

A/C SYSTEM NEW FUNCTION : TORQUE CONTROL



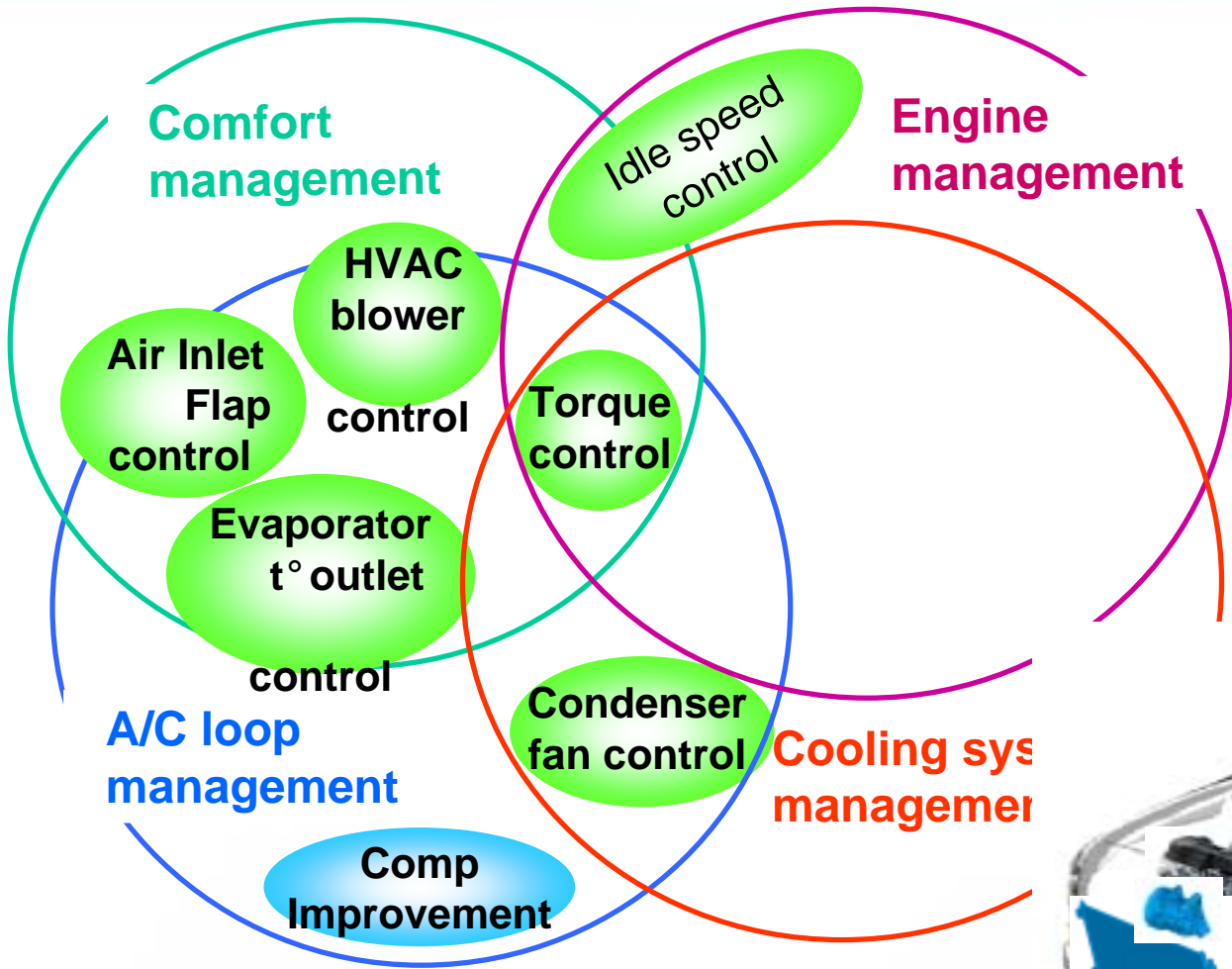
**Mohamed BEN YAHIA, Stefan KARL, Jin Ming LIU, Thierry RAUX
Paul MEURILLON**

