

CITADELS

TESTBED DESCRIPTION



Cultivating Industry 5.0 Talents: Academia-industry collaboration and empowerment through accessible DEep technoLogieS

Project acronym:	CITADELS
Project topic:	HORIZON-WIDERA-2024-TALENTS-03-01
Project number:	101217281
Type of action:	HORIZON-CSA
Project starting date:	1 September 2025
Project duration:	48 months
Dissemination level	PU

1 Co-Spark Robotic Welding Cell

TestBed title	Co-Spark Robotic Welding Cell
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1.1 Short summary

The CO-SPARK TestBed is a collaborative robotic welding cell designed to support the transition from manual to automated welding processes. The system integrates a robotic platform with arc welding technology, enabling safe and flexible welding operations in industrial environments.

The key technological focus lies in collaborative robotics, welding automation, and flexible manufacturing. The TestBed enables intuitive programming and operation, allowing users with no prior robotics experience to effectively use the system.

CO-SPARK supports human–robot collaboration, making it suitable for dynamic production environments with frequent product changes and small-batch manufacturing. The system enables improved repeatability, consistent weld quality, and reduced dependence on skilled manual labour. The TestBed is particularly relevant for Industry 5.0 applications, as it supports human-centred automation, workforce upskilling, and accessible adoption of robotic welding technologies.

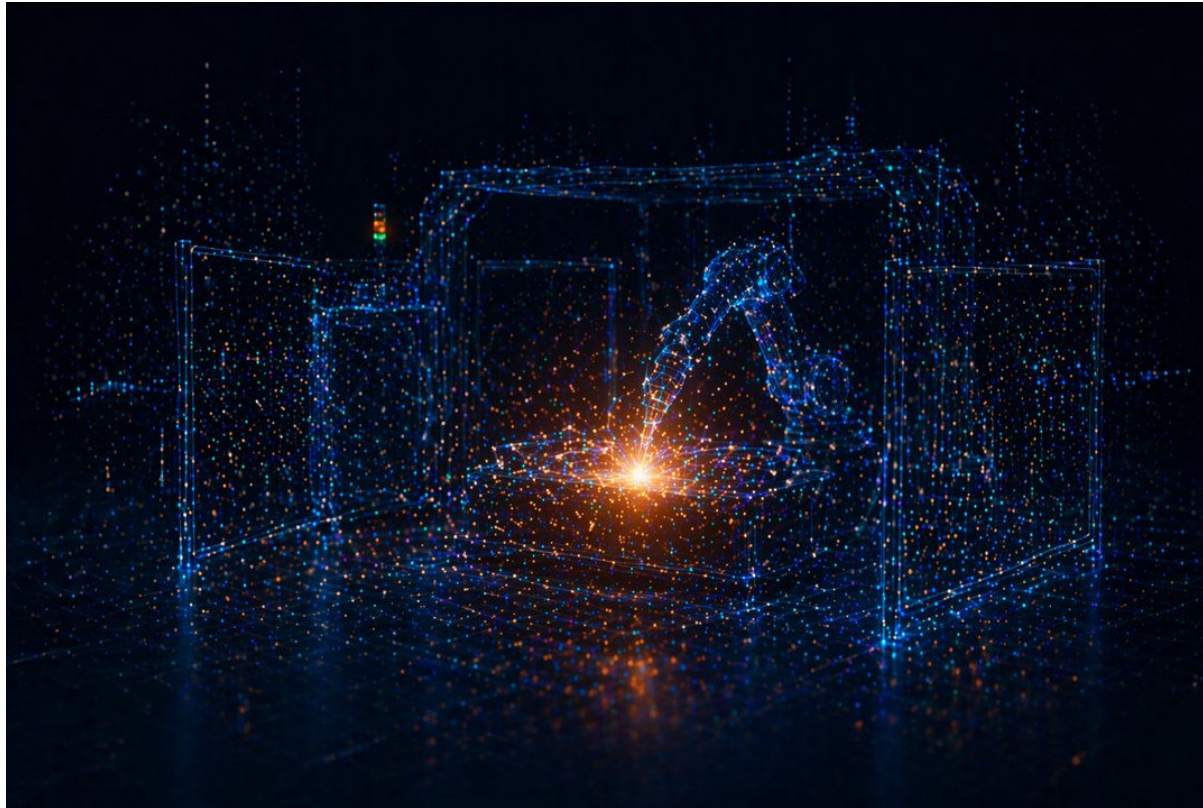
Principal Investigator Name	Anita Gjerek
Position / institutional role	Director of the Robotics department
Email	For access through CITADELS project please contact Pomurje Technology Park at info@p-tech.si or marko@p-tech.si
Phone No.	+386 2 530 82 00
ORCID persistent identifier (PID)	N/A
TestBed Responsible Name (if different from PI)	N/A
Funding source(s) for TestBed’s acquisition	VIRS d.o.o.
Relevant Keywords	Robotic welding, collaborative robot, arc welding, MIG/MAG welding, welding automation, human–robot collaboration, flexible manufacturing, small-batch production, intuitive programming, industrial robotics

