ESIS TECHNICAL COMMITTEE 10 “ENVIRONMENTALLY ASSISTED CRACKING”

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We present a brief sketch of the history of creation of the Technical Committee 10 on “Environmentally Assisted Cracking” at the ESIS and outline its principal tasks. They are based on the application of the approaches of fracture mechanics to the investigation of the processes of corrosion cracking and corrosion fatigue. Since 1990, the TC 10 has organized six meetings with 154 participants from 15 countries. Recent years are marked by a significant increase in the number of participants from the countries of Eastern and Central Europe. As an achievement of the TC 10, one can also mention the appearance of a series of methodical works, in particular, by R. J. H. Wanhill “Fracture Control Guidelines for Stress Corrosion Cracking of High Strength Alloys” and by G. Gabetta and I. Cole “Fracture Control Guidelines for Environmentally-Assisted Cracking of Low-Alloy Steels.” In addition, the TC 10 developed the first draft of “Recommendations for Stress Corrosion Testing Using Precracked Specimens” (ESIS Document P4-92D). In future, the attention of the TC 10 will also be given to the development of procedures for the evaluation of lifetime, investigation of the mechanisms of corrosion cracking and corrosion fatigue, and simulation of these processes.

European Structural Integrity Society (ESIS)

The European Structural Integrity Society (ESIS) was established as the European Group on Fracture (EGF) in 1976. It is pan-European with 24 nation states as members plus the CEU. The nation states constitute the ESIS Council, the supreme body, and institutional, industrial, and individual members make up the ordinary membership.

ESIS is an interdisciplinary body involved in the development of the understanding and application of all issues relating to the integrity of structures and components operating in life-limiting or otherwise damaging situations. It has a wide representation from learned societies, technological research institutions, manufacturers, and insurers and covers the complete spectrum from fundamental research to the end-user.

ESIS’ objectives, as laid down in the Statutes, include the following:
To organize technical meetings, including the biennial European Conference on Fracture, ECF [the next one, ECF 12, will be in Sheffield (UK) in September 1998].
To consolidate scientific and technological developments for the benefit of European users.
To make recommendations to standardization bodies, users, etc.
To develop an improved scientific discourse between its member states.
To assist in the technological transfer, via educational courses, etc.

The Technical Committees (TCs) are its working units. These are run by chairmen and cochairmen and organized internationally. They perform appropriate collaborative and cooperative exercises, hold technical meetings, receive and disseminate information, and report to the Council. Some of these TCs have Subcommittees which address special issues. As of now, the ESIS has eleven TCs and nine Subcommittees.

Technical Committee 10

The Technical Committee 10, “Environmentally Assisted Cracking,” is the second youngest TC. It was initiated at the first workshop on Fracture Mechanics Approach to Corrosion Assisted Cracking organized in 1990 by the GKSS Research Center in Geesthacht, Germany. It was then formally established as a TC of the ESIS in 1991 after the second workshop meeting in Hannover.

The main objective of the TC 10 is to merge experiences of the following two basic research areas:

- fracture mechanics as a method of failure assessment and
- environmental degradation of materials.

Hence, the work is strongly related to the application of fracture-mechanics-based test and evaluation techniques to problems of environment-assisted cracking (EAC). So far, the activities have essentially been concentrated on environmental cracking caused by monotonic loading although issues concerning corrosion fatigue have also been discussed at past meetings.

Since the TC meetings are open to everyone who is interested in the matter and there is no special membership to the committee, the number of members can only roughly be estimated. In the past, approximately 60 persons have took active part in the work of TC 10. The current mailing list comprises a total of about 100 persons. The present Chairpersons of TC 10 are Dr. Giovanna Gabetta from ENIRICERCHE, Italy, and Dr.-Ing. Wolfgang Dietzel from GKSS Research Center, Germany.

Since 1995, the TC 10 has a Subcommittee on “Hydrogen Degradation.” Prof. O. E. Andreikiv from the “Proton” R&D Center, Ukraine, is the Chairman of this Subcommittee with Prof. H. Nykyforchyn from the Karpenko Physicomechanical Institute of the Ukrainian Academy of Sciences acting as Secretary.

The special interests of this Subcommittee are connected with the investigations of degradation of materials under long-term loading affected by temperature changes and hydrogen- or hydrogen-sulfide-containing media (gas and petroleum refining plants, offshore structures, etc.), investigations of hydrogen degradation in metal welded joints under long-term loading, methods for diagnosing and prevention of hydrogen degradation in structural elements, as well as with the development of inspection methods for fracture in structural elements operating in contact with hydrogen-containing media.

Activities

In the past, the TC 10 organized six workshop meetings, the minutes of which can be found in the editions of the ESIS Newsletter which are listed below together with the names of the local organizers of these workshops:

1990 in Geesthacht, Germany (GKSS Research Center Geesthacht; ESIS Newsletter, No. 13, pp. 7–8);
1991 in Hannover, Germany (University of Hannover; ESIS Newsletter, No. 16, pp. 14–15);
1992 in Northeastpolder, The Netherlands (NLR National Aerospace Laboratory; ESIS Newsletter, No. 18, pp. 8–9),
1993 in Rez, Czech Republic (Nuclear Research Institute, Rez; ESIS Newsletter, No. 23, p. 9),
1995 in Copenhagen, Denmark (Force Institute; ESIS Newsletter, No. 27, p. 5),
1996 in Rez, Czech Republic (Nuclear Research Institute, Rez; Newsletter, No. 30, pp. 8–9).

These meetings were attended by a total of 154 participants from 15 different countries (Fig. 1). As with the total numbers of delegates attending the workshops, the number of represented countries continuously increased from five at the first meeting in Geesthacht to 12 at the last workshop in Rez (Fig. 2).

Figure 3 shows that the work of the TC 10 attracts not only scientists from universities (UNI) and research institutes (RES) but also from industrial companies (IND) (about one third of the total number of participants).

Another interesting feature is the analysis of evolution of the origins of participants attending the TC 10 workshops. Since an almost exclusive EU event in 1990, the number of delegates from the countries of Central Europe (CCE) and new independent states of the former Soviet Union (NIS) was constantly increasing. In Fig. 4, the expression “Others” stands for delegates coming from Norway, Switzerland, and Israel. This diagram clearly demonstrates the successful integration of scientists coming from all parts of Europe into the work of the TC 10. We hope that this development will continue.