# ETAS VECU-BUILDER V1.7

Release Notes

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## Definitions and Abbreviations

**API**

Application Programming Interface

**ASIL**

Automotive Safety Integrity Level

**CAN**

Controller Area Network

**CDD**

Complex Device Driver

**CPU**

Central Processing Unit

**DLL**

Dynamic Link Library

**ECU**

Electronic Control Unit

**EEPROM**

Electrically Erasable Programmable Read-Only Memory

**EHI**

ETAS Helpdesk International

**FMI**

Functional Mock-Up Interface

**FMU**

Functional Mock-Up Unit

**KIR**

Known Issue Report

**MCAL**

Microcontroller Abstraction Layer

**NVRAM**

non-volatile Random-Access Memory

**OS**

Operating System

**OSS**

Open Source Software

**PR**

Problem Report

**SiL**

Software-in-the-Loop

**SuT**

System under Test

**SW**

Software

**V&V**

Verification and Validation

**vCDD**

Virtual CDD

**vECU**

Virtual ECU

**vMCAL**

Virtual MCAL

**WSL**

Windows Subsystem for Linux

**XCP**

Universal Measurement and Calibration Protocol

# Table of Contents

# 1. General Description

VECU-BUILDER is a tool that builds a virtual ECU (vECU) for V&V of automotive ECU software via Software-in-the-Loop (SIL) simulations. The inputs can either be Classic AUTOSAR sources, non-AUTOSAR C/C++ sources, or compiled binaries including symbol information. The tool uses a text file in YAML format for configuring all vECU properties such as inputs, outputs, parameters, tasks, or the XCP slave.

VECU-BUILDER wraps the binaries of the vECU into an FMU. The resulting FMU adheres to the FMI standard for Co-Simulation 2.0 or 3.0. VECU-BUILDER utilizes CMake and the GNU compilers or Microsoft Visual C/C++ compiler for compiling the vECU. It includes its own MinGW installation and supports user provided installations of MingW as well.

The software is delivered with an installer via download as a zip archive. The user documentation in PDF format can be found as part of the archive.

## 1.1. System and Software Prerequisites

The following minimum system prerequisites must be met:

| | |
|---|---|
| Hardware | 2.0 GHz PC, 8 GiB RAM |
| Operating System | Windows® 10 (64bit) or Ubuntu Linux 20.04 LTS |
| Free Disk Space | 5 GiB (not including the size for application data) |

The following system prerequisites are recommended:

| | |
|---|---|
| Hardware | 3.0 GHz PC, 32 GiB RAM |
| Operating System | Windows® 10 (64bit) or Ubuntu Linux 20.04 LTS |
| Free Disk Space | >100,0 GiB |

The following 3rd-party software installations are mandatory:

- CMake 3.15 or higher

The following 3rd-party software installations are recommended:

- Notepad++

The following 3rd-party software installations are optional:

- Microsoft Visual Studio 2015, 2017, 2019, 2022
- Visual Studio Code

## 1.2. Installation

You can start the installation on Windows by executing `VECU-BUILDER_installer_1.7.0.exe`. On Ubuntu Linux you can use one of the package managers to install the package `VECU-BUILDER_installer_1.7.0.deb`.

An installation of the 3rd-party product CMake is required. The installer gives a hint where to download this tool. However, the installer does not enforce the installation. Please ensure that

CMake has been installed, before using ETAS VECU-BUILDER.

We recommend installing the open-source software Notepad++.

## 1.3. Licensing

The use of ETAS VECU-BUILDER is protected by electronic licensing. Valid licenses are necessary to install ETAS VECU-BUILDER and its add-ons. The use of unlicensed ETAS software is prohibited. The required licenses are not included in this delivery. When you purchase ETAS VECU-BUILDER licenses, you receive a separate entitlement certificate which contains an activation ID needed to acquire the license. It is necessary to distinguish the used technology.

### 1.3.1. Machine based licenses

Install your ETAS Software and start ETAS License Manager In Windows Start menu go to: ETAS → ETAS License Manager In the ETAS License Manager, you can acquire your license either online or offline.

For further details see the License manager help chapter "Machine-Based License with FlexNet Embedded".

### 1.3.2. Floating, server-based licenses

You activate the license using the self-service portal on the ETAS website. During the activation process, you create a license file for download that you add to the license server. To generate the license file, you need the server ID. Additional information is available in the license administration guide.

For assistance, please consult the manual available under "help" on the start page of the self-service portal or see the ETAS licensing FAQ.

