



CLiCAM

Cultivating Leaders for Innovative
Coatings and Additive
Manufacturing Applications



Funded by
the European Union



Virtual Test Beds

Materials and Coatings Area01

Material Preparation and Additive Manufacturing Area02

RESEARCH INFRASTRUCTURE.
EXPERTS. REAL SOLUTIONS

www.clicam.eu

ABOUT

CLiCAM

Virtual Test Beds



EXPERTISE
TECHNOLOGY
COLLABORATION
INNOVATION

MATERIALS
COATINGS
ADDITIVE
MANUFACTURING
REAL IMPACT

Connecting research capabilities with industrial challenges.

CLiCAM Virtual Test Beds connect companies with advanced infrastructure, specialised experts, and technologies from four European research institutions.

Together, we help companies find the right expertise and capabilities to address your specific materials and technological challenges – from material and process development to characterisation, testing, and experimental validation.

Our activities focus primarily on research, development, and experimental validation up to TRL 4-5.



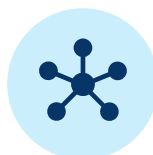
EXPERTISE

Access specialised knowledge across four European research institutions.



INFRASTRUCTURE

Use advanced research equipment and technologies without building your own facilities.



CONNECTED SOLUTIONS

Combine complementary capabilities to address complex industrial challenges.



Have a technical challenge?

Describe your challenge and we will help you find the right experts and capabilities.

QR

Bridging Research and Industry for a Sustainable Future.



Funded by
the European Union

Two Areas. One Network of Capabilities.

The CLiCAM Virtual Test Beds are organised into two complementary areas, covering a wide range of materials, coatings and additive manufacturing capabilities.

Area 01

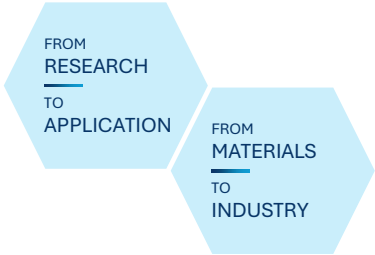
Materials and Coatings

Area 02

Material Preparation and Additive Manufacturing

Explore the capabilities and case studies in our online catalogue.

What Can You Use the Virtual Test Beds for?



DEVELOP ADVANCED MATERIALS

Metallic, ceramic, glass and other advanced materials and powder.



DEVELOP AND APPLY FUNCTIONAL COATINGS

Surface engineering, protective and functional coatings tailored to specific applications.



ADVANCED ADDITIVE MANUFACTURING

Development and optimisation of materials, processes and components for additive manufacturing.



CHARACTIRISE MATERIALS AND COMPONENTS

Microstructure, chemical and phase composition, mechanical properties and comprehensive material analysis.



TEST MATERIAL PERFORMANCE

Hardness, strength, wear resistance and other properties under relevant operational conditions.



INVESTIGATE FAILURES AND DEGRADATION

Analysis of fractures, wear, degradation mechanisms and root cause of component failure.



VALIDATE NEW TECHNOLOGIES

Experimental development, testing and validation of materials, process and technologies for industrial applications.



Have a technical challenge?

Describe your challenge and we will help you find the right experts and capabilities.



Bridging Research and Industry through Innovation.

Academic Partners

Four European institutions. Connected research infrastructure.

Industrial Partners

Collaborating for real-world impact.



AGC INTERPANE

ADVANCED COATINGS & SURFACE ENGINEERING

AGC Interpane specialises in **advanced coating technologies and surface engineering**. Its expertise includes PVD, PECVD, magnetron sputtering, and the development of functional thin-film coatings. The company combines materials development, coating process optimisation, and industrial-scale coating technologies for advanced applications.



CASTOLIN EUTECTIC

SURFACE ENGINEERING, WEAR PROTECTION & REPAIR

Castolin Eutectic specialises in **surface engineering, wear protection, repair, and joining technologies**. Its expertise includes thermal spraying, hardfacing, welding, brazing, and laser cladding. The company develops material and coating solutions designed to improve component durability, service life, and performance in demanding industrial environments.



