Green Additive Manufacturing through Innovative Beam Shaping and Process Monitoring – InShaPe

26th of September 2023

InShaPe

INNOVATION THROUGH LASER BEAM SHAPING IN METAL-BASED AM

InShaPe | Vision and Mission

Vision

InShaPe makes metal-based additive manufacturing faster, cheaper and more sustainable

Mission

InShaPe is underpinned by two technical innovations i) beam shaping and ii) multi-spectral imaging for metal-based additive manufacturing

11
Project partners

36 months
Project duration

1st of June 2022
Starting date

6.8 Mio. €
Project volume

InShaPe | Partners

Participants

1. Technical University of Munich
2. EOS GmbH
3. Oerlikon AM Europe GmbH
4. Eindhoven University of Technology
5. SILIOS Technologies SA
6. BeamIT SPA
7. Aenium Engineering SL
8. Amexci AB
9. Bavarian Research Alliance
10. Technion – Israel Institute of Technology
11. Institute of Metals and Technology

InShaPe | Motivation

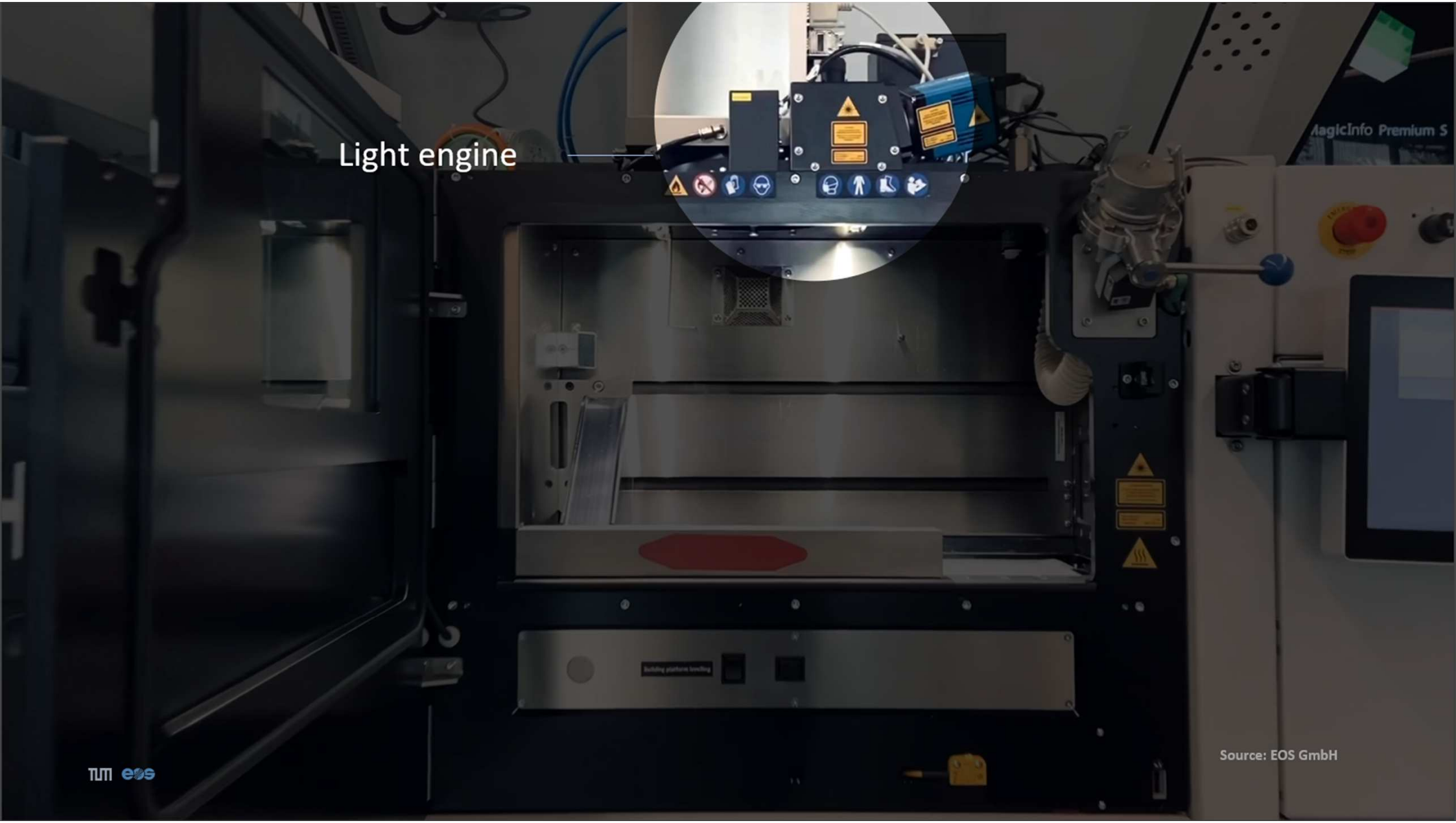
Laser-based powder bed fusion of metals is now an **established industrial manufacturing** process with great potential for innovation

