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We have now arrived in what passes for summer here in Manchester. We have had some warm and sunny days but I note that my barbecue has not yet seen the light of day this year. Many of our members are taking the opportunity to take well-earned holiday and a break from the never ending task of preventing or mitigating the effects of corrosion. However, as you all know the corrosion process never sleeps and its demand for attention is always at hand.

Since my last article in Corrosion Management the joint ICorr/NACE Knowledge Transfer – Corrosion Matters Workshop was held over two days in June. The event was a significant technical success and resulted in a small financial surplus, which will be shared with NACE.

This is a very good result given the difficult times being experienced by our target market due to the continuing low prices for oil and gas. However many of the technical objectives were achieved and much credit is due to George Winning and the organisational team, particularly the ICorr members that "got the show on the road". It is hoped that when the dust settles that another similar event can be organised for 2016, perhaps is a location outside London.

The contributions to the Workshop were many and varied and we are grateful to all the contributors and it was noticeable that the discussion sessions were both intense and lengthy showing that the attendees were getting good value from the event.

It should be noted that one of our former Presidents, Brian Wyatt, has become President of CEOCOR. Founded in 1956, CEOCOR is an international scientific non-profit association dealing with corrosion and protection of pipes and pipeline systems. Having Brian as President will encourage more collaboration between CEOCOR and ICorr and we are now seeking an ICorr member to replace Brian as the UK representative. More information on CEOCOR including contact details can be found on the ICorr website at http://www.icorr.org/news/343/index.phtml

Our relationship with the Australian Corrosion Association continues to develop and I am pleased to report that my paper on Pull-Off Adhesion Testing of Coatings – Improve Your Technique has now been accepted for presentation. The planning for my visit to Adelaide in November is now underway.

Although the summer is normally a quiet period in terms of corrosion related events there are activities at which ICorr will be represented. For example, the Eurocorr 2015 Congress will be held in Graz, Austria from the 6th to the 10th September. The theme is "Earth, Water, Fire, Air, Corrosion happens everywhere" and there will be a small but significant ICorr presence at the event.

Other initiatives that are progressing through the summer are the discussions with the Marine Corrosion Forum on how more young people can be encouraged to study STEM subjects and be attracted to work in the "Corrosion" industry. I am planning to send a short questionnaire to the ICorr Sustaining Members to try and get some information on recruitment practises to aid the deliberation of this group and determine some action points to make a difference.

There is also an initiative to improve contacts with the Water and Sewage Handling industry to raise awareness of corrosion prevention methods that are available for pipelines and storage tanks, as it is clear that interest in corrosion science has declined in this area and there is an opportunity for ICorr to provide some assistance in raising awareness again.

Looking forward, the autumn is the time when ICorr Branches start to hold their evening events and I hope to find time to attend some of these in my target of visiting all the active branches during my time as President. I did manage to attend the North West Branch AGM and Golf Day and I have the mark to prove it.

I would like to take this opportunity to encourage all ICorr members to get involved with your local branch. Make contact and seek out the upcoming events that are of interest and if the diary of events does not contain anything of interest to you make contact with the branch secretary, they will be interested to here of any event you would like to see included in the planning.

I hope you all have a pleasant and restful time during you vacations this summer and that you will all be refreshed for more corrosion activity in the months to come.

John Fletcher
President of the Institute of Corrosion
On the 9th June 2015 the Midlands Branch had a site visit to the recently established offices and laboratories of the UK arm of Vector Corrosion Technologies, now based in Cradley Heath in the West Midlands. George Sergi of Vector welcomed members to the premises and gave a tour of their new facilities. Vector is specialist in the production of anodes for installation into concrete structures to prevent reinforcement corrosion and the research facilities have been set up to assist in the development of new anode products.

George explained that product development work was undertaken in both the UK and at the parent company headquarters in Canada, but that fundamental research was undertaken and new product ideas put to test here at the Cradley Heath site. Nikita Rathod presented some of the testing that she is presently undertaking in the laboratory. This will then be transferred to Canada for large scale testing and validation trials.

After the laboratory tour visitors were treated to a fish supper and a presentation by George on the subject of ‘Extending Residual Service Life of Steel Reinforced Structures by the Use of Galvanic Anodes’. The history of use of galvanic anodes in concrete, now with a track record of over 15 years was explained and some service data from UK sites, including current outputs, current density measurements and polarization data for the reinforcement were presented.

George then looked at some interesting future developments in the field of galvanic anodes for concrete. These are based on the ability to passivate and maintain as passive reinforcement in concrete, and this was explained by the use diagrams showing the areas of pitting initiation, propagation, instability; and areas of immunity to corrosion and re-passivation on plots of potential versus chloride content. It was explained that the level of charge required to passivate reinforcement will be dependent on the level of chloride contamination and on the applied current density.

Several Midlands Branch members have field responsibility for corrosion control of highway infrastructure and a lively and informed discussion ensued around the presentation. Branch chairman Ali Sharifi thanked Vector for their time and hospitality. The next Midlands Branch meeting is hoped to be a sustaining members day to be held at Ironbridge in September.

The North West Branch Golf Event ended prematurely for the President when I was hit a glancing blow from a golf ball coming from the group of players who were following the ICorr foursome round the course.

This happened on the 10th fairway and so the rest of the group were spared my terrible golf in the blustery wind, as I chose to retire to the Club House to get some ice on the injury.

As my son said later in the evening, “just a flesh wound” so no real damage done but I must learn to duck away not in to the flight of the ball.

By the time the rest of the ICorr players had completed the course the bleeding had stopped and we were able to carry on with the North West Branch AGM as though nothing had happened. I think that the incident did not even get a mention in the minutes.
Yorkshire Branch News

ICorr Yorkshire Branch Visit to Elcometer Ltd

Thursday 21st May saw a great turnout of 18 ICorr members and prospective members for an afternoon visit to Elcometer Ltd in Manchester.

The purpose was 2 fold; to gain an insight into the history and product range of Elcometer Ltd and also to reform the Yorkshire Branch committee as there had been many retirees over recent years.

The meeting got off to a good start with networking over coffee and refreshments which lead into a presentation by John Fletcher, ICorr President and Technical Support Manager for Elcometer Ltd of the range of test instruments and markets that Elcometer supply.

The presentation was followed up with an informative tour of the manufacturing and testing areas.

Attendees then returned to view many of the instruments in the demonstration area.

The tour of Elcometer was then followed up with a meeting regarding the history, current position and future of ICorr Yorkshire Branch.

There was constructive discussion about previous historic events and where members wished to hopefully see the Branch evolve to. One of the recent inhibitors to Yorkshire Branch moving forward was the retirement or career changes of many of the existing committee members and it was proposed to form a new committee to regain momentum.

Several attendees showed interest in election to the new committee to move things forward and Nigel Peterson-White the current Yorkshire Branch Secretary will help this by coordinating a programme of future events.

Graeme Manning proposed that Richard Green of IMechE for the position of Chairman and Dave Griffiths of ARL/Griffiths Associates seconded this. Unfortunately Richard could not attend due to overseas commitments.

The meeting rounded off with suggestions for meetings, events and technical talks and it was proposed to meet late summer at a venue to be confirmed to move Yorkshire Branch forward. It was also suggested that the Sustaining Members of ICorr Yorkshire be contacted and followed up with a visit to strengthen ties and gain an understanding of what these valuable members would like from The Institute of Corrosion.

Thank you to John Fletcher (2nd from right) ICorr President and Technical Support Manager for Elcometer Ltd for an enjoyable presentation, tour of the facility and meeting from student members of ICorr Yorkshire Branch.

Visit the new ICorr website
www.icorr.org
INSTITUTE OF CORROSION MEMBERS COMBINE RESOURCES TO HELP PROTECT HISTORIC WARSHIP

HMS Wellington was built at Devonport Dockyard in 1934. She was one of 13 Grimsby class warships built for service in the Commonwealth and Dependencies and from 1936 to 1939 she patrolled the waters around New Zealand and 2.5 million square miles of the western Pacific visiting and policing the Island chains and Possessions then under British rule.

At the outbreak of World War Two HMS Wellington was recalled to perform convoy escort duties in the Atlantic. During six years of wartime service she rescued over 450 Merchant Navy seamen and was active at Dunkirk and the North African landings. She also shared the credit for sinking a U-Boat. Shortly after the end of the war she was retired and laid up at Pembroke Dock.

The Honourable Company of Master Mariners had been looking for a livery hall since 1939. After the war the chances of building a livery hall in London were remote. In 1947 HMS Wellington was made available by the Admiralty and the Company decided to buy her and convert her to a floating Livery Hall. HQS Wellington arrived at Victoria Embankment in 1948.

In 1991 major refurbishment was carried out over three months in dry-dock at Sheerness. In 2005 ownership was transferred to the Wellington Trust, a charitable trust established to ensure the preservation of this historic ship. The ship relies on income from functions and exhibitions and charitable donations to assist with maintenance and is moored in the Thames close to Temple tube station. HQS Wellington had a coating system applied during the refurbishment in 1991 but did not have any cathodic protection system.

In 2014, six corrosion professionals, a number of whom are Institute of Corrosion members had combined resources to provide a CP system to protect the ship’s hull and persuaded their respective companies to provide free of charge the various constituent parts of a marine CP system. The four organisations FORCE Technology, IACS Corrosion Engineering Ltd, Corrpro Companies Europe Ltd and Silvion have all contributed to the application of CP to extend the vessels life and contribute to the preservation of the Nation’s Naval Heritage by reducing the rate of corrosion of the ships hull.

Dr Paul Chess, Mr Frits Gronvold and Dr Peter Vagn Nygaard of FORCE Cathodic Protection in Denmark provided one of their latest switchmode cathodic protection power sources, Dr Patrick Lydon of IACS Corrosion Engineering Ltd designed the CP system and assisted with its installation and commissioning. Mr Mike Moffat of Corrpro Companies Europe Ltd provided the impressed current anodes with IACS Corrosion Engineering Ltd contributing to part of the anode cost and Mr Robert Britton of Silvion Ltd provided the Ag/AgCl/seawater reference electrodes used for the control of the CP system and routine monitoring.

