



compact, smart and reliable drive unit for fully electric vehicles

AMAA 2015

Integration and Test of the COSIVU SiC BJT Based Inverter

S. Nord, J. Ottosson, Volvo Group Trucks Technology, Advanced Technology and Research
F. Hilpert, Fraunhofer IISB



AMAA 2015

19th International Forum on Advanced Microsystems for Automotive Applications
Berlin, 7-8 July 2015





Volvo Group Trucks Technology

Advanced Technology & Research, Stefan Nord

2 2015-07-08



Agenda

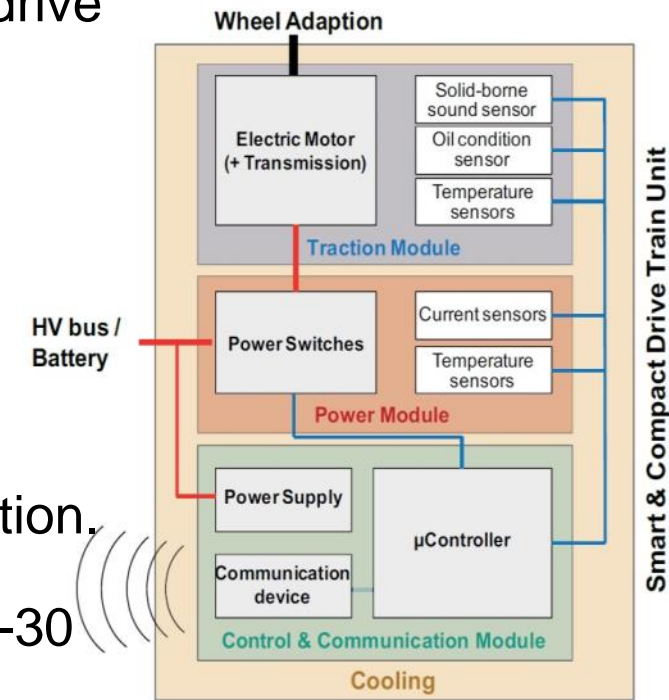
- Introduction
- COSIVU Inverter Integration
- COSIVU Inverter System
- Measurement Setup
- Initial Test Results