1.2 Hosting Institution

Name of Host Organization	VIRS d.o.o.
Department or Lab	N/A
Name of Building	N/A
Physical Address	Industrijska ulica 4 B, 9220 Lendava, Slovenia
Website Links	https://www.virs.si/en/
Institutional contact name	For access through CITADELS project please contact Pomurje Technology Park
Institutional contact email	info@p-tech.si or marko@p-tech.si

1.3 Photos/videos






Main photo:



1.4 DeepTech Area and Application Domain

DeepTech Area	Check all that apply	Check ONE main area
Extended Reality	<input type="checkbox"/>	
Robotics	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Artificial Intelligence	<input type="checkbox"/>	
Human Machine Interfaces	<input checked="" type="checkbox"/>	
Biotechnology	<input type="checkbox"/>	
Other	<input type="checkbox"/>	

The main DeepTech area of this TestBed is Robotics, as it consists of a collaborative robotic welding system designed for automated arc welding applications. The system integrates robotic motion control with welding processes, enabling safe and flexible human–robot collaboration. It supports intuitive operation and programmable workflows, making it suitable for small-batch and adaptive manufacturing environments.

Application Domain	Check all that apply
Manufacturing 	✓
Healthcare 	<input type="checkbox"/>
Logistics 	<input type="checkbox"/>
Agriculture 	<input type="checkbox"/>
Maintenance & inspection 	<input type="checkbox"/>
Other	<input type="checkbox"/>

1.5 Potential Stakeholders and Exploitation Scenarios

Non-academic stakeholders	
Industrial Partners	✓
SMEs	✓
Startups	✓
Government Bodies	<input type="checkbox"/>
Professional Associations	✓
Community	<input type="checkbox"/>
Others 1 (comma-separated)	
Academic stakeholders	
Undergraduate students	✓
MSc students	✓
PhD students	✓
Researchers	✓
Others 2 (comma-separated)	
Other types of stakeholders	

Others 3 (comma-separated)	
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	Check all that apply	Short notes (optional)
Internal academic research only	<input type="checkbox"/>	
Collaborative research with external academic partners	<input checked="" type="checkbox"/>	
Contract research / Proof-of-Concept for industry	<input checked="" type="checkbox"/>	
Pilot / DeepTech Deployment in operational environment	<input checked="" type="checkbox"/>	
Training services (courses, workshops, certification)	<input checked="" type="checkbox"/>	
Service provision (testing, benchmarking, validation)	<input checked="" type="checkbox"/>	
Open access for walk-in users (e.g. open days / hackathons)	<input type="checkbox"/>	
Other (specify): _____	<input type="checkbox"/>	

