Agenda

➢ CATL BMS business and testing overview
➢ Virtual testing environment
➢ Multiple project variants management
➢ Controlling ETAS device with CANoe+vTESTstudio
### CATL BMS Business

<table>
<thead>
<tr>
<th></th>
<th>Passenger Car</th>
<th>Commercial Vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMS</strong></td>
<td><img src="image1" alt="BMS Passenger Car" /></td>
<td><img src="image2" alt="BMS Commercial Vehicle" /></td>
</tr>
<tr>
<td><strong>Customer</strong></td>
<td><img src="image3" alt="Customer Logos" /></td>
<td><img src="image4" alt="Customer Logos" /></td>
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</tbody>
</table>
| **On-Road Quantity** | 200K sets by the end of 2018 (Safe use over 5 billion KM)  
700K sets by the end of 2019  
1300K sets by the end of 2020 | 150K sets by the end of 2018 (Safe use over 6 billion KM)  
250K sets by the end of 2019  
400K sets by the end of 2020 |
BMS Validation process and toolchain

- Pack requirements
- BMS System requirements
- System architecture
- SW/HW requirements
- Software architecture
- Implementation
- Unit Test
- Software integration test
- Hardware test
- Validation
- Verification
- System test
- System integration test
- Software test
- SYS Test: System Requirement Verification
- SYS int. Test: System Architecture Verification
- SW/HW Test: SW/HW Requirement Verification
- SW int. Test: Software Architecture Verification
- SW Unit Test: Software Unit Design Verification
- Validated Product
- Acceptance test
- Pack/Vehicle Test: Pack Requirement Validation
- SYS Test: System Requirement Verification
- SYS int. Test: System Architecture Verification
- SW/HW Test: SW/HW Requirement Verification
- SW int. Test: Software Architecture Verification
- SW Unit Test: Software Unit Design Verification
- Validated Product
BMS Testing challenges

➢ Multiple subprojects fast iterative test and delivery

➢ Multiple subprojects lifecycle management, especially requirements and test case
Virtual testing environment

Testing architecture based on CANoe+vTESTstudio

- Easy switch between both setups for SW test and System test
- Reuse the test case suit across the phases
Virtual testing environment

- Software and system test based on early stage
- Debug system testcase before transferring to system test

\[\text{BMS System requirements} \rightarrow \text{System architecture} \rightarrow \text{SW/HW requirements} \rightarrow \text{Software architecture} \rightarrow \text{Implementation} \rightarrow \text{Verification} \rightarrow \text{Software test} \rightarrow \text{Hardware test} \rightarrow \text{System integration test} \rightarrow \text{System test} \rightarrow \text{Verification} \rightarrow \text{Test case script} \rightarrow \text{Test Base on VTT/ETAS with vTESTstudio} \rightarrow \text{A Sample or pre A Sample} \rightarrow \text{B Sample or after B Sample}\]
Virtual testing environment

Test scope based on VTT

- Logical function
- Software strategy

System test scope (Target Board)

- System function base hardware
- Real fault injection
- Sampling
- Time running
- Stress and Robustness

VTT Test Scope
Target Board
Test Scope
Virtual testing environment

Abstract test interface variable and HW emulation

➢ Share the same test interface variable between SW test and system test
➢ Emulate the HW function and peripheral electrical architecture
Multiple project variants management

CANoe and vTESTstudio support management of multiple project

- CANoe and vTESTstudio share the same configuration parameters from variation
- vTESTstudio supports variation choice by variant dependencies

Test Script Management

Subproject

Variation A

C

B

Cfg_Parameter

Variation A

Variation B

Variation C

Test Result
Multiple project variants management

vTESTstudio and ALM support the project management

➢ Test Script directly generates test cases and then be submitted to ALM to trace related requirements

➢ Automatically submitted to ALM and generated test section by test result
Multiple project variants management

vTESTstudio and ALM support the project management
➢ Subproject test case can be branched from platform test library by variant parameter
➢ Support same configuration of test environment, requirement and test case
Controlling ETAS device with CANoe+vTESTstudio

Original situation
➢ Tool chain confusion
➢ Test case management confusion
Controlling ETAS device with CANoe+vTESTstudio

CANoe+vTESTstudio solution for unifying tool chain

➢ One-click generation test interface variable
感谢聆听

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