
**Draft Project plan for the CEN
Workshop on " Fracture
toughness evaluation
methodologies applied to
advanced high strength steel
sheets"**

**Requests to participate in the Workshop
and/or comments on the project plan are
to be submitted by 2022-10-20 to
jlopezquiles@une.org¹**

Recipients of this project plan are kindly requested to name all patent rights known to them to be relevant to the Workshop and to make available all supporting documents.

Madrid, 2022-07-22 (Version 1)

¹ Applications for participating in the Workshop and comments on the project plan that are not received by the deadline do not need to be taken into consideration. Once constituted, the Workshop will decide whether or not to consider the comments received in good time.

Contents

Summary	4
1 Status of the project plan	4
2 Workshop proposer and Workshop participants	4
2.1 Workshop proposer	4
2.2 Workshop secretariat	4
2.3 Other potential participants.....	4
3 Workshop objectives and scope.....	5
3.1 Background.....	5
3.2 Scope	5
3.3 Related activities	5
4 Workshop programme	6
4.1 General	6
4.2 Workshop schedule	6
5 Resource planning	8
6 Workshop structure and rules of cooperation	8
6.1 Participation in the Workshop.....	8
6.2 Workshop responsibilities.....	8
6.3 Decision making process	9
7 Dissemination and participation strategy	9
8 Contacts	11

Summary

The sheet metal forming sector lacks adequate test methods to assess high strength metal sheet formability and part performance at the product design stage. This is essential to be able to develop high-performance parts at a reduced cost with new high strength materials, such as high strength steel (AHSS). The planned CEN Workshop and the CWAs to be developed on "Fracture toughness evaluation methodologies applied to advanced high strength steel sheets" compile relevant findings from research developed in previous and ongoing RFCS projects and academic research, and provides recommendations to be applied during the planning, design, and operational phases of the manufacture of AHSS sheets and components. Furthermore, a new simple testing procedure for the determination of a Cracking Resistance Index (CRI) in AHSS sheets is proposed.

1 Status of the project plan

Draft project plan for public commenting (Version 1.0)

This draft project plan is intended to inform the public of a new Workshop. Any interested party can take part in this Workshop and/or comment on this draft project plan. Please send any requests to participate or comments by e-mail to jlopezquiles@une.org.

All those who have applied for participation or have commented on the project plan by the deadline will be invited to the kick-off meeting of the Workshop on **2022-10-26**.

2 Workshop proposer and Workshop participants

2.1 Workshop proposer

Organisation	Short description and interest in the subject
Fundació Eurecat	Fundació Eurecat is a Technology Centre that provides innovative technology to companies. It has developed fracture toughness methodologies for the evaluation of metal sheets, has coordinated related H2020 projects such as FormPlanet, and coordinates the RFCS project ToughSteel.

2.2 Workshop secretariat

The Spanish Association for Standardisation (UNE) will hold the secretariat of the workshop.

2.3 Other potential participants

This CWA will be developed in a Workshop (temporary body) that is open to any interested party. The participation of other experts would be helpful and is desired. It is recommended that:

- Industry and commerce companies (AHSS metal sheet manufacturers and users)
- Academic and research institutions
- Testing organisations

take part in the development of this CWA.

3 Workshop objectives and scope

3.1 Background

The sheet metal forming² sector is one of the most important manufacturing processes to obtain high performance metal parts from steel and aluminium for almost every industrial production sector, such as transport, construction, home appliances and packaging, generating over €400M in 2016.

The sector faces a major challenge with respect manufacturing of metal sheet parts, represented by the lack of adequate test methods to assess sheet formability and part performance at the product design stage. This is essential to be able to develop high-performance parts at a reduced cost with new high strength materials, such as high strength steel (AHSS). Such high strength makes them processing sensitive, so forming parameters and sheet properties must be assessed to assure a zero-defect production and part quality, avoiding unexpected defects that cannot be predicted at the product design stage using traditional experimental or computational approaches.

