ASAM

CASE STUDY

quality & productivity improvements at Siemens AG using ASAM AE MBFS block library within model based development

> "ASAM provides us a standard to ease the exchange of executable specifications and transfer of models between simulation tools."
>
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i **Summary**

Challenge: Improved comprehension of specifications and clear understanding of requirements are one of the keys for efficient communication between OEM and supplier. While the introduction of model based approaches are ongoing in different companies, and based on different tooling, the exchange of models between the companies also becomes more and more important. In order to ease this exchange of such models as executable specifications, and also for improved efficiency of the model based development, the Automotive Block set, including standardized and well defined functionality, has been introduced in the development process of Siemens VDO.

Solution: The standardized ASAM AE MBFS library specification, which is available in a tool independent, as well as in tool dependent versions, has been used as bases for the implementation of a reference library based on Matlab/Simulink. It is used to model and simulate the functions of Powertrain Electronic Controller Units (ECU).

Key Benefits: The key benefits were found in the usage of a tested and established library, which covers all main library blocks for automotive application. The usage of a standardized library greatly eases the exchange of models with other companies e.g. OEMs.

ii **Situation**

The usage of model based development has greatly increased in the automotive industry. Within this development, executable models are built for ECU functionalities within powertrain, body electronics and communication or entertainment applications. These models are used during the development not only for simulation but also for documentation, rapid prototyping, automatic code generation and testing.

As the same algorithms (e.g. Counters, Integrators) are repeatedly used in different functions, development time can be strongly reduced by using library blocks for these algorithms. Therefore a block set covering main blocks and algorithms for automotive application is needed within each company using the model based approach.

iii **Challenges**

The different use cases for executable models give a long list of requirements for each functionality represented by the blocks of the automotive block set. The requirements are fulfilled for each company by the specific implementation of the blocks themselves, in order to fulfill all the requirements with high efficiency.

With the use of executable models, either for the communication between OEM and supplier – or even for common development, it is necessary to exchange these proprietary blocks. This exchange is on the one hand, very time consuming and on the other hand, also an additional source for errors. Additionally, it might not be possible to find a 1 to 1 mapping between the different blocks used by the supplier and the OEM, due to functional details that are only available in one of the two block version.

With increasing model based development the model exchange between suppliers and OEMs also becomes very important. As every company uses its own block set for modeling, it is very time consuming to integrate or

rework models which are exchanged between different companies. In order to ease the exchange of models and to reduce integration time, it is very helpful if the models are built using a standardized block set showing the same well defined functional behaviour.

iv **Success strategy**

In order to overcome the described situation, the ASAM AE MBFS block library is used at Siemens VDO Powertrain for modeling and simulating ECU functionalities. This block set includes the main blocks and algorithms needed for automotive application, and is also widely spread among the automotive suppliers and OEMs. The exchange of models with OEMs using the same block set got much more efficient as the mapping and transformation of different block implementation is not necessary any more. For function documentation, the standardized icons of the blocks greatly facilitates the understanding of the described functionalities.

Beside this, the standardized icons ease also the understanding of models created with different simulation tools, and also enables a transfer from one simulation tool to the other.

v **Challenges during the project**

The introduction of a new standard to an existing community always gives some challenges, regarding training of the community and transfer of existing artifacts. In the example of the ASAM AE MBFS block library, this challenge was first the training of the developers in the usage of this block set, and second, the transfer of existing models to this new block set.

On the other side the standard provides a unique understanding of each block seen either in the printed documentation or in the model itself, and by this, also eases the communication with the customer.

Since the standard specification also includes a pseudo code description of the represented functionality of the block, it also facilitates the internal communication between the developers.

vi **Business benefits**

ASAM provided us a standard which helped to ease the exchange of executable specifications with our customers in our future projects and enables us to transfer models between different simulation tools.

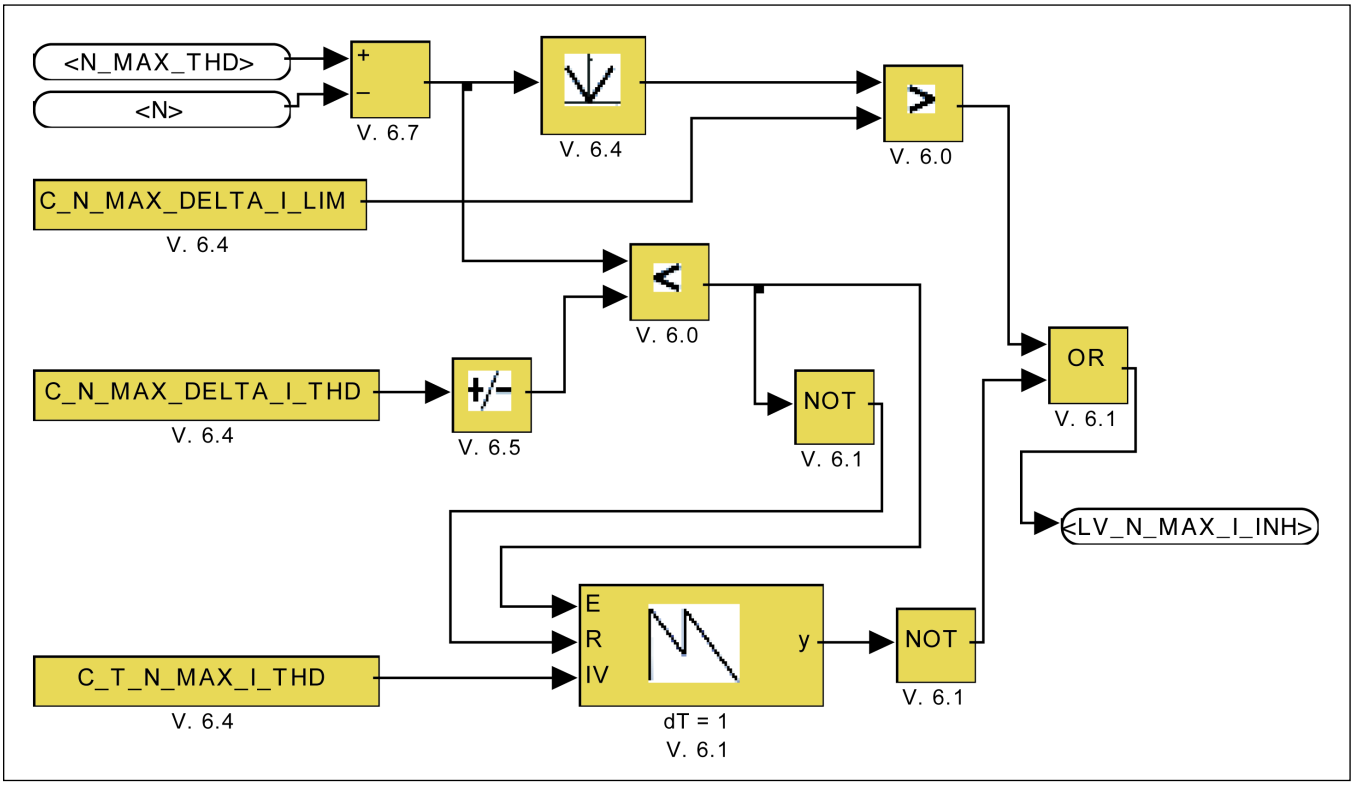

Figure 1: Usage of ASAM AE MBFS specified blockset in Matlab/Simulink functional models. The highlighted blocks are built according to the ASAM AE MBFS V1.0 specification. The version numbering below the blocks is Siemens VDO specific.