TECHNICA ENGINEERING

Creating the Automotive Future

Q4 2019
ABOUT US

WHO WE ARE
Technica Engineering started as a **one-man company** as consultant for electronic development in automotive environments at BMW. The focus of the early years was in the classic test tasks directly at the OEM.

More than **400 employees** currently work at Technica Engineering with branches, distributors and partners in **5 continents** all over the world. We offer the whole Automotive Industry **all-in-one solution designs** with own **Hardware and Software products**, supporting the innovation process from **problem analysis to solution and validation**.
More than 400 employees currently work at Technica Engineering – with an upward trend.

More than 95% of employees hold an academic title.

Technica Engineering is represented with branches, distributors and partners in 5 continents all over the world.
1. **Germany**  
   Headquarters (Munich) and Product Logistics (Garching)

2. **Scandinavia**  
   Partnership with our distributor TechTeal

3. **USA and Canada**  
   Local representation

4. **South Korea**  
   Partnership with our distributor CANSystems

5. **Spain**  
   Electronic Development Center (Barcelona)

6. **Tunisia**  
   Offshore Development Center (Sfax)

7. **China**  
   Partnership with our distributor Sigent

8. **Japan**  
   Partnership with our distributor Gailogic and our engineering partner Toyo

9. **India, Australia and South East Asia**  
   Partnership with our distributor Menlopark
ALL IN ONE

WHAT WE DO
THE TRANSITION IN AUTOMOTIVE GLOBAL NEED AND MARKET

Problems of the Automotive Industry

Time to Market
Without reuse, the deployment time will not be met

Complexity
Increasing complexity creates a competence problem at the OEMs

Costs
The cost of controlling the complexity will explode

Needs required by these problems

New development models needed
New integration models needed
New value added Chain needed
New strategies of testing needed
COMPANY SERVICES

ALL-IN-ONE SOLUTION DESIGN

System Engineering
- Ethernet Networks
- ADAS
- Body Electronics
- Specifications for communication systems
- GW Specifications + Test Concepts
- Protocols: AVB, NM, SOME IP, TSN

Testing Services
- Test Management
- Test Specification
- Test Implementation
- Test Execution
- Test Reporting
- ISTQB Enabled / extern

Product & Test Solution
- Ethernet Media Converters
- Ethernet Media Gateways
- Ethernet Capture Modules
- ANDi Tool – RBS
- Ethernet Test Suite
- ADELA

Research & Development
- Rapid Prototyping
- Test Racks and Test Systems
- HW & Firmware development
- Design for Build to Print
- A-Samples ECU Engineering
- Automotive Sound Design

Experience from different sectors boosts customer benefit and quality, leading to a faster response to customer requests
TESTING LEVELS AND CHALLENGES
AUTOMOTIVE TEST LEVELS

• Process
  • Testing is closely interrelated to development
  • Most common development process in automotive: V-Model
  • Functional Safety: ISO 26262

• General testing levels
  • (Notice: after compliance tests passed!)
  • Software Component Test – SiL, MiL
  • Component Test – HiL
  • System Integration Tests
  • Full Vehicle Test
AUTOMOTIVE TEST LEVELS

• Test scope
  • Basic functions
    • start-up, partial networking, shut-down
  • Diagnostics
  • re-programming
  • Component-specific functions (including interaction with network components)
  • Functional Safety components (ISO 26262)

• Important: execution on every test level!
  • Software Component Test – SiL, MiL
  • Component Test – HiL
  • System Integration Tests
  • Full Vehicle Test
KEY DRIVER OF CHANGE
AUTOMOTIVE ETHERNET

- Market adoption
  - OPEN Alliance (est. 2011) standardization via IEEE

TRACTION IS ALSO SEEN IN THE INDUSTRY AS SUCH AS OTHER CAR MANUFACTURERS ARE FOLLOWING SUIT.

- Advantages
  - State-of-the-art Software Architecture
  - Maintainability
  - Scalability
  - Flexibility
  - Upgradeability

- Legacy issue
  - Need of new-generation Gateways
  - Need for “service-based” communication design
AUTOMOTIVE ETHERNET NETWORK TESTING

CHALLENGES

• Changes in Automotive Network Architecture: Mindset change!!
  • OEMs have developed E/E architectures based mostly on CAN and LIN technologies, some have also used FlexRay, MOST, LVDS and similar technologies

• Challenge
  • Toolchain, architecture design, mindset are still “signal-based”
  • Physical Layer and protocol considerations are mandatory (switch!)

• Situation
  • IT-based know-how necessary to meet the challenge: how does Ethernet work? Client-Server communication... (not typical for automotive)
  • Most OEM started slowly to realize and react
  • Management generally underestimates the necessity and importance of “training” and “learning”
AUTOMOTIVE ETHERNET NETWORK TESTING

CHALLENGES

- CAN, LIN, FlexRay vs. Automotive Ethernet:
  - Physical Layer (Bus vs. Switched-Network)
  - Protocols
  - Functional Testing

VS.

