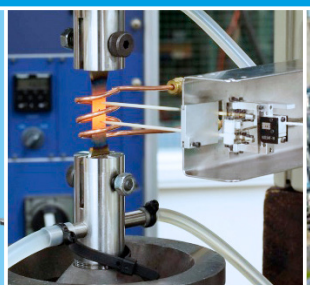
Scanning Electron Microscope facility

Aerospace Vehicles Division
Structures Testing & Evaluation

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"THE PROVIDER OF ANSWERS"

The National Aerospace Laboratory NLR offers a multi-level approach in material science for the essential feedback to design, manufacturing and maintenance. To obtain this feedback, the Scanning Electron Microscope facility provides NLR the capability required to solve your material problems.

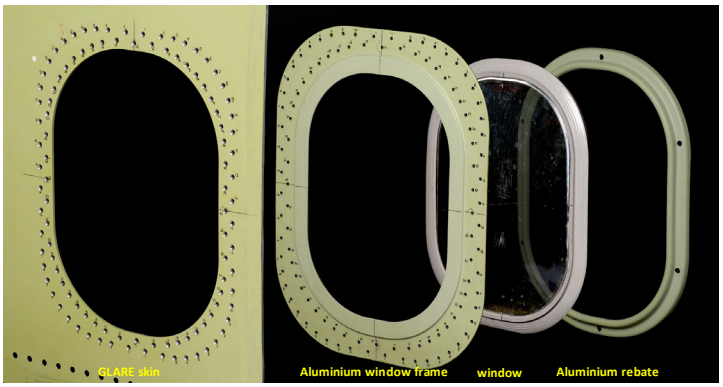
The facility includes:

- Scanning electron microscope (SEM)
- Energy Dispersive X-ray analysis (EDX)
- Wavelength Dispersive X-ray analysis (WDX)
- Electron BackScattered Diffraction (EBSD)
- Micro-mechanical testing
- In-situ pattern generation
- Image analysis (2D & 3D)

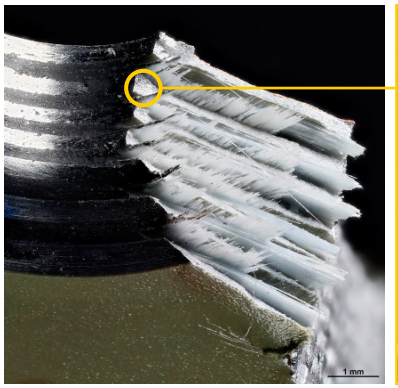
Life prediction

The SEM facility opens new avenues toward the understanding of fracture surfaces in three dimensions. Quantitative factography can be used to measure features and important characteristics of a fracture surface in terms of true surface areas, markerloads, striation spacing, numbers and orientations as well as distributions of these quantities. This enables engineers to develop accurate fracture mechanic models, perform better failure analyses, better understand the relationship between the fracture mode and the microstructure, and develop new materials.

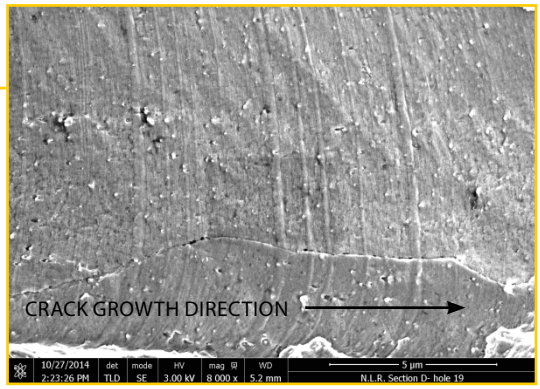
Fractographic analysis of fatigue cracks found in GLARE after a barrel test of the A380



