Automate brake testing with IPEmotion

- Application note for brake tests with IPEmotion

The initial situation

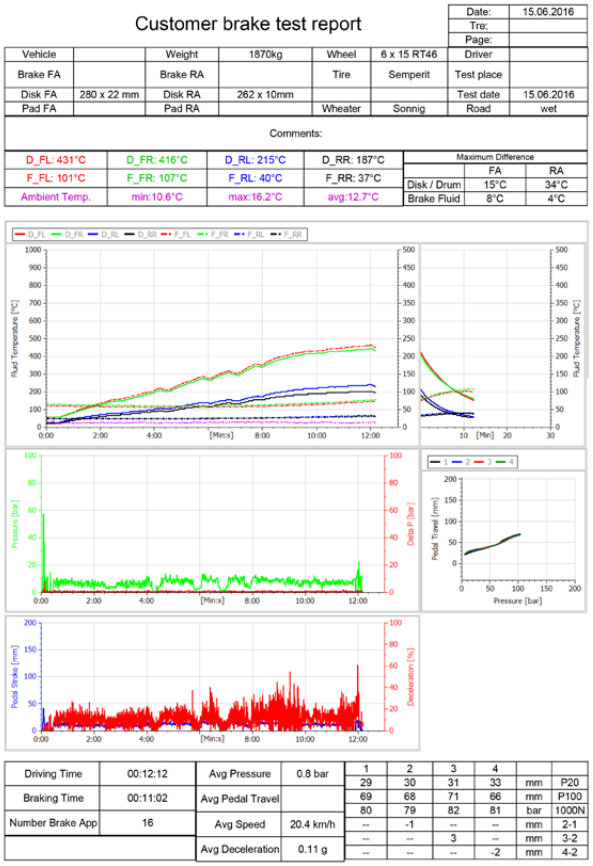
The testing of brake systems is an extremely important part of the vehicle validation. As safety-relevant components, they have to work flawlessly at all times. Rigorous checks of all systems before the start of production are therefore essential. Vehicle manufacturers have to test and document driving and temperature conditions as well as protection. The different proof and endurance tests must meet the common standards.

The Challenge

Brake system endurance tests can be conducted in road traffic (e.g. up-hill) or on test routes. While the brake system is subjected to a repeatable strain situation, all relevant measurement values of vehicle and brake (various different parameters such as pressure, force, temperature, speed, or GPS position) have to be acquired simultaneously and prepared for the report. In addition to that, the complex sensor setup has to be handled in an efficient way, including brake force pedal sensors, brake pedal travel measurements, brake pressure measurements, brake caliper temperature measurements (with thermocouple), or brake disk temperature measurements (via telemetric systems or optical sensors like infrared pyrometers). To meet these requirements, guarantee the comparability of the test results, and support the test driver as much as possible, a software-based measurement with systematic sequence control is the key.

Requirements

- Software-based measurement with input masks
- Adjust of pressure- and STG-based measurement points
- Access to the vehicle or body/motor control unit OBD signals
- Fast inputs for STG parameters for force and pressure profiles
- Analog inputs for further external sensors (e.g. infrared pyrometer)
- Thermocouple inputs for caliper temperatures
- GPS and, if necessary, video signals



Customer brake test report

						Date:	15.06.2016
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Vehicle		Weight	1870kg	Wheel	6 x 15 RT46	Driver	
Brake FA		Brake RA		Tire	Semperit	Test place	
Disk FA	280 x 22 mm	Disk RA	262 x 10mm			Test date	15.06.2016
Pad FA		Pad RA		Wheater	Sonnig	Road	wet

Comments:

				Maximum Difference		
					FA	RA
D_FL: 431°C	D_FR: 416°C	D_RL: 215°C	D_RR: 187°C	Disk / Drum	15°C	34°C
F_FL: 101°C	F_FR: 107°C	F_RL: 40°C	F_RR: 37°C	Brake Fluid	8°C	4°C
Ambient Temp.	min:10.6°C	max:16.2°C	avg:12.7°C			

