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 an 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.