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As I go around the country attending the various ICORR meetings I am repeatedly amazed by the energy and commitment of our membership in organising attending and contributing to the many activities of the Institute. This is our lifeblood, without that contribution freely given and, I am sure, often to the detriment of other demands on our time and resources the Institute could not function. The question I need answers to is what can I and the central administration function do to make your contributions more effective? Do not assume that there are no funds, if needed, to push initiatives forward. I am not saying that we can or indeed should throw money at everything suggested but I am saying it does no harm to ask and a well thought through proposal with a worthwhile return will be seriously considered. At the Council meeting on 15th June there is a proposal for consideration and approval to improve the ICORR website and make it more useful to our membership. The site has significant traffic so it is a serious contender for publicising what we do in our branch and divisional activities but we need to use it more and that means it needs to be easier to use. As soon as that proposal has been debated and, I hope, approved we will give full information on how to get the most from the reinvigorated site.

I recently attended the CED meeting at NPL and found it fascinating. Not only were there some interesting presentations and worthwhile debates but it was a superb opportunity to renew old friendships and make new ones. I remember attending a month long course at Henley Management College some years ago when one of the points most strongly made and reinforced was the importance of networks and networking and what a splendid vehicle ICORR meeting are for that. Often networking will be included on an agenda as an adjunct to coffee or lunch but I think it may really be the most important part of the event and its value should never be underestimated. During the tour of NPL I found that, amongst other things, they are working on electrochemistry at elevated temperatures and pressures; the subject of my PhD thesis in the 1970’s and I am delighted to know that a lot of what I did then is still relevant now although I have to say that a lot of the instrumentation has moved a long way in the intervening decades.

I am very conscious that in these tight financial times money to attend exhibitions and conferences is tight but I remind you that the CORREX conference is taking place with Surface World at the NEC Birmingham this year 1st – 3rd November. This year the programme is intended to include a number of student presentations. For employers seeking new talent this could be a showcase of the very best students in the country and an opportunity to find suitable candidates at a fraction of the cost of advertising.

At the London Branch meeting on 14th April, our invited speaker was Bob Crundwell, ICorr President (left). The title of his presentation: ‘Corrosion Engineers – Mice or men?’ became clear in his closing remarks. He briefly described his experiences, not least 20 years spent with Impaloy where he eventually became Managing Director. When he ‘retired’ he advised candidates for job interviews and learned that certain companies, rather than concentrating on CV details, were saliently more interested in peoples’ ability to work successfully as part of a team. He enthused about the new ICorr office connectivity technology and the success of ICATS as well as the various training schemes provided by ICorr, emphasising that we are a learned society and that local branch activity is important. However, he bemoaned the ‘excess of grey hair’ and wanted to encourage younger members to be more pro-active in Institute matters. It was important to be aware that about 10% of the country’s GDP corrodes every year and that dire situation needed to be addressed; especially bearing in mind that preventing corrosion is such good value. In particular he wanted to raise the profile of the Institute and to have much more influence in the off-shore industry. We should be much more forthright in our approach to the problems of corrosion and Bob’s final slide illustrated his point. The photograph depicted a valve operating handle on an off-shore installation; half the operating wheel had corroded away completely and the other half would never have passed a touch profile test – and yet nothing had been done about it, despite the fact that control of such corrosion is not exactly very challenging – hence – ‘Corrosion Engineers – Mice or Men?’
Nick Smart (Serco Limited) welcomed delegates. This is the fourth meeting in a series of recent working days of the Institute of Corrosion’s, Corrosion Engineering Division (previous meetings were held at Birmingham, Warrington and Buxton). Working Groups meeting during the day were: Monitoring, Nuclear, Coatings, Oilfield Chemicals and Water Treatment. Tours of NPL laboratories were available. Robert Hart (Head of Materials, NPL) welcomed delegates and summarized materials/corrosion activities at NPL. The Materials Division aims to support sustainable technologies by research and development on fuel cells, solar cells, improve the longevity of nuclear installations, provide consultancy and produce a thermodynamics software package. He pointed out that 25% of the UK’s GDP depends upon a robust measurement structure. Nigel Simms (Cranfield University) presented “Smart Corrosion Resistant High Temperature Coatings.” High efficiency gas turbines use clean natural gas, oils etc; single crystals may be used up to around 1000°C. Recent trends include the use of solid fuels, e.g. biomass (miscanthus grass, coppiced willows etc), with longer intervals between overhauls. These novel (gaseous) fuels contain a mix of contaminants, e.g. natural gases with up to 5% H₂S. From solids, contaminants such as CO, CO₂, H₂O (N₂) may arise. Under oxidizing conditions, impurities such as SO₂, HCl and particles involving Na, K and traces of other sulphates and chlorides arise. A transport and deposition model is available. At high temperatures, it was found that high Cr-coatings performed well; at low temperatures aluminides were found to perform better. Smart Coatings involve multi-layers – an outer Al-rich/Cr-lean layer, under which was a Cr-rich layer. Ternary iso-corrosion maps (Al-Cr-Ni) have been developed for such coatings. Coating performance includes electroplating, vapour phase alloying (co-deposition) and magnetron sputtering. Such coatings may be repairable – their lifetimes are currently 3 years. Douglas Mills (University of Northampton) addressed “Novel Water Treatment Technologies,” having been involved with corrosion prevention of radiators in central heating systems and car radiators using standard inhibitors, minimizing corrosion in power station boilers by keeping O₂ levels low (but not too low!), seawater dosed with ferrous sulphate to reduce effect of Cl⁻ on condenser tube corrosion and various “magic” water softeners. More recently, he has reviewed annually corrosion inhibitors in his Eurocor Conference and is interested in cheap, environmentally-friendly inhibitors as addition to water for high pressure water blasting. He then outlined John Lindeman’s (Water Treatment Consultant) ideas on reducing calcium carbonate scale by adding polymer products, improving calcium phosphate inhibitors and the introduction of halogen-resistant inhibitors. Phosphate may be added to drinking water systems to prevent lead leaching on lead pipes. Possible phosphate-related problems have been observed by Phil Munn (Consultant) on copper tubes. He considers the following main drivers for change:

- Environmental
- Human Toxicity
- Move away from inorganic substances

Towards Organic treatments Dr Mills described Dr Alan Pomfret’s (CE Infrastructures) philosophy for boiler water treatment requirements in the 21st Century, including the data for deciding “chemical” water boiler treatment programmes. He outlined existing pre-treatment plant in the 19/20 Centuries and suggested 21st Century ones would be membrane systems, e.g. reverse osmosis and electrodeionization. Future developments include: producing environmentally-friendly, cheap inhibitors, highly effective at all temperatures for all metals, fully approved by all boiler manufacturers and safety authorities. Barry Lamb (BAC Corrosion Control) spoke on, “Novel Electrochemical Treatment for Accelerated Low Water Corrosion” ALWC is a combination of EC and MIC. It is the accelerated corrosion on unprotected, immersed steel structures giving rise to an average loss of 0.3 – 2.0 mm per year on the wetside – found just above Lowest Astronomical Tide (L.A.T). Corrosion product is a “black sludge” containing: H⁺, S²⁻, Cl⁻, H₂S, HS⁻, FeS, FeO and FeOOH. Damage comprises rapid and local metal thinning, leading to premature failure. The ICE Maritime Board estimates that control of corrosion costs of some £250 M, needed to protect assets worth billions of pounds. Presently, there is no accurate model for predicting risk of ALWC at any geographical location. Conventional in-situ testing may:

- be expensive
- introduce new corrosion cells

Continued
• interrupt Port operations
• risk contamination
• H & S issues
• be weather-dependent

The alternative solution is to engender a calcereous film on steel comprising an admixture of CaCO₃ and Mg(OH)₂, providing cathodic protection to the steel structure. LATreat ™:
• applies a calcereous deposit
• electrochemical process
• generates active agents electrochemically.