Example of a disassembled window of a glare panel of the A380



Fatigue crack in glare

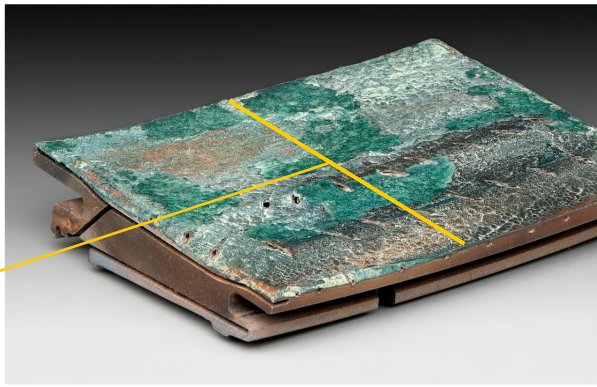


Markerloads due to peak loads in a flight spectrum

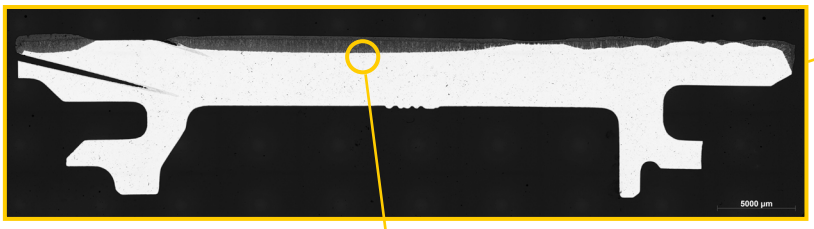
"INVESTIGATIONS DOESN'T STOP AT A FAILED COMPONENT"

Material degradation

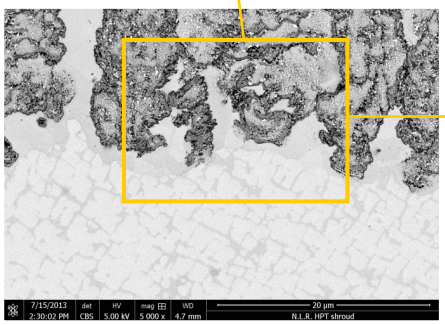
Interaction of a material with the environment, can lead to failure or a premature shut down of an installation due to material degradation. Depending on the environment failure can be caused by corrosion, hot corrosion, sulfidation, hydrogen or metal-induced embrittlement, etc.. The analytical capabilities from the SEM facility provided the right tool to determine the degradation cause.



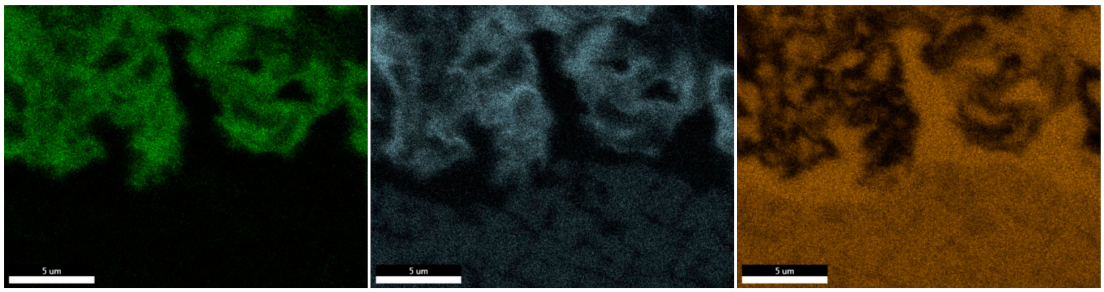
Degraded shroud surface



Crosssection of the material degradation



Transformation between base material and degratation



Discreet element distrubution: Oxygen map

Aluminium map

Nickel map

"MATERIAL ANALYSIS SAVES MONEY ON MAINTENANCE"

Specifications of the SEM facility:

- NovaNanoSEM 450
- EDAX Trident material analysis system with EDX, WDX and EBSD
- In-situ tensile, compression, three and four point bending test capability.
- Operates at high or low vacuum for investigations of conductive and non-conductive materials
- Working envelope:
  - Resolution up to 1,0 nm
  - Maximum specimen dimensions: 150 x 150 x 60 mm, maximum weight 2 ,5 kg.
  - Stage movements: X , Y-axis = 110 mm (motorized) , Z-axis = 25 mm (motorized).
  - Qualification and Quantification up to boron
  - Quantification of trace elements
- 2D & 3D image analysis
- Crystallograhic texture and orientation measurements

Facilities of the Aerospace Vehicles Division

Besides the Scanning Electron Microscope facility other equipment includes photographic facilities, light microscopes, high temperature facilities, environmental facilities, mechanical test facilities, non-destructive investigations and a well-equipped laboratory to perform material qualification and structural certification programmes.

Features

- The SEM facility gives answers to your material problem, such as corrosion, oxidation, coating and/or failure cause of a component.
- The SEM facility is the tool you need for 2D and 3D analysis for the applied material problem.
- Conductive and non-conductive materials can be analysed in de SEM facility.
- For material analysis the SEM facility offers three different analysis techniques to provide the right answers.
- Tensile, compression and 3/4 point bending tests can be performed directly in the SEM

Please contact us for a free demonstration

Fracture surface of a anodic layer on aluminium

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