

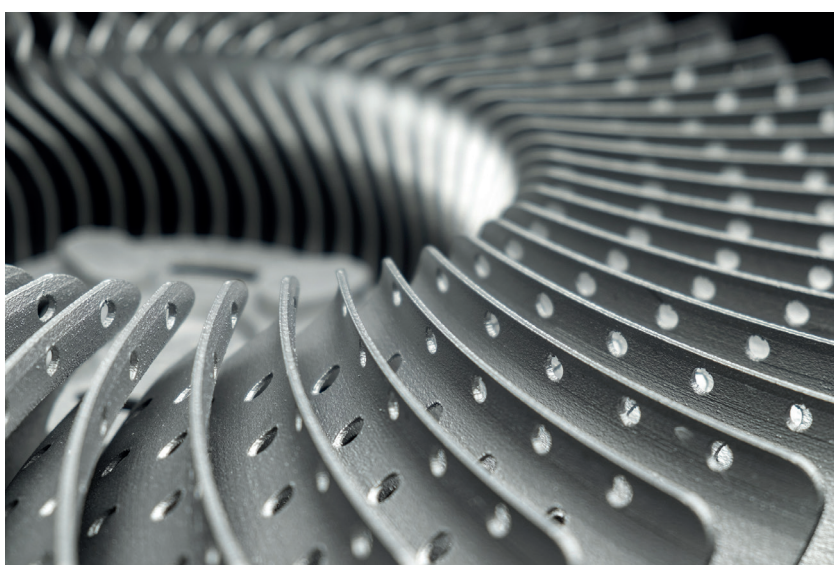


Driving the Next Industrial Revolution

Oerlikon AM Innovation & Technology Centre

Until recently, Additive Manufacturing (AM) was thought to have value solely in prototyping new products or designs. Today, however, it is evolving into a game-changing production technology, with companies like Oerlikon at the forefront of industrializing this technique. In their Munich-based Innovation and Technology Centre, Oerlikon places priority on attention to detail throughout the entire AM process chain—from the initial research and development to final product inspection. To ensure that all AM components reach their desired geometric accuracy and specified mechanical characteristics, Oerlikon chose ZEISS to supply the lab’s microscopy and metrology solutions.

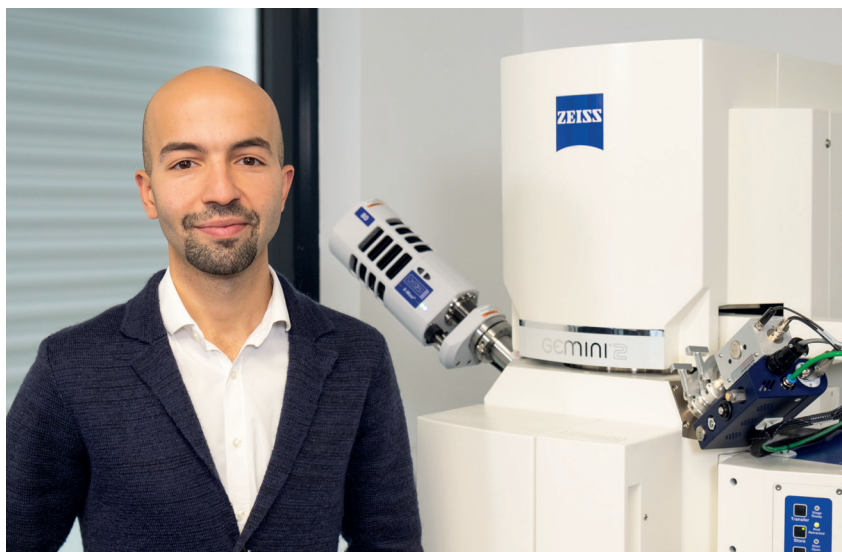
Additive Manufacturing, more commonly known as 3D printing, is a production technology that is driving the next industrial revolution. In metal AM, all products start as a digital model. AM equipment reads the data from this model to build the product by adding layer upon layer of metal powder. This powder is fully melted to the layers beneath it using a high-powered laser or electron beam. The process is repeated, layer by layer, until the part is complete. Using this technique, objects can be made of customized metal alloys in virtually any shape. The advantages are apparent: Additive Manufacturing delivers the freedom to innovate, enabling production of parts with lower weight, higher temperature resistance, and improved mechanical performance – characteristics demanded by aerospace, automotive, medical, power generation, tooling, oil and gas, and other industries.



