EUROPEAN DEFENCE AGENCY

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Circularity & AM

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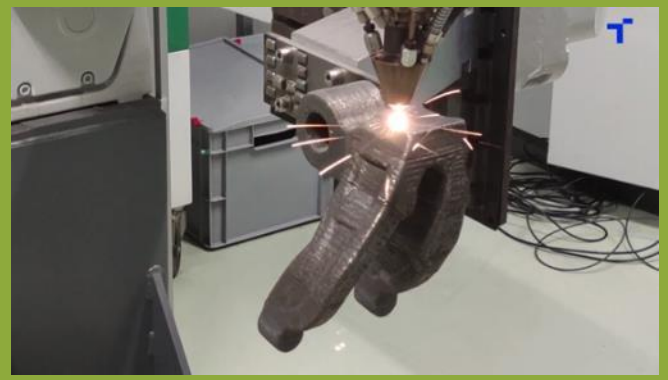
CIRCULARITY & AM (1) - INTRODUCTION

- **Additive Manufacturing contributes to an efficient use of resources**
  - ✓ Optimised design → use materials where needed.
  - ✓ Adapted to lot-size-one and small series
    → no need for mould / specific manufacturing ancillary equipment.
    → enabler for production of spare parts (extending lifetime of assets).
  - ✓ Possibility to use additive technologies for repair.

Source: AMD Engineering

Example: Laser Metal Deposition (LMD) for repair / Tekniker



Example: Optimisation of design & printing strategy with Artificial Intelligence / 1000Kelvin

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CIRCULARITY & AM (2) – DEPLOYABLE SOLUTIONS

- **Answering operational needs AND circular**
  - ✓ Printing spare parts to maintain operational capacity.
  - ✓ Repairing instead of replacing.
  - ✓ If coupled with recycling, optimal use of materials available.

- **How can it help reduce the logistics & environmental footprint**
  - ✓ On-demand manufacturing (vs stockpiling).
  - ✓ On-site manufacturing (vs dedicated shipment).

Source: DMFG

Example: Deployable 3D Printer with Integrated Recycling Unit / 3DPrint.lu

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CIRCULARITY & AM (3) – CIRCULARITY OF MATERIALS

- **Closing the loop of materials**
  - ✓ Reduce the need for primary resources.
  - ✓ Keep materials in the EU loop (especially for critical raw materials).
  - ✓ Use of recycled and bio-based materials.

Example: Part printed with recycled material (brown / > 75% recycled content) & virgin materials / Liqtra

Example: polymer with biobased or recycled content / Tectonic3D

Tectonic

Sustainability materials Tectonic3D

• TenneT KRATIR PA11 CF	96% biobased polymer with recycled carbon fiber
• TenneT KRATIR PA11 CF MC	96% biobased polymer with recycled carbon fiber with 15% density reduction for lightweight parts
• TenneT KRATIR PP CF	Polypropylene with recycled Carbon fiber for extreme strength (13 GPA)
• TenneT KRATIR PP CF MC	PP with recycled Carbon fiber for extreme strength (13 GPA)with up to 40% weight reduction
• TenneT TPE 80A	A Flexible Thermoplastic elastomer with >50% biobased. Medical class 6 approved and sterilizable
• TenneT KRATIR rPEEK CF	100% recycled PEEK with outstanding mechanical performance and easy to print.
• TenneT PLA	PLA easy to print 100% biobased
• TenneT PHA filled	100% biobased polymer PHA with natural fillers for higher strength. Seawater degradable and compostable.

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