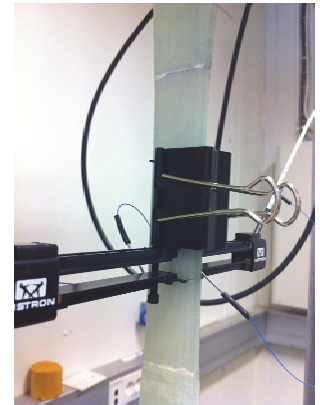
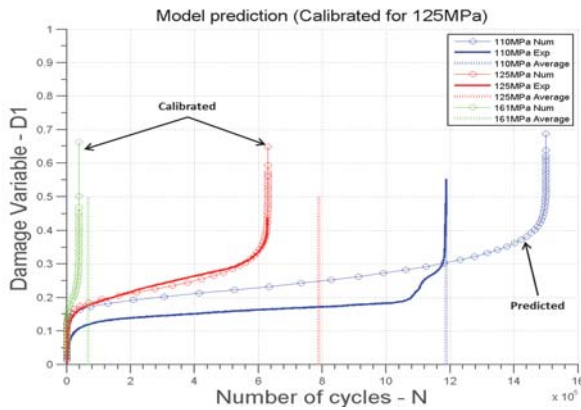
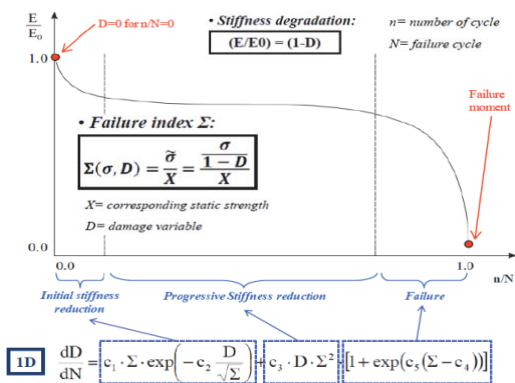


# Composite Fatigue Damage Estimator

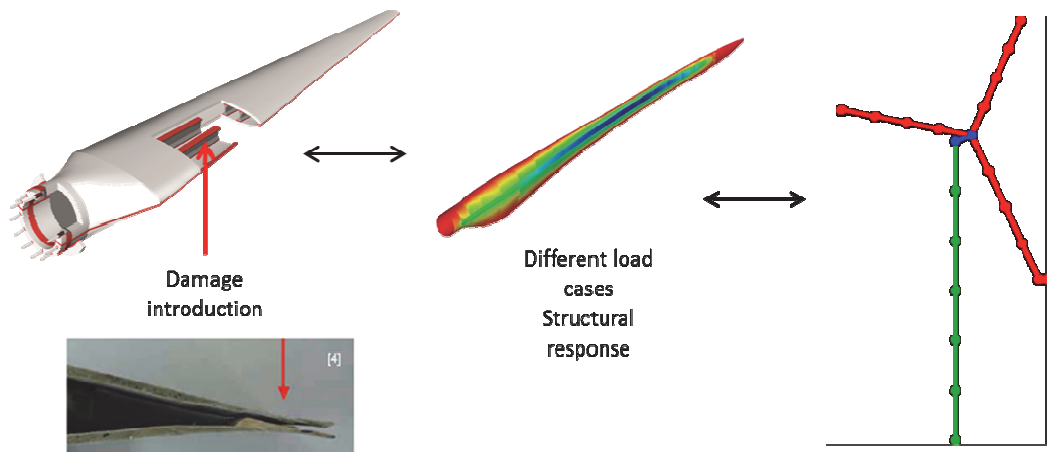
## Innovation description

A nonlinear model to simulate fatigue in composite materials has been formulated and implemented in FEM software (Abaqus, LS-Dyna). The model predicts the anisotropic progressive stiffness reduction and strength degradation and further fatigue based on current state. In addition numerical routines to extract model parameters from material test data has been developed.



## Impact

- Composite fatigue is one of the major design criteria for wind turbine blades and blades are designed with significant safety factors towards fatigue failure. Better models for fatigue than standard linear damage accumulation can enable lower safety factor and lighter design
- Reliable fatigue models are of high value in relation to structural health monitoring and remain lifetime prediction based on measured loads.



## Further development

The Composite Fatigue Estimator is part of a collection of composite damage models in house at SINTEF MC developed in NOWITECH and associated projects and implemented in FEM software (delamination, impact). Work is ongoing to interface these models with multibody wind turbine simulation software (FEDEM, HAWC2)

## References

SINTEF Report Sint-F23952, Implementation of a fatigue law for composites.