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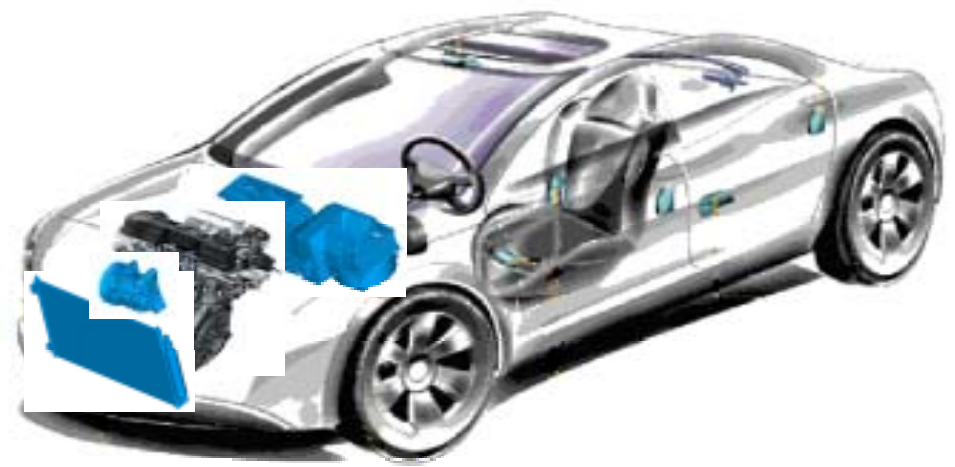


