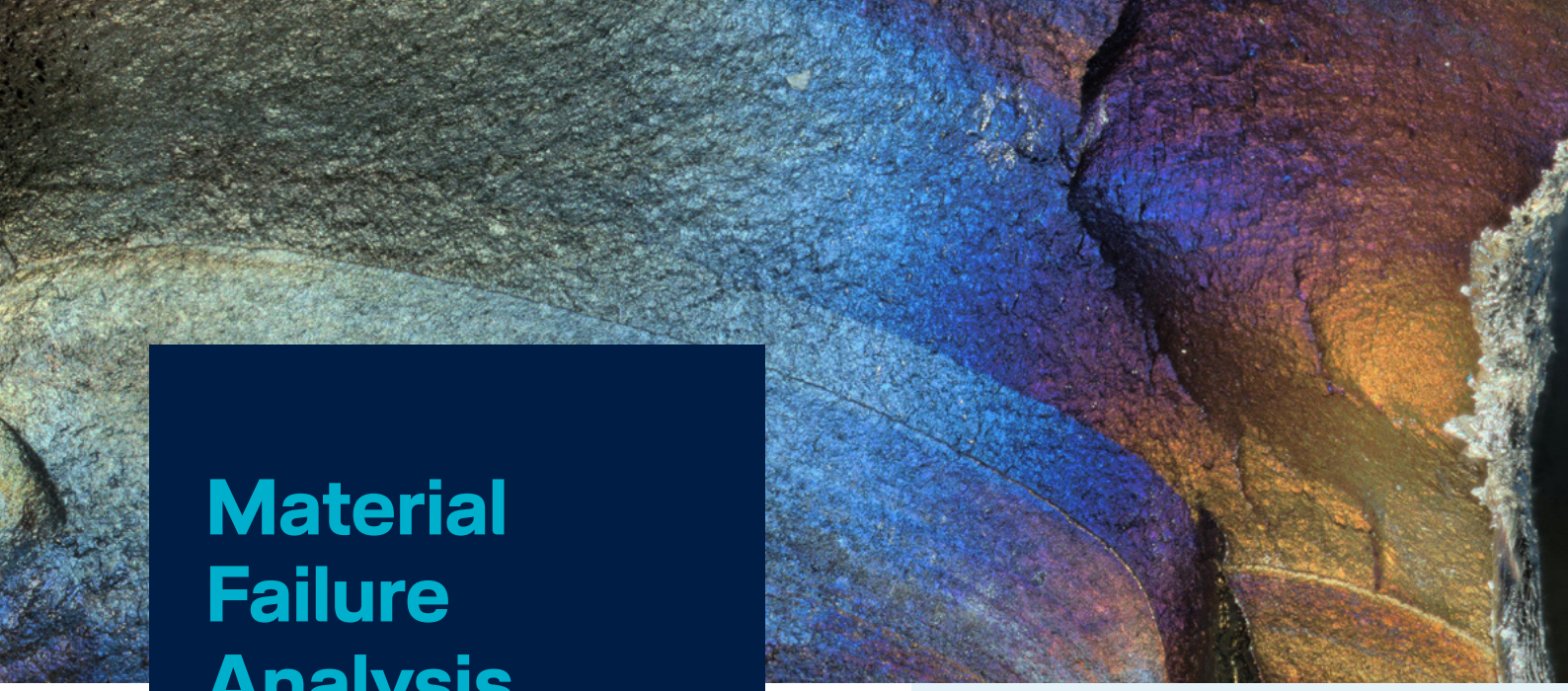


Material Failure Analysis

for Aviation

In aviation safety is a top priority. This calls for extensive investigations after any material failure. In order to determine the root cause of such incidents, Lufthansa Technik operates a material investigation unit specialized in all aviation materials. Our team of forensic material experts, equipped with a broad range of cutting-edge analytical technologies, is ready to identify the failure mechanism with its root cause and to advise on future damage prevention.

Aviation materials are subjected to unique stress and ageing profiles during flight operations, such as take-off or high altitude. These harsh, constantly changing conditions may cause damages and failures.

