

BEYOND WHAT'S POSSIBLE

Additive Manufacturing.
Thinking things new



Foto :©EDAG

voestalpine Additive Manufacturing
www.voestalpine.com/additive

voestalpine

ONE STEP AHEAD.

FROM CONCEPT TO COMPONENT

Additive Manufacturing (AM) is the process of manufacturing objects from Computer Aided Design (CAD) model data, usually layer upon layer, as opposed to using methods of subtractive manufacturing (removing material until the desired shape is reached) or formative manufacturing (applying mechanical forces and/or heat through processes such as bending, casting, and molding).

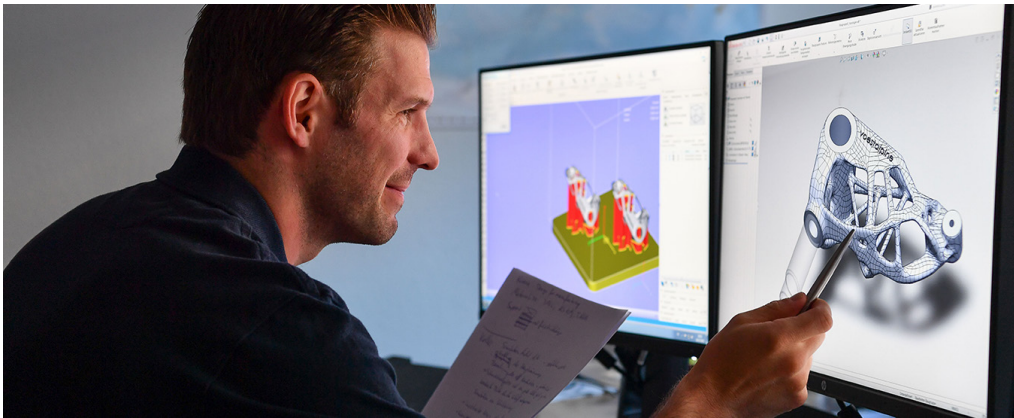
It's not simply a new way of producing. It's a new way of thinking.

Interest in AM has grown swiftly as applications have progressed from rapid prototyping to the production of end-use products. AM equipment can now use metals to “print” a range of functional components including complex structures that cannot be manufactured by other means. AM technology can be used to build complete parts, add features, or make repairs.

The AM process can build custom tools or parts from a range of metals such as aluminum, high-grade steel, titanium, nickel-base alloy, and cobalt chrome. Applications serve a variety of markets, for example tooling, aerospace, oil and gas, automotive, and medical industries to name a few.

THINKING THINGS NEW

After being digitally designed in a 3D-CAD model, even the most complex of structures can be “printed” via metal powder layer by layer.



LIGHT WEIGHT

With the added freedom of additive manufacturing design, additional shapes and connectivity of multiple parts can be explored. Additive Manufacturing allows highly optimized fabrications designed for the best results in terms of weight and stability.

COMPLEXITY

AM offers a new way of producing parts in nearly endless forms and complex structures which solves problems e.g. in molding production. That's why applications in the tooling industry are showing big potential for AM.

EFFICIENCY

Additive Manufacturing can drive efficiencies because AM is able to produce near net-shape parts.



CENTERS OF EXCELLENCE

In our **Centers of Excellence** spread around the globe, we combine a thorough understanding of manufacturing challenges with a forward-thinking embrace of technology. At the same time, we drive innovation and work non-stop on the technical and operational development of our services. With strong partners within the voestalpine group we're offering the end-to-end solution starting from the production of metal powders through to consulting and designing right to production and post-processing of parts.

POWDER PRODUCTION

- » **Uddeholm**
Hagfors, Sweden
- » **voestalpine Böhler Edelstahl**
Kapfenberg, Austria

PART PRODUCTION & SERVICES

LASER BEAM MELTING

- » **voestalpine Additive Manufacturing Center**
Düsseldorf, Germany
- » **voestalpine Additive Manufacturing Center**
Mississauga, Ontario, Canada
- » **voestalpine Additive Manufacturing Center**
Houston, Texas, USA
- » **voestalpine Technology Institute Asia**
Taiwan

LASER METAL DEPOSITION

- » **voestalpine Additive Manufacturing Center**
Singapore
- » **voestalpine eifeler Lasertechnik**
Salzgitter, Germany

AM METAL POWDER PRODUCTION

Our huge portfolio of metal powder is constantly being updated by newly enhanced products. In the test laboratories of voestalpine BÖHLER Edelstahl and Uddeholm we gather important information and parameters by creating test objects and prototypes in order to develop further and deliver even higher performing metal powders for Additive Manufacturing.

