

METALLIC GLASSES AS HIGH-TECH ALLOYS

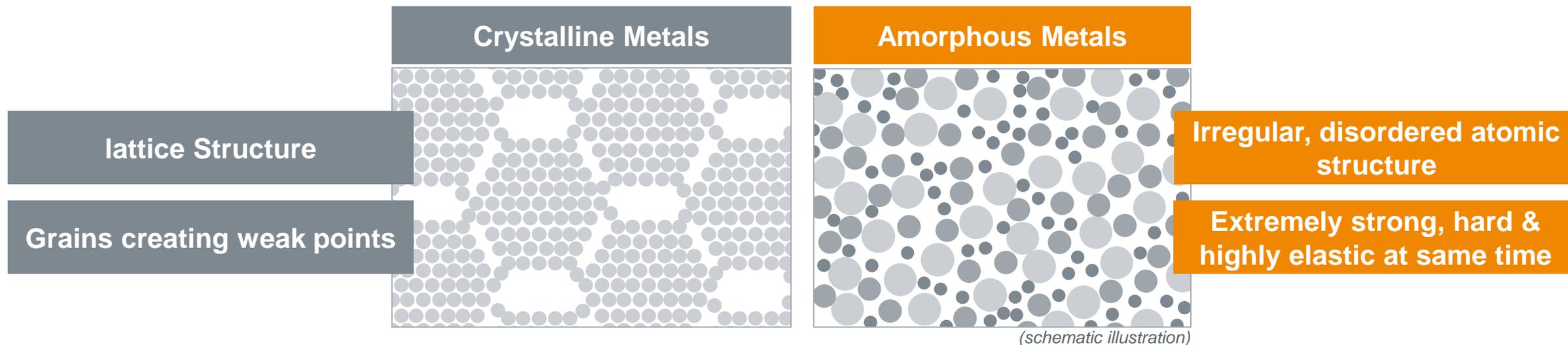
September 2020



AMLOY

PUSHING LIMITS OF MATERIAL PERFORMANCE

- › Amorphous Alloys are **undercooled frozen metallic liquids**
- › In comparison to crystalline solidifying metals and alloys, they can be characterized by
 - › Having no significant shrinkage during solidification
 - › Absence of lattice defects



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OUTSTANDING PROPERTIES FOR IMPROVED PRODUCTS

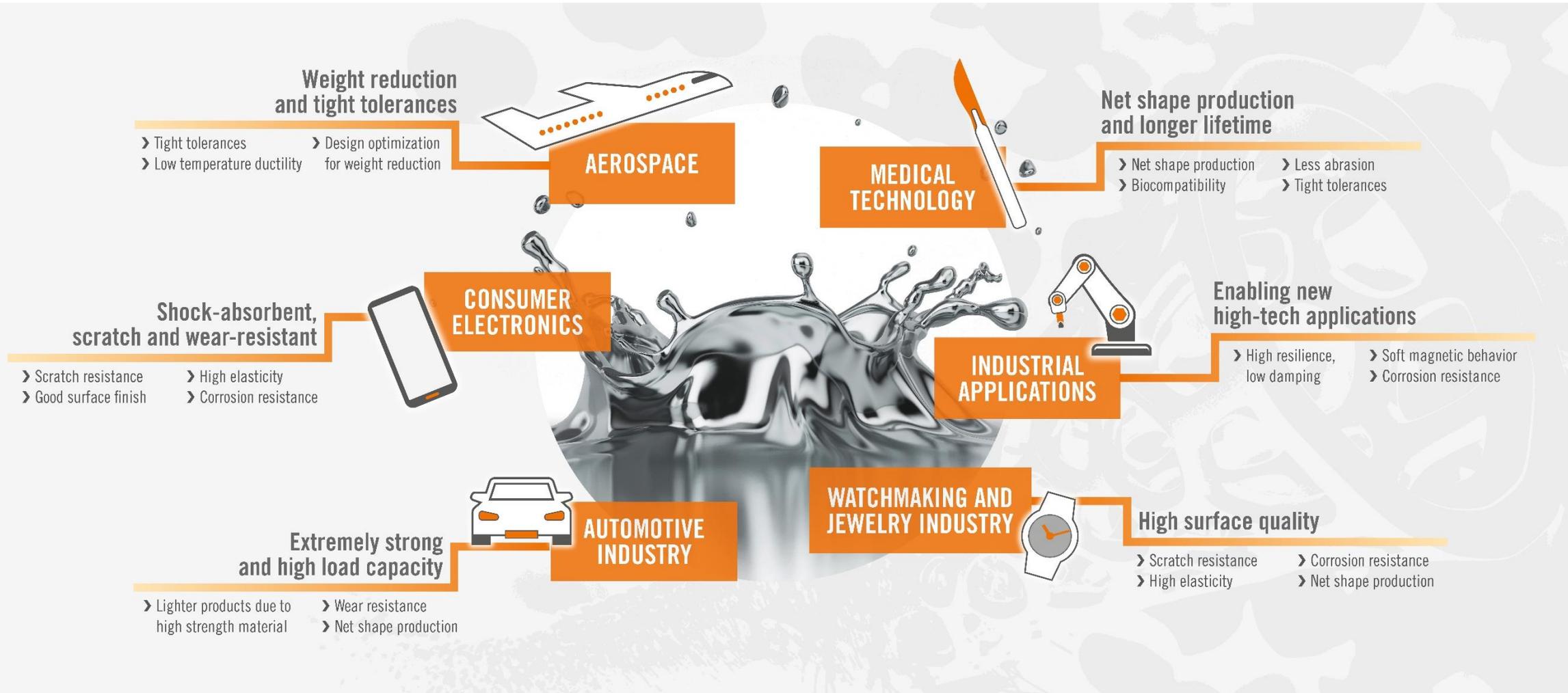
- ✓ Elasticity
- ✓ Strength
- ✓ Corrosion resistance
- ✓ Low shrinkage
- ✓ Hardness
- ✓ Biocompatibility
- ✓ High surface finish

