

Development of a control system to improve of the dynamic backlash passage of an electrically preloaded drive train

Drives used in robotics often require high torques at low speeds. In order to be able to operate electric motors at favorable operating points, gearboxes are generally used for torque/speed conversion. However, these are subject to backlash and introduce additional spring stiffness and damping into the system.

In particular, the process of relaxing this spring stiffness in conjunction with the backlash and the impact on the opposite flank of the gearbox is to be improved in this work by means of a control system.

A control strategy is to be developed on the basis of literature sources. This is to be investigated using a simulation model and then applied on the test bench.

Student profile:

- Knowledge in the field of electric motors, transmission technology and in particular control engineering
- Ideally experience with Matlab Simulink, dSpace and ControlDesk, but training is possible
- Structured, independent and thorough way of working, intrinsic motivation
- Enrolled at the University of Stuttgart
- On-site work required depending on work package



Work packages:

- Familiarization with literature / software
- Concept selection or development of the control strategy, modeling and simulation using Matlab Simulink
- Adaptation of the dynamic behavior of the control system, consideration of real variable properties such as fluctuating clearance width
- Application on the test bench, recording of measurement series and validation of functionality
- Documentation and presentation



Multi-motor setup with coupled symmetrical drive trains, mounted on the test bench

Projektrahmen:

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