Meeting: **Tags:** Notes; Proceedings; Standardisation document

C-X Structural Performance of Welded Joints – Fracture Avoidance

Agenda Annual Assembly 2026

X-2135-2026

Author: Mitsuru OHATA

Comments: Monday, 13 to Wednesday, 15 July 2026, 14.00 to 18.00, Room " Mozart 2"
Meeting to be held in person only, not hybrid

1. Agenda for the meetings

Monday 13 July 2026

	Agenda Item	Responsibility	Action
14.00	1. Introduction	Mitsuru Ohata	
	1.1. Welcome	Mitsuru Ohata	Information
	1.2. Approval of the Agenda	Mitsuru Ohata	**Motion required**
14:05	2. Review of C-X Meeting, 2025-2026	Mitsuru Ohata	
	2.1. Approval of draft minutes of C-X meeting at Annual Assembly in Genoa, Italy, 2025	Mitsuru Ohata	**Motion required**
	2.2. Approval of draft minutes of C-X intermediate meeting in OCAS NV/Ghent University, Belgium, 2026	Mitsuru Ohata	**Motion required**
	2.2. Terms of reference and Operational plan of C-X	Mitsuru Ohata	Information
	2.3. Status of C-X papers in Welding in the World (WitW)	Mitsuru Ohata	Information
14.15	3. Technical presentation	Mitsuru Ohata	Information
	3.1. S1: Advancement of FFS –Fracture toughness evaluation	Authors	
	3.2. S2: Advancement of FFS –Stress Corrosion Cracking	Authors	
	3.3. S3: Advancement of FFS –Fatigue	Authors	
16.15	3.4. S4: Advancement of FFS –Welding residual stress	Authors	
18:00	Close of Day 1 Activities		

Tuesday 14 July 2025

	Agenda Item	Responsibility	Action
14.00	4. Technical presentation	Mitsuru Ohata	Information
	4.1. S5: Advancement of FFS –Brittle fracture	Authors	
	4.2. S6: Dissimilar joint	Authors	
16:15	5. WG: Fracture Toughness Test at Cryogenic Temperature	Jung Goo Park	Information
	5.1. Presentation	Authors	
18:00	Close of Day 2 Activities		

Wednesday 15 July 2026

	Agenda Item	Responsibility	Action
14.00	6. SC-AM: Fracture Avoidance in Additively Manufactured Parts/Components	Mustafa Koçak Fikri Bashar Yalciner	Information
	6.1. Presentation	Authors	
16.15	7. Technical presentation	Mitsuru Ohata	
	7.1. S7: Advancement of FFS –Ductile fracture 2	Authors	
	7.2. S8: Environment induced fracture –Hydrogen		
17.30	8. Resolutions	Mitsuru Ohata	**Motion required**
	8.1. Recommendation of documents to Welding in the World	Delegate	**Motion required**
17.50	9. Next meeting	Mitsuru Ohata	Information
	9.1. Intermediate meeting	Delegate	Information
	9.2. 80th Annual Assembly		Information
18:00	Close out of C-X		

2. Commission Leadership

Commission X —Structural Performance of Welded Joints – Fracture Avoidance			
Chair	Mitsuru OHATA	Japan	ohata@mapse.eng.osaka-u.ac.jp
Vice Chairs	Gyubaek AN	Korea	gyubaekan@chosun.ac.kr
Sub-commission SC-AM :			
Chair	Mustafa Koçak	Turkey	MKOCAK@gedik.com.tr
Vice-Chair	Fikri Bashar Yalciner	Turkey	basharyalciner@gmail.com
Working group WG :			
Chair	Jung Goo Park	Korea	jgbest.park@samsung.com

3. Terms of Reference

C-X Summary for 2026 Annual Report – INTEGRATED HIGHLIGHTS FROM IIW TECHNICAL COMMISSIONS

ADVANCING WELDING SCIENCE AND TECHNOLOGY:
Structural Integrity - Ensuring Reliability and Performance

The Structural Integrity group focuses on the fundamental challenge of translating advances in welding and joining technologies into structures that are safe, reliable and fit for service. As materials, processes and manufacturing routes continue to increase in complexity, structural integrity assessment plays an essential role in supporting industrial application and ensuring long-term performance.

