AutomationDesk – Key Features for successful ECU Testing

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Content

- Introduction to ECU Testing & Hardware-in-the-Loop Simulation
- Application Examples & Benefits of Test Automation
- Key Features to maximize Benefit
How to test ECU without plant?

- e.g. to test ECU before finishing development of plant prototype
- e.g. to protect plant against damage in case of ECU failures
- e.g. to avoid abrasion and consumption of resources (fuel)
Introduction to Hardware-in-the-Loop Simulation

How to test ECU without plant?
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Hardware-in-the-Loop (HIL) Simulation!
(Simulation of plant model in real-time)
Testautomation with AutomationDesk

- Describing test maneuvers to test ECU
- Test maneuvers accessing HIL Simulator
- Driving test maneuvers automatically
- Automatic evaluation and reporting of test results
First Virtual Vehicle in Japan!

Integration HIL
- 5 Full-Size-Racks
- > 20 ECUs
- Body electronics & Power train
- Short start-up period

“AutomationDesk is easy to use on base of Libraries.”
Ford Cologne

HIL for Body Electronics, Power Train & Vehicle Dynamics
- > 50 ECUs
- > 10 000 test cases
- about 1800 CAN signals

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**Ford Cologne**

“Even detection of sporadic errors due to increase of number of test runs.”

“Reduction of complete E/E system and function testing time from 12 weeks to 1 week.”

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"Reduction of complete E/E system and function testing time from 12 weeks to 1 week."
Automated testing of steering systems

- ECU diagnostics with dSPACE CalDesk
- Coupling of AutomationDesk and Telelogic DOORS (requirements management system)

"Coupling AutomationDesk and DOORS via dSPACE's Connect&Sync Module has greatly simplified ECU testing at ZF LS."

"Visibility of constantly up-to-date test result at management level leads to high 'error remedying morale' of developers."

Telelogic Technology Partner Agreement between dSPACE and Telelogic
How to achieve these benefits?

...by efficient development & execution of Tests!

➔ Key Features for successful ECU Testing
Graphical Test Development with AutomationDesk

- Graphical blocks for implementation of control flow, error handling, variant handling, ...
- Prevention of syntax errors (supervision by graphical editor)
- Python scripting for algorithms, e.g. complex algorithms, API calls, ...
- Combination & Integration of graphics & scripts.
  Experience: 40-60% graphically, 40-60% scripting
Tool Interfaces in AutomationDesk

**HIL-Simulator**
- dSPACE real-time platforms, ControlDesk, electrical fault simulation units, 3rd party HILs

**Diagnostic tool support**
- CalDesk, DTS6, DTS7, EDIABAS, VAG-Tester, DiagRA, CAESAR\(^1\)
- CalDesk, DTS6, DTS7, samtec\(^1\)

**Measurement and Calibration tool support**
- CalDesk, INCA, CANape, CANoe\(^2\), CANalyzer\(^2\)

**Calculation and Evaluation**
- MATLAB

**Customer specific Extension**
- 3rd party hardware or software

\(^1\) on demand  \(^2\) in customer projects
Results & Reports

- Automatic report generation in HTML and PDF
- Reports can contain
  - Text
  - Tables
  - Images
  - Plots
  - Hyperlinks

Test Steps and Evaluation
- 16:31:26 SetIgnitionKey (Position: Off)
- 16:31:26 GetIgnitionKey
  - CurrentPosition: Off
- 16:31:26 CheckIgnitionKey (ExpectedPosition: Off)
  - CurrentPosition: Off
  --> Result: OK
Multi User Support

- Multiple Custom Libraries can be used at a time
- Re-use of Custom Libraries through Import and Export
- **Version Management Interface** for Custom Libraries

**Version Management Tool**

- Check-In
- Check-Out
- Get
- Check-In

![Library Browser](image)
Bookmarks

- Fast navigation by double clicking
- List of all available bookmarks
Offline Test Execution

- Execution of test sequences to “test the test”
- Execution possible without “real HIL“
- Access to real-time model, failure insertion units, MATLAB, remote calibration, and ECU diagnostics are “redirected“
- Instead, blocks return a “dummy“ value
  - Test development „offline“ at the developer’s desk
  - HIL-Simulator can be used full-time for automated testing
AutomationDesk – Key Features for successful ECU Testing

- Process integration capabilities, Openness, Flexibility
- HIL Test-Automation-Tool with most installations worldwide
- Worldwide customer and user base
- Worldwide sales, professional training
- Competent services and support in Test-Automation, HIL simulation, and diagnostics from one source – dSPACE
- Continuous enhancements and new versions
Test Automation 2.0

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