Benefits claimed:
• cheaper than conventional methods
• no permanent equipment
• cost, circa £100K
• minor disruption
• equipment removed on completion
• environmentally friendly
• no external agents used
• Mg²⁺ and Ca²⁺ available in seawater

LATreat ™ is a 3-step process:
Cleaning: generating H₂, removing aggressive surface foulant
Sterilization: generating Cl⁻
Coating: A rapid in-situ application of a protective alkaline coating by pulsed current techniques.
Lifetime: 5 years, quoted by University of Manchester. Ports participating: Shoreham, Harwich and Aberdeen.

Dr Bob Crundwell (President, Institute of Corrosion) thanked the hosts, NPL, speakers and audience, especially Nick Smart and Douglas Mills for organizing the event.

Dr D F Nuttall,
Consultant, Independent Corrosion Solutions
Technical Topics No.31:
POST CED DAY AND WATER TREATMENT TO PREVENT CORROSION, SCALE BUILD UP AND TOXICITY
by Technical Secretary, Douglas J Mills

I’ll start by saying a few words about the CED day that has just happened down at Teddington (a longer report from one of the delegates is on pages 5 & 6). It was an excellent day including three plenary lectures, a tour and a nice lunch. Also several work group meetings were held. I chaired the Coatings Work Group and it was quite lively. More about that in the next TT when I will take a coatings theme. It was also nice to welcome our President, Bob Crundwell to an ICorr technical meeting. As he said in his summing up, “sharing information at days like this is what the Institute should be all about”. I gave a plenary, in lieu of a couple of experts: John Lindeman (with help from Alan Pomfret) and Phil Munn, on Novel Water Treatment Technologies. This is one of those areas of corrosion that I have an interest in. But I am not an expert and I don’t think I have discussed this topic before in a TT. So giving the talk was challenging! Anyway here I thought I’d pick out some parts from my talk starting with a brief review of my experience of this area. This arises from previous industrial jobs (several of them quite a good number of years ago) and also from my contact with industry in my present job(s) (this included being TS of Icorr). Things I have direct experience of include preventing corrosion of radiators in central heating systems using standard inhibitors (benzoate, nitrite etc), testing inhibitors for car radiator systems (mixed metal systems etc) and minimizing corrosion in boilers in power stations (hydrazine, ammonia treatments- keeping pH high, keeping O₂ levels low; but problems can arise if O₂ kept too low). Also while working at the BNF with Hector Campbell and Roger Francis, I came across an interesting example where sea water was dosed with ferrous sulphate to reduce the effect of chlorine on corrosion of condenser tubes. As I recall it was very effective! (A quick plug for a book here: Roger Francis has just written “The corrosion of copper and its alloys; a practical guide for engineers”. This is published by NACE and includes a very good review of all the work in this area that the BNF did (as many of you will know the BNF closed in 1992 and most of the reports covering the excellent work it had done were consigned to the skip). Also while at the BNF I tested various “magic gadgets” to prevent scale build up, none of which showed much promise! (this resonated with John Lindeman who had come across several of these in his work. Coming now to current technologies and innovations for water treatment to control scale, corrosion or toxicity, the experts have provided several interesting examples. Thus it was pointed out that new boiler designs can bring new challenges e.g condensing boilers with their narrow passages are less tolerant than older types to scale built up. In cooling systems, there is a need to improve “inhibitors” for calcium carbonate and calcium phosphate (this is using the word inhibitor to mean something that inhibits SCALE build up) Note the main reason phosphate is added is for corrosion control i.e. to prevent lead pipe corrosion and/or, if there is steel in the system, by preventing mild steel corrosion (at neutral pH it provides anodic inhibition at 10 -20 mg/l, in alkaline waters it provides mainly cathodic inhibition at 4 – 8 mg/l). Currently one way of mitigating calcium phosphate scale build up is to add acid to suppress pH. Because this can cause other problems (e.g. causing metals to dissolve more readily!) the industry has developed environmentally friendly co and ter polymers, which are better at calcium phosphate deposition in alkaline waters. An example where the need to control toxicity can have unwanted side effects is in the application of Legionella legislation in cooling systems. This has resulted in many treatment programmes using continuously applied chlorine or bromine. This on-going presence of free halogen, and raised chloride ions as a result, increases corrosion rates in mild steel, stainless steel and yellow metals. And because traditional yellow metal inhibitors (tolyl triazole, benzotriazole) are not halogen stable, new azole ‘halogen resistant’ products are having to be developed. Going back to phosphate “problem”. Phil Munn has observed considerable attack on copper pipes (leading to blue water) where amounts of phosphate has been found in the corrosion product (see picture). Whether the phosphate caused the attack or it merely precipitates out when corrosion starts is uncertain (an interesting and important topic for research?) There was quite a bit more in my CED talk including lots about Boilers (see picture of a typical fireside boiler). But space precludes including that here (hopefully the whole lecture will appear in time on the website in the CED section). But my general conclusion was that, in this field, if you develop some improved compound to deal with one aspect, whether that is corrosion, scale build-up or toxicity, be very careful that it does not affect the other aspects! As usual any comments on this months TT please write to Douglas@harrbridge.freeserve.co.uk

Acknowledgment: Thanks are expressed to Phil Munn and John Lindeman for providing much of the technical information (and some of the comment on it) in this TT.
ICORR ABERDEEN BRANCH REFLECTS ON A SUCCESSFUL 2010/2011 SESSION

Our inaugural meeting was held jointly with the Institute of Welding and Joining (WJS) on 30th September 2010. As expected, the topic of recent developments in Stress Corrosion Chloride Cracking (SSCC) testing of Welded, Carbon and Low alloy Steels proved to be very popular with fifty six (56) attendees. The presenter, Dr. Chris Fowler, is currently President of NACE and director of corrosion testing at Exova. His talk covered the current position of the newly proposed Four Point Bend Test Procedure and the validity of widely used procedures against expected service conditions. Finally, Chris led a discussion on “how should reeled pipe be tested” with his audience, which included a number of engineers who are very experienced in reeled pipe laying, and proved to be very interesting.

On 26th October Dr. Zeinab Marsh of WGIM presented on Aging Assets in the North Sea and Materials Testing for Sour Environments to an audience of thirty four (34). Zeinab is the Corrosion Technical Authority for the operator TAQA and her talk considered that many of the aging assets in the UK sector of the North Sea are now seeing increasing levels of field souring. This has raised a number of issues with respect to the original materials of construction where conditions have moved from sweet to sour production. Particularly where the original design concept did not take this into account or the asset may now be seeing H2S partial pressures beyond the original design case. She explained that change of ownership and loss of original documentation can also mean that sour service compliance can be in question. She presented the stages of a sour service survey, ranging from establishing both present and future predicted sour service conditions through to the remedial steps required where materials were found to be non compliant. Zeinab finished her talk with some interesting examples of materials degradation and failures from TAQA’s assets which provoked enthusiastic discussion of the possible degradation mechanisms amongst the audience.

