A commemorative issue celebrating the 50th anniversary of the Institute of Corrossion on 21st May 2009
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:
13th & 14th July 2009
14th & 15th September 2009
23rd & 24th November 2009
Additional courses can be arranged depending on demand.

For further information or administrative details, costs and bookings for courses and examinations or detailed information packages free of charge, please contact:
Martin Dawson or David Betts on:
Tel: +44 (0)1709 560459 Fax: +44 (0)1709 557705
Email: enquiries@ruanetpo.com
Internet: http://www.ruanetpo.com
Technical and eligibility enquiries can be made direct to Dave Griffiths the ICorr Scheme Manager on:
Tel: +44 (0)1709 550999

Reader Enquiry Service
March/April 2009

For further information on any of the items featured in this edition of Corrosion Management, please write the appropriate Reader Enquiry Service number(s) in the spaces below.

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Before you ask, yes, that is an old picture of me, but it is not an attempt on my part to claim youth is on my side. It was taken about 25 years ago, roughly the same time I joined ICorr. That means that only my beard and my marriage are older than my membership. Scary thought, really. Even more impressive is the realisation that there are a considerable number of current members who had already been associated with the organisation we now know as the Institute of Corrosion for 25 years when the photo was taken.

Golden anniversaries have some quite unique characteristics. Unlike centenaries, there are likely to be a fair number of the original protagonists to confirm (or disagree vehemently about) the details of the early years and subsequent developments. It is a special, one-off opportunity to recognise the past with those who made it happen while looking forward to the future with the current, and hopefully growing, membership.

Over the past half century we have jointly committed something in excess of 50,000 man/person/whatever-you-are-comfortable-with years to the Institute. That’s roughly equivalent to one Channel Tunnel (don’t ask for the working out, just trust me on this one). A completely irrelevant comparison, of course, but it does put some sort of scale on the combined contribution the membership has invested in the Institute’s success. And like all investments (at least until recently) it is important to maintain a high level of interest. In our case, this is delivered by the various Branches and Divisions with technical meetings and social events plus contributions to committees and standards that form the interface between the Institute and its membership. All this activity then generates the news and technical articles that form the bulk of Corrosion Management or appear on the website.

By the way, if you haven’t visited the website recently (still at www.icorr.org), now is a good time as it has had a bit of a make-over. In addition to news and articles you will find a discussion forum and all manner of downloads such as the application forms for Chartered Scientist.

One of the enduring factors of our craft has been its multi-disciplinary nature. We are practitioners of every hue, linked by a common interest in a complex product of material, environment, design, maintenance (or lack of it) and perception. You even get instances where folk get upset because of too little or the wrong type of corrosion (I’m thinking patination, you might be thinking battery technology, we’d both have a point).

So, hurrah for us and a big ‘thank you’ to all the head office staff, Branch officers and committee members who make it all happen. And on this very special occasion, an extra special ‘thanks’ to those who started things rolling 50 years ago. We all owe them a great debt of gratitude, which we will pay back by setting a straight and true track for the Institute’s next half century.

ICorr 50TH Anniversary VIP Invitations

Dear Member

The organising committee for the Institute of Corrosion’s 50th Anniversary Celebration Event, 21st May 2009, had the difficult task of selecting 10 individuals, or close relatives of past Members, who had been significantly influential in the development of ICorr during the 50 years, 1959-2009.

There are clearly so many individuals who have put in a lot of work and support for the Institute in the last 50 years, since its formation and it was therefore an extremely difficult job to “whittle” this down to just ten in number. I trust that the Membership will appreciate the careful thought and the reasons for finalising the list below which is set out in alphabetical order.

With Best Wishes

David H. Deacon
50th Anniversary Committee Chairman

Tony Benn. The Rt. Hon. Anthony Wedgwood Benn, M.P. was the Government, Minister for Technology in 1969 and responded to the calls from the active Members of BACE/Institution of Corrosion Technology, to set up a Committee to establish the actual cost of corrosion in the UK.

This initiative resulted in a number of actions from the DTI report Chaired by Dr Hoar, a Past President and Honorary Fellow of the Institute. It resulted in the appointment of the first Professor of Corrosion, Graham Wood at UMIST and the merger of CAPA and BACE/ICorr Tech, to form the Institution of Corrosion Science and Technology.

It is appropriate that Tony Benn has responded to our theme, ‘Across the Generations,’ since his son, Hillary is now the Environment Minister with responsibility for the activities at the Thames Barrier. His Granddaughter Emily is the prospective parliamentary candidate for Southampton.

Derek Bayliss. Derek Bayliss, who although he was not a Member of the inaugural committee of the British Association of Corrosion Engineers, (BACE) gave major support to the new organisation, as the most senior coatings specialist in the CEGB at that time and made a significant impact on its recognition.

Derek has continued to support the Institute over the past 50 years, as Chairman of the Technical Committee in the early days, Member of Council, Vice-President and President and represented the Institute for over 30 years on the International Standards Committees for Surface Preparation on a worldwide basis.

He was active in the early days of the Institute’s coating inspection programme and trained hundreds of inspectors throughout the world. Derek’s advice and guidance on the corrosion protection of Thames Barrier is also well known.
Charles Booker. Charles Booker was a Member of the Corrosion and Protection Association (CAPA) and was instrumental in the merger of that Association with the Institution of Corrosion Technology, which grew out of the original BACE group. Charles Booker was the Institute’s Honorary Secretary for the longest period of time of any officer.

During the Derek Bayliss Presidency Charles was instrumental in relocating the administration of the Institute from London to IMF in Birmingham (and even drove the removal van with Henry Cole on Boxing Day). That move signalled his first retirement as Hon. Sec., but when we moved away from IMF and relocated in Leighton Buzzard, Charles was persuaded to rejoin as Hon. Sec., and remained in office for many years.

Charles has been on Council for over half the Presidents of the Institute and has always provided them with a steady guiding hand.

Gordon Currer. Gordon has been a Member of ICorr for many years and has provided specialist Cathodic Protection Consultancy advice on a worldwide basis. He was the first appointment within the Gas Industry, as a designated corrosion engineer and then right through the 1980s was chief engineer at Metal and Pipeline Endurance Ltd. (Mapel).

He has been active and influential on the British Standards drafting committee for various Cathodic Protection Codes of Practise, in particular, CP1021,1983 (now the BS7361).

He has presented numerous papers to Institute events, Branches and Conferences and has guided many of our present members. He will be a Pipeline Panel Member at the 50th Anniversary event on the 21st May 2009.

Nicola Galloway. Nicola Galloway is the Granddaughter of Jack Galloway, and represents the theme of, ‘Across the Generations.’ The late Jack Galloway was on the inaugural Committee of BACE and was the first Chairman of the BACE Council, under the Presidency of C L Wilson.

The CSD have been awarding the Galloway medal in his memory to the young scientist of the year and Nicola has been invited in memory of her grandfather and in recognition of the services that her Grandfather gave to the Corrosion Industry and the Institute. Jack was the first member to open discussions with NACE in the USA in 1962.

Nicola has not followed her Grandfather into the Corrosion World, but has inherited his stubborn streak. Nicola is the Customer Operations Manager with Norwich Union in Sheffield. She has a daughter called Hannah (Jack’s great Granddaughter) and a younger sister, Lisa.

Harry Hatley. Harry Hatley was a Founder Member of BACE and was on the first BACE Council, subsequently becoming Chairman. He has remained a Member of the Institute for the full 50 years. He has been actively involved in numerous committees, including Membership of Council for many years and guided the Membership Committee, now called, the Professional Assessment Committee, for over 30 years.

Harry was also instrumental in setting up the Institute’s Professional Code of Conduct and has been a source of information and guidance to many of the Officers, Presidents and members over the 50 years.

Jack Tighe. Jack Tighe has been in the coating application business since the formation of BACE in 1959 and was actively involved in the setting up of the Institute’s Yorkshire Branch in the early 1960s. Many of his staff have supported Institute events, with sponsorship and giving papers and supporting Institute activities.

He has been involved with many major contracts and his Company undertook the blasting cleaning and coating of the Thames Barrier Gates at Cleveland Bridge during the 1970s. Jack is probably one of the best known names in the protective coating industry. It has also been supporting the ICATS scheme since its start.

John Tiratsoo. John is the second representative, ‘across the generations,’ since it was his father, Dr John Tiratsoo Snr, whose publishing company with his corrosion Magazine Corrosion Prevention and Control in the 1950s, who set up a “Corrosion Engineer” section in his magazine, which became the focal point and catalyst for the formation of BACE. The first inaugural Council Meetings were held at the Tiratsoo offices, and his journal was the first step in publishing the Minutes and activities and promoting the development of the BACE work in the early days.

His son John has continued with the publishing of corrosion control information and now publishes the Journal of Pipeline Engineering and organises pipeline training courses worldwide. Unfortunately John will be away on the 21st May but will be represented by his son Adam.

Brian Tunnard. Brian will be remembered by many Members, as the Technical Editor and Chairman of the Publications Committee, a position he held for over 30 years. His guiding hand and editorial skills provided the communications vehicle for the increasing membership of the Institute, from the original Corrosion Bulletin through the Industrial Corrosion magazine and into the current Corrosion Management.

He dealt with the various publishers and publishing companies when the magazine became too big to produce in-house and remained as Editor until the contract was passed to Square One in 2002 and our current Editor, Robert Akid took over the editorial role on Brian’s retirement.

Graham Wood. Graham Wood was appointed, Professor of Corrosion Science at the University of Manchester, Institute of Science and Technology (UMIST), when this position was created in 1972, following the recommendations from the DTI Committee report, set up by the Minister of Technology, Tony Benn.

