TA Tool Suite
Managing the Timing Behavior of AUTOSAR Multi-Core ECUs

What is TA Tool Suite?
TA Tool Suite is part of the Vector product family since 2018. It offers user-friendly tools for the design, simulation, optimization and verification of embedded multi-core real-time systems. It covers the non-functional requirement “timing” across the complete development cycle as a unified solution. The expert mode enables a deep analysis of the timing behavior. Furthermore, TA Tool Suite simplifies the distribution of application software on different cores in multi-core ECUs. This increases the efficiency and reactivity of multi-core and many-core real-time systems. With TA Tool Suite, project managers, system architects, developers and integrators make full use of all the advantages of multi-core technology.

Overview of Advantages
> Optimizes single-core software architecture for execution on high-performance multi-core or many-core processor platforms
> Increases system understanding by graphical visualization of software dependencies
> Evaluates system utilization and enables hardware dimensioning forecasts
> Simulates and optimizes different alternatives of ECU system designs at early development stages
> Shows alternatives for application software integration with regard to real-time and performance properties
> Visualizes and analyzes target traces for verifying timing properties
> Imports AUTOSAR and AMALTHEA system descriptions and hardware traces

Options for TA Tool Suite
The modular TA Tool Suite provides a dedicated software product for each step of the software project lifecycle. This includes specification of timing requirements, analysis and optimization of software architecture design as well as verification of the target system behavior.
The base module includes a project explorer and a browser for timing model elements. It enables data import/export and specifications of timing requirements.
Four options extend the base module of TA Tool Suite:

**TA.Design**
Definition of timing requirements of the application software for complex and highly integrated multi-functional software systems by interactive dynamic visualization.

**TA.Simulation**
Model-based simulation of ECU timing behavior and sophisticated graphical and table based evaluations of timing metrics for analyzing system behavior in different levels of detail.

**TA.Optimization**
Optimization tool for the distribution and mapping of application software to operating systems and processor models for embedded multi-core systems.

**TA.Inspection**
Verification of the timing behavior of application software and of the operating system. This enables third-party trace measurements that have already been recorded to be analyzed in terms of response times, utilization, and other metrics.

**Special Functions**
Several enhancements support individual project conditions.

**Import/Export Interfaces**
TA Tool Suite provides interfaces to the common exchange formats. The options TA.Design, TA.Simulation and TA.Optimization use the system descriptions AUTOSAR and AMALTHEA as data sources. TA.Inspection bases its analysis on trace log measurements from various debugger and profiling providers.

**Processor Models**
The precision of the options TA.Simulation and TA.Optimization can be extended with the runtime properties and memory behavior of specific processor derivatives. This enables a detailed analysis of processor effects.

A list of supported processor models is available at [www.vector.com/ta-tool-suite](http://www.vector.com/ta-tool-suite).

**Models for Operating Systems**
Models for operating systems improve the accuracy of the options TA.Simulation and TA.Optimization by replicating the dynamic scheduler behavior of the corresponding operating system implementations. Currently supported are MICROSAR.OS, Tresos AutoCore and Tresos Safety OS.

**Workflow Editor**
The workflow editor is a graphical solution for the description of automated processes within TA Tool Suite and leads to considerable time saving. For example, it summarizes the information from various system descriptions. This allows previously unused data sources to be accessed easily and conveniently. Routine tasks such as creating timing models, starting simulations, trace verifications and creating reports can thus be easily defined and executed. A direct interface to DaVinci Configurator Pro is also available.