MT | MASTERTHESIS

LEBENSZYKLUSANALYSE VON CFK- UND STAHLKOMPONENTEN IN MOTORSPINDELN

LIFE CYCLE ASSESSMENT OF CFRP AND STEEL COMPONENTS IN MOTOR SPINDLES

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Feel free to reach out if you have any questions!

START
immediately

TASK DESCRIPTION:
Fiber-reinforced plastics (FRP), and particularly carbon fiber-reinforced plastic (CFRP), offer significant lightweight potential in the field of rotating and moving masses. They are already being used in electric drives or pumps. Motor spindles, which serve as main drives in machine tools, are also a promising application area. However, the effects of material substitution with FRP go beyond the mere reduction of moving mass. To evaluate the impact and benefits of lightweight measures, a holistic assessment and comparison with conventional steel components must be made. Life cycle assessment (LCA) is an established methodology in research for this purpose.

The task can be divided as follows:

- Literature research and acquaintance with the methodology of life cycle assessment
- Familiarization with the simulation environment for life cycle assessments
- Analysis of the manufacturing processes of CFRP and steel components to identify influencing factors
- Development of parameterized life cycle assessments
- Evaluation of the influencing factors and conducting a sensitivity analysis
- Derivation of recommendations for reducing CO2 emissions/overall life cycle impact
- Documentation of the work and results