

WP18@EUROCORR 2016

The WP18 session on Tribocorrosion took place on September 13th and September 14th during Eurocorr2016, a mostly appreciated conference thanks not only for the excellent scientific program but also for the perfect organization and the exceptional frame of the historical and gastronomic city of Montpellier.

During the Tribocorrosion session at the Eurocorr 2016 12 papers and 3 posters were presented in an active and dynamic atmosphere. In general, a quite animated audience constituted by around 40 people was attending the session. The variety of aspects treated in the session was broad, involving both fundamental and engineering issues including coatings, modelling, marine and biomedical applications, fretting corrosion, metal forming and tribometallurgical phenomena. The high scientific level of the talks lead to interesting discussions.

The maturity and efficiency of triboelectrochemical techniques was illustrated by several studies dealing with materials screening for biomedical implants undergoing fretting corrosion, tribocorrosion characterization of metallic wires for orthodontic applications, marine applications and fretting in power plants.

Materials solutions tailored for tribocorrosion applications were presented. In the field of coatings and surface modifications, the properties of relatively thick oxide films generated by thermal oxidation or plasma electrolytic processes were presented in two distinct lectures. Good results were obtained with both processes although the final outcome depends critically on process parameters that should be well controlled in order to avoid porosity or cracking due to excessive residuals stresses. The effect of metal microstructure was investigated by comparing the behavior of nano-crystalline, micro-crystalline and single crystal nickel subject to waterjet. Interestingly the microstructure was shown to have little effect and this because a tribometallurgical layer develops on the metal surface and determines the further metal behavior independently on the original state. The impressive FIB cross sections revealed in detail the extremely large plastic flow that metal surface undergo during tribocorrosion.

For the first time a large number of lectures dealt with modelling. This reflects on one hand a certain maturity in experimental techniques yielding solid quantifiable results. On the other hand, the variety of experimental results requires models for they correct interpretation and for rationalizing the influence of different parameters. Modelling was approached by different mechanistic methods related to the third body model, to consideration on local contact pressures and their time evolution during wear, to repassivation kinetics. The limitations of global synergistic descriptions of tribocorrosion was also highlighted. With respect to the modelling a very successful case consisted in a complete model integrating the phenomena of mechanical wear, wear accelerated corrosion and lubrication was applied to face the hip-joint degradation problem. With the model, aspects such as the diameter of the head, the clearance of the hip-joint or the sliding velocity, the mechanical and chemical properties of the wearing materials on wear were precisely described and results from hip joint simulators, which required a very complex and costly experimentation, were perfectly predicted.

Once more, a good scientific year for the WP18.

During the business meeting the new organization of the WP-18 was presented. S. Mischler, the new Chair, opened the discussion and asked for the feedback from the audience after the two-half days of tribocorrosion session. In general, the people were positive with respect to the outputs from the talks, the scientific level and also with the variety of treated aspects. Several topics were discussed:

- 1.- Education on tribocorrosion: a demand for specific courses on tribocorrosion (theoretical aspects, experimental techniques and case studies) was highlighted.
- 2.- Closer relations with industrial problems and scientific advice to companies which may have tribocorrosion problems should be further developed
- 3.- Dissemination of tribocorrosion achievements should be promoted

In order to achieve those goals two clear proposals were made:

- a) to organize a tribocorrosion course next year during the Eurocorr2017 in Prague and
- b) to design a Business meeting with invited speakers from companies to deal with industrial problems in a tribocorrosion engineering forum before the usual tribocorrosion session.

Finally, a short ceremony took place to thank Pr. J-P Celis and Pr. P. Ponthiaux, past Chair and vice chair of the WP18. The tribocorrosion community is indeed indebted to Prof. Celis and Pr Ponthiaux as they initiated and developed the WP18 which initial official step goes back to September 2002. The following sentences have been extracted from the EFC report (http://efcweb.org/efcweb_media/tribo.pdf) highlighting the starting point of the tribocorrosion WP 18 in EFC and Eurocorr: *'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.'* As acknowledgment for the dedication and contributions of Pr. Celis and Pr. Ponthiaux to the tribocorrosion community, honor diplomas were handed over to them by Pr. Philippe Marcus, chairman of Eurocorr 2016, Pr. Arjan Mol, chair of the international scientific committee, and Marcel Roche, president of the Cefracor. In their allocutions, Pr. P. Marcus and the M. Roche highlighted the importance of actively promoting and developing the scientific exchanges among scientists in a given field, a task that Pr. Celis and Pr Ponthiaux performed with extraordinary dedication and involvement.

Thanks again Jean-Pierre and Pierre!



Pierre Ponthiaux (left) and Jean-Pierre Celis exhibiting their honor diplomas received for their dedication and contributions to the tribocorrosion community.