

# THE INSTITUTE OF CORROSION – A RUSTY PAST, A GOLDEN PRESENT AND A SUSTAINABLE FUTURE



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With the notable exception of gold and the occasional chunk of meteoric iron, metals are as artificial as plastic bags. This is because most metals only exist in stable combined states with other elements. So iron, as an example, can be found as an oxide such as haematite or a sulphide as in pyrites or 'Fool's Gold'. Once the artificial nature of metals is accepted it is perhaps easier to understand why we have problems of oxidation and corrosion. Corrosion is a natural and normal process, returning the metals to their lowest energy state. Most commonly employed metals have a similar life-cycle to their masters. Once 'born' their lifespan is dependant upon the job they are given and how well they are looked after. Put to good use and properly cared for they can last to 100 years and beyond. However in this context gold remains all but immortal and is treated accordingly.

There is something wonderfully appropriate about an organisation committed to the study and control of metallic degradation celebrating a milestone named after a metal renowned for its durability. The membership certainly appears to be more durable than the metals they strive to protect,

with many of the original founders still active in the Institute and ready to join in the celebrations, which include a special event at the Thames Barrier, fifty years to the day after the first British organisation dedicated to corrosion was founded.

The birth of the Institute can be traced back to the British Association of Corrosion Engineers (BACE), founded on 21st May 1959. It was the brainchild of Dr John Tiratsoo who was the then owner and driving force of a publication entitled Corrosion Prevention and Control. An announcement was made to the national press at a social event at the Rembrandt Hotel which stated that the Objects of the Association would be:

*"to generally promote the dissemination of technical information about corrosion activities and to develop, by means of social activities the free interchange of information among members. In due course the Association which is essentially non profit making will progress towards the establishment and acceptance of suitable qualifications for corrosion engineers and promotion of standardisation in the terminology and techniques of corrosion control.*

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

BACE was clearly aimed at practising corrosion engineers, already active in the immediate post-war period. At around the same time another society aimed squarely at academia where the fundamentals and processes of corrosion were being studied was founded under the banner of the Corrosion Science Society. The society initiated and organised an annual conference called the Corrosion Science Symposium, still an annual event and also in its 50th anniversary year. From inception, the Symposium has been an event where mainly academic papers are presented, often by young researchers making their first presentations to an informed though generally benign audience of fellow students and academics.

The Corrosion Science Society became the Corrosion and Protection Association (CAPA) in the mid 60s and BACE eventually became the

Institute of Corrosion Technology (ICorrT). The latter amalgamated with CAPA on 1st January 1975 to become the Institute of Corrosion Science and Technology which later in 1988 became the Institute of Corrosion. The Institute still maintains two divisions, the Corrosion Science Division (CSD) and Corrosion Engineering Division (CED), representing the interests of the largely academic or predominantly engineering membership.

As far as corrosion science and engineering is concerned, probably the most significant single event of the past half century was the commissioning by Tony Benn in 1969 of the Hoar Report. This key document was the product of a committee chaired by the late T P Hoar who was one of the doyens of corrosion science and had greatly contributed to the understanding of corrosion processes while working with U R Evans at Cambridge University.

The committee was asked to estimate the cost of corrosion in various industry sectors and finally reported in 1971 under the title Report of the Committee on Corrosion and Protection. Costs to the nation as a direct result of corrosion were judged to be approximately 4% of GDP, a figure that has proved to be remarkably robust both in this country and the developed world in general. Equally importantly, it was estimated that at least 25% (ie 1% of GDP) of this enormous loss to the nation could be saved in a cost effective manner simply by the immediate application of known technologies. The equivalent monetary figures for the USA are truly eye watering, exceeded only by those recently quoted with respect to the present 'economic difficulties'.

Direct outcomes of the Hoar Report included the establishment of a National Corrosion Advisory Service at NPL, the founding of the Corrosion and Protection Centre at the former UMIST and the provision of commercial testing and consultancy by the Corrosion and Protection Centre Industrial Service (CAPCIS). During the following decades there have been significant new developments and refinements of materials and methods for the control and avoidance of corrosion. For example, cathodic protection which can be traced all the way back to Sir Humphry Davy FRS and his work on preventing the corrosion of the iron nails used to attach the copper sheeting to the bottom of Royal Navy ships, ably aided by his humble lab assistant, Michael Faraday.

Over the last 50 years cathodic protection has developed into a primary method of protecting submerged and buried metallic structures including ships, pipelines and oil rigs and has contributed hugely to the success and safety of the oil and gas industries. Through major contributions by UK based scientists and engineers, cathodic protection is now also used to protect major reinforced concrete structures such as bridges and tunnels and many of the historic steel framed masonry building to be found in city centre locations such as Regent Street and Fleet Street in London and Deansgate in Manchester. Should you ever be outside Gloucester Road Underground Station, take note of the carefully restored teapot red faience finish and consider that since 1997 the wrought iron structural frame hidden within has been protected by a modern variation of Humphry's technique.

## . . . The replacement of a tonne of steel lost to corrosion results in the generation of two tonnes of carbon dioxide. . .

The next 50 years will bring their own challenges, chief amongst them being an increasing need to be aware of sustainability issues and avoiding waste. In this area the Institute and its membership are well positioned to assist. The replacement of a tonne of steel lost to corrosion results in the generation of two tonnes of carbon dioxide. We have been acting to enhance sustainability for decades without even realising – we just thought we were saving money and enhancing safety. Through the application of techniques such as cathodic protection, enhanced protective coating systems, intelligent design and optimised manufacturing procedures it is already possible to ensure durability in service without risk to people, the environment or the economy.

Regarding the Institute of Corrosion's recent connections with Government, we have been a member of the Parliamentary and Scientific Committee for about the last ten years. Meetings are regularly attended by the Technical Secretary and, whenever possible, the current President. Matters where corrosion is of importance have been raised many times in that period with topics ranging from nuclear waste disposal to ageing aircraft and in December 2006 one of

our now Past-Presidents, Professor Stuart Lyon of the University of Manchester, made a keynote presentation on the role of the science of corrosion in extending the useful life of materials as part of the programme entitled Materials, Minerals and Mining – Innovation, Conservation and Wealth Creation. We look forward to our continuing active association with the Committee and expect to be able to offer other significant contributions in the coming years.

Returning to our 50th anniversary celebrations on 21st May, the Thames Barrier was a natural choice for the location as many of the Institute's original founder members were directly involved with the successful corrosion prevention of this prestigious structure. 2009 is also the Thames Barrier's 25th anniversary year. A full technical and social programme including presentations on the Thames Barrier and Forth Road Bridge plus a panel discussion on the developments in pipeline protection over the last half century have been prepared. All current members and past supporters have been invited. The Institute is very aware of its past, particularly this year, but its membership is already looking ahead with a determination to deliver a safer, more durable and far more sustainable future.