Graham has been an active Member of the Institute since that time and was involved in the merger of CAPA and the Institution of Corrosion Technology. He has been on Council, as Vice-President and President of the Institute, as well as providing guidance to many of the graduates from UMIST, who in turn have become Members of the Institute, Officers and Members of Council.

He unwittingly gave tremendous publicity to the Institute when the tabloid papers headlined him, “The First Professor of Rust.”
Evening Walk - London Branch, 7th May

This year’s Guided Walking Tour will start at Marble Arch outside the main entrance to the Cumberland Hotel, Great Cumberland Place W1, around the corner from Marble Arch U/G station [Central Line], at 17.45. We will finish at the Naval Club in Hill Street for complementary refreshments and hot chilli with rice.

Our London Blue Badge guide will again be Ingrid M Wallenborg, BA Hons.

The tour will be of the Portman Estate, the workplace of one of Britain’s most famous spies... and many forgotten Grand Houses with its pleasant pubs!

The fascinating aspect of the history of the Portman Estate is the way in which its evolution over the centuries has influenced the style of building and social fabric of modern Britain. The age of empire, trade cycles, wars, and the movements of people have all left their indelible mark on the Estate’s development.

To many Londoners, this is unknown territory. Yet, this part of Marylebone is an exciting and cosmopolitan mix of old and new, with its own distinctive style as an elegant quarter offering private gardens and resplendent architecture.

There is no charge for this Event and family and friends of members will be most welcome. The Event will go ahead irrespective of the weather.

John T O’Shea - Walk Co-ordinator.
In February we launched the new ICorr website at www.icorr.org. In addition to all the news and information we now have some new features. These include a discussion forum called the ‘Technical Forum’ a business directory and a members login.

There are two main aims for the new site. The first is to provide all members with a platform where they can discuss current topics, network with other members and provide them with up to date information on all the Institutes activities from social events to education and training. The second aim is for the site to become the first port of call for anyone who has a Corrosion related query. This will of course bring potential business opportunities to our members whilst providing a much needed resource for people outside of the industry.

The success of the site in achieving these aims is ultimately down to the people who use it, which primarily will be you the members. We would encourage all members to have a good look around the site, register and start some discussions on the Forum. In the long term this will encourage visitors to the site, to start interacting with our membership, asking technical questions and hopefully doing some business with you.

We have put together the following guide to the various areas of the site which you may be unfamiliar with. If you have any questions, comments or suggestions regarding the new site please contact our site administrator Jonathan Phillips at Square One on 0114 2621873 or jonathan@squareone.co.uk

Technical forum

Potentially this could be the most powerful part of the site and will provide the platform for visitors to ask questions to our members. It will also enable members to have discussions ranging form the latest developments in the industry to which is the best hotel to book for Correx 2009!

Registering is easy, and once registered you will be able to create discussion topics or add posts to topics which are already running. Different levels of access are allocated for visitors and members. This will enable members to access parts of the forum which are not available for the visitors to view.

Members Area

If you register for the forum and provide your membership number you will automatically be given access to the member’s areas. This will give you access to parts of the site which normal visitors cannot access. Currently this is limited, however we plan to add to this as the site develops. The section of the site which is currently restricted to members only is the magazine archive. If you have any ideas of what else you would like to be included please let us know.

Sustaining member’s directory

The directory is built around a micro search engine enabling visitors to search using keywords as well as by classification. Sustaining company members can enhance their advertisements adding more keywords to the database and improving the chances of your company being found in a search.

Conferences and events

Details of all events can be found in this section which is also displayed in brief down the side of every page. Each event has a ‘book it now’ button enabling interested parties to register an interest in the event which will generate an email to the organiser.

In addition we have a Recruitment News section where all the latest vacancies can be advertised. Full details of Corrosion Management Magazine, including a magazine archive, downloadable media packs and the facility for visitors to submit articles. Full details of how to become a member of the Institute along with all the relevant application forms are also available on the site.

Enjoy using the new site and if you have any comments or suggestion please don’t hesitate to get in touch.
NEWS FROM CORREX – CORREX 2009
27TH – 29TH October 2009 at NEC Birmingham

The re-launch of the Correx 2009 Exhibition and Conference is really taking off. The exhibition stands are selling fast with enquiries coming in each day.

Correx 2009, alongside Surface World 2009, together with Interbuild 2009 has meant that bookings for exhibition space are far ahead of any previous year and with over six months to go, some companies who are hesitating may find stand space hard to acquire if left too late. The popular area in the stand display places is on the boundary between Surface World 2009 and Correx 2009 and these areas are now fully booked.

Nigel Bean, Director of Hill Media Limited, who have been hired by Correx to organise, market and promote the exhibition told us that, "we are surprised and delighted at the impact that the re-launch of Correx 2009 has had on the successful Surface World exhibition. Our bookings are up by over 30% at this time (over six months to go) and this should be the most well attended corrosion exhibition and surface coatings show for many years".

The Correx organising committee for the Conference and Workshops are working closely with Hill Media to ensure that the theme of the conference and the practical workshop sessions will provide delegates with a balance between attending half day workshops or conference sessions and so being able to spend time visiting the many varied technical exhibition display areas.

The conference, "call for papers", which was sent out earlier in the year has had a good response from potential authors and the organising committee will be finalising the draft programme of conference sessions and workshops, by the end of May so the full programme will be available five months in advance.

The three conference sessions will comprise Corrosion Protection of Bridges, Immersed Structures and Floodgates and the third one will be on Corrosion Protection of Buildings.

Each issue of Corrosion Management will feature particular emphasis on various sessions in the build up to Correx 2009. The organising committee have approached and appointed well known Chairmen to lead this session and we are pleased to confirm that the Bridge Master of the Forth Road Bridge, Mr Barry Colford has agreed to Chair the bridges session at the conference.

Barry Colford has had many years experience of Bridge Engineering, both construction and maintenance and will be giving a special lecture at the 50th anniversary event to be held in May at the Thames Barrier, so those members who are able to get tickets for the special Centenary Event will be able to hear how Barry Colford’s team is tackling maintenance of this world famous suspension bridge, both from the coatings and the control of the corrosion in the cables.

Major repainting of the Forth Road Bridge will be commencing in the near future and the major trials which were carried out with eight paint manufacturers materials on the main span of the bridge has been recently assessed and we could not have a better Chairman to handle the conference Bridges Session. Our picture shows Barry Colford photographed recently in his office with the famous bridge in the background, seen through his office window.

The workshop sessions will each be of four hours duration and delegates can book for one or two of the workshops on each day, thus allowing them the opportunity to spend half a day walking around the, “up to 100 exhibition stands”, which with all the interesting products and services on display will be a well worthwhile but time consuming exercise.

The organising committee have carefully selected the workshop sessions to be of the most interest to the construction industry generally and to avoid clashes with the conference programme. For example, one of the workshops which will be on inspection instruments will be of considerable interest to a wide range of delegates, for visitors to Interbuild exhibition as well as Surface World. The ICAT scheme, which has rapidly expanded since it was first launched by Correx, some three years ago, will be holding a workshop for the trainers and qualified registered operatives, so all the latest coating instrumentation will be of considerable interest to this particular group of visitors.

David Eyre, the ICATS Co-ordinator, is organising the ICATS session at the Correx 2009 conference and more details of these workshops will be produced in successive issues of Corrosion Management, leading up to this major event in October – Put the date in your diary now: 27th -29th Octoher.
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The Engineering Council UK (ECUK) has recently noticed a marked increase in the number of engineering professionals enquiring about registration for Chartered Engineer (CEng), Incorporated Engineer (IEng) and Engineering Technician (EngTech) status. The organisation has, therefore, been taking steps to accommodate this surge in interest, which it believes is a result of the increasingly competitive job market.

Significantly improving job security and career prospects, professional registration is open to any competent practising engineer, with different levels and pathways available. The three categories - EngTech, IEng and CEng - have been developed to provide a progressive registration structure, reflecting the recognition that lifelong learning and career development are the norm, and will remain so whatever the short-term economic situation may be.

“Evidence of employing registered engineering professionals is a frequent requirement for the award of contracts both in the UK and internationally,” says Andrew Ramsay, Chief Executive of ECUK. “So it is hardly surprising that registrants generally find it easier than non-registrants to gain promotion or a new job. As an added bonus, many employers place such high importance on registration that they are happy to pay the fees on their employees’ behalf.”

National Grid is one of numerous organisations aware of the advantages of employing professional staff who are already registered or plan to work towards registration. Tony Moloney, National Grid’s Manager, UK Learning & Development says, “At National Grid we are committed to maintaining a professional workforce. The advantage to us as employers is that by taking on registered engineers or technicians we have the assurance of knowing that our key personnel hold an internationally recognised mark of competence.”

Applicants for any of the three levels need to join one of 36 professional engineering institutions (such as The Institute of Corrosion) licensed by ECUK to assess candidates. They will be required to demonstrate competence to perform professional work to the necessary standards, as well as show commitment to maintain their competence, work within professional codes and actively participate within the engineering profession.

The financial benefits of holding the designatory letters CEng have recently been proven in the Institution of Chemical Engineers’ (IChemE) Salary Survey 2008. The report reveals that chartered chemical engineers aged 45-54 can now earn, on average, around £7,000 pa more than their non-chartered counterparts.

Further evidence is provided by the Engineering and Technology Board’s (ETB) 2007 survey of registrants, which demonstrates that average salaries for Chartered Engineers starts to significantly diverge from average salaries for non-chartered mechanical and electrical engineers from an early age, becoming around 40% higher by age 45.

