CEN and/or CLC Workshop Autonomous manipulator using morphing modular mats- Vocabulary, characteristics, performance criteria and related test methods

Workshop description form

- PART A – Workshop Summary
- PART B – Project Plan

PART A – Workshop SUMMARY

1	WS details		
1.1.	**Organization**	☒ CEN ☐ CENELEC ☐ Joint with ☐ CEN lead ☐ CENELEC lead	
1.2.	**Title**	CEN WS Autonomous manipulator using Morphing modular mats - Vocabulary, characteristics, performance criteria and related test methods (select CEN or CLC or leave CEN/CLC in case of joint WS)	
1.3.	**Scope**	This document applies to autonomous manipulators using morphing modular mats (AUTOMATs). It defines the relevant terminology and describes the characteristics, performance criteria, and methodologies for specifying and evaluating the manipulation performance of AUTOMAT systems. This document is not intended for verification or validation of safety requirements.	
1.4.	**Does this WS stem from an EU Research project?**	☒ YES Name of the project: MOZART Grant number: 101069536 End date 30th September 2026 ☐ NO	
1.5.	**Financial support**	☒ EU Research project ☐ EC/EFTA Grant reference: Type here ☐ Other Specify, if needed: Type here	
1.6.	**WS Proposer/Proposed ChairWS proposer**	Name: Organization: Postal address: Email: Phone: Webpage: Contact person (name and email):	Dr. Kasper Støy IT University of Copenhagen Rued Langgaards Vej 7, 2300 København, Denmark na https://en.itu.dk/ Kasper Støy ksty@itu.dk
1.7.	**WS Secretariat**	Organization: Postal address: Email: Phone: Webpage: WS Secretary name: Email: Phone:	UNI Via Sannio, 2 – 20137 Milan (Italy) emanuela.pisani@uni.com +39 02700241 www.uni.com Emanuela Pisani emanuela.pisani@uni.com +39 0270024386
1.8.	**CEN and CENELEC Management Centre (CCMC) contact**	Organization: Postal address: Webpage: CCMC Project Manager name: Email: Phone:	CEN and CENELEC Rue de la Science 23B - 1040 Brussels, Belgium https://www.cencenelec.eu/Pages/default.aspx Claire VAN THIELEN cvanthielen@cencenelec.eu +32 25500831 Type here Type here Type here

1.9.	**Tentative date and place of the Kick-off Meeting**	Date: end of February 2026	Place: To be decided
1.10.	**Does the proposed Workshop fall within the scope of existing CEN and/or CENELEC Technical Bodies?[1]**	☒ ☐	YES Specify: CEN/TC 310 NO
1.11.	**Are there other Technical Bodies or Joint Advisory and Coordination Groups potentially interested in the Workshop? ?[2]**	☒ ☐	YES Specify: ISO/TC 299, CEN/TC 153 NO

1.12. **Are the following aspects affected?**

Aspect	YES		NO	
Safety matters	YES[3]	☐	NO	☒
Management system aspects	YES[4]	☐	7	☒
Conformity assessment aspects	YES[5]	☐	NO	☒
Security matters	YES[6]	☐	NO	☒
			NO 8	

Add information/explanations if Management System aspects and Conformity Assessment aspects are affected:
Type here

2	**WS Deliverables**	
2.1.	**CWA #1**	
2.1.1	**Title**	☒ Same as WS title (1.2) ☐ Other: Type here
2.1.2	**Scope**	This document applies to autonomous manipulators using morphing modular mats (AUTOMATs). It defines the relevant terminology and describes the characteristics, performance criteria, and methodologies for specifying and evaluating the manipulation performance of AUTOMAT systems. This document is not intended for verification or validation of safety requirements.
2.1.3	**Does the proposed CWA conflict with a published EN**	☐ YES Specify: Type here ☒ NO In case the answer is 'yes', the development of the CWA shall be stopped

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[1] Part A and Part B of this form shall be sent by the WS secretary to the secretary of the Technical Bodies identified in this section to inform them about the creation of the WS and register any possible objection within 30 days (45 during the holiday period).

[2] Part A and Part B of this form should be sent by the WS secretary to the Bodies identified in this section to inform them about the creation of the WS.

