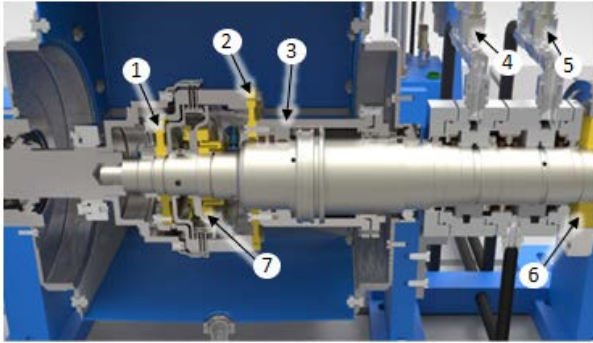
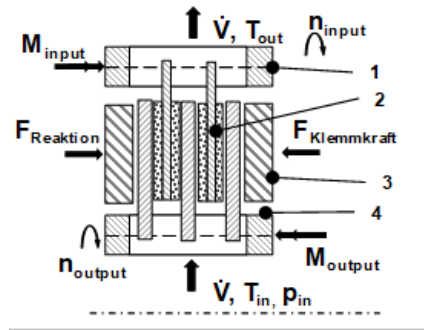


Sectional visualization InLine – Unit



- 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 volumetric flow (actuation)
- 6: Sensor for speed
- 7: Measurement of torque

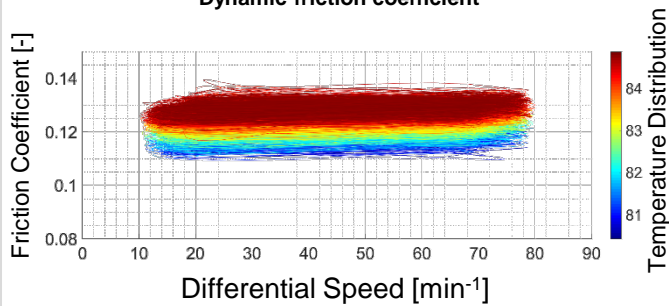
Plate package structure



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

Example study

Dynamic friction coefficient



Contact

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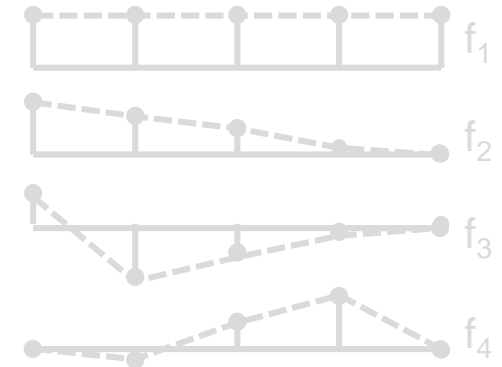
Updated March 2019
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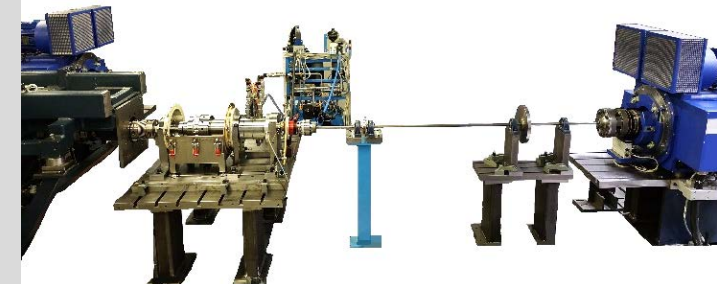


InLine – Unit

Test bench unit for wet clutch plates



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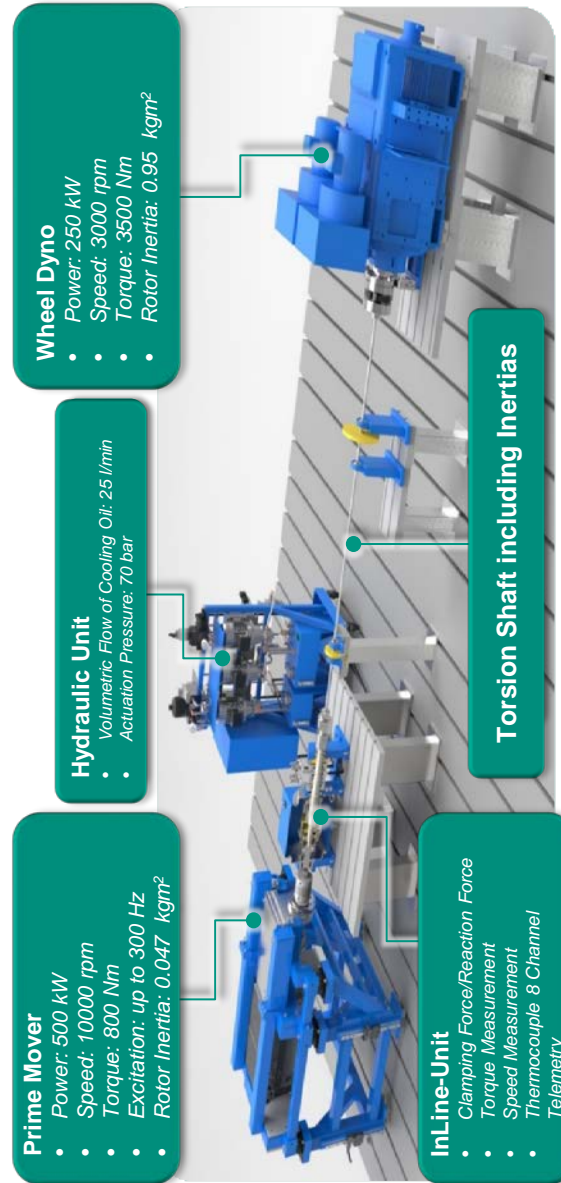


Research topics

- 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)



Prime Mover

- Power: 500 kW
- Speed: 10000 rpm
- Torque: 800 Nm
- Excitation: up to 300 Hz
- Rotor Inertia: 0.047 kgm²

Hydraulic Unit

- Volumetric Flow of Cooling Oil: 25 l/min
- Actuation Pressure: 70 bar

Wheel Dyno

- Power: 250 kW
- Speed: 3000 rpm
- Torque: 3500 Nm
- Rotor Inertia: 0.95 kgm²

InLine-Unit

- Clamping Force/Reaction Force
- Torque Measurement
- Speed Measurement
- Thermocouple 8 Channel
- Telemetry

Torsion Shaft including Inertias

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.: 6000/10000 rpm
- Dyno speed: 3000 rpm
- PM torque nom./max.: 400/800 Nm
- Dyno torque nom./max.: 2500/3500 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