Ostbayerische Technische Hochschule Amberg-Weiden

Fraunhofer UMSICHT

FAKULTA STROJNÍ ZÁPADOČESKÉ UNIVERZITY V PLZNI

REGIONÁLNÍ TECHNOLOGICKÝ INSTITUT

VŠB 1849 OSTRAVA TECHNICKÁ UNIVERZITA

New Materials for Additive Technologies
Neue Materialien für die additive Fertigung / Nové materiály pro aditivní technologie

About the Project

Additive manufacturing (AM) processes are in a special focus, due to:

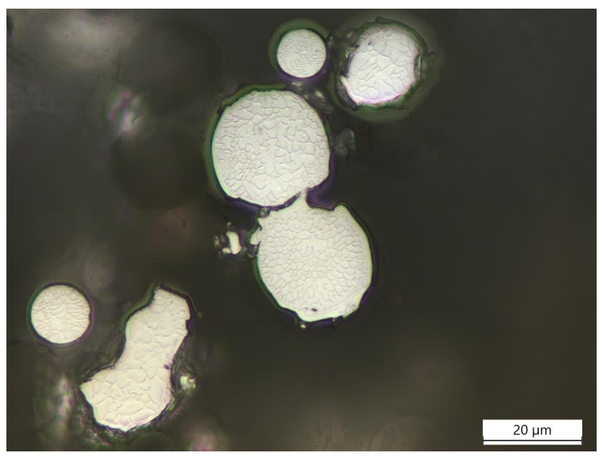
- Geometrical freedom
- Load path optimized design
- Weight optimized design
- Feasibility to industry 4.0
- Mass production achievable

Major objectives of the project is to :

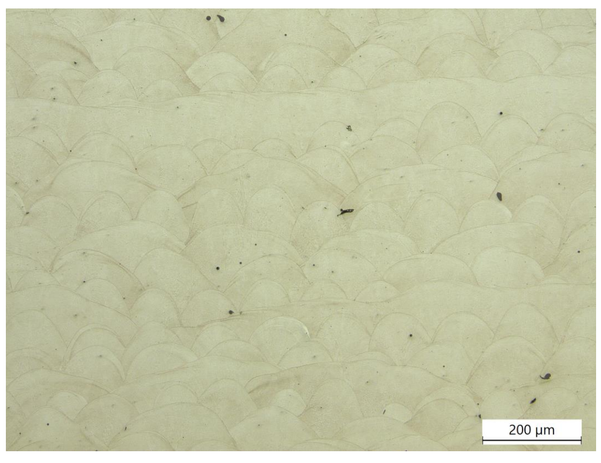
- Achieve a better engineering strength
- Increase process profitability
- Lower use of material
- Improve the maximum powder re-use cycles
- Enhance the powder recycling processes
- Development of new AM-materials

Ostbayerische Technische Hochschule Amberg-Weiden

University of Applied Sciences Amberg-Weiden is represented by Faculty of Mechanical and Environmental Engineering in the project. The project is mainly processed by students and young researchers at the laboratories of the University of Applied Sciences Amberg-Weiden. Major objective of the UAS is to examine the mechanical properties of the 3D-printed parts. This is done by the use of the equipment of the laser laboratory as well as the metallography, which includes light and scanning electron micro-scopes, topography measuring instruments, hardness testing machines , X-ray diffractometers and a various number of laser systems. The results of these investigations will be used for a comparison of the mechanical properties between additive manufactured and conventional steel parts. By treating the sample surface via laser radiation an improvement of the mechanical properties should be achieved.