Andrew Ramsay adds, “In the long term, maintaining registered status ensures that engineers are continually kept up to date with new developments in their profession. It also means that they are governed by a professional code of conduct and receive reminders and assistance in determining their obligations under this code.”

“And on top of the benefits of registration, institution membership brings its own advantages. All licensed engineering institutions provide news of job vacancies, library and support services, as well as access to continuous professional development. Some have club facilities and many have job pages or career-finder services. The conferences, meetings and seminars they organise, many of them free to attend, open up opportunities to meet and network with professionals in the relevant field.”

For further details of how professional members of ICorr can apply for Chartered Engineer or Chartered Scientist status please visit the new website. All the information can be found in the ‘Education and Training Section’.

A London Branch presentation on high temperature Corrosion

At the London Branch evening on 12th March, members and guests enjoyed a presentation by Dr Kate Coleman on high temperature corrosion and the difficulties associated with it. There was emphasis on the corrosion problems faced by the power generation industry and with reference to an on-going research project in which various energy sources including biomass fuels are being tested with due regard to environmental factors.

London Branch Meeting

24 Members and guests were present on 12th February at the Naval Club for the London Branch Meeting when Steve Pearce of Winn and Coales gave an interesting presentation on the protection of jetty piles. He explained the problems involved and how they were overcome with various coatings, backed up by descriptive photographs.
The History of the Institute
BACE to ICorr Tech to ICorr S&T 1967 to 1978

In the last issue of Corrosion Management, I talked about the early days and the formation of the British Association of Corrosion Engineers (BACE), which was inaugurated at a meeting held on the 21st May 1959.

The arrangements with Dr Tiratsoo, the publishers of the journal, Corrosion, Prevention and Control, which had the insert Corrosion Engineer, were discontinued following a meeting of the Council of BACE in July 1962. BACE then produced their own journal in the autumn of 1962. This change followed the establishment of a number of sub-committees and Branches and clearly the message was spreading rapidly across the country.

The Council of BACE decided in 1966 to rename BACE so as, “to become institutionalised.” The selected name by the Membership was the Institution of Corrosion Technology and this brought about the first office move from Old Brompton Road to Ovington Place, both in South West London.

The expansion and the momentum created with the change of name resulted in a number of key Members of Council and Officers lobbying MP’s about the inactivity of the country generally and industry in particular to the devastating costly effects of corrosion in all areas of industry. The result of this lobbying was brought to the attention of the Minister for Technology, the Rt. Hon. Anthony Wedgwood Benn, resulted in close collaboration between members and officers of both CAPA and ICorr Tech. During the early 1970s after the launch of the report, meetings of the two Councils were held and after protracted discussions the Institute of Corrosion Science & Technology (ICorr S&T) was formed on the 1st January 1975.

This merger of the two most important Corrosion Institutions and Associations gave a further boost in the fight against corrosion in the UK. The first President of ICorr S&T was Prof. Stuart Llewellyn-Leach and the Chairman of Council was, Dr Michael Clarke. The Corrosion and Protection Association, transferred on that date to become the Corrosion Science Division of the new Institution.

The meetings, the Annual Dinner and the activities of the various Branches became wider spread and the programmes across the UK were rapidly growing and were very well supported. At the time of the merger the total Membership of the two organisations was in excess of 900 Members, but since there was a degree of overlap the new Institution started with 850 Members.

It was interesting to note that in the early BACE/ICorr Tech days the Annual Dinner was only attended by males, with formal dinner jacket dress and any guests had to be males only! The formation of the new Institution and the annual dinner in 1975 allowed for the attendance of female guests!

The launch of the DTI, Hoar report, which had such a major impact on the corrosion world resulted in Prof. Graham Wood being appointed, Prof. of Corrosion Science at the University of Manchester. Institute of Science and Technology (UMIST) when this position was created in 1972. One of the first actions was for Prof. Graham Wood to set up an industrial corrosion consultancy, called, CAPCIS and he appointed Dr David Gearey as head of this unit. He also later became President of ICorr. Additional publicity was given to the World of Corrosion by the tabloids publicising the fact that the first, “Professor of Rust,” had been appointed following the Government report, emanating from Tony Benn’s, initiative.

Following the merger of CAPA and ICorr Tech the new Institution launched a number of awards, two of which in particular were of considerable merit. The first was in recognition of the late Jack Galloway, a founder Member of BACE and Former Chairman of BACE Council. The Galloway medal was for young corrosion scientists, under the age of 25 and was based on an essay submission, or a work project report. The Galloway medal was to be presented at the Corrosion Science Division, Annual Symposium and the first award was made in September 1976 at the 17th Corrosion Science Symposium.

The second award, was the UR Evans award, which took the form of an engraved sword. The first recipient of the UR Evans award was made to Dr T P Hoar for the work that he had carried out, not only at Cambridge University as Reader, but for his work on the Government Committee for the UK cost of Corrosion. The award was also presented in 1976 by the first President of the new Institution, Prof. Stuart Llewellyn-Leach. It was felt very appropriate that Dr T P Hoar was the first recipient, since the idea of these awards came at the time of the merger discussions between CAPA and ICorr Tech and it represented memories of two most influential individuals, from the early days of the two organisations.

David H. Deacon
N.B. The next issue of the History of our Institute will cover the relationship with USA, NACE “the engagement, the marriage and the divorce” – CCEJ/CEA (1979-1989)
I was privileged to be asked to present an engraved tankard to Past President, John O’Shea at the 20th London Branch Luncheon on his retirement from the industry, effective from December 2008. I was, however, disappointed that I was not able to make some comments about his many achievements, not only for our Institute, but also for the industry at large. I was informed that time did not permit the recognition that this retirement should have been given.

I first met John at the South East Gas Research Laboratories in the late 1960s and recognised the work that he was undertaking at that time, which paralleled our research on corrosion at BISRA, but he had taken it a step further. He has since served on numerous BSI and ISO Standards’ Committees dealing with surface preparation, heavy-duty coatings, paint testing and painting practices. He has also been the author of a number of UK Gas Industry Standards and has been a major contributor to many others.

In 1985, with Mike Foskett, then Hon Secretary of ICorr and the Corrosion Engineer at North Thames Gas, they undertook the first ever full scale site painting trial of a working 2 million cubic foot, water-sealed gas holder. Every Paint / Coating Company was invited to participate. 34 different paint systems, covering a wide range of generic types were applied and their performance monitored over the following three years while the holder was re-instated for normal operations. This usually involved the side sheets being immersed twice daily. The preparation and painting was carried out by W G Beaumont, painting contractors, Sustaining Members of ICorr.

The unexpected result was that a water-based vinyl acrylic paint system out-performed all others. This trial was the beginning of the recognition that environmentally friendly paint systems could provide excellent performance. In 1988 John and Mike received the Society of British Gas Industries Medal for their published paper on this work entitled “The Wrong Paint That Turned Out to be Right”.

John developed and directed a wide range of technical courses and workshops. These included a 5 day specialist course on Pipeline Condition Monitoring which helped to set a unified and recognized standard for cathodic protection practices and operators within the Gas Industry.

Another landmark for John has been the design and execution of the first major programme to totally refurbish the external surfaces of the LNG tanks at the five UK Gas Storage Sites, since their commissioning in the early 1970s. This involved state-of-the-art, enclosed grit blasting of structures over 50m high and the application of high-build paint systems.

The structure and ownership of the UK Gas Industry has undergone major changes, but John continued gaining increasing status and recognition for his expertise on corrosion protection. He received his 40 years, Long Service Award last October.

Members of the Institute will also be aware of his significant impact on the Institute of Corrosion through his work, both with his London Branch activities and his national role as President at the beginning of this Millennium. I had the pleasure of awarding him with his Honorary Life Fellowship certificate at the Harrogate Conference in 2004.

Other notable milestones during his Presidency, were the recognition of ICorr by the Engineering Council as an Affiliate Member and by the Science Council as a Corporate Member with full rights of awarding Chartered Scientist Status to it’s members. Recently, Dave Harvey has enhanced this by becoming the first person to attain Chartered Engineer status through ICorr.

John’s achievements were numerous, but his crowning glory was the acquisition of Corrosion House, which turned out to be a significant investment for the Institute, which was purchased at the optimum time. He was also able to take his Presidency on a truly national basis and he organised extremely successful conferences in Edinburgh and Cardiff, as well as seminars in Dublin and Cork, a truly country wide coverage. John represented ICorr at two NACE Conferences as a wider recognition of our Institute.

John and I were invited to a most enjoyable Luncheon at the House of Lords, attended by Tony Benn, the former Minister for Technology who in 1969 set up the DTI Report on the cost of corrosion in the UK, an initiative that changed the direction of our Institute.

John was eager that efforts of the many stalwarts of the Institute were recognised. Thus the President’s Plaque was created for “Exceptional Service to the Institute”. A full listing and pictures of the presentations are on view on the ICorr website.

There were many other, “behind the scenes” benefits, which John initiated including the move of our magazine, Corrosion Management from the previous publishers to our current publishers, Square One and modifying the Sustaining Membership scheme to provide financial support to nominated Branches and more tangible benefits to the participating Companies…

The good news is that we will not be losing John from the Institute’s activities, he has already agreed to join me on the 50th Anniversary working group to set up and organise the celebration of our 50th, which is to be held at the Thames Barrier on the 21st May this year.

John has also agreed to join the conference and workshop organizing committee to be held along side Correx 2009, which will be held later this year, on October 27th-29th. So, all his old friends, colleagues and acquaintances will be able to meet up at the Thames Barrier on 21st May or at the National Exhibition Centre in Birmingham at Correx 09 in October.