One of the main areas of activity within the group concerns the structural integrity of additively manufactured components. Work in this area addresses the influence of welding and AM process variables on microstructure, fracture behaviour and fatigue performance. Sub-commissions and dedicated working groups have been established to develop practical methodologies for fracture avoidance, fitness-for-service assessment and the qualification of AM components for demanding applications.

The ongoing energy transition has introduced new and challenging service environments, with hydrogen technologies emerging as a major topic across several Commissions. Current research activities include fracture toughness testing at cryogenic temperatures for liquid hydrogen storage, studies of hydrogen-induced fracture mechanisms in steels, and the assessment and inspection of welded joints in hydrogen pipelines. Round-robin testing programmes, focused intermediate meetings and the preparation of draft standards all demonstrate the strong commitment of the Structural Integrity group to supporting the safe deployment of hydrogen infrastructure.

Artificial Intelligence and Machine Learning are increasingly acting as key enabling tools within this group. They support activities such as microstructure simulation, prediction of weld properties, and fracture and fatigue assessment, and are being explored more widely for the design and evaluation of welded structures. In parallel, knowledge exchange is strengthened through joint seminars, symposia and collaborative meetings.

Annex : Detail of Agenda [Doc. X-2135-2026]

Annual Assembly 2026
Salzburg, Austlia
Agenda

C-X: Structural Performance of Welded Joints – Fracture Avoidance
July 13-15, 2026
Room@ Mozart 2
Chair: Mitsuru Ohata (Japan)

Monday, 13th July – Room@ Mozart 2 (14:00 – 18:00)

1. Preliminary Items

14:00 – 14:05

(a) Welcome address (Prof. M. Ohata, C-X Chair, Osaka University, Japan)
(b) Approval of agenda (X-2135-26)
(c) List of C-X documents (X-2134-26)

2. Review of C-X Meeting, 2025–2026 (Prof. M. Ohata)

14:05 – 14:15

(a) Approval of draft minutes of C-X meeting at Annual Assembly in Genoa, Italy, 2025 (X-2120-2025)
(b) Approval of draft minutes of C-X intermediate meeting at OCAS NV/Ghent University, Belgium, 2026 (X-2133-2026)
(c) Terms of reference and Operational plan of C-X (X-1998-22)
(d) Status of C-X papers in Welding in the World (WitW)

3. Technical presentation

S1: Advancement of FFS –Fracture toughness evaluation

14:15 – 14:35 X-2153-2026
BS 7910 and the Plan for Future Revision
Yin Jin Janin, (TWI Ltd, Cambridge, UK)

14:35 – 14:55 X-2149-2026
Causal Analysis of Apparent Negative Crack Growth in Unloading Compliance Method for J-R Curve Determination
Tomoya Kawabata (The University of Tokyo, Japan)

S2: Advancement of FFS –Stress Corrosion Cracking

14:55 – 15:15 X-2138-2026
Stress Corrosion Cracking Assessment of Onshore Oil Pipelines
Fikri Bashar Yalciner (NMDC Energy Abu Dhabi, Istanbul Gedik University/Turkey)

S3: Advancement of FFS –Fatigue

15:15 – 15:35 X-2146-2026
Experimental and numerical validation of fatigue crack depth limit for retrofitting using high frequency mechanical impact provided in the updated IIW recommendations

Yuki Banno, Jan Schubnell (Gifu University, Japan; Fraunhofer Institute for Mechanics of Materials IWM, Germany)

------ Coffee break (15:45 – 16:15) -------

16:15 – 16:30

1) VISIT FROM IIW
2) WitW (Welding in the World) report presentation
   Majid Farajian, Lead Editor in Chief WitW