***SAE Automotive Alternate Refrigerant Systems Symposium
Scottsdale, Arizona, USA***

Introduction

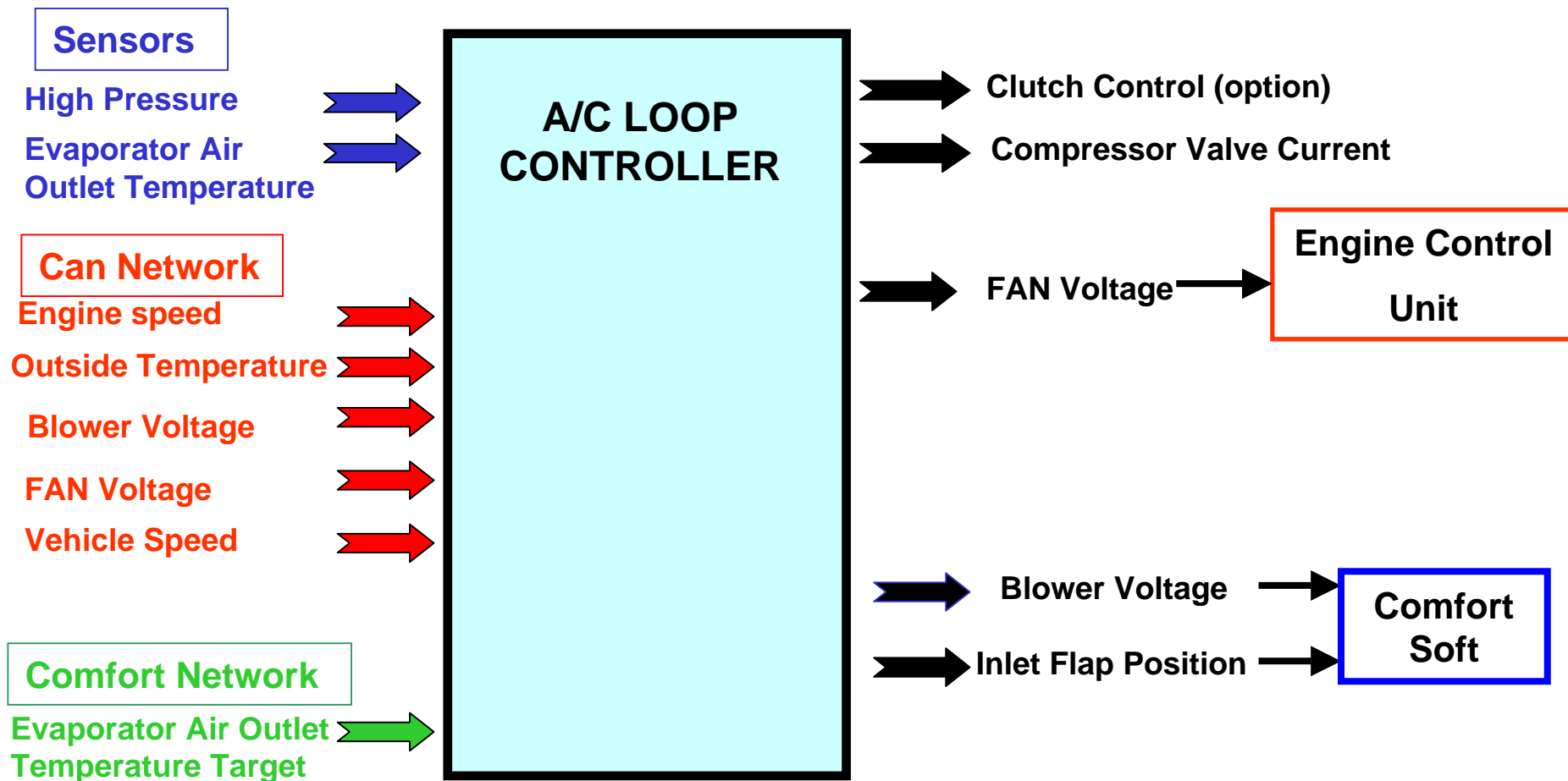


- Today status
- Objectives
- Results
- Conclusion



Current A/C system control

With Externally Controlled Compressor

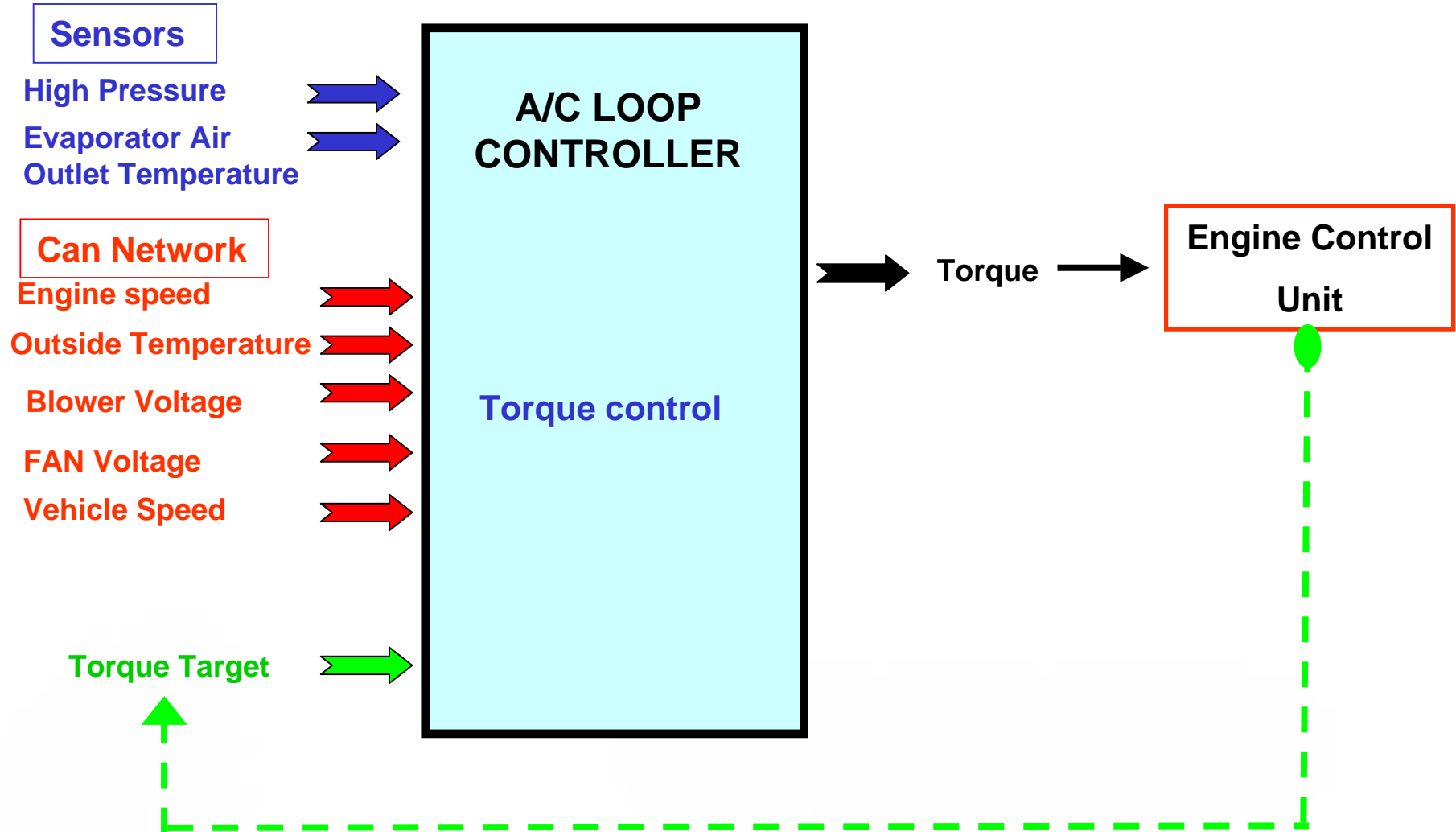


Objectives



- Why ?
 - To adjust and optimize the fuel consumption by estimating the compressor torque
- How ?
 - With a minimum of sensors and added devices
- For ?
 - R134a A/C system with TxV or Orifice tube
 - R744 A/C system
