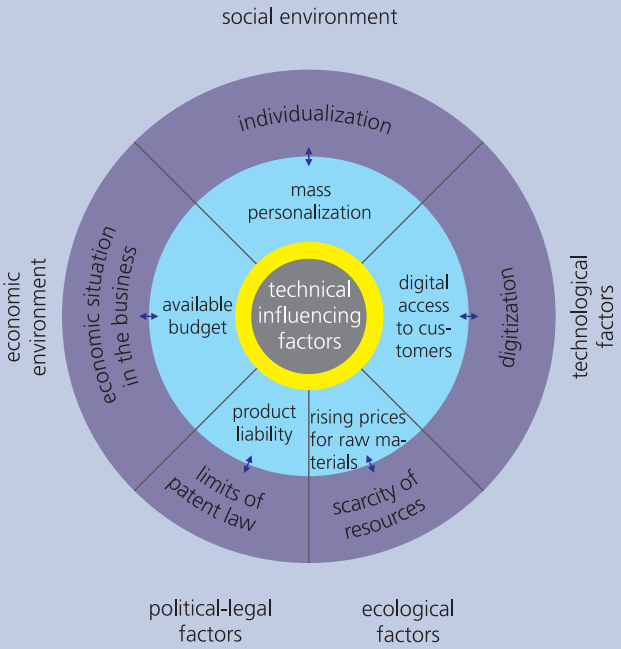
AGENT-3D – FRAMEWORK FOR ADDITIVE MANUFACTURING

THE TASK

The market for additive manufacturing techniques and additively manufactured products is rapidly growing, as well as the number of companies interested in new manufacturing technologies. The Fraunhofer IWS evaluated the additive manufacturing potential with more than 100 partners in the "AGENT-3D" project funded by the Federal Ministry of Education and Research (BMBF). Growth must be generated by pointing out the existing technological and economic limits and the ways how to bypass them.

Overall system to create future scenarios, subdivided into fields of exploration and outside factors



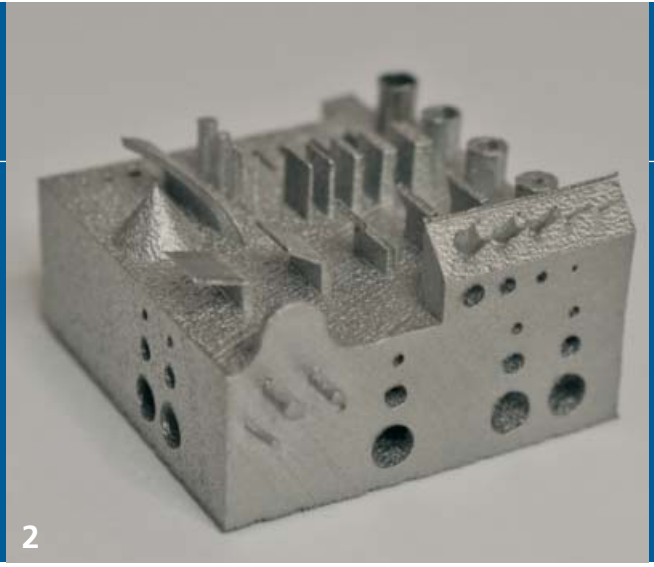
1

OUR SOLUTION

Twelve research institutes and more than 45 companies under the auspices of the Fraunhofer IWS Dresden launched the strategic alliance entitled "AGENT-3D – Die 3D-Revolution zur Produktherstellung im Digitalzeitalter (The 3D revolution for product manufacturing in the digital age)" in the innovation partnership "Zwanzig20 – Partnerschaft für Innovation" program funded by the BMBF. After successful completion of the strategic phase, 111 partners are now involved in the alliances's two basic projects and seven technology projects. The team, which represents various disciplines and in which 82 percent of participants come from industry, has established a powerful network open to large-scale industry, small- and medium-sized companies, and research institutes in Germany, and is further developing additive manufacturing to make it a key technology.

The sociopolitical, economic, managerial, technological, and legal framework was defined and options to influence it were presented in the basic project "Rahmenbedingungen für die Additive Fertigung (Framework for additive manufacturing)". This framework is based on detailed results obtained by analyzing external real-world factors in the strategic process. Basic findings from various disciplines will be introduced into the AGENT-3D technology projects. The following topics are explored in detail in the basic project:

- consequences of socio-economic factors for development opportunities for additive manufacturing
- copyright/patent rights, product liability, anti-trust regulations
- new design and construction methodologies
- process safety, materials, quality assurance
- interfaces and standardization



2

RESULTS

The socio-economic studies above all focus on future scenarios with potential development scenarios for additive manufacturing application and a changing organization of value adding systems. Relevant influencing factors for the use of additive manufacturing have to be anticipated (Fig. 1).

The system of the environmental system, subdivided into the fields of politics/law, economy, society, ecology and technology, surrounds the field under consideration and affects it through specific factors. The players in the field to be explored (such as companies or research institutions) have little or no influence on this. The relevant technical factors, such as material availability and productivity, have been identified in addition to the available capital/budget or rising prices for raw materials – non-technical factors that are specific to additive manufacturing.

The legal framework was qualified in a central information platform for legal issues to be contacted online via www.agent-3d.de dedicated to proprietary rights, product and data protection and liability in conjunction with additive manufacturing techniques. Current use cases can be discussed with experts via the platform to find solutions.

Opportunities and limitations of new design approaches in additive manufacturing were analyzed based on technology-specific design options.

Intricate geometric features, such as overhangs or lattice structures, were identified, shown in technology demonstrators (Fig. 2) and checked for quality. As a result, the geometric limitations of the manufacturing techniques can be evaluated.

Significant progress was achieved in quality assurance. Additive product manufacturing at low cost and with high quality demands that the quality standards for each step in the process chain be maintained. Specific parameters and error frequencies of various technologies are identified in the new additive manufacturing measurement and test center, capable of performing computer tomography, 2D X-ray radiography and ultrasonic testing. Quality assurance is enhanced by process modeling and analyses of consequences. The measurement and test center at the Fraunhofer IWS Dresden is a central contact point for testing and measurements in additive manufacturing in Germany.

"AGENT-3D" is funded by the Federal Ministry of Education and Research (BMBF) in the program "Zwanzig20 – Partnerschaft für Innovation (Twenty20 - Partnership for innovation)" (registered under the numbers FKZ 03ZZ0201 to FKZ 03ZZ0211).

2 Demonstrator manufactured by selective laser melting (SLM) with demanding geometries

CONTACT

Dr. Elena López
☎ *+49 351 83391-3296*
✉ *elena.lopez@iws.fraunhofer.de*