LITHOZ GmbH

ADDITIVE MANUFACTURING OF HIGH PERFORMANCE CERAMICS

Lithoz GmbH is a technology company specialising in the **additive manufacturing of high-performance ceramics**. Its expertise includes lithography-based ceramic manufacturing, advanced ceramic materials, and the production of complex, high-precision components. Lithoz develops innovative ceramic 3D printing technologies for demanding industrial, medical, and research applications.

Industrial Partners

Collaborating for real-world impact.



OUEST COATING

THERMAL SPRAY & SURFACE ENGINEERING

Ouest Coating specialises in **thermal spray coatings and advanced surface treatments**. Its expertise includes HVOF, plasma spraying, cold spraying, and arc spraying, as well as complementary surface finishing technologies. The company develops coating solutions that improve resistance to wear, corrosion, erosion, and high temperatures.



TREIBACHER

ADVANCED CERAMICS & FUNCTIONAL MATERIALS

Treibacher Industrie AG is a leading materials company specialising in **advanced ceramics, ceramic powders, and functional materials**. Its expertise covers the development and processing of materials based on zirconia, rare earths, and other high-performance compounds. The company develops material solutions for demanding applications, including thermal spraying and wear-resistant coatings.



Zoz GROUP

POWDER PROCESSING & MECHANICAL ALLOYING

Zoz Group specialises in **mechanical alloying, high-energy milling, and advanced powder processing technologies**. Its expertise includes developing novel metallic, ceramic, and composite materials with tailored microstructures and properties. The company develops processing technologies and material solutions for advanced manufacturing and coating applications.

Industrial Partners

Collaborating for real-world impact.



3D CENTER

ADDITIVE MANUFACTURING & 3D PRINTING

3D Center focuses on **additive manufacturing and advanced 3D printing technologies**. Its expertise includes developing and applying innovative manufacturing processes and materials to produce complex components. The company works on transferring additive manufacturing technologies from research and development into practical industrial applications.

CLiCAM ERA Talents

Expertise. Knowledge transfer. Innovation.
Industry collaboration.

RESEARCHERS
FROM 4 EUROPEAN
PARTNER
UNIVERSITIES

MATERIALS
COATINGS
ADDITIVE
MANUFACTURING
ANALYSIS

ERA Talents are researchers from CLiCAM partner universities bringing specialised expertise in advanced materials, coatings, additive manufacturing, and materials characterisation. Through collaboration with industrial partners, they combine scientific knowledge with practical experience and contribute to the analyses, experiments, and technological solutions available within the CLiCAM Virtual Test Beds.

OUR EXPERTS



Assoc. Prof. Ladislav Čelko, PhD.
CEITEC – Brno University of Technology

Advanced Coatings & Materials
Engineering

Thermal Spray

Coating Testing

Surface Engineering

Materials Characterisation

Assoc. Prof. Ammirhosein Pakseresht
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Pawel Sokolowski, PhD.
CEITEC – Brno University of Technology

Advanced Coatings & Materials
Engineering

Thermal Spray

Coating Testing

Surface Engineering

Materials Characterisation

Tomáš Tesař, PhD.
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Edgar Benjamin Montufar, PhD.
CEITEC – Brno University of Technology

Advanced Coatings & Materials
Engineering

Thermal Spray

Coating Testing

Surface Engineering

Materials Characterisation

Aleksandra Malachowska, PhD.
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CliCAM ERA Talents

Diana Carolina Lago, PhD.

CEITEC – Brno University of Technology

Advanced Coatings & Materials Engineering

Thermal Spray

Coating Testing

Surface Engineering

Materials Characterisation

Pavel Gejdoš, PhD.

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Omid Sharifahmadian, PhD.

CEITEC – Brno University of Technology

Advanced Coatings & Materials Engineering

Thermal Spray

Coating Testing

Surface Engineering

Materials Characterisation

Anastasiia Novokhatska, PhD.

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Serhii Tkachenko, PhD.

CEITEC – Brno University of Technology

Advanced Coatings & Materials Engineering

Thermal Spray

Coating Testing

Surface Engineering

Materials Characterisation

Akansha Mehta, PhD.

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Mateusz Skwarski, PhD.

CEITEC – Brno University of Technology

Advanced Coatings & Materials Engineering

Thermal Spray

Coating Testing

Surface Engineering

Materials Characterisation

Mokhtar Mahmoud, PhD.