- Accuracy ?
 - In static conditions : $< +/- 2 \text{ Nm}$
 - In dynamic conditions : $< +/- 4 \text{ Nm}$

Inputs needed for the torque control



Cars Tested and Results presented



	NEDC Wind tunnel	Field tests
R134a TxV A/C System	VW Golf Diesel 1.9 liter TDI	VW Golf Diesel 1.9 liter TDI
R134a OT A/C System	Renault Laguna Gasoline 1.6 liter	Renault Laguna Gasoline 1.6 liter
R744 A/C System	VW Golf Diesel 1.9 liter TDI	VW Golf Diesel 1.9 liter TDI

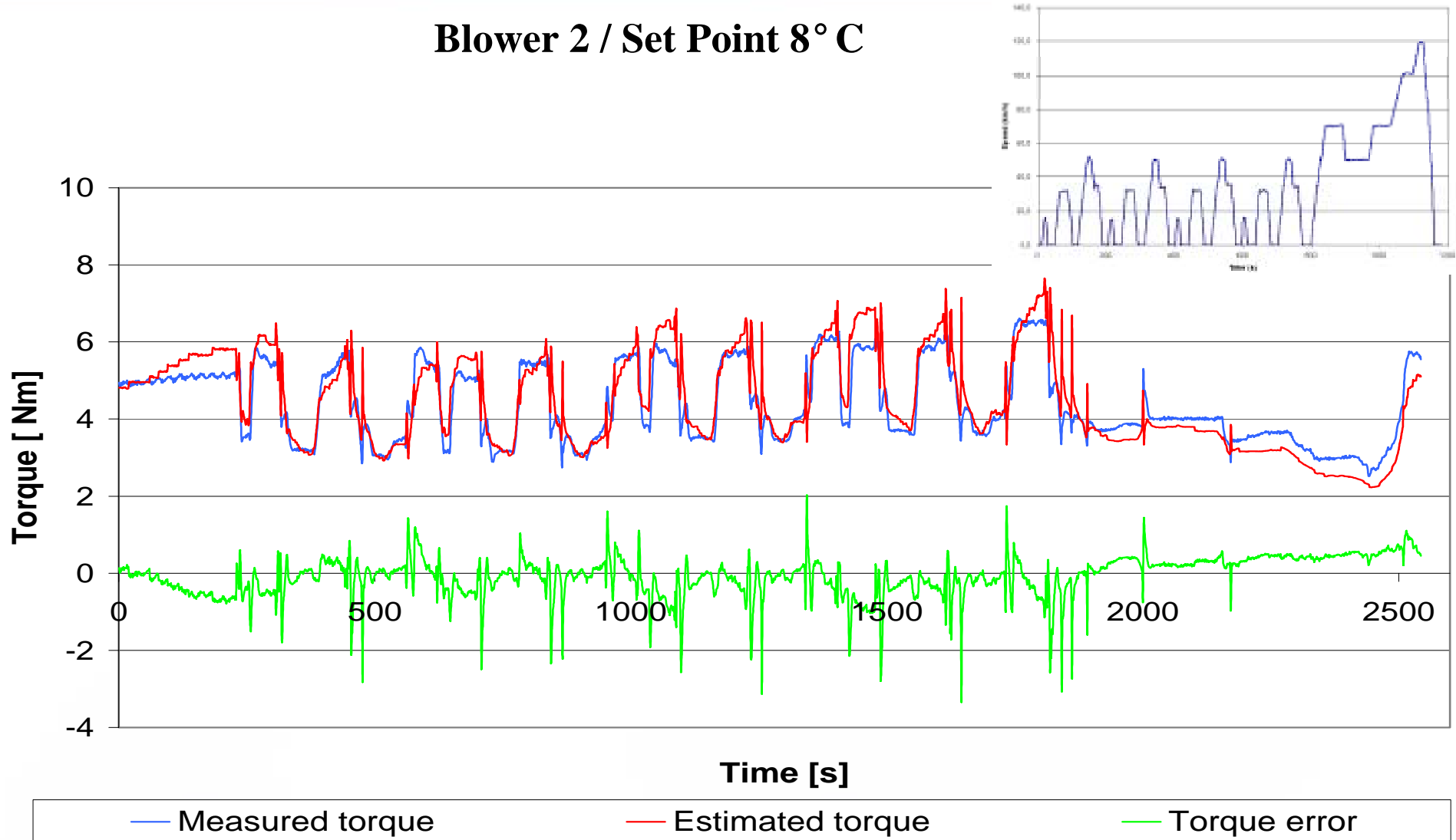
In blue : results presented in this communication