I am sure that you would all like to join me in wishing John every success and happiness in his retirement and a very big thank you for all his input to our Institute activities.

David H. Deacon
March 2009
Introduction to the Technical Articles

As this is our 50th anniversary issue we wanted to have a selection of technical articles that reflected the scale of contribution made by the Institute and its Members on some of the most strategically important projects of the past half century. To this end we have selected the following three topics.

During the mid to late 1950’s a number of serious flooding events in London initiated a series of reports on ways to alleviate the risk to the capital. These eventually resulted in the 1972 Thames Barrier and Flood Prevention Act which paved the way for the current structure. Construction commenced in 1974 and it became an early beneficiary of improved methods and materials for the protection of structural steelwork. As well as engineering a 25 year design life into the protective coatings, twice the typical maximum life at the time, areas at particular risk of damage were also subject to cathodic protection. Martin Earlam of the Thames Barrier describes how a durable design and effective protective coating system was developed which not only achieved the aspired doubling of life, but promises to go on working for at least another 15 years.

Government approval for the construction of the Forth Road Bridge was given in 1958 and construction started the same year. At the time, its 1006 metre span made it the longest outside of the USA and the fourth longest in the world. Traffic flow rapidly increased from an initial 2 million vehicles per annum to well over 10 million by the end of the century. The age of the structure and the massive increase in its use has inevitably resulted in maintenance headaches, aggravated by the officially recognised historic status of the structure. Chief Engineer and Bridgemaster Barry Colford describes the complex investigations and innovative remedial options that have been developed to ensure this key structure continues to deliver safe and reliable transit across the Firth of Forth.

Finally, there is the remarkable tale of the 950 mile fuel pipeline built during the dark days of the Second World War to transfer vital petroleum from the more easily defended ports on the western side of the country to London. For speed, the pipeline was laid bare with no external protection but once peace was won it soon became apparent that some form of additional protection would be urgently required. Cathodic protection was the obvious, if not straightforward answer and a programme of installation was initiated, starting with the areas showing the greatest number of leaks. Institute Fellow Harry Hatley has kindly agreed to recount the story of this incredible venture and some of the particular problems he and his colleagues had to overcome to maintain reliable fuel supplies to the capital in the immediate post-war period. I trust you will find these articles interesting in their own right, with a particular relevance in this our anniversary year. The three topics covered also form the basis of the technical part of our 50th celebrations at the Thames Barrier on the 21st May.

The Thames Barrier -
EVALUATION OF COATING CONDITION AFTER 25 YEARS PROTECTION.

**INTRODUCTION**

Numerous locations and designs were given very careful consideration, before the final selection for the Thames Barrier construction was decided upon in the 1970s and the work commenced in erecting the now famous, Thames Barrier, which was opened by the Queen in 1984. The final selected design comprised of a series of steel gates, four of which, for the main navigation sections were 61m wide, and a further six were 31m wide. A general view of the Barrier taken in 2005 can be seen in Figure 1 below.

All of the gates were constructed of steel and the larger gates and some of the smaller ones were to be immersed in the Thames River water and to be located in the riverbed, only being raised for flood defence requirements, through 90° to form a “steel wall” across the river and to hold back the high tide and prevent the flooding of London.

Corrosion prevention of the steel gates was of great concern and an extensive investigation and evaluation of the possible protective coating systems available in the early 70’s was commenced in 1972, to obtain an optimum coating system, which would protect the gates for, if possible, at least 25 years, before any further major maintenance of the coatings would be required.

![Figure 1 – Thames Barrier general view](image-url)
This was a daunting challenge in the 70s, since the life of even 5 coat systems was of the order of only 7 to 12 years and the Designers were looking for a figure of double that time.

The early work on the evaluation of coating systems to be used was undertaken by the late Keith Julyan Day, a Coating Consultant with BIE Anti-Corrosion and colleague of David Deacon and Derek Bayliss, all three of whom followed each other as Chairmen in the 70’s, of the Institute of Corrosion’s "Flagship" Technical Committee.

The requirements and conditions that were set out for the coatings to be assessed can be listed as follows:

1. Minimum 25 year coating design life.
2. Resistance to the Thames water, which at the time was polluted and therefore very corrosive.
3. Protection against abrasion from gravel and slurry movement.
4. Resistance to impact damage from vessels and floating debris.
5. The adhesion properties of the coating system to be selected were considered to be of major importance.
6. In view of fact that mechanical damage was a possibility and in minor areas inevitable, sacrificial cathodic protection was considered and the resistance of the coating to cathodic disbondment was also taken into account.
7. It was clear that the coating system had to be as impervious as possible to prevent the ingress of moisture in the long period of immersed conditions.
8. In view of the design of the Barrier, edge protection of the steel cross-bracings and stiffeners inevitably meant that a coating with good hold out on edges and corners would be an important factor.

THE HISTORY OF THE COATING SELECTION

The coating selection trials started in mid 1972 and initially 34 coating systems were included after researching the various options available at that time and their track record on similar steel structures, not only in the UK, but also in mainland Europe and North America. A further 9 coating systems were added to the list in 1976 and a brief summary of the coating systems evaluated is as follows:-

- High Build Chlorinated Rubber Coatings (5 coats)
- High Build Aluminium/Bitumen (4 coats)
- Epoxy Coatings, pigmented with MIO (4 coats)
- Inorganic Zinc Silicates/Epoxy topcoats (4 coats)
- Thermal Metal Spray and Epoxy/PU Coat (4 coats)
- Coal Tar Epoxies (3 coats)
- Solvent free, hot applied Epoxy (1 coat)

TESTING OF THE COATINGS

The coatings were applied in triplicate, to a series of 12” by 15” mild steel panels, which had double bead welds placed across one side of the panel, to evaluate the effectiveness of the coating for weld protection and the panels were also deliberately damaged by a knife incision to evaluate the spread of corrosion under the film.

The main panels were immersed in half tide at the Woolwich Jetty, on a specially designed exposure rack and were examined at regular intervals up to 1976, when the final decision and specification was agreed. Figure 2 shows a section of some panels during removal from the original exposure rack at Woolwich Jetty, in 1978.

In addition to the natural exposure of the panels in the River Thames, a series of accelerated tests, which were designed to evaluate the properties, likely to be encountered, of the various coating systems were also carried out. This initial testing regime comprised accelerated testing in “weatherometers” and salt spray cabinets, tests for cathodic disbondment, adhesion, cohesion and blistering, as well as specially designed tests for erosion and impact damage with failing graded wet gravel.

The final selection of the coatings came down to just one system, although in the interim period in 1975, different coatings were proving possible options. The final selection in 1977 gave us one choice and this was a hot applied solvent free epoxy.

This generic system from 3 manufacturers all performed well on all of the tests carried out and the coating was rated, far better than the coal tar epoxies and the combined metal coating and paint systems. In particular the hot applied coatings held out very well with a thick coating on edges, corners, welds and fixings.

The fabrication contractor, Cleveland Bridge, appointed two painting sub-contractors, Loynes and Jack Tighe Ltd and the selected coating system was Sigma Coatings (now PPG), solvent free epoxy. Figure 3 shows one of the High Build Sigma panels after 5 years exposure.

Over the 25 years of coating exposure in service, ad-hoc Inspections, at approximately 5 yearly intervals were carried out, by the paint consultants and the staff of GLC/Thames Water/National Rivers Authority and finally, now the Environment Agency (EA), who also undertook annual visual checks.

These spot checks and inspections showed that the coating, apart from minor areas of mechanical damage, was performing as predicted and now, after 25 years the EA has set up a major evaluation programme to see if the coating, with the projected life of 25 years is nearing the end of its life or if not the estimated duration likely to be achieved.

25 YEAR TESTING PROGRAMME

The initial, 25 year testing programme, carried out by SPC Inspectors, which started in 2004, required a detailed survey of the
coatings to provide baseline test information so that the future results can be monitored regularly to project when the degradation will reach a point where major maintenance of the coating system is required.

This intensive testing regime produced a significant amount of information on the properties and the condition of the coating, which was transferred to a detailed and accurate database for ongoing future reference. This intensive testing regime has covered adhesion, both qualitative and quantitative, using a specially modified adhesion test instrument. Any blisters were measured for density and size and the pH of any liquids when the blisters were exposed was identified and recorded. Cracking, pinholes, any mechanical damage and associated rusting were also monitored and recorded.

To enable this detailed survey to be carried out, the surfaces of the coating were water jetted at 10,000 psi and the inspection, comprising careful visual checks was assisted by the use of x 10, illuminated magnifiers when any defects were identified. Close up photography of all features identified during this fingertip survey were taken and transferred to the database, with a cross reference to the area and location.

THE FINDINGS OF THE SURVEY

The overall condition of the coating, at the end of the first years, 25 year testing programme, was described as excellent and it was projected that the coating would last for a further 15 years, before the likelihood of any major maintenance will be required.

Figure 4 shows the generally excellent condition of the coating after water jetting, with the original gloss still present, which is evident from the picture.

SUMMARY

The detailed inspection of the three gates, carried out in 2005 and the full reconnaissance of all the other remaining seven gates, showed that the condition after 25 years of all of the gates was similar and only minor patch repairs in localised areas would be necessary.

The Environment Agency will continue with regular inspections, both general and detailed, over the next 15 years of the now projected 40 year coating life.

