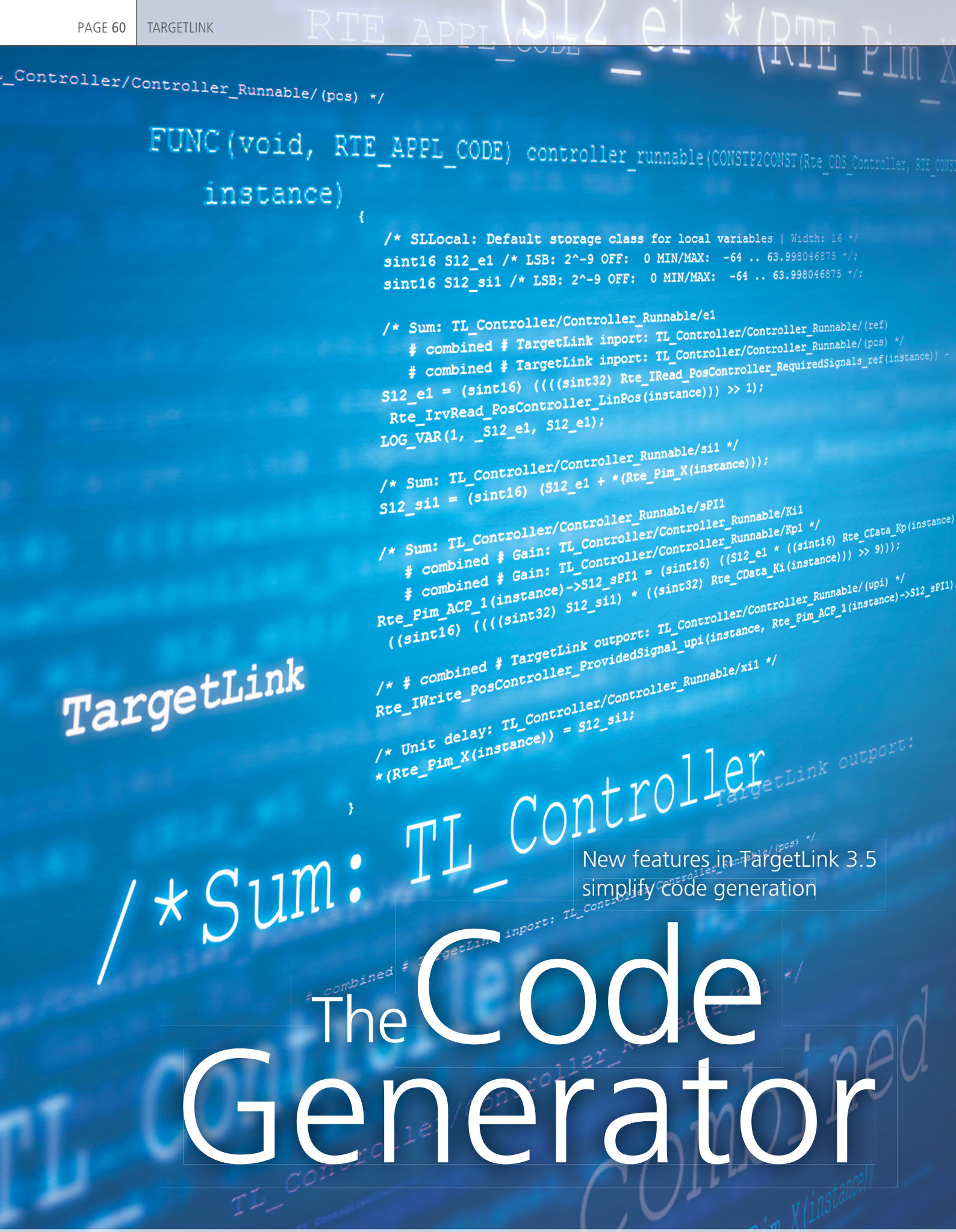
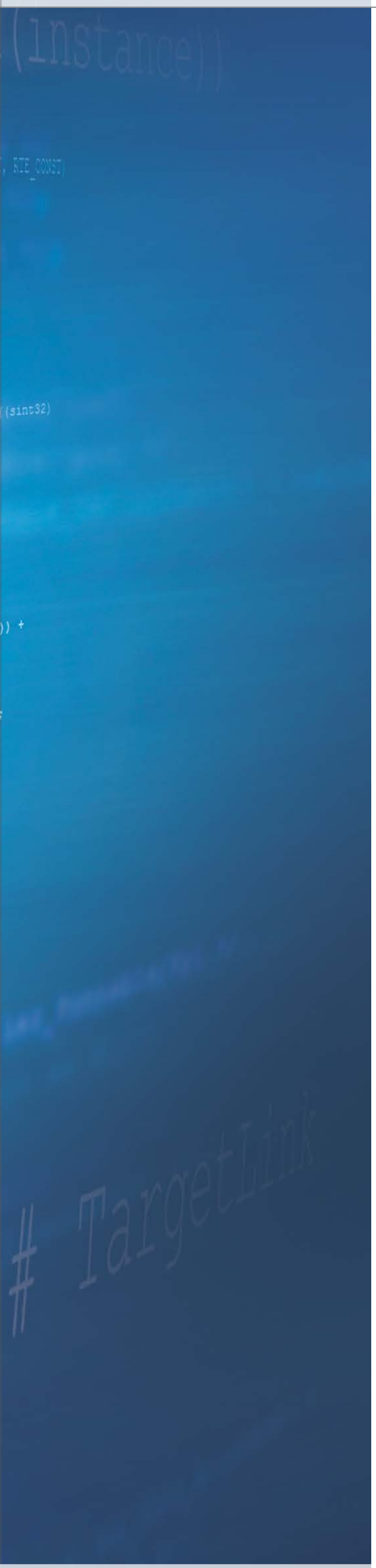