Introduction

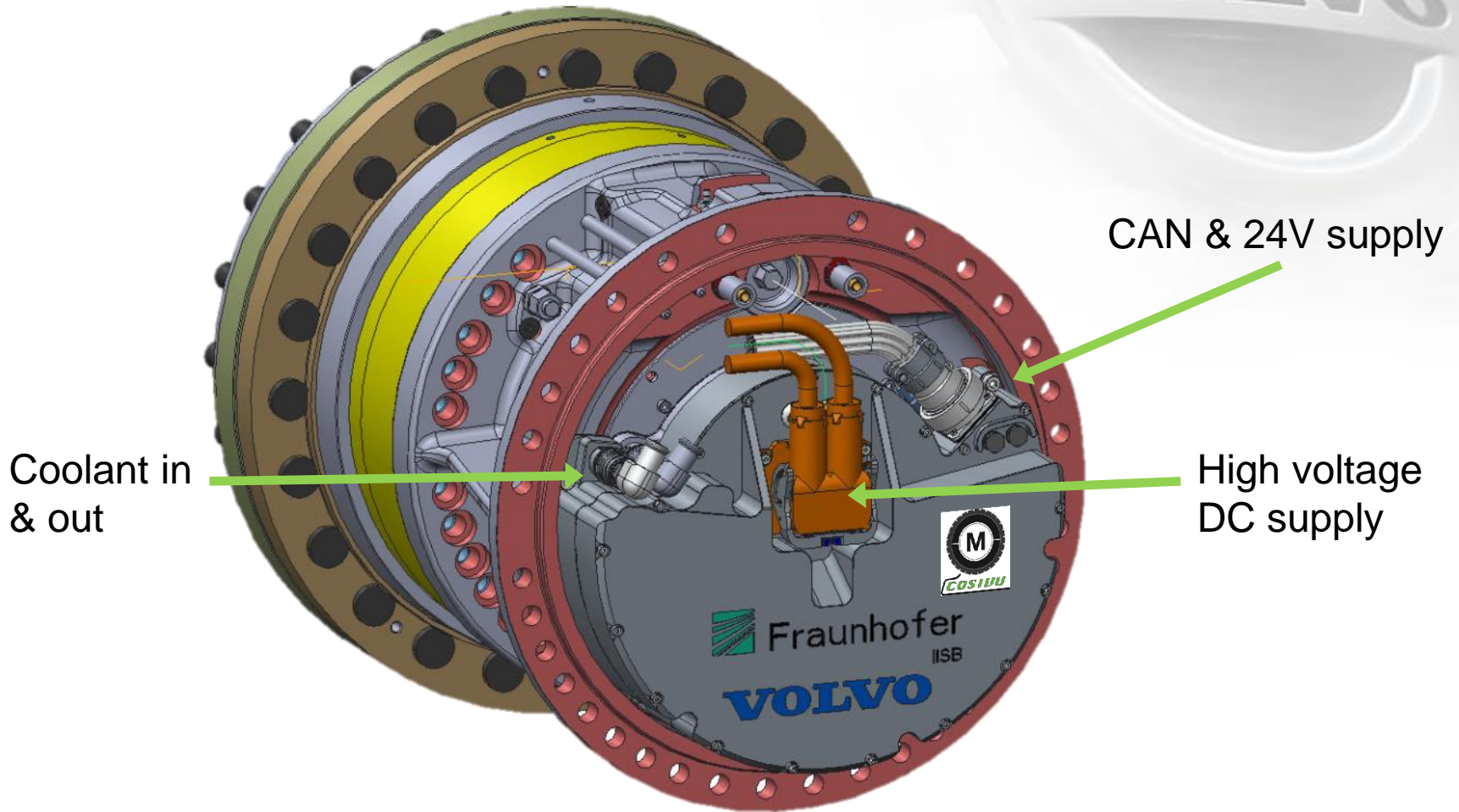
The COSIVU project

- The EU-funded FP7 project COSIVU aims at a new system architecture for drive-trains by development of a smart, compact and durable single-wheel drive unit with:
 - integrated electric motor,
 - compact transmission,
 - full silicon carbide (SiC) power electronics,
 - and an advanced ultra-compact cooling solution.
- Project Started 2012-10-01, and ends 2015-09-30