[3] Work on the proposed CEN and/or CENELEC Workshop shall not be initiated.

[4] The CEN and/or CENELEC Workshop proposal shall be submitted to the CEN/CENELEC BT(s) for decision.

[5] CEN-CENELEC Internal Regulations - Part 3, Clause 33 applies.

[6] For projects dealing with security matters the security risk analysis provided in Annex I shall be carried out.

[7] See Note 2 in CEN-CENELEC Guide 29, Clause 3.

[8] See Note 2 in CEN-CENELEC Guide 29, Clause 3.

PART B – Project Plan

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 by sending an email to the WS secretary.

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 **<end of February 2026>**.

2   Workshop proposer and potential Workshop participants

2.1 Workshop proposer

The proposer of this CEN Workshop is the MOZART project, funded by Horizon Europe programme under Grant agreement n. 101069536 and coordinated by:

Dr. Kasper Støy

IT University of Copenhagen, Rued Langgaards Vej 7, 2300 København, Denmark

e-mail: ksty@itu.dk

Dr Kasper Støy is also the main contact point for the CEN Workshop.

The CEN national member holding the Workshop secretariat is:

UNI - Ente italiano di Normazione

Via Sannio n.2, Milano, Italy (20137)

2.2 Potential participants

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

- academic and research bodies
- funded European Projects (i.e. Horizon 2020, Horizon Europe)
- industry and commerce
- Non-governmental organizations (NGO)
- standards application

take part in the development of this CWA.

3 Workshop objectives and scope

3.1 Workshop background

According to recent studies, the food processing industry is both essential and rapidly evolving in Europe, contributing significantly to GDP and employing millions of workers. Yet many essential operations, especially those involving soft, fragile, or heterogeneous food items—remain heavily manual, labor-intensive, prone to injury, waste, quality issues, and inefficiencies. As automation technologies mature under what might be called "Food Processing 4.0," there is strong motivation to bring robotics into domains traditionally resistant to automation: handling delicate products with precision, hygiene, and minimal damage.

The MOZART project (Morphing Computerized Mats with Embodied Sensing and Artificial Intelligence) funded under Horizon Europe (Grant Agreement ID 101069536) aims precisely at advancing the state of the art in robotics for soft object manipulation, with a specific focus on the food industry.

Manual handling of fish, poultry, and other delicate foods remains widespread across the food industry, posing significant challenges related to food safety, hygiene, product waste due to damage, and occupational hazards for workers. The growing demand for sustainable and efficient production processes with lower CO_2 footprints—driven by the shift toward higher consumption of fish and poultry and reduced reliance on red meat—has increased the pressure to minimize production costs and losses. However, the automation of fragile food items remains particularly complex with current graphing-based robotic manipulators, which lack the ability to interact safely and effectively with soft, irregular objects. This scenario calls for a new technological paradigm capable of combining soft sensing, deformable interaction, and adaptive manipulation, while reducing dependence on skilled manual labour.

The MOZART project aims to develop a new class of robotic technology—AUTOMATs (Autonomous Manipulation using Morphing Modular Mats)—designed to handle soft, heterogeneous, and fragile food products through deformable, AI-controlled surfaces. The project seeks to design modular electronic systems, actuation layers with origami-inspired mechanisms, and soft poroelastic sensing skins able to locally modify curvature to manipulate objects precisely. It also focuses on developing AI-based tools for control, learning, and perception, leveraging distributed control APIs, cellular automata, and deep learning to enable both individual and group manipulations. These technologies will be demonstrated in real food-processing contexts, such as fish descaling, chicken sorting, and product presentation, ensuring that developments extend beyond laboratory prototypes to operational food-plant environments. Moreover, MOZART integrates social sciences and human–robot interaction studies to promote sustainability across economic, social, and environmental dimensions, with attention to ergonomics, standardization, and usability.

At the core of this innovation are the deformable "mats," which incorporate soft sensors within modular layers that combine electronics, actuation, and sensing capabilities. These surfaces can alter their shape and curvature to manipulate objects, replacing the need for grippers. The hybrid control framework merges AI, learning algorithms, cellular automata, and distributed control, enabling flexible, coordinated manipulation strategies. Particular emphasis is placed on real-world demonstrations to validate the feasibility of these systems under industrial food-handling conditions.

