The emerging AUTOSAR standard for vehicle software design has the potential to deliver new economies and efficiencies to automotive design and manufacturing. A vehicle's electronic content approaches 45% of the cost of the vehicle today, with much of that content running on embedded code. Software will enable differentiation among automobile platforms in the future, and AUTOSAR is poised to take the industry in that direction.

Mentor Graphics leads the way in AUTOSAR implementation with its complete tool suite of vehicle system design tools.
**Why AUTOSAR?**

AUTOSAR is essentially a set of standards encompassing interfaces and software module definitions. At the conceptual level, AUTOSAR can be viewed as a new platform that enables designers to focus on unique, innovative functions while insulating them from the implementation details of integration. Most importantly, it sets forth a structure for the embedded software that ultimately operates a vehicle’s complex network-based distributed system.

AUTOSAR is gaining ever wider acceptance among car makers, which sets the stage for further development of automated tools for system design, evaluation, and feasibility studies. As these tools begin to penetrate the automotive design field, they will become the foundation of optimization processes that help engineers design profitable automotive products more efficiently than ever before.

**VSx Tools by Mentor Graphics**

Volcano VSx is an integrated tool suite for top-down vehicle system and ECU design. Despite tight integration, each tool can be individually used and supports standard AUTOSAR import/exports.

The VSx tool chain is the industry’s most comprehensive AUTOSAR-based design, analysis, verification, virtual integration, and test tool suite. It covers automotive SW and electronic systems design, virtual verification, testing, and configuration. All VSx tools are built upon the Eclipse framework, and thus, are part of a modular and open framework for development tools.

**Volcano Vehicle Systems Architect – VSA**

VSA is a system design tool for AUTOSAR-based systems. It enables engineers to design automotive SW and HW architectures and to manage the relationships between the two. At the same time, it provides the user with required support to manage industrial-scale projects with distributed development partners.

VSA enables the design of the SW and HW architecture of an AUTOSAR system, the mapping of SW components to ECUs and the system signals exchanged between them. VSA supports the full AUTOSAR data model and enables industrial-scale development projects with multiple users and iterative development through the use of integrated configuration management and merge technologies.
Volcano VSA COM Designer

VSA COM Designer enables users to design automotive CAN, LIN and FlexRay networks in keeping with modern systems engineering practices while managing timing requirements, variants, configurations, and releases. Intended for large-scale industrial use, VSA COM Designer supports multiple concurrent users and enables them to easily manage diverse configurations and variants of the designed systems.

Volcano Virtual Systems Integrator – VSI

VSI is a software validation environment that behaves like an integrated system made up of hardware elements such as ECUs, buses, sensors, and actuators, etc. It enables early validation of software functionality before actual hardware is available.

- Execution environment for AUTOSAR Systems
- Early validation of SW functionality on virtual ECU and BSW
- Full debug and interactive validation at all relevant levels of software system, OS task or executing code
- True AUTOSAR OS support – more than simply VFB simulation

BridgePoint Executable, Translatable UML Suite

BridgePoint is a comprehensive design environment based on reusable, target-independent, executable specifications and models. It provides xtUML models that permit defect detection and repair.

BridgePoint xtUML tools enable engineers to develop, model, and test their concepts in a platform-independent environment before target hardware is built. This allows important design changes to be made early and correctly.

Network Design Process in VSA COM Designer

VSA COM Designer supports network design with AUTOSAR-based ECUs and also supports standard CAN/LIN implementations, such as those using Volcano VTP. Systems containing both AUTOSAR BSW and other implementations can also be designed in VSA COM Designer.

With VSI, embedded system software can be verified at any time during the design process, with minimal hardware system prototyping. The underlying Model Driven Development technology within VSI ensures that embedded code tested therein is ready to become the application.

VSI receives embedded code from BridgePoint and system characteristics from VSA. VSI creates a virtual bus to evaluate the SW and HW interactions among these elements.
Volcano VSTAR – AUTOSAR Basic SW Stack

The Volcano VSTAR embedded basic software for AUTOSAR offers maximum flexibility and ease-of-use for application programmers. The product consists of an Operating System (OS); RTE Generator (RTE); modules for mode management; modules for supporting AUTOSAR services like memory, diagnostic, and communication services; and firmware for I/O HW abstraction. Furthermore, VSTAR optionally includes complete communication stacks for LIN, CAN and FlexRay.

The Mentor Graphics AUTOSAR Operating System is based upon the OSEK/VDX standard and supports all conformance classes and scalability (class 1 to 4). The OS is part of the AUTOSAR system services and provides features such as OSEK OS, counter interface, schedule tables, stack itoring, protection hooks, timing protection, global time/synchronization support and memory protection.

Volcano Vehicle Systems Builder – VSB

The Volcano Vehicle Systems Builder works in conjunction with VSTAR to configure and build ECU networks.