COSIVU Inverter Integration

External connections



COSIVU Inverter Integration

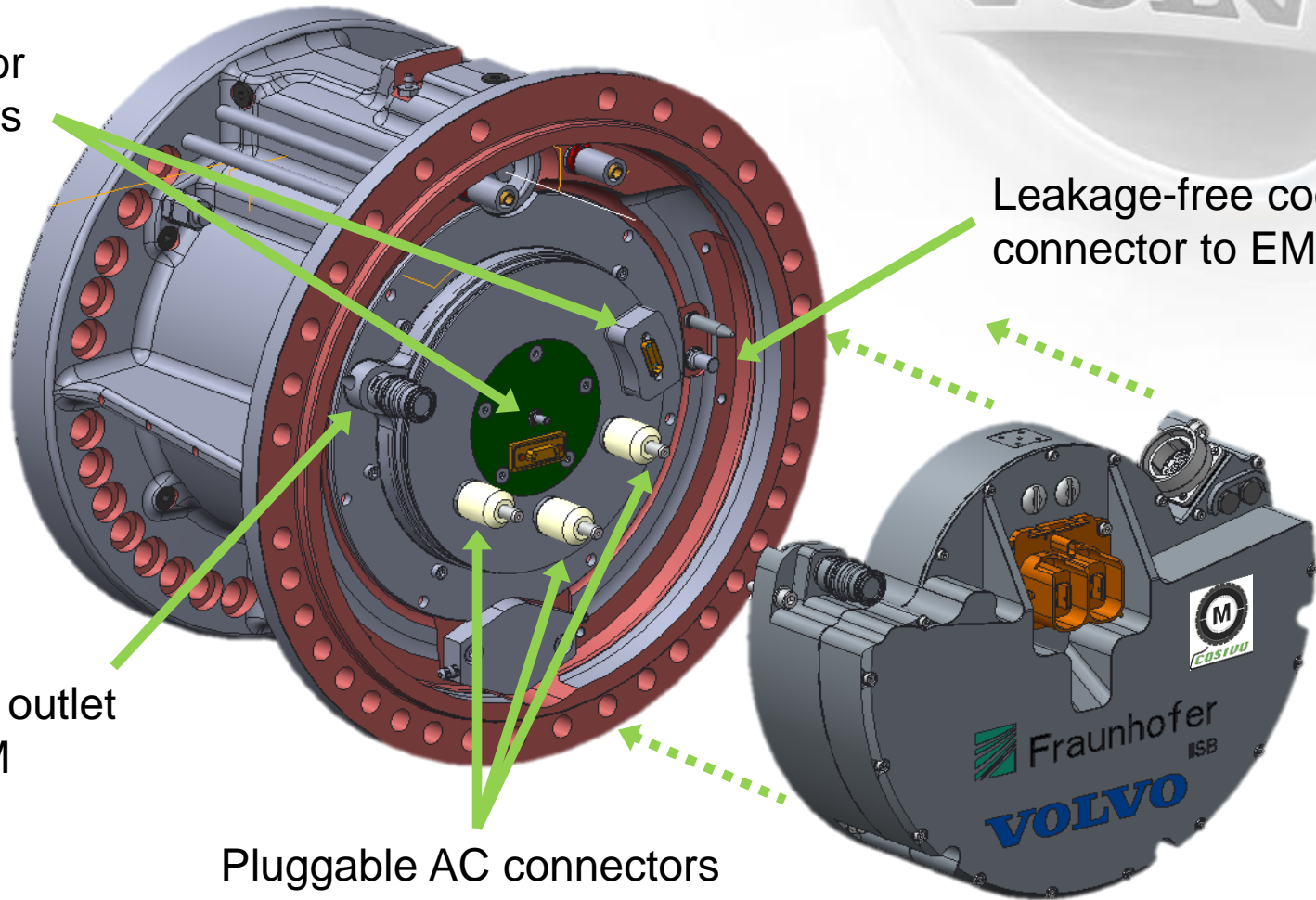
„Plug & Play“

EM Sensor connectors

Leakage-free coolant connector to EM

Coolant outlet from EM