Light microscopy picture of the powder in etched condition



Light microycopy picture of printed metal layers

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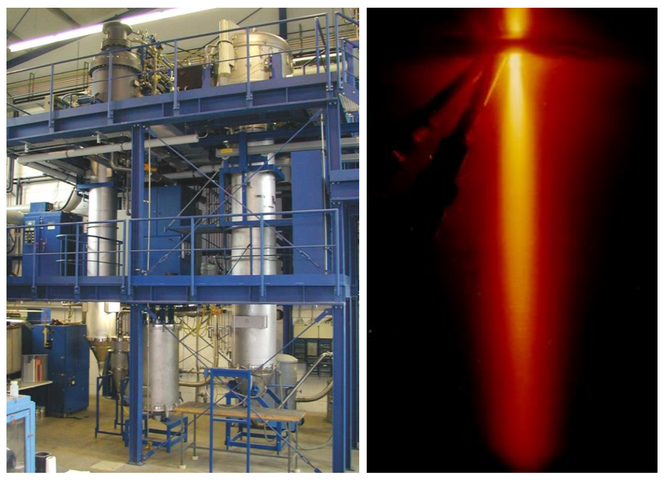
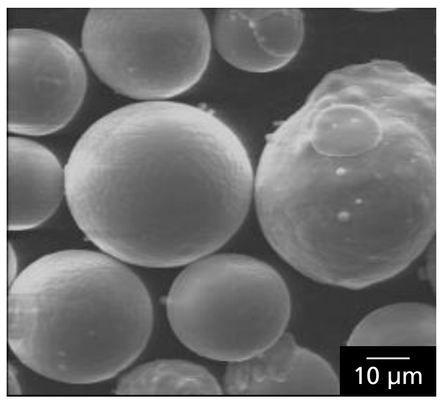
Fraunhofer-Institut für Umwelt-, Sicherheits- und Energietechnik

Fraunhofer UMSICHT is represented by its institute branch in Sulzbach-Rosenberg. The institute branch is specialized in powder manufacturing through melt atomization as well as in recycling technologies for a broad range of materials. AM powders are re-used in the successive manufacturing routines. Unavoidable ageing effects of the repeatedly used powders can be detrimental for the AM process, the parts qualities and, as a consequence, for the process economy and sustainability. The main tasks of UMSICHT are concentrating on the characterization of these ageing phenomena and the corresponding influence on the manufacturing of parts. From these investigations, suitable methods shall be deduced for refreshing/recycling steps of used powders in order to provide a more economic and reliable production of AM parts. These subjects are performed in close cooperation with the university partners.



Atomizing towers (left) and atomized molten metal jet (right) for the manufacturing of spherical metal powders at UMSICHT.



Inert gas atomized spherical Ni alloy powder .

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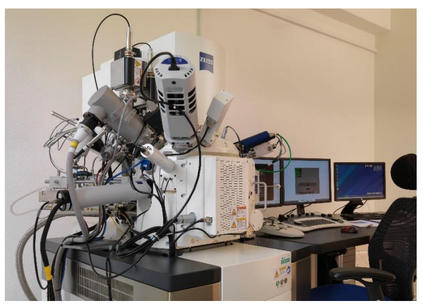
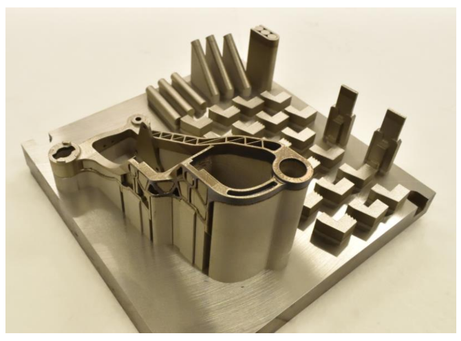
Západočeská univerzita v Plzni

University of West Bohemia in Pilsen is represented by RTI – Regional Technological Institute, research center of Faculty of Mechanical Engineering in the project. Project activities are performed by students and young researchers at new laboratories of RTI, mainly with the equipment for 3D-printing. The machine EOS M290 uses the DMLS principle. Metal parts are manufactured of tool steel, Inconel 718 and stainless steel. As the part is built by consecutively adding and sintering thin layers, virtually any external and, most importantly, internal shape can be created which would be unattainable using conventional techniques. Intensive research into the properties of printed components takes place in modern laboratories RTI, eg. in Metallographic laboratory, Mechanical testing laboratory, Strength and fatigue life testing laboratory.



EOS M290 machine and view into Metallographic laboratory.



Examples of printed components.

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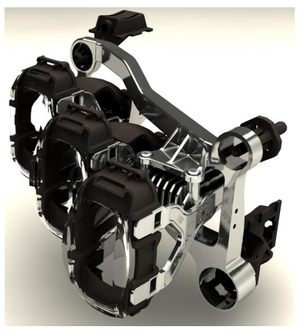
Vysoká škola báňská – Technická univerzita Ostrava

VSB – Technical University of Ostrava is represented by Faculty of Metallurgy and Materials Engineering, Department of Materials and Technologies for Vehicles, in the project. Project activities are performed by the students and young researchers at laboratories of Department, mainly with the equipment for 3D-scanning, mechanical analyses and dynamic testing. Experimental processes are supported with use of five-axis CNC machining center. Experimental program will focus on testing of selected components for Automotive. These will be produced with the additive technologies. The project will also examine the workability of these parts.



StudentCar and components.

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