

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 Multi-System Additive Manufacturing TestBed (incl. Bambu Lab H2S)

TestBed title	Multi-System Additive Manufacturing TestBed (incl. Bambu Lab H2S)
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1.1 Short summary

The TestBed provides a practical environment for additive manufacturing, enabling users to transform digital designs into physical components using systems such as the Bambu Lab H2S. It supports the full workflow from CAD design to automated production, allowing rapid prototyping, customization, and small-scale manufacturing. The key technology focus is additive manufacturing, combined with elements of materials processing and digital fabrication. The TestBed is relevant to DeepTech as it supports experimentation and Proof-of-Concept development using advanced manufacturing technologies. In the context of Industry 5.0, it promotes flexible, human-centric, and resource-efficient production.

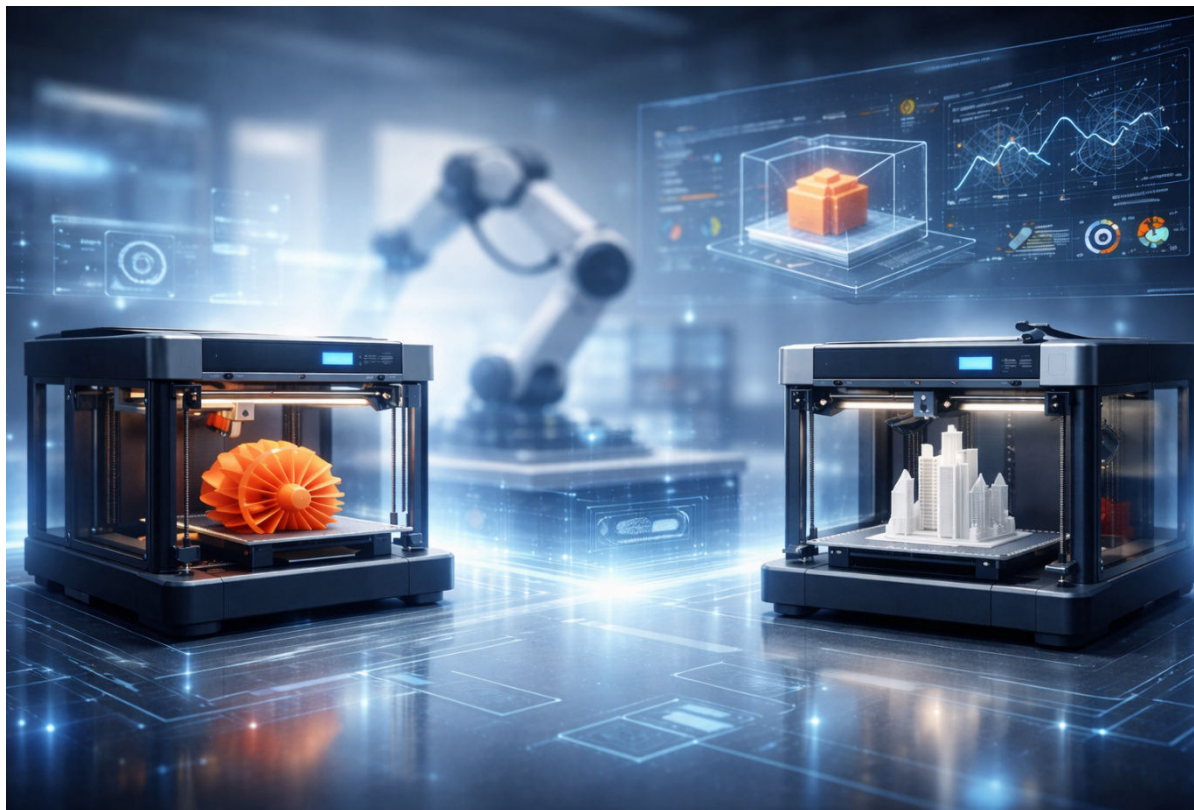
Principal Investigator Name	Aleš Car
Position / institutional role	Business owner
Email	ales.car@3dtecho.si
Phone No.	+386 41 296 079
ORCID persistent identifier (PID)	N/A
TestBed Responsible Name (if different from PI)	N/A
Funding source(s) for TestBed's acquisition	3DtechoCAR, Aleš Car s.p.
Relevant Keywords	Additive Manufacturing, 3D Printing, Rapid Prototyping, Material Testing and Validation