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CliCAM ERA Talents

Michaela Remešová, PhD.

CEITEC – Brno University of Technology

Advanced Coatings & Materials Engineering

Thermal Spray

Coating Testing

Surface Engineering

Materials Characterisation

Kamalan Kirubaharan Amirtharaj Mosas, PhD.

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Tomasz Kielczawa

CEITEC – Brno University of Technology

Advanced Coatings & Materials Engineering

Thermal Spray

Coating Testing

Surface Engineering

Materials Characterisation

Anusha Sekar, PhD.

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Si Chen, PhD.

CEITEC – Brno University of Technology

Advanced Coatings & Materials Engineering

Thermal Spray

Coating Testing

Surface Engineering

Materials Characterisation

Germán A. Clavijo Mejía

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Vojtěch Mařák, PhD.

CEITEC – Brno University of Technology

Advanced Coatings & Materials Engineering

Thermal Spray

Coating Testing

Surface Engineering

Materials Characterisation

Fatih Kurtuldu, PhD.

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CliCAM ERA Talents

Rajesh Mundotia, PhD.

CEITEC – Brno University of Technology

Advanced Coatings & Materials Engineering

Thermal Spray

Coating Testing

Surface Engineering

Materials Characterisation

Abel Woldu Ourgessa, PhD.

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We push the boundaries of materials.

We turn research into real-word solutions.

We help industry innovate.

We connect expertise with industrial needs.

We bring ideas from the lab to application.

Collaboration Opportunities

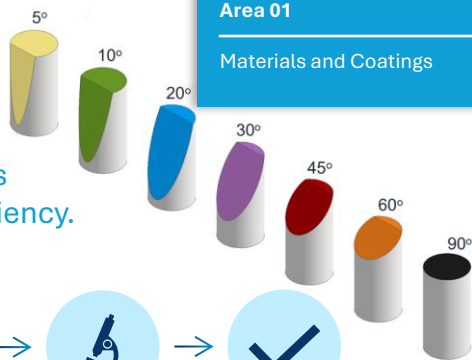
Four European institutions. Connected research infrastructure.

Deposition Efficiency of Thermal Spray Coatings

Relationship between thermal coatings microstructure and its deposition efficiency.

Area 01

Materials and Coatings



Design of Experiment



Samples Manufacturing



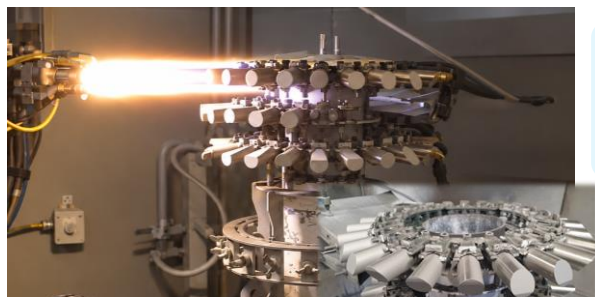
Atmospheric Plasma Spraying



Characterisation & Analysis

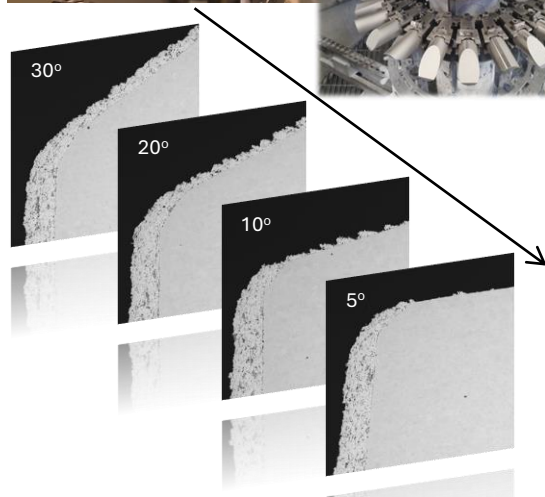


Validation



THE CHALLENGE

Understanding thermal spray process physics for reproducible ceramic coatings production.