S4: Advancement of FFS –Welding residual stress

16:30 – 16:50 X-2139-2026
Mechanical and Microstructural Performance of Electron Beam Welded Aluminium Alloys Exposed to Proton and Neutron Irradiation
Shabdali Gundappa Ashwit, Yannick Beßler, Wilfried Behr (Institute of Technology and Engineering (ITE), Germany)
Hossein Sina, Ghaleb Natour (European Spallation Source ERIC, Sweden)

16:50 – 17:10 X-2144-2026
Optimization of Laser Shock Peening Using Finite Element Analysis and Deep Neural Networks
Jeongung Park, Gyubaek An (Chosun University, Korea)

17:10 – 17:30 X-2150-2026
Welding induced residual stress analysis in offshore monopile structures
Ardeshir Sarmast, Jan Schubnell, Eva-Regine Carl, Florian Dittmann, Igor Varfolomeev (Fraunhofer Institute for Mechanics of Materials IWM, Germany)
Stefan Burger, Moritz Braun (German Aerospace Center (DLR), Germany)
Georg Klenk (Materials Testing Institute, Germany)

17:30 – 17:50 X-2157-2026
Treatment of weld residual stress in fracture mechanics model
J. Chen, Pingsha Dong (University of Michigan, USA)

Tuesday, 14th July – Room@ Mozart 2 (14:00 – 18:00)

4. Technical presentation

S5: Advancement of FFS –Brittle fracture

14:00 – 14:20 X-2136-2026
Fabrication of Dissimilar Armour Grade Steel Joints – An Investigation on the influence of welding processes and consumables on Ballistic Resistance (Immunity)
V Balasubramanian, S Malarvizhi (Annamalai University, India)
S Naveen Kumar (ESAB India Limited, India)
A Hafeezur Rahman, V Balaguru (DRDO, Avadi, India)

14:20 – 14:40 X-2137-2026
Enhancing the Structural Performance (Fatigue, Fracture Toughness and Ballistic) of Rolled Homogenized Armour Steel Joints by Rotating Gas Metal Arc Welding Technique
V Balasubramanian, N Sankar (Annamalai University, India)

A Hafeezur Rahman, V Balaguru (DRDO, Avadi, India)

14:40 – 15:00 X-2152-2026
Strength Improvement and Fracture Behavior Control of Laser-Welded SiCp/2A14 Joints Using Ti Foil Interlayer
Jing YANG, Shuili GONG, Fei XU, Wenqiang GAO, Yue GONG (AVIC Manufacturing Technology Institute, China)

15:00 – 15:20 X-2140-2026
Investigation of notch sensitivity applying absorbed specific fracture energy in pipeline steel and its physically simulated heat-affected zone
János Lukács, Judit Kovács (Institute of Materials Science and Technology, University of Miskolc. Hungary)

S6: Dissimilar joint

15:20 – 15:40 X-2158-2026
Analytical solutions to bi-/tri-material interface crack problems in dissimilar material joints
Yuning Zhan, Pingsha Dong (University of Michigan, USA)

------ Coffee break (15:45 – 16:15) -------

5. WG: Fracture Toughness Test at Cryogenic Temperature

16:15 – 17:00 X-2155-2026
Fracture toughness test at cryogenic temperature (Final report) : Material Properties Evaluation of STS316L for Liquefied Hydrogen carriers
DaeHee Seong, JiSun Rho, JungGoo Park (Samsung Heavy Industries, Korea)
Gyubaek An (Chosun University, Korea)

17:00 – 17:20 X-2145-2026
Effects of Hydrogen Embrittlement on Fracture Toughness
Gyubaek An, Woonjun Joo, Jeong-ung Park (Chosun University, Korea)
JungGoo Park (Samsung Heavy Industries, Korea)

17:20 – 17:40 X-2154-2026
Performance Evaluation of Welding Materials for Liquid Hydrogen Storage: Conventional vs. Novel Alloys
Hyojin Park, Woo-hyuk Choi (Hyundai Steel R&D Center, Korea)
Jin Hwan Cho (Hyundai welding - welding R&D center, Korea)