Our last meeting before the Christmas break was the 23rd November, a cold, dark, wet uninviting night, but John Middleton of Tuscan Corrosion Control proved to be an engaging presenter on the subject of Validation Testing of Composite Repairs for Pipes and Pipelines. John identified that composite repair technology has matured significantly in the last decade with the advent of specialised resins and reinforcing fibres. Plastic composites are now accepted in a wide variety of repair applications which include piping systems and pipelines. He explained how creep testing has been used to predict the long term strength of composite repairs and how significant the glass transition temperature of the resins, which can be as low as ambient temperature, are in estimating the expected life. John’s presentation addressed what the pipeline owner and operator can reasonably expect from a composite repair system with regards to performance and testing. As for all our meetings this year the question and answer session stimulated considerable discussion, particularly on the use of composites for “defined life” or temporary repairs.

The first meeting of 2011 was held at 18.00 on Tuesday 25th January. The technical presentation titled “Materials Engineering - Issues in Oil & Gas” was well delivered by Dr. Rob Howard of Lloyd’s Register. Dr. Rob set the stage by explaining some basic principles of Material Science such as mechanical properties of materials, fracture mechanics, microstructure and effects of heat treatment on metals. He went on to explain the procedure and importance of verification/certification from design to operational stage. Dr. Rob presented examples of welding procedure specification and material certificates showing typical key parameters. His presentation also touched on material engineering aspects of integrity management and an example of microstructural effects of a metallic structure due to fire. The audience asked Dr Rob some engaging questions on inspection of welds and an interesting discussion on alternatives to material testing as proof of integrity during the operational stage developed.

Craig Emsile of Somatic gave a presentation titled ‘Non-Invasive Inspection Techniques’ during the meeting held on the 25th February, 2011. The presentation covered the benefits of using non-intrusive techniques for performing inspections and the importance of understanding potential degradation mechanisms with inspections. Craig explained the various inspection techniques available and their capabilities/limitations. He outlined the use of inspection data and its importance in integrity management decision making. The presentation led to a lively question/discussion session.

The Icorr joint meeting with the Marine Corrosion Forum (MCF) and was held on the 12th of April, 2011. The technical presentation was delivered by Lammert Brantsma of MEL and was titled ‘Cracks and their Causes’. Mr Brantsma highlighted the problems with improper material selection and poor fabrication that could lead to cracks. He said that from experience, information provided in material certificates were not always accurate and advised that critical elements of engineering components should be tested to confirm specified parameters. He went on to talk about cracks due to improper fabrication processes such as tempering and gave illustrations of different types and causes of cracks. The presentation was concluded by Mr Brantsma responding to a series of interesting questions from the audience relating to the
Members during technical presentation.

various types of cracks and how to perform non destructive inspection on these defects. There was a good turnout for the May joint meeting with the National Association of Corrosion Engineers (NACE). The meeting was held on Tuesday the 24th of May and the highlight of the meeting was a presentation expertly delivered by Alan Foxton of Subsea 7. The presentation was titled “Good Material Selection - Is this the death of the solid CRA?”. Alan urged the audience to give more consideration to ‘Lined’ and ‘Clad’ pipeline during design. He explained the history of these materials for pipeline construction and detailed how materials have evolved over time because of a need for the industry to handle more aggressive product, environment and operational conditions while maintaining a balance with material/fabrication cost. According to Mr Alan Foxton, clad/lined pipelines offer a cost effective CAPEX and can be laid by standard pipelay techniques. The audience asked questions relating to erosion resistance, reelability, CP compatibility and fabrication techniques for clad/lined pipelines in what was a thought stimulating session. Other activities of the day was a formal handover by Alison Chalmers to Alistair Seton as the chair of the Icorr Aberdeen branch and a call for new members for the 2011/2012 branch committee to volunteer for nomination. For information or queries about the Aberdeen branch activities please contact our branch Secretary, Frances Blackburn, ICorrABZ@gmail.com. Alternatively a calendar of local events of interest to corrosion professionals in the Aberdeen area and the opportunity to sign up to the branch mailing list is available at https://sites.google.com/site/icorrabz/home.

The occurrence of the publication of issue 100 of Corrosion Management prompts me to wonder if those currently working in the corrosion field might possibly be interested in the reminiscences of one who was in corrosion research at a time when some of the basics of the science and technology were being established.

I worked in the corrosion section at the British Non-Ferrous Metals Research Association (BNFMRA) at Easton Street from 1943 to 1955. A senior colleague of mine was A B Winterbottom who had been at Trondheim University, but left before the German occupation of Norway. Some of my other colleagues who made notable contributions to the advancement of corrosion knowledge included Ralph May (who had previously worked with Guy Bengough, whom I never met), Hector Campbell, Victor Lucy and T Howard Rogers. In the course of my work I had many interesting and helpful contacts with eminent experts in the field. Foremost of these must be U R (Ulick) Evans who devised such elegant simple experiments to demonstrate the electrochemical nature of corrosion processes. He visited the BNFMRA on a number of occasions and after our discussion he often wrote to me in his distinctive longhand with little crossings out and additional words inserted. I wish I had kept what would have become historic documents. He was also one of the assessors for my PhD degree. Other well-known academics at Cambridge with whom I had many contacts included T P (Sam) Hoar and J E O (Jack) Mayne. The committee set up to estimate the overall costs to the community of corrosion was chaired by Dr Hoar and I was his deputy. A notable meeting with him was in New Zealand where we were both giving lectures. J E O Mayne was a great character who combined research with commercial activities.

Other members of the academic world with whom I had contacts were Prof Redvers Parkins at Newcastle, Prof Stuart Leach at Nottingham, Prof Graham Wood at UMIST, and, of course, there was Lionel Shrier, editor of corrosion manuals, who had many contacts with all of us. Another contemporary corrosion worker was Charles Booker. I made many visits to NPL for helpful discussions with W. H. K. J. Vernon, one of nature’s gentleman, and with Frank Wormwell his deputy and subsequently his successor. Others I met there included Dr Butler and Miss Brasher.

We worked closely with one of our sister organisations the British Iron and Steel Research Association (BISRA). The head of BISRA was the formidable Dr J C Hudson (on a social occasion I played in a bridge match against him and his wife). His able assistant and successor was J F Stanners whom I met often. We had a number of outings together to atmospheric corrosion sites, one of which was at Brixham, Devon – not a particularly unpleasant day’s work!

I attended the first seven International Corrosion Congresses at London, New York, Moscow, Amsterdarm, Tokyo, Sydney and Rio de Janeiro and number of other international conferences on marine corrosion and desalination. At most of these I presented papers or contributed to discussions. During these meetings and on other visits abroad I met many overseas corrosion experts. These included Marcel Pourbaix, Hans Arup of the Danish Corrosion Centre, Shiro Sato of Japan and Einar Mattson of the Swedish Corrosion Centre whom I was happy to meet socially as well as professionally. I became firm friends with Frank LaQue of International Nickel who was delighted personality with a mischievous sense of humour as well as a formidable intellect. I made several visits to INCO’s Marine corrosion testing station at Harbor Island, North Carolina. One of my favourite occasions was an interview with a salesman trying to promote one of the dubious devices said to protect against aqueous corrosion. After Frank had demolished his attempts to provide a scientific basis for his product, the salesman had to fall back on the usual response ‘I know it works because I have all the testimonials from satisfied customers’. One of the notable leisure activities at Harbor Island was aboard a boat to catch shrimp, which were brought back, cooked and eaten.