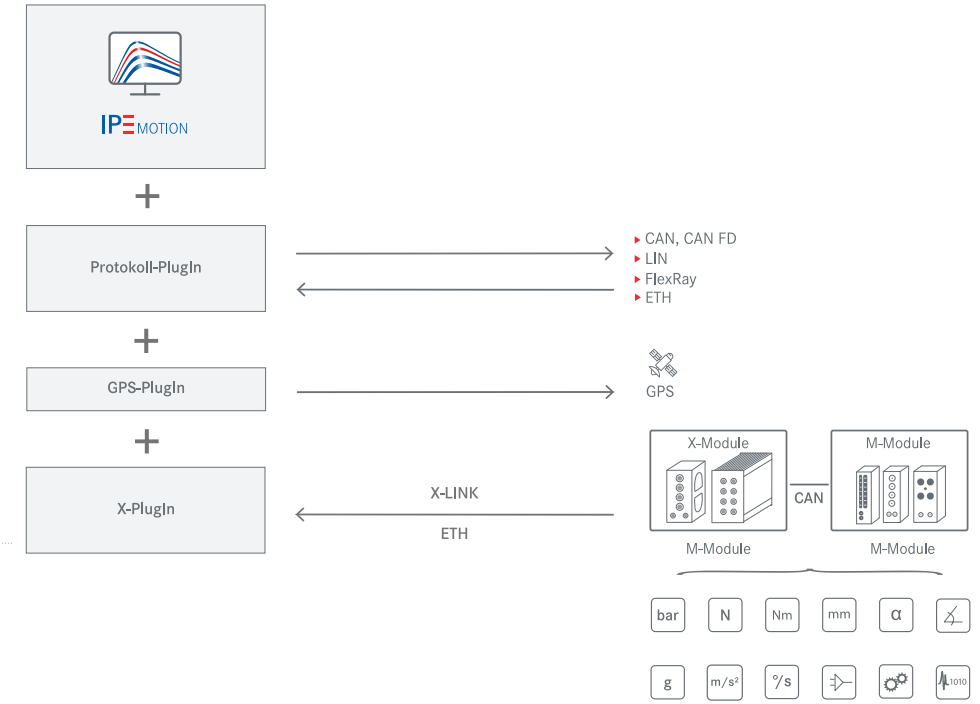
Driving Time	00:12:12	Avg Pressure	0.8 bar	1	2	3	4		
Braking Time	00:11:02	Avg Pedal Travel		29	30	31	33	mm	P20
				69	68	71	66	mm	P100
Number Brake App	16	Avg Speed	20.4 km/h	80	79	82	81	bar	1000N
				--	-1	--	--	mm	2-1
		Avg Deceleration	0.11 g	--	--	3	--	mm	3-2
				--	--	--	-2	mm	4-2

The Solution

IPEmotion is the ideal measurement data acquisition software for all brake system test requirements. It offers various display instruments for the graphic representation of brake profiles. In addition to that, you may set up measurement points very quickly via a parameter mask and predefine values such as waiting time, cooling time, repetition cycles, or braking curves (with varying slope).

Via the X-LINK connection of the analog measurement modules and XCPonEthernet, the high-resolution module Mx-STG2 6 with a sample rate of up to 100 kHz can be used to acquire STG, route, and pressure sensor values. You may also include the compact M-CAN modules M-THERMO 2 (temperature measurement), M-SENS2 (voltage measurement), and M-CNT2 (counter and encoder inputs) in the measurement chain or connect further external systems (e.g. GPS modules, OBD signals, vehicle control units) via our various plugIns. All measurement data can be stored in a chronologically synchronous way and analyzed with the reporting module.

System sketch



The Advantages

- Guided measurement with user input masks
- Graphic representation of the driving profiles
- Connecting STG inputs via the Mx-STG2 6 module
- Analog and digital I/O channels
- Integration of further plugIns (e.g. for GPS, video, and acoustics)
- Integrated PDF analysis and reporting of the measurement results

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