Pluggable AC connectors



COSIVU Inverter System

Modular Inverter Concept

3 modular
„Inverter Building
Blocks“ (IBB) in
serial connection

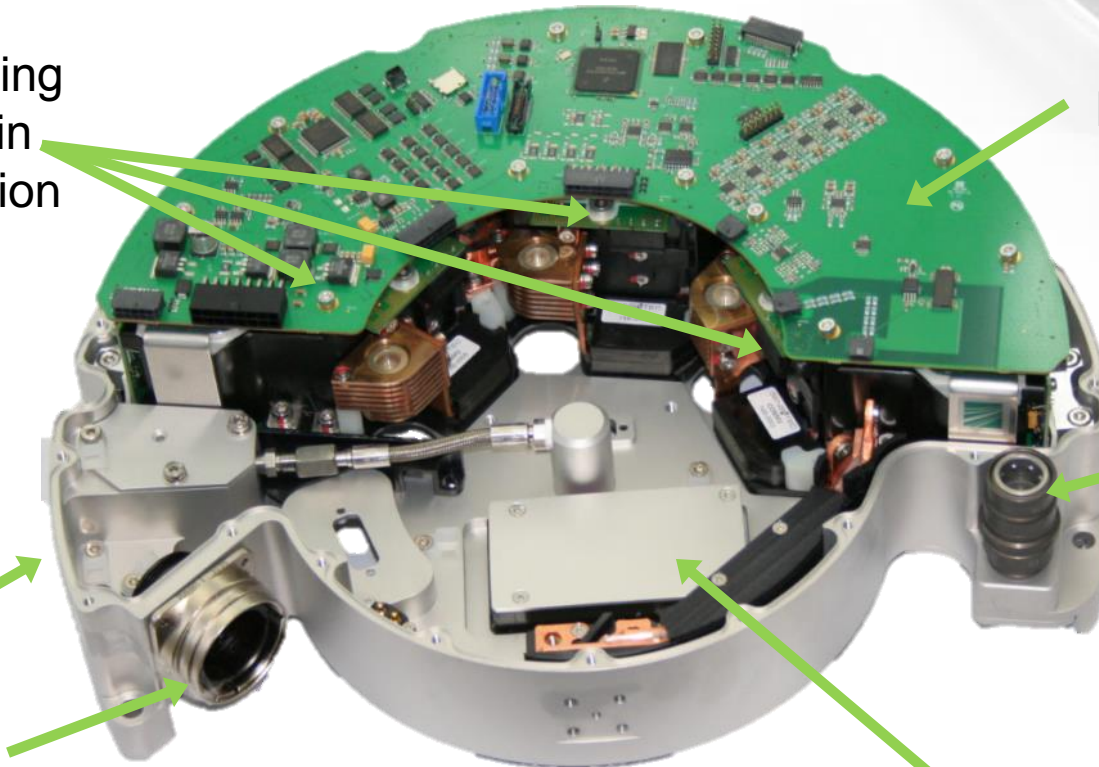
Inverter Controller
Module (ICM)