The implementation of a fracture toughness approach has proved to be effective to address crack-related issues in AHSS sheets in response to the industry growing need of knowing the fracture properties of this material. Several methodologies exist for the evaluation of fracture toughness, with different complexity and procedures. The main objective of the CEN WS "Fracture toughness evaluation methodologies applied to advanced high strength steel sheets" is to provide a guideline (CWA) describing these different methodologies, informing about their suitability, and to provide recommendations that can be applied by the manufacturers during the planning, design, and operational phases of the manufacture of AHSS sheets. The guideline will also include relevant findings from research developed in previous H2020 projects, such as FormPlanet (CEN/WS FormPlanet and CWA 17793:2021), and ongoing RFCS projects and academic research. A second CWA describing a new testing procedure to evaluate a Cracking Resistance Index (CRI) based on fracture mechanics to classify the crack propagation resistance of advanced high strength steel sheets is proposed. The index is based on the fracture energy obtained from tensile tests with sharp-notched specimens. The procedure is very fast and simple, comparable to a conventional tensile test, and it may be used as routine testing for quality control and material selection.

3.2 Scope

The CEN Workshop on "Fracture toughness evaluation methodologies applied to advanced high strength steel sheets" will develop two CWAs.

The first planned CEN Workshop Agreement (CWA) describes the existing methodologies for fracture toughness evaluation in metal sheets. It compiles relevant findings from research developed in previous and ongoing RFCS projects and academic research. It also provides recommendations to be applied during the planning, design, and operational phases of the manufacture of AHSS sheets and components, as well as successful industrial case studies.

The second planned CEN Workshop Agreement describes a new testing procedure to estimate the crack propagation resistance of AHSS sheets using a Cracking Resistance Index (CRI) based on fracture mechanics. The procedure provides a fast and simple method that can be implemented as a routine procedure for in-plant quality control and material selection and/or acceptance.

3.3 Related activities

The subject of the planned CWAs is not at present the subject of a standard. However, there are committees, standards and/or other technical specifications that deal with related subjects and thus need to be taken into account - and involved, where necessary - during this Workshop:

Related technical committees

² Sheet metal forming processes are those in which a force is applied to a piece of sheet metal to modify its geometry rather than remove any material. The applied force stresses the metal beyond its yield strength, causing the material to plastically deform, but not to fail. By doing so, the sheet can be bent or stretched into a variety of complex shapes.

- CEN/TC 459/SC 1 “Test methods for steel (other than chemical analysis)”
- ISO/TC 164/SC 4 “Fatigue, fracture and toughness testing”
 - ISO 26843:2015 Metallic materials — Measurement of fracture toughness at impact loading rates using precracked Charpy-type test pieces
 - ISO 12135:2021 Metallic materials — Unified method of test for the determination of quasistatic fracture toughness
 - ISO 22889:2013 Metallic materials — Method of test for the determination of resistance to stable crack extension using specimens of low constraint
- CEN/WS FORMPLANET “Innovative testing in support of the sheet metal forming industry”
 - CWA 17793:2021 Test method for determination of the essential work of fracture of thin ductile metallic sheets

Other standards

- ASTM E1820-21 Standard Test Method for Measurement of Fracture Toughness
- ASTM E2472-12 Test to Determine Resistance of metal to Stable Crack Extension

4 Workshop programme

4.1 General

The kick-off meeting is planned to take place on 2022-10-26 in Madrid.

A total of 2 Workshop meetings (kick-off meeting and Workshop meetings) and web conferences will be held, during which the content of the CWA will be presented, discussed and approved.

The CWAs will be drawn up in English (language of meetings, minutes, etc.). The CWAs will be written in English.

4.2 Workshop schedule

Table 1: Workshop schedule (preliminary)

CEN/CENELEC Workshop	M01 JUN 22	M02 JUL 22	M03 SEP 22	M04 OCT 22	M05 NOV 22	M06 DEC 22	M07 JAN 23	M08 FEB 23	M09 MAR 23	M10 APR 23
Initiation										
1. Proposal form submission and TC response										
2. Project plan development										
3. Open commenting period on draft project plan (mandatory)										
Operation										
4. Kick-off meeting										
5. CWAs development										
6. Open commenting period on draft CWA(s) (optional)										
7. CWAs finalised and approved by Workshop participants										
Publication										
8. CWAs publication										
Dissemination (see 7)										
Milestones										

- K** Kick-off
- M** Workshop meeting
- V** Virtual Workshop meeting
- A** Adoption of CWA
- P** Publication of CWAs
- D** Online distribution of CWAs

5 Resource planning

Registration and participation at this CEN Workshop are free of charge, but each participant shall bear his/her own costs for travel, accommodation, and subsistence in the case of on-site meetings.