1.6 Formal Access Conditions

Type of partner asking for access	Type of contractual relationship	Check all that apply
Academic partners	No contract (direct access)	<input type="checkbox"/>
	Direct contract between parties (e.g., research agreement)	<input checked="" type="checkbox"/>
	Indirect contract between parties (e.g., project framework)	<input checked="" type="checkbox"/>
	Other / Describe	<input type="checkbox"/>
Industrial	No contract (direct access)	<input type="checkbox"/>
	Direct contract between parties (e.g., research agreement)	<input checked="" type="checkbox"/>
	Indirect contract between parties (e.g., project framework)	<input checked="" type="checkbox"/>
	Other / Describe	<input type="checkbox"/>

Type of prerequisites	Description of prerequisites	Check all that apply
Agreements	Confidentiality agreement for proprietary algorithms	<input type="checkbox"/>
	Data sharing agreement for datasets generated	<input checked="" type="checkbox"/>
	IP agreements	<input checked="" type="checkbox"/>
	Other / Describe	<input type="checkbox"/>
Insurance	Users must have appropriate liability coverage through their home institution	<input checked="" type="checkbox"/>
	Other / Describe	<input type="checkbox"/>

1.7 Training and Safety

Mandatory technical training	Basic training in system operation provided by the supplier.
Recommended technical training	Basic understanding of welding processes (MIG/MAG) and general technical literacy; no prior experience in robotics is required.
Mandatory safety requirements	Use of appropriate personal protective equipment (PPE).

1.8 Technical description

Hardware	<ul style="list-style-type: none"> • Robot: CO-SPARK robotic system with robotic controller and console mounted on the 6th robot axis.
	<ul style="list-style-type: none"> • Welding torch: Kemppi welding torch enabling control of the robot during welding operations.
	<ul style="list-style-type: none"> • Welding system: Kemppi Master M welding system providing arc welding functionality with water cooling.
	<ul style="list-style-type: none"> • Control panel: Interface for setup and control of the welding process.
	<ul style="list-style-type: none"> • Welding table: Siegmund System S16 welding table (Professional 750, 2 × 1 m – other options available) used for positioning workpieces during welding.
Software needed to run the TestBed	<ul style="list-style-type: none"> • Integrated control interface for robot operation and programming.
Standards that apply	<ul style="list-style-type: none"> • N/A

1.9 Existing Software Assets (i.e. in GitHub)

Link:	Short description:
N/A	N/A

1.10 TestBed documentation

Type	Short description:	Name and source (link):
Documentation	CO-SPARK product webpage	Co-Spark – VIRS official website (Slovenian version), https://www.virs.si/avtomatizacija-in-robotizacija/varilne-robotske-celice/co-spark/

1.11 Application cases

Application case:	Short description:	Photo of the Application case
Robotic arc welding of metal components	Use of a robotic system for performing arc welding operations on metal components.	N/A

Welding of different workpieces	Use of the robotic system for welding workpieces of different shapes and sizes.	N/A
Flexible welding in small-batch production	Application of the system in environments with frequent product changes and varying production requirements.	N/A
Human-robot collaborative welding	Use of the system in collaborative operation, allowing interaction between the operator and the robot during welding tasks.	N/A

Possible TRL application range	TRL4	<input type="checkbox"/>
	TRL5	<input type="checkbox"/>
	TRL6	<input type="checkbox"/>
	TRL7	<input type="checkbox"/>
	TRL8	<input checked="" type="checkbox"/>

1.12 Funding source

Funding source acknowledgements
The creation of this TestBed was supported by VIRS d.o.o., Industrijska ulica 4 B, 9220 Lendava, Slovenia.

1.13 Ethical and societal aspects

Ethical and societal aspect:	Short description:
Improved worker safety	The TestBed supports safer welding work through the use of a collaborative robotic welding system designed for safe interaction with the operator. The system enables the operator to work alongside the robot while maintaining supervision and control of the welding process.
Improved ergonomics and working conditions	The TestBed contributes to improved working conditions by supporting the execution of repetitive welding tasks with a robotic system. The operator remains involved in setup, supervision, and handling of workpieces, while the robot performs the welding process.
Accessible and human-centred adoption of automation	The TestBed supports human-centred automation through simple use and intuitive operation. The system is designed to be used by operators without extensive prior experience in robotics, supporting gradual adoption of robotic welding in small-batch production environments.