Validation on R134a TxV A/C System

VW Golf TDI



Blower 2 / Set Point 8°C



Validation Test

Typical 2 weeks Ride and Drive



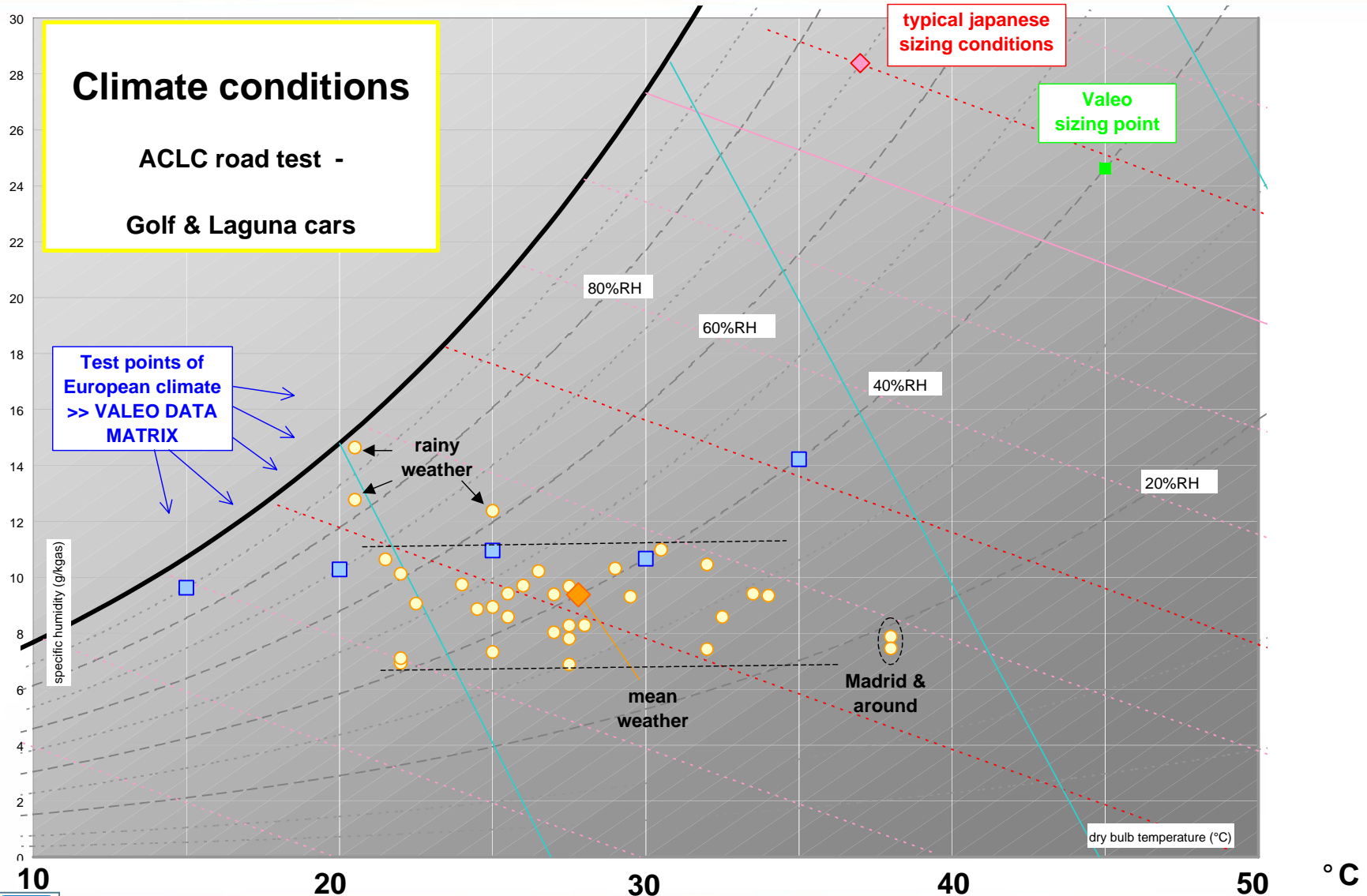
Typical Drive conditions :

