

Variant management with TestBench

Tool support during testing of an electronic control unit of the Continental AG

The starting situation

The Continental AG is one of the world leading suppliers of vehicle systems. Nearly every automobile manufacturer (OEM) worldwide uses Continental AG products. Therefore, Continental AG vehicle systems need to be usable for a variety of car models in different series and need to function reliably.

Our task

In the specific project, the task was to secure the functions of an electronic control unit which is produced in different variants. The control units are tested by means of Hardware in the Loop Tests (HIL), which need to keep the highest security level ASIL-D of ISO 26262.

In the product, about 90% of the functions of the different OEMs are the same.

The remaining 10% contain modifications for the client. These are mainly the performance data, the interface to the client's software and the types of bus communication in the target vehicle.

One of the biggest projects contains 100% of the same range of functions. Nevertheless, two performance classes and two vehicle bus types were supported. In total, this led to four different variants.

For all OEMs, more than 10 variants need to be maintained in the testing area.

The responsible testing team of Continental AG operates at locations in Germany and Romania and has been using the imbus TestBench since spring 2010. The creation and maintenance of variant-dependent test cases has been carried out manually so far and has thus been very time-consuming.

By using the new TestBench feature when testing multi-variant systems, the streaming potentials of variants that are in a very "steady component" could be increased.

The approach

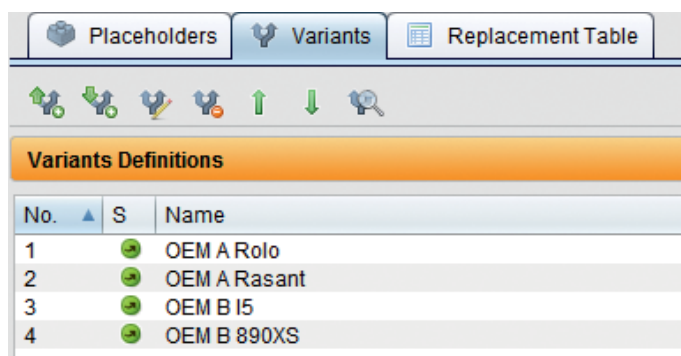
Soon after the TestBench had been introduced, a cross-variant library project has been created. In order to prepare this project for a project-specific test run, it needed to be exported. After that, it needed to be edited outside of the TestBench using scripts and then imported in a time-consuming manner again.

With the help of the new variant handling, this preparation can be realized completely within the imbus TestBench.



The implementation

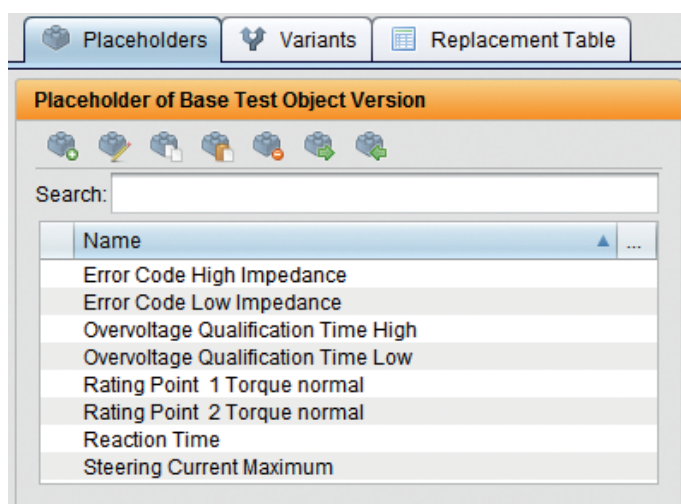
The TestBench offers a chart for all variants and placeholders with their particular variant-specific values. A generalization process has been set up that derives the variant-specific test project from the library project.



No.	S	Name
1	➔	OEM A Rolo
2	➔	OEM A Rasant
3	➔	OEM B I5
4	➔	OEM B 890XS

Fig. 1: List of a basic project's variants

The variants were defined by the test managers. The test designers defined the placeholders, the generic parameters and the reusable components. The test automation specialists then carried out the implementation of the interactions.



Name
Error Code High Impedance
Error Code Low Impedance
Overvoltage Qualification Time High
Overvoltage Qualification Time Low
Rating Point 1 Torque normal
Rating Point 2 Torque normal
Reaction Time
Steering Current Maximum

Fig. 2: List of placeholders

The result

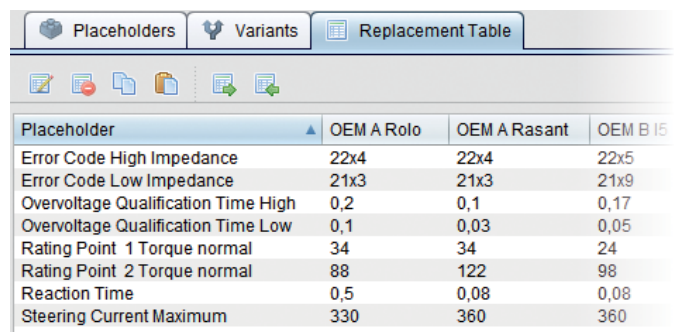
By using TestBench, Continental is now able to generate a variant-specific test project with approximately 10,000 test cases within only one hour, based on the original project. In this context, about 1,000 placeholders were allocated variant-specifically. There are no additional costs, if there is a change in a non-variable part.

This change is only being made in the basic project and can then be taken over for all affected variants.

In addition, the variant management offers a simpler workflow, should there be changes necessary in test runs within a project-specific test phase.

The imbus TestBench further guarantees the complete traceability of all data, from the request of the test case to its test result.

Furthermore, the tracking of failed tests is supported by the integrated defect management of the imbus TestBench.



Placeholder	OEM A Rolo	OEM A Rasant	OEM B I5
Error Code High Impedance	22x4	22x4	22x5
Error Code Low Impedance	21x3	21x3	21x9
Overvoltage Qualification Time High	0,2	0,1	0,17
Overvoltage Qualification Time Low	0,1	0,03	0,05
Rating Point 1 Torque normal	34	34	24
Rating Point 2 Torque normal	88	122	98
Reaction Time	0,5	0,08	0,08
Steering Current Maximum	330	360	360

Fig. 3: Replacement chart with placeholder values for all variants

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