

From Simulation to Optimization of Wind Turbine Components

Your easy step into the world of structural topology and shape optimization with TOSCA Structure

Global Market, Global Competition

Demands for the state-of-the-art product development are stronger than ever. Nowadays all industries are subject to accelerating changes in production and development and increasing aggressive competition. Complex demands can be fulfilled by applying simulation and optimization technologies in a virtual product development process. The increasing global competition requires that leading companies use the best technology to keep their position. Product cycles become shorter, product complexity increases.



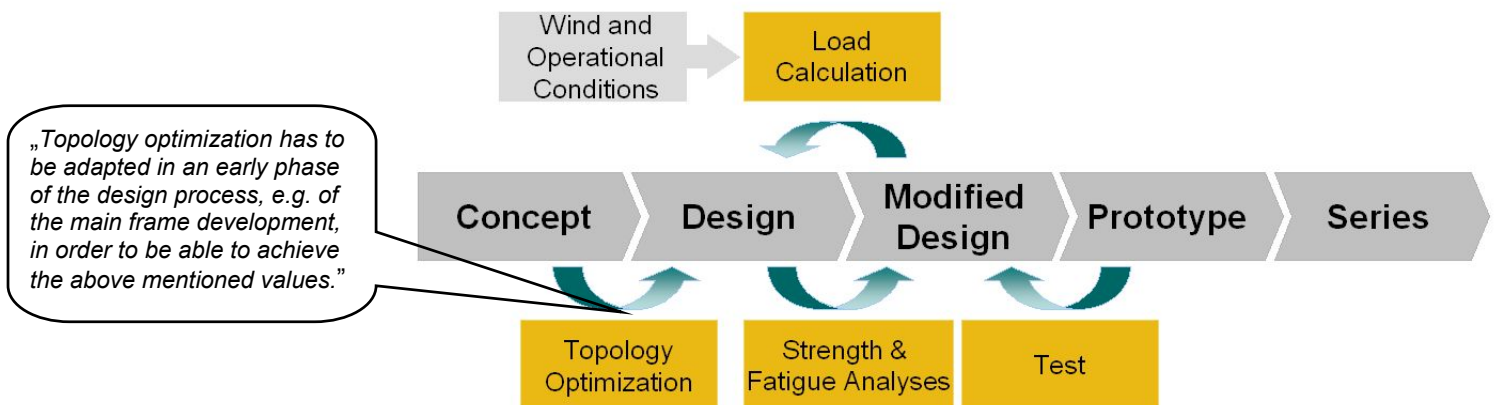
All figures and chart by courtesy of Suzlon Windkraft GmbH

Challenges

Due to the demand to decrease the time-to-market of new products while maintaining a high quality level and reducing overall product development costs, structural optimization tools have become of significant importance in the virtual product development process.

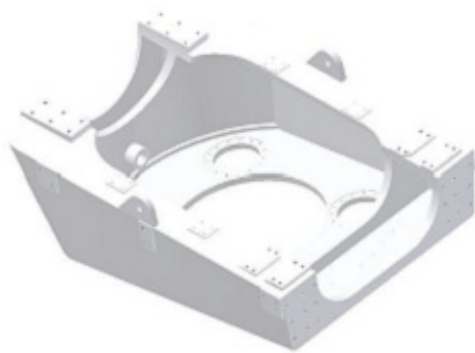
The ultimate challenges today are to become „faster – better – lighter – safer – cheaper“ in order to

- get the ability to make early decision in the design cycle
- reduce design and manufacturing cost
- reduce trial and error procedure in design
- reduce cost of materials
- increase engineering productivity
- automate the simulation workflow by adding optimization methods.



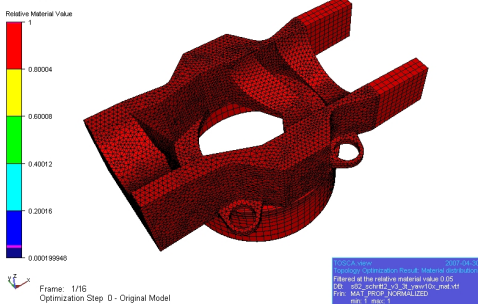
Industry Applications

These examples, the optimization of support frames of wind turbines, are showing the huge differences between the conventional design and the optimized design :



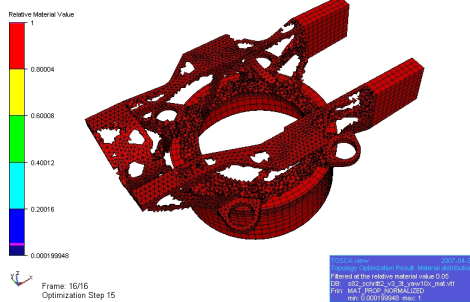
- based on experiences of designer
- large number of design cycles
- based on numerical optimization procedure
- reduction of mass and development cycles

Topology Optimization Result: Material distribution



TOSCA Structure.topology gives you optimal design proposals from a given design domain under consideration of all loads, boundaries and manufacturing constraints.

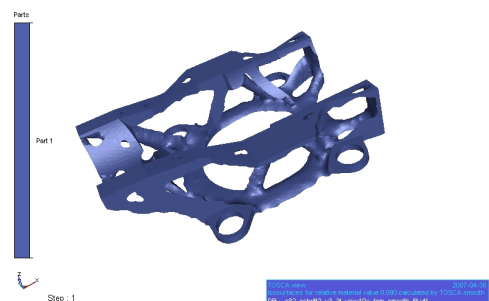
Topology Optimization Result: Material distribution



TOSCA Structure.topology enables you to maximize overall stiffness, minimize volume and

You can use your existing CAE environment (e.g. ANSYS, MSC NASTRAN, NX-NASTRAN, ABAQUS, MARC) and run **TOSCA Structure** as an add-on system in order to achieve significant design improvements.

Isosurfaces for relative material value 0.090 calculated by TOSCA.smooth



These results could be achieved after 16 iteration between your FEA solver and **TOSCA Structure.topology**; which means within a few hours (depending on your hardware).