Coolant inlet

Coolant outlet

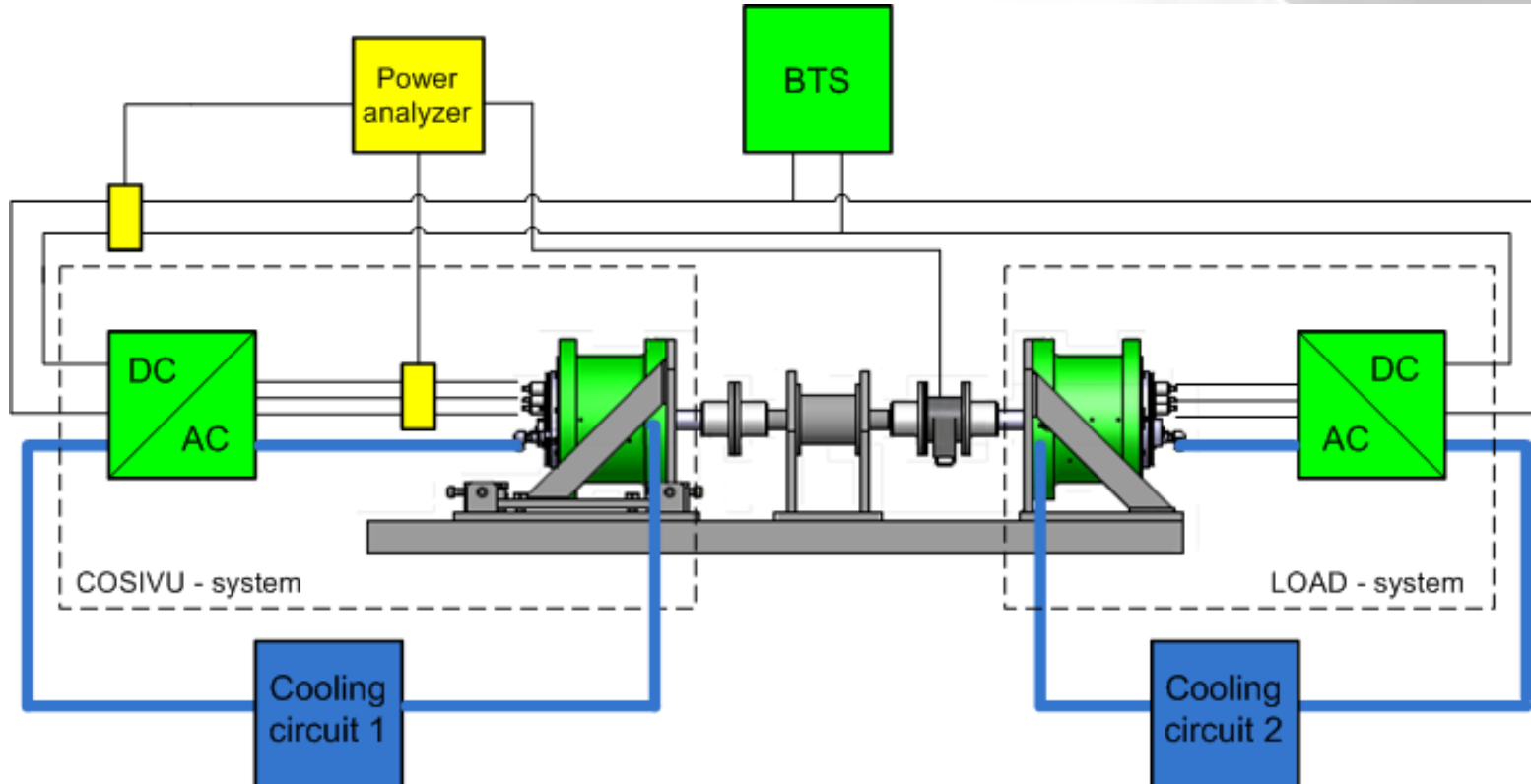
24V supply & CAN
communication

24V stabilizer



Measurement Setup

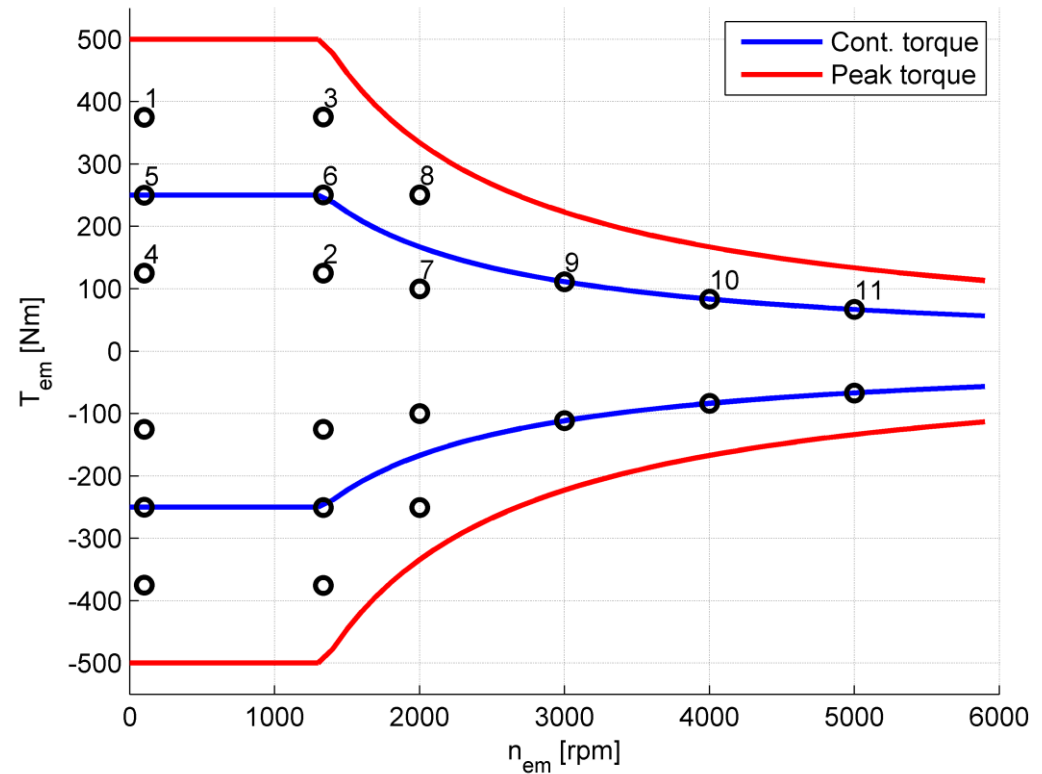
Back-to-back test rig



Measurement Setup

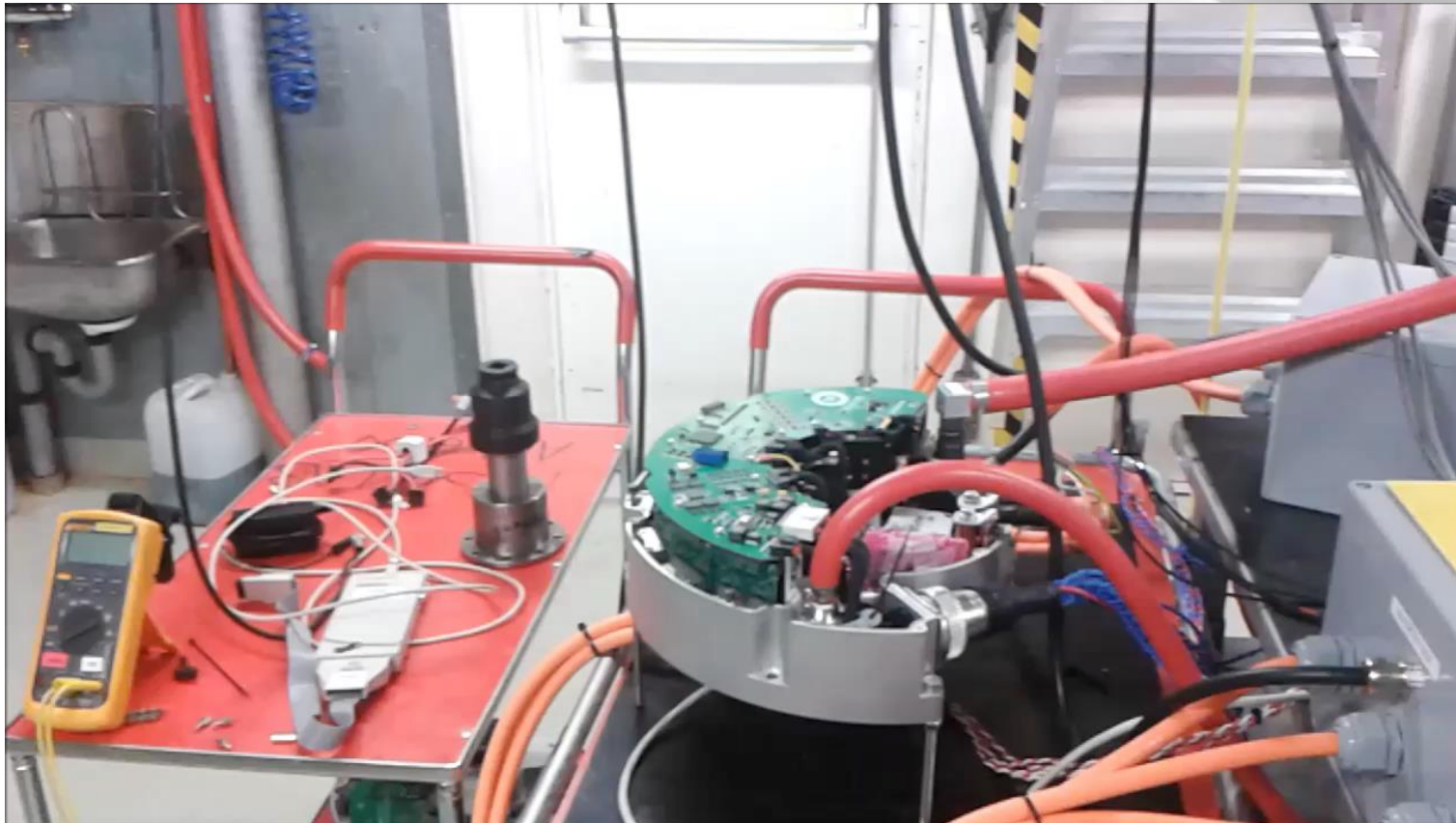
Operating Points

- Initial tests done with in-house developed inverter (IGBT) – used as reference
- 11 different operating points ran as a cycle both as motor and generator
- The same cycle now also done with the COSIVU inverter (SiC-BJT)
- Inverter losses compared

