

MSc-Project (30ECTS):

Vortex shedding of circular members on lattice towers: State-of-the-Art investigation inclusive wind tunnel tests

The project focuses on vortex shedding on inclined bracing and investigates a new discovered phenomenon that have led to fatigues of circular members on lattice towers.

Keywords: wind load; vortex shedding; inclined members; structural dynamics in frequency and time domain; lattice towers of circular members

Standard tower codes for design of towers - such as the Eurocode EN 1993-3-1 - are normally used for the design of lattice self-supporting towers with circular members. However these codes usually do not request an analysis of vortex shedding of the members. Though a new series of special lattice towers have showed that this is sometimes a problem.

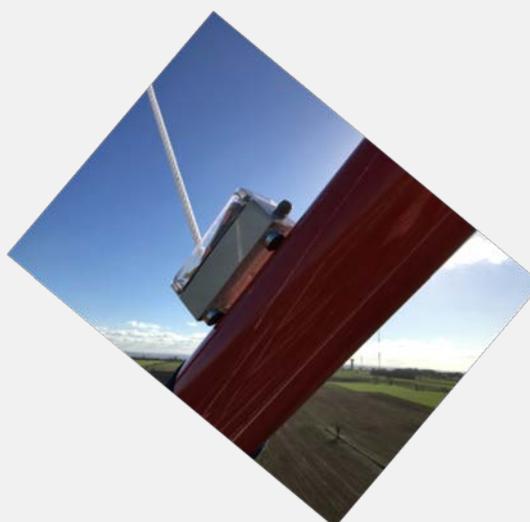
Ramboll has during the last more than 30 years designed in excess of 30 000 lattice towers of circular members and without having observed any fatigue problem of vibration of the diagonals. However a new series of tall towers has showed a problem with vibration of the inclined diagonals in the out-of-plane direction, when the wind is parallel to the tower face. These vibrations are not covered by any codes.

During the study the literature provided methods for dynamic design of vortex shedding are studied. Furthermore, wind tunnel tests are carried out to study the phenomena. Finally, proposal for a design guide is developed. One important parameter in the analysis of vortex shedding is the structural damping. This is studied on existing lattice towers.

The study will be carried out in close connection with the Tower Division in Ramboll and a proposal for investigating the problem may be included in a revision of Eurocode EN 1993-3-1.



Lattice self-supporting tower with circular members



Measurements of the response on bracing members