New features in TargetLink 3.5 simplify code generation

The Code Generator



The latest version of TargetLink, dSPACE's production code generation, comes with major new features: support for Simulink enum data types for transparent modeling, AUTOSAR 4.1-compliant development, and the generation of multi-instantiable software components. Software rollout in large user groups and process documentation have also become much simpler.

More Flexible Modeling

The new TargetLink® version provides substantial extensions for modeling in Simulink®/Stateflow®. One major new feature: Simulink enum data types are now supported, making models more self-explanatory (figure 1). Users working on the Simulink and Stateflow model level can use symbolic names instead of numeric literals, so their models are much easier to read and maintain. TargetLink 3.5 also makes it very easy to attach C code to native Simulink blocks and use it when production code is generated for the blocks. A comfort functionality helps by generating appropriate file fragments to which users just have to add block-specific parts. Among other modeling enhancements are support for the Stateflow 'Enter Chart at Initialization' semantic, and buffering input signals ("latched inputs") for subsystems addressed via function calls.

Extensions to Proven AUTOSAR Support

TargetLink 3.5 also supports all the relevant AUTOSAR versions: AUTOSAR Revision 4.1.1 has been added, and support for older revisions continues. As usual with TargetLink, software components for different AUTOSAR versions can be generated from the same model, so that models can easily be reused in different projects. A fundamental new AUTOSAR feature is the generation of multi-instantiable software components, which TargetLink 3.5 also supports (figure 2). TargetLink generates the component code such that several instances of a component prototype, all using the same code, can be formed on one electronic control unit (ECU). Together with instant-specific AUTOSAR calibration parameters, this not only saves ECU resources, but also reduces test effort. Incremental code generation for software components is now even more powerful and flexible. For easier interaction with SystemDesk®, TargetLink-specific validation rules make it possible to check directly whether a SystemDesk architecture is compliant with TargetLink.

More Efficient Code and Improved Variant Support

TargetLink 3.5 gives users extended code optimization for eliminating state variables with static storage duration to save RAM capacity. This ensures more efficient use of valuable ECU resources. Compliance with MISRA has also been extended

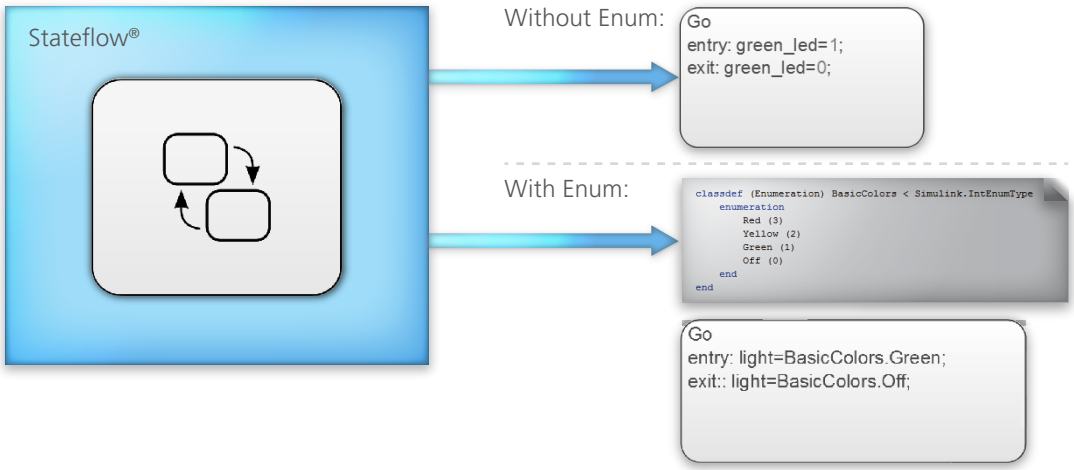
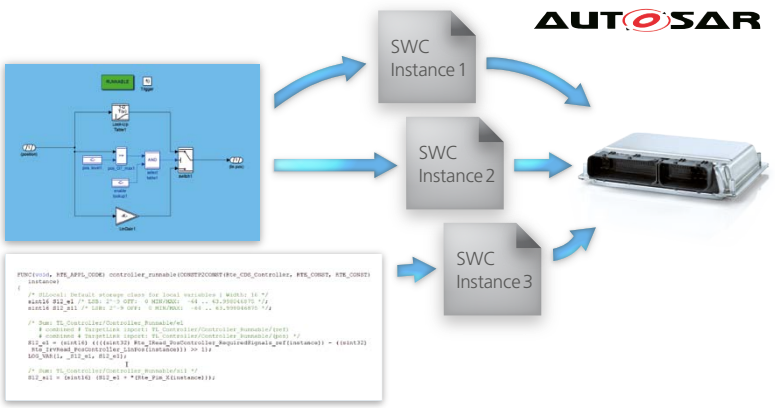