## 1.4. Restrictions

Here is a list of known limitations of VECU-BUILDER:

- vECU Calibration:
  - The DCM parser supports VALUEs, CURVEs, and MAPs only.
  - Processing A2L and DCM files is unsupported on Ubuntu Linux.
  - The A2L parser supports COMPU_TAB and COMPU_VTAB only. Conversion table COMPU_VTAB_RANGE is not supported.
  - The DCM and the A2L parsers support UTF-8 encoding only.
- XCP Slave / A2L:
  - The XCP slave and the A2L parser support the measurement and calibration use cases only.
  - XCP support is available on Windows only.
  - Only the characteristics of type VALUE, CURVE, and MAP in the A2L file are

patched.

- The XCP slave and the A2L parser support only STATIC DAQ_CONFIG_TYPE. The support of DYNAMIC DAQ_CONFIG_TYPE is experimental.
- XCPplus is not supported.
- The support of 3rd-party MCD tools is experimental.

– ETAS license activation on WSL does not work.
– On Windows the Plugins shall be built using VisualStudio. Using MinGW results in an exception.
– The usage of non-latin characters in path names or file names is unsupported.
– Certain C++ functions may not appear in the symbol details.
– The included version of FMPy suffers from a bug that affects the correct loading of arrays from .csv files (see also section Hints).

## 1.5. Used 3rd Party Software

VECU-BUILDER uses the following 3rd-party software components internally:

– Visu-IT ASAP2 parser NG
– Open-Source Software. See separate OSS Attribution Document.

## 1.6. Release Test Configuration

ETAS VECU-BUILDER has been tested with the following software test setup (other versions will work as well):

– Microsoft Windows Server 2019, Microsoft Windows Sever 2022, Windows 10, Windows 11, and Ubuntu Linux 20.04 LTS
– Compilers: MinGW, Microsoft Visual Studio 2019, GCC 9.4.0
– XCP Connection with ETAS INCA V7.3 and V7.4
– FMU Runner: FMPy 0.3.15

## 1.7. Known Issue Reports

If a product issue develops, ETAS will prepare a Known Issue Report (KIR) and post it on the internet. The report includes information regarding the technical impact and status of the solution. Therefore, you must check the KIR applicable to this ETAS product version and follow the relevant instructions prior to operation of the product.

# 2. Changes

## 2.1. Changes in VECU-BUILDER V1.7

This chapter describes changes with respect to the previous version of VECU-BUILDER.

### 2.1.1. What's New

The following changes have been applied since the previous version:

- Portable version of VECU-BUILDER for Windows without installation
- Extended handling of initial data
- FMI 3.0 Support for Plugins

### 2.1.2. Compatibility to earlier releases

VECU-BUILDER V1.7 is largely compatible with VECU-BUILDER V1.6. For adaptations needed when migrating workspace created with previous versions, please refer to the User Guide. Please contact ETAS Technical Support if you need any assistance when migrating your workspace to the latest version of VECU-BUILDER.

### 2.1.3. Fixed Problems

Since the last release of VECU-BUILDER we have fixed the following problems:

| **Problem Number** | **Title** |
|---|---|
| 742275 | Issue with SymbolDetails.txt |
| 746135 | Unsupported encoding in DCM files |
| 758397 | MergedInitialData.VarVal has missing address for multi dimensional array variable |
| 759164 | Plugin example: access violation in the call to task of getInternalName() |
| 759761 | fmi2DoStep() and Task execution out of phase |

### 2.1.4. Known Issues

The following problems are known issues in this release of VECU-BUILDER.

| **Problem Number** | **Title** |
|---|---|
| 760094 | XCP Server crashing during fmi2Terminate() |
| 761693 | Building FMU archives failed by Error: '<' not supported between instance of 'ModelVariableInfo' and 'ModelVariableInfo' |

| Problem Number | Title |
|---|---|
| 764973 | Creation FMU fails with Ubuntu language packs German |

## 2.2. Changes in VECU-BUILDER V1.6

This chapter describes changes with respect to the previous version of VECU-BUILDER.

### 2.2.1. What's New

The following changes have been applied since the previous version:

- Support of FMI 3.0 for Co-Simulation
- Event-triggered Tasks
- Update of DCM Parser and Handling of Initial Data
- Improved Handling of interplay with ETAS INCA on XCP connections

### 2.2.2. Compatibility to earlier releases

VECU-BUILDER V1.6 is largely compatible with VECU-BUILDER V1.5. For adaptations needed when migrating workspace created with previous versions, please refer to the User Guide. Please contact ETAS Technical Support if you need any assistance when migrating your workspace to the latest version of VECU-BUILDER.

