Strength and Lifing

The aerospace and aero engine industry is heavily controlled by the demands on reliability and safety, which are strictly enforced by authorities and legislation. This leads to a high degree of conservatism in the development of materials and engineering methods, which is contradictory to the leaps in technologies needed to reach the necessary reductions in fuel consumption and pollution levels while continuously improving performance.

The vision of the cluster is to contribute to the development of reliability based methods for strength and life prediction, where physically based models can account for all relevant effects of manufacturing and in-service conditions. This can only be achieved by utilizing the synergies arising from an efficient collaboration between industry and academia in both basic and applied research projects. The purpose is to develop experimental and numerical methods to support the design of lighter components with increased reliability at a lower cost.

The main areas of interest are:

- Reliability based models
  - Probabilistic methods for fatigue life prediction
  - Multiple sources of uncertainties
- Physically based models accounting for manufacturing processes and in-service loads
  - Effects of defect distributions, residual stresses, surface integrity, ..
  - Complex loading cycles (thermo-mechanical and time-dependent fatigue, …)
- Integrated modeling
  - Linking models and experiments across length scales
  - High-through-put methods for multi-disciplinary optimization