

Presenter: Associate Professor Niels Aage

Title: Reducing CO2 emission by structural optimization

Abstract: The construction industry is currently responsible for up to 39 percent of the world's CO2 emissions, which to a large degree is due to the use and production of concrete. It is therefore obvious that any weight savings in large civil engineering structures, such as high risers, bridges, etc. has the potential to significantly reduce the carbon emission. As an example, a novel redesign of a large scale suspension bridge obtained by systematic topology optimization will be discussed, which demonstrates possible weight savings in excess of 28 percent while maintaining manufacturability. Another area known for high carbon emissions, concerns the aerospace and transport industry. Again, by application of structural optimization, we demonstrate how to redesign the internal support structure of a full scale aeroplane wing allowing for mass reductions of 2-5 percent and hence, reduction in fuel consumption of about 40–200 tonnes per year per aeroplane.

Biography: Dr. Niels Aage is an Associate Professor of Solid Mechanics and Optimal Design at the Technical University of Denmark and member of the DTU TopOpt group. His research interests includes the development of new methods for structural optimization, efficient numerical methods for giga-scale optimization, multiphysical design optimization and educational tools for structural optimization. Prof. Aage has authored more than 46 papers in ISI indexed journals, including three highly cited in the field. He has been invited speaker and key note lecturer at multiple scientific conferences and has received prizes for his pioneering work on giga-scale computational morphogenesis published in Nature. Furthermore, he has developed specialized structural optimization open-source codes tailored for use on high-performance computing systems. See more on www.topopt.dtu.dk.

