The Volcano VSA COM Designer is part of the comprehensive Mentor Graphics vehicle systems design toolset, which provides a robust medium for an AUTOSAR-based vehicle system design flow, including E/E architectural design, application software development, virtual validation, and software test.

Designing Automotive Communication Networks

The Volcano VSA COM Designer is a network design tool for AUTOSAR-based systems. It enables users to design automotive CAN, LIN, and FlexRay networks using 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, enabling them to easily manage diverse configurations and variants of the designed systems.

VSA COM Designer supports network design of AUTOSAR-based electronic control units (ECUs); it also supports standard CAN/LIN implementations, such as those using the Mentor Graphics Volcano VTP tool. Systems containing both AUTOSAR basic software and other implementations can also be designed in VSA COM Designer.

Timing Requirements and Analysis

The VSA COM Designer enables definition of timing requirements from sensor to actuator, from network signals between ECUs, and for arbitrary complex signal and sensor/actuators chains. This enables a clear definition of functional timing requirements which, after allocation of functionality to ECUs, is used as input to the network design process. The user is able to balance the amount of time spent on the different network segments and the amount of time spent internally on ECUs, as in the case of signal chains or gatewaying. In addition, the VSA COM Designer’s analysis capabilities verify that all signals arrive at their destinations in time, calculate their timing margins, and assess the amount of spare capacity on each network segment.

System Integration and Using Legacy Components

In many cases, an automotive network designer’s job is primarily to integrate existing ECU components with newly developed ECUs to create a single working system configuration while ensuring that the majority of ECUs be
reusable in multiple vehicle models or even platforms. VSA COM Designer supports the user in this complex task by allowing the specification of an acceptable change level for each ECU, which VSA COM Designer then enforces. For example, an ECU is completely fixed (no change at all) or extendable, meaning that new signals/frames cannot be modified. Post-build configuration is also supported in the system design level.

Additionally, the VSA COM Designer allows management of ECU variants as so-called “Super ECUs,” which reduces design maintenance effort and ensures consistent network design of all ECU variants. This is achieved by allowing the user to work in a 150% view of the project. Later, VSA COM Designer reduces the configuration data to exactly what is required for each individual ECU variant.

**Inputs and Outputs**

VSA COM Designer uses AUTOSAR system descriptions as input, bringing in the objects relevant for communication, such as ECU topology, system signals, etc. Once the design is completed, VSA COM Designer provides exports in various formats, such as AUTOSAR ECU extract, DBC, FIBEX, and LDF.

**Typical Steps in Designing Automotive Networks**

- Define a system using Volcano VSA or other system design tool. This step includes definition of ECUs, software components, topology, timing requirements, etc.
- Define change constraints for carry-over ECUs and previous network designs
- Design a strategy definition that includes Super ECUs
- Design an initial communication matrix based on requirements and constraints
- Design analysis and validation steps per requirements
- Refine the network design
- Generate output: AUTOSAR ECU extract, DBC, LDF, FIBEX, etc.
- Generate reports, with configurable layout and formats

VSA Com Designer supports a contract-based development methodology suitable for projects in which multiple companies at geographically dispersed locations cooperate. This is typical in automotive projects.

**Options**

Mentor Graphics offers synthesis options to the VSA COM Designer for each supported protocol. These provide an additional level of automation to the design process.

- Automatic signal packing
- Automatic frame parameter definition and scheduling
- Automatic gateway routing

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