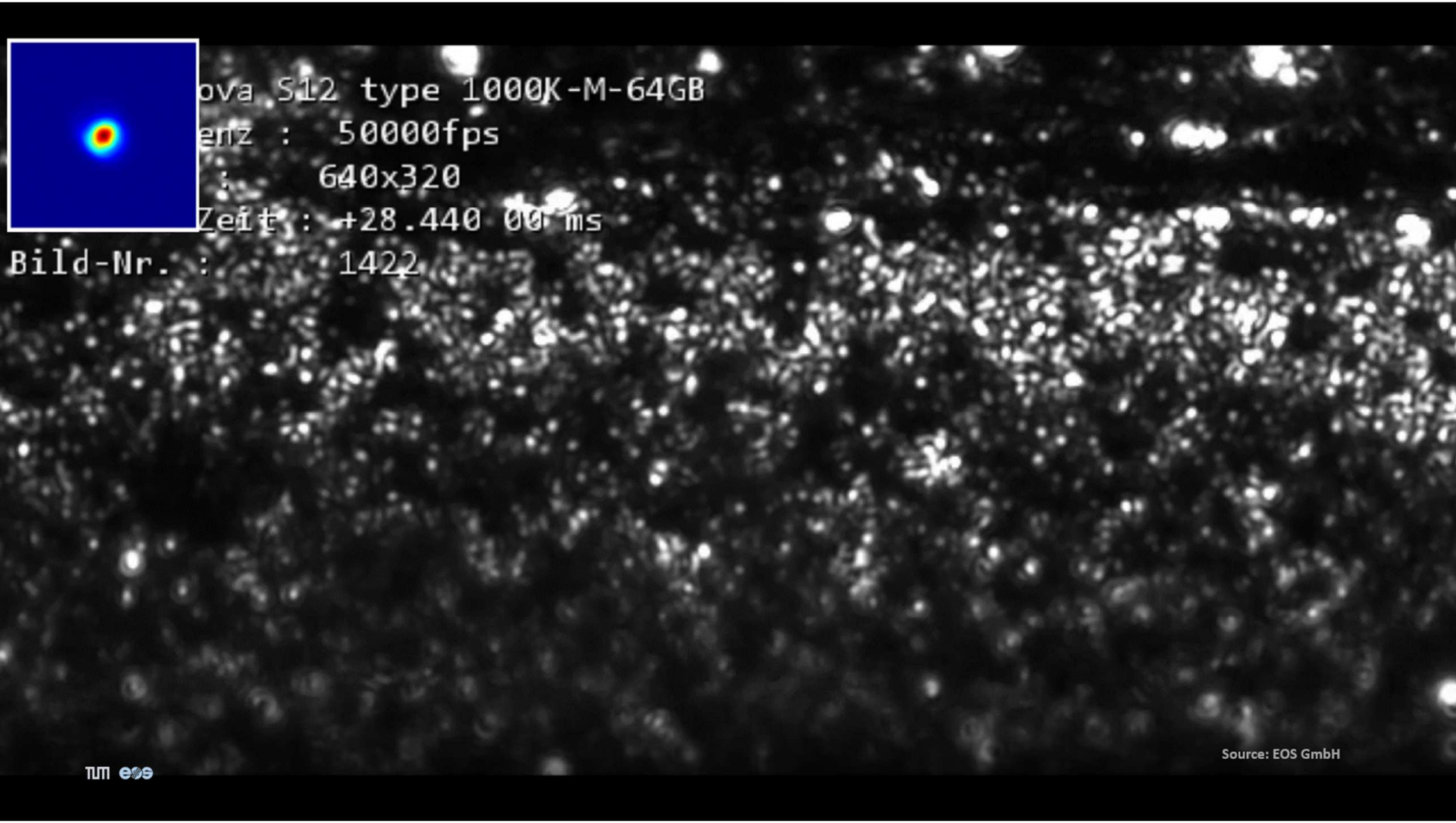
InShaPe | Aim

As a young process, we still have further optimization potential

InShaPe is aiming for

7x	-50%	-60%	-30%
Productivity	Part costs	Energy consumption	Scrap


Light engine
MagicInfo Premium S
Source: EOS GmbH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Source: EOS GmbH

InShaPe | Technical innovation

AI-BASED BEAM SHAPING

- Novel optical module with programmable beam shapes
