Technical Specification

High-dynamic PMSM-Motors

- Power nom.: 2 x 1,5 kW
- Speed max.: 6000 min^{-1}
- Torque nom./max.: 2.4 / 10.3 Nm
- Rotor inertia: 0.67 · 10^{-4} kgm^2

Linear actuator

- Force: 1000 N
- Operation speed: 25 mm/s
- Resolution: 10 µ/step

Flexible applicable mounting plate

- Lenght: 1430 mm
- Depth: 752 mm

Real-Time-Environment

- Jäger ADwin-Pro II:
  Drivetrain-simulation and digital signal processing with frequency up to 20 kHz
- Control by flexible MATLAB®/Simulink®-Models
- Analog and digital interfaces
- FPGA signal I/O
- Optional: xPC-Target, Linux RTAI

Contact

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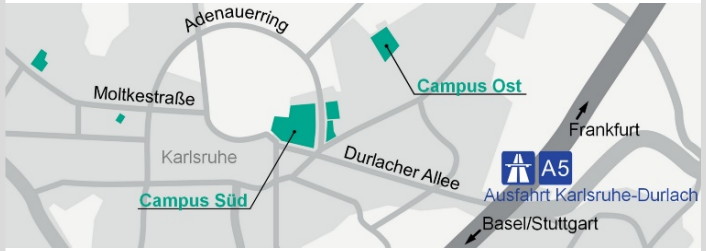

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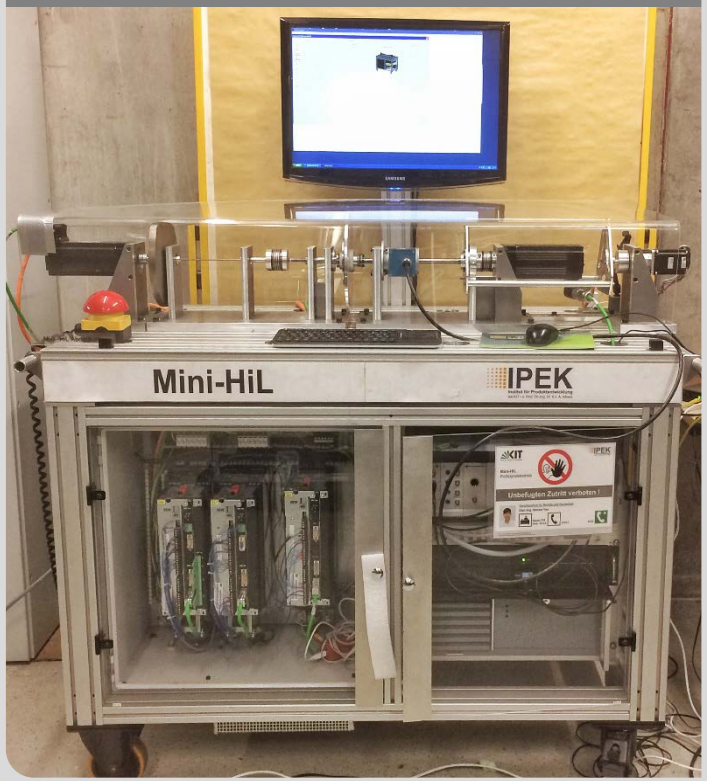
Mini-HiL

Mini-Hardware-in-the-Loop-Test Bench As Development and Validation Platform

IPEK ▪ Institute of Product Engineering



Features

Flexible test set-up

The grooved clamping plate allows the flexible and rapid set-up of various experiments in smaller and therefore more cost-effective size.

Accessibility of the actuators and sensors

Different actuators and sensors are available, which are used as required. The open design allows quick installation and access to all relevant components.

Validation of simulation models

The experimental test environment is used to validate simulation approaches with little complexity of the test set-up, meaningfully. By creating new knowledge the test set-up can thus be used to optimize the SiD - System in Development.

Development environment for control algorithms

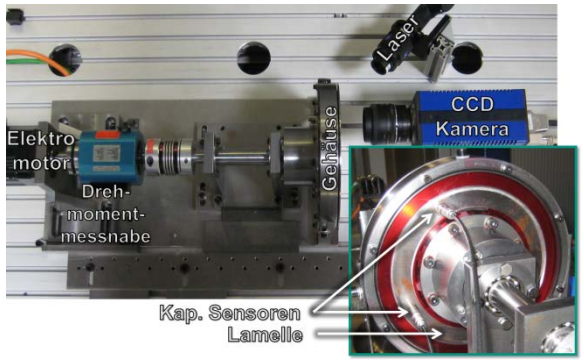
Due to its low power the Mini-HiL provides an ideal platform for the development and optimization of control algorithms, which are used afterwards for a more powerful test bench. Furthermore, networking concepts of spatially distributed validation environments can be investigated.

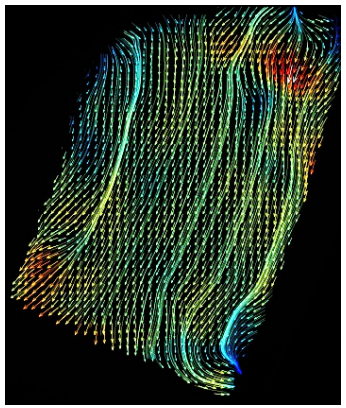
Application Example

Development and validation environment for clutch plate designs

Analyzing the behavior of a single, axially freely movable or fixed clutch plate with respect to the drag torque considering influences such as tumbling, oil viscosity or clearance:

- Optical measurement of the oil flow between the driven body and freely rotatable clutch plate.
- Validation of flow models, which can be used as a basis for improvement of wet-running starting clutches.

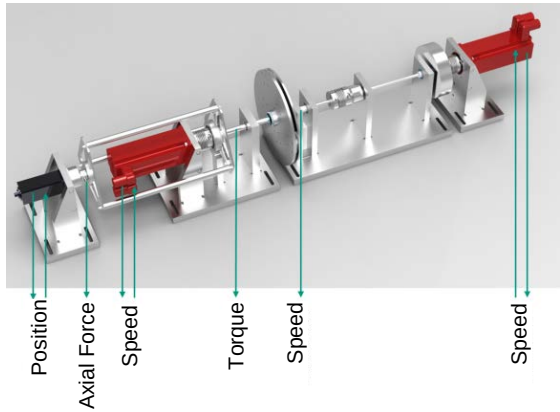




Application Example

Validation of control algorithms and real-time systems using the example of clutch judder

- Due to the large speed range, only the moments of inertia and the torque have to be scaled
- Virtual representation of different vehicles through real-time simulation
- Physical representation caused by contact pressure and friction pairing vibration phenomena of the clutch
- Virtual and physical representation of the rest system “vehicle” as a multi mass oscillator
- Testing of active measures for regulating the friction vibrations



Test bench measurement