The ANSYS Workbench environment provides the ideal environment for fatigue analysis combining the power of ANSYS Mechanical and ANSYS nCode DesignLife.

**ANSYS nCode DesignLife Fatigue Process in ANSYS Workbench – Example: Wind Turbine**

*Maximize fatigue life while minimizing design, manufacturing and maintenance costs.*

- Wind-turbine failure simulated with DesignLife
- Measurements made in different weather
- Axial forces and moments are measured

- Initial failure occurs inside the outer shaft support
- The hub is redesigned by changing the geometry
- Parameters in DesignModeler are used to improve the design

- Wind-turbine failure simulated with DesignLife
- The extrusion of the hub near the area of failure is varied
- DesignXplorer optimizes the geometry for fatigue life
- The response surface by DesignXplorer shows the variation in fatigue life vs function of the parameters

- ANSYS DesigLife is integrated within ANSYS Workbench with ANSYS Mechanical
- The maximum forces and moments are used by Mechanical to calculate stresses and strains
- A duty cycle is built by repeating the measured forces and moment to create a representative year of loading
- Maximum stress and strains scaled by the measured data
- Accumulated damage used to determine fatigue life

- The automatic optimizations improves fatigue life by a factor of 21

*All of the optimization is done with a few clicks of the mouse*

**ANSYS nCode DesignLife Applications**

- Seam Weld Fatigue on a muffler
- Hot-spot detection on a residential wind turbine
- Fatigue analysis on a high frequency power module switch
- Multi-axial strain life fatigue on a pressure manifold
- Vibration fatigue
- Thermo-Mechanical-Fatigue