

AVL- PASSION AND RESULTS

AVL is the world's largest privately owned company for development, simulation and testing technology of powertrains (hybrid, combustion engines, transmission, electric drive, batteries and software) for passenger cars, trucks and large engines.

Thesis work – Noise optimization of bevel and hypoid gears

Background

The power train in vehicles is a source to several dynamic and acoustic problems. When electric drive is introduced the noise and vibrations from the engine are reduced and hence, the noise and vibrations from the transmission will be of greater importance than before. Hypoid and bevel gear transmission are common solutions in automotive applications due to the possibility to transmit torque between non parallel shafts. However, these gears are also known for creating noise due to structural vibrations and will therefore be of main focus within this thesis work. Transmission error and the varying gear mesh characteristics are two important reasons to such noise and vibrations. These deviations are typically an effect of the production system i.e. both manufacturing leading to deviations in geometry, surface roughness etc. and assembling leading to misalignment, failure initiations etc.

What

The purpose of the thesis is to create guidelines and simple tool(s) how to design the bevel and hypoid gears in order to minimize gear noise (Transmission Error, TE) while fulfilling durability and efficiency requirements.

How

- Conduct a literature survey and background investigation to understand how bevel and hypoid • gears works and the causes of NVH, losses and durability.
- Identify/define equations/models to estimate/calculate TE, strength/durability and losses.
- Define a method/process to optimize the bevel and hypoid gears of the transmission in order • to minimize TE and fulfilling all other requirements (Efficiency and Strength/Durability).
- Document methods and process in a design guideline.
- Optional: Automate the method/process and create an optimization tool where variables and constrains/requirements can be inserted, and the tool propose the best layout based on this.

When

Spring 2018

Tools

Gleason gear design tool, AVL Excite

Candidates

Suitable candidates are M.Sc. students within mechanical engineering, vehicle engineering or engineering physics with a good understanding of modelling and simulations.

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Contact

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