

MASTER'S DISSERTATION AT ENGINEERING ACOUSTICS & STRUCTURAL MECHANICS

DEPARTMENT OF CONSTRUCTION SCIENCES | FACULTY OF ENGINEERING | LUND UNIVERSITY



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PRESENTATION

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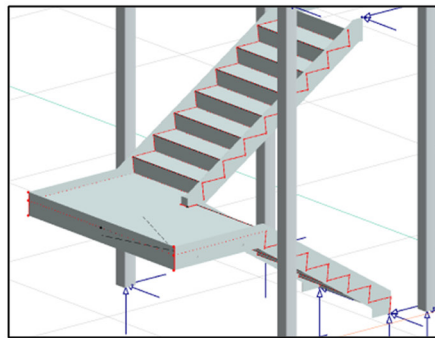
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DYNAMIC ANALYSIS OF VIBRATIONS IN STEEL STAIRCASES INDUCED BY WALKING



BACKGROUND

Designing a steel staircase often requires more than just checking the load bearing capacity. The dynamic effects must be considered as they can create discomfort for the user and the surrounding environment. How the vibrations spread in the structure depends on the staircases' components and connections. This could create problems in the interface between the structural engineers and the acoustical engineers work. This is something we would like to further investigate in an interdisciplinary master thesis, considering acoustical engineering and structural dynamics.

THE STRUCTURAL ENGINEER

The structural engineer is to build a FE-model for the studied staircases. The model will be altered so that it matches the response of the real staircases with consideration to acceleration, vibration modes and natural frequencies. When this is achieved the staircase model will be altered in some way to investigate the effects. FE-programs such as ABAQUS and FEM-design will be used.

OBJECTIVE

The objective of the master thesis is to investigate how steel staircases can be designed to create a situation that is acceptable for the user considering structural and acoustical engineering. The influence of connections and structural components will be considered in the analysis. For this to be achieved a case study will be done using staircases of special interest in the MAX IV-facility in Lund. The aim is to find possible improvements to the existing staircases that enhance the structural and acoustical behaviour of the staircases.

THE ACOUSTICAL ENGINEER

Create a simulation of the acoustical environment. Perform vibration and airborne noise measurements. Analyse the results and compare to the operative standards. Propose alterations of the structure to fulfil the requirements or enhance the acoustical behaviour of the staircase. Program used for acoustical simulations will be CATT.

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