With decades of experience Lufthansa Technik offers a broad range of high-quality investigations into defective or damaged aircraft parts. Our team of material experts are ready to derive a tailored investigation and sample strategy and can accurately interpret the test results. Thus, we will give advice on the failure mechanism with root cause determination and how to prevent future damage.

As a result, Lufthansa Technik provides a detailed failure report correlating the different findings. It provides conclusive results and, as applicable, recommendations for design and process improvement.

Benefits

- Extensive know-how in aviation materials based on more than five decades of experience for your case of failure
- State of the art metallographic / technological equipment
- Large laboratory infrastructure and mobile on-site support at client shops
- Personal expert consultation and specific recommendations based on analytical results
- Incorporation of VDI guideline 3822 (Structured Failure Analysis)
- Easy collaboration with fast, actionable responses

Lufthansa Technik

Certainty over Chance

Each failure case requires a tailored investigation strategy and access to a broad range of analytical methods. Sometimes these can only be selected during an investigation.

An exemplary selection of relevant equipment is listed below:

Visual Analyses / (Digital) Microscope [1]

- Failure symptoms and characteristics
- Metallographic evaluations on cross-sections

Scanning Electron Microscope (SEM)

- High resolution surface characterization

Compositional Precision Analyses (OES, EDX, RFA, LIBS, FTIR) [1]

- Destructive and non-destructive compositional analysis of metals and plastics

Hardness tests (Macro-, Micro-, Nano indentation / Fischerscope® etc.) [1]

- Hardness and hardness profile

Laser-Scanning-Microscope (LSM)

- Surface characterization and surface roughness (non-destructive using impression material)

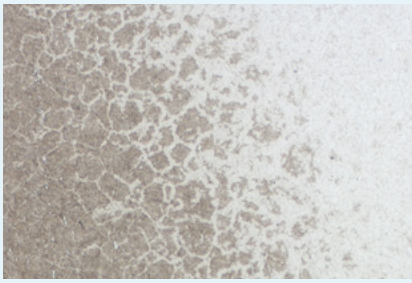
Tensile / Torsion / Bending tests

- Structure examinations
- Setpoint comparisons

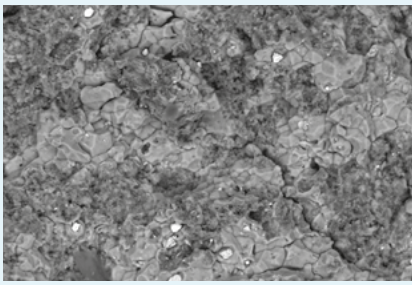
Differential Scanning Calorimetry (DSC) & Thermogravimetric Analysis (TGA)

- Thermal analysis of plastics (e.g. Transition points, Crystallinity)
- Proportion of fillers

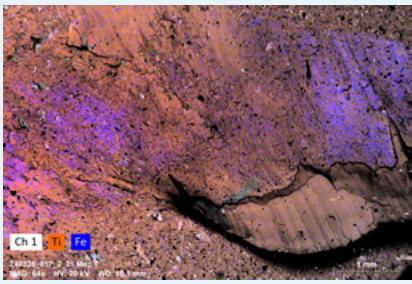
[1] Mobile investigation possible



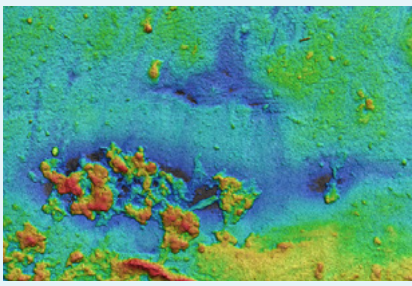
Microstructural evaluation (microscope)



Identification of corrosion type (SEM)



Compositional surface mapping (EDX)



Precision analysis of surface topography (laser-scanning-microscope)

Contact us about your special requirements!

If you have a specific analysis requirement, such as an on-site investigation, or you would like us to perform a failure root cause analysis, we offer the optimal testing program. Individual consultancy support or multi-stakeholder sessions for witnessing (e.g. in presence of OEM, operator, insurance companies, etc.) can be arranged. We invite you to contact Lufthansa Technik Laboratory's Material Failure Investigation team. Together we will find a solution for an appropriate investigation approach.

Contact
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