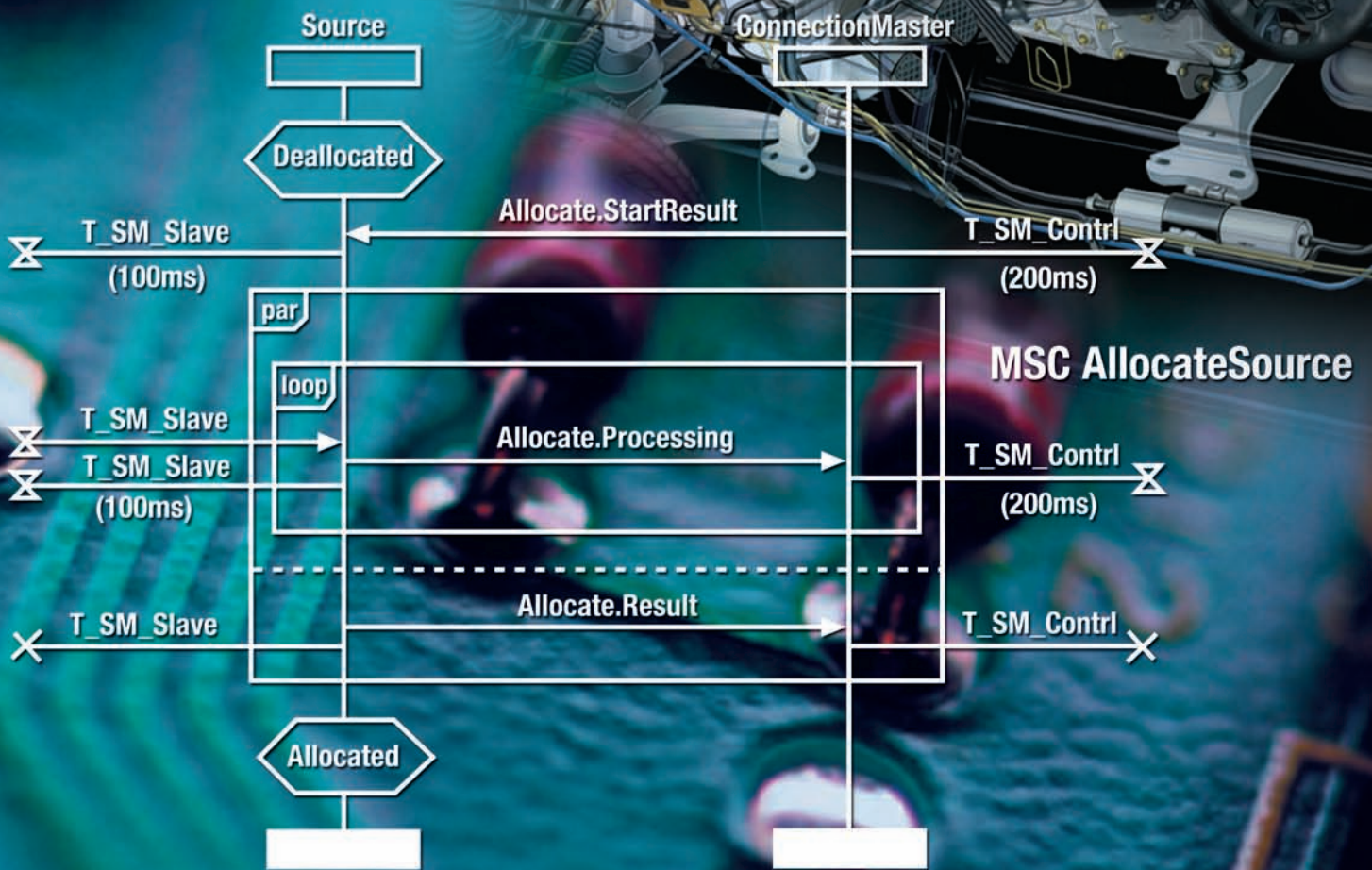


MSC Tool Chain

- MSC Editor
- SystemAnalyzer
- SequenceAnalyzer



Standards for the Development of On-Board Electrical Systems

Modern vehicle ECU networks are characterized by a large number of complex distributed functions. Therefore, the challenge to be faced today is to provide unambiguous and concise communication specification between the individual control units.

Up to now answers to the question of which control unit shall pass which information item to which component in which order have been structured predominantly in textual format. This time-consuming practice can lead to misunderstandings between suppliers and automobile manufacturers and impact the quality of the entire life cycle. However, this source of error can be avoided by using Message Sequence Charts (MSCs).