- Tailoring of beam shape based on melt pool characteristics
- AI-powered „recipe book“ for beam shape material property correlation

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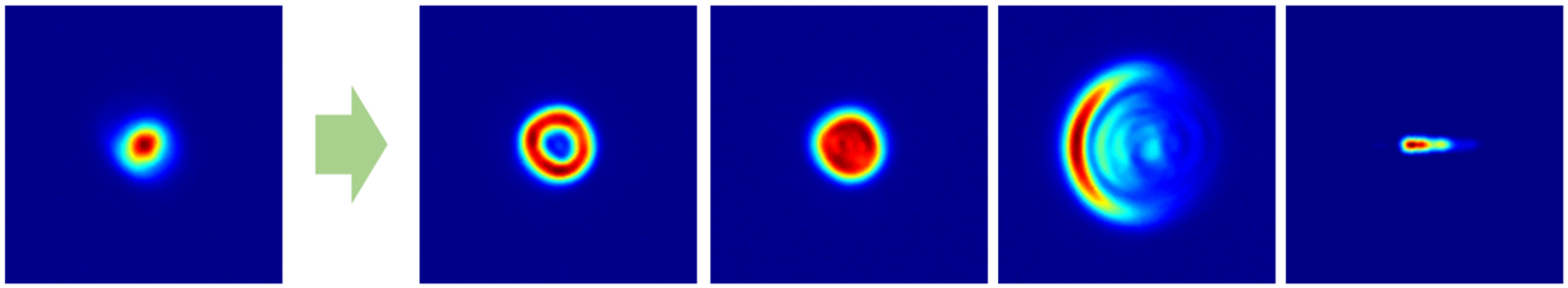
MULTISPECTRAL IN-LINE MONITORING & CONTROL

- Multi-spectral imaging to monitor absolute temperatures and melt pool geometry
- AI algorithm for resolution enhancement of multi-spectral data

