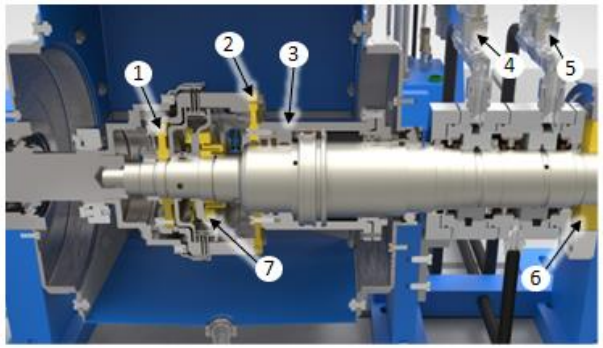
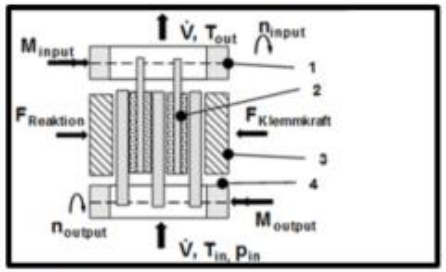
Sectional visualization InLine – Unit



1: Measurement of reaction force
2: Measurement of clamping force
3: Hydraulic piston
4: Sensor for pressure and volumetric flow (cooling)
5: Sensor for pressure and volumetic flow (actuation)
6: Sensor for speed
7: Measurement of torque

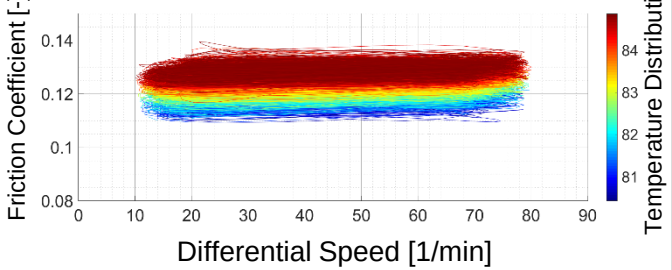
Plate package structure



1: Outer disc
2: Friction plate
3: Steel plate
4: Clutch hub

Example study

Dynamic friction coefficient



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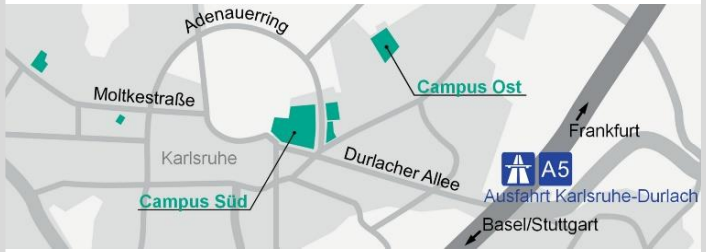

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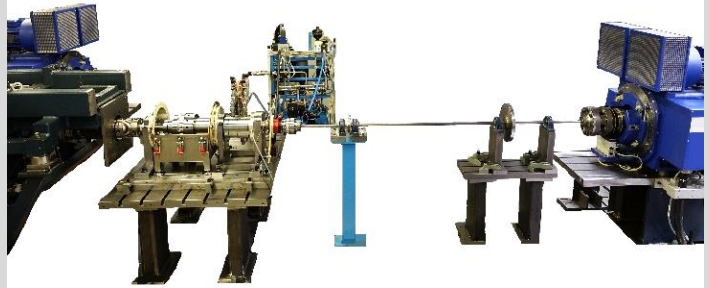
InLine – Unit

Test bench unit for wet clutch plates

IPEK ▪ Institute of Product Engineering

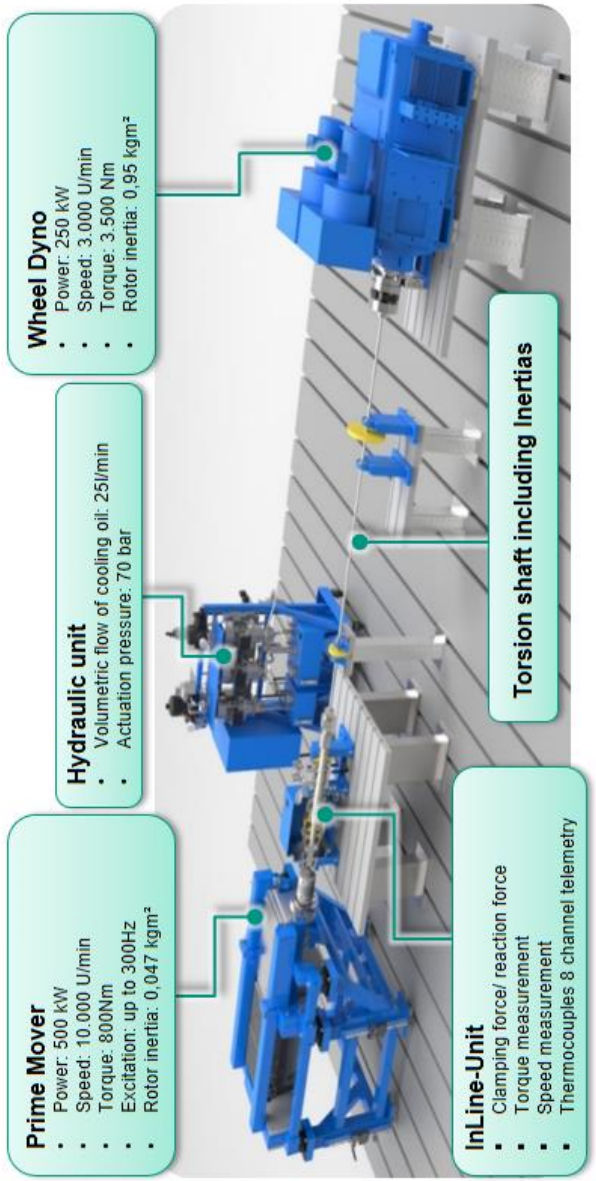


Research topics

- Investigation of performance limits of wet clutch systems with various load conditions
- Determination of Friction coefficient composition and friction coefficient characteristics of wet multi-plate clutches
- Investigation of vibration decoupling with wet clutch systems running in controlled slip mode
- Identification of influencing factors on vibration decoupling
- Drag torque investigations using a design of experiment approach (DoE)

Test programs for application specific loads

- Synchronization
- Brake
- Breakaway
- Continuous slip under constant load, torque and speed
- Continuous mass simulation
- Torsional vibrations (Excitation up to 150 Hz)



Technical specification

Prime Mover and Wheel Dyno

PM power nom./max.:	250/500 kW
Dyno power nom./max.:	200/250 kW
PM speed nom./max.:	6.000/10.000 rpm
Dyno speed:	3.000 rpm
PM torque nom./max.:	400/800 Nm
Dyno torque nom./max.:	2.500/3.500 Nm
Torque excitation:	up to 300 Hz

Hydraulic unit

Actuation unit:	70 bar, 10 l/min
Axial force:	29,7 kN
Cooling oil unit:	25 bar, 25 l/min
Oil tank volume:	8 - 60 l
Oil injection temperature:	20 - 120 °C
Size of clutch plates:	Automobile, Industry

Measurement setup

- Precision sensor of pressure
- Precision sensor of volumetric flow
- Torque measurements
- Precision encoder on drive and output side
- Speed sensor at clutch output
- Thermocouples with telemetric data transmission
- Measurement of clamping force
- Measurement of reaction force

Control engineering

- Speed and torque control
- Pressure force control / pressure control
- Temperature of cooling oil control
- Control of differential speed