In the later stages of my working career, I had responsibilities, as a board director of a large manufacturing company, for diverse activities including maintenance engineering, transport and some aspects of production, but corrosion was still an important interest. After retiring from full time work, I became a part time consultant on corrosion problems for a number of years.

I have published a few dozen scientific and technical papers, during my career. Most of these will now be only of historical interest as newer and more sophisticated techniques have been developed and newer materials have become established.

Peter Gilbert
Surface World 2011 will run alongside Correx - the national corrosion conference and exhibition.

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

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The only international exhibition staged in the UK dedicated to product finishing, surface engineering, coatings and advanced surface treatments, together with corrosion management and control – SURFACE WORLD & CORREX 2011 www.surfaceworldshow.com – will be held at the Pavilion, NEC, Birmingham, on November 1st, 2nd and 3rd this year.

This follows the highly successful coming together of these vital sectors of industry for the first time at an exhibition in 2009, which attracted exhibitors and visitors from across the globe to the NEC and was the biggest event of its kind for over 10 years.

SURFACE WORLD & CORREX 2011 will showcase the latest technologies, products and services embracing protective, decorative and functional coatings of all kinds, component cleaning and degreasing, surface pretreatments, electroplating and allied processes, abrasive blasting and mechanical finishing, plus state-of-the-art techniques in the testing and measurement of coatings and surface integrity, advanced methods of corrosion control, environmental control and energy conservation.

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

In tandem with the exhibition, the British Coatings Federation will be holding a seminar majoring on innovative developments in coatings technology.

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

A limited number of stands are still available at the exhibition – for exhibitor and visitor information, log onto surfaceworldshow.com or contact Nigel Bean at Hill Media Ltd, Marash House, 2-5 Brook Street, Tring, Hertfordshire, HP23 5ED, UK. Telephone: +44 (0)1442 826826. Fax: +44 (0)1442 823400. Email: nigelbean1@aol.com Website: www.surfaceworldshow.com
ABSTRACT
Fluoroethylene vinyl ether (FEVE) resins have been in use as topcoats for steel bridges for more than 25 years. FEVE resins combine the desirable properties of fluoropolymers like weatherability and corrosion resistance to the properties of polyurethane resins such as reactivity, solubility, and ease of application. Fluorourethane coatings have undergone a continuous performance monitoring at 29 bridge locations throughout Japan since 1985 in a joint research project with the Ministry of Land, Infrastructure and Transport, in comparison with conventional polyurethanes, alkyds and chlorinated rubber. Results of this extended project will be discussed in this presentation. Based on the project conclusions, FEVE resin based coatings are since 2005 required for use on all bridges in Japan. The use of these topcoats should increase the effective life of bridge coatings systems to at least 30 years, and in some cases up to 60 years.

1. INTRODUCTION
Coatings have been used on steel and concrete bridges primarily to prevent corrosion. The last 30 years has seen the development and increasing use of zinc rich primers, which offer corrosion protection on steel substrates that approaches 30 years. Typical coating systems include a zinc rich primer, a middle coat, and a topcoat. The middle coat is used to prevent penetration of corrosion initiators in case of mechanical damage to the topcoat. The topcoat is usually a durable coating type used to impart a good appearance and will generally be more resistant to the elements than the middle coat. Examples of topcoats used in bridge coating systems include polyurethanes, polysiloxanes, acrylics, alkyds, vinyls, and chlorinated rubber. The use of zinc rich primers has significantly reduced corrosion problems on steel bridges. Many bridges coated up to 30 years ago exhibit no signs of corrosion, even as the use of de-icing salt has increased. However, many of the topcoats used show extensive chalking, fading, loss of gloss and colour, and coating loss. These changes are not necessarily significant in topcoats of gray, pale yellow, and other light colours. However, in recent years, a trend toward improving the aesthetics of bridge coatings has been seen. There is more interest in using bridges as a means of architectural expression, including the use of brighter, more vivid colours for topcoats. While polyurethanes and acrylics weather better than earlier coatings, neither can match the long-term performance of the zinc rich primers. As changes in coating requirements occur, there appears to be a requirement for topcoats that can match the long-term performance of zinc rich primers.

2. FLUOROPOLYMER COATINGS
Fluoropolymers have always offered intriguing possibilities in coatings. This has been primarily due to their outstanding UV stability, and their chemical and corrosion resistance. These properties are derived from the extreme stability of the carbon-fluorine bond present in all fluoropolymers. Unfortunately, fluoropolymers have characteristics that make their use in coatings problematic. Most fluoropolymers form films only at high temperatures, either by melting or coalescing, which precludes their use in field-applied coatings. Adhesion to substrates can be difficult with fluoropolymers. Because of their low surface energy, fluoropolymers cannot be readily recoated if damaged. To address these shortcomings, a group of fluoropolymer resins known as fluoroethylene vinyl ether (FEVE) resins were developed in the early 1980’s. As the name implies, these resins are copolymers of a fluoroethylene monomer and a vinyl ether monomer. As in other fluoropolymers, the fluoroethylene segment provides weather resistance, corrosion resistance, and chemical resistance. Incorporation of the vinyl ether segments into the polymer is unique, and provides properties unavailable in traditional fluoropolymers. By changing the type of vinyl ether, the physical properties of the polymer can be modified. Certain groups allow the polymer to be dissolved in solvents commonly used in coatings, or dispersed in water. Coating hardness, flexibility, chemical resistance, and toughness can be modified by changing the vinyl ether. Vinyl ether types that enable formulation of ambient temperature curable coatings can be added. This means that now, fluoropolymer coatings can be applied in the field to structures like bridges. This makes them suitable for both shop application for new construction and field application for existing bridges. Adhesion to substrates such as steel, concrete, composites is excellent, comparable to that achieved by polyurethane coatings. Finally, FEVE based coatings can be recoated, even after weathering, meaning that field repairs can be made.

3. FLUOROETHYLENE VINYL ETHER (FEVE) BASED COATINGS
3.1. Weathering of FEVE Based Coatings
UV radiation found in sunlight contains enough energy to break chemical bonds in coatings. The results of this degradation include chalking, fading, and loss of colour and gloss. In addition, degradation products are more easily removed from the surface of the coating. This leads to loss of coating thickness, and potential subsequent increase in corrosion. The strength of the carbon-fluorine bond is greater than that found in UV radiation. Therefore, fluorourethane coatings based on FEVE resins offer excellent resistance to UV radiation, as measured by changes in gloss retention after exposure. Natural weathering tests for coatings are often run in south Florida, due to the intensity of sunlight, humidity, and salt found there. Coated panels are placed on racks at specified angles, then allowed to weather. Physical properties, in this case, gloss retention, are periodically measured. Figure 1 below graphs gloss retention of a clear coating and a pigmented coating made with FEVE resins. In this particular weathering test, gloss retention is required to be greater than 50% after ten years of south Florida weathering. The FEVE based coating easily meets this standard.

