

MASTER'S DISSERTATION AT STRUCTURAL MECHANICS

DEPARTMENT OF CONSTRUCTION SCIENCES | FACULTY OF ENGINEERING LTH | LUND UNIVERSITY



JAKOB DIAS DOS SANTOS INGESSON
jakob.ingesson@gmail.com

PRESENTATION

JUNE 2019

REPORT

Will be published as
Report TVSM-5239

SUPERVISORS

Dr **PETER PERSSON**
Div. of Structural Mechanics, LTH
Dr **OLA FLODÉN**
Volvo Cars

EXAMINER

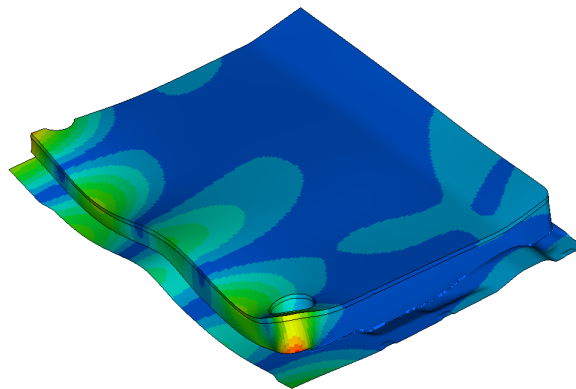
Professor **PER-ERIK AUSTRELL**
Div. of Structural Mechanics, LTH

**THE WORK IS PERFORMED AT
VOLVO CARS GÖTEBORG**

**IN COOPERATION WITH
VOLVO CARS**



MODEL CORRELATION FOR DYNAMIC ANALYSIS OF VEHICLE FLOOR PANELS



BACKGROUND

When designing a car today, the noise, vibration and harshness (NVH) aspect is more important than ever before since consumers have become more sensitive to and aware of noise and vibrations, and interior noise levels are often deemed as an indicator of overall vehicle quality.

One main source of interior noise is structure-borne noise, which originates from dynamic loading of the vehicle body. The dynamic loading gives rise to vibrations that are transmitted through the vehicle body resulting in noise radiation from the panels into the interior. One significant source of interior structure-borne noise are the floor panels of the car. To reduce noise levels, the floor panels are covered with carpets that consist of a foam layer and a heavy rubber layer. However, the interaction between the floor panels and carpets are not fully understood. This causes challenges and complications when modelling noise transmission and predicting noise levels in the early design stage.

AIM AND OBJECTIVE

The aim of the Master's dissertation is to increase the knowledge regarding the dynamic behaviour of floor panels and carpets in vehicle bodies in different frequency ranges.

More specifically, the objective is to gain an understanding of the interaction between, and behaviour of, the carpet and the floor panel, and to provide recommendations for analytical modelling of carpets.

METHOD

Measurements of the vibrations will be performed on a cut-out of a floor panel and carpet of a Volvo car. Numerical models will be correlated with the measurements. The carpet will be modelled as a non-structural mass as well as with solid elements using a isotropic material model and a poro-elastic material model. Different contact conditions between the carpet and panel will also be applied. The different modelling strategies will be compared with the measured data and evaluated.

DIVISION OF STRUCTURAL MECHANICS

Faculty of Engineering LTH, Lund University, Box 118, SE-221 00 Lund, Sweden

• Tel: + 46 (0)46-222 73 70 • Fax: + 46 (0)46-222 44 20 • www.byggmek.lth.se