- total distance : 4000 km
- daily total distance : 100 to 500 km
- daily average speed : 30 to 120 km/h
(except test in Idle conditions)

A/C Control panel Settings :

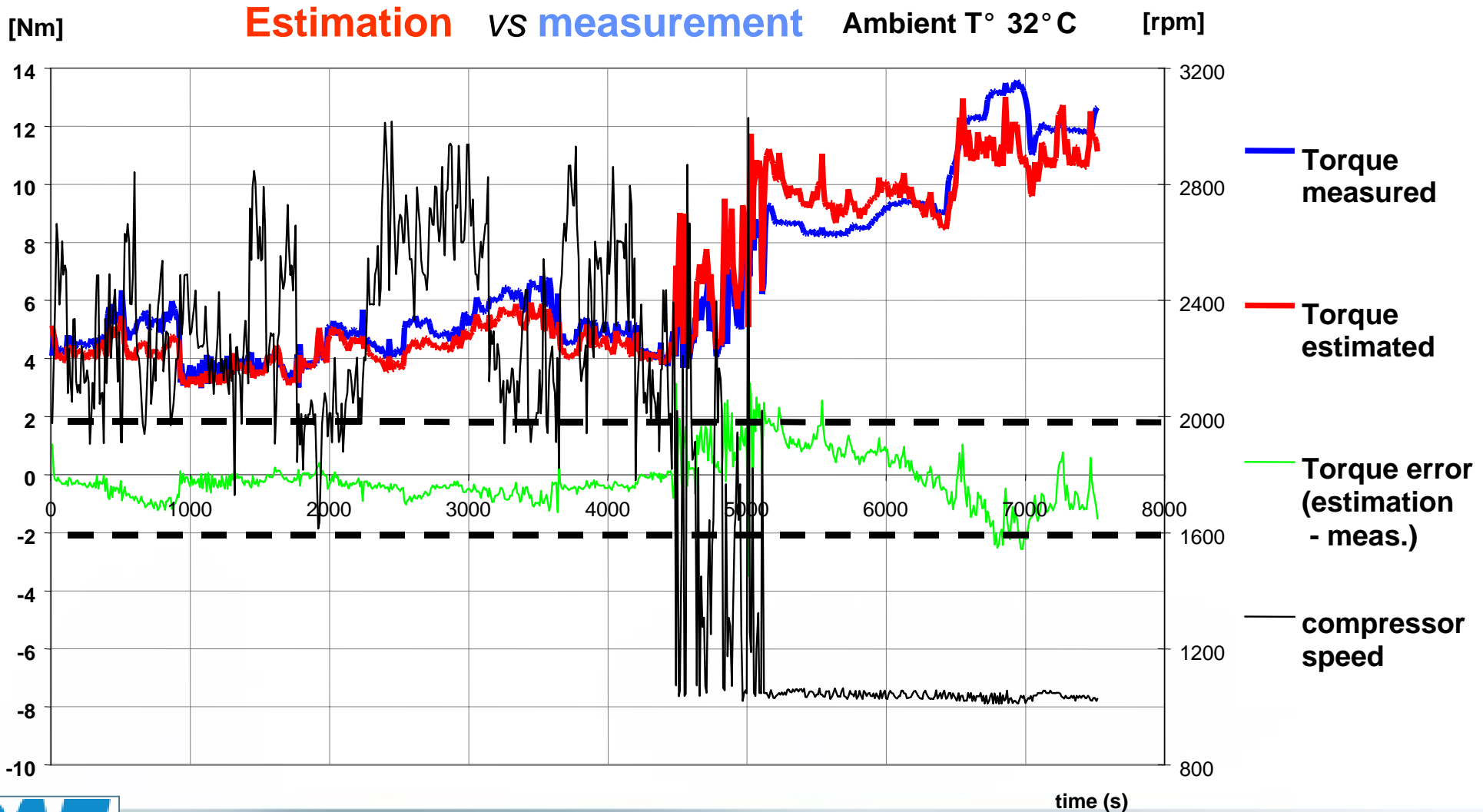
- Blower Speed : Min-Med-Max
- T setting : 2 to 8 C versus the Ambient
- Air inlet flap : OSA-Med-Recy