In addition to natural weathering tests, there is a number of accelerated weathering tests used to ascertain the durability of coatings. The purpose of these tests is to attempt to reduce the amount of time required to screen coating formulations. There is considerable
disagreement on the relationship between results obtained in accelerated weathering tests compared to actual weathering of coatings. Nevertheless, these tests are used extensively in the coatings industry, and may be especially useful to compare the relative performance of coatings. The first accelerated weathering test is QUV-A exposure (ASTM D 4587). In this test, coated coupons are exposed to QUV-A radiation of 340 nm. UV exposure is typically followed by exposure to moisture by condensation for some period of time to simulate rainfall. The test maybe conducted at elevated temperatures to enhance degradation. Results of the test are shown below in Figure 2. QUV testing is typically run for about 5,000 hours. In this test, the FEVE based fluorourethane shows little change in gloss even after 15,000 hours, far outperforming the standard urethane coatings, which are used extensively as topcoats on bridges. The second comparative accelerated weathering test is the EMMAQUA (Equatorial Mount with Mirrors for Acceleration with Water) test. In this test, coated coupons are exposed to QUV-A radiation of 340 nm. UV exposure is typically followed by exposure to moisture by condensation for some period of time to simulate rainfall. The test may be conducted at elevated temperatures to enhance degradation. Results of the test are shown below in Figure 2. QUV-A exposure tests.

Figure 2. QUV-A Exposure Test: Gloss Retention of White Pigmented Coating Formulations

FEVE fluorourethane coatings assist in corrosion prevention due to their weathering properties. Because decomposition does not occur readily in FEVE coatings, practically the only decrease in coating thickness is due to physical removal by wind, rain, and other mechanical means. This means that even after years of exposure, FEVE coatings will lose less thickness, thus continuing to provide an effective barrier removed by mechanical means. The removal of these materials exposes a fresh surface to UV light, setting up further degradation, and additional coating removal. The durability of FEVE coatings has been demonstrated in extensive testing. The Ministry of Land, Transportation, and Infrastructure in Japan operates a marine test station 250 meters offshore in Suruga Bay, the deepest bay in Japan. The platform is used to provide a real time test platform for coatings for various types of exposure, including immersion and tidal zone. FEVE based fluorourethane coatings were tested side by side with standard polyurethane coatings over a period of 16 years on this platform. Each coating system consisted of an inorganic zinc rich primer (75μm), an epoxy middle coat (150 μm), and a topcoat (25 μm).
Coated panels were evaluated at regular intervals for gloss and colour retention, as well as changes in coating thickness. During the first seven years of the test, the FEVE fluorourethane coating showed no change in thickness. For the next nine years, the FEVE based topcoat showed an average loss of 0.38 μm/year, for a total loss of 3.4 μm over the entire test period. At this rate of change in thickness, the expected life of the fluorourethane topcoat would exceed 60 years. The urethane topcoat in contrast, lost about 2 μm/year after the second year of exposure. The urethane topcoat was completely removed from the test coupon after 13 years.

Analysis of the coating system by Scanning Electron Microscopy (SEM) and Energy Dispersive X-Ray Microanalysis (EDX) indicated that no chloride had penetrated the FEVE based topcoat. No corrosion of the zinc rich primer was found, confirming that corrosion initiators had not reached the primer.

One other measurement of corrosion is indicated by Electrochemical Impedance Spectroscopy (EIS). EIS involves sending alternating current between two electrodes, one a 3% salt water solution, the other the metal panel. The coated side of the panel is exposed to the salt solution. The change in impedance at a constant frequency of 1 kHz is then measured. The smaller the change in impedance, the better the corrosion protection offered by the coating system. In essence, the change in impedance can be related to the movement of corrosion initiators like chloride through the coating system. In the particular test, results of which are shown below in Figure 6, four coating systems were exposed for 1,000 hours in an accelerated weathering test. Then, the unscribed panels were subjected to 500 and 1,000 hours in the ASTM B-117 salt fog test, which is an accelerated test for corrosion. Results indicate that the FEVE based coating system far outperforms competitive systems. Because the coatings were subjected to accelerated weathering and corrosion tests prior to use in the EIS test, the results indicate that the competitive topcoats suffered some degradation, and therefore were permeable to corrosion initiators.

Figures 1-6 indicate that the FEVE fluorourethane coating not only shows no signs of damage from weathering or erosion, but that the FEVE coating has prevented corrosion initiators from reaching the zinc rich primer and the surface of the panel. The low coating loss rate over the 16-year period means that thinner topcoats can be used to achieve corrosion resistance compared to other coating systems like urethanes. Using a thicker FEVE topcoat could conceivably lead to a potential coating lifetime of greater than 30 years. For example, the FEVE topcoat used on the Akashi Strait Bridge in Japan, the world’s longest suspension bridge, has been applied at a thickness that requires recoating only every 60 years. The lack of penetration of chloride through the FEVE topcoat suggests that it may be feasible to use two coat systems with a zinc rich primer and an FEVE based topcoat. This could lead to substantial savings in application costs.

4. BRIDGE PROJECTS USING FEVE BASED COATINGS

Since FEVE resins were developed in Japan, the great majority of bridge applications demonstrating long-term performance were done there. In the mid 1980’s 29 bridges were coated with FEVE based topcoats on half, and half with conventional topcoats. The performance of each topcoat was then observed over time.
The Tokiwa Bridge in Hiroshima was recoated in 1986; half with an FEVE based topcoat and half with a chlorinated rubber topcoat. This bridge is located in a mountainous area near Hiroshima. In winter, a good deal of snow falls in the area, requiring the extensive use of CaCl₂ for de-icing the bridge.

Photos were taken over the next 20 years from the 1986’s recoating, examining the weathering of each coating system. Photos in Figure 7 above show weathering of the FEVE based fluorourethane topcoat through 2005. The consistency of gloss over that 19-year period is clear from the photos.

The portion of the bridge topcoated with chlorinated rubber showed a decrease in gloss almost immediately. Signs of rust and corrosion appeared after five years.

The Katsushika Harp Bridge was completed in 1986, although coating of metal components had begun as early as 1982. The coating system consisted of a zinc rich primer, epoxy middle coat, and FEVE based fluorourethane topcoat. In addition to steel, the concrete feet of the bridge were also coated with an FEVE based topcoat. In the case of concrete, primer coats of an elastomeric material were used to address flexibility requirements on concrete. In 2007, about 80% of the concrete piers were encased in steel to reduce potential damage from earthquakes. The side-by-side photos of the newly painted steel panels and the concrete feet painted in 1987 show the gloss retention of the FEVE topcoat.

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The Akashi Strait Bridge is currently the world’s longest suspension bridge (3,911 meters, 12,828 ft.), spanning the water between Japan’s main island of Honshu and Shikoku. The longest single span of the bridge is 1,991 m (6,527 ft.), and the towers stand at 283 m (928 ft.). The bridge was built to reduce the time and risk involved in moving people and goods between the two islands. The coating system used on the bridge is more complex than those typically used in Europe or the U.S., consisting of a number of coatings both field and shop applied. The application of the coating system is given below in Table 1. Elapsed time is the time period between treatments.

The estimated life of the Akashi Strait Bridge is estimated at 120 years. During that time, the Honshu Shikoku Bridge Authority is planning to recoat the bridge only once. To accomplish this, the fluorourethane topcoat was applied at 55μm (2.2 mils), or about twice the normal thickness. While the erosion rates may be somewhat higher than those obtained in the platform test discussed above (the Akashi Strait is the site of frequent typhoons, with substantial wind and rain common in the area), this coating thickness should allow the Authority to reach their goals.

