Technical specifications

High Dynamic Primemover / Drive

- Power nom./max.: 250 / 500 kW
- Speed nom./max.: 6.000 / 10.000 rpm
- Torque nom./max.: 400 / 800 Nm
- Torque excitation: up to 300 Hz
- Rotor inertia: 0,047 kgm²

Wheel Road Machines (2x)

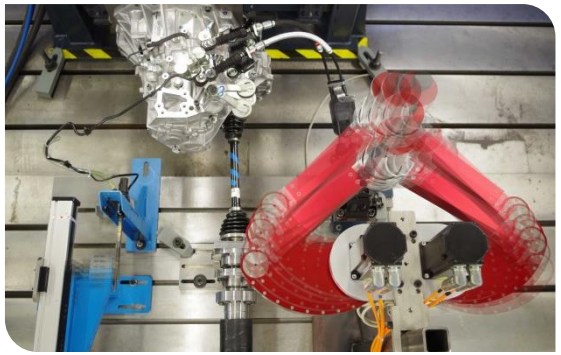
- Power nom./max.: ea. 200 / 250 kW
- Speed max.: 3.000 rpm
- Torque nom./max.: ea. 2.500 / 3.500 Nm
- Rotor inertia: ea. 0,95 kgm²

Clutch Actuator

- Force max.: 2.000 N
- Actuating speed max.: 0,8 m/s

IPEK Gear Shifting Robot

- Working area: 300 x 250 mm
- Force max.: 500 N
- Actuating speed max.: 1,5 m/s
- Control: Force and Position



IPEK Gear Shifting Robot in operation

Contact

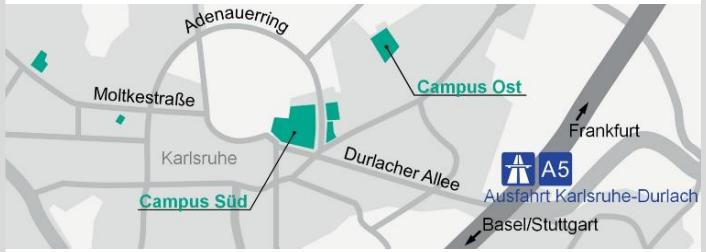
Karlsruhe Institute of Technology (KIT)
IPEK ▪ Institute of Product Engineering

Dipl.-Ing. Sascha Ott
Managing Director

Campus South, Building 50.33

Gotthard-Franz-Straße 9 | 76131 Karlsruhe
Phone +49 721 608-43681
E-Mail sascha.ott@kit.edu