The ship’s management team have provided invaluable assistance during the work particularly the Chief Engineer, Martin Brownjohn and the Commanding Officer, Commodore Angus Menzies have contributed to the overall success of the work. They have also allowed the Wardroom to open to provide welcome refreshment when any work took place.

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A total of 45 delegates attended this Working Day, organized jointly between the Corrosion Engineering Division and the Aberdeen Branch of the Institute of Corrosion. It was held at the Palm Court Hotel in Aberdeen, the usual venue for Aberdeen branch meetings (in fact a joint NACE/Aberdeen Branch meeting was held the same evening - see separate report). There were seven exhibitors including the ICorr stand. One purpose of this meeting was to bring the Aberdeen branch more into the fold. They are a strong and dynamic branch but their geographical position rather mitigates against attendance by them at other ICorr events and vice versa. In this aim the meeting was successful. Also another aim was to allow networking with other corrosion professionals from different industry sectors, to learn about some of the latest developments in the field of lifetime extension and asset management. This was also achieved. Normally all of the CED working groups (monitoring, Nuclear, Coatings, CP, Corrosion in Concrete, Oilfield Chemicals and Water Treatment) meet at these annual CED days. However due to the unavailability of chair people, only two of the CED Working Groups (Nuclear and Coatings) held meetings. These were well attended and some very useful business was conducted. Regarding how some of the less active work groups could become more active and involve people from Aberdeen branch, a proposal has been made by Peter Allison to change the focus for working group activity in the oil and gas industry by forming one group which would focus on “Corrosion issues in the Oil and Gas industry”. This would mean that two industry sectors, Nuclear and Oil and Gas had focused working groups rather than the previous functionally focused groups. This new group would include all of the current oilfield chemicals and oil and gas related monitoring activity. The consensus of the attendees present agreed this was the best way forward and discussions are taking place into how this could be implemented and opinions are welcome. Going back to the meeting, as usual there was a pleasant buffet lunch and also there was a round up question and answer session at the end at which four of the five speakers were present. Companies exhibiting included Sherwin Williams, Corrocoat Ltd, Spencer Coatings Limited, North East Corrosion Engineers, Galvanisers Association, Proserve, and the Institute of Corrosion.

Nick Smart (AMEC) welcomed the delegates. The first lecture, entitled ‘Role of corrosion engineering relating to offshore ageing & life extension, maximising recovery, and the EU directive on offshore safety’ was given by Andy Duncan from Intertek. This was an entertaining talk. He started by giving the six laws of corrosion engineering which included including “anything that can go wrong will go wrong”; and “nature always sides with the hidden flaw”. He also indicated the rather low esteem in which corrosion as a subject can be held in some quarters
with a quote: "Mr Duncan, we do not have a corrosion problem, we have a maintenance issue", (this despite the fact that nearly 80% of problems are corrosion related!). Andy stressed how important it is that integrity management and the role of the corrosion engineer are recognised by users, employers and by regularity bodies. Next Martin Worth from Plant Integrity Management lectured on 'Assessment of remaining life of ageing equipment with limited information'. This was quite a clever statistically based approach which attempted to put more exact estimates onto lifetimes (and also the chance of failure after a certain time) by combining the variables statistically and including the range and type of statistical variable that it was eg Gaussian, Poisson etc. So if the original wall thickness could be between 8mm and 10mm (average 9mm), External corrosion rate could be 0.05mm/year to 0.2 mm a year (average 0.1mm) and internal similar , Time to coating failure 5 years to 20 years (average 10 years): all these added together led to a much better statistical based probability of failure at any given time eg after 20 years the chance of a failure was 50/50. Whereas after say 30 years it could be 99%. After a break for refreshments and look at the exhibition, the next speaker was Kevin Christie from Amec Foster Wheeler who spoke on, 'Corrosion aspects of lifetime extension in the nuclear industry'. He pointed out that nuclear stations were originally designed...
for a 25 year life. But now, with pressure to keep generation levels up, lifetimes are being pushed up to 40+ years. So what does this mean for metals? Plenty of problems! These include creep, irradiation creep, increased oxidation, flow assisted corrosion of steam lines, fatigue; as well as metals deterioration of non-metals like graphite, polymers and concrete. But he was confident that these risks can be assessed and managed. He took as a specific example O ring study for PWRs. This was followed by Carol Devine from North East Corrosion Engineers (NECE) who spoke on, ‘Microbiological aspects of corrosion control associated with extended field lifetimes’. The aim of the oilfield microbiologist is to generate useful and appropriate data in order to predict at which locations eg in pipework where there is a particular threat from MIC, to prioritise areas for treatment according to budget and time restraints and to apply and monitor appropriate strategies to mitigate against the effects of MIC in vessels. Examples were given to illustrate these areas. There was then a lunch followed by the afore mentioned working party meetings. The final lecture, ‘Analysis of materials and corrosion damage reports (MCDRs) for ageing assets’ was delivered by Stephen Tate from Amec Foster Wheeler. This commenced with a shocking 15 minute video showing a very horrendous number of corroded items in the North Sea situation. (This should be compulsory watching for all decision makers eg MPs and Lords!). He then went on to describe MDCRs in detail: how they are ranked, how defects can be grouped, how some MDCRs are erroneous and some are missed, how some need to be monitored and how eventually a MDCR might be liquidated. He gave as an example of an erroneous MDCR an oil spool removal where the thickness was actually over twice what had been recorded by ultrasonics (2.2-2.4 mm when actual thickness was 5.5 mm (see picture)  The session finished at 4:30 pm with a Closing Panel Discussion, chaired by Nick Smart. In conclusion he thanked the Speakers, Aberdeen Branch for hosting the event and the delegates for attending.

By Douglas J Mills, Technical Secretary

NORTH EAST BRANCH NEWS
NORTH EAST BRANCH CONTINUES TO GROW

Two further meetings of the North East branch have taken place in May and July 2015 with attendance numbers continuing to increase. The branch had its highest number of attendees in July since it reopened earlier this year with over 35 people coming together. North East Branch Secretary Gemma Malthouse commented “We’re thrilled to have such a great response to the North East branch. We have had lots of interest from local businesses and we’re really grateful for the support we have received from the likes of Macaw Engineering and Newcastle University who have helped us by hosting the last two events”.

“One thing that is key is the networking and opportunity to ask questions” added Neil Wilds, Branch Chair. “Having such a variety of people in attendance across different areas of the industry and with varied experiences in the room we’re seeing a lot of discussion following on from the presentations and new connections are made at every meeting”.

The next meeting will be hosted at Macaw Engineering on Tuesday 8th September – to receive more information contact icorne@outlook.com

We hope to see you there!
NORTH EAST BRANCH
MAY PRESENTATION

Doug Gilbert, a corrosion consultant from Safinah, gave a very well received presentation on Ballast Tank Corrosion and the IMO PSPC regulations. The presentation described in detail the corrosion issues found in ballast tanks and cargo tanks including:

1. Galvanic corrosion
2. Knife edging cracks
3. Reverse impact damage
4. Erection weld brake down
5. Holidays and missed areas
6. Corrosion of outfitting items
7. Weld & edge corrosion

This coupled with Doug’s vast experience and numerous pictorial examples lead to lots of technical questions from the audience. A number of people in attendance were quite surprised by the level of information which is detailed in Coating Technical Files which are completed during construction of the ship and then follow the ship for the rest of its life. There was an interesting discussion on the merits of introduction of the IMO PSPC regulations especially the fact that increased costs that have been born by the owners, yards and coating suppliers whereas the beneficiaries of this investment have been the class societies, coating inspectors and coating test houses. The presentation ended with a summary that we still don’t know what effect the IMO is having on the long term quality. This is because the same coatings that were being applied pre IMO are still in use having passed all of the prequalification tests. In the end it was recognised that that this has definitely been a good way to improve the standard of anticorrosion in ships but still there needs to be more done.

NORTH EAST BRANCH
JULY PRESENTATION

George Winning, Premier Oil, gave a very informative talk on the challenges for materials selection in Oil & Gas projects in remote locations. Some of the key challenges presented were:

• Safety
• Local environment
• Self Sufficiency
• Geopolitical Issues
• Enhanced Corrosion performance

Critically the key theme throughout the presentation was the need to have everything for the project at the project site and the need for long term reliability. This will include the necessity to build a laydown area and warehousing for all the equipment and supplies, and the logistics of housing personnel required for the project. Items such as subsea packages would need to be fully fabricated to be instantly installed rather than fabricated at project site. The issues of having competent staff available are also a real challenge. Regarding any repairs if things go wrong and repairs are required they don’t have the ability to draw from a ‘Repair Club’ like they have in the North Sea so there is need to keep repairs and failures to a minimum. The supply chain issues mean that if spares are needed they need to ship them from other areas which can take to 2-3 months in some cases unless local supplies are kept.

This all results in an upfront investment with increased CAPEX to reduce repairs and failures during operations. With increased CAPEX life cycle costs still need to be controlled so it is vital that operating costs must be kept to a minimum. This from a materials point of view drives the design decisions towards the use of corrosion resistant alloys (CRA's) which in the right circumstances give very long performance. However with CRAs other issues such as cracking pitting and crevice corrosion still need to be addressed to ensure the correct material is used for the environments to be encountered.

The night will also be remembered for the fact that the difference between seals and sea lions are that sea lions have ears and seals don’t!
INSTITUTE OF CORROSION PROVIDES THE NEW PRESIDENT FOR CEOCOR

During the CEOCOR meeting in Stockholm in June 2015 our Past President, Brian Wyatt, was elected to be President of CEOCOR for a three year term until the middle of 2018.