5. CONCLUSIONS

FEVE topcoats have now been in use for over 25 years. Based on field experience over

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Coating Dry Film Thickness, μm (mils)</th>
<th>Elapsed Time Before Next Treatment</th>
<th>Coating Location</th>
</tr>
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<tbody>
<tr>
<td>Abrasive blast</td>
<td>-</td>
<td>-</td>
<td>Shop</td>
</tr>
<tr>
<td>Inorganic zinc rich primer</td>
<td>15μm (0.6 mils)</td>
<td>6 months</td>
<td>Shop</td>
</tr>
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<td>Abrasive blast</td>
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<td>-</td>
<td>Shop</td>
</tr>
<tr>
<td>Inorganic zinc rich primer</td>
<td>75μm (3 mils)</td>
<td>7 days</td>
<td>Shop</td>
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<tr>
<td>Epoxy mist coat</td>
<td>10μm (0.4 mils)</td>
<td>7 days</td>
<td>Shop</td>
</tr>
<tr>
<td>Epoxy midcoat</td>
<td>60μm (2.4 mils)</td>
<td>7 days</td>
<td>Shop</td>
</tr>
<tr>
<td>Epoxy midcoat with MIO</td>
<td>60μm (2.4 mils)</td>
<td>12 months</td>
<td>Shop</td>
</tr>
<tr>
<td>FEVE based fluorourethane topcoat</td>
<td>30μm (1.2 mils)</td>
<td>7 days</td>
<td>Shop/onsite</td>
</tr>
<tr>
<td>FEVE based fluorourethane topcoat</td>
<td>25μm (1 mil)</td>
<td>-</td>
<td>Shop/onsite</td>
</tr>
<tr>
<td>Total coating thickness</td>
<td>275μm (11 mils)</td>
<td>60 years</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Coating Procedure for Akashi Strait Bridge.
this time, it has been proven that the use of FEVE topcoats can substantially reduce life cycle costs for bridges and other structures, especially when costs like traffic diversion, closing lanes during bridge repainting and maintenance throughout the service time of the bridge, are factored in. The use of FEVE topcoats in combination with zinc rich primers should offer bridge coating systems that provide corrosion protection exceeding 30 years.

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Japan Paint Manufacturers Association, Guidebook for Heavy Duty Coatings, 2007

STAINLESS STEEL DRUM PUMP IS IDEAL FOR CHEMICALS AND CORROSIVES

The latest addition to the Finish Thompson range of drum emptying pumps is the EFS Series pump in stainless steel which is ideal for pumping corrosive chemicals, light oils, caustic cleaners, solvents and other challenging liquids in many industrial applications.

Available from pumping specialists, MICHAEL SMITH ENGINEERS, the compact and competitively priced EFS pump is available with a choice of two-speed splash-proof electric or variable speed air motors which have CSA or CE certifications. The pump features a 3.16 SS tube and shaft, with tube lengths of 16”, 27”, 40” and 48” (41cm, 69cm, 102cm, 122cm) so its suitable for most sizes of tanks, drums and carboys.

The EFS pump is a perfect alternative to hand pumps, providing a clean and efficient method of liquids transfer in applications such as surface treatment and finishing processes. It is suitable for light to medium duty and provides flow rates up to 64 lit/min at discharge pressures up to 6 metres.

For further information contact: Michael Smith Engineers Ltd, Oaks Road, Woking, Surrey, GU21 6PH, UK.
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www.michael-smith-engineers.co.uk
AIR ATOMISING NOZZLE SUITS HIGH VISCOSITY FLUIDS

A new air atomising nozzle which enables effective spraying of viscous fluids at very fine atomisation but at low flow rates, is the latest addition to the BETE range of nozzles. The XA ER nozzle, which provides a full cone round spray pattern for liquids with a high viscosity (100+ cP), complements the existing XA EF nozzle which produces a flat fan spray pattern.

The XA ER nozzle operates with an external mix which means the exit orifice can be larger allowing for viscous fluids to be sprayed. The XAER is also a liquid pressure fed nozzle (as opposed to siphon fed), so the flow rate is not dependent on the air pressure which results in easier control. It is available for 1/4” and 1/8” pipe sizes and can be specified in a choice of standard materials including nickel plated brass, 303 or 316 stainless steel.

Typical applications will include ozonating water, for example, where the water is at 5 psi and the ozone at 60 psi. This would not be possible with a traditional internal mix nozzle due to its inability to cope with such a large difference between the liquid and the gas pressure. Also, gas cooling and injecting viscous liquids into gas streams containing powder particles in order for the droplets to coat the powder is possible with the XA ER nozzle.

For further information contact: Ivan Zytynski, BETE Ltd, PO Box 2748, Lewes, East Sussex, BN8 4BA, UK
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www.beteuk.com

METALLISATION WINS BUSINESS OF THE YEAR AWARD

Metallisation, the global leader in metal spraying, has scooped the ‘Business Of The Year’ title in the Chartered Institute of Accountants in England and Wales (ICAEW), West Midlands awards.

Metallisation Ltd was anonymously nominated to the ICAEW Panel. The nominees were then voted for by members of the ICAEW in an online vote. The award was given to the business that has achieved the most in the past twelve months and where a chartered accountant plays a leading role. Consideration was not only given to financial performance but also to staff training and care, service to clients and innovative approaches to business.

The name Metallisation has been synonymous with surface coatings since 1922. From its beginnings as a company providing an answer to corrosion problems on structural steelwork, Metallisation has developed into an expert in the technology of surface coatings. It produces world-renowned metal spraying equipment, including Arcspray, Flamespray, Plasma, HVOF and Automated Spraying Systems.

Metallisation employs a growing workforce, currently of 35 people, at its factory in Dudley, West Midlands and is represented around the world by a network of agents and distributors, who assist clients with their equipment, material and technical requirements. In recent years, Metallisation has grown the business both nationally and internationally, and now has in excess of 75 per cent of its business overseas. Innovative product development, understanding its customers’ needs, and responding to them promptly and efficiently, have been key to this growth.

Commenting on the award, Terry Lester, Managing Director at Metallisation, says: “I am thrilled the work of everyone at Metallisation has been recognised and we have been rewarded with the prestigious Business Of The Year title. We are committed to developing new thermal spraying equipment and surface coating solutions, and providing exceptional service to our customers throughout the world.”

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www.metallisation.co.uk
Winn & Coales (Denso) Ltd are proud to announce their sponsorship of the XOD Class for Aberdeen Asset Management Cowes Week, named this year after its lead sponsor.

The Company, who specialise in the manufacture of Denso anti-corrosion and sealing products for the protection of exposed, buried or immersed steel or concrete, joins seven other companies and many private individuals who gave enthusiastic support to the Class in its centenary year.

The X Yacht was designed by Alfred Westmacott and the first race of the class was held in 1911. The X Yacht is a classic yacht and has been consistently the largest fleet at Cowes week for many years. Cowes Week has played a key part in British sport since 1826 and is one of the UK’s longest running and most successful sporting events. It now stages 40 daily races and around 1,000 boats and is the largest sailing regatta of its kind in the world.

William Norris, XOD Class Captain said “It is an exiting time for the Class with well over 100 boats expected for the year’s main event which is Cowes week itself.” He went on to say that all the sponsors are helping to make Cowes Week a very special occasion for the Class.

Winn & Coales (Denso) Ltd, originally established in 1883, are well known for the reliability, efficiency and longevity of their products and have built an enviable reputation based on problem solving for their customers. Apart from the UK, they also have subsidiaries in America, Canada, Australia and South Africa as well as a global network of over 70 agents making their products available virtually anywhere in the world.