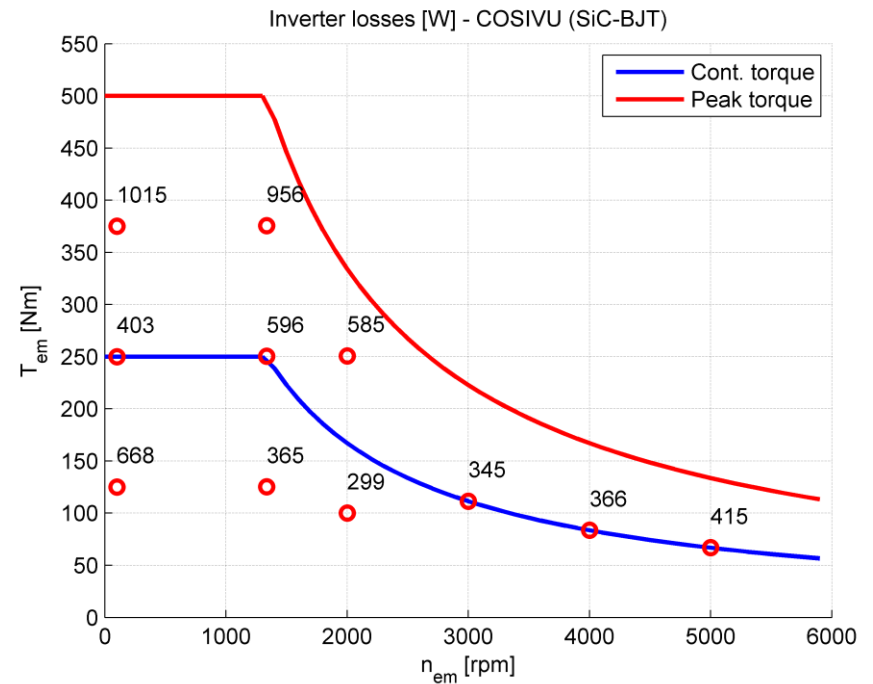
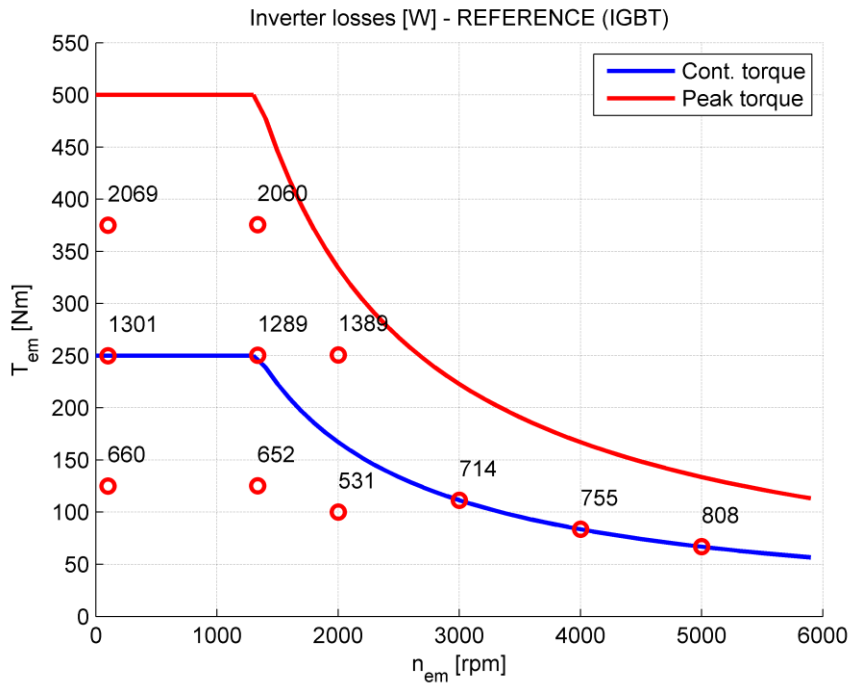