CEOCOR is the European Committee for the Study of Corrosion and Protection of Pipes and Pipeline Systems. It addresses, in particular, corrosion and protection of buried drinking water, waste water, gas and oil pipelines. CEOCOR was founded in 1956 and became an International, non-profit, scientific association in 1981. It has membership from most European countries representing universities and research centres, water, waste water, oil and gas companies, producers of pipe, coatings and cathodic protection systems.

Its objectives are to foster international exchange of experience and expertise in an independent manner, to provide scientific and technical guidance publications and to contribute to European and International Standards. This work is divided into 2 Commissions; Commission 1 addresses Internal Corrosion of water and waste water pipelines and Commission 2 addresses External Corrosion and Cathodic Protection of water, gas and oil pipelines.

CEOCOR publishes its own documents and many excellent papers have been published at the annual Congress of CEOCOR and can be accessed by Members via the web site. The Institute of Corrosion has been a member of CEOCOR for many years; latterly David Harvey has been our representative.

Brian Wyatt is both an individual Member and ICorr’s (and UK’s) representative to CEOCOR and first attended the Congress and Technical Exhibition, in Florence in June 2013. Subsequently he and the then President of ICorr, Trevor Osborne, represented ICorr at the Congress and Technical Exhibition, in Weimar in June 2014. Brian has attended the ‘Autumn Days’ meetings in Brussels in 2013 and 2014; Chris Lynch also attended the latter on behalf of ICorr. Now that Brian is President of CEOCOR, ICorr will nominate a replacement for him as UK’s representative to the CEOCOR Board.

CEOCOR’s main activity, in addition to its very high quality, high technical standard Congress papers, is in the Work Groups of the two Commissions. These function as open technical exchanges for field and laboratory experience, data and technical opinion; they are very significant meetings for joint learning and technology advance. One of their objectives is to prepare pre-standard documents within the field of competence of the Commissions. Past documents in the field of cathodic protection of buried pipelines have included the 2001 publication on ac corrosion, by far the best document on this subject at that time. More recently the 2013 document on the use of coupons and probes for CP monitoring purposes presents the technology and best practice in this field. Current work includes preparation of pre-standard documents on remote monitoring, instant off potential measurement techniques and reference electrodes. There is also a liaison group in respect of Certification. In Commission 1 the activities relate to internal corrosion, water quality, asset management and renovation techniques and microbial corrosion in sewer systems.

ICorr wish to encourage our Members to participate in both the Congress and the Work Groups of CEOCOR. Any Members wishing to receive more information can access the CEOCOR web site http://ceocor.lu or contact Brian Wyatt brianwyatt@controlcorrosion.co.uk.

Membership of CEOCOR is open to all. Attendance at the Congress (including the Work Groups) and participation in the ‘Autumn Days’ Work Group meetings is open to all.

CEOCOR 2016 Congress is in Ljubljana, Slovenia from 17th to 20th May 2016; the 2015 ‘Autumn Days’ Work Group meetings are in Brussels 24th to 25th November 2015. The recent meeting in Stockholm was attended by participants from throughout Europe and also from Australia, Canada, South Africa, USA and Japan. A truly International meeting organised by a truly collaborative, International, non-profit making body. The most common comment from those who attend their first CEOCOR meeting is: ‘This is the best technical meeting I have been to in years; I wish I had participated years ago.’

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The May meeting was a joint session with the National Association of Corrosion Engineers (NACE) and was held on the 26th of May 2015 at the Palm Court hotel Aberdeen. The Annual General Meeting was held during this session and the last technical presentation of the 2014/2015 season was delivered by guest speaker Douglas Mills of the University of Northampton.

In the introduction, Douglas stated that the aim of on-site coating monitoring was to get a numerical indication of the coating’s protection ability at a specific time, determine how much protection was left and estimate how fast it is deteriorating. He explained the principles and application of various electrochemical techniques for monitoring coating systems in the laboratory. These techniques include DC Resistance, Electrochemical Impedance Spectroscopy (EIS), various scanning techniques, DC Current interrupter technique and Electrochemical Noise Method (ENM). He explained that the ‘challenge’ was transiting promising techniques with proven laboratory application to robust field application. For this to be possible, he observed that the technique would have to be portable, non-intrusive, fast, accurate, easy to interpret and leave no long term change to the area examined. The presenter then focused on the Electrochemical Noise Method (ENM) giving a brief history of the technique and explaining in some detail the working principles of the method.

With illustrative photographs, the Dr Mills covered some case studies of how the technique had been applied with considerable success including being used for coating in an aircraft carrier, on a pier leg and other applications. In each case, he presented the results with interpretation comments. The presentation concluded by identifying improvement work for the future. This included development of a hand held unit with a paintometer which can be attached to structure, calibration techniques, automation of the system, improved delamination measurement and indication of the presence of active corrosion under the coating.

After the meeting, there was a Question and Answer (Q&A) session with discussion on various aspects of the presentation. For information about the Aberdeen branch activities please contact our branch secretary, Frances Chalmers, 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.
PI TT IN G AND CREVICE CORROSION RESISTANCE OF A NI-BASED ALLOY IN SYNTHETIC SEAWATER

Almobrouk Omar Aboulqasim: Corrosion Department, Sirte Oil Company Brega, Area 2, Libya.

ABSTRACT
Ni-Cr-Fe alloys are used in a wide variety of corrosive environments, and commonly in seawater, an aggressive and complex environment. The performance of these alloys is often characterized by investigating the pitting and crevice corrosion tendency. This study presents the results of pitting and crevice corrosion resistance of Alloy-X750 based upon, accelerated electrochemical potentiodynamic polarization scans and immersion tests, respectively. Pitting tests were conducted in naturally aerated artificial seawater, at different temperature ranges from 4 to 50°C. At 20°C and above, the alloy suffered from pitting corrosion. It has been also found that as temperature increases, pitting potential decreases to more active values. However, in terms of dimensions and number of pits, it has been observed that as temperature increases, the number of pits decreases while their size increases. At lower temperatures (10°C and less), the alloy exhibits transpassive dissolution rather than pitting corrosion. However, small pits were observed in the transpassive region, which has been also reported elsewhere. Critical Pitting Temperature (CPT) measurements revealed that CPT of the alloy lies between 11 and 20°C. During potentiodynamic polarization measurements, ennoblement in corrosion potential with time was noted, and no steady state corrosion potential was attained, even when the test coupons were immersed in solution for more than 3 days prior to polarization. Crevice corrosion tests were also carried out through long-term exposure in stagnant artificial seawater for 30 days at two different temperatures (25 and 40°C). The alloy did not suffer from crevice corrosion under the tested conditions. This may indicate that the alloy under crevice tests performs better, compared to accelerated electrochemical pitting tests.

INTRODUCTION
Corrosion resistant alloys (CRAs) are used extensively in the oil and gas industry and are a preferred choice when corrosion protection of carbon steel, in aggressive environments is considered unfeasible. Seawater is one of these environments and can cause severe general corrosion to carbon steel. Although CRAs do not generally suffer from general corrosion in seawater, they may deteriorate significantly due to more damaging localized, pitting and crevice corrosion (and stress corrosion cracking (SCC) in the presence of stress). Alloy X-750 is a high corrosion resistant nickel base super-alloy, used extensively for high temperature services, as well under ambient temperature conditions in seawater environments. Recently, a number of failures of this alloy have been reported in seawater environments due to pitting and crevice corrosion damage. This current study was intended to provide an initial evaluation of the alloy’s corrosion properties notably to investigate the pitting and crevice corrosion resistance of the alloy in seawater at different temperatures (from 4°C equating to seabed temperatures, to 50°C at risers piping systems). Cyclic Potentiodynamic Polarization tests were conducted in synthetic seawater solution, to evaluate pitting resistance by characterizing the pitting and repassivation potentials. Critical Pitting Temperature (CPT) was also targeted in this work, another means of alloy’s evaluation. CPT measurements were conducted electrochemically through both potentiodynamic and potentiostatic polarization tests.

An attempt to recognize probable pit nucleation sites that are thought to be responsible for failure due to pitting was implemented with the aid of optical and electron microscopy with (EDX) analysis. A semi-quantitative measurement of the degree of pitting attack on selected pitted sample was conducted by interference microscopy to determine pit size, depth and volume.

Finally, crevice corrosion resistance was evaluated through long-term exposure tests in artificial seawater solution with two types of non-metallic crevice formers at 25 & 40°C, for 30 days.

EXPERIMENTAL PROCEDURE
The samples were extracted from solid round bar made up of alloy UNS N07750. The nominal chemical composition is given in table 1 below. Initially, the workpiece was cut into circular slices perpendicular (transverse) to the rolling direction. All samples were tested in the as-received (mill-annealed) condition.

Pitting Corrosion Tests
For pitting tests, several samples were cut into rectangular shapes of approx. 1cm², spot welded on the back face to an electric wire for electrical connection, and cleaned before embedding in epoxy resin with a plastic tube to isolate the wire from the electrolyte. The sample was then wet ground successively with 240, 400 and 600 SiC grit paper, followed by degreasing with acetone and deionized water rinsing. To avoid the presence of fine crevices at the electrode-resin interface, the edges of the metal were masked with a quick-cure epoxy resin, leaving an exposed area of approx. 0.85 cm². Thus, after grinding to 600 SiC grit, all test samples were left in air for 2 to 16 hrs before introduction into the corrosion cell. Cyclic potentiodynamic polarization (CPP) was conducted in a 1L capacity, three-electrode polarization cell. A platinum counter electrode was used and the potential was measured against a saturated calomel electrode (SCE) connected to the cell through a salt bridge (Luggin probe) filled with the test electrolyte. Following immersion in solution, the open circuit potential (OCP)

Table 1: Chemical composition of alloy UNS N07750.
Test solution, used in all tests, was substitute ocean water, prepared in accordance with ASTM D1141.