Figure 4 – General view of coating after 25 years immersion
1.0 Introduction

The Forth Road Bridge is a long span suspension bridge and was opened in September 1964. The bridge crosses the Firth of Forth some 15km west of Edinburgh and is a vital link in Scotland’s strategic road network. The bridge lies at a latitude of 56° north and at the time of construction was the most northerly long span suspension bridge in the world. Over 24 million vehicles cross the bridge each year. The historic importance of the structure to Scotland was recognized in 2001 when the bridge was classed as a Category A listed structure. The design and construction of the bridge is described in the Proceedings of the Institution of Civil Engineers (1).

The maintenance and operation of the bridge and all the major improvement works carried out are described fully in a paper given to the 5th International Cable-Supported Bridge Operator’s Conference, New York, August 2006 (2).

The Forth Estuary Transport Authority (FETA) is the body responsible for the management, maintenance and operation of the Forth Road Bridge. FETA, in partnership with local authorities on each side of the Forth, and the Scottish Government, endeavours at all times to minimise the impact of bridge maintenance programmes on users of the crossing.

The bridge has benefitted from having both a dedicated maintenance workforce and an engineering management team on site and both are considered essential to ensure that a proactive maintenance and improvement programme is funded and carried out. In addition FETA engage private consultants and contractors, normally on a Quality/Cost procurement basis for specific large capital projects.

2.0 Painting of the Bridge

2.1 Suspended Spans Stiffening Truss

In 1964 the FRBJB was advised that major maintenance painting was not required on the bridge for a period of 15 years. However, in 1978 a report to the Board highlighted known problems in relation to the condition of the paint systems on the bridge and emphasised the need for action that in some areas was considered to be urgent. It was noted that the cost of maintenance was going to be very much higher than previously considered. Up until 1980/81 maintenance painting on the bridge had been carried out using a number of different paint systems and was limited to relatively small areas of blast cleaning and overcoating.

Following the introduction of a new permanent access system to the below deck suspended span stiffening truss in 1980/81, major maintenance painting was undertaken on the suspended structure between 1980 and 1993. This major maintenance included the removal of the existing paint system using blast cleaning and the application of new paint systems based on zinc phosphates; chlorinated and acrylated rubbers, and epoxy esters.

From 1994 until 1999 areas of existing sound paint were washed down and overcoated using a chlorinated rubber system as required. In 1999 an in-house review of the method of painting the truss was undertaken. This review was required because paint manufacturers had intimated that the production of chlorinated rubber paints and other paints with a high volatile organic compound (VOC) content were being phased out and the UK Highways Agency were removing such paints from their specifications. The phasing out of these paints followed the 1990 Environmental Protection Act (EPA), which restricted the amount of VOCs, that paint manufacturers could emit during production.

The review took into account the Scottish Environmental Protection Agency (SEPA) Joint Guidance Note PPG23 “Maintenance of Structures over Water - Pollution Prevention Guidelines” and SEPA’s objective that over a period of time there should be a significant reduction in the volume of spent abrasive and paint entering the Forth.

Trials were carried out late in 1999 to determine whether or not the existing aged paint system could be over-coated. A modern two pack epoxy system was selected to be applied on top of the existing oleo-resinous/chlorinated rubber systems. Unfortunately, the results of pull-off testing of this option were poor, with recurring cohesive failure of the underlying layers.

Initial concerns about using a completely different paint system, with very different properties, on top of an aged multi-layered system proved to be well founded. The option remaining was to consider the removal of all the existing aged paint systems and the application of a new protective system on the grit blasted steel or remaining metal spray.

After considering advice from consultants, the Steel Protection Consultancy (SPC) and discussions with the Highways Agency and other bridge owners, the decision was taken to organise site trials based on the removal of the existing paint systems and the application of a modern two pack epoxy system. A paint system registered and widely used in the UK by the Highways Agency and other Overseeing Authorities was selected as the preferred system for the trials.

During the painting season of year 2000, trials were undertaken on the truss adjacent to the north main tower. Containment was put in place to prevent grit and paint spray reaching the carriageways and cycletrack/footways of the bridge. The erection of this containment was very labour intensive and thus expensive.

Figure 1 Suspending Spans stiffening Truss
The containment was successful in preventing the blast medium and paint overspray affecting bridge users, however a number of complaints of alleged paint damage to cars and property from residents and others in North Queensferry were received. After a long investigation by the Board’s insurers and forensic scientists, the Board denied liability for the damage, as it was considered that all reasonable practical steps had been taken to avoid damage to third parties. However, a number of claims were settled on a strictly “without prejudice” to liability basis.

It had become apparent that the two-pack epoxy paints were remaining active for some time after spraying and had the potential to cause damage to property a considerable distance away. This contrasted with the use of chlorinated rubber paints which when used even with a minimum level of containment, only caused damage locally if overspray occurred. In addition, chlorinated rubber paints can easily be removed quite satisfactorily from car bodywork and glass by the use of solvents.

The same is not true for two pack epoxies that unfortunately, are likely to cause pitting damage to car body paintwork. Therefore, although the two-pack epoxy system appeared to be working well in terms of adhesion and applicability, problems of overspray and the provision of effective containment required a major re-evaluation of the painting programme on the bridge.

SPC was appointed to carry out a survey of the condition of the existing paint on the main and side spans, which was completed in September and October of 2001. Following the survey, SPC recommended(3) that approximately 50% of the zinc had to be removed, leaving sound metal spray on the flat areas, i.e. the main webs where porosity had not proved to be a problem.

It was also recommended that an epoxy system be applied to the sound substrate and metal coat which would last 25 years after which time it could be overcoated to give a further 25 years without the need to blast clean.

As a result of this survey, a further series of large-scale trials on the bridge suspended span was organised.

The purpose of the trials was to:
- Trial epoxy systems from different paint manufacturers
- Examine in more detail the problems of containment and removal of spent blast
- Examine different methods of application

The importance of a high standard of containment was essential to prevent a recurrence of the 2000 Trial and an American containment standard The Society for Protective Coatings Guide No. 6 was adopted as there was no comparable British equivalent.

The trials were successfully carried out in September and October of 2001 and confirmed that even in the limited trial area the form and size of the steel truss making up the underdeck of the suspended spans of the bridge makes access and containment for painting work very difficult. The eight systems applied in 2001 continue to be monitored closely by SPC.

It was clear that the new standards of containment necessary for epoxy paint systems, requires a radical change to the methods traditionally used to paint the bridge. Trials on site, desk studies and studies of containment systems on other bridges in the UK and abroad, have been undertaken to determine the most suitable form of access, containment and paint system for the Forth Road Bridge.

These studies into access and containment initially focused on the provision of a large, discrete, effectively contained underdeck access platform specifically designed for the Forth Road Bridge. This platform was perceived to have a number of advantages over traditional scaffolding in terms of health and safety; minimising of contact points and speed of movement.

Following the feasibility studies and site trials, which highlighted the complexity and uniqueness of the platform, it was considered that the Authority’s best interests would not be served by procuring, managing and operating such a platform to paint the suspended span truss.

Further it was recommended that tendering by the private sector would be the most suitable format to assess the commercial risks, and determine the most cost effective method of painting the suspended span truss, including the provision of access and containment required to meet all relevant health and safety, and environmental standards.

Estimating the overall cost of a contract to repaint the truss is difficult because there are so few precedents. An estimated cost has been produced by the Authority and external estimates have been obtained from SPC and Balfour Beatty Ltd who are currently project managing painting works on the adjacent Forth (Rail) Bridge.

These estimates must be considered to be first order costs but all three are indicating that the total cost of painting the 202,000 plus square metres of the suspended span truss by the private sector including access, containment, blasting and the protective systems required, would be in the order of £65 million and could be achieved within a 12 to 15 year programme. Given the cost of this project SPC were instructed to carry out a further review of options available. SPC examined two options, a ‘Do Nothing’ option and a ‘Spot Blast and Overcoat’ option:

## a) Do Nothing Option

There would be no initial financial commitment for this option. However, the report stressed that a far more difficult situation would be stored up in the future. It is anticipated that the coatings at the present time could last approximately 10 to 12 years before delamination by inter-coat adhesion loss and blistering of the zinc coating would occur.

The main concern though would be that under the zinc film, corrosion of the steel substrate, that is already occurring, would increase in intensity with loss of localised section of steel where the porosity of the zinc metal spray is already causing a problem.

The heavy pitting of the steel which would result from the do nothing option would mean that however careful the re-blasting and repainting would be in the future, the high standards and long life, which are achievable if painting is not delayed, would not be able to be met.

The future re-blasting process would only be likely to achieve a 10–15 year life in the corroded areas and these would then become a constant maintenance problem in the future. In addition if steel corrosion becomes significant, section replacement may become necessary.

It is important to note that most of the corroded areas are visually concealed at the present time, but were exposed during the blasting trials and survey and many of these are associated with welds and flange joints which are critical parts of the structure.

## b) Spot-Blast Option

The second option detailed in the SPC report is to commence a programme of spot blasting localised areas of breakdown and patch coat these localised areas. These patches would then continue to be protected, but other areas either remote from those already patched or in adjacent areas, would continue to appear year on year thereby setting up a costly, and technically inferior, annual maintenance spot blasting programme which would continue indefinitely for the life of the structure.

The spot blasting concept could be supplemented by the application of one or two coats of single pack material, which is
2.2 Tower Painting

Following the paint trials in 2001, SPC were asked to carry out a coating condition survey of the main towers. This survey concluded that overcoating of the existing paint on sound areas, which were in excess of 95% of the total, would be able to maintain the integrity of the present coating system and to prolong the paint life for a further 20–25 years, without removal of the existing paint and/or metal coating back to steel.

The towers had been completely repainted between 1991 and 1993 with a five coat MIO/oleo-resinous system. Tension splices which have been added subsequently as part of the tower strengthening works in 1997 had been given a two-part epoxy aluminium and MIO Phenolic finish coat.