Oerlikon Group, a leading producer of metal powders, recently formed the company Oerlikon AM to focus on Additive Manufacturing. In its Munich Innovation and Technology Centre, Oerlikon connects the dots between materials science, component design, process engineering, production, and post-processing. Under the leadership of highly regarded materials research scientist Blanka Szost, a young, international team of researchers, engineers and metallurgists is dedicated to driving the integrated development of new materials, production processes, software, automation and post-processing solutions.

“When the time came to invest in characterization, inspection, measurement and analytical technologies, we chose ZEISS instruments for their proven precision and reliability, which we could trust to support our entire process chain.”

Alper Evirgen
Metallurgist, Oerlikon AM



“We carefully control all production parameters and post processing conditions which could markedly affect our final product microstructure and therefore, final properties.”

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The ZEISS instruments are engaged in a wide range of analytical and inspection tasks – from metallographic investigation, in-process analysis, dimensional measurements and inner structure examination – to surface characterization and final quality control.

Oerlikon’s new Munich microscopy laboratory is equipped with a ZEISS Comet 6 3D scanner, a ZEISS Stemi 508 stereo microscope, a ZEISS Smartzoom 5 digital microscope, a ZEISS Smartproof 5 confocal microscope, and a ZEISS MERLIN field emission scanning electron microscope (FE-SEM). The diverse characterization and measurement capabilities delivered by these solutions are enabling thorough study of material properties, allowing scientists to compile comprehensive data for verifying the quality of printed parts.

“A reliable quality check as well as precise measurements are necessary to reveal product properties in their entirety,” process engineer Luke Dee says. “Every component produced by our AM machines undergoes a dimensional inspection to ensure that part geometries are within tolerance.” Alper Evirgen adds: “In this regard, ZEISS Comet 6 16M is a crucial tool for assessing the dimensional accuracy of the designs and components. Its 16 megapixel camera provides the needed precision to produce the highest quality 3D scan data. ZEISS Comet 6 16M is one of the best solutions available for supporting AM.”

Another important challenge is to produce components with the desired microstructure while minimizing variation from part to part.



Alper Evirgen: “We carefully control all production parameters and post processing conditions which could markedly affect our final product microstructure and therefore, final properties.” To further assure a successful process flow, Oerlikon employs the ZEISS Smartzoom 5 digital microscope and the ZEISS MERLIN FE-SEM. Process engineers, powder experts and metallurgists use this suite to characterize the powders, alloys and the printed materials. The instruments help them identify changes to microstructure during the entire manufacturing process. Specifically the ZEISS Merlin FE-SEM reveals further details for both process powders and final products with its high resolution imaging and compositional analysis capabilities.



“In materials science terms, AM is like discovering a new universe, and the field of microscopy is like the telescope we need to explore it.”

Blanka Szost
Head of Additive Manufacturing
Competence Centre, Oerlikon AM



To meet the strict surface quality requirements in industries such as aerospace or medical, scientists meticulously inspect each component produced in the Munich facility via surface texture measurements. Alper Evirgen: “We benefit greatly from the high accuracy of the ZEISS Smartproof 5 confocal microscope when obtaining surface roughness profiles from the final products. A significant advantage to using this microscope is that there is no damage to the analyzed surfaces, because confocal technology uses light scattering principles. No surface contact is required during analysis.”

Referring to the success story of Oerlikon’s implementation of ZEISS instruments in their laboratories, Blanka Szost comments: “In materials science terms, AM is like discovering a new universe, and the field of microscopy is like the telescope we need to explore it. ZEISS provides us with the equipment we need to continue driving the industrialization of Additive Manufacturing.”

As one of only a few companies able to provide the entire process chain – from powder production, processing and handling – to the final component production, Oerlikon will continue using ZEISS equipment to lead the development of its AM technologies.

About Oerlikon AM:

Oerlikon AM is an approved supplier to leading OEMs and an integrated provider of AM solutions with custom alloy development capabilities. Oerlikon offers AM component production services from prototyping to series production, as well as alloy design and AM design for lightweight, structural, heat-resistant and high-performance components, such as those used in aircraft structures, engine components, space and missile components, and ground and marine structures.



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