<table>
<thead>
<tr>
<th>Element</th>
<th>Ni + Co</th>
<th>Cr</th>
<th>Fe</th>
<th>Ti</th>
<th>Al</th>
<th>Nb + Ta</th>
<th>Mn</th>
<th>Si</th>
<th>S</th>
<th>Cu</th>
<th>C</th>
<th>Co</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt%</td>
<td>73.0</td>
<td>15.5</td>
<td>7.0</td>
<td>2.5</td>
<td>0.7</td>
<td>1.0</td>
<td>0.01</td>
<td>0.50</td>
<td>max.</td>
<td>0.01</td>
<td>max.</td>
<td>0.25</td>
</tr>
</tbody>
</table>
was monitored for 1hr before polarization. A potential scan was started with a scan rate of 0.5mV/sec. and current density recorded as a function of potential. The onset of localized corrosion was marked by a rapid increase of anodic current. The potential scan was reversed when a current density of 6mA/cm² was reached. The reverse scan continued until the hysteresis loop closed or the original start potential was reached. Pitting tests were performed at different temperatures, notably, 4, 10, 20, 30, 40 & 50°C. The corrosion cell was immersed in a thermostatted water bath for temperature control, and a thermometer inserted in the cell test solution to monitor the temperature during the test. As a minimum, duplicate samples were tested at each temperature. Following potentiodynamic tests, pit morphology was observed using an optical microscope and a scanning electron microscope (SEM) with energy dispersive x-ray spectroscopy for chemical analysis.

**Crevise Corrosion Tests**

Four samples, from the solid bar, were cut into 4mm thick slices, with a diameter of 56mm. Each sample was drilled with a 10mm diameter hole and marked for identification with an engraver. Samples were ground to 120 SiC grit, followed by cleaning with acetone and rinsing in deionized water. Before crevice assembly, all samples were weighed. Two types of non-metallic crevice formers were used: Continuous plateau PTFE multi-crevice assembly (figure 1) and Serrated plateaus with grooves acrylic glass multi-crevice assembly (figure 2). Dimensions of such crevice formers are shown in figures 3 & 4 respectively.

Crevise samples were assembled with metal fasteners (nut-and-bolt type), made of 316 stainless steel, to ensure secure crevice assembly (figures 5 & 6). To avoid contact with electrolyte and electrically insulate the metallic fastener from the test specimen, the fastener and nut were coated with epoxy. To provide consistency in tightening, all crevice assemblies were tightened by a torque wrench applying a torque of 8.5 N·m.

Two specimens were immersed in 1.8L of artificial seawater, and supported in the container by mounting with plastic string using the crevice former free ends (figure 7). The interface between crevice former and nickel alloy was not pre-wetted with seawater or treated with any other substance prior to initiating crevice corrosion experiments. Crevise corrosion tests were performed at 25 and 40°C, with the two types of crevice formers placed in the same solution (figure 7). During exposure, the test was monitored at intervals for any indication of corrosion. After 30 days exposure in naturally aerated synthetic seawater solution, the four samples were extracted and analysed for signs of corrosion.

### RESULTS

**Cyclic Potentiodynamic Polarization (CPP) Measurements**

Table 3 (on the next page) summarizes the measurements of pitting characteristics i.e. pitting potential and repassivation potential. The measurements were conducted at different temperatures.

---

**Figure 1: Photograph of PTFE continuous plateau crevice former.**

**Figure 2: Photograph of serrated acrylic glass crevice former.**

**Figure 3: Schematic of PTFE continuous plateau crevice former, Dim. in mm.**

**Figure 4: Geometry and dimensions of the serrated acrylic glass MCA.**

**Figure 5: Photograph of crevice assembly; continuous plateau.**

**Figure 6: Photograph of assembly; serrated plateau.**

**Figure 7: Photograph of crevice samples immersed in solution.**
At low temperatures (4 & 10°C), below the CPT, no pitting corrosion was observed. Rather, the alloy undergoes transpassive dissolution, where the whole passive film dissolves in solution at high overpotentials, resulting, overall, in general corrosion of the surface. This was confirmed visually by observation under the optical microscope (figure 9), where the surface was uniformly attacked to a large extent. However, there exist pits (several 10s of microns in size) at the surface (figure 10). This is supported by the metastable events observed from the polarization curve.

A further feature of transpassive dissolution is the preferential attack at the grain boundaries (figure 10), which results from higher reactivity of grain boundaries relative to grains.4 Being a result of preferential segregation of various solute elements or the precipitation of metal compounds at the grain boundaries4.

### Effect of Temperature on Pitting Characteristics

The dependence of the pitting potential on the electrolyte temperature is summarized graphically in Figure 11 where a negative shift 70mV shift in $E_{np}$ in the active direction was observed as the temperature increased from 20 to 50°C. The decrease in pitting potential with temperature suggests an increased instability of the protective film at higher temperatures due to accumulation and stronger chemisorption of chloride ions on the metal surface, causing easier breakdown of the passive film.6,7 It was also observed from analysis of the polarisation curves, that the temperature has an effect on the passive current density of alloy in the naturally aerated artificial seawater. The passive current density tends to increase with increase in temperature. Rosenfeld postulated that this effect is possibly related to the fact that hydrolysis of anodic dissolution products takes place very readily at higher temperatures.8

<table>
<thead>
<tr>
<th>Test Temp. (°C)</th>
<th>Number of tests</th>
<th>$E_{np}$ (mV) SCE(25°C)</th>
<th>$E_{pr}$ (mV) SCE(25°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2</td>
<td>Transpassive dissolution</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>Transpassive dissolution</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>3</td>
<td>493 ± 03</td>
<td>191 ± 02</td>
</tr>
<tr>
<td>30</td>
<td>2</td>
<td>508 ± 78 (Standard Deviation)</td>
<td>161 ± 27 (Standard Deviation)</td>
</tr>
<tr>
<td>40</td>
<td>2</td>
<td>444 ± 02</td>
<td>122 ± 08</td>
</tr>
<tr>
<td>50</td>
<td>2</td>
<td>444 ± 44</td>
<td>085 ± 02</td>
</tr>
</tbody>
</table>

### Test Temp. (°C) Number of tests $E_{np}$ (mV) SCE(25°C) $E_{pr}$ (mV) SCE(25°C)

At higher temperatures, ≥ 20°C, alloy suffers from pitting, as shown in polarization curves figures 8A-D.

![CPP curves of tests in normal aerated artificial seawater, scan rate 0.5mV/s, at: A) 20, B) 30, C) 40 and D) 50°C](image)

![Optical macrograph of transpassive dissolution, polarised at 10°C, 0.5mV/s.](image)

![SEM micrograph of a pit at transpassive dissolution, polarised at 10°C, 0.5mV/s, before cleaning.](image)

![CPP curves of tests in normal aerated artificial seawater, scan rate 0.5mV/s.](image)

**Table 3:** Various characteristic pitting parameters obtained from CPP as a function of temperature.

**Critical Pitting Temperature (CPT)**

It was derived from cyclic potentiodynamic polarization experiments that the CPT lies between 10 and 20°C. Further investigations of CPT using potentiodynamic polarization at 12, 14, & 16°C revealed that: 10°C<CPT≤12°C. Interestingly, however, potentiostatic determination of CPT at 700 mV and 500mV suggests that the CPT is 5 and 6°C, respectively, see figure 12.

![Potentiostatic CPT determination using 500 & 700mV SCE, Starting temperature 3°C, Temp. ramp 1°C/min, CPT determined at 200μA/cm².](image)
This difference in the value of CPT between Potentiodynamic (12°C) and potentiostatic (6°C) methods is more likely to be due to a crevice effect at the metal-epoxy interface causing premature corrosion activity below the actual CPT in the case of potentiostatic methods as it has been revealed, under optical microscopy, that corrosion was observed at the interface between the metal and epoxy-resin. Based on this, and without further investigation being conducted, potentiostatic results were discarded. Thus, it was considered that the CPT lies between 10 and 20°C.

**Pit morphology studies**

**Above Critical Pitting Temperature**

Hemispherical pits were observed (after potentiodynamic polarization above $E_{p}$, up to current densities of 6mA/cm², with a sort of lace-like cover at the edge, i.e., a thin metal membrane with a relatively large hole (due to high applied potential) at its centre and numerous randomly distributed small holes, as shown in figure 13. This may indicate that the pit started at a precipitate/inclusion and then it has grown radially under the metal surface away from the precipitate/inclusion; further surface penetration comes from underneath, producing the lace-like structure that extends from the precipitate/inclusion. Formation of this membrane may indicate that the passive film on UNS N07750 is selectively attacked and corrosion continues below the surface of the film.

H. Pickering & R. Frankenthal observed a similar case with Fe in HClO₄ and postulated that the faceted structure is an expected feature of active dissolution from a film-free surface under conditions for which the rate is controlled by the removal of atoms from the surface i.e. activation controlled. The formation of these facets inside the pit indicates anisotropic dissolution of the alloy. Z. Szklarska-Smialowska suggested that the pit is formed on different grains having different orientations.

**Below Critical Pitting Temperature**

Open hemispherical pits were found (figure 14) in the alloy after being polarized to high potentials (approx. 1V), which may indicate that the thin membrane, that was observed at higher temperatures > CPT (figure 13), has been attacked by the aggressive anions under high potentials. It was also observed that the metal sample sites of the alloy UNS N07750, their degree with many facets, i.e., the inside walls of pits are crystallographic (bounded by crystallographic planes).

<table>
<thead>
<tr>
<th>No.</th>
<th>Temp. °C</th>
<th>Pit depth (μm)</th>
<th>Pit diameter (μm)</th>
<th>Pit volume (mm³)</th>
<th>Weight loss (1) (μg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pit_01</td>
<td>50</td>
<td>137</td>
<td>518</td>
<td>0.014</td>
<td>116</td>
</tr>
<tr>
<td>Pit_02</td>
<td>50</td>
<td>199</td>
<td>186</td>
<td>0.010</td>
<td>83</td>
</tr>
</tbody>
</table>

(1) Density = 8.28g/cm³
Figure 17 shows an example of another precipitate within the matrix, which on analysis was found to be rich in Ti-and-Nb.

