SUMMARY

Accuracy in gear assembly is crucial. Poor assembly can result from low-quality connected parts, such as shafts, or imprecise assembly of gear pair components. This study examined how errors in assembly, specifically shifts in centre distance, affect contact stress in gears.

The primary objective was to demonstrate that shifts in centre distance influence contact stress and to quantify these changes. The stress in spur gears was calculated using AGMA standards. Variables and parameters such as gear specifications, and AGMA factors are defined, focusing on 18CrNiMo7-6 steel for its high strength. Contact stress calculations consider both independent and dependent variables on centre distance, like tangential force and pressure angle adjustments due to shifts in centre distance.

It was found that centre distance has an inverse relationship with contact stress. Increasing the centre distance decreases contact stress, while decreasing it increases contact stress. This finding highlights the significant impact of assembly accuracy on gear functionality.

Understanding that increasing centre distance can improve safety is useful when setting gear tolerances. Positive centre distances up to a certain point can be considered acceptable tolerances.

To validate these findings, KISSsoft software was used. KISSsoft confirmed the results and proved beneficial by considering many tolerances and manufacturing characteristics that are difficult to include in theoretical calculations. This makes simulation results more realistic.

Although this thesis focused on contact stress, but gear teeth also go through bending stress. Analysing bending stress would provide a better understanding of how centre distance influences gear functionality, and it can be an interesting topic to work on in future.

Additionally, the research revealed that changes in centre distance influences the pressure angle, which affects contact stress. Since centre distance is not the only factor that changes pressure angle, future research could explore other design factors that might change pressure angle and as a result reduce both contact and bending stress. This could lead to the development of more efficient gears with higher safety and better functionality.