KEY RESULTS



Spraying angle influences coatings deposition efficiency



Formation of oriented microstructure below the angle 30°



Small amount of coating spots remain at perpendicular surface



Not only angle but also distance affects deposition efficiency



Coating microstructure consists of characteristic splat structure

Sample angle significantly influences coating formation, microstructure, and deposition efficiency.

Partners involved

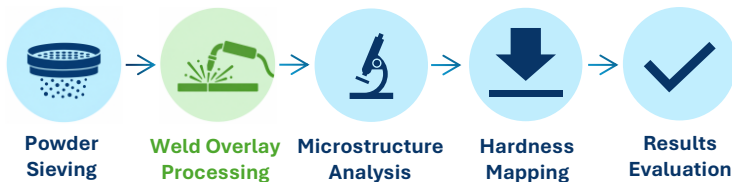


Welding and Harfacing for Harsh Abrasive and Erosive Wear Applications

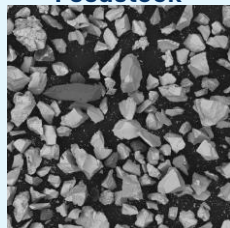
Area 01

Materials and Coatings

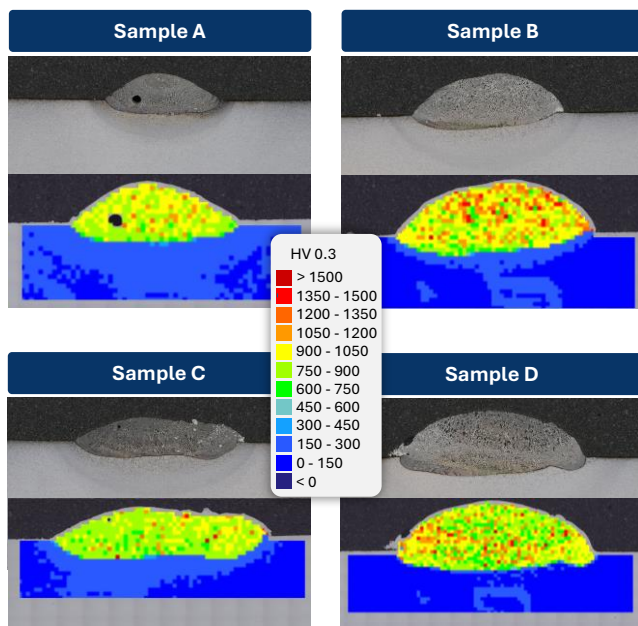
Comparative evaluation of the microstructure and microhardness distribution in weld overlays



Initial Powder Feedstock



SEM powder morphology



Various processing parameters result in different microstructures and hardness distributions.

THE CHALLENGE

Optimising weld overlays to achieve controlled geometry, microstructure and microhardness distribution for components exposed to severe abrasive and erosive wear.

OUR EXPERTISE & OFFER



Powder sieving



Material characterisation (powder, weld overlays, microstructure, chemical and phase composition)



Hardness measurement and mapping



Technical consulting



Results evolution and interpretation



Process and material optimisation recommendations

From powder to high performance weld overlays by manufacturing process optimisation for highly demanding wear applications.

Partners involved



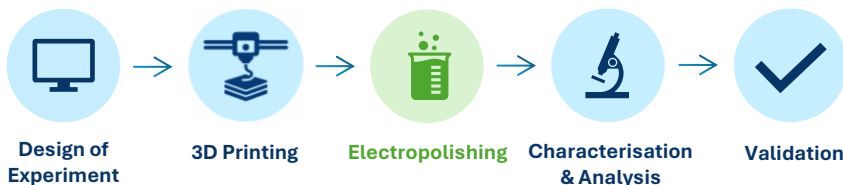
Electrochemical Polishing of 3D Printed Structures

Area 02

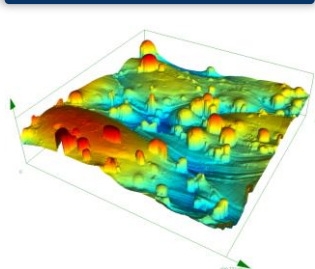
Materials Preparation
and Additive Manufacturing

Improving the surface quality of complex additively manufactured components.

3D printed structure
sample after
electropolishing
IMAGE!!!