### 2.2.3. Fixed Problems

Since the last release of VECU-BUILDER we have fixed the following problems:

| Problem Number | Title |
|---|---|
| 746774 | HEX File not created when DCM file contains 1.7976931348623158e308 as a value |
| 748253 | VECU-BUILDER sets Integer variable's variability to "continuous" |
| 747548, 751914, 751326, 743682 | The example FMU cannot disconnect or restart |
| 750886 | Float32 arrays are not included in MergedInitialData.VarVal |
| 756238 | 3a_CheckFMU.bat failed to instantiate FMU if build_tool is Microsoft Visual Studio |
| 756261 | Changing build_tool in yaml file gives error |
| 748197 | Compilation error with unclear error message references:'NoneType' object is not iterable |
| 753446 | Error encountered during FMU generation phase |

### 2.2.4. Known Issues

The following problems are known issues in this release of VECU-BUILDER.

| Problem Number | Title |
|---|---|
| 742275 | Issue with SymbolDetails.txt |
| 746135 | Unsupported encoding in DCM files |

## 2.3. Changes in VECU-BUILDER V1.5

This chapter describes changes with respect to the previous version of VECU-BUILDER.

### 2.3.1. What's New

The following changes have been applied since the previous version:

- Support of DCM files and A2L COMPU_METHODs for initial data
- Improved MCD use case through the generation of .hex-file
- Support of Bitfields
- Replacement of fmuChecker by FMPy
- Additional Compile Flags for C and C++

### 2.3.2. Compatibility to earlier releases

VECU-BUILDER V1.5 is largely compatible with VECU-BUILDER V1.4. For adaptations needed when migrating workspace created with previous versions, please refer to the User Guide. Please contact ETAS Technical Support if you need any assistance when migrating your workspace to the latest version of VECU-BUILDER.

### 2.3.3. Fixed Problems

Since the last release of VECU-BUILDER we have fixed the following problems:

| Problem Number | Title |
|---|---|
| 717061 | DCM values differ after 7th decimal digit |
| 719549 | DCM data lost after 6 decimal places. |
| 739677 | Union Type variables have wrong data and address |

### 2.3.4. Known Issues

The following problems are known issues in this release of VECU-BUILDER.

| Problem Number | Title |
|---|---|
| 742275 | Issue with SymbolDetails.txt |
| 746135 | Unsupported encoding in DCM files |
| 746774 | HEX File not created when DCM file contains 1.7976931348623158e308 as a value |
| 748253 | VECU-BUILDER sets Integer variable’s variability to "continuous" |

## 2.4. Changes in VECU-BUILDER V1.4

This chapter describes changes with respect to the previous version of VECU-BUILDER.

### 2.4.1. What’s New

The following changes have been applied since the previous version:

- A plugin mechanism for vECU with a C/C++ API
- Addition of task triggers for early initialization
- Addition of licensing mechanism to Linux vECUs
- Performance improvement of A2L label mappings

### 2.4.2. Compatibility to earlier releases

ECU-BUILDER V1.4 is largely compatible with the VECU-BUILDER V1.3. For adaptations needed when migrating workspace created with VECU-BUILDER V1.3 please refer to the User Guide.

Please contact ETAS Technical Support if you need any assistance when migrating your workspace to VECU-BUILDER V1.4.

### 2.4.3. Fixed Problems

This section describes the set of fixed problems of the released version of VECU-BUILDER V1.4.

| Problem Number | Title |
|---|---|
| 732528 | Return status incorrect when disk is full |
| 731757 | Reinstallation issue with different folder name |
| 735644 | additional_scripts executing twice |

| Problem Number | Title |
|---|---|
| 738234 | Improved FMI compliance when no signals exist |
| 734018 | Symbol name error with MinGW |
| 713944 | Can’t run additional script with arguments |
| 713295 | Problem with selection of DAQ list |

### 2.4.4. Known Issues

This section describes the set of known problems of the released version of VECU-BUILDER V1.4.

| Problem Number | Title |
|---|---|
| 719549 | DCM data lost after 6 decimal places |
| 742275 | Issue with SymbolDetails.txt |

## 2.5. Changes in VECU-BUILDER V1.3

This chapter describes changes with respect to the previous version of VECU-BUILDER.