17:40 – 18:00 X-2156-2026
Prediction of Fracture Toughness in Welded Joints Using Small Scale Specimen
Jiseung Lee, Woonjun Joo, Jeong-ung Park, Gyubaek An (Chosun University, Korea)
Junseok Seo (Hyundai Steel Company, Korea)

Wednesday, 15th July – Room@ Mozart 2 (14:00 – 18:00)

6. SC-AM: Fracture Avoidance in Additively Manufactured Parts/Components

14:00 – 14:45 X-2159-2026
Defect Assessment of AM Components
Mustafa Koçak (Istanbul Gedik University/Turkey)
Fikri Bashar Yalciner (NMDC Energy Abu Dhabi, Istanbul Gedik University/Turkey)

14:45 – 15:05 X-2143-2026
Integrated Quality Evaluation of Metal Additive Manufacturing Components with Emphasis on Defect-Based Fatigue Performance
Akiyoshi Yokota (Shimadzu Corporation, Japan)

15:05 – 15:25 X-2151-2026
Structural Integrity and Safety Assessment of WAAM AA5183 Aluminium Alloy in a Hydrogen Environment for Certification of Hydrogen Systems
Ali BAKIR, Shahryar Manzoor (Metallic Materials and Integrity Group, TWI Ltd, UK)

15:25 – 15:45 X-2147-2026
Fracture toughness testing method for wire-arc additively manufactured (WAAM) carbon steel wall components
Kazuma Shimizu, Mitsuru Ohata, Ryo Kinugawa, Hiroto Shoji (The University of Osaka, Japan)
Fikri Bashar Yalciner (NMDC Energy Abu Dhabi, Istanbul Gedik University, Turkey)
Mustafa Koçak, Ugur Gürol (Istanbul Gedik University, Turkey)

------ Coffee break (15:45 – 16:15) -------

7. Technical presentation

S7: Advancement of FFS –Ductile fracture 2

16:15 – 16:35 X-2148-2026
A Ductile Crack Growth Simulation for Strain-Based Design of Girth Welds in High-Pressure Linepipes
Hiroto SHOJI, Mitsuru OHATA, Kazuma SHIMIZU (The University of Osaka, Japan)
Fumiaki KIMURA (Nippon Steel Engineering Co., Ltd., Japan)

S8: Environment induced fracture –Hydrogen

16:35 – 16:55 X-2141-2026
Fracture Toughness of X65 Girth Welds in High-Pressure Hydrogen Gas: Effect of Test Methods and Specimen Type
Yuki Kiyokawa, Fumiaki Kimura, Yasuhiro Kawai (Nippon Steel Engineering Co., Ltd., Japan)
Keigo Manabe, Yuji Kisaka, Shusuke Fujita (Nippon Steel Pipeline & Engineering Co., Ltd., Japan)
Hiroto Shoji, Mitsuru Ohata (The University of Osaka, Japan)

16:55 – 17:15 X-2142-2026
Low-Cycle Fatigue Performance of Hydrogen Pre-charged X65 Girth Welds under Seismic Strain Conditions
Tsubasa Katayama, Yuki Kiyokawa, Fumiaki Kimura, Yasuhiro Kawai (Nippon Steel Engineering Co., Ltd., Japan)
Keigo Manabe, Yuji Kisaka, Shusuke Fujita (Nippon Steel Pipeline & Engineering Co., Ltd., Japan))
Behzad Farahani, Margo Cauwels, Tom Depover, Wim De Waele (Ghent University, Belgium)

17:15 – 17:35 X-2160-2026
Fitness-for-Service Assessment of Hydrogen Induced Cracking (HIC) in Vertical Pressure Vessels
Fikri Bashar Yalciner (NMDC Energy Abu Dhabi, Istanbul Gedik University/Turkey)

8. Resolutions

(a) Recommendation of documents to Welding in the World
(b) Others

9. Next Meeting

(a) Intermediate meeting:
Date : TBD, 2027
Place : TBD

(b) 80th Annual Assembly
Date : TBD 2027
Place : TBD

(c) Any other business

10. Closing