Validation Test Climate conditions



Validation on R134a TxV A/C System

VW Golf TDI



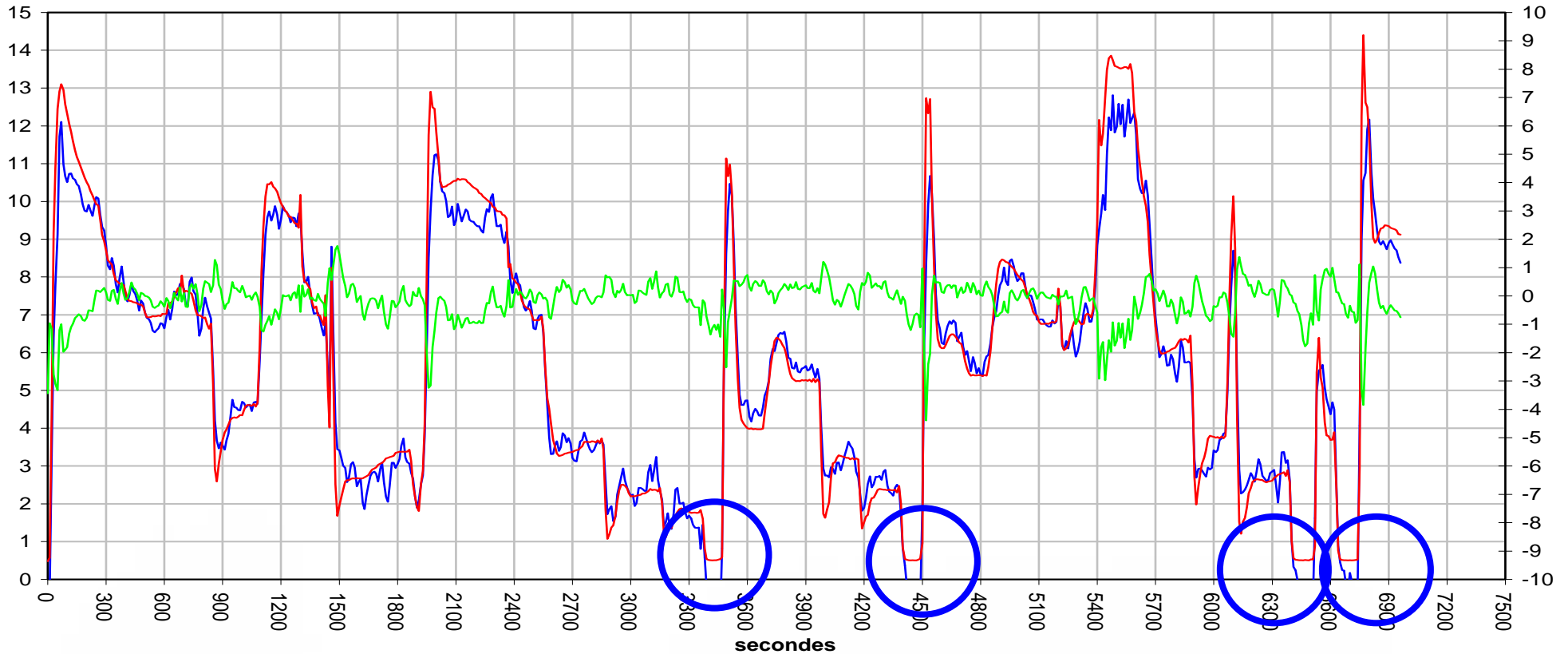
Validation on R134a OT A/C System

Renault Laguna 1,6 liter gasoline



Ambient T° 35° C, driving + AC ON/OFF

[Nm]

