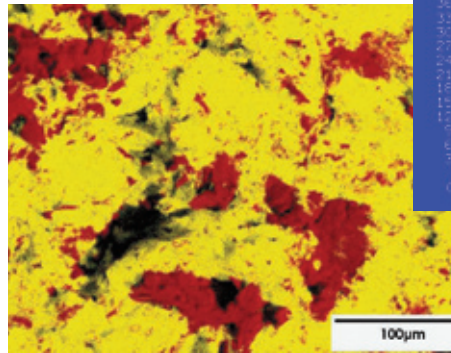


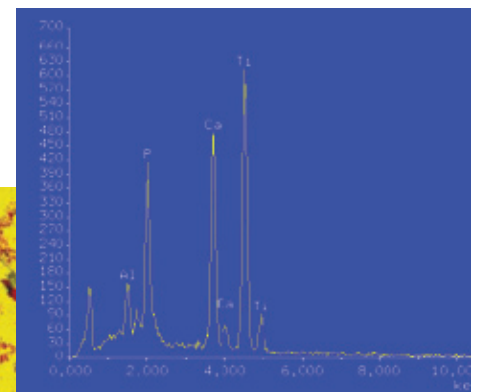
## Metallic Materials

### Analysis and assessment of the failure mechanisms of materials and components

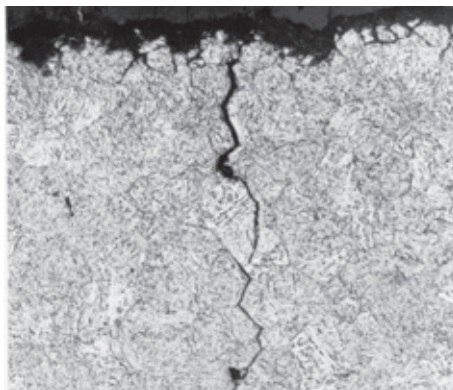
- base materials and coatings
- fractography: light microscopy and scanning electron microscopy (SEM)
- microstructure and chemical composition: energy dispersive analysis (EDX)



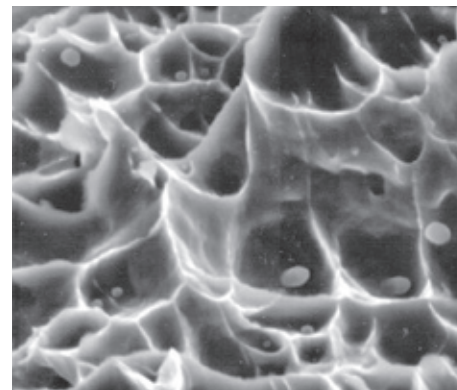
element distribution (TiAl6V4)



EDX analysis (titanium alloy)



stress corrosion cracking (steel)



fracture surface (TiAl6V4)

### Process improvement

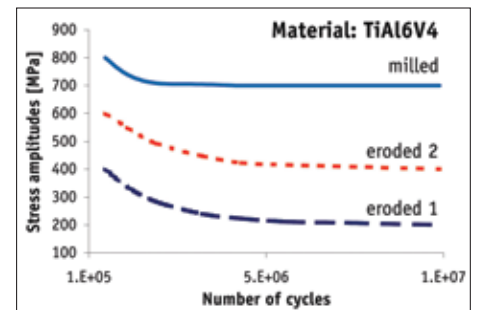
- development of advanced manufacturing processes: welding, brazing, coating, heat treatment  
→ tailored mechanical properties
- surface treatment (e.g. sandblasting, shot peening)
- evaluation of mechanical properties after process improvement

## Mechanical testing of materials

- cyclic deformation behaviour of metallic materials
- steels, aluminium-, copper-, nickelbase- and titanium alloys
- metallic and ceramic coatings
- development of fatigue lifetime prediction methods for cyclically loaded materials and components
- tension, compression, relaxation
- LCF, HCF, specialized mechanical testing methods
- experimental validation of design analysis tools



electro-mechanical test system



stress-life diagram of TiAl6V4

## Infrastructure

The following infrastructure is available:

### Material and Component Testing

- Electromechanical test machine, equipped with extensometer and heat chamber
- Hardness testing (Rockwell, Brinell, Vickers), micro-hardness test system
- Instrumented impact fracture test system

### Microscopy, material analysis, failure analysis

- Scanning electron microscope (SEM), including energy dispersive analysis (EDX)
- Light microscopes, including digital imaging software
- Metallographic preparation facilities for light microscopy and SEM

### Heat treatment

- Various furnaces up to 1300°C

### Wear and friction testing

- Pin-on-disc tribometer