Figure 1: TargetLink 3.5 uses Simulink/Stateflow enum data types to make models more self-explanatory.

and covers all the mandatory rules in the new MISRA C:2012 standard. A new code generation report introduced with TargetLink 3.5 helps with issues such as the code generation options used, and implicit type conversions and rescalings for ports and their predecessor blocks. The latter are often the result of misspecification by the user, and the report helps users to find and eliminate them. Code generation for function variants has also been further improved: For example, Simulink modeling constructs, subsystems with variants, and model references can be used to create variants during code generation. This means that a single model can represent all the variants, and users just need to select a variant immediately before running the code generation process. Variant support in Stateflow has been extended so that entire subcharts, states and transitions can be encapsulated with preprocessor instructions to implement a specific variant during the build process, while the inactive variants are eliminated via compiler options.

Figure 2: TargetLink 3.5 can generate multi-instantiable AUTOSAR software components, i.e., code that can be instantiated on an ECU multiple times.



Enhanced Test Support and Usability

TargetLink 3.5 provides enhanced support for module and integration testing to make verifications in Simulink/TargetLink more efficient. For example, tool integration with the code coverage tool CTC Testwell allows the coverage provided by the TargetLink-generated code to be measured during software-in-the-loop simulation and later analyzed. This provides values for decision coverage and modified condition decision coverage (MCDC), as may be required for ISO-26262-compliant projects. Custom connections to specific target platforms for measuring code coverage during processor-in-the-loop simulations can be

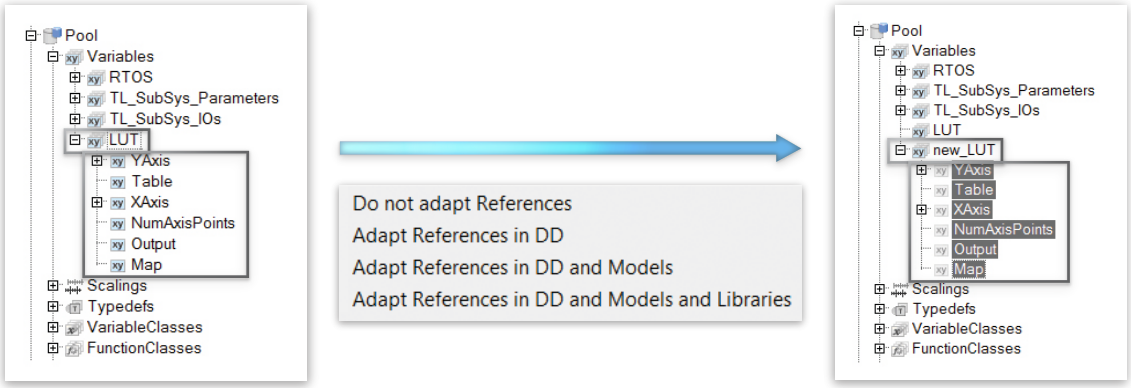


Figure 3: Simplified refactoring (structural improvement) of Data Dictionary specifications, for example, adapting object names.

TargetLink's proven AUTOSAR support has been further extended in Version 3.5. Whether you need AUTOSAR 4.1 or multiple instantiation of components – TargetLink provides the solution.

developed on request. For testing, TargetLink includes a powerful mechanism for feeding stimuli to a TargetLink subsystem, and retrieving signal values from it, without a visible connecting line and without affecting the actual production code. This is helpful when stubs are used to implement missing model and code parts for test purposes, and the stubs have to be appropriately stimulated during simulation. There are also significant enhancements to TargetLink's usability, such as a more powerful selection of multiple Data Dictionary objects for visualization and processing, and refactoring functionality (structural improvement) for changing the names and paths of Data Dictionary objects (figure 3).

Easier Rollout in Work Groups

TargetLink 3.5 is easier to install for a large number of users thanks to clear separation between TargetLink installation data and project-specific adaptation files such as hook functions. The project-specific parts can be cleanly versioned and used together with the unaltered TargetLink 3.5 installation (figure 4). All project team members can then work with the same project settings, e.g. hook functions, which greatly increases process safety. TargetLink 3.5 supports all four MATLAB versions current at the time of release, from MathWorks R2013b through MathWorks R2012a, and as usual, it is available as a 32-bit and a 64-bit version. Like its predecessor versions, TargetLink 3.5 will be ISO 26262- and IEC 61508-certified. ■

Figure 4: Working in large groups is much easier with TargetLink 3.5.