www.ipek.kit.edu



Publisher

IPEK ▪ Institute of Product Engineering
Kaiserstraße 10 | 76131 Karlsruhe

Updated March 2019

www.kit.edu

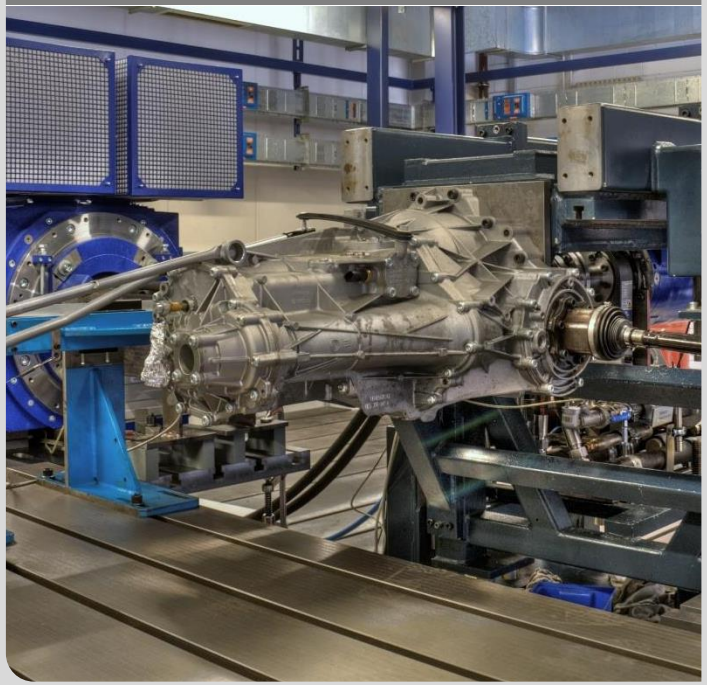
Karlsruhe Institute of Technology

IPEK Institute of Product Engineering at Karlsruhe Institute of Technology

PLP

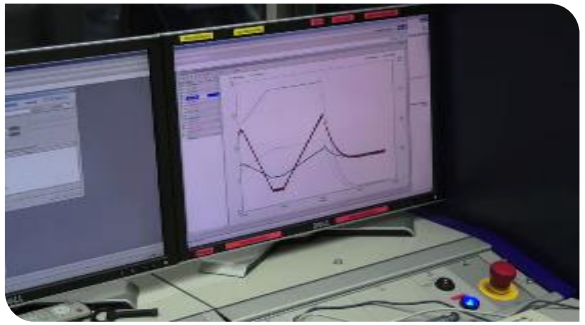
Powertrain-in-the-Loop Test Bench

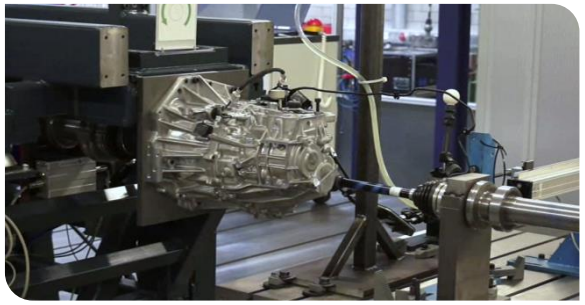
IPEK ▪ Institute of Product Engineering

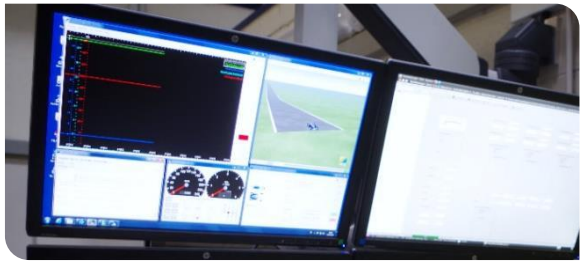


Capabilities

- Setup of a whole drive train (two-wheel drive)
- Simulation of combustion engine characteristics
- Reproducing of tire slip by dynamic wheel road engines for µ-split/jump and snap-start-maneuver
- Identification of potential limitations of current torsional damper systems to reduce non-uniformities in drive trains
- Sectioning of a drive train in physical and virtual subsystems by variable interfaces



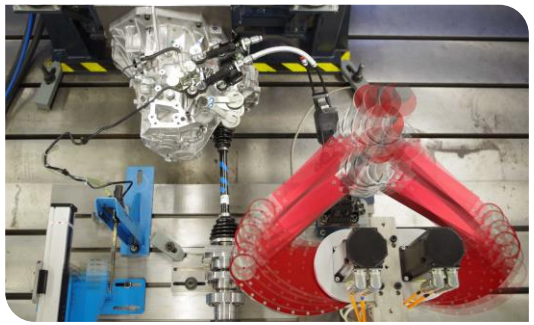


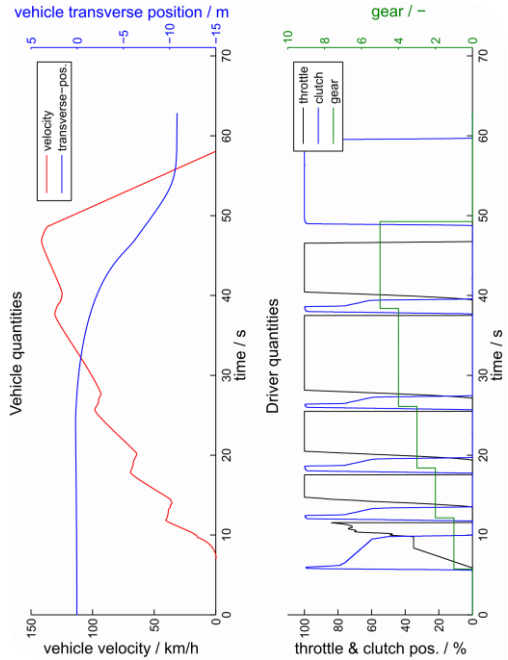


Application examples

Investigations by connection of physical and virtual subsystems

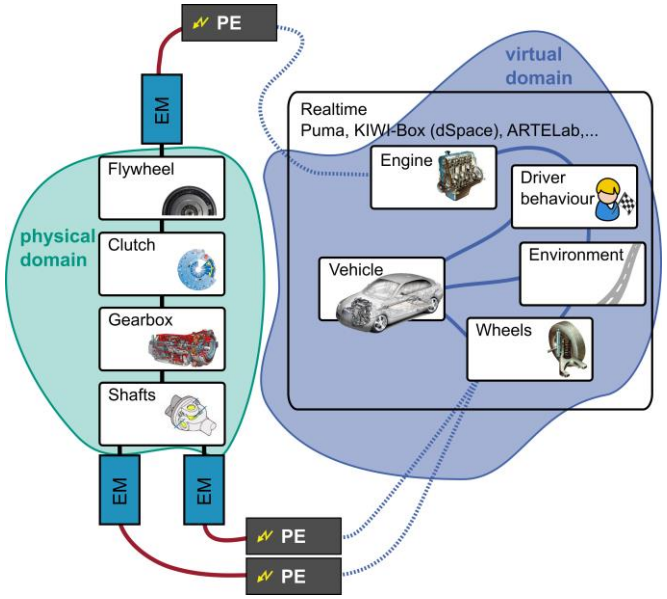
- Track stability upon tip-in maneuvers by simulation of the remaining system using AVL InMotion / Carmaker
- Full load acceleration with manual gear shifting by IPEK gear shifting robot
- Gearbox efficiency testing (e.g. during drive cycle)





Investigation example

- Physical NVH investigations of drive trains using combustion engine simulation, e.g. gear rattle and dynamic transmission behavior
- Maneuver based parametrization of the drive train for electrical and conventional application
- Analysis of drive train vibrations during transient maneuver such as start-up or shifting procedures to analyze the sensitivity for clutch judder phenomena
- Determination of torque peaks in the drive train in consideration of tire slippage during different maneuvers e.g. alternating loads caused by µ-split
- Investigation of endurance and performance qualities of the drive train
- Abuse load simulation with tire behavior model



Test bench topology and typical setup