Following SPC recommendations areas of localized corrosion and paint breakdown, were prepared by abrading back to sound paint, sound metal coating or bright steel using hand and power-tool cleaning methods. These areas were then feathered back into sound metal coating before wet cleaning down.

Finally; prepared areas of exposed steel were overcoated with two coats of HA Item 116 two pack epoxy with one coat on the sound paint; followed by a modified (Item No 169 non HA registered) polyurethane system applied overall. The paint was provided by Ameron Coatings Ltd, (now PPG Industries).

SPC recommended that paints should be selected from those used in the feasibility trials on the below deck stiffening truss. Compatibility trials were carried out at the pier head level of the South tower to ensure that the selected system was “fit for purpose”.

Painting of the main towers of the bridge presents a particular difficulty given current traffic volumes and an access cradle was purchased, for use by FETA’s in house painting squad, that would provide both containment and secure access for employees.

The cradle, is designed to be suspended by wire ropes and is powered using hydraulic winches. In February 2002 a tender of £767,965.00 submitted by Alps UK Ltd to supply a platform and containment system manufactured by the Beeche Corporation (USA) was accepted.
Inspected externally and no leaching of water or moisture staining had ever been recorded. However, it was acknowledged that the condition of the individual wires could not be determined with any certainty.

The U.S.A. has many more suspension bridges of a greater age than the Forth and the U.S. Transport Research Board of the National Academies commissioned a guide for main cable inspection under the direction of consultant Weidlinger Associates Inc of New York. This guide was to become known as NCHRP Report 534 (6).

Although the guide was not published until 2005, it was decided to adopt the draft NCHRP Report 534 recommendation that aerially spun cables on suspension bridges over 30 years old should be opened up for a first internal inspection.

This first internal inspection work was completed in 2004 and 2005. A total of ten 18 metre long panels (a panel is the length of main cable between vertical hangers) at various points on both cables were opened, inspected and rewrapped. In general eight 6 metre long samples of individual wires were taken at each panel, and cut to a length of 254 mm for tensile testing. Tests to determine the degree of deterioration of the zinc coating and tests on water samples were also undertaken. FaberMaunsell assisted by Weidlinger supervised the works which were undertaken by contractor C Spencer Ltd.

To inspect a panel the wrapping wire, firstly had to be removed followed by the protective layer of red lead paste, which had in the main become friable. Strict containment had to be in place for this work.

Following the American practice, initially eight wedge lines were opened around the cable using brass chisels and then driving in hardwood and plastic wedges. This allowed inspection to take place down to the middle of the cable. Much to the surprise of the inspection team fairly extensive corrosion and wire breaks, although these were relatively small in number, were found in some panels. Given the relatively young age of the bridge these results gave cause for concern.

The condition of the wires exposed for the worst panel (mid span on the east cable) are shown in the form of a tree ring diagram in Figure 6. The corrosion stage of the wires was determined from the NCHRP Report 534 Guidelines which are shown in Figure 7.

The corrosion stage of the wires and the number of broken wires in all the ten panels

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**Figure 4** Internal Inspection Methods

**Figure 5** Main Cable Broken Wires

**Figure 6** Tree Ring Cross Section
inspected are shown in Table 1 and as can be seen there appears to be little correlation between the number of broken wires in a panel and the condition of that panel.

Based upon the results of this limited intrusive inspection of the main cables, the Authority’s consultants concluded that the loss of strength of the cables, based on the worst section uncovered, was 8%. This estimate of the current cable strength was determined from statistics obtained from the wire testing using the Brittle Wire Model of analysis as defined in the NCHRP Report. The consultants were asked to project those figures to try to determine what the likely cable strength would be over the next 5, 10 and 15 years, if no steps were taken to halt the deterioration. It was recognised that the figures from such a projection would have to be treated with caution. However, it was predicted that, if deterioration could not be halted, the cable could lose 13% of original strength by 2014 and 17% by 2019.

Main cables of suspension bridges have traditionally been designed on the simple working stress approach. In the original design the direct stress in the main cables on Forth was limited to 40 tons/sq.in and a minimum wire tensile strength of 100 tons/sq.in was specified. This would result in a factor of safety (fos) of 100/40 = 2.50 and it should be noted that this factor is against ultimate failure. It is usual in working stress design to use yield or 0.2% proof stress (which would be 75 tons/sq.in) rather than ultimate strength to determine the fos and if the 0.2% proof stress were used the fos would be 75/40 = 1.875.

In order to determine the 2004 value of the fos, WA Fairhurst and Partners carried out an assessment of the actual current dead and super dead load of the bridge and a check on this work was carried out by Faber Maunsell. It was concluded that the bridge was about 3.5% lighter than the engineers had estimated originally and that the actual factor was nearer to 2.59.

The live load used in the analysis was the 2002 Forth Road Bridge Specific Live Assessment Live Load and Bridge Specific Footway Loading assumed was a low value of 0.15 kN/m.

Assuming a strength loss of 8%, the 2004 fos was calculated to have dropped to 2.27 and was projected to fall below 2 between 2014 and 2019. This is illustrated in Graph 1.

There is no absolute number that determines the minimum acceptable fos of the main cables of a suspension. However, from discussion with USA bridge authorities the feeling was that most would be uncomfortable running uncontrolled traffic with a value less than 2 as a permanent condition.

From the results of the first inspection at Forth there does now seem to be serious doubts over the use of paint systems to try to protect the cables of suspension bridges.

It was concluded that if the rate of deterioration due to corrosion could not be halted consideration would have to be given to the possibility of introducing loading restrictions on the bridge around 2014. Given the significance of the crossing both strategically and locally, this news caused quite a political and media storm.

Following the findings, in November 2005, the Scottish Executive appointed Flint & Neill Partnership assisted by New York based Ammann and Whitney to audit the findings. The purpose of the audit was to carry out a desk study of the findings and to advise whether they were reached using a process of appropriate rigour and whether the conclusions were reasonable.

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<th>Inspection Findings (2004)</th>
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<tr>
<td>Stage 1</td>
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<tr>
<td>1: 100-100E</td>
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<tr>
<td>2: 00NE-2NE</td>
</tr>
<tr>
<td>3: 00S-2SW</td>
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<tr>
<td>4: 100-100W</td>
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<tr>
<td>5: 00N-2NW</td>
</tr>
<tr>
<td>6: 98-100NE</td>
</tr>
<tr>
<td>7: 22-24NW</td>
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<tr>
<td>8: 18-20SE</td>
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<tr>
<td>9: 74-76SW</td>
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<td>10: 58-60NE</td>
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In January 2006, a comprehensive audit report was submitted and concluded that the initial internal inspection and cable strength calculation had been carried out in accordance with accepted practice in the United States and in general conformance with NCHRP guidelines. It was noted in the audit that certain assumptions had been made that differed from the NCHRP methods but they were reasonable and appropriate considering the particular characteristics of the Forth Road Bridge versus the older US bridges upon which the NCHRP study relied on as case studies.

The total cost of the project to inspect a relatively small length of the cable was £2.3 millions. A full description of this work is described in a paper given to the 5th International Cable-Supported Bridge Operator’s Conference, New York, August 2006(7).

It was clear that action was required to try to halt or limit the corrosion and to try to monitor the cables and the following works and studies were commissioned:

- Installation of Acoustic Monitoring on both cables.
- Installation of a Dehumidification System on the cables.
- A feasibility study to determine whether or not the cables could be replaced or augmented if the corrosion continued and to investigate the condition of the main cable anchorages.

The audit report from FNP supported the adoption of these proposals.

3.2 Acoustic Monitoring

In November 2005, a contract was awarded to French contractor Advitam SAS to fit both cables with acoustic monitoring equipment. The system was designed to provide continuous monitoring of wire breaks in the cables in order to increase confidence that the worst section of cable had been uncovered. Site works commenced in April 2006 and the works were commissioned in August of the same year. Since commissioning a total of 23 wire breaks have been recorded to date (December 2007). The total cost of this scheme was £620,000 with a further £310,000 to be spent on monitoring over 5 years. This work was supervised by FaberMaunsell.

3.3 Dehumidification

Dehumidification is a well-tried system of preventing corrosion of galvanized steel. Although it was already being used in box girders of some bridges and indeed in the anchor chambers at Forth, its application to main cables of suspension bridges was relatively new. Such systems are being fitted to new bridges in Japan, Sweden and Denmark where corrosion has been uncovered.

As already described above, the main cables are made up of 11,618 parallel wires that have been compacted. However, within the cross section of the cable between the contact points of the wires there are voids and at Forth these voids make up 20.5% of the cross sectional area. The key in dehumidification is to fill the voids with air with a low relative humidity.

Studies have shown that a piece of galvanized wire in a chamber with a relative humidity of under 40% will not corrode. Therefore, if air with a relative humidity of under 40% can be introduced into the cable and surround all the wires, then the capacity for further corrosion is likely to be negated.
It should be stressed whilst it was considered that there was good reason to have confidence that dehumidification could slow down or halt corrosion there was no body of evidence yet available to allow an assurance to be given that this will work on Forth.

However, the only viable alternative to dehumidification seemed to be oiling the cable. Whilst a small number of main cables on bridges in the USA had been oiled the results seemed at best patchy and the costs of carrying out the work, and the disruption to traffic, were significant as the whole cable required to be unwrapped and then re-wrapped.

As in most schemes on the bridge, access and keeping traffic moving safely were key to the contract. The contractor was limited to the type and number of carriageway and lane closures available and there were generally no restrictions allowed between 06.00 and 21.00 hours during weekdays and only a limited number of weekend carriageway closures allowed.

