

**Report on Meeting of Commission X**  
**“Structural Performance of Welded Joints – Fracture Avoidance”**,  
**held in Dubrovnik, Croatia, July 2-4, 2007**

**By: John Bowker, Delegate to Commission X**

Monday 8:30 to 12:30, July 2, 2007

1. The meeting opened with a welcome from the Chair, Mustafa Kocak of GKSS and a request for Approval of the Agenda which was given by the delegates.
2. The Chairman’s report for 2006 (Doc. X-1612-07) was presented focussing on issues related to the publication, “Welding in the World”. It was stated that a special issue of this publication containing documents from a joint session of Commissions V/X/XI held in Prague in 2006 together with a few recent documents all devoted to NDT and fitness for service was published in 2007 (volume 51, No. 5/6). New developments related to publication in the Welding in the World, in which a peer review process is to be initiated, were described. A request for reviewers from Commission X was made.
3. The next item on the agenda was a “Review of the Working Programme of Commission X” which consisted of:
  - Best Practice Documents of Commission X from 2006 of which the following were recommended:
    - X-1596-06 : Fracture mechanics assessment of beam-to-column joints subjected to cyclic and dynamic loading.
    - X-1600-06 : FKM guideline "fracture mechanics proof of strength for engineering components" - Overview and extension topics.
    - X-1603-06 : FITNET Fitness-service-for-service procedure: An overview
    - X-1604-06 : Treatments of structural welds using FITNET fitness for service assessment procedure.
    - X-1612-06 : On the Residual Stress Profiles in New API 579/ASME FFS-1 Appendix E.
  - Draft Strategic Plan
    - A draft strategic plan was presented for 2007 to 2012 for Commission X with the IIW goal to identify, create, develop and transfer best practices for sustainable development in a sustainable environment. Key strategies within four objectives were presented with a request from delegates to review the information and provide comments to the Chair at their earliest opportunity.

4. The following technical presentations were given:

- X-1614-07 : Effect of un-welded face on behavior of brittle crack arrest in tee joint structure
- X-1617-07 : Evaluation of heterogeneity of microscopic deformation and stress distribution in steel and its weld by FEM-MD coupling simulation
- X-1618-07 : Reduction of Welding Deformation by Split Laser Beams in Automobile Parts
- X-1613-07 : UIT application for angular distortion compensation in welded T-joints
- X-1619-07 : Temperature distribution for reduction of angular distortion by in-process control welding
- X-1621-07 : Data required to assess fitness for service of a structure presenting a defect
- X-1624-07 : 3D Finite Element Analysis on influence of various factors for reducing welding distortion of fillet welded structures
- X-1615-07 : Numerical investigations on the residual stress field in a clad plate due to the cladding process.

Tuesday 8:30 to 12:30, July 3, 2007

4. (cont'd)

- X-1626-07 : Development of girth weld flaw assessment procedures for pipelines subjected to plastic straining.
- X-1628-07 : Simulation of the effect of steel properties and plastic constraint on CTOD-R curve.
- X-1630-07 : Comparison of Residual Stress Measurements with Current Fitness-For-Service Assessment Procedure for Thick Section Repairs.
- X-1634-07 : Failure behavior of laser spot welds of trip800 steel sheet under coach - Peel loading.
- Discussion of the Determination of CTOD Values.
- X-1625-07 : Comparison of CTOD Estimation Procedures.
- X-1627-07 : FITNET Fitness-For-Service fracture module software.

Wednesday 8:30 to 18:00, July 4, 2007

5. A joint meeting between Commissions X, XIII and XV was held with the following presentations given:

- Residual Stress and Distortion:
  - X-1631-07/XIII-2190-07/XV-1242-07 : Annual Report of JWG X/XIII/XV on Residual Stress and Distortion Prediction.
  - X-1633-07/XIII-2199-07/XV-.....-07 : JWG X/XIII/XV Report on the Round Robin Activity on Residual Stress Analysis.
  - X-1620-07/XIII-2169-07 : Numerical analysis of weld distortion considering phase transformation effects.

- XIII-2171r1-07 : Influence of welding residual stresses and notch effect on fatigue data for welded joints and components.
  - XIII-2172-07 : Residual stresses from welding, prediction by fea and verification by measurements and fatigue tests.
  - XIII-2153-07 : Residual stresses and near surface material condition of welded high strength steels after high frequency mechanical post-weld treatments
  - X-1632-07/XIII-2198-07/XV-1262-07 : State of the Art Document on Residual Stress Compendium.
- Design of Welded Tubular Structures:
    - XIII-2186-07 : Annual Report of IIW Subcommittee XV-E Tubular structures to IIW Commissions XIII and XV.
    - XIII-2159-07 : Stress concentration factors at welds in tubular sections and pipelines.
    - XV-1256-07 : Ductility and ultimate strength of cold –formed rectangular hollow section welded joints in arctic conditions.
    - XIII-2185-07 : Annual report 2007 of IIW Joint Working Group XIII-XV.
    - XIII-2151r1-07 : Recommendations for fatigue design of welded joints and components.
    - XIII-2158-07 : Assessment of multiaxial spectrum loading of welded steel and aluminium joints by modified equivalent stress and gough-pollard algorithms.
    - XIII-2162-07 : Fatigue strength evaluation formula for cruciform welded joints failing from weld roots under bi-axial loading.
    - XIII-2192-07 : Probabilistic fatigue analysis of a pipe under thermal mixing.
    - XIII-2193-07 : Estimation of fitness for service of a structure presenting a fatigue crack using two software packages.
    - X-1629-07 : Fatigue crack propagation and fracture analysis of aerospace Al-alloy flat panels with laser beam welded stringers and clips.
    - XIII-2160-07 : Low cycle fatigue assessment for welded joints based on local strain approach.
    - XIII-2174-07 : Influence of parent metal strength on the fatigue strength of parent material with machined and thermally cut edges.
    - XIII-2157-07 : Fatigue design values for welded joints of the wrought magnesium alloy az31 (iso-mgai3zn1) according to the nominal, structural and notch stress concepts in comparison to welded steel and aluminium connections.
  - Fatigue Assessment and Design:
    - XIII-2187-07 : IIW Working Group XIII - WG 3 and XV - WG 10 "Stress Analysis" Annual Report.
    - XIII-2166-07 : Local stress analysis and fatigue assessment of bracket toes based on measured weld profile.
    - XIII-2181-07 : Thickness effect in mesh-insensitive structural stress.