 445 3939

Fairhurst Ward Abbots
225 London Road, Greenhithe, Kent, DA9 9RR
T: 01322 387000

F M Conway Limited
Conway House, Rochester Way, Dartford, Kent DA1 3QY, UK
T: 0208 636 8822

H & S Decorating
1 Wellesley Avenue, Richings Park, Iver, Bucks, SL0 9AU, UK
T: 01753 654123

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

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

JPV (Painters) Ltd
Unit 8 Prospect Way, Hutton Industrial Estate, Brentwood, Essex, CM13 1XQ, UK
T: 01277 201515

Lanarkshire Welding Co.
82 John Street, Wishaw, Lanarkshire, ML2 7TQ
T: 01698 264271

Leighs Paints
Tower Works, Kestor Street, Bolton, Lancs, BL2 2AL
T: 01204 521771

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

Nusteel Structures
Lyme Industrial Estate, Lyme, Hythe, Kent, CT21 4LR
T: 01303 268112

Opus Industrial Services
Ethan House, Royce Avenue, Cowpen Industrial Estate, Billingham, TS23 4BX, UK
T: 01642 371850

Ormac Coatings Ltd
Newton Chambers Road, Thorncliffe Park Estate, Chapeltown, Sheffield, S3 2PH
T: 0114 246 1237

Radleigh Metal Coatings
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

Severfield-Reeve
Dalton Airfield Industrial, Dalton, Thirsk, North Yorkshire, YO7 3JN
T: 01845 577896

Southern Contracting
Unit 6, Trident Business, Shore Road, Hythe Southamton, SO45 6DF, UK
T: 02380 849000

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

Steel Protection
7a High Street, Mews, High Street, Leighton Buzzard, Beds, LU7 1EA, UK
T: 01525 852500

Taylor & Sons
5-6 Curran Road, Cardiff, CF10 5DF, UK
T: 029 2034 4556

Watson Steel Structures
Loston Lane, Lostock, Bolton, BL6 4BL
T: 01204 699999

Weir Coating Systems
Unit 19, Heysham Business Park, Middleton Road, Heysham, Lancs, LA3 3PP
T: 01606 723426

W G Beaumont & Sons
Unit 1, Chadwell Heath Industrial, Kemp Road, Dagenham, RM8 1SL
T: 0208 590 8523

William Hare Ltd
Brandleholme House, Brandleholme Road, Bury Lancs, BL8 1JU, UK
T: 0161 609 0000
Thursday 12th March
London Branch meeting
Topic: High temperature corrosion by Dr. Stephen Mabbutt of Cranfield University
Venue: Naval Club, 38 Hill Street, London, W1 17.30 for 18.15 start

Thursday 9th April
London Branch meeting
Venue: Naval Club, 38 Hill Street, London, W1 18.00

Thursday 23rd April 2009
ICorr (CED/Yorkshire & NW Branches) Symposium
‘Corrosion Failures and How to Avoid Them’
Venue: Health & Safety Laboratories, Harper Hill, Buxton, Derbyshire SK17
Contact: Chair of CED, Nick Smart, Email: nick.smart@serco.com

16 September – 17 September
50th Corrosion Science Symposium
Venue: The University of Manchester
Running as a session of the RSC/SCI Electrochem 09 Conference.
Local organisers: Nicholas Stevens (ICorr) and Rob Dyre (RSC).
Email: nicholas.stevens@manchester.ac.uk
Abstract Deadline: 31st May 2009

14 September – 18 September
Fifth International Conference
- Advances in Corrosion Protection by Organic Coatings
Conference organiser: Professor David Scantlebury, The University of Manchester
Conference venue: Christ’s College, Cambridge
Contact: Fiona.Fraser@manchester.ac.uk
www.manchester.ac.uk/materials/events

27th, 28th & 29th October
Surface World with CORREX 2009
Venue: NEC, Birmingham
Enquiries & stand bookings: Contact Nigel Bean, Sales Director on +44 (0)1442 826826, email: ngebean1@aol.com
www.surfaceworldshow.com

Institute of Materials, Minerals & Mining
Corrosion Committee Meeting
One Day Conference on: “Underground Corrosion”
DATE: TBC
Venue: The Health & Safety Laboratories, Buxton
Enquiries: john.thirkettle@thorcorrosion.co.uk
rakid@shu.ac.uk

SHORT COURSES
23-26 March
Corrosion Control in the Oil and Gas Industry
Houston: 23-26 March 2009. USA, Houston,
23 - 26th March 2009, details from Colin Britton,
Tel: +44 (0)1489-860943, Email: cbrit79727@aol.com

20-23 April
Corrosion Control in Industry
Amsterdam - Further details contact Colin Britton
Tel: +44 (0) 1489 860943 e: cbrit79727@aol.com

30 March – 3 April
Corrosion Engineering and Control:
This five-day course, in its 38th year, is ideal for professionals and recently appointed graduates working in the field of corrosion prevention. Guided by established experts in the field, you will explore principles, protection strategies and the industrial applications of corrosion and its control.
Course venue: School of Materials, The University of Manchester
Contact: Short Course Team
Tel: +44 (0)161 306 4869
Email: shortcourses-materials@manchester.ac.uk
www.manchester.ac.uk/materials/shortcourses

16-20 February
NACE, Basic Corrosion Course
Venue: London
For further details contact Dr. Paulette Sidky
Tel. 020-7460 9408 Email: p.sidky@cmcltd.uk

9-13 March
NACE, Basic Corrosion Course in the Refining Industry
Venue: London
For further details contact: Dr. Paulette Sidky
Tel. 020-7460 9408
Email: p.sidky@cmcltd.uk

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