



## Press Release

April 21, 2020

### **Heraeus AMLOY and TRUMPF open door to industrial 3D printing of amorphous metals**

- **Collaborative venture succeeds in boosting process and cost efficiency of 3D-printed amorphous parts for industry**
- **New 3D-printed parts are isotropic, retaining their high strength regardless of build direction**
- **Major benefits likely for parts that experience significant stresses in sectors such as medical devices, aerospace and mechanical engineering**

**Hanau / Ditzingen, Germany** – The technology companies Heraeus AMLOY and TRUMPF have started working together on the 3D printing of amorphous metals, also known as metallic glasses. Their goal is to establish the printing of amorphous parts as a standard production method on the shop floor by improving process and cost efficiencies. Amorphous metals are twice as strong as steel, yet significantly lighter and more elastic. They exhibit isotropic behavior, which means their material properties remain identical, regardless of the direction in which the 3D printer builds up the workpiece. In addition to creating highly robust parts, 3D printing also gives engineers more freedom in the design process. A number of areas could benefit from 3D printing of amorphous metals. Key examples include parts that are subject to significant stresses and lightweight design in sectors such as aerospace and mechanical engineering. These materials are also an excellent choice for medical devices due to their biocompatibility.

#### **3D printing opens up new applications for amorphous metals in industry**

“3D printing of amorphous components in industry is still in its infancy. This new collaboration will help us speed up printing processes and improve surface quality, ultimately cutting costs for customers. This will make the technology more suitable for a wider range of applications, some of which will be completely new,” says Jürgen Wachter, head of the Heraeus AMLOY business unit.

“Amorphous metals hold potential for numerous industries. For example, they can be used in medical devices – one of the most important industries for additive manufacturing. That’s why we believe this collaboration is such a great opportunity to make even more inroads into this key market with our industrial 3D printing systems,” says Klaus Parey, managing director TRUMPF Additive Manufacturing.

Amorphous metals are formed by cooling molten metal extremely quickly. A 3D printer can then build them into larger, more complex parts – something that other methods are unable to do. This opens the door to new industrial applications for amorphous metals. 3D printing also exploits the considerable potential that amorphous metals hold for lightweight design. A 3D printer only builds structures that actually help a part fulfil its function, so material use and weight are kept to a minimum. For their part, amorphous metals are very light by nature, so the combination of 3D printing and amorphous metals can reduce weight in all sorts of applications. 3D printing makes the production of amorphous parts faster and simpler in a

wide range of contexts. The technology enables users to build parts in one piece instead of making components one by one and then assembling them into a finished part.

### **Optimized material + adapted 3D printer = high quality in high-volume production**

In this cooperation, Heraeus AMLOY combines its expertise in the production and processing of amorphous metals with TRUMPF's experience in additive manufacturing. Heraeus AMLOY has optimized its amorphous alloys for 3D printing and tailored the material for use with TRUMPF's TruPrint systems. The latest-generation TruPrint 2000 machine is a particularly good choice for printing amorphous metals. The machine is designed in such a way that the excess powder can be prepared in an inert gas environment for the subsequent building process. This protects the powder from any adverse influences. This is a key benefit for amorphous metals because they react so quickly with oxygen. TRUMPF has also boosted the productivity of the TruPrint 2000. Two 300-watt lasers scan the machine's entire build chamber in parallel. Using a laser focal diameter of just 55 micrometers, users can carry out both low and high-volume production of amorphous parts with extremely high surface quality. The "Melt Pool Monitoring" function automatically monitors the quality of the melt pool, so any errors in the process are spotted at an early stage.

### **Customers can already order amorphous parts or print them themselves**

Customers that already have a TRUMPF 3D printer can now use it to process zirconium-based alloys from Heraeus AMLOY. It is also possible to order 3D-printed amorphous parts directly from Heraeus AMLOY. The two partners are also hoping to make copper- and titanium-based alloys available for 3D printing in the future.