**Crevice Corrosion Immersion Tests**

Following immersion of 4 crevice samples, in naturally aerated artificial seawater at 25 and 40°C, for 30 days, no apparent corrosion on the surface was observed from optical microscopy and it was concluded that alloy UNS N07750 did not suffer from crevice corrosion under these conditions. These results seem to be inconsistent with electrochemical pitting measurements, which show that alloy UNS N07750 is not highly resistant to pitting corrosion with pitting potentials of 493, 508, 444 & 444 mV SCE respectively.

Potentiodynamic polarization measurements of CPT have showed that CPT of alloy UNS N07750 is in the range of 11-20°C.

In the transpassive dissolution of alloy UNS N07750 at low temperatures; small pits were found in the transpassive state with preferential attack at the grain boundaries.

Arbitrarily selected pits analysed under interference microscope for dimensional measurement, were 137 and 199μm deep and 518 and 186μm in diameter, reflecting high pit growth rate in seawater.

Alloy UNS N07750 was not found to suffer from crevice corrosion when immersed in substitute (non-stirred) naturally aerated seawater at 25 and 40°C, for 30 days. This suggests that the alloy has good resistance to crevice corrosion in seawater under the conditions tested in this study.

**ACKNOWLEDGEMENTS**

The author would like to acknowledge Sirte Oil Company – Brega/Libya for the financial support and The University of Manchester for access to laboratories and facilities.

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DENSO SEASHIELD 80 PROTECTS MANX OUTFALL PIPE

Manx Utilities in the Isle of Man have installed a new sea outfall pipe at Kirk Michael for the discharge of foul effluent from its treated waste water plant. Hyder Consulting, consulting engineers for the new pipe installation, approached Winn & Coales (Denso) Ltd for advice on a suitable system to protect the joints on the outfall pipe.

Due to the extreme tidal conditions at the exposed location it was decided that Denso Seashield 80 System would be used, but with an additional application of Denso Glass Outerwrap to combat the severe conditions. The contractor chosen to apply the system was JCK Ltd from Ballasalla, Isle of Man.

Winn & Coales also provided assistance and guidance to JCK Ltd in the application of the system. The successful work was overseen by Homes Grace Consulting Engineers, Hyder Consulting and Manx Utilities.

Denso Seashield 80 System consists of Denso S105 Paste, Densyl Mastic, Denso Marine Piling Tape and Densoclad 70. On this particular application Denso Glass Outerwrap, which is a flexible fibreglass cloth impregnated with a water activated resin, was used as additional protection over other Seashield 80 systems. Denso Glass Outerwrap provides a protective coating which offers exceptional mechanical and impact strength for underwater, underground and above ground pipes, flanges and other irregular surfaces.

BAGNALLS WINS FAMILY BUSINESS APPRENTICE 2015

In 2015, Family Business United launched a new campaign to find the ‘Family Business Apprentice of the Year 2015’. A nationwide search was undertaken and family businesses from all different industries were encouraged to nominate potential candidates.

Bagnalls, a family owned and managed business, celebrating 140 years in the painting, decorating and coatings industry, nominated three of their promising apprentices for the award. Despite being early on in their careers, each apprentice has demonstrated that they have the skills and commitment to become excellent tradesmen in the future.

Six finalists were shortlisted in total to attend the awards, held on Monday 8th June at the premises of Close Brothers Asset Management, who sponsored the event.

Paul Andrews, of Family Business United explains “All of the finalists were a credit to themselves and the family businesses they represent. Their employers should be congratulated for the time and commitment invested in their apprenticeship schemes. The finalists demonstrated great commitment, desire to achieve and willingness to go the extra mile.”

“We were pleased to announce Troy Sanderson of Bagnalls as the worthy winner. He impressed us right from the start. He demonstrated his capabilities as a painter, his commitment to being an excellent employee and his desire to deliver great customer service, regularly going above and beyond the role expected of an apprentice.”

Troy works as a Painting and Decorating Apprentice at Bagnalls. Established in 1875, Bagnalls continues to be one of the country’s leading painting, decorating and specialist coatings contractors. He attended the event with two of his painting apprentice peers who had also been shortlisted as finalists, Joel Mortlock and Connor Smith.

On winning the award Troy added, “I am absolutely delighted to have won the first Family Business United Apprentice of the Year Award. I would like to thank my employer Bagnalls for giving me an opportunity to pursue a career in painting & decorating and for encouraging me to enter the competition.”

Stephen Bagnall, Managing Director of Bagnalls added “It was great to see so many apprentices at today’s awards and I am personally very proud that three of our apprentices reached the final judging. All three of our apprentices have demonstrated their commitment to our long standing apprenticeship programme since they joined Bagnalls. It was a wonderful surprise when Troy Sanderson, was named as the overall Family Business Apprentice winner, 2015.”

For further information contact: Alfred Bagnall & Sons Limited, 6 Manor Lane, Shipley, West Yorkshire, BD18 3RD Tel: 01274 714800  Fax: 01274 530171  www.bagnalls.co.uk
At the 27th Annual Premier Trophy Awards of Painting and Decorating Association, Bagnalls were proud overall winners of the Industrial Category Award as well as receiving awards in the Commercial, Decorative and Highly Decorative categories for other painting contracts undertaken during 2014.

Bagnalls’ Contracts Manager Bernie Smith and Site Supervisor Kevin Travers collected the Industrial Category Award alongside Taylor Woodrow’s Senior Project Manager John Hartley. The award was presented for the outstanding painting and decorating works undertaken at Nottingham Hub Railway Station last year, as part of a £60 million redevelopment project by Vinci Construction / Taylor Woodrow. Bagnalls undertook a wide range of industrial and decorative painting works across the station, however most notably was the ultra high pressure washing/blasting and re-painting of the 111 year old steel roof trusses in the historic Porte-cochère at the station entrance.

Following the win John Hartley commented “I was delighted to witness Bagnalls being awarded the top prize in the Industrial category at the 2015 PDA Premier Trophy Awards for their work at Nottingham Station. This reflected a fantastic job done, I really enjoyed working with the Bagnalls team and for me, this achievement reflects their excellent safe working practice and positive attitude shown throughout the project. The highest quality of workmanship is there for all to see and this has contributed significantly to the transformation of the 111 year-old station into a modern transport Hub, fit for the 21st Century. Well done!”

The awards which took place at the prestigious Plaisterers Hall in London saw Bagnalls scoop several other certificates, these were;

**Commercial Category**
- Highly Commended Certificate for the major redecoration to the new build Bristol Southmead Hospital.

**Decorative Category**
- Commended Certificate for the external redecoration to a Grade II listed building at Port Sunlight on the Wirral.
- Very Highly Commended Certificate for redecoration of Wolverhampton Grand Theatre.
- Highly Commended Certificate for redecoration of Morley Town Hall, a Grade I listed building.
- Commended Certificate for the redecoration of Leeds Civic Hall.

Bagnalls Group Managing Director, Stephen Bagnall said “Being recognised by our Trade Association for the projects we deliver is very important to us as a specialist painting contractor. We are very proud to have won the Industrial category for works delivered at Nottingham Hub as this was a true test of our capability not only in painting but also managing works safely in a very busy station environment and meeting the tight deadlines required by the customer. The finished project is testament to the skills and expertise of our site and management teams.”

Bagnalls are undertaking the project as subcontractor to The Lady Builder Ltd, property and construction experts. This award is particularly special as John works for Bagnalls and not a hotel employee. Steve Mandry, Bagnalls’ Branch Manager added “This award is a real testament to how his positive approach stood out and we are really pleased that his hard work and dedication to customer care has been recognised.”

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Email: mail@mabeybridge.co.uk

MCL COATINGS GROUP LTD
Pickering Road, Halebank Industrial Estate
Widnes, Cheshire WA8 6XW
Tel: 0151 423 6166 Fax: 0151 495 1437
Email: info@mcl.eu.com
Website: www.mcl.eu.com

MPM NORTH WEST LTD
Marine Road, Maryport, Cumbria CA15 8AY
Tel: 01900 810299
Email: mikej@mpmnw.co.uk
Website: www.mpmmarine.co.uk

NORTHERN PROTECTIVE COATINGS LTD
16 High Reach, Fairfield Industrial Estate, Bill Quay,
Gateshead, Tyne & Wear NE10 0LR
Tel: 0191 438 5555 Fax: 0191 438 3082
Email: jack.welsh@npcoatings.co.uk

NUSTEEL STRUCTURES
Lymane, Hythe, Kent CT21 4LR
Email: simon.slinn@nusteelstructures.com
Website: www.nusteelstructures.com

ORRMAC COATINGS LTD
Newton Chambers Road, Thorncliffe Park Estate, Chapeltown
Sheffield S3 2PH
Tel: 0114 2461237 Fax: 0114 2570151
Email: orrmac@aol.com Website: www.orrmac.co.uk

Pipeline Induction Heat Ltd
The Pipeline Centre
Farrington Road, Rossendale Road Industrial Estate
Burnley, Lancs BB11 5SW
Tel: 01282 415323 Fax: 01282 415326
Email: Sales@pih.co.uk www.pih.co.uk

PIPERCREST LTD
T/A Halls Specialised Services
Brookyn Farm, North Hill, Norden on the Hill, Essex SS17 8QA
Tel: 01375 361408 Fax: 01375 361448
Email: halls@btconnect.com

PORT PAINTERS LTD
Unit 3, Ringside Business Park, Heol-Y-Rhosog, Cardiff CF3 2EW
Tel: 029 2077 7070 Fax: 029 2036 3023
Email: port.painters@talk21.com