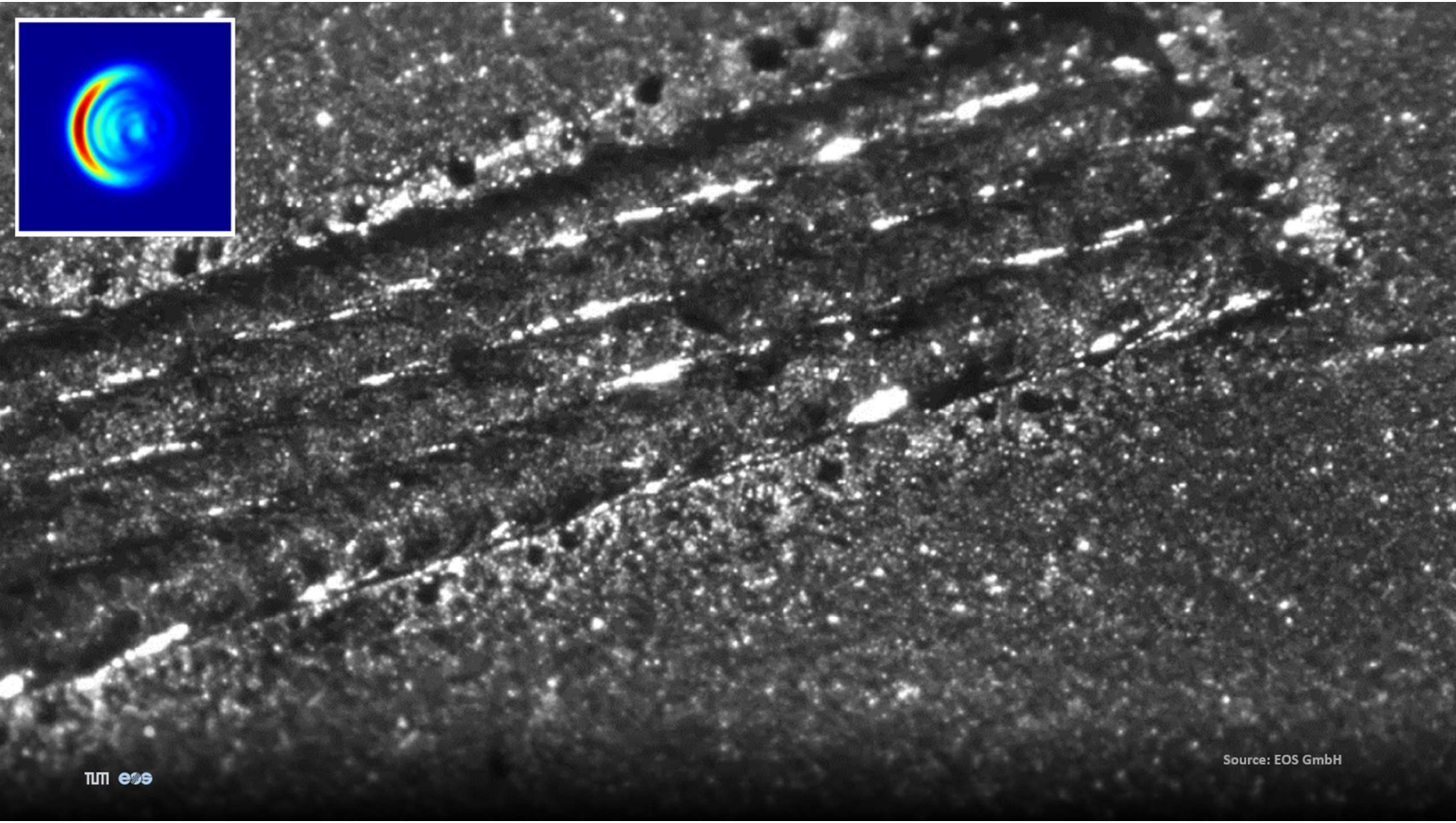
InShaPe Innovation

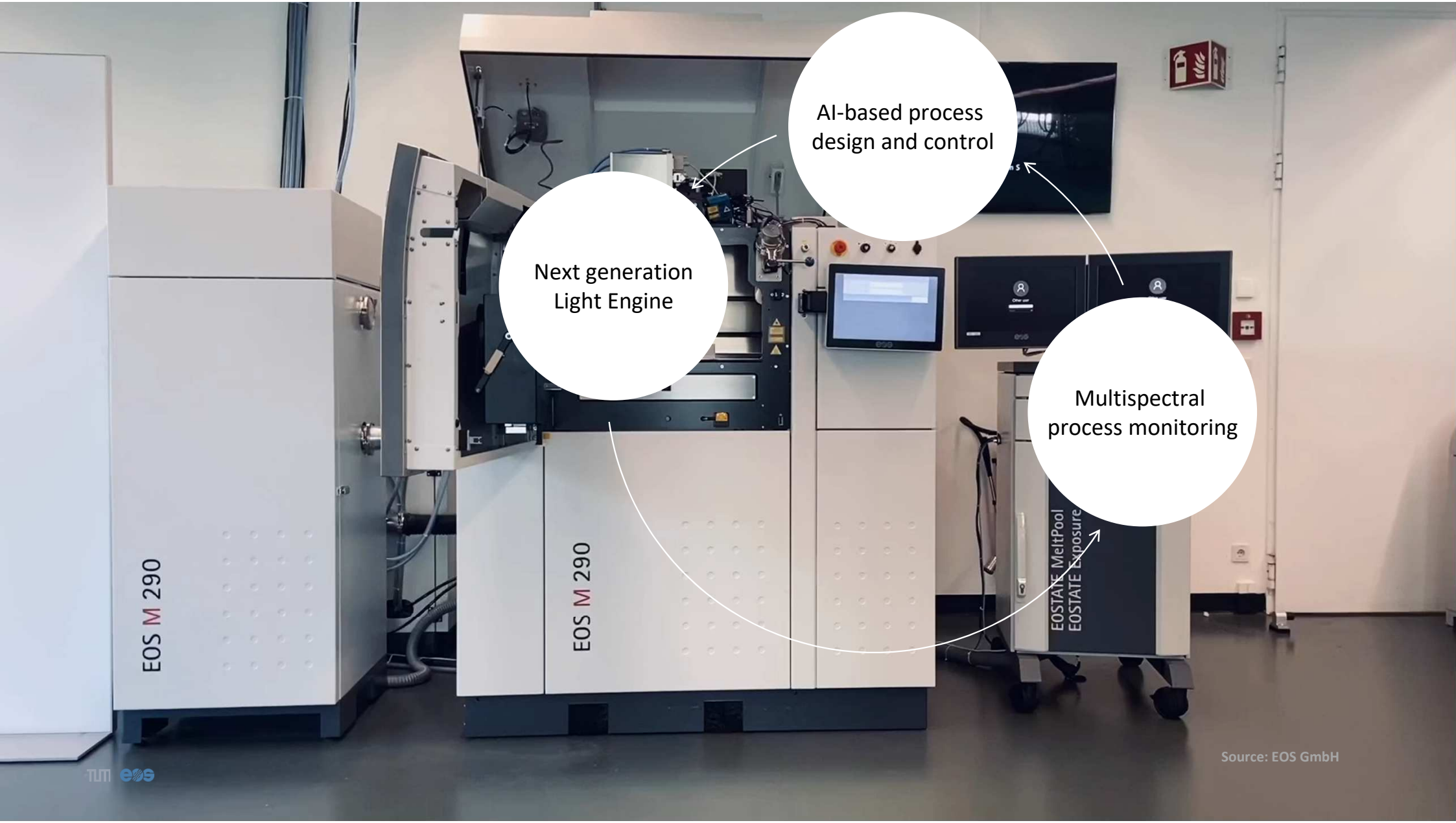
Beam shaping is the basis for the next level of productivity in industrial PBF-LB/M



© EOS

- Flexible adaption of beam shape to influence material properties
- Flexible zooming of spot size
- Higher productivity


Source: EOS GmbH

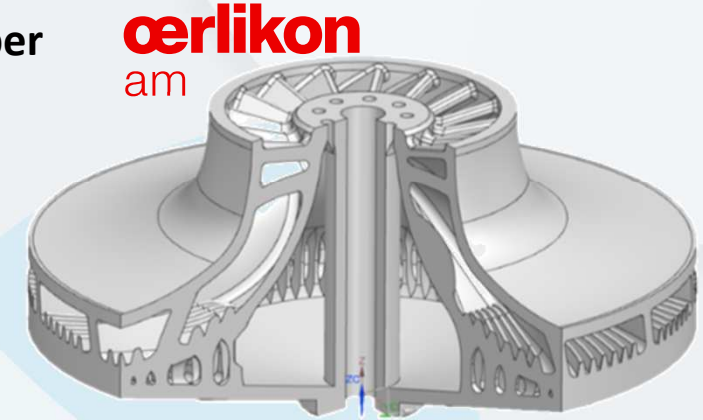

AI-based process design and control
Next generation Light Engine
Multispectral process monitoring
EOS M 290
EOS M 290
EOSTATE MeltPool
EOSTATE Exposure
Source: EOS GmbH

InShaPe Use-cases

SPACE

Combustion Chamber
Material: CuCrNb
Main goals:
- Increase productivity
- Lower surface roughness
- Control microstructure

SPACE



Impeller
Material: IN718
Main goals:
- Increase productivity
- Lower surface roughness
- Lower overhang angles

InShaPe Use-cases

CONSUMER GOODS

Cylinder Head for a Chainsaw
Material: AlSi10Mg
Main goals:
- Increase productivity

ENERGY

Part for Industrial Gas Turbine
Material: IN718
Main goals:
- Increase productivity
- Lower surface roughness
- Control microstructure

InShaPe
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Questions?

Thank you!

We are looking forward to a vivid exchange

InShaPe

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