

New EFC Working Party on Tribo-Corrosion

Tribo-corrosion is a complex degradation process affecting metals and alloys, which results from the combined effects of mechanical loading and environmental effects. The combination of processes such as sliding and rolling friction, fretting, impact, erosion, etc., together with electrochemical or chemical attack can result in various forms of deterioration ranging from loss of section thickness to cracking. Many aspects of tribo-corrosion processes have still to be elucidated because of the complexity of the individual processes and the need to take into account synergies between these processes. To make matters worse, when a tribo-corrosion process occurs in the presence of biological species, bio-tribological processes can modify the material degradation kinetics and even lead to unknown surface properties.

There is much interest globally in tribo-corrosion at present but so far, with one or two exceptions, the work has not been very closely co-ordinated and there has been relatively little collaboration. Only recently has CEFRACOR in France established a Tribo-Corrosion Committee involving French, Swiss and Belgian research teams, and in the UK the Tribo-corrosion network TriCORR-NET has been established with the following website: www.tricornet.strath.ac.uk.

Against this background, a proposal to form a new EFC Working Party on Tribo-Corrosion was made earlier this year by CEFRACOR, one of the two EFC Member Societies in France. This nominated Dr. Pierre Ponthiaux of Ecole Centrale Paris (Chairman of the CEFRACOR Tribo-corrosion Committee) and Professor Jean-Pierre Celis of Katholieke Universiteit Leuven (Person in Charge of European Relations) as the contact persons. The proposal found strong support within the EFC Science and Technology Advisory Committee and Board of Administrators, and when expressions of interest were sought more widely afield, positive responses were received from over 40 individuals from 12 industrial concerns, 11 research centres and 20 universities distributed within 19 different European countries.

The formation of a new EFC Working Party must have the support of EFC Member Societies in at least four different countries in addition to the country from which the proposal was made. Therefore, the next stage was for the EFC Scientific Secretary, Paul McIntyre, to initiate an enquiry within the EFC. Very soon, support had been received from member societies in Belgium, Norway, Portugal, Sweden, The Netherlands, UK and Yugoslavia. Arrangements were, therefore, made to hold the inaugural meeting of the new working party, EFC WP 18 on Tribo-Corrosion, in Granada on Monday 23rd September 2002. This was attended by sixteen delegates, from Belgium, France, Italy, Germany, Switzerland and UK, of whom eleven belonged to EFC Member Societies.

At the meeting, Dr McIntyre welcomed delegates and explained that its primary aims would be to appoint a chairman and a secretary, to prepare objectives and terms of reference for the working party, and to develop a provisional membership list. When the election of officials took place, Professor Celis was elected unanimously as Chairman of WP 18 and Dr. Ponthiaux was also elected unanimously as its Secretary.



Dr Pierre Ponthiaux (left) and Professor Jean-Pierre Celis

Professor Celis proposed that the purpose of WP 18 should be to make both the industrial and academic worlds aware of the problems and possible synergies between corrosion and wear. He went on to report the results of a survey conducted among those who had expressed interest in the formation of the working party on tribo-corrosion. This had shown the following levels of support for various aspects of the subject:

- Tribo-corrosion in general (36)
- Lifetime prediction of components/materials in tribo-corrosion (27)
- Tribo-corrosion in nano-materials (21)
- New ways of lubrication (20)
- In-situ monitoring of tribo-corrosion (19)
- Bio-tribology (16)
- Environmental and/or health hazards of tribo-corrosion (12)

It was envisaged that diverse fields of application would benefit from the existence of the working party, including:

- Transportation (automotive, trucks, aeronautics, ships)
- Energy production
- Electronics (connectors, MEMs)
- Implants (hip, prostheses, dentistry, knee joints)
- Offshore Industry
- Materials processing (ferrous and non-ferrous alloys and composites, ceramics, nanomaterials, tribo-reactive materials and magnetic materials)
- Defence (helicopters)
- Machining and shaping of materials (e.g cutting fluids)
- Lubrication (environmentally friendly products, additive-free nanolubrecants)
- Paints and varnishes

There was agreement that the best way of organising the large number of tasks facing WP 18 would be by means of separate task forces each with distinct responsibilities and its own chairman. Accordingly, the following appointments were made:

Task Force 1. Science and Technology Watch – Volkmar Neubert, DN Institute

Task Force 2. Inventory of Centres of Excellence – Margaret Stack, University of Strathclyde

Task Force 3. Inventory of present and future industrial needs and scientific knowledge to be developed in tribo-corrosion, bio-tribology, and nano-materials tribo-corrosion – Dieter Landolt, EPFL, Lausanne, Switzerland

Task Force 4. Establishment of Specific R&D Actions – Stephan Mischlev, Swiss Federal Institute of Technology, Zurich, Switzerland

Task Force 5. Standardisation – Alfons Fischer – University of Essen, Germany

Task Force 6. Knowledge Dissemination, Education and Training – Lidea Benea, University “Dunarea de Jos” of Galati, Romania

Task Force 7. Sustainable Growth – Claude Cabrillac, CEFRACOR

It was decided that work on establishing these task forces and commencing activity would begin as soon as final approval for WP 18 had been given by the EFC General Assembly, which was due to meet in five days' time. An important aim would be to contribute papers to a session on Tribo-corrosion to be held during EUROCORR 2004 in Nice. For this event it is planned that papers will be presented in four topic areas, as follows:

- Basic Testing of Tribo-corrosion
- Technological Testing of Tribo-corrosion
- Monitoring of Tribo-corrosion
- Industrial Case Histories of Tribo-corrosion

Following the resolution of a number of administrative matters, it was agreed that WG 18 should meet twice yearly, and that the next meeting should take place in Germany during Spring 2003.

The minutes of the inaugural meeting were discussed at the meeting of the EFC Science and Technology Advisory Committee in Granada on Friday 27th September, where the new working party received endorsement from all members. On the following day, the EFC General Assembly gave its unanimous approval to the formation of EFC WP 18. This was the final stage in the approval process.

Those with interests in the field of tribo-corrosion who would like more information about WP18 should contact either Professor Celis (jean-pierre.celis@mtm.kuleuven.ac.be) or Dr Ponthiaux (pponthia@ecp.fr).

Paul McIntyre
EFC Scientific secretary