

CADFEM Consulting

Brake-Squeal Analysis with ANSYS® Mechanical™ and optiSLang

Simulation of Friction Induced Vibration Effects

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Task

NVH problems consume significant resources in engineering. Brake-squeal noise of a car is an important issue that strongly impacts customers' satisfaction. The task is to predict design problems leading to brake-squeal in advance.

Solution

A prestressed complex modal analysis is applied to account for the friction effects leading to mode coupling instability. The modal solution is based on a nonlinear contact analysis. Features like friction as a function of velocity or pressure, squeal damping, gyroscopic effects and mode tracking allow accounting for different physical effects within a robust solver.

Customer Benefit

This way designs that are prone to annoying brake squeal can be identified in the early development phase. Typically friction coefficients, brake pressure and geometrical CAD parameters have to be varied within the automated closed loop process shown below to identify the sensitive parameters with respect to instable modes. ANSYS robust CAD based meshing technology together with its parametric approach and optimization based on optiSLang play the key role to develop proper brake designs.

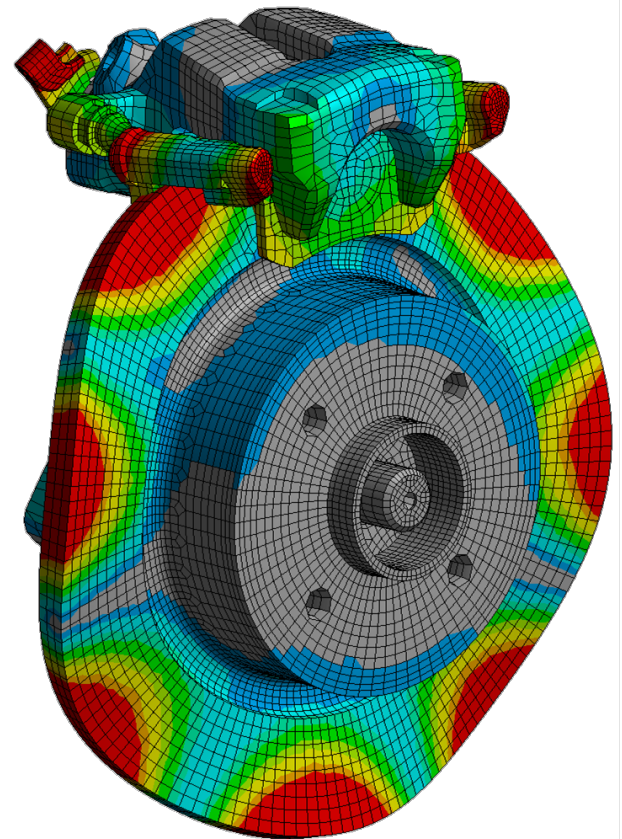


Bild: TRW Automotive, CADFEM