PPC LTD
10 Valiant Gardens, Hilsea, Portsmouth PO2 9NZ
Tel: 023 92612405 Email: enquiries@ppc-ltd.info

RHINOCEROS LIMITED
Huntingdon Works, Huntingdon Road, East Finchley,
London, N2 9DX
Tel: 0208 444 6165 Fax: 0208 365 2865
Email: contracts@rhino247.co.uk www.rhino247.co.uk
SUSTAINING MEMBERS

JOTUN PAINTS (EUROPE) LTD.
Stather Road, Flixborough, Scunthorpe, North Lincolnshire DN15 8RR
Tel: 01724 400 125 Fax: 01724 400 100
Email: decpaints@jotun.co.uk www.jotun.co.uk

PPI PROTECTIVE & MARINE COATINGS
Unit 3 Maes Way, The Village, Carter Lane, South Normanton, Derbyshire DE55 2DS
Tel: +44 (0) 1773 814520 Fax: +44 (0) 1773 814521
Web: www.ppgrpmc.com

SPENCER COATINGS LTD
6 York Street, Aberdeen, AB11 5DD
Tel: 01224 288780 Fax: 01224 211070
Website: www.spencercoatings.co.uk

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

STORK TECHNICAL SERVICES (RGB) LIMITED
Norfolk House, Pitmedden Road, Aberdeen AB21 0DP
Tel: 01224 722888 Fax: 01224 723406
Email: robert.grainger@stork.com
Website: www.storktechnicalservices.com

TINSLEY SPECIAL COATINGS
Enterprise House, Durham Lane, Eaglescliffe TS16 0PS
Tel: 01642 784279 Fax: 01642 782891
Email: enquiries@tinsleyspecialproducts.com

SUPPLIERS GENERAL

AIRBLAST EUROSPRAY
25 King Street Industrial Estate, Langtoft, Peterborough PE6 9NF
Tel: 01778 560650 Fax: 01778 560724
Email: j.cook@airblast.co.uk
Website: www.airblast.co.uk

APPLIED GRAPHENE MATERIALS
The Wilton Centre, Redcar, TS10 4RF
Tel: 01642 438214
Email: info@appliedgraphenematerials.com

DOORBOS EQUIPMENT
Tel: 01642 673391 Fax: 01642 673210
Email: sales@doorbosequipment.co.uk
Website: www.doornbosesquipment.co.uk

FERNOX
MAKES WATER WORK
Forsyth Rd, Woking, Surrey GU21 5RZ
Tel: 01483 793200 Fax: 01483 793201 www.fernox.com

Fischer Instrumentation (GB) Ltd
Gordleton Industrial Park, Pennington, Lymington, Hampshire SO41 8JD
Tel: 01590 684100 Email: mail@fischergb.co.uk

FM CONWAY LTD
Conway House, Rochester Way, Dartford, Kent DA1 3QY
Tel: 0208 6368822 Fax: 0208 6368827
Email: sharon.howlett@fmconway.co.uk

LLEWELLYN RYLAND LTD
Haden Street, Birmingham B12 9DB
Tel: 0121 4402284
Email: research@llewellyn-ryland.co.uk

NEONICKEL (BLACKBURN) LTD
Walker Industrial Park, Blackburn BB1 2QE
Tel: 01254 503505

OCEANEERING INTERNATIONAL SERVICES LTD
Oceaneering House, Pitmedden Road, Dyce, Aberdeen AB21 0DP
Tel: 01224 758500
ICATS REGISTERED COMPANIES

ICATS is a comprehensive structured training scheme for the registration, training and certification of industrial surface preparation and coating operatives. Companies wishing to have a workforce certificated under ICATS must first register with Correx.

Workplace training is carried out by ICATS certificated trainers who are qualified to train and assess operatives. Training is carried out in-house and may be undertaken by a certificated trainer employed by an ICATS registered training organisation. However it is more usual for registered companies to nominate experienced employees to ICATS for prior approval as company trainers. Subject to meeting the acceptance criteria, nominees attend a 2 day ICATS Company Trainer course held at various locations in the UK.

Successful completion of the ICATS course by operatives leads to certification by Correx. Trainers and operatives will require re-certification after 3 years and renewal after 9 years.

A & R Painting Services Ltd
Marwood House, Riverside Park, Bromborough, Wirral, CH62 3QX
Tel: 0151 445 3589

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

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

AlpAccess s.r.l.
I.L. Caragiale, 21 Ploiesti, 100015, P.H. Romania
T: +44 (0) 7222140858

A McKie Building & Engineering Ltd
19 Kyle Road, Irvine, Ayrshire, KA12 8JX
T: 01294 279586

APB Construction (UK)
First Floor Offices, Grange Business Centre, River Works, Grange Lane, Sheffield, S5 0DP
T: 01709 541000

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

Appplus UK Ltd
Block 2, Units C & D West Mains Industrial Estate, Grangemouth, Stirlingshire FK3 8YE
T: 01324 489785

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

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

Aveon Offshore Ltd
Aveon Offshore Facility, Rumuolmeni, Port Harcourt, Rivers State, Nigeria
E: dpetillion@aveonoffshore.com

B & A Contracts Ltd
Dale Road, Haverster, Milford Haven, Pembrokeshire SA73 3PR
T: 01646 693489

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

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

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

Bilfinger Salamis UK Ltd
4 Greenhole Place, Bridge on Don, Aberdeen, AB23 8EU
T: 01224 246499

Bluhull Marine Ltd
Orange Grove Birbal Street, Bazlan, BZN 9013 MALTA
T: +356 21445807

Border Coatings (Scotland) Ltd
Unit 7, Station Road Industrial estate, Earlston, Berwickshire TD4 6BZ
T: 01896 848919

Brightstar Shotblasting & Coatings Ltd
Newhall Works, Newhall Road, Sheffield, S9 2QL
T: 0114 2618532

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

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

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

C E Pittaway & Son Ltd
106 – 114 Fenton Street, Hull HU3 4NA
Tel: 01482 329007

Celtic Specialist Treatments Ltd
Enterprise House, Herbert Road, Newport, South Wales, NP19 7BH
T: 01633 267007 (office)
01633 215900 (workshop)

Centregreat Engineering Ltd
11/12 Wyndham Close, Brackla, Brackla Industrial Estate, Bridgend, CF31 2AD
T: 01656 650481

Chemcem Scotland Ltd
Wester Crosshill, Avonbridge Road, Falkirk FK1 3DF
T: 01324 851987