1.2 Hosting Institution

Name of Host Organization	3DtechoCAR, Aleš Car s.p.
Department or Lab	N/A
Name of Building	Pomurje Technology Park
Physical Address	Pleše 9 A, 9000 Murska Sobota, Slovenia
Website Links	https://www.3dtecho.si/
Institutional contact name	Aleš Car
Institutional contact email	ales.car@3dtecho.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 type="checkbox"/>	
Artificial Intelligence	<input type="checkbox"/>	
Human Machine Interfaces	<input type="checkbox"/>	
Biotechnology	<input type="checkbox"/>	
Other: Additive manufacturing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

The TestBed covers the Advanced Manufacturing domain, specifically additive manufacturing, as it utilizes a 3D printing system such as the Bambu Lab H2S to transform digital models into physical objects. It supports users in performing prototyping, small-scale manufacturing, and training activities, while combining elements of materials processing, mechatronics, and digital manufacturing. This allows operators to gain hands-on experience with modern production technologies and understand the full workflow from digital design to physical output.

Application Domain	Check all that apply
Manufacturing 	✓
Healthcare 	✓
Logistics 	✓
Agriculture 	✓
Maintenance & inspection 	✓
Other	✓

1.5 Potential Stakeholders and Exploitation Scenarios

Non-academic stakeholders	
Industrial Partners	✓
SMEs	✓
Startups	✓
Government Bodies	<input type="checkbox"/>
Professional Associations	<input type="checkbox"/>
Community	<input type="checkbox"/>
Others 1 (comma-separated)	<input type="checkbox"/>
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	<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 3D printing workflow, using slicer software, basic safety.
Recommended technical training	Mechanical fundamentals and mechatronic basics, as well as material science.
Mandatory safety requirements	Use of appropriate personal protective equipment (gloves, safety glasses), basic safety equipment, and strict adherence to the manufacturer’s instructions.

1.8 Technical description

Hardware	<ul style="list-style-type: none"> The TestBed is based on a multi-system additive manufacturing setup, centered around advanced 3D printing equipment such as the Bambu Lab H2S and complementary devices. The hardware includes: <ul style="list-style-type: none"> High-performance FDM 3D printers with large build volumes (~340 × 320 × 340 mm). High-speed motion systems (up to ~1000 mm/s). Enclosed, temperature-controlled chambers for engineering materials.
Software needed to run the TestBed	<ul style="list-style-type: none"> The system can be operated using Bambu Studio as the primary slicing software, while also supporting third-party slicers capable of generating standard G-code (e.g. SuperSlicer, PrusaSlicer, Cura).
Standards that apply	<ul style="list-style-type: none"> The TestBed is aligned with relevant additive manufacturing and safety standards. Equipment such as the Bambu Lab H2S complies with applicable regulatory requirements (e.g. CE, RoHS) and is operated according to manufacturer guidelines. STANDARDS

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):
Technical documentation	Official product website	Bambu Lab H2S, https://bambulab.com/en-us/h2s/tech-specs

1.11 Application cases

Application case:	Short description:	Photo of the Application case
Customized functional components	Design and production of application-specific parts tailored to user requirements, including mechanical, protective, or domain-specific components across different industries (e.g. medical, industrial, or consumer use).	N/A
Material testing and validation	Experimental evaluation of different materials (e.g. strength, flexibility, thermal resistance) to determine suitability for specific applications.	N/A
Rapid prototyping and design iteration	Fast transformation of digital designs into physical prototypes to test functionality, optimize geometry, and accelerate product development.	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
3Dt technoCAR, Aleš Car s.p.

1.13 Ethical and societal aspects

Ethical and societal aspect:	Short description:
Societal aspect	The TestBed contributes to improved workplace safety and ergonomics by enabling the design and production of customized tools, holders, and protective components that reduce physical strain and support safer handling of equipment.
Ethical aspect	The TestBed involves minimal data collection, mainly limited to design files and operational parameters. Any personal data is handled in compliance with the General Data Protection Regulation, ensuring data minimization and secure handling. No AI-based decision-making is used, so alignment with the AI Act is not required beyond general awareness.

Environmental aspect	The TestBed supports principles of circular economy by minimizing material waste and enabling on-demand production. Products can be quickly modified and reprinted without the need for additional tooling, reducing resource consumption, costs, and environmental impact compared to traditional manufacturing processes.
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