AMLOY ZR01



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TACKLING REQUIREMENTS OF HIGH-TECH APPLICATIONS

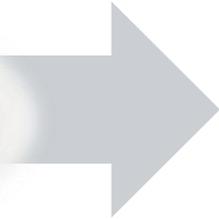


INJECTION MOLDING

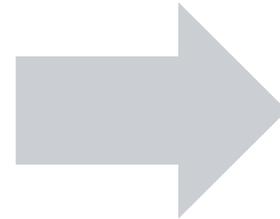
➤ Fast net-shape processing of high strength metal parts



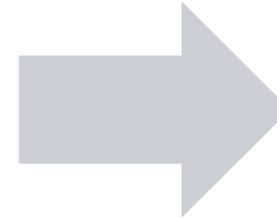
AMLOY material



Injection molding machine



Molded part with runner



Assembled part

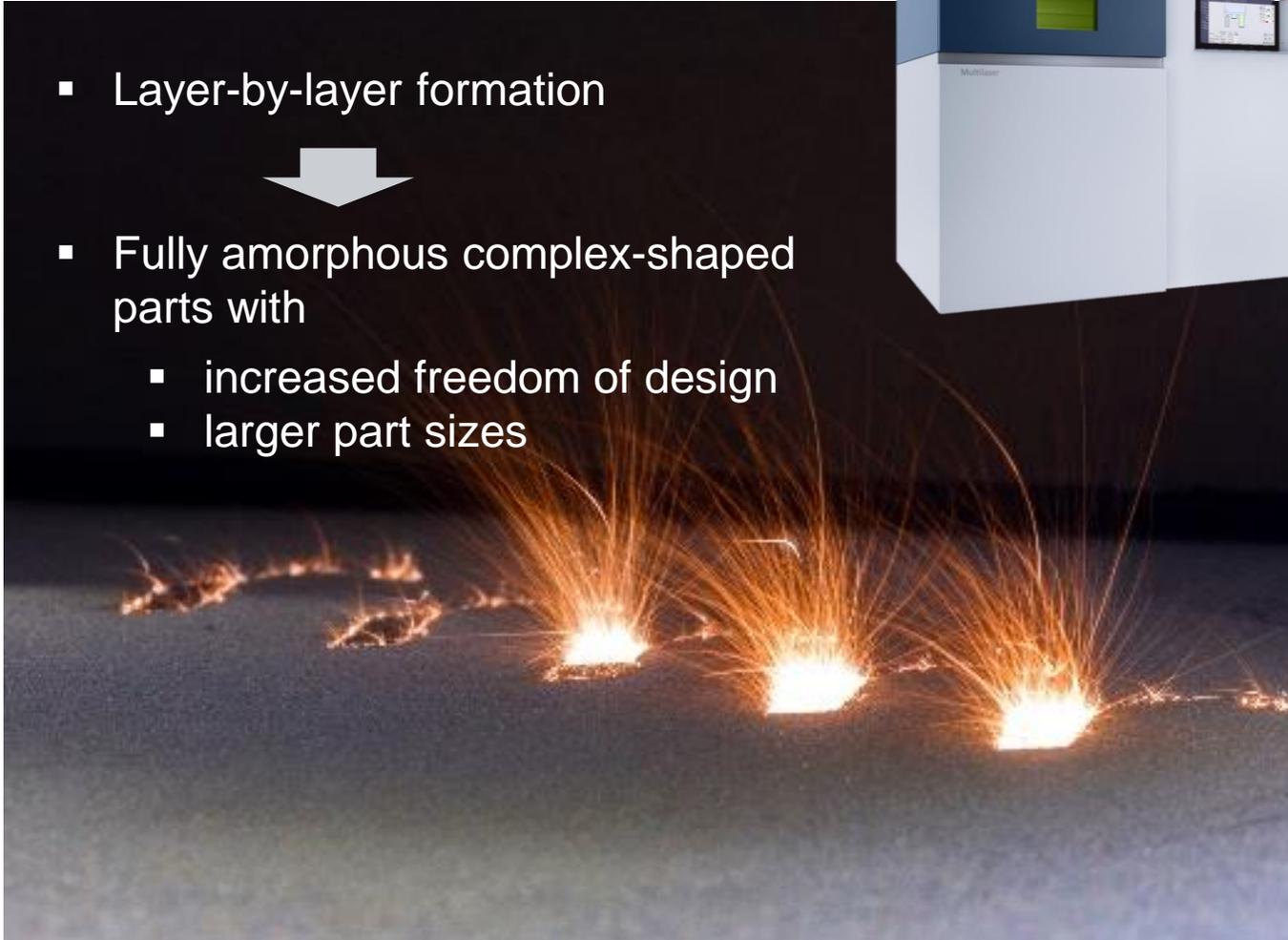
- ✓ High productivity (cycle time: 90s)
- ✓ High dimensional repeatability (+/- 0.008 mm)
- ✓ High surface finish of as-fabricated parts