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

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

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

Collis Engineering Railway Contracts
Salcombe Road, Meadow Lane Industrial Estate, Alfreton, Derbyshire, DE55 7RG
T: 01773 833255
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Clean</td>
<td>11 Old Forge Road, Ferndown Industrial Estate, Ferndown, Wimborne, Dorset, BH21 7RJ, UK</td>
<td>0845 6850133</td>
</tr>
<tr>
<td>Corrocoat</td>
<td>Forster Street, Leeds, LS10 1PW</td>
<td>01132760760</td>
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<tr>
<td>Corroless Eastern Ltd</td>
<td>Greens Road, Greens Industrial Estate, Dereham, Norfolk NR20 3YG</td>
<td>01362 691484</td>
</tr>
<tr>
<td>County Building Services Ltd</td>
<td>Unit D3, Spectrum Business Estate, Anthony’s Way, Medway City Estate, Rochester, Kent, ME2 4NP</td>
<td>01604 711507</td>
</tr>
<tr>
<td>Darcy Silicapat Manufacture</td>
<td>Brook House, Larkfield Trading Estate, New Hythe Lane, Larkfield, Kent ME20 6CN</td>
<td>01622 715100</td>
</tr>
<tr>
<td>D&amp;D Rail Ltd</td>
<td>Time House, Time Square, Basildon Essex SS14 1DJ</td>
<td>01268 520000</td>
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<tr>
<td>Denholm Industrial Services</td>
<td>200 200 Cammichael Street, Glasgow, G51 7QU</td>
<td>0141 445 3939</td>
</tr>
<tr>
<td>D F Coatings Ltd</td>
<td>Unit 17, Willerems Ind. Estate, Hazel Road, Woolston, Southport SO19 7HS</td>
<td>0238 044 5634</td>
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<tr>
<td>Donyal Engineering Ltd</td>
<td>Hobson Industrial Estate, Burnopfield, Newcastle Upon Tyne NE16 6EA</td>
<td>01207 270909</td>
</tr>
<tr>
<td>DRH Coatings Ltd</td>
<td>Suite 5, 3 Shawcross Industrial Estate, Ackworth Road, Portsmouth PO3 5JP</td>
<td>023 9266 6165</td>
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<tr>
<td>Dyer &amp; Butler Ltd (Rail)</td>
<td>Mead House, Station Road, Nursling, Southampton, SO16 0AY UK</td>
<td>02380 667549</td>
</tr>
<tr>
<td>ENC (Yorkshire) Ltd</td>
<td>Unit 38 Rotherham Road, Dinnington, Sheffield, S25 3RJ</td>
<td>01909 567860</td>
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<tr>
<td>ESB Surface Engineering</td>
<td>203 Westgate Street, Gloucester, GL1 2RN</td>
<td>01452 306272</td>
</tr>
<tr>
<td>F A Clover &amp; Son</td>
<td>Bardolph Road, Richmond, Surrey, TW3 2LH</td>
<td>0208 948 6321</td>
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<tr>
<td>Farbuild Ltd</td>
<td>Trelawnn Lodge, Vicarage Road, Wingfield, Diss, Norfolk IP2 5R8</td>
<td>01379 640670</td>
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<tr>
<td>Ferrous Protection Ltd</td>
<td>Units 27-29 Saddlesworth Business Centre, Huddersfield Road, Delph, OL3 5DF</td>
<td>01457 837419</td>
</tr>
<tr>
<td>FMC Technologies NIGERIA</td>
<td>No. 22 Gerrard Road, Ikoyi, NIGERIA</td>
<td>+234 (0) 8039740023</td>
</tr>
<tr>
<td>Focus Scaffolding Ltd</td>
<td>Meadow Road Compound, Meadow Road, Whitehaven, Cumbria, CA28 9HY</td>
<td>01946 592338</td>
</tr>
<tr>
<td>Forth Estuary Transport Authority</td>
<td>Forth Road Bridge, Administration Office, South Queensferry, EH30 9SF</td>
<td>0131 319 1699</td>
</tr>
<tr>
<td>Forward Protective</td>
<td>Vernon Street, Shirebrook, Mansfield Notts, NG20 8SY</td>
<td>01623 748323</td>
</tr>
<tr>
<td>Fountains part of OCS Group</td>
<td>12 Church Street, Omagh, Co Tyrone, BT7 3BX</td>
<td>028 8240391</td>
</tr>
<tr>
<td>Gabre (UK) Ltd</td>
<td>Bremhein Court, George Street Banbury, Oxford, OX16 5BH</td>
<td>01295 750000</td>
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<tr>
<td>Gemini Corrosion Services</td>
<td>Brent Avenue, Forties Road, Montrose, Angus, DD10 9PB</td>
<td>01674 672 678</td>
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<tr>
<td>Global Energy Group (Access Coatings) Ltd</td>
<td>Unit 5, Service Base, Shore Road, Invergordon, IV18 0EX</td>
<td>013648 855123</td>
</tr>
<tr>
<td>GPL Civil Engineering Ltd</td>
<td>(Special Projects Division) Kennedy House, Chettletert Street, Salford, M6 6YW</td>
<td>01617 745 7888</td>
</tr>
<tr>
<td>H&amp;BH Contracting Ltd</td>
<td>8 Barnfield Hill, Exeter, EX1 1SR</td>
<td>07960 900725</td>
</tr>
<tr>
<td>Hayes Engineering Services Ltd</td>
<td>Bridle Road, Off Hadfield Road, Cardiff CF11 8TL</td>
<td>029 2002 6088</td>
</tr>
<tr>
<td>Harsoo Infrastructure UK Ltd</td>
<td>Unit 3 Manby Road, South Killingholme, Immingham, North Lincolnshire, DN40 3DX</td>
<td>01469 553800</td>
</tr>
<tr>
<td>Harrisons Engineering Lancashire Ltd</td>
<td>Judge Wilmore Mill, Longworth Road, Billington, Clitheroe, Lancashire, BB7 9TP</td>
<td>01254 823993</td>
</tr>
<tr>
<td>HBS Protective Coatings Ltd</td>
<td>40 Manse Road, Belfast BT8 6SA</td>
<td>028 90708280</td>
</tr>
<tr>
<td>Hempel UK Ltd</td>
<td>Llantarnam Park, Cwmbran, Cowen, NP4 3SF</td>
<td>01633 874024</td>
</tr>
<tr>
<td>Herrington Industrial Services Ltd</td>
<td>Crown Works, Crown Road, Low Southwick, Sunderland SR5 2BS</td>
<td>0191 5160634</td>
</tr>
<tr>
<td>Hi-Tech Surface Treatment Ltd</td>
<td>Unit 8, Dixon Trading Estate, Chippenhall Lane, Eastleigh, Hants SO50 6JR</td>
<td>023 80611789</td>
</tr>
<tr>
<td>Hyspec Services Ltd</td>
<td>Unit 3 Meadowfield Industrial Estate, Cowdenbeath Road, Burntisland, Fife, KY3 0LH</td>
<td>01592 874661</td>
</tr>
<tr>
<td>Industrial Coating Services</td>
<td>A1 House, Rolling Mill Street, Norton Canes, Cannock WS11 9UH</td>
<td>0845 474 0007</td>
</tr>
<tr>
<td>International Energy Services Ltd</td>
<td>94 Awolowo, Ikoyi, Lagos State, Nigeria</td>
<td>014615636</td>
</tr>
<tr>
<td>Interserve Industrial</td>
<td>Unit 2, Olympic Park, Pool Hall Road, Ellesmere Port, Cheshire, CH66 1ST</td>
<td>0151 3737660</td>
</tr>
<tr>
<td>Company Name</td>
<td>Address</td>
<td>Contact Information</td>
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</tr>
<tr>
<td>Jack Tighe Coatings</td>
<td>Sandall Lane, Kirk Sandall, Doncaster, DN3 1QR</td>
<td>T: 01302 880360</td>
</tr>
<tr>
<td>Jack Tighe Ltd</td>
<td>Redbourne Mere, Kirkton Lindsey, Gainsborough, Lincs, DN21 4NW, UK</td>
<td>T: 01652 640003</td>
</tr>
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<td>J Murphy &amp; Sons Ltd</td>
<td>Hiview House, Highgate Road, London NW5 1TN</td>
<td>T: 020 7267 4366</td>
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<td>JWM Industrial Services Ltd</td>
<td>47 Barton Road, Stretford, Manchester, M32 9FA</td>
<td>T: 0161 2825329</td>
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<td>JTL Fire Ltd</td>
<td>24 Cove Road, Farnborough, Hants, GU14 0EN</td>
<td>T: 01252 545741</td>
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<td>J W Coatings Ltd</td>
<td>9 Prospect Road, Ossett West Yorks, WF5 8AE</td>
<td>T: 01924 267022</td>
</tr>
<tr>
<td>Kaefer C&amp;D Ltd</td>
<td>Riverside House, Rolling Mill Road, Viking Industrial Estate, Jarrow,</td>
<td>T: 0191 428700</td>
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<td>K &amp; N Finishers (Southern) Ltd</td>
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<td>T: 02380 869700</td>
</tr>
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<td>Kilbridge Construction Services Ltd</td>
<td>McDermott House, South Crescent, Covy Road Business Park, London E16 4TL</td>
<td>T: 0207 511 1888</td>
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<tr>
<td>K P Coatings Ltd</td>
<td>23 Prospect Park, Mahon Road, Portadown, Ca Armagh, BT62 3EH</td>
<td>T: 02838 338151</td>
</tr>
<tr>
<td>Lanarkshire Welding Co.</td>
<td>B2 Prospect Road, Wishaw, Lanarkshire, ML2 7TQ</td>
<td>T: 01698 264271</td>
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<tr>
<td>Ledwood Protective Coatings Ltd</td>
<td>Pembroke Dock, Pembrokeeshire, SA72 4RR</td>
<td>T: 01646 623600</td>
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<tr>
<td>Livingstone Surface Treatments Ltd</td>
<td>Unit 4, The Energy Coast Business Park, Haile, Egremont, Cumbria, CA22 2NH</td>
<td>T: 01946 841191</td>
</tr>
<tr>
<td>Mabey Bridge Ltd</td>
<td>Station Road, Chester, Monmouthshire NP16 5YL</td>
<td>T: 01291 623801</td>
</tr>
<tr>
<td>Maclean &amp; Spears Blasting Ltd</td>
<td>Unit D, East Fulton Farm, Darluth Road, Linwood, Paisley, PA3 3TP</td>
<td>T: 01505 324777</td>
</tr>
<tr>
<td>Maclean &amp; Spears Blasting Ltd</td>
<td>Unit D, East Fulton Farm, Darluth Road, Linwood, Paisley, PA3 3TP</td>
<td>T: 01505 324777</td>
</tr>
<tr>
<td>Maldon Painting Company Ltd</td>
<td>2 Spital Road, Maldon, Essex CM9 6EH</td>
<td>T: 07956597392</td>
</tr>
<tr>
<td>Mark Smith Inspection Services Ltd</td>
<td>T4 Seaham Close, South Shields, Tyne &amp; Wear, NE34 7ER</td>
<td>T: 0191 456 9925</td>
</tr>
<tr>
<td>MCL Coatings Group Ltd</td>
<td>Pickerings Road, Haloebank Industrial Estate, Widnes, Cheshire, WA8 8XW</td>
<td>T: 0151 423 6166</td>
</tr>
<tr>
<td>Miller Fabrications Ltd</td>
<td>Barownhill Works, Overtown Road, Whishaw, Lanarkshire, ML2 8EW</td>
<td>T: 01698 373770</td>
</tr>
<tr>
<td>MIS North East Ltd</td>
<td>Units 2, S/5a Mill Hill, North West Ind Estate, Peterlee, SRB 2HR</td>
<td>T: 0191 514 2804</td>
</tr>
<tr>