Therefore, the contractor and engineer Benetts designed a bespoke platform for use on the main cable that could be pulled along the cable without the need for operatives to access the cable and work above the carriageway. This greatly reduced the number of carriageway closures required.

Following award of the contract in January 2006, a lot of time was spent initially in designing the access and the dehumidification system. Work actually started on site on the west cable in May 2007, and commissioning of the full system on both cables is programmed for completion in October 2009.

The air that will be introduced into the cables will be at a very low pressure (some 3000 pascals) via seven inlets along each cable. The air will vent, after travelling along the cable either 160 metres in the main span or 200 metres in the side spans.

Initially, the air will be introduced at a relative humidity of 20% to try to speed up the rate of drying out. When air with a relative humidity below 40% is vented at the exhausts then the system will be run at a relative humidity of 40%.

Prior to the system being commissioned on the east cable a full internal inspection of three panels at mid span was being carried out in 2008 to benchmark the condition of the cable prior to starting dehumidification and to determine the strength loss in the cable since 2004.

The work has been designed and supervised by FaberMaunsell assisted by Nippon Steel and is currently being carried out on site by C Spencer Ltd. The project is scheduled for completion in October 2009 and it is predicted that it could take 18 months for the main cables to “dry out” that is for the relative humidity in both cables to fall to 20% at every outlet manifold.

Therefore, a further inspection is planned around 2011 at mid span on the east cable to determine if the corrosion has been halted or significantly reduced.

The final project cost of the dehumidification works is likely to be in the order of £10.5 million.

Acknowledgement

Working to maintain and operate the Forth Road Bridge in a safe manner to allow users a safe and reliable crossing requires a large number of skilled people to work together effectively. This paper is dedicated to all those past and present who have been involved in this difficult but hugely rewarding task.

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Corrosion prevention of a Pipeline System

By H. M. Hatley, FI Corr.

Background

Due to enemy action by aircraft and U-boats during WW2 inbound petroleum product tankers were restricted to discharging cargo in western UK ports only, i.e. Shellhaven, Avonmouth, South Wales, etc. Road and rail transport of fuel was not able to cope with the amount of tonnage required to be distributed throughout the UK. A pipeline was therefore constructed from Avonmouth to the London area in April 1941 and operational in November 1941 (excavation, all by hand).

From this early start a ring-main of some 950 miles of steel unwrapped pipelines were laid to distribute fuel around the country to airfields and for other military and civilian use and completed by 1944. One spur from the Isle of Wight to the Cherbourg peninsula of 4" dia. Welded steel was laid overnight in July 1944 – known as PLUTO (Pipeline Under the Ocean). A speed record for pipe laying?

Corrosion Aspects

The buried pipelines of 6" but mainly 8" and 10" diameter, operating at up to 850 p.s.i. were laid unwrapped (short term use only expected, or more likely, not even thought about) at a depth of 3ft. in random lengths between 5ft. and 50ft. connected by mechanical Viking Johnson joints which averaged some 11.25 degrees of angle change at 35ft. apart but this method of joint location, excavation and bond over each of the random lengths between 5ft. and 50ft. became urgent. By happy chance the fact that the pipelines had been laid unwrapped and with joints that could be conducting, non conducting or intermittently conducting was the saving of the system. Long line corrosion (due to changes in resistivity) was not a significant source of corrosion and also because of the nature of the Viking Johnson joints and the lack of any coating tended to spread the corrosion action with consequent weight loss but little pitting.

At around this time (mid 1950s) some of the pipelines were re-commissioned both to supply fuel to military airfields in the cold war era and also for domestic commercial use. A requirement for the application of cathodic protection is, of course, electrical continuity of the structure, hence, the need to locate, excavate and bond over each of the random length Viking Johnson joints, averaging some one hundred and fifty per mile. Initially, the joints were assumed to be approximately 35ft. apart but this method of joint location, by measurement, was labour intensive, time consuming, missed couplings and was slow. Universities and other professional bodies were consulted to solve this problem without success.

However, a system for detection of the joints was finally developed utilising volt drop technology and accurate instrumentation to such a high degree of accuracy, that a welded joint could be detected. Various surveys were undertaken, such as, soil type (sand, gravel, clay, etc), pH water content, observation of areas of sulphate reducing bacteria and resistivity measured by Shepards Cane at pipe depth. The soil resistivity clearly became the primary indication of likely leak locations and subsequently confirmed by pressure testing.

The application of cathodic protection was obviously directed to those sections of operational pipelines with the highest cumulative leak record, (if such records existed) and confirmed by the soil resistivity survey. Cathodic protection polarisation was not understood at this time for bare pipelines. Original current drainage surveys (CDS) indicated up to 50 amps/mile was required for 8" and 10" pipelines. However, a CDS on an 8" pipeline over an eighteen month period, achieved protection (then set at – 0.85v vs. Cu/Cu SO4 reference cell), indicated that 10 amps/mile was sufficient (approx 0.41 mA/ft2).

The criterion of -0.85v vs. Cu Cu/ SO4 was found to be insufficient to prevent corrosion under conditions of sulphate reducing bacteria being present. This was found in gravel, thought not possible at that time and it was considered that it therefore could be present in any other type of soil. The criterion of protection was therefore raised to -0.95v and subsequently for standardisation purposes to -1.0v. The maximum negative potential was fixed at -2.5v, which standard was found acceptable to newly relaid pipe, with no bitumen pipe wrap disbondment being noted.

The effectiveness of the applied cathodic protection was illustrated by graphs of the accumulated leak curves which levelled off after one to two years. Ironically, the initial application of CP sometimes increased leaks as a pinhole penetration of the pipewell,
blocked by corrosion product, was disbanded from the pipe by hydrogen evolution on the pipe wall, thereby revealing a leak, waiting to happen.

### Siting of Groundbeds

As protection was extended to operational pipelines in high resistivity soils, it was realised that the amps/mile figure of 10 amps for 8" and 12 amps for 10" pipe per mile, could be greatly reduced – by up to 40%. It was also noted that in the case of closely laid parallel pipelines, an increase of current requirement over a single line was only about 30%.

Availability of local mains A.C. power was, of course, one of the governing factors in designing a C.P. system. A decision was made, after much thought, to position the pole mounted transformer / rectifier units closely adjacent to the pipeline to act as a route marker to assist patrolling (by foot initially, latterly by helicopter). It was also considered that the future monitoring of cathodic protection of the pipeline system might be achieved by aerial survey. This decision was taken despite the exposure of a buried anode cable to accelerated corrosion.

### Design and Construction

Groundbed design was based on a slightly modified Dwights Curve, together with back EMF, cable volt drop and resistivities measure with pin spacing of 5ft., 10ft., 20ft. and 30ft. at the proposed groundbed site. Initially, groundbeds were constructed some 300ft. away from the pipeline in soils up to 5000 ohm cms. To try to obtain maximum spread, bearing in mind that groundbeds were spaced some two to three miles apart. In higher resistivity soils, (over 9000 ohm cms) the groundbed was installed some 150ft. away from the pipe.

A system was developed to mile plough cables by mounting the cable drum on the mole ploughing machine and feeding the cable into the ground at the back of the plough, thus speeding up installation time and limiting ground disturbance. If large interference with foreign structures was anticipated, reducing the circuit resistance by increasing the groundbed length (maximum 300ft. – see Dwights Curves.) was employed – with unknown economic results. Soil resistivities varied over the 950 miles of pipe between 750 ohm cms and 15000 ohm cms.

The designed circuit resistance and the actual or applied circuit resistance never coincided and an effort was made to adjust the design to correct the assumed constant design fault. The results of the two elements (design and installed circuit resistance) were plotted, resulting in a complete scatter diagram with no common design fault emerging – such are the vagaries of cathodic protection which the CP engineer has to learn to live with.

### Interference with Buried Structures

It will be understood that with the large current requirements necessary to achieve protection, (as opposed to today’s m/A / mile, or less) the testing for interference with other buried metallic plant accounted for a large proportion of the available time, together with the remedial action required.

### Conclusion

By the time full cathodic protection was applied to this pipeline system, over three hundred groundbeds had been installed and leaks eliminated. Eventually, the whole pipeline system was re-laid to modern standards and only a few of the original groundbeds retained.

It was a bold decision by the pipeline owners to tackle applying cathodic protection to over nine hundred miles of bare pipe, in the early fifties, justified at the time, by the ‘cold war’.

### APPENDIX I

**TABLE OF STATISTICS**

<table>
<thead>
<tr>
<th>LINE LENGTH (MILES)</th>
<th>PIPE SIZE (IN.)</th>
<th>NO. IF MILES PER INSTALLATION</th>
<th>CURRENT DENSITY MA/SQ. FT.</th>
<th>AMPS PER MILE</th>
<th>PERCENTAGE COATED</th>
<th>DATE LAID</th>
<th>REMARKS</th>
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<tr>
<td>68.8</td>
<td>12</td>
<td>17.2</td>
<td>0.0412</td>
<td>0.726</td>
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<td>10.55</td>
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<td>2.3</td>
<td>0.8170</td>
<td>9.74</td>
<td>39.7</td>
<td>1943</td>
<td>Generally low resistivity. Large interference</td>
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<td>25.25</td>
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<td>1959</td>
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<td>0.695</td>
<td>100</td>
<td>1956</td>
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</table>
Supablast Nationwide Limited based in the Midlands has successfully completed a project on an underbridge at Knutsford Station, King Street, Knutsford. Cheshire.