The administrative costs of the CEN Workshop Secretariat as well as the logistical support, such as online conference tool, will be covered by the ToughSteel project through its RFCS funding. The copyright of the CWAs shall be with CEN. 8% secretariat costs will be provided by UNE to CCMC to cover the free download of the published CWAs.

6 Workshop structure and rules of cooperation

6.1 Participation in the Workshop

The Workshop will be constituted during the course of the kick-off meeting. By approving this project plan, the interested parties declare their willingness to participate in the Workshop and will be formally named as Workshop participants, with the associated rights and duties. Participants at the kick-off meeting who do not approve the project plan are not given the status of a Workshop participant and are thus excluded from further decisions made during the kick-off meeting and from any other decisions regarding the Workshop.

As a rule, the request to participate in the Workshop is closed once it is constituted. The current Workshop participants shall decide whether any additional members will be accepted or not.

Any new participant in the Workshop at a later date is decided on by the participants making up the Workshop at that time. It is particularly important to consider these aspects:

- a. expansion would be conducive to shortening the duration of the Workshop or to avoiding or averting an impending delay in the planned duration of the Workshop;
- b. the expansion would not result in the Workshop taking longer to complete;
- c. the new Workshop participant would not address any new or complementary issues beyond the scope defined and approved in the project plan;
- d. the new Workshop participant would bring complementary expertise into the Workshop in order to incorporate the latest scientific findings and state-of-the-art knowledge;
- e. the new Workshop participant would actively participate in the drafting of the manuscript by submitting concrete, not abstract, proposals and contributions;
- f. the new Workshop participant would ensure wider application of the CWAs.

All Workshop participants who voted for the publication of the CWAs or its draft will be named as authors in the European Foreword, including the organisations which they represent. All Workshop participants who voted against the publication of the CWAs, or who have abstained, will not be named in the European Foreword.

6.2 Workshop responsibilities

The Workshop Chair is responsible for content management and any decision-making and voting procedures. The Workshop Chair is supported by the Workshop Vice-Chair and the responsible Workshop secretariat, whereby the Workshop secretariat will always remain neutral regarding the content of the CWA. Furthermore, the Workshop secretariat shall ensure that CEN-CENELEC's rules of procedure, rules of presentation, and the principles governing the publication of CWA have been observed. Should a Workshop Chair no longer be able to carry out her/his duties, the Workshop secretariat shall initiate the election of a new Workshop Chair. The list below covers the main tasks of the Workshop Chair. It is not intended to be exhaustive.

- Content related contact point for the Workshop
- Presides at Workshop meetings
- Ensures that the development of the CWAs respects the principles and content of the adopted project plan
- Manages the consensus building process, decides when the Workshop participants have reached agreement on the final CWAs, on the basis of the comments received
- Ensures due information exchange with the Workshop secretariat
- Represents the Workshop and its results to exterior

The Workshop secretariat, provided by a CEN/CENELEC national member, is responsible for organising and leading the kick-off meeting, in consultation with the Workshop proposer. Further Workshop meetings and/or web conferences shall be organised by the Workshop secretariat in consultation with the Workshop Chair. The list below covers the main tasks of the Workshop secretariat. It is not intended to be exhaustive.

- Administrative and organisational contact point for the Workshop
- Ensures that the development of the CWA respects the principles and content of the adopted project plan and of the requirements of the CEN-CENELEC Guide 29
- Formally registers Workshop participants and maintains record of participating organisations and individuals
- Offers infrastructure and manage documents and their distribution through an electronic platform
- Prepares agenda and distribute information on meetings and meeting minutes as well as follow-up actions of the Workshop
- Initiates and manage CWAs approval process upon decision by the Workshop Chair
- Interface with CEN-CENELEC Management Centre (CCMC) and Workshop Chair regarding strategic directions, problems arising, and external relationships
- Advises on CEN-CENELEC rules and bring any major problems encountered (if any) in the development of the CWA to the attention of CEN-CENELEC Management Centre (CCMC)
- Administrates the connection with relevant CEN or CENELEC/TCs

