

## Graduation assignment: Determination of the vibration source for 3D analyzes

<b>Type</b>	Graduation assignment
<b>Office location</b>	Delft
<b>Education level</b>	TU/WO
<b>Field of study</b>	Civil Engineering, geophysics
<b>Duration of internship</b>	6 Months
<b>Desired start</b>	September 1 <sup>st</sup> 2020

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Every year ABT has the possibility for about 30 students to do an internship or graduation assignment. In these strange times (1.5 meter economy) we ask a little more than usual: you have a good level of independence, proactivity and responsibility. We all partly work from home, therefore you receive a laptop so you can work flexibly everywhere.

### Topic

Vibration in buildings is becoming an increasingly important aspect in the design of a comfortable building. Vibrations from external sources, such as trains and speed bumps, pass through the soil and will vibrate the building via the foundation. The excitation and propagation of the vibrations are complex and are still under development for the design of low-vibration buildings.

At the time it is common practice, that with an existing vibration source at the ground level on one or at most a few a few locations, vibration measurements are carried out and they are directly used as input to building analyzes. This method does not take into account differences in excitation at different locations in the soil.

The challenge of the research is to determine the 3D image of the soil vibrations on the basis of a limited ground level measurement. By analyzing the vibration measurement, with the knowledge of the track structure, the propagation of vibrations through the soil, you should recalculate what the vibration source should have been. With this analyses you should be able to determine the dominant parameters of the vibration source. These can then be used to predict the vibrations at different points in the soil. The result of the research is an analysis method to relatively easily predict the 3D behavior of soil vibration at the location of a building.

As part of your graduate work you include with vibration measurements and modeling in ABAQUS, which simulates the dynamic behavior. You will be guided by members of the Knowledge Group Dynamics.

### Steps to be taken

- Research into the state of the art and theory of soil vibrations in the vicinity of railtrack structures;
- Analysis of ground level vibrations due to train passages. Exploratory measurements can be carried out for this;
- Exploring the vibration situation at locations near the track;
- Drafting concepts for calculating back vibration measurements;
- Working out concepts with simulations in ABAQUS;
- Setting up guidelines for when 3D analyzes are necessary for vibration analyzes of a building.

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This is how we build our ambitions together.

**We look forward to your response!**

Interested in this challenge? We look forward to your response at [future@abt.eu](mailto:future@abt.eu). For questions about the vacancy, please call Malou Geerman, Corporate Recruiter, 06 - 13137416.

Want to know more about ABT or the projects to which you can contribute? Then visit [www.abt.eu](http://www.abt.eu) or visit our [Facebook](#)-, [Instagram](#)- or [LinkedIn](#)page.