

## Motivation

The reliability of products depends on the one hand on the occurring load and on the other hand on the strength. The strength is influenced by the material used, the geometry and the manufacturing process. The load is determined by the customer, the environmental conditions and the configuration of the system. The load on the components in the field is often not measured by corresponding sensors. However, this information is of importance for the design as well as for the determination of the condition of the component.

## Objective:

Due to the lack of knowledge about the load of a component in the field, it is determined by a virtual sensor. The knowledge of the local load is used on the one hand for lifetime prediction and on the other hand for the description of the usage in the field. The prediction of the lifetime is done by knowledge of the customer specific load. The additional information provided by the PHM methodology is used to describe customer usage and can thus be used in the design of future developments.

## Approach:

- Analysis of the interactions of the system and evaluation of the occurring failure mechanisms and their relevant influencing factors
- Modeling of the component load by a soft sensor on the basis of the correlation between recorded measured variables and the target variable
- Transfer of the load-time signal into a system-specific load spectrum
- Estimation of the remaining useful life by using the system-specific load and a lifetime model
- Determination of the usage behavior of the product