- ✗ Design & size limitations
- ✗ Tooling costs

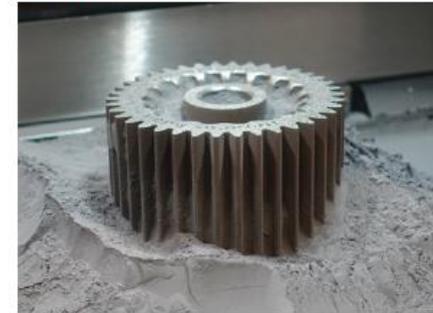
3D-printing

➤ Overcoming limitations

- Layer-by-layer formation
- ↓
- Fully amorphous complex-shaped parts with
 - increased freedom of design
 - larger part sizes

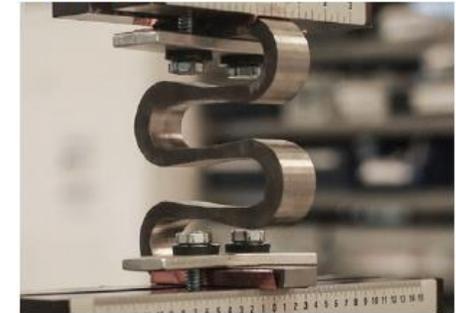


Gears



- Topology optimized
- Good wear resistance
- No lubricants needed

Springs



- Elasticity
- Resilience
- Low damping

Tools



- High strength
- No embrittlement at low temperatures
- Good wear resistance

Jewelry



- High hardness
- Scratch-resistant
- Smooth and shiny surfaces
- Exclusivity

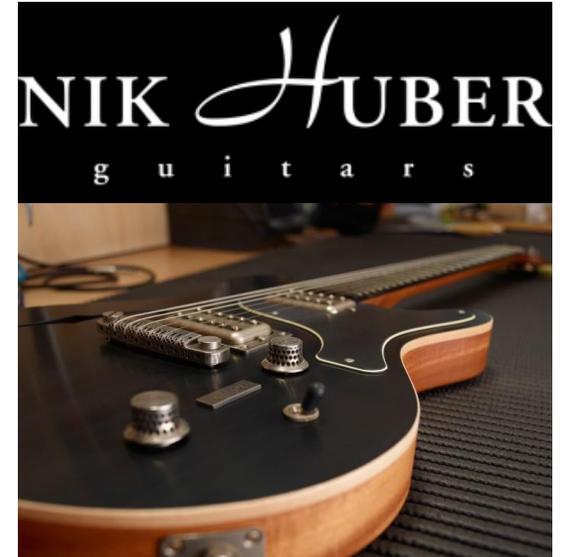
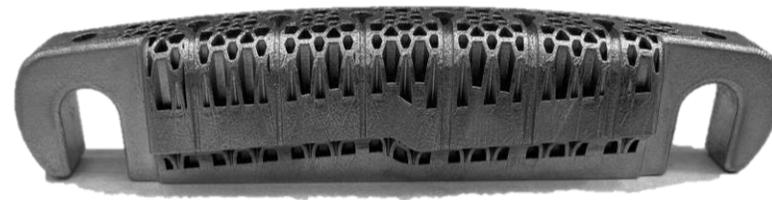
3D-printing

➤ applications

3D-printed guitar bridge

Thanks to the properties of the amorphous material, the 3D-printed guitar bridge yields a **unique sound pattern** combining a harder attack with a longer sustain. 3D printing makes it possible to create **new designs** that cannot be produced by conventional processing technologies, enabling a **customization** of parts and sound patterns.

➔ <https://youtu.be/fKB-PrCYGTA>



3D-printing

➤ applications

3D-printed expansion sleeve

Thanks to the **high elasticity** of the amorphous material, it deforms more readily than a conventional sleeve. 3D printing makes it possible to produce the part in **one piece instead of making components one by one** and then assembling them. This simplifies the production process.



Thank you for your attention!

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Heraeus AMLOY receives German Innovation Award

Hanau, Germany - May 26, 2020

The German Design Council honors amorphous alloys from Heraeus AMLOY gold in the "Materials & Surfaces" section of the "Excellence in Business to Business" competition class.