Measurement Setup

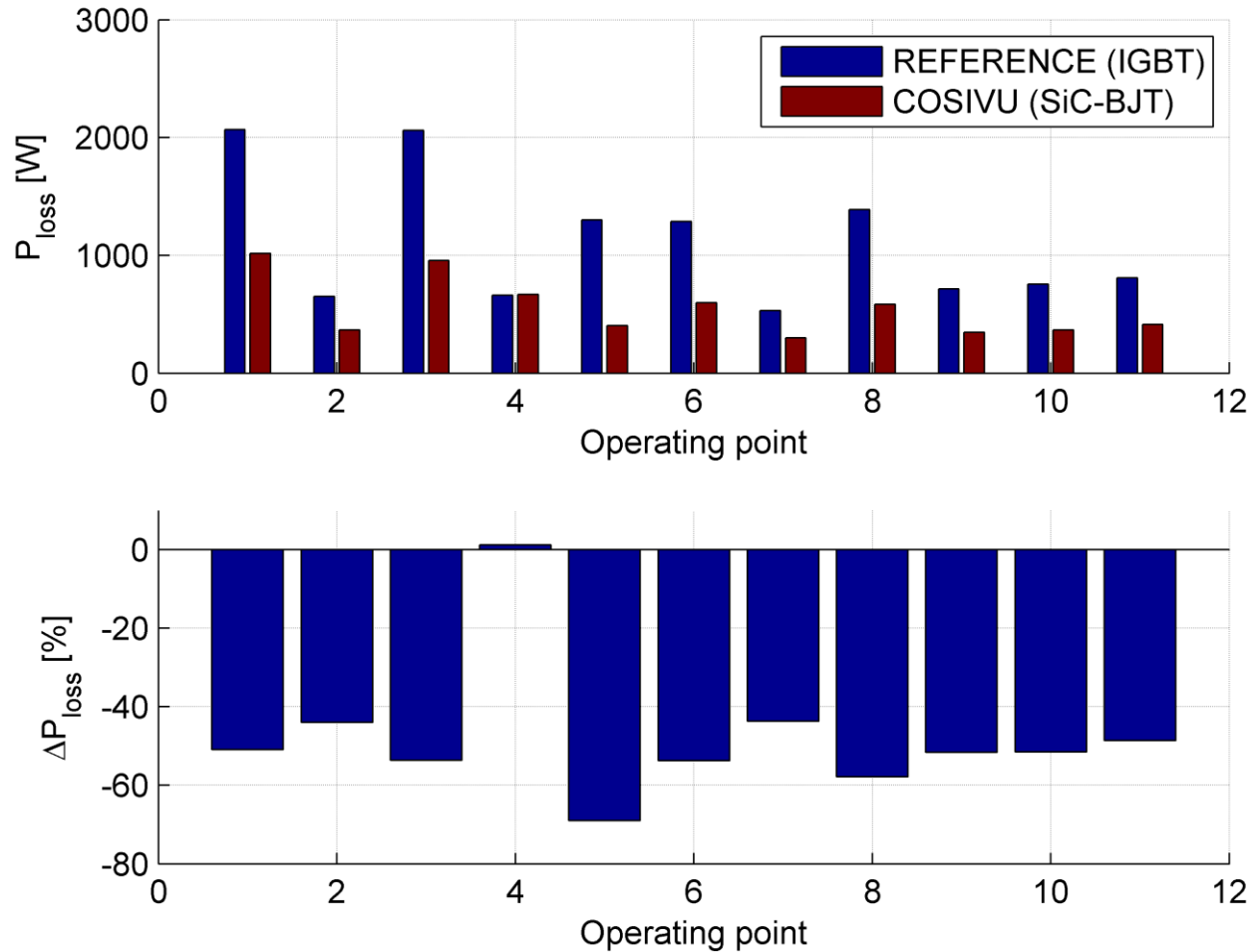
Test Rig



Initial Test Results



Initial Test Results





compact, smart and reliable drive unit for fully electric vehicles

AMAA 2015

Thank you!

VOLVO



Fraunhofer

IISB