### **Images:**



**Fig. 1: TruPrint 2000**

The new TruPrint 2000 3D printer from TRUMPF is the ideal choice for printing amorphous metals from Heraeus AMLOY. (Source: TRUMPF)



**Fig 2: Project team**

From left to right: The project team from Heraeus AMLOY and TRUMPF Additive Manufacturing: Hans-Jürgen Wachter (Head of Business Unit Heraeus AMLOY), André Kobelt (Chief Commercial and Technology Officer of Heraeus Holding), Moritz Stolpe (Heraeus AMLOY), Valeska Melde (Heraeus AMLOY), Arwed Kilian (TRUMPF Additive Manufacturing), Klaus Parey (Managing Director TRUMPF Additive Manufacturing), Jan-Christian Schauer (TRUMPF Additive Manufacturing). (Source: Heraeus AMLOY)



### Fig. 3: Amorphous expansion sleeve

One part that can be improved by 3D printing amorphous metals is an 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. (Source: Heraeus AMLOY)

#### About Heraeus AMLOY

Heraeus Amloy specializes in the development and processing of amorphous metals. With their unique material properties, combining hardness with high elasticity as well as corrosion resistance and biocompatibility, amorphous metals are opening completely new hightech applications. The near-net-shape process solutions from Heraeus AMLOY are optimally suited for industrial manufacturing.

#### About Heraeus

Heraeus, the technology group headquartered in Hanau, Germany, is a leading international family-owned portfolio company. The company's roots go back to a pharmacy operated by the family since 1660. Today, Heraeus combines businesses in the environmental, energy, electronics, health, mobility and industrial applications sectors. In the 2018 financial year, Heraeus generated total revenues of €20.3 billion, with approximately 15,000 employees in 40 countries. Heraeus is now one of the top 10 family-owned companies in Germany and holds a leading position in its global markets.

With technical expertise, a commitment to excellence, a focus on innovation and entrepreneurial leadership, we are constantly striving to improve our performance. We create high-quality solutions for our clients and strengthen their long-term competitiveness by combining unique material expertise with leadership in technology. High tech from Heraeus sailed into outer space 50 years ago, as part of the first moon landing: Triple prisms made of quartz glass still make it possible to reliably measure the exact distance from Earth to the moon. In addition, cubes made by Heraeus with a gold-platinum alloy will soon penetrate even farther into space to detect gravitational waves whose existence Albert Einstein described in theory more than 100 years ago.

#### About TRUMPF

The high-technology company TRUMPF offers production solutions in the machine tool and laser sectors. It is driving digital connectivity in manufacturing industry through consulting, platform and software offers. TRUMPF is the world technological and market leader for machine tools used in flexible sheet metal processing, and also for industrial lasers.

In 2018/19 the company – which has about 14,500 employees – achieved sales of 3.8 billion euros. With over 70 subsidiaries, the TRUMPF Group is represented in nearly all the countries of Europe, North and South America, and Asia. It has production facilities in Germany, France, Great Britain, Italy, Austria, Switzerland, Poland, the Czech Republic, the USA, Mexico, China and Japan.

For more information about TRUMPF go to [www.trumpf.com](http://www.trumpf.com)

#### Media contact Heraeus

**Katharina Reichel**  
International Media Manager

Heraeus Holding GmbH  
Heraeusstraße 12 - 14  
63450 Hanau, Germany

Tel +49 6181 35-4861  
Mobile +49 157 8051 1120  
E-Mail [katharina.reichel@heraeus.com](mailto:katharina.reichel@heraeus.com)

#### Media contact TRUMPF

**Ramona Hönl**  
Spokesperson Additive Manufacturing

TRUMPF GmbH + Co.KG  
Johann-Maus-Straße 2  
71254 Ditzingen, Germany

Tel +49 7156 303-31251  
Mobile: +49151-26384773  
E-Mail [ramona.hoenl@trumpf.com](mailto:ramona.hoenl@trumpf.com)