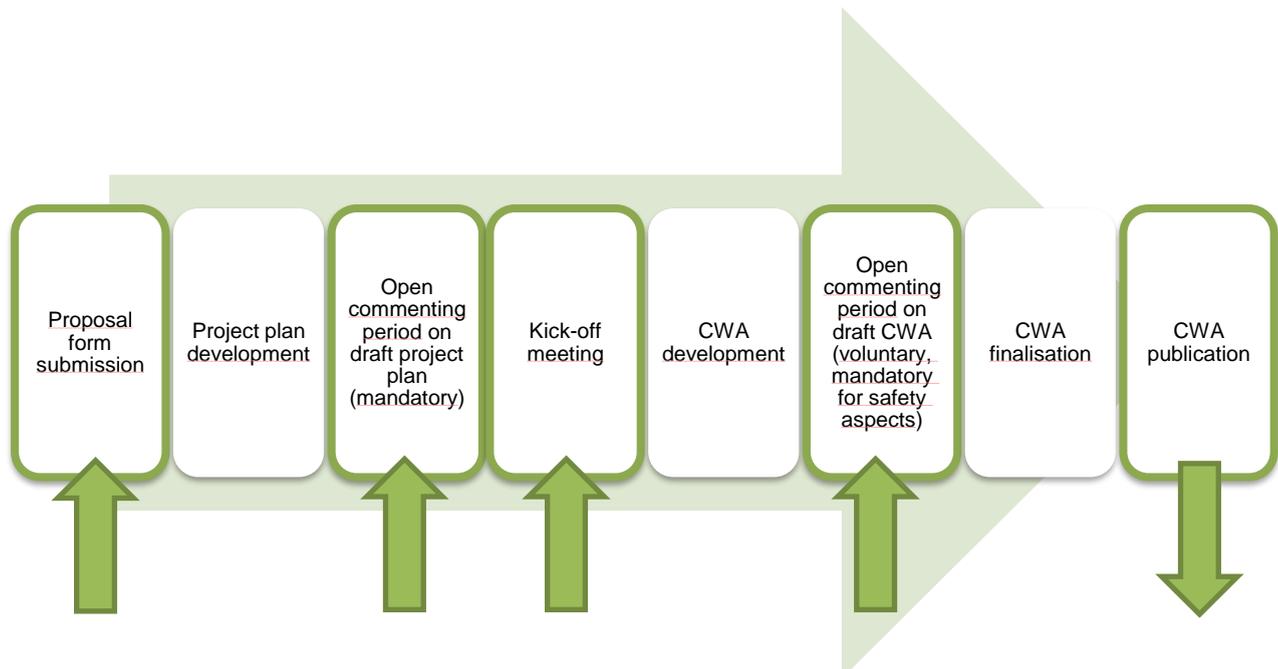
6.3 Decision making process

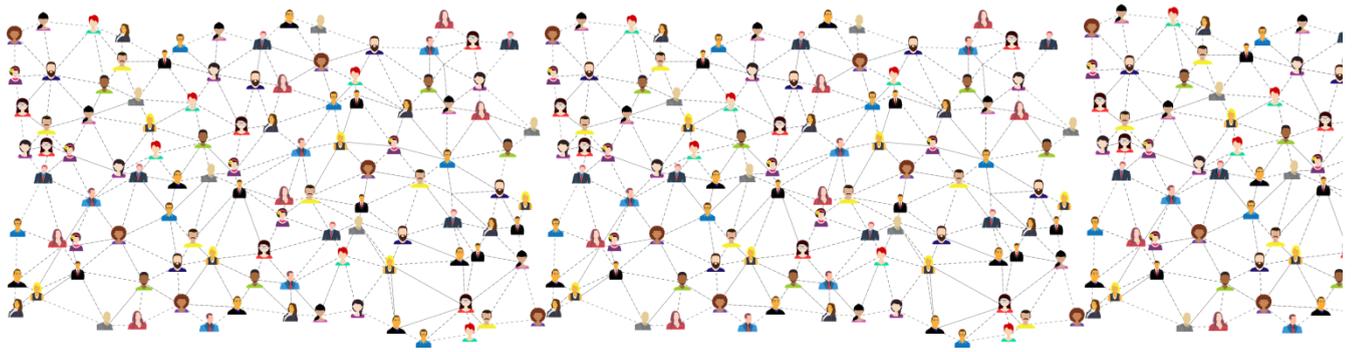
Decisions will be consensus based.

The final draft of the CWA, considered by the Chair to represent the best possible consensus, will be presented to the Workshop participants who will be invited to express their support for this final draft so that their names can be listed in the Foreword.