### 2.5.1. What’s New

The following changes have been applied since the previous version:

- Simple File Modifications
- Example on how to add characteristics as parameters to a given YAML file
- Many bugfixes and improvements

### 2.5.2. Compatibility to earlier releases

VECU-BUILDER V1.3 is largely compatible with the VECU-BUILDER V1.2. For adaptations needed when migrating workspace created with VECU-BUILDER V1.2 please refer to the User Guide. Please contact ETAS Technical Support if you need any assistance when migrating your workspace to VECU-BUILDER V1.3.

### 2.5.3. Fixed Problems

This section describes the set of fixed problems of the released version of VECU-BUILDER V1.3.

| Problem Number | Title |
|---|---|
| 722829 | Sporadic Issue with renaming the resources folder |
| 712894 | Support all types of characteristics when patching A2L files |
| 720072 | Patched A2L had wrong address for array type variables |
| 711731 | License Manager popup blocks automated CI environment |

### 2.5.4. Known Issues

This section describes the set of known problems of the released version of VECU-BUILDER V1.3.

| Problem Number | Title |
|---|---|
| 713944 | Can’t run additional script with arguments |
| 719549 | DCM data lost after 6 decimal places |
| 713295 | Problem with selection of DAQ list |

## 2.6. Changes in VECU-BUILDER V1.2

This chapter describes changes with respect to the previous version of VECU-BUILDER.

### 2.6.1. What’s New

The following changes have been applied since the previous version: * Full support for Ubuntu 20.04 LTS Linux * Many bugfixes and improvements

### 2.6.2. Compatibility to earlier releases

VECU-BUILDER V1.2 is largely compatible with the VECU-BUILDER V1.1. For adaptations needed when migrating workspace created with VECU-BUILDER V1.1 please refer to the User Guide. Please contact ETAS Technical Support if you need any assistance when migrating your workspace to VECU-BUILDER V1.2.

### 2.6.3. Fixed Problems

This section describes the set of fixed problems of the released version of VECU-BUILDER V1.2.

| Problem Number | Title |
|---|---|
| 696454 | A2L patch lost variable information |

| Problem Number | Title |
|---|---|
| 698175 | FMU creation fails at step 2/5 without any usable message |
| 702849 | 2_Build.cmd does not work with the arguments --no-dialogs in CLI |
| 703309 | Building FMU archives fails with error “not enough values to unpack” |
| 704091 | Fix launch.json |
| 706255 | A2L Patch delete 2 type of data object <COMPU_VTAB_RANGE> and <RECORD_LAYOUT> |
| 706565 | Notepad++ 32bit registry key not considered |
| 709255 | Invalid timestamp for “generationDateAndTime” in modelDescription.xml |
| 709442 | DCM parser swaps x and y axis |
| 715279 | Missing static variables in symbol details |
| 716524 | Array data in FMU by VECU-BUILDER does not correctly show in COSYM |

### 2.6.4. Known Issues

This section describes the set of known problems of the released version of VECU-BUILDER V1.2.

| Problem Number | Title |
|---|---|
| 713944 | Can’t run additional script with arguments |
| 719549 | DCM data lost after 6 decimal places |

## 2.7. Changes in VECU-BUILDER V1.1

This chapter describes changes with respect to the previous version of VECU-BUILDER.

### 2.7.1. What’s New

The following changes have been applied since the previous version:

- Advanced Build Flags can be defined in the YAML file
- Aliases for FMI Variables can be defined in the YAML file
- Mapping between symbols and A2L labels can be defined in the YAML file
- vECU can be built directly in Visual Studio or VS Code
- vECU built with MinGW can be debugged using VS Code
- Debug Hook can be configured in the YAML file

### 2.7.2. Compatibility to earlier releases

VECU-BUILDER V1.1 is largely compatible with the VECU-BUILDER V1.0. For adaptations needed when migrating workspace created with VECU-BUILDER V1.0 please refer to the User Guide. Please contact ETAS Technical Support if you need any assistance when migrating your workspace to VECU-BUILDER V1.1.