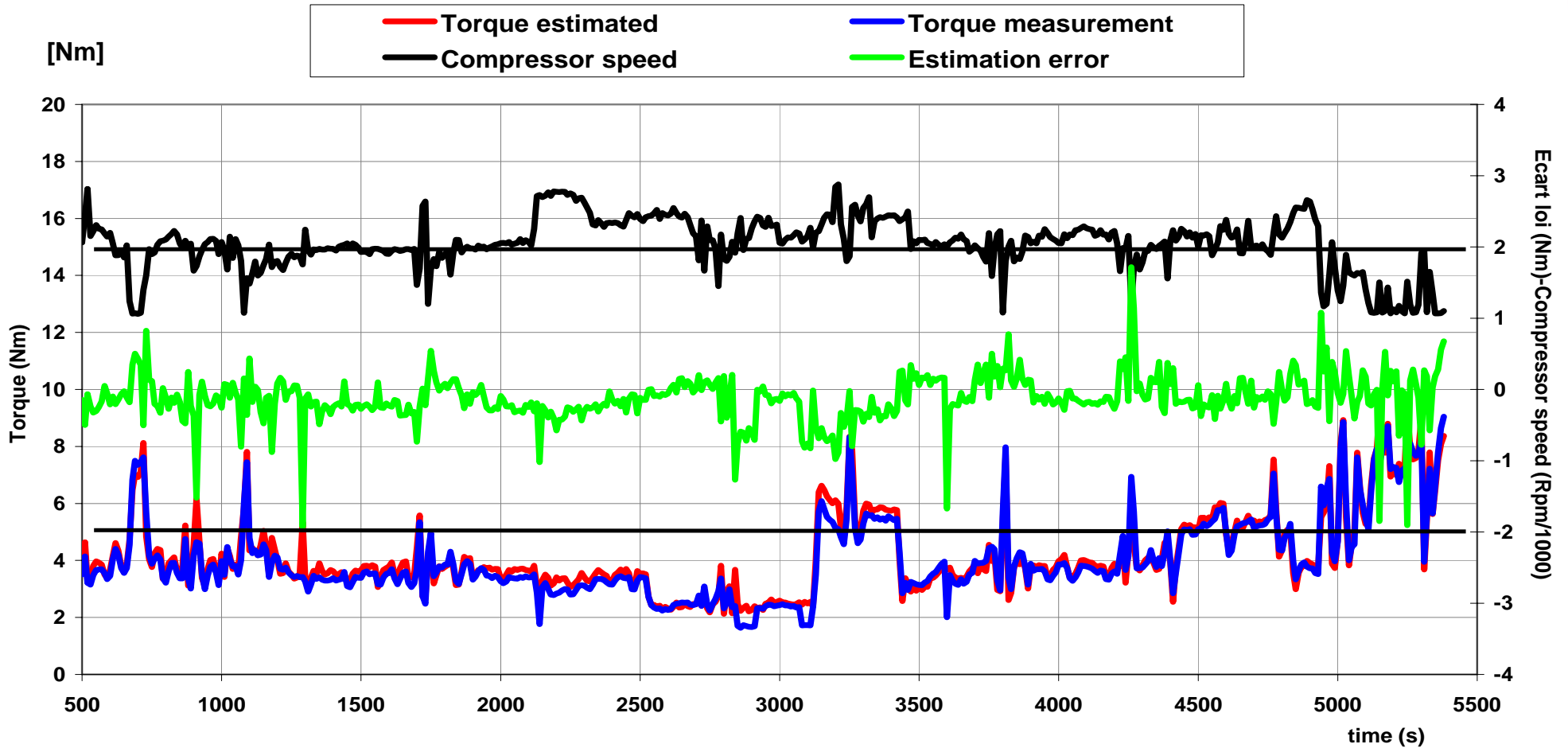


— Torque measured — Torque estimated — Torque error

A/C ON/OFF

Validation on R744 A/C System

VW Golf TDI



Result : Deviation < +/- 2 Nm

Conclusion



Valeo has developed algorithms for AC systems in order to estimate the compressor torque to be communicated to the engine ECU with the objective to reduce the fuel consumption.

**The function is available for the different coolants :
R134a, R744 .**

**Current accuracy for all conditions :
In steady state : Torque deviation $< \pm 2$ Nm
In dynamic driving cycle : Torque deviation $< \pm 4$ Nm**