During the drafting process, in cases where opposing views are expressed, the overall level of support by the Workshop will be tested by asking the Workshop participants to express their position. These interim decisions on the direction to be taken will be decided on the basis of a simple majority among the organizations participating in the Workshop. If Workshop participants cannot be present in the meetings where such decision is taken, an alternative means of including them in the decision process may be used.

7 Dissemination and participation strategy





Proposal form submission

The Workshop proposal has been disseminated to the following relevant stakeholders and bodies for consultation:

- CEN/TC 459/SC 1 “Test methods for steel (other than chemical analysis)”
- CEN/WS FORMPLANET “Innovative testing in support of the sheet metal forming industry”

Open commenting period on draft project plan

The project plan will be disseminated to the following relevant stakeholders and bodies for commenting:

- CEN/TC 459/SC 1 “Test methods for steel (other than chemical analysis)”
- CEN/WS FORMPLANET “Innovative testing in support of the sheet metal forming industry”

In addition to the CCMC website, the project plan and the date of the kick-off meeting will be advertised on the ToughSteel website (<https://toughsteel.eu/>) to raise awareness. Interested parties are requested to contribute either through commenting of the project plan (short term) or through Workshop participation (long term).

Open commenting period on draft CWAs

The draft CWAs will be disseminated to the following relevant stakeholders and bodies for commenting:

- CEN/TC 459/SC 1 “Test methods for steel (other than chemical analysis)”
- CEN/WS FORMPLANET “Innovative testing in support of the sheet metal forming industry”

In addition to the CEN and CENELEC website, the draft CWAs will be advertised on the ToughSteel website (<https://toughsteel.eu/>) to raise awareness. Interested parties are requested to contribute through commenting of the draft CWAs (short term).

CWAs publication

The final CWAs will be disseminated to the following relevant stakeholders and bodies:

Standardisation area	Standardisation Technical Committee
Steel and steel products	CEN/TC 459/SC 5 Steels for heat treatment, alloy steels, free-cutting steels and stainless steels
	CEN/TC 459/SC 8 Steel sheet and strip for electrical applications
	CEN/TC 459/SC 9 Coated and uncoated flat products to be used for cold forming
	CEN/TC 44 Commercial and Professional Refrigerating Appliances and Systems, Performance and Energy Consumption
	CEN/TC 130 Space heating and/or cooling appliances without integral thermal sources
	CEN/TC 153 Machinery intended for use with foodstuffs and feed
	CEN/TC 261 Packaging
	ISO/TC 17/SC 4 Heat treatable and alloy steels

	ISO/TC 17/SC 12 Continuous mill flat rolled products
	ISO/TC 8 Ships and marine technology
	ISO/TC 86 Refrigeration and air-conditioning
	ISO/TC 122 Packaging
	ISO/TC 326 Machinery intended for use with foodstuffs
	ISO/TC 47 Chemistry
Mechanical testing of steel	CEN/TC 459/SC 1 Test methods for steel (other than chemical analysis)
	ISO/TC 17/SC 20 General technical delivery conditions, sampling and mechanical testing methods
	ISO/TC 164 Mechanical testing of metals
	ISO/TC 164/SC 1 Uniaxial testing
	ISO/TC 164/SC 2 Ductility testing
	ISO/TC 164/SC 3 Hardness testing
	ISO/TC 164/SC 4 Fatigue, fracture and toughness testing

In addition to the CEN and CENELEC website, the final CWAs will be advertised on:

- the ToughSteel website (<https://toughsteel.eu/>)
- social media, such as
 - LinkedIn
 - Twitter

8 Contacts

- **Workshop Chair and Workshop proposer:**

David FRÓMETA
 Fundació Eurecat
 Plaça de la Ciència, 2, 08243, Manresa, Spain
 +34 938 777 373
david.frometa@eurecat.org
www.eurecat.org

- **Workshop Secretariat:**

Javier LÓPEZ-QUILES
 Spanish Association for Standardisation - UNE
 Génova, 6, 28004, Madrid
 +34 91 529 49 51
jlopezquiles@une.org
www.une.org

- **CEN-CENELEC Management Centre**

Alessia GAETANI
 CEN and CENELEC
 Rue de la Science 23
 B - 1040 Brussels, Belgium
 +32 2550 09 56
agaetani@cencenelec.eu
<https://www.cencenelec.eu/Pages/default.aspx>