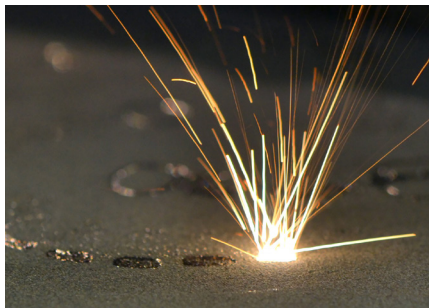
SOME INSIGHTS:

- » Powder is produced using latest atomization techniques and tested in-house.
- » Vacuum induction melting and atomization under inert gas ensure the highest product quality.
- » Depending on the steel grade and customer requirements, raw materials molten under vacuum or remolten can be used. This ensures the highest quality standards and minimizes undesired impurities.
- » Depending on the requirements of the AM process used, the appropriate particle fraction in a range from 15-150µm can be provided.

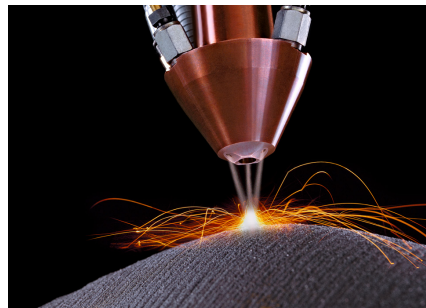


FLEXIBILITY AND EXPERTISE

The Centers of Excellence use equipment from leading AM production equipment suppliers for both **laser beam melting** and **laser metal deposition**. By working with both production technologies from different equipment suppliers, voestalpine has the flexibility and expertise to select the best AM production process for your application.

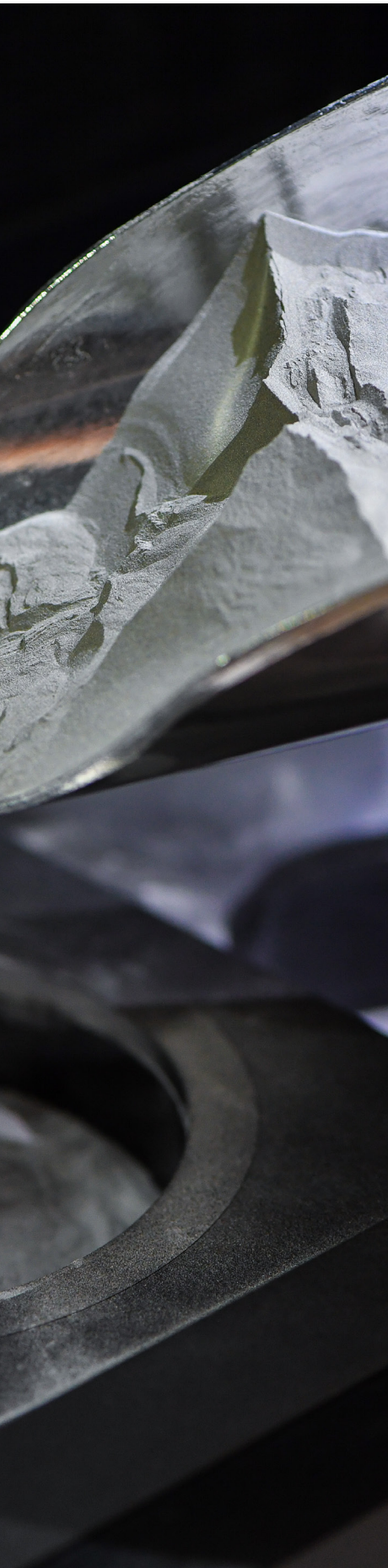


Laser Beam Melting



Laser Metal Deposition





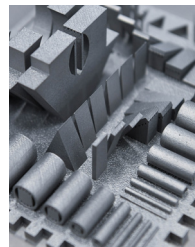
END-TO-END SOLUTION

As a global technology leader, we offer the full suite of production techniques and services throughout the value chain, supporting and driving innovation and development based on lengthy experience around materials and processing. Starting from the alloy development and metal powder production, to design and manufacturing and including post-processing. We offer the end-to-end solutions the reduce waste and mitigate risk in the supply chain with the goal of being your trusted and reliable business partner.

