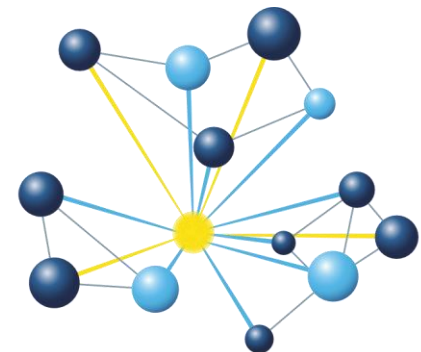


# Innovative hybrid (subtractive/additive) manufacturing approach for repairing added value damaged objects

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**VANGUARD INITIATIVE**

New growth through smart specialisation

## Agenda of the session

- ProM Facility
- The regional team
- The Vanguard 3DP democase rationale
- The technology
- The way forward – Action plan

# ProM Facility

TRENTINOSVILUPPO  
IMPRESA INNOVAZIONE MARKETING TERRITORIALE

## Prototyping Facility for Mechatronics

- Investment 7 M€ in machinery
- 2000 sq.m
- 20 people staff

### Machines:

**AM:** metal, polymeric and hybrid

**Metrology:** Xray Computed Tomography

**Reverse engineering:** 3D scanners, CMM

**Mechanical testing** and climate chamber

Artificial Intelligence, electronic prototyping, HPC



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<http://promfacility.eu>

# The regional team



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**VANGUARD INITIATIVE**



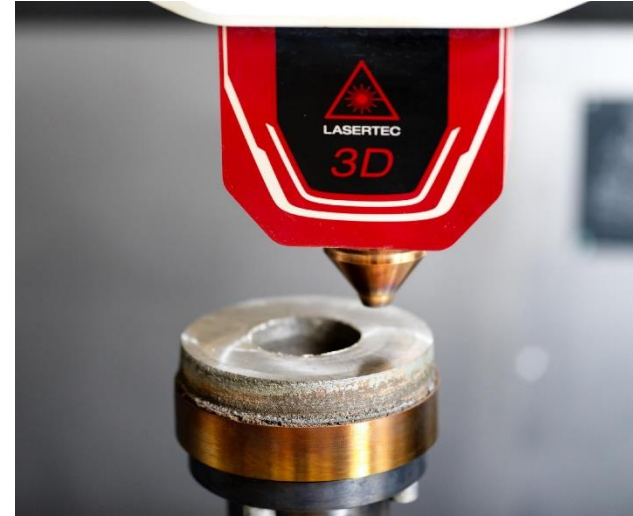
# Rationale of the Vanguard democase (1/2)

- Up to now **repairing is a difficult task** (hand-made, skill-dependent, non-repeatable)
- **Hybrid manufacturing** (subtractive+additive) can be a solution
- For **high-value components** (e.g. dies) can be very convenient
- **CAD-CAM process is still demanding**



# Rationale of the Vanguard democase (2/2)

- Main target applications:
  - **Dies and moulds** for foundry, hot stamping, CFRP fabrication
  - **Wear-prone components** in energy industry (Pelton turbines)
- Target technologies:
  - Hybrid machines: milling + DLD, WAAM, LENS...
- TRL: high (6-8)



# Technical approach to repairing

## Implementation

- **3D scan** of the damaged object
- **Comparison** with the CAD model using octree
- **Add new material** where is missing
- Restore the original shape by **milling**

## Targets

- **Worn out** toolings
- **High value** components
- **Out-of-stock** spare parts
- **Complex-shape** objects
- **Artistic/historic** artefacts

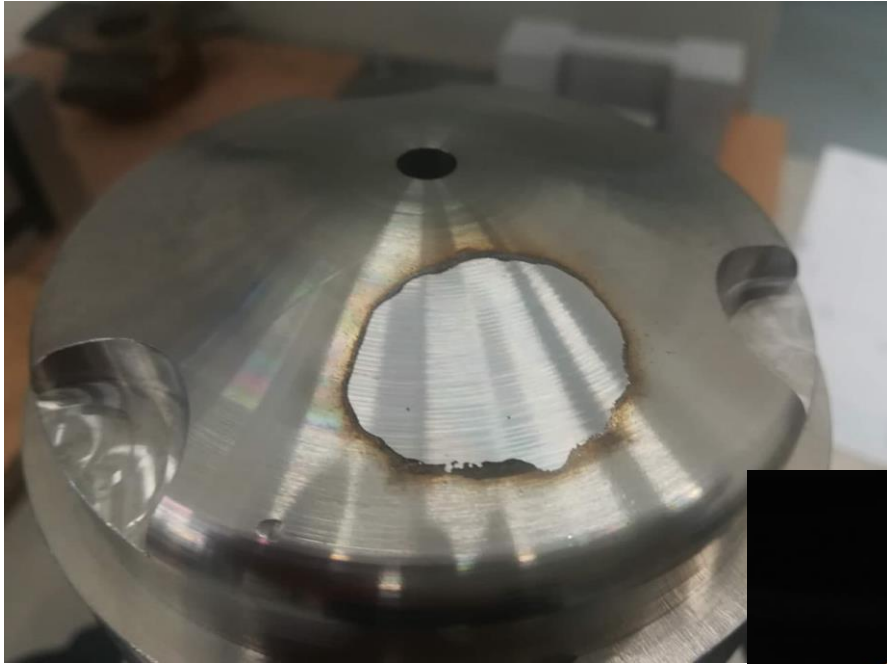
# Examples of industrial applications (1/2)

- Development of **mechanical special parts** for industrial application (impellers, blades, etc...with conformal channels) impossible to realize by standard CNC or pure AM technologies
- **Repair of injection moulds** by reverse engineering and material deposition (Direct Energy Deposition (DED) or equivalent technologies) and post-processing by milling machining, in order to restore the original geometry





## Examples of industrial applications (2/2)



- Development and/or **restoration of cutting tools** for the automotive industry by hybrid manufacturing approach
- **Multi-materials** deposition of by DED of (e.g. mix of different metal powders) **to prevent wear** and failure of tools and moulds used in the manufacturing industry

# Status of activities

- Vanguard new democase launched in Nov. 2020, Kick Off Mar. 2021
- Technical Assistance Facility (TAF) application submitted
- R&D activity running to **extend material portfolio**
- Technical **competence network** within 3D Pilot is growing
- **Industrial applications** were demonstrated
- **Further use cases are welcome** from interested stakeholders

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