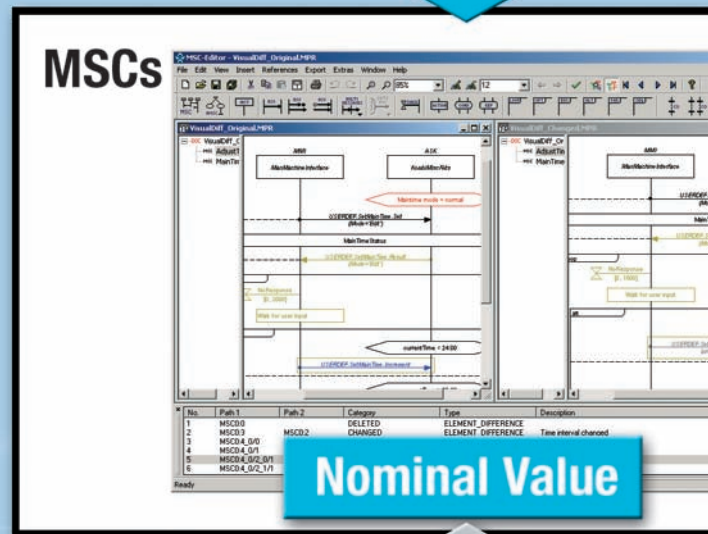
PROCESS SUPPORT

ESG has developed the MSC Tool Chain specifically with regard to the requirements of the automotive industry. The MSC Tool Chain consists of three adapted powerful software tools: MSC Editor, SystemAnalyzer and SequenceAnalyzer. These tools considerably simplify the creation of the specification, integration and also testing of ECU's of on-board electrical systems. Thus development engineers are able to precisely define and test how vehicle control units communicate with each other.

This creates the preconditions for a defined, functioning and documented process. Communication within companies and between companies is standardized and optimized.



Specifica



MSC EDITOR

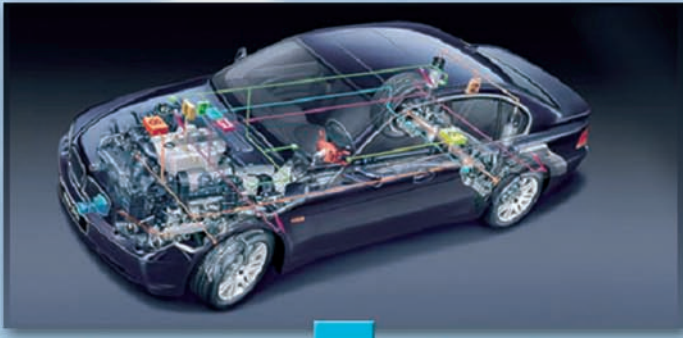
The ESG MSC Editor is a graphical editor with function catalog support. The comfortable and configurable graphical user interface enables simple creation, efficient processing and graphical comparison of Message Sequence Charts (MSC). The Editor uses graphic and text formats of MSC 2000 standard.

This means that message catalogs can be imported which allow the required message and parameter assignment to be quickly and faultlessly selected by a click of the mouse. Among others the Editor integrates function catalogs according to the default format of MOST cooperation and diverse CAN-catalogs (CANdb, 4CS General Database).

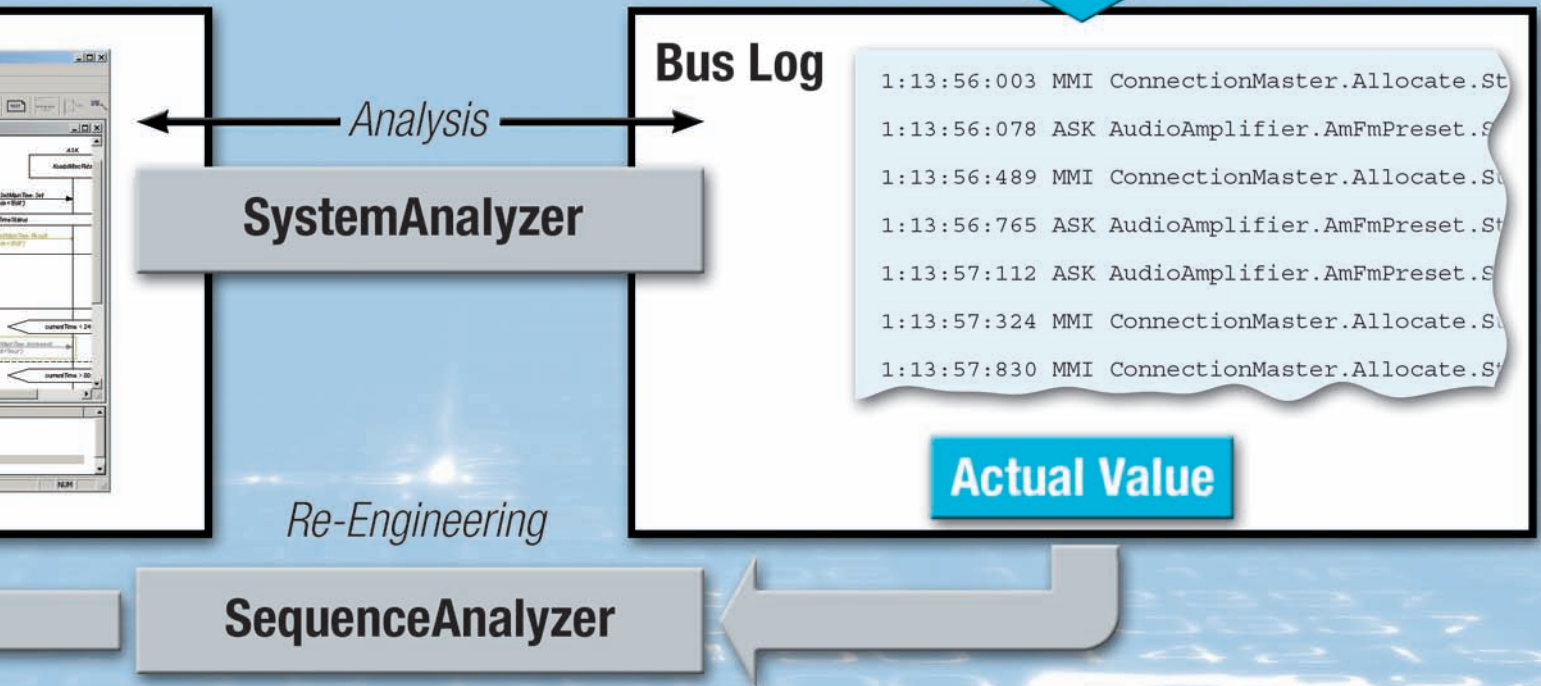
The Editor is optimally prepared for integration into the respective business process by working with external version control systems (CVS, PVCS), using its own reference database and various export possibilities to specification documents or to requirements management systems directly.