From 1883 until today, leading Anti-Corrosion Product Manufacturing Specialist Winn and Coales (Denso) Ltd, have been headed by only three Chairmen. The founder of the company Paul Winn (top left) served a long 65 years as Chairman from 1883-1946. Following Paul Winn was Frank Coales (centre) who served an almost equally long time as Chairman for 45 years. Frank joined in 1916 and held the position of Chairman from 1946-1991, working a staggering 75 years in total. Frank Coales lived until he was 102 and died in 1991.

The company’s current Chairman, the founder’s grandson, David Winn OBE (right) who joined The Company in 1965, will have served 20 years on the 22nd of April and is still going strong. The long service life of their products and systems they manufacture must have rubbed off on them! This 20 year celebration happens to coincide with the recent achievement of winning a Queen’s Award for Enterprise. The company has gone from strength to strength over the years and it most certainly has something to do with the leadership skills of these three men.

The organisation grew from a small business founded 128 years ago in London. Paul Winn set up the import/export house where the original mainstay of the business was the export of coke to Germany. In 1929 The Company took on the agency for a German tape used for corrosion prevention and general sealing. As a result Winn and Coales (Denso) Ltd became one of the market leaders in the corrosion prevention industry. Today the company has a strong presence worldwide with subsidiaries in the USA, Canada, New Zealand and South Africa and a network of agents across the globe. The company’s anti-corrosion and sealing solutions have been used to protect buried, exposed and submerged steelwork and pipeline in highly corrosive environments for over 80 years.

For further information contact: Winn & Coales International Ltd, Denso House, Chapel Road, London SE27 0TR
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Automated Metal Spraying at Laguna Verde Nuclear Power Plant Veracruz, Mexico

Metallisation customer, Lainsa, based in Mexico and part of Grupo Dominguís, provides metal spraying for corrosion protection of pipes used to exchange and transport dry water vapour in thermoelectric, conventional and nuclear power plants.

The application of metal spraying is critical, as the circulation of dry steam at high temperatures can lead to corrosion of the carbon steel. As a consequence of this corrosion the pipes can become perforated, which can lead to an unplanned closure of the plant resulting in a costly and inconvenient loss of electricity generation.

To protect against corrosion the inner walls of the pipes are protected with a coating made up of several layers of cast metal alloys. The coating is extremely hard and resistant to abrasion, protecting against corrosion and improving the tribological properties, the resistance to wear and tear by friction of the water molecules contained in the steam.

Grupo Dominguís has developed the TIRANT 3® system, a worldwide innovative automatic system used to apply metal spraying to the inner surfaces of steam pipes. TIRANT 3® system is operated from outside the pipe, which means the only human intervention is the operation of the robot positioning and to change the metal wire. As a robotic, automated system that is pre-programmed, the metal spraying process is significantly extended without the need for rest periods and the only ‘down time’ is for robot maintenance.

The TIRANT 3® system also provides increased coating uniformity, therefore its resistance to corrosion, by keeping the selected parameters constant and consistent. In 2010, Lainsa successfully metal sprayed the inner surfaces of Cross Under pipes at Units I and II of the Laguna Verde Nuclear Power Plant. Using the TIRANT 3® system and the Metallisation Arcspray 140/S350 system, 300m2 of steam pipes were metal sprayed in thirty four days. The project was commissioned by Comisión Federal de Electricidad de México, and had to be completed during a routine break in the refuelling of the units.

The inner surface of the steam pipes was blasted to a cleanliness SA 3 before being metal sprayed to a thickness of approximately 500 μm. The coating was applied in three layers: An anchoring layer of nickel / aluminium alloy; an intermediate layer of chrome / nickel alloy and a surface layer of chrome / nickel alloy.

The manual application of metal spraying requires a great deal of physical effort with frequent rest periods, which is mainly due to working in confined spaces, thermal stress and the need for independent and semi-independent breathing equipment and face masks.

The manual operator uses the gun to project the molten metal particles onto the surface, which can entail bending and kneeling in difficult and uncomfortable positions, while spraying pipes varying in size from 1 metre in diameter and up to 25 metres long. Due to the inaccessibility of pipes with smaller diameters, they are usually left untreated and prone to corrosion. The flexible TIRANT 3® system is the perfect solution for metal spraying small diameter pipes.

The metal spraying process also produces a large amount of fume, sparks and particles of metal dust, which means manual operators must have appropriate protection, including fireproof clothing, masks and a supply of breathing air. In certain industries additional protection must also be put in place, such as protection against ionising radiation, if the work has to be carried out in a radiological area.

Another inherent problem in manual application is the task of achieving uniformity of the coating thickness, so a reduction in thickness variations will result in greater resistance and greater surface protection. The difficulties arise due to the position of the operator inside the pipe. Movement is restricted and the visual distance or perspective of the coating application can be hampered making it more difficult to obtain a uniform layer.

While working on metal spraying the inner surfaces of the Cross Under pipes of a Boiling Water Reactor at the Nuclear Power Plant, these conditions were exacerbated with the additional risk of exposure to radiation for a manual operator. Opting for an automated process to metal spray these pipes reduced the risk of radiation by 70%. This was achieved by adopting protection measures using three basic principles - distance shield and time.

The TIRANT 3® system has been developed in direct response to the need for a simple, remote tool that removes manual application of a coating, while guaranteeing a uniform coating layer. The thickness applied to the surface of the pipe depends on four factors: The wire type used; the forward speed; the rotation speed and the distance of the Arcspray 140 from the wall of the pipe. The TIRANT 3® system, used in conjunction with Arcspray 140/S350 equipment, is versatile and appropriate for different pipe diameters, projected materials and desired thicknesses. The control software enables consistent and uniform forward and rotation speeds in relation to the thickness of the wall of the pipe. The TIRANT 3® system also has an automatic folding and unfolding system making it suitable for metal spraying pipes in all shapes and sizes.

The Metallisation Arcspray 140 system is the ultimate solution to today’s demands for high performance Arcspray equipment. The patented ‘Syncrodrive’ push/pull system provides constant, reliable and trouble free operation, utilising two gearboxes linked by a flexible drive. The drive system guarantees that the ‘push’ and ‘pull’ elements cannot be out of synchronisation, which ensures consistent wire feed over a long range, of up to 20 metres, making spraying at a distance much easier. The benefits of the Arc 140 system include a choice of coating textures, low running costs, high throughput, portable wire dispensing, safety interlocks and steel reinforced conduits.

In the Metallisation Arcspray process, the raw material, a pair of metal wires, is melted by an electric arc. The molten material is atomised by a cone of compressed air and propelled towards the work piece. This spray solidifies when it hits the surface of the work piece to form a dense coating, which protects against corrosion or repairs components. Sprayed coatings may also be used to provide wear resistance, electrical and thermal conductivity or for free standing shapes.

Metallisation Ltd, based in the UK, provides anti corrosion solutions to industries around the world and has done since 1922.
For further information contact: Pump Engineering Ltd, Riverside Estate, Littlehampton, West Sussex, BN17 5D F  Tel: 01903 730900  Fax: 01903 730234  Email: sales@pumpeng.co.uk  www.pumpeng.co.uk

SEALLESS PLASTIC PUMPS SUIT AGGRESSIVE FLUIDS

Magnetically driven, sealless pumps are acknowledged as the ideal choice for handling aggressive and challenging fluids and the latest C MAG-P 3M pumps available from PUMP ENGINEERING, are no exception. These competitively priced horizontal, sealless pumps with a permanent magnet drive system are particularly suited to transferring corrosive acids and plating solutions in surface treatment and finishing applications.