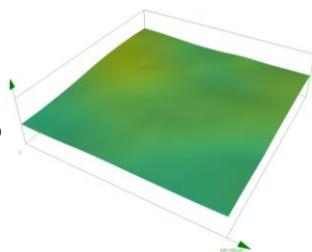


BEFORE

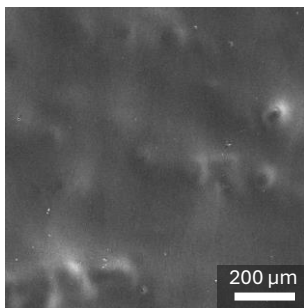
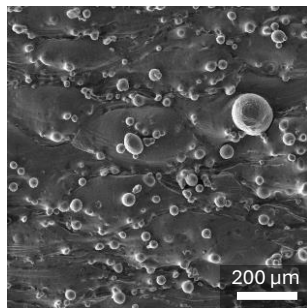


μm
60
0
-60

AFTER



3D surface topography



Scanning electron image of the surface



THE CHALLENGE

Reduce surface roughness, improve surface gloss, and preserve the complex geometry of 3D-printed structures.

KEY RESULTS



Reduced surface roughness



Improve surface gloss



Complex geometry preserved



Optimised pre-treatment, electropolishing, and post-treatment processes.



Surface microstructure characterised

Smoother surface with gloss finish. Experimentally validated.

Partners involved



CEITEC
BRNO UNIVERSITY
OF TECHNOLOGY



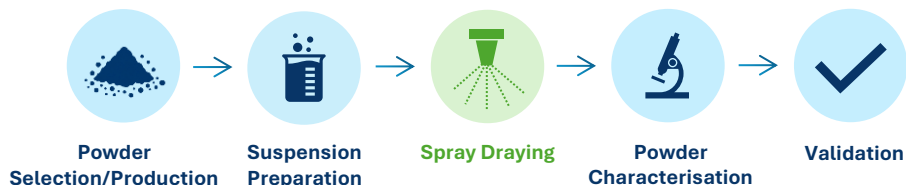
3D Center
YOUR IDEA IN OUR DIMENSION

POWDER MODIFICATION BY SPRAY DRYING

Area 02

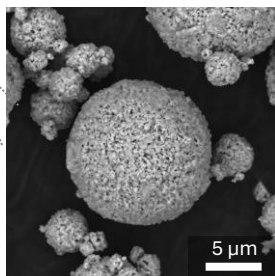
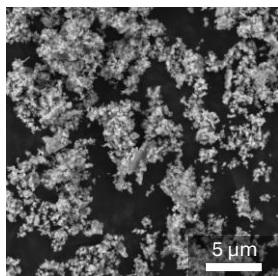
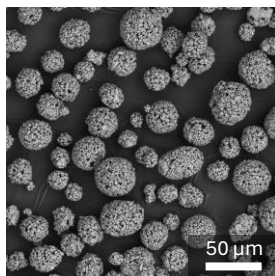
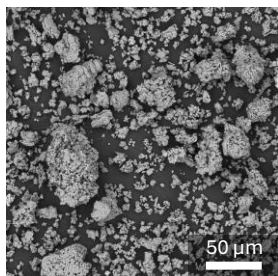
Materials Preparation
and Additive Manufacturing

Transforming fine powders into spherical, flowable particles.



BEFORE

AFTER



THE CHALLENGE

Improve powder flowability, particle size distribution, and morphology for subsequent processing.

KEY RESULTS

- ✓ Spherical particle morphology
- ✓ Increased particle size
- ✓ Improve powder flowability
- ✓ Controlled particle size distribution
- ✓ Reduced powder agglomeration
- ✓ Optimised spray drying parameters

Controlled particle size and morphology for improved flowability and processability.

Partners involved



FunGlass

Lets Work Together

From industrial challenges to research-driven solutions.

Have a materials or technology challenge?

Let's find the right expertise and solution together.



**DESCRIBE YOUR
CHALLENGE**



**CONNECT WITH
EXPERTS**



**DEVELOP &
VALIDATE**

QR

Start your collaboration with us

Scan the QR code, describe your challenge, and get in touch.

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CLiCAM

Virtual
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RESEARCH INSTITUTIONS
AND INDUSTRY