The expected impacts of MOZART are multifaceted. This technology will significantly reduce manual labor in repetitive, delicate, and hazardous tasks, enhancing food safety and minimizing waste through gentler and more

precise handling. It will foster the creation of knowledge-based employment, with operators transitioning from purely manual roles to positions focused on supervision, quality control, and robotic system operation. Environmental benefits include lower waste generation, reduced resource usage due to fewer damaged goods, and greater processing efficiency. Economically, the project aims to boost productivity and lower handling costs for fragile items, paving the way for AUTOMAT technology to evolve into a market-ready product with potential applications across the food packaging sector.

Despite its objectives, the project faces several challenges. From a technical perspective, the development of surfaces that are durable, hygienic, and compliant with food-industry regulations—while maintaining reliable sensing and actuation—remains demanding. The AI control system must also generalize across a wide range of soft and irregular objects. On the human and social front, it is essential to ensure fair workforce transitions through skill retraining, to define effective human–robot collaboration in food plants, and to address ethical, usability, safety, and standardization concerns. Commercialization presents further hurdles, particularly in moving from prototype-level technologies (TRL 5) to cost-competitive, standardized products ready for industrial deployment.

Scope:

This document applies to autonomous manipulators using morphing modular mats (AUTOMATs). It defines the relevant terminology and describes the characteristics, performance criteria, and methodologies for specifying and evaluating the manipulation performance of AUTOMAT systems. An informative annex provides templates for presenting AUTOMAT characteristics, which can assist manufacturers in describing product features, users in specifying system requirements, and operators in defining the properties of objects to be handled within specific applications. However, the document is not intended for verification or validation of safety requirements.

Related activities:

The subject of the planned CWA 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:

– CEN/TC 310 Construction equipment and building material machines - Safety

–ISO/TC 299 Robotics

– Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)

– Regulation (EU) 2023/1230 of the European Parliament and of the Council of 14 June 2023 on machinery and repealing Directive 2006/42/EC of the European Parliament and of the Council and Council Directive 73/361/EEC

4   Workshop programme
4.1 General

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

The drafting process is open and all comments will be considered, first by the chair person and secondarily by the participants of the workshop.

In order to minimize travelling, meetings will mostly be done remotely. If a physical meeting is desirable, it will be organized.

The kick-off meeting is planned to take place within February 2026.

4.2 Workshop schedule

Table 1: Workshop schedule (preliminary)

CEN/CENELEC Workshop	M01 Nov 25	M02	M03	M04 Feb 26	M05	M06	M07	M08	M09	M10 Aug 26	M11	M12	...
Initiation													
1. Workshop description form submission and TC response													
2. Open commenting period on draft project plan (mandatory)													
Operation													
3. Kick-off meeting													
4. CWA(s) development													
5. Open commenting period on draft CWA(s) (optional)													
6. CWA(s) finalized and approved by Workshop participants													
Publication													
7. CWA(s) publication													
Dissemination (see 6)													
Milestones				K	V	V	V	M /A	P	D	D		

Legend

K   Kick-off

M   Workshop meeting

V   Virtual Workshop meeting

A   Adoption of CWA

P   Publication of CWA

D   Online distribution of CWA

The administrative costs of CEN Workshop Secretariat will be covered by resources from the Horizon Europe project MOZART GA n° 101069536

5 Resource planning

The administrative costs of CEN Workshop Secretariat will be covered by resources from the Horizon Europe project MOZART GA n° 101069536

6 Workshop structure and rules of cooperation

The workshop will be led by a chair or vice-chair, while the project leader will support them in the organization. The CEN Workshop Chair is responsible for ensuring that the development of the CWA follows the principles and content of the adopted project plan and the requirements of the CEN Guide 29. The CEN Workshop Chair may take decisions on the conduct of the CEN Workshop on the basis of the comments expressed by the participants according to the CWA rules. The workshop secretariat is responsible for the organization and management of the workshops according to the CEN Guide 29. CEN Workshop participants draft the CWA and take in consideration the comments after the public commenting phase. CEN Workshop participants are the CWA proposers (the members of MOZART project), plus other relevant stakeholder, identified by the proposer.