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Observation/ Recording



SYSTEMANALYZER

As soon as the communication processes of the control units are defined, the electronic components are developed and then assembled to a prototype. This is used to test whether the elements actually communicate with each other as intended.

ESG has developed the SystemAnalyzer for tests to be carried out on the MOST bus. It documents the actual communication processes and compares them with the specifications from the MSC Editor. When nominal behavior and actual behavior do not match it displays detailed information on the corresponding error. This can occur either by a graphic representation by means of interactive error display or by means of detailed reports that can be used for documentation purposes.

In addition to tests on prototypes, the SystemAnalyzer is also ideal for use in diagnostics with regard to endurance tests.

SEQUENCEANALYZER

The ESG SequenceAnalyzer rounds the chain off by providing the engineers with a tool for the additional specification of CPU's on the basis of the observed behavior.

That means that MSCs are generated again from recorded communication processes:

As a first step a recording is filtered and an analysis for certain communication partners is carried out. The second step involves recognizing and abstracting of structures and repetitions in order to produce compact MSCs.

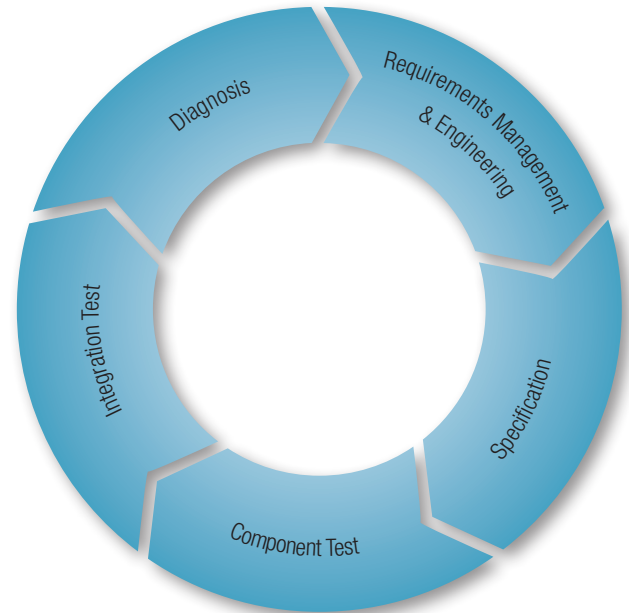
A typical procedure is the "two-sides" approach: When the communication behavior of a real control unit deviates considerably from the MSCs in the specification book it is recommended to check the actual behavior of the control unit represented as MSC by means of the SequenceAnalyzer.

MSC TOOL CHAIN IN THE LIFE CYCLE

Nowadays information is no longer defined in a solely process-specific manner, i.e. the requirements are even more wide-ranging: A database must be created that can be controlled and reproduced throughout the whole lifecycle. Message Sequence Charts in conjunction with a mature tool set provide a common database, as they establish the connection between development and diagnosis.

As a system and software house it is our core competence to develop, integrate and monitor system and software solutions over the full life cycle. As a process partner with intensive knowledge of the processes in the automotive industry our services include consultation with respect to the process to be installed and the selection of suitable methods, such as requirements management.

In addition, we provide individual services throughout the lifecycle of a complete system. This includes the control and handling of all engineering processes, the creation of specifications, the testing of components and systems as well as the diagnosis of on-board electrical wiring system communications.



ESG System Competence

Our cooperation with manufacturers and suppliers is characterized by long-term, intensive partnerships with our customers and an understanding of the requirements of the automotive industry.

CUSTOMERS (EXTRACT)

