



Lightweight floor systems

RESEARCH SCHOOL INTEGRAL DESIGN OF STRUCTURES

Designed for vibration comfort

Subject

A major trend in the current building practice is to reduce the weight of structures which is part of the IFD way of building. One of the heaviest and most complex parts of a building is the floor.

Lightweight structures have different characteristics compared to heavier structures like susceptibility to vibrations. In this research a lightweight floor system is developed

Goal

The main goal is to design a lightweight floor system that meets IFD-requirements and has good vibration comfort.

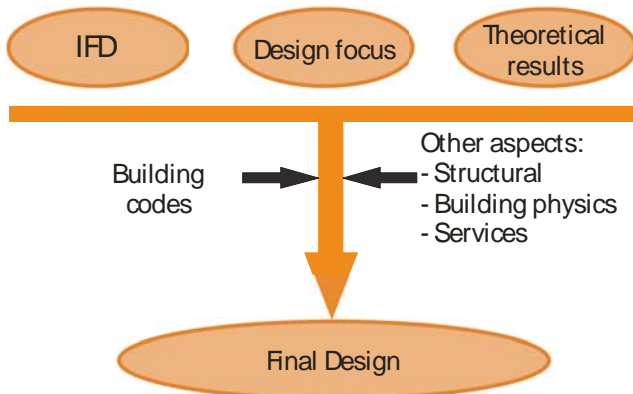
Expected Results

- A prototype design of a lightweight floor system with good vibration comfort and meeting IFD requirements
- Theoretical knowledge on vibration comfort of floor systems.

Experiments



Design proces

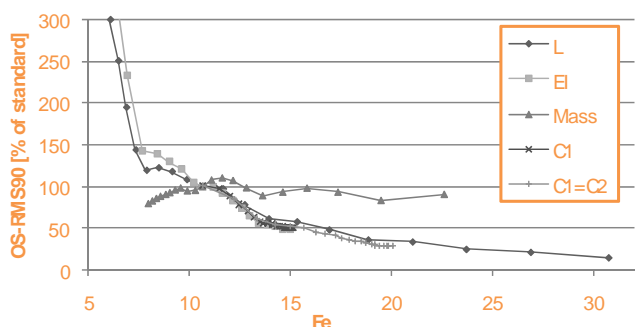


Design-focus

Light weight ↔ Good vibration characteristic



Comfort analysis



Lightweight Floor Systems Design for vibration comfort

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Subject: Design of lightweight floor systems for vibration comfort

A major trend in the current building practice is to reduce the weight of structures. The main incentives for this trend are the scarcity of materials and the rising costs. This is one of the goals of the IFD (Industrial, Flexible and Demountable) way of building. One of the heaviest and most complex parts of a building is the floor. Therefore the focus of this research is to develop a lightweight floor system. These lightweight floor systems are susceptible to vibrations and are therefore regarded less comfortable than heavier, traditional floor systems.

Goals

The main goal is to design a lightweight floor system that meets IFD-requirements and has good vibration comfort. To realize this secondary goals are defined. The first secondary goal is to create an objective evaluation tool to rate a floor system on meeting IFD-requirements. The second is the creation of a numeric model to increase knowledge on the behaviour of floor systems with regard to vibration comfort. Various material properties and geometrical variants are investigated to assess their influence on vibration comfort.

Research Question

How can a lightweight floor system of 100 kg/m² be designed to meet IFD requirements and have good vibration comfort.

Strategy

First a theoretical basis will be developed for all aspects of the floor system. This theoretical basis will be used to define design-guidelines that are used to design a prototype floor system that has optimal vibration comfort and meets IFD requirements. The one-step RMS₉₀ method developed by TNO will be used to objectively compare vibration comfort. Essential parts of the design and theory will be experimentally verified.

Expected Results

- A prototype design of a lightweight floor system with good vibration comfort and meeting IFD requirements
- Theoretical knowledge on vibration comfort of floor systems.

Preferred Partners Applications / Sponsors

Flooring industry / construction industry

Prime Publication / Prototyping

The results of the research will be published in a thesis and in international journals. Papers will be published and presented on international conferences.

Research Period

October 2002 – June 2008