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:

• 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;

• the expansion would not result in the Workshop taking longer to complete;

• the new Workshop participant would not address any new or complementary issues beyond the scope defined and approved in the project plan;

• 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;

• the new Workshop participant would actively participate in the drafting of the manuscript by submitting concrete, not abstract, proposals and contributions;

• the new Workshop participant would ensure wider application of the CWA.

All Workshop participants who voted for the publication of the CWA or its draft will be named as authors in the European Foreword, including the organizations which they represent. All Workshop participants who voted against the publication of the CWA, 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 consensus building. The Workshop Chair is supported by the Workshop Vice-Chair (if any) and the responsible Workshop secretariat, whereby the Workshop secretariat will always remain neutral regarding the content of the CWA(s). Furthermore, the Workshop secretariat shall ensure that CEN-CENELEC's rules of procedure, rules of presentation, and the principles governing the publication of CWA(s) 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 CWA respects the principles and content of the adopted project plan
- Manages the consensus building process, assesses when the Workshop participants have reached agreement on the final CWA, 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 and/or CENELEC Member, is responsible for organizing and leading the kick-off meeting, in consultation with the Workshop proposer. Further Workshop meetings and/or web conferences shall be organized 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 organizational 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 organizations and individuals
- Offers infrastructure and manages documents and their distribution through an electronic platform
- Prepares agenda and distributes information on meetings and meeting minutes as well as follow-up actions of the Workshop
- Initiates and manages CWA approval process upon decision by the Workshop Chair
- Interfaces with CEN-CENELEC Management Centre (CCMC) and Workshop Chair regarding strategic directions, problems arising, and external relationships
- Advises on CEN-CENELEC rules and brings 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

The CEN and/or CENELEC Workshop Chair is responsible for ensuring that the development of the CWA follows the principles and content of the project plan described in this document and the requirements of CEN-CENELEC Guide 29. The CEN and/or CENELEC Workshop Chair may take decisions on the conduct of the CEN and/or CENELEC Workshop on the basis of the comments expressed by the participants and of CEN-CENELEC Guide 29.