VALUE CHAIN



Metal Powder



Parameter Development



Design/Simulation



Additive Manufacturing



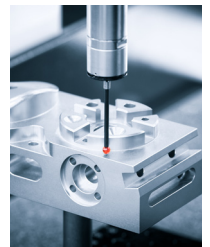
Heat Treatment



Machining



PVD Coating



Inspection/Testing

AREAS OF EXCELLENCE AUTOMOTIVE, ENGINEERING, AEROSPACE.

OIL & GAS / MARINE / MECHANICAL ENGINEERING

We support customers via consultation to choose the right material for the right application. Furthermore, we help to redesign parts where appropriate according to the requirements of your application. We use state of the art software and technology to support the manufacturing process from initial concepts to functional parts.

AUTOMOTIVE & AEROSPACE

It is very possible that the automotive and aerospace industries may stand to benefit the most from the possibilities offered by Additive Manufacturing. With the ability to create lightweight yet solid components with shorter prototyping and production times many opportunities exist. Smart and energy-absorbing solutions can be game changers. From mass-production to motorsport. From efficiency to high safety requirements, it is an area for building cutting edge technologies for future generations.



CONFORMAL COOLING COOLING DOWN EXACTLY WHERE NEEDED.

It is one of the applications in the tooling industry showing the highest growth potential for AM: Conformal Cooling.

Why? Because it is solving the major problems in molding production. For example, in the plastic injection molding industry as well as in die-casting production, it reduces the production cycle and improves the quality of parts.

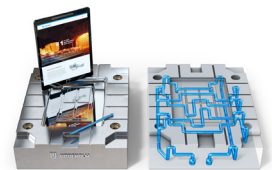
GO DOWN THE PATH OF CHANGE

Cooling is the most time-consuming component in the plastic molding process. At the same time, it's the moment when internal stress reduces the quality of parts and can even cause defects.

Traditional cooling systems that use in-mold drilling channels are limited to straight lines. That's exactly the point where AM enters the production stage. With far more flexibility in the construction of the molds, the cooling channels can be placed exactly where they are needed. Hot spots can be reached, cooling down periods can be reduced and a top-level of quality for the parts with faster cycle times is assured.



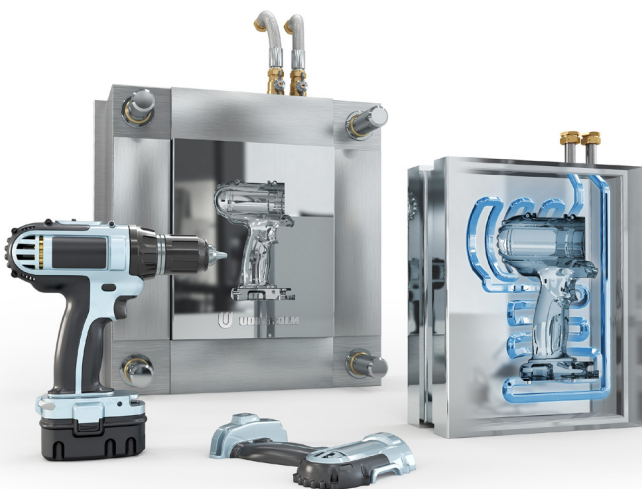
Cool down right at hot spots



Flexibility in mould-constructions



Not limited to straight lines



Benefits of using AM in Conformal Cooling

- » Cooling channels directly aimed at the hot spots
- » Faster cycle times
- » Higher quality of parts in plastic injection molding and die-casting production
- » Lower scrap rate by reducing internal stress due to different thickness
- » More homogenous material properties
- » Less energy consumption
- » Better part surface qualities

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