# 3D printing – Reliable testing procedures for innovative products

DEKRA

## Material testing for additive manufacturing

**Additive Manufacturing (AM) is a duplication production technology in which parts are produced layer by layer in a printing-like process (3D printing) using a raw material which usually takes the form of a metal or polymer powder.**

**Today AM is an established technology in many fields known for special characteristics and extreme reliability in difficult conditions such as aerospace & aviation, medical and automotive. However, AM is also entering the traditional industrial manufacturing and workshops.**

### The benefits of additive manufacturing

The manufacturing process gives great freedom to design and engineering allowing complex geometries and advanced materials used in a non-traditional way providing exceptional features. Furthermore, additive manufacturing can have a significant impact on material consumption during the manufacturing process compared to traditionally crafted components.

### Verification of material quality

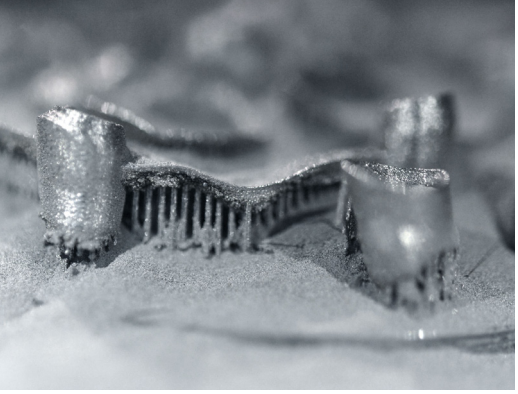
Essential requirements for the industrial use of 3D printing and serial production in additive manufacturing are materials quality and the reliability of the components.
In many cases, the AM parts need to comply with the same requirements as components produced with conventional technologies. However, as the traditional manufacturing supply chain is challenged by the AM technology there might be special barriers to hinder the qualification of the products.
Laboratory tests can be used to determine mechanical strenght and other materials characteristics, also internal defects and important quality features of materials and components can be observed in the laboratory.

### What DEKRA offers you – Advantages of choosing us

As a global testing partner, with our comprehensive scope in testing services, DEKRA is the ideal partner for your testing needs along the AM value chain:

- Material testing and chemical analysis
- Accredited laboratories
- Modern testing technology
- A network of locations around the world
- Reliability and experience

Our accredited laboratories offer modern testing procedures to support you in matters requiring material testing and chemical analysis. Our testing portfolio is complemented by special analytical and testing expertise including methods like FE-SEM/EDX, FT-IR, DSC, TGA, XRD, computer tomography, thermal shock chamber, UV weathering and salt spray tests, element analysis, gas chromatography.
DEKRA can provide impartial and accurate testing data which you can trust on any occasion. There are also special regulations such as ATEX, UN, REACH, RoHS, and CLP, for the safety and health of powders, raw materials, wastes & waste disposal which we can help you with.



## DEKRA's laboratories offer support in all areas of the product's life cycle

### Reference projects

- Design & Engineering
- Prototype development
- Manufacturing
- After Sales & Service

Thanks to our experience in testing and modern testing technology we were able to build rapidly new expertise, procedures and data regarding determination of Elastic modulus used in the design of medical components. This helped our customer to solve a critical manufacturing challenge with more confidence to the test results.

### Prototype development

Together with a customer we tailored a test set up to verify mechanical strength on prototypes of AM printed lattice structures. DEKRA is capable to support you in choosing the right test methods according to your requirements to save time and money.

### Manufacturing

We tuned our production processes for specific tensile tests according to needs of an AM customer to fit volumes of several thousands of test samples annually. Furthermore, we accommodated the testing parallel to our standard testing routines and equipment to offer a solution with competitive price and high efficiency. The process was built to cover from logistics to data transfer to allow lean operation as an external laboratory handling the testing routines of an AM production unit of the customer.

### After sales & service

With a test chamber for VOC emission testings together with migration and sensoric testings for food contact requirements, we evaluated the suitability of specific materials to be used for consumer goods in specific markets.

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### Other services you can profit from

Mechanical and technological tests
- Tensile tests
- Tensile tests in elevated temperature
- Charpy impact testing
- Hardness tests
- Fatigue testing
- Bend tests

Metallography and microscopy
- Macro- and microstructural studies
- Specimen preparation and cross cuts
- Optical microscopy
- Scanning electron microscopy (SEM & Microanalysis)

Environmental simulation and corrosion testing
- Thermal Shock resistance
- UV irradiation and Xenotest
- Salt spray tests
- Temperature change test
- Durability testing
- Standardised corrosion tests

Plastics testing
- Identification of plastics, fibers, and fillers
- Surface and fracture structures
- Oxidation resistance tests
- Melting decomposition temperature testing

Technical cleanliness
- Technical cleanliness of part surfaces
- Particle analysis
- Organic contaminants tests

Material analyses and chemical safety of raw materials, parts, and dusts
- Element analysis
- Alloy analysis
- Hazardous substances (RoHS, REACH) emissions tests and migration tests (contact with food)
- Hazardous material classification (ADR/UN) tests
- Explosion protection (ATEX)

Damage analysis
- Residue analysis
- Determination of the cause of breakage and material fatigue
- Determination of the cause of corrosion

DEKRA
On the safe side.

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