### 2.7.3. Fixed Problems

Since the last release of VECU-BUILDER we have fixed the following problems:

| **Problem Number** | **Title** |
|---|---|
| 686446 | FMU with GO License not executable on PC without LIMA |
| 687970 | Crashes when simulation starts with active XCP configuration |
| 688347 | Does not patch AXIS_PTS segments of A2L file |
| 688673 | EEPROM variable cannot be written if defined as const |
| 688713 | COMPU_METHODs removed by the patching process |
| 689088 | No .die file created |
| 690021 | In A2L comment name contain 0x…..causes address modified error during patch |
| 691013 | CLI not working |
| 692104 | Cannot debug a vECU built by gcc |

### 2.7.4. Known Issues

| **Problem Number** | **Title** |
|---|---|
| 691641 | INCA crashes when experiment is open with XCP Sim |
| 696454 | A2L patch lost variable information |
| 698175 | FMU creation fails at step 2/5 without message |

## 2.8. Changes in VECU-BUILDER V1.0

This chapter describes changes with respect to the previous version of VECU-BUILDER V1.0.

### 2.8.1. What’s New

This is the initial release of ETAS VECU-BUILDER as a product. The following changes have been applied since the last pre-release version vEcuBuild 0.7.3:

- A mandatory keyword “version” has been added to the YAML file
- An optional keyword “sync” has been added to the eeprom section of the YAML file
- The keyword “patch_a2l_files” has been renamed to “patch_a2l_file”. Only a single file can be specified.
- Stability of symbol parser has been improved.
- Behavior of task scheduler has been improved.

### 2.8.2. Compatibility to earlier releases

This is the first release as a product. All older versions of vEcuBuild are deprecated and no longer supported. VECU-BUILDER V1.0 is largely compatible with the pre-released versions of vEcuBuild; manual adaptations when upgrading might be needed, though. Please contact ETAS Technical Support if you need any assistance when upgrading to VECU-BUILDER V1.0.

### 2.8.3. Fixed Problems

This section describes the set of fixed problems of the released version of VECU-BUILDER V1.0.

| **Problem Number** | **Title** |
|---|---|
| 676011 | Failed to parse the large *.die files |
| 676651 | VECU crashes when calling fmi2FreeInstance |
| 676674 | Invalid ModelDescription.xml caused by Enumeration |
| 682813 | Does not patch AXIS_PTS segments of A2L file |
| 685992 | VECU not buildable without useful error message and massive resource usage |
| 684579 | Error encrypting message after stop simulation |
| 684845 | XCP Transport layer configuration failed in INCA when vECU is created with VECU-BUILDER-XCP license |
| 684582 | Created 3d_RemoveGoLicense.bat in workspace fails |

### 2.8.4. Known Issues

| **Problem Number** | **Title** |
|---|---|
| 687970 | Crashes when simulation starts with active XCP configuration |
| 688347 | Does not patch AXIS_PTS segments of A2L file |
| 686446 | FMU with GO License not executable on PC without LIMA |
| 688673 | EEPROM variable cannot be written if defined as const |

| Problem Number | Title |
|---|---|
| 688713 | COMPU_METHODs removed by the patching process |
| 689088 | No .die file created |
| 690021 | In A2L comment name contain 0x…..causes address modified error during patch |

# 3. Hints

## 3.1. Windows Defender blocks CMake configuration

The 3rd-party program CMake generates temporary executables during the configuration phase. When using certain versions of CMake, in particular 3.23.1, the Windows Defender warns about the Trojan "Win32/Tiggre!pz" in these executables. This is a false positive and causes no harm. Nevertheless, Windows Defender blocks their execution and the CMake configuration process fails.

If you experience a similar behavior, ETAS recommends you the installation of a recent version of CMake. Please contact ETAS Technical Support if you require further assistance.

## 3.2. Loading of values from CSV Files with FMI 3.0

We are aware of two independent issues when loading values from CSV files. They occur with recent versions of two popular FMI 3.0 runners.

The included version of *FMPy* suffers from a known defect when loading arrays from CSV files. As a workaround, you can use the aliasing feature of VECU-BUILDER. This workaround forces the FMU runner to treat each element of the array as a scalar variable. For instance, you can include the following code in your yaml file:

```
inputs:
- factor*
- alias: '"Array\[(\d+)\]" -> "Array_\1"'
outputs:
- product
parameters:
locals:
```

If you use *fmusim* v0.0.31 as FMU runner, the loading of floating point values from .csv files does not work due to a limitation in this software version. An issue has been filed for this, which has not been resolved at the time of the release of VECU-BUILDER V1.7.

# 4. Hotfix Information

Not applicable.

# 5. Contact Information

## Technical Support

For details of your local sales office as well as your local technical support team and product hotlines, take a look at the ETAS website:

https://www.etas.com/hotlines

ETAS offers trainings for its products:

https://www.etas.com/academy

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