Knutsford railway station serves the town of Knutsford in Cheshire, England. The station is 36 km (22¼ miles) south of Manchester Piccadilly on the Mid-Cheshire Line to Chester. This track runs over a public road - King Street. The main lines were reconstructed circa 1905 and the siding span was reconstructed in 1934. It comprises single steel span decks. Knutsford station opened to passengers on 12 May 1862 with a service between Knutsford and Altrincham. Trains to Northwich commenced from 1 January 1863. Services were operated by CLC until nationalisation on 1 January 1948. Passengers numbers at Knutsford are currently increasing by as much as 27% per annum.

Description of works: Grit blast and paint and general civils:
Due to the fact that the bridge ran over a main road, the safety of the public was paramount to Supablast.
June 2008 – 6 week programme.
The timing of this job was crucial as it had to be completed in readiness for the Royal Horticultural Society Annual Flower Show at Tatton Park – this ran from Wednesday 23rd – Sunday 27th July 2008.
Remit:
• Replacement of existing cast iron parapets with Steel.
• All exposed metal works to be shot-blasted and painted with XM92 system.
• Carry out masonry and drainage repairs to both abutments and wing walls.
• Install new ballast retention plates.
• Pigeon protection.
• Herbicide treatment.

Scaffolding – This included a Birdcage scaffold, set up under the bridge on a half closed section of road. The scaffold incorporated a central opening to allow passage of road traffic. Additionally a pedestrian walkway was incorporated in to the abutment scaffold on the footway side.

Herbicide treatment – Herbicide treatment to trackside in the CESS adjacent to the parapet walls, abutment walls and wing walls – to remove all vegetation.

Grit Blast and paint – Unsound paint and corrosion was removed by grit blasting. All existing parapets and central section of soffit – Carried out all tests required by Network Rail for the XM92 paint system. XM92 is a protective treatment used on steel structures that have been prepared by dry abrasive blast cleaning. It includes a surface tolerant epoxy primer which is suitable for application to gingered or flash rusted areas, all in accordance with Network rail Line standard NR/GN/CIV/002 – giving a service life of 25 years.

Colours specified for the bridge were: 00 E 53 Black, 04 D 45 Maroon and 10 C 31 Ivory.

Cast iron parapet removal and reinstatement – The cast iron parapets removed and replaced with bespoke steel parapets. This was painted in our works to N1 specification prior to installation. The top coat then applied on site.

All reinstating works were carried out during full road closures. This was co-ordinated with the track possessions.

Scaffolding and sheeting used to reduce dust and noise. All local residents kept fully informed of the plans.

Brickwork and masonry repairs – extensive repairs together with pointing and grouting.

Pigeon Protection – This was sourced and erected to the underside of the structure to prevent re-infestation.

Contact details:
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Fax: 01675 464447
Email: katrina@supablast.co.uk
Website: www.supablast.co.uk
Winn & Coales International Ltd, 125th Anniversary Xmas Dinner Cruise, 12th December 2008

Continuing the celebrations in 2008, marking anti-corrosion and sealing specialist manufacturer Winn & Coales International’s 125th Anniversary, to end the year in style, a special Xmas Dinner Cruise was organised for the company’s office and factory staff. The Naticia River Boat was hired for the venue, embarking from the Embankment Pier on a three hour cruise, down to the Greenwich Peninsula and back again taking in all of the sights and Christmas illuminations of the River Thames along the way. After the presentation of the company’s various ‘Merit’, ‘Suggestion Box Scheme’ and ‘Salesman of the Year’ awards by Joint Managing Director, Christopher Winn’s fiancee, Melese Glazer to the appropriate members of staff, a traditional Christmas meal with all of the trimmings was served with plenty of liquid refreshments at hand, to wash it all down with. The Xmas Dinner River Cruise turned out to be a very successful and enjoyable evening and was a fitting culmination for the company to the amazing year that had preceded it. The reception on the Gaticia River Boat.

A traditional Christmas Dinner was served complete with all of the trimmings.

Staff awards were announced by Joint Managing Director, Chris Winn and given out by his fiancee Melese Glazer.

Eastbourne College Careers Evening - 29th February 2009

Directors and key managers from anti-corrosion and sealing product manufacturer Winn & Coales (Denso) Ltd, recently attended a ‘Careers Evening’ on the 29th February, organised by and held at, Eastbourne College. They were there to assist the pupils evaluate work options in an industrial manufacturing and sales led environment and to help with this they utilised a lightweight exhibition stand to use as a backdrop to the conversations. This annual event is extremely important for the sixth form and year 11 pupils at the college as it gives them a chance to discuss their future career prospects and get valuable advice about various industries from the professionals who are actually employed there. The evening went very well with numerous students visiting the Denso team and they were able to answer many questions about careers in their particular area of the industry.
Belzona Helps Restore Famous London Landmark

Belzona Polymerics Limited of Claro Road, Harrogate together with Blunt Construction Limited one of Belzona’s Approved Specialist Applicators have recently completed a project by applying a Belzona high performance liquid applied membrane system as a lead alternative to help restore one of London’s historic landmarks, The Monument.

The works are part of a much larger £4.5 million project, carried out by Principal Contractor CWO Ltd and funded by the owners of The Monument; The City of London Corporation to restore the famous structure built in 1678 and dedicated to the 1666 Great Fire of London.

This is one of four listed historic buildings where Blunt Construction and Belzona products have been specified by Julian Harrap Architects. Julian Harrap, Principle for Julian Harrap Architects explained, “We have previously worked with Blunt Construction applying Belzona products on the refurbishment of the listed early 20th century wind tunnels at Farnborough over a period of five years in which we had a productive and cooperative relationship. This application was also supported by the Belzona Technical department. We felt that the repair to The Monument was another opportunity in which we could work with Blunt Construction. The Belzona solutions helped avoid the need to replace lead flashings which would be expensive and potentially damaging. The Belzona product’s weatherproofing capability is beneficial for safeguarding the Portland stone for the foreseeable future.”

Blunt Construction’s Specialist Applicators began preparations by first applying a sealer coat to the surface at the base of The Monuments column to help ensure high adhesion of the Belzona 3131 (WG Membrane). Five coats of Belzona 3131 (WG Membrane) was then applied by brush with layers of mesh bonded between the coats to give greater strength and resistance to cracking.

Pyeroy, the expanding industrial services group, has been awarded a £6 million contract to refurbish London’s 120 year old Blackfriars Railway Bridge.

The works will be carried out over a two year period for main contractor Balfour Beatty on behalf of Network Rail.

The refurbishment work is being carried out as part of the Thameslink Programme which will extend the platforms at Blackfriars Station across the Thames, partially supported by the bridge piers.

Pyeroy’s involvement will see the Gateshead-based firm’s infrastructure services division providing scaffolding and steelwork support ahead of applying a new long last protective coating to the wrought iron bridge.

The Thameslink Programme will deliver a new station at Blackfriars able to handle 12 car trains for the first time, with significantly more trains being able to stop at the station every hour.

The station also becomes the first to span the Thames, with a new roof over the entire platform length and a new entrance on the South Bank providing better access to the Tate Modern and the surrounding area.

Designed by W. Mills, the current wrought-iron bridge opened in 1886 and was built alongside the original St Pauls/Blackfriars railway crossing. Its river spans match the old bridge, and on the downstream side the bridge is decorated with pulpit turrets, while on the upstream side there are Gothic-style cast-iron parapets.

The work to be carried out on Blackfriars Railway Bridge by Pyeroy follows the company’s appointment for extensive refurbishment contracts on Tower Bridge and Southwark Bridge for the City of London Corporation.

As well as the range of services provided by its infrastructure division, Pyeroy carries out work in a range of other sectors. These include marine (construction and re-fit of naval & commercial ships), industrial (power stations, pharmaceutical plants, chemical plants, refineries) and construction (commercial & residential buildings) sectors.
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Tel: 0208 3054146 Fax: 0208 8547546

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DIARY DATES 2009

Thursday 16th April 2009
London Branch meeting
Topic: Beyond red lead by Brian Goldie
17.30 for 18.15 start
This will be preceded by the London Branch AGM at 18.00
Venue: Naval Club, 38 Hill Street, London W1
Please note date change

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

Thursday 7th May 2009
London Branch Walking Tour
Meet at Marble Arch at 17.45
Theme, ‘Spies acting in Mayfair’
Meet at Naval Club, 38 Hill Street, Prompt 18.00 start, returning to Naval Club for chilli and rice supper. Members and friends welcome
John O’Shea - Walk Co-ordinator

Thursday 21st May 2009
50th Anniversary of ICorr
Venue: Thames Barrier
Details in Journal

Thursday 4th June 2009
London Branch Golf Day at Silvermere
Details from Mike Moffat

16th September – 17th 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 Dryfe (RSC).
Email: nicholas.stevens@manchester.ac.uk
Abstract Deadline: 31st May 2009

14th September – 18th September
Fifth International Conference
- Advances in Corrosion Protection by Organic Coatings
Conference organiser: Professor David Scamblebury, 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: nigelbean1@aol.com
www.surfaceworldshow.com
For conference enquiries please contact Denise on 01525 851771.

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

SHORT COURSES

20th-23rd April
Corrosion Control in Industry & Plants
Amsterdam:- Further details contact Colin Britton
Tel: +44 (0) 1480 860943  e: cbrit79727@aol.com

BRANCH CONTACT DIRECTORY

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Young ICorr Chairman:
Oliver Lewis
Email: acesol@exchange.shu.ac.uk

CSD Division:
Nick Stevens
Tel: 0161 3063621

CED Division:
Nick Smart
Tel: 01635 280385

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