<td>Moore Steel Developments Ltd</td>
<td>Station Road, Thornley, Peterborough PE6 0QE</td>
<td>T: 01733 270729</td>
</tr>
<tr>
<td>Murvic Contracts Ltd</td>
<td>Askern House, High Street, Askern, Doncaster, DN6 0AA</td>
<td>T: 01302 701122</td>
</tr>
<tr>
<td>New Image Contracts Ltd</td>
<td>Askern House, High Street, Askern, Doncaster, DN6 0AA</td>
<td>T: 01302 708070</td>
</tr>
<tr>
<td>N L Williams Group Ltd</td>
<td>Westside Industrial Estate, Jackson Street, St. Helens, Merseyside WA9 3AT</td>
<td>T: 017744 26526</td>
</tr>
<tr>
<td>Northern Protective</td>
<td>T6 High Loft, Fairfield Industrial Estate, Bill Quay, Gateshead, Tyne &amp; Wear, NE10 0UR</td>
<td>T: 0191 438 5555</td>
</tr>
<tr>
<td>NSG UK Ltd</td>
<td>Fourth Avenue, Deeside Industrial Park, Deeside, Flintshire CH5 2NR</td>
<td>T: 01244 833138</td>
</tr>
<tr>
<td>Nusteel Structures</td>
<td>Lympe Industrial Estate, Lympe, Hythe, Kent, CT2 1 4LR</td>
<td>T: 01303 268112</td>
</tr>
<tr>
<td>Offshore Marine Services Ltd</td>
<td>Brumby House, Jalan Bahasa, PO Box 80148, 87011 Lubuan F.T. Malaysia</td>
<td>T: +356214444410</td>
</tr>
<tr>
<td>Orrmac Coatings Ltd</td>
<td>Newton Chambers Road, Thoncliffe Park Estate, Chapelstown, Sheffield,</td>
<td>T: 0114 246 1237</td>
</tr>
<tr>
<td>Over Rail Services Ltd</td>
<td>Unit 10 Millhouse Way, Purdys Industrial Estate, Rochford, Essex, S54 1ND</td>
<td>T: 07976372866</td>
</tr>
<tr>
<td>Paintel Ltd</td>
<td>Trianon, Westover, Ivybridge, Devon, PL7 1JH</td>
<td>T: 01752 719 701</td>
</tr>
<tr>
<td>Painting &amp; Labour Services Ltd</td>
<td>Unit 1, Queens Road, Immingham DN40 1QG</td>
<td>T: 01469 578105</td>
</tr>
<tr>
<td>PCM Nigeria Plc</td>
<td>99 River Road, Amans Amadi, Port Harcourt, Rivers State, Nigeria</td>
<td>T: +2348055297828</td>
</tr>
<tr>
<td>P H Shotblasting &amp; Sprayng Services</td>
<td>43a Drumraine Road, Castlecaulfield, Dungannon, Co Tyrone, BT70 3NY</td>
<td>T: 028 8776 7722</td>
</tr>
<tr>
<td>Pipeline Induction Heating</td>
<td>The Pipeline Centre, Farrington Road, Rosendale Rd Industrial Estate,</td>
<td>T: 01282 415323</td>
</tr>
<tr>
<td>Port Painters Limited</td>
<td>Unit 3, Ringside Business, Hoel-Y-Rhosog Cardiff, CF3 2EZ</td>
<td>T: 02920 777070</td>
</tr>
<tr>
<td>Prestec UK Ltd</td>
<td>T68 Birmingham Road, Shenstone Wood End Stafs WS14 ONX</td>
<td>T: 0121 308 8001</td>
</tr>
<tr>
<td>Company Name</td>
<td>Address</td>
<td>Telephone</td>
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<tr>
<td>Pro Steel Engineering Ltd</td>
<td>48a Severnbridge Industrial Estate, Symondscliffe Way, Caldicot, Monmouthshire, NP26 5PW</td>
<td>01291 424949</td>
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<tr>
<td>Radleigh Metal Coatings Ltd</td>
<td>Unit 30, Central Trading Estate, Cable Street, Wolverhampton, WV2 2HZ</td>
<td>01902 870606</td>
</tr>
<tr>
<td>R H Painting Limited</td>
<td>Alexander House, Monks Ferry, Birkenhead, Wirral, CH41 5LU</td>
<td>0870 7892020</td>
</tr>
<tr>
<td>R.L.P. Painting Contractors Ltd</td>
<td>Unit 1, Grange Lane, Balby, Doncaster DN4 9BB</td>
<td>01302 853077</td>
</tr>
<tr>
<td>RMF Construction Services Ltd</td>
<td>Unit 2, Oughton Road, Birmingham, B12 0DF</td>
<td>0121 440 7970</td>
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<tr>
<td>SCA Group Ltd</td>
<td>Waterbridge Ind. Park, Three Legged Cross, Dorset, BH3 1FA</td>
<td>01202 808202</td>
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<tr>
<td>Severn River Crossing Plc</td>
<td>Bridge Access Road, Aust, South Gloucestershire, BS35 4BD</td>
<td>01454 633351</td>
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<tr>
<td>Sherwin-Williams Protective &amp; Marine Coatings</td>
<td>Tackeray House, Bridge Walk, Acock's Green, Birmingham, B27 6SN</td>
<td>0121 706 4000</td>
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<tr>
<td>Shirley Industrial Painters &amp; Decorators Ltd</td>
<td>Grand Union House, Bridge Walk, Acock's Green, Birmingham, B27 6SN</td>
<td>0121 706 4000</td>
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<tr>
<td>Shutdown Maintenance Services Ltd</td>
<td>Kimberley Industrial, Hoo, Rochester, Kent, ME3 9ND</td>
<td>01634 256969</td>
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<tr>
<td>Sitecote Ltd</td>
<td>33 Kielder Close, Ashton in Makerfield, Wigna, WN4 0JE</td>
<td>07714678719</td>
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<tr>
<td>Solent Protective Coatings Ltd</td>
<td>Tegardill Way, Marine Parade, Southampton, Hants, SO14 5JF</td>
<td>02380 221480</td>
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<tr>
<td>South Staffs Protective Coatings Ltd</td>
<td>Bloomfield Road, Tipton, West Midlands, DY4 9E</td>
<td>0121 522 2373</td>
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<tr>
<td>Southern Coating Contractors Ltd</td>
<td>Malmsbury House, 227 Shirley Road, Shirley, Southamptom, SO15 3HT</td>
<td>0238 0702276</td>
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<tr>
<td>Specialist Blasting Services Ltd</td>
<td>Smiths Quay, Hazel Road, Woolston, SO19 5FB</td>
<td>023 8043901</td>
</tr>
<tr>
<td>Specialist Painting Group Ltd</td>
<td>Unit 3 Proprior House, Ashwell Park, Padholme Road East, Fenny Stratford, PE1 5X</td>
<td>01773 309500</td>
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<tr>
<td>Stainless Restoration Ltd</td>
<td>Unit M1, Adamson Industrial Estate, Croft Street, Hyde, Cheshire, SK14 1EE</td>
<td>0161 3686191</td>
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<tr>
<td>Stamford Construction Limited</td>
<td>Barcham Court Business Centre, Taston, Maidstone, Kent, MV18 5BJ</td>
<td>07912037033</td>
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<tr>
<td>Standish Metal Treatment Ltd</td>
<td>Potter Place, West Pimbo, Skelmersdale, Lancs, WN8 9PW, UK</td>
<td>01695 455977</td>
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<tr>
<td>Stobbarts Ltd</td>
<td>Farm House, Lakes Road, Darwen Howe Industrial Estate, Cumbria CA14 3YP</td>
<td>01900 870780</td>
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<tr>
<td>Story Contracting Ltd</td>
<td>Burgh Road Industrial Estate, Carlisle, Cumbria CA2 7NA</td>
<td>07730 764414</td>
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<tr>
<td>Stream Marine Training Ltd</td>
<td>River Side Park, Middlesbrough, Cleveland TS2 1UT</td>
<td>01642 228141</td>
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<tr>
<td>Tees Valley Coatings</td>
<td>Rivside Park, Middlesbrough, Cleveland TS2 1UT</td>
<td>01642 228141</td>
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<tr>
<td>Surfase Technik (Oldhill) Ltd</td>
<td>Roverhouse Works, Deepdale Lane, Lower Gomal, Dudley, DY3 2AF</td>
<td>01384 457610</td>
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<tr>
<td>TEMA Engineering Ltd</td>
<td>S-5 Currant Road, Cardiff, CF10 5DF, UK</td>
<td>020920 344556</td>
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<tr>
<td>Tinsley Special Products</td>
<td>Enterprise House, Durham Lane, Eaglescliffe, Stockton-on-Tees TS16 0PS</td>
<td>016427 84279</td>
</tr>
<tr>
<td>T I Protective Coatings</td>
<td>Unit 6, Lodge Bank, Crown Lane, Horwich, Bolton, Lancs, BL6 9HU</td>
<td>01204 468080</td>
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<tr>
<td>Torishima Service Solutions Europe Ltd</td>
<td>Sunnyside Works Gartshirene Road, Coatbridge M5S 2JY</td>
<td>0123642390</td>
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<tr>
<td>Transys Systems Ltd</td>
<td>Morsal House, 1 Bramble way Alfret, Derbyshire, DE5 4RH</td>
<td>01773 831100</td>
</tr>
<tr>
<td>Underhill Engineering Ltd</td>
<td>Building 152 - Langar North Industrial Estate, Harby Road, Langar, NG13 0HY</td>
<td>01949 869784</td>
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<tr>
<td>Vale Protective Coatings Ltd</td>
<td>Building 152 - Langar North Industrial Estate, Harby Road, Langar, NG13 0HY</td>
<td>01949 869784</td>
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<tr>
<td>Walker Construction (UK) Ltd</td>
<td>Park Farm Road, Folkestone, Kent, CT19 5DY</td>
<td>01303 851111</td>
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<tr>
<td>Wardle Painters Ltd</td>
<td>Unit 3, Wimborne Building, Atlantic Way, Barry Docks, Glamorgan, CF63 3RA, UK</td>
<td>01446 748620</td>
</tr>
<tr>
<td>Wescott Coatings &amp; Training Services Ltd</td>
<td>9b/9c Tyne Point, Shaftesbury Avenue, Simonside Industrial Estate, Row, Tyne &amp; Wear, NE32 3UP</td>
<td>0191 497 5550</td>
</tr>
<tr>
<td>W G Beaumont &amp; Son</td>
<td>Beaumont House, 8 Bernard Road, Romford RM7 0HX</td>
<td>017708 749202</td>
</tr>
<tr>
<td>William Hare Ltd</td>
<td>Brandlestone House, Brandlestone Road, Bury, Lancs, BL8 1JJ, UK</td>
<td>01611090000</td>
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<tr>
<td>Wood Group Industrial Services Limited</td>
<td>Kirkstone House, St Omers Road, Western Riverside Route, Gateshead Wear, NE11 9EZ</td>
<td>0191 4932600</td>
</tr>
<tr>
<td>Xervon Palmers Ltd</td>
<td>331 Charles Street, Royston, Gloucestershire, GL2 2QJ.</td>
<td>01441 212 8777</td>
</tr>
<tr>
<td>Visit the ICATS website</td>
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