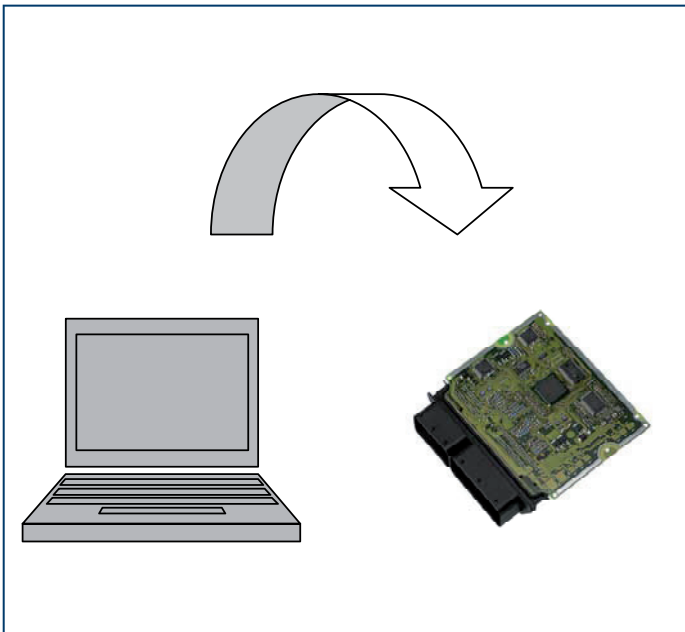


# Bosch Engineering GmbH

## Automatic code generation with ASCET/TargetLink



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Invented for life



### Automatic code generation

The constantly increasing extent of functions of modern engine control units and the extensive protection measures and tests associated with them call for improved software development processes.

With the help of model-based code generation, comprehensive tests can already be carried out during the design phase in order to ensure the correct functioning of the algorithms at a very early stage.

### Automatic code generation with ASCET

ASCET is a rapid prototyping tool developed by the ETAS Company and is part of the control-unit development environment at BOSCH. It basically consists of three parts:

#### ASCET MD – Modeling & Design

Models can be specified on the physical plane on the basis of block diagrams, automatic status generators or in the very high-level languages ESDL or C. It is then possible to test the behavior of the model in an off-line environment.

#### ASCET RP – Rapid Prototyping

With ASCET RP the models can be tested and assigned data on the target system (vehicle, lab car).

#### ASCET SE – Software Engineering

ASCET models are specified on the physical plane in order to simplify the development of the software. ASCET SE contains a code generator for generating C code for the respective target system. All aspects of implementation such as storage layout, data types, calculations etc. can be set using masks. Following their specification, all relevant files required for the integration of the model into an engine control unit are then generated “at the push of a button”.

### dSPACE TargetLink

TargetLink is a software manufactured by dSPACE for automatic series-code generation based on a subset of Simulink/Stateflow models. TargetLink generates both ANSI-C and processor-optimized codes.

### The MathWorks MATLAB/Simulink

MATLAB is a software produced by The MathWorks to solve mathematical problems and to present the results in graphic form.

Simulink permits the hierarchic modeling of systems with the help of graphic blocks and permits their time-controlled simulation. Simulink is an addition to MATLAB. Stateflow is available as an extension to Simulink for event-oriented simulation.

### Automatic code generation with MATLAB/Simulink and dSPACE TargetLink

Simulink is a program for the modeling and simulation of physical/technical systems. It offers extensive possibilities for evaluating the simulation results and is frequently employed in the prototype development of new algorithms/functions.

TargetLink permits code generation from a Simulink/Stateflow model and provides support for implementation on a target system. The fixed-point arithmetic often used in embedded systems causes quantification effects which can be analyzed during development under Simulink, as can possible overflows during arithmetical operations.

### Code generation at Bosch Engineering GmbH

With automatic code generation, we offer a high degree of flexibility in the implementation of customers' wishes. We make use of the extensive possibilities of ASCET and TargetLink for designing and verifying complex functions.

We would also be pleased to implement your models direct. Integration in an engine control unit is then supported by these tools. This ensures that the functions developed will behave in the control unit just as the simulated models did.

### Advantages of automatic code generation

- Short development times
- Design and generated code are consistent with one another
- Functions can be tested very early in the development process
- Higher quality software even in the case of complex functions

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