Similar in construction to the other well established pumps in the 3M range, C MAG-P models feature an isolation shell which effectively separates and seals the fluid chamber from the atmosphere. The combination of this sealless design and use of corrosive resistant materials, such as PP and PVDF, make them particularly suited to handling aggressive fluids occurring in process and chemical industries.

The range includes a wide choice of models which offer flow rates up to 120 mc/h, with heads up to 44 metres and maximum system pressure up to 6 bar. Options include close-coupled drives and universal flange connections to meet DIN PN16 and ANSI 150 requirements.

3M mag-drive pumps have numerous applications, for example, transferring acids, alkanes, hydrocarbons, heat transfer oils, liquid gases, toxic and explosive chemicals in industrial and chemical industries. They are also suitable for pumping low viscosity surfactants, acids and CIP chemicals in pharmaceutical and cosmetic industries. In the food and drink industries they are ideal for handling CIP chemicals, such as sodium hydroxide, nitric acid and hydrogen peroxide and pumping water treatment chemicals.

For further information contact:  Pyeroy limited, Kirkstone House, St Omer’s Road, Western Riverside Route, Gateshead, Tyne and Wear, NE11 9EZ   Tel: 0191 493 2600   Fax: 0191 493 2601  www.pyeroy.co.uk

PYEROY COMPLETES TOWER BRIDGE PAINT JOB

Industrial services specialist Pyeroy has completed its contract to repaint London’s iconic Tower Bridge after three years of work.

The last stages of the substantial refurbishment project undertaken for the City of London Corporation (at no cost to tax or local rate payers) - the re-painting of the bascule balustrades and underside structure - finished at the end of March and the bridge is now back in full operational mode and open to river traffic.

Pyeroy won the multi-million pound contract after the Corporation decided to refurbish the landmark London structure ahead of the 2012 Olympic Games.

Repainting the bridge will extend its life expectancy for another 25 years and was essential to protect the steelwork and preserve the bridge for future generations.

A team of specialist contractors from Pyeroy have been involved on the project since they first erected access scaffolding and environmental containment systems in March 2008.

More than 1,500 tonnes of expendable abrasive were used to blast the structural sections back to their bare metal framework before 22,000 litres of paint was applied to provide six protective layers.

The bridge has been repainted in the red, white and blue colour scheme originally prepared for the Queen’s 1977 Silver Jubilee celebrations while 40,000 motorists and pedestrians continued to cross it every day.

During the latter stages of the work a team of specialist abseilers were used to install temporary access gantries to enable the repainting of the two high level walkways to be undertaken.

Brendan Fitzsimons, director of Pyeroy’s Infrastructure Division said: “This has been an extremely prestigious project for us and has gone extremely well - the City of London Corporation are delighted with the new paintwork. “It has shown our extensive capability in delivering projects of this importance and our ability to work over water and at height. It also reinforces our reputation for quality of work, safety standards and professionalism.”

The Pyeroy Group is based in Gateshead and employs 1000 people working on industrial, construction and marine projects throughout the UK and Ireland.

The company provides a range of industrial services, which comprise contract scaffolding and equipment hire, surface preparation and application of marine/industrial protective coatings, insulation, civil engineering / building works and environmental management services such as asbestos removal.

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<td>9 Holme Road, Dromore, Omagh Co Tyrone, BT78 3BX</td>
<td>T: 02882 897950</td>
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<tr>
<td>G W Burton Ltd</td>
<td>New Court, Wooddalling, Norwich, Norfolk, NN1 6SA</td>
<td>T: 01263 584203</td>
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<tr>
<td>Harasco Infrastructure Services Ltd</td>
<td>Unit 3 Manby Road, South Killingholme, Immingham, North Lincolnshire, DN40 3DX</td>
<td>T: 01469 553800</td>
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<tr>
<td>Hi-Tech Surface Treatment Ltd</td>
<td>Unit B, Deacon Trading Estate, Chickenhall Lane, Eastleigh, Hants SO50 6RP</td>
<td>T: 023 80611789</td>
</tr>
<tr>
<td>H &amp; S Decorating</td>
<td>Administration Building, Forth Road bridge, South Queensferry, Edinburgh, EH30 9SF</td>
<td>T: 01753 654123</td>
</tr>
<tr>
<td>Hemplel UK Ltd</td>
<td>Llantarnam Park, Cwmbran, Gwent, NP44 3XF</td>
<td>T: 01633 874024</td>
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<tr>
<td>Leigs Paints</td>
<td>Tower Works, Kestor Street, Bolton, lancs, BL2 2AL</td>
<td>T: 01698 264271</td>
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<tr>
<td>Malakoff Limited</td>
<td>North Ness, Lerwick, Shetland, ZE1 0LZ, UK</td>
<td>T: 01595 695544</td>
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<td>Matthew James Services</td>
<td>Unit 4, Shibdon Business, Cowen Road Blaydon, Newcastle-Upon-Tyne, NE21 5TX</td>
<td>T: 0191 414 5700</td>
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<tr>
<td>Metal Cleaning UK Ltd</td>
<td>Randles Road, Knowsley Business Park, Knowsley, Merseyside, L34 9HX</td>
<td>T: 0151 5492449</td>
</tr>
<tr>
<td>N L Williams Group Ltd</td>
<td>Westside Industrial Estate, Jackson Street, St. Helens, Merseyside WA9 3AT</td>
<td>T: 01744 26526</td>
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<tr>
<td>NGS UK Ltd</td>
<td>Fourth Avenue, Deeside Industrial Park, Deeside, Flintshire CH5 2NR</td>
<td>T: 01244 833138</td>
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<tr>
<td>Paint Inspection Ltd</td>
<td>Trafalgar House, 223 Southampton Road, Portchester, PO6 4PY</td>
<td>T: 0845 4638680</td>
</tr>
<tr>
<td>Possilpark Shotblasting Co Ltd</td>
<td>Dalmarrock Works, 73 Dunn Street, Glasgow, G40 3PE</td>
<td>T: 0141 556 6221</td>
</tr>
<tr>
<td>Radleigh Metal Coatings Ltd</td>
<td>Unit 30 Central Trading Estate, Cable Street, Wolverhampton, WV2 2HX</td>
<td>T: 01902 870606</td>
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<tr>
<td>R.L.P. Painting</td>
<td>Heathfield House, Old Bawtry Road, Finningley, Doncaster, DN9 3DD, UK</td>
<td>T: 01302 772222</td>
</tr>
<tr>
<td>Specialist Blasting Services Ltd</td>
<td>Smiths Quay, Hazel Road, Woolston, SO19 7GB</td>
<td>T: 023 80438901</td>
</tr>
<tr>
<td>Sussex Blast Cleaning</td>
<td>Unit 35–37 Station Road, Hailsham, East Sussex, BN27 2ER</td>
<td>T: 01323 849229</td>
</tr>
<tr>
<td>Tinsley Special Products</td>
<td>Enterprise House, Durham Lane, Eaglescliffe, Stockton-on-Tees TS16 0PS</td>
<td>T: 01642 784279</td>
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