02.12.2019
PRODUCT PORTFOLIO

OUR SOLUTIONS
OUR PORTFOLIO

HARDWARE PRODUCTS

CONVERTERS
- 100BASE-T1 MEDIA CONVERTER _BCM
- 100BASE-T1 MEDIA CONVERTER _NXP
- 1000BASE-T MEDIA CONVERTER
- USB-100BASE-T1 CONVERTER
- 100BASE-T1 MEDIA CONVERTER _EMC SET
- 1000BASE-T1 EMC Converter
- 100BASE-T1 SFP MODULE
- 1000BASE-T1 SFP MODULE

SWITCH BASED
- MEDIA GATEWAY
- UNIVERSAL EMC DEVICE

TAPS
- 100BASE-T1 SPY-12 PORT
- 1000BASE-T1 SPY MINI

IVN 2 ETHERNET
- CAPTURE MODULES:
  - CM 1000 HIGH
  - CM 100 HIGH
  - CM ETH COMBO
  - CM CAN COMBO
  - CM LIN COMBO
- *Will be substituted by Capture Modules

INTEROPERABILITY
- GOLDEN DEVICE 100BASE-T1
Capture Modules

Demo Example

1. Car-traffic generation via
   • PC (ANDi Tool)
   • MediaGateway
   • 1000BASE-T1 SFP Module
   • 1000BASE-T1 Converter
   • BTS Evo (CAN, CAN-FD, LIN, FlexRay, Analogue)
   • FCCP (FlexRay, LIN)

2. Traffic capture via
   • CM LIN Combo
   • CM CAN Combo
   • CM Eth Combo
OUR SOLUTIONS

GOLDEN DEVICE

• Reference circuit for standardization of 100BASE-T1
  • Based on the original circuit used by the OPEN Alliance (TE product)

• Guided Gui (Wizard) for test execution
  • ANDi Tool – based ANDi GD Add-on (can run on Rohde & Schwarz RTO)
  • Step-by-step guidance on the use of external circuits for different test cases
  • Automatic Report generation

• Integrated circuits for IOP test execution
  • Execution of OPEN TC8 IOP v1 tests without need of additional external components
  • Possible execution of current OPEN TC8 IOP v1 tests with components, synchronized with ANDi

• Execute the OPEN Alliance IOP tests
  • Link-up time, Signal Quality, Cable Diagnostics
OUR PORTFOLIO

SOFTWARE PRODUCTS

**ANDi**
**AUTOMOTIVE NETWORK DIAGNOSER**

The simple test and simulation environment for Ethernet controllers and bus systems. ANDi is a test and simulation environment for Ethernet electronic control units (BASE-T1) and also for the CAN/CAN-FD, LIN and FlexRay bus systems. The first-ever evaluation tool for SOME/IP-SD.

**ADELa**
**AUTOMOTIVE DATABASE EDITION AND LAYOUT**

The user-friendly automotive database tool that works perfectly with ANDi. ADELa is an automotive database edition tool that provides visualization and validation features of Fibex and ARXML automotive databases, primarily for Automotive Ethernet but also for CAN.

**OBSERVER**
**AUTOMOTIVE ETHERNET TRAFFIC ANALYZER**

Observer is an ANDi add-on feature that analyzes Ethernet traffic automatically by using different testing modules simultaneously. It is especially useful when having large and complex traffic captures.

**ETHERNET TEST SUITE**
**AUTOMOTIVE ETHERNET TESTING TOOL**

Ethernet Test Suite is a testing tool that includes all the specific Ethernet Tests: Basic TCP/IP, SOME-IP, Enhanced Testability Service (ETS), Service Discovery (SD), Stress tests, etc.

**EVA**
**AUTOMOTIVE ETHERNET VIDEO ANALYZER**

The Ethernet Video Analyzer is an application for displaying, recording and checking of Ethernet video-data of 100BASE-T1 cameras.
Is OPEN Alliance TC8 “enough”? → No!

- TC8 is only entry-level testing
- TC8 covers basic conformance (via Test House: certificate)
- Much deeper testing must follow at OEM / Tier 1 development cycle:
  - Component communication test (e.g. Ethernet Test Suite)
  - Application level test (e.g. HiL level)
  - System integration test
  - Application level test in the system

→ Technica assists BMW on SOME/IP component test solution since the invention of SOME/IP
→ All BMW Tier 1 providers of Automotive Ethernet ECUs are customers
→ Technica proposes migrating our solution to other OEMs (requires prior evaluation of their test specification!)

70% application and integration test (both component and system level)
→ Tier 1 + OEM with different HiL and other test benches; in some cases Tier 2, like Technica Engineering

20% component communication test
→ e.g. Ethernet Test Suite (Technica)

10% TC1/TC8 compliance
→ Test House (certificate)
→ Prior to that, pre-test in-house at OEM and Tier 1 with joint solution from Technica (IOP), R&S (PMA), Spirent (protocols) is available
What does the Ethernet Test Suite need for execution?

- Windows PC running the latest ANDi tool version and a valid Ethernet Test Suite license
- Corresponding OEM database with ECU descriptions, services, etc. (Fibex or ARXML)
- External hardware setup with customer-specific interfaces (Technica hardware products can be used if needed)
- OEM version of Ethernet Test Suite
OUR SOLUTIONS
INFORMATION AND TRAINING

• The original book by our CTO, Thomas Königsdemer (formerly BMW)
(Third edition expected Q2 – 2020)
OUR SOLUTIONS

HW PRODUCTS: LOOK INTO THE FUTURE

- 1000BASE-T1 next-gen test device
- ECU/GW prototyping platform
- 10BASE-T1S testing solutions
- MultiGig testing solutions

Stay tuned!
(and ask Technica Engineering)
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