7 Dissemination and participation strategy
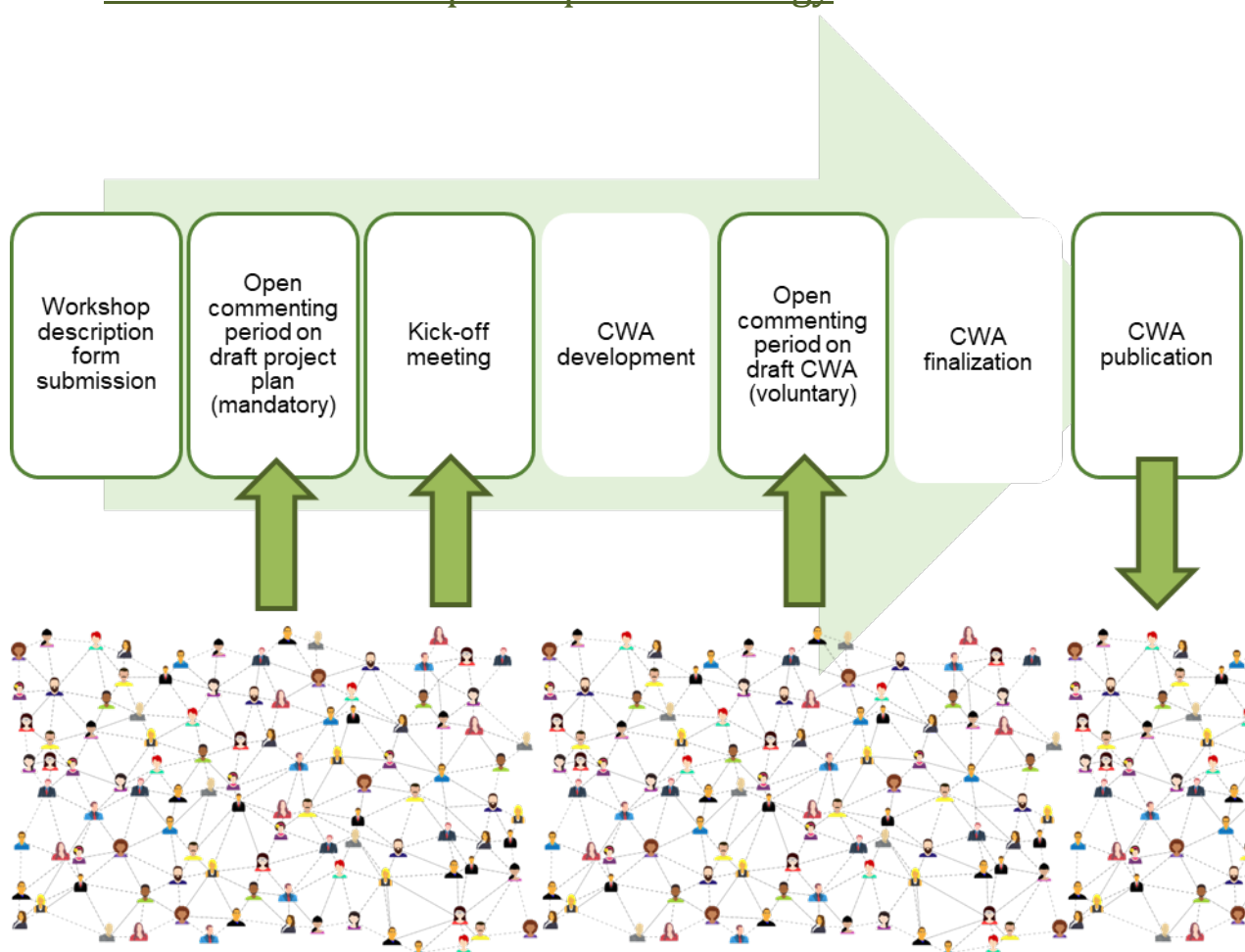
Open commenting period on draft CWA

The commenting phase is not compulsory in this case and it can be added. Decision on the submission of the draft CWA to public commenting phase can be agreed at a later stage, during the works of the CEN/WS.

<u>**CWA publication**</u>

<u>The final CWA will be disseminated to the following relevant stakeholders and bodies:</u>

<u>– standards committee, working group etc.</u>

– publisher of technical rules

– sector forum

– focus group

 – coordination group

– others (MOZART sister projects)

In addition to the CCMC website, the final CWA will be advertised on:

– sector specific newsletter

– social media, such as

  o Facebook

  o Instagram

  o LinkedIn

   o X

– Research Gate

 – EC Newsroom

 – Other

Annex I – Security risk analysis

This annex shall be completed if section 1.12 of Part A indicates that security aspects are addressed by the Workshop.

I.I General

Security risk analysis is a process of identifying and analyzing the main negative factors that may affect a standardization project's objectives. The following is targeted at secretariats of CEN and/or CENELEC Workshop Agreements (CWA) dealing with security issues. Its purpose is to help them identify and mitigate the risks associated with their project. It is structured around two main security threats that can affect the success of the work: major diverging interests among stakeholders and sensitive information.

I.II Risk analysis on major diverging interest among stakeholders

Diverging interests among stakeholders can impede the process in reaching agreement on the CWA and even lead to failure to deliver the planned CWA. In order to identify and possibly mitigate the risks, the following questions should be reviewed:

− Is the planned CWA expected to have a major impact on the security policy/strategy of the core stakeholders?

− Does the scope of the CWA cover products or services with a clear dual-use purpose (i.e. which can be used for military purposes)?

I.III Risk analysis on sensitive information

− In light of the scope of the CWA, is it likely that it may deal with sensitive information? If so, what is the information sensitivity level?

− Is there a need for a (non-)disclosure agreement?

− Is there any conflict of interest for stakeholders involved in the CEN and/or CENELEC Workshop, regarding especially the use they may make of any information they receive during the development of the CWA?

− What steps should be taken to manage information dissemination and storage (e.g. memory stick, emailing, storage) during the development process of the CWA?