MicroNova
Software and Systems

EXAM - EXtended Automation Method

EXAM

- Test automation for X-in-the-Loop environments
- Automated tests for efficient hardware-related software development
- Uniform test processes across departments and throughout the company

Automated test processes for efficient ECU development

Time pressure, cost pressure, quality assurance: In vehicle development, the number and complexity of tests required to validate electronic control units (ECUs) is steadily on the rise – at the same time, budgets are shrinking and development cycles are becoming shorter and shorter. Technologies such as Autonomous Driving or the Connected Car require an enormous amount of test cases on account of the multitude of scenarios that need to be tested. The result is complex processes, huge amounts of data and ever new challenges for testing departments and suppliers. The solution is automation and standardization of test processes with location-independent use of X-in-the-Loop (XiL) resources.

EXAM

EXAM is...

...a common language for test data
As a comprehensive methodology based on the Unified Modeling Language (UML), EXAM (EXtended Automation Method) creates a platform-independent language to represent test situations. By using this solution, companies can create uniform test processes, ensure test cases can be reused and perform tests in conjunction with partners or suppliers across departmental and company boundaries. The ease of use means no professional programming knowledge is required to graphically model test sequences. EXAM is suitable for use in hardware-in-the-loop (HiL) simulations as well as for XiL environments and for test bench and industrial automation.

...easy to integrate into existing test environments
EXAM supports users in allocating tasks to the different roles in the test process, e.g. test designer, test bench supervisor and test result reviewer. The EXAM role-based model ensures it can easily be integrated into the existing test landscape and supports the complete test process – from specification to results management.

...used as standard in the Volkswagen Group
AUDI AG, Volkswagen AG and MicroNova have been jointly developing the EXAM test automation solution since 2006. The solution for the graphical development of test cases has since established itself as a uniform standard for test automation for HiL simulators within the Volkswagen Group. EXAM is continuously being developed in close cooperation with users, such that with each new release a mature system with tooling and libraries is available.

...available under freeware license
EXAM is available free of charge for creating and executing tests and reviewing results – unique for a solution of this kind. The tooling is available under freeware license, the core libraries are available as open source. In addition, licensed extensions supplement the test automation solution and make it even more versatile.

EXAM offers...

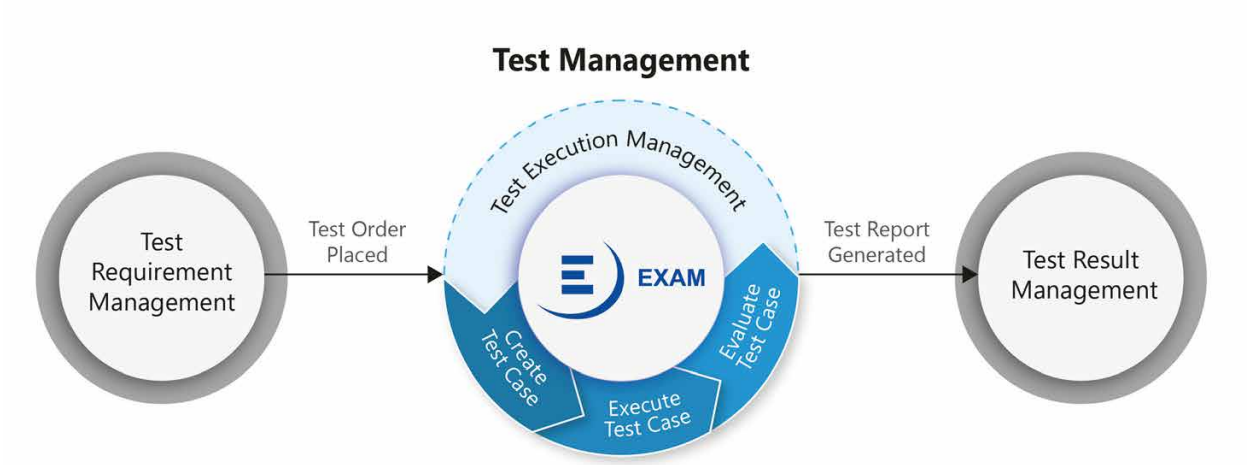
...multi-client capability
EXAM supports the creation of tests in a team, so that users can simultaneously generate and edit test cases on a common model. Centralized data storage in EXAM enables a global role and rights management. All information relevant for the test can be stored in the EXAM model, so that transactions are secured.

...flexible extensions
Through open interfaces to the EXAM applications, additional hardware and software can be easily connected, such as in the form of plug-ins and as extensions to the EXAM libraries. In addition, own report templates can be stored for the presentation of result data. The internal script interface can also be used to automate manual processes in the tool, e.g. for mass data changes or test statistics.

...platform independence
A sophisticated interface concept ensures test cases remain independent from the hardware and software being controlled. This allows any desired functionality to be abstracted by storing different implementations. Only at the time of execution of the test case does the user determine which implementation should ultimately be used. Connections for the platforms of the leading manufacturers of HiL systems are already integrated.

...separation of test procedure and test parameters
Keeping test data separate from the test procedure ensures that a test sequence is kept general for a complete set. This means there is a separate assignment of parameters to the respective sequence for each test case. This ensures test cases can be reused and exchanged.

...a development environment for test cases
EXAM offers all features of a software development environment, such as continuous syntax checking, refactoring or debugging.



Easy start, better test process

EXAM is built around the three perspectives of Modeler, Test Runner and Report Manager. In Addition there are numerous libraries containing operations used to create test cases. These allow an uncomplicated connection of EXAM to the respective system and test equipment.

Test development:
The Modeler perspective is used to design the test: From creating test sequences in sequence diagrams, creating and assigning parameter sets, to modeling or programming operations and test composition.

Managing the test process:
Individual test cases and test groups are activated or deactivated in the Test Runner. In addition, interfaces can be configured here and the user can define how often a test case or a test group should be executed. It is also where the interface and the corresponding implementation of the test run are assigned to each other. Finally, execution of the test is managed via the Test Runner. During the test run, the logging information and the status are continuously and clearly displayed.

Managing test results:
Completed test runs are analyzed using the Report Manager. Core features include managing reports in the results databases and a meaningful presentation of results. Furthermore, results can be easily documented and measurement data clearly visualized. Template-based PDF generation enables the test results to be disseminated to others.

One tool – many interfaces

EXAM supports numerous hardware and software components:

- ASAM XiL API (MAPort, EESPort)
- NovaCarts Test Operation Software
- dSPACE ControlDesk
- ETAS INCA
- RA Consulting DiagRA
- Vector CANape
- Vector CANoe
- Vector CANalyzer
- VW ODIS

- IBM Rational DOORS
- PTC Integrity LifeCycle Manager
- Jira Xray & Zephyr Test Management

- and many more

An up-to-date list of all interfaces is constantly being added to and is available at www.micronova.de/en/exam/interfaces.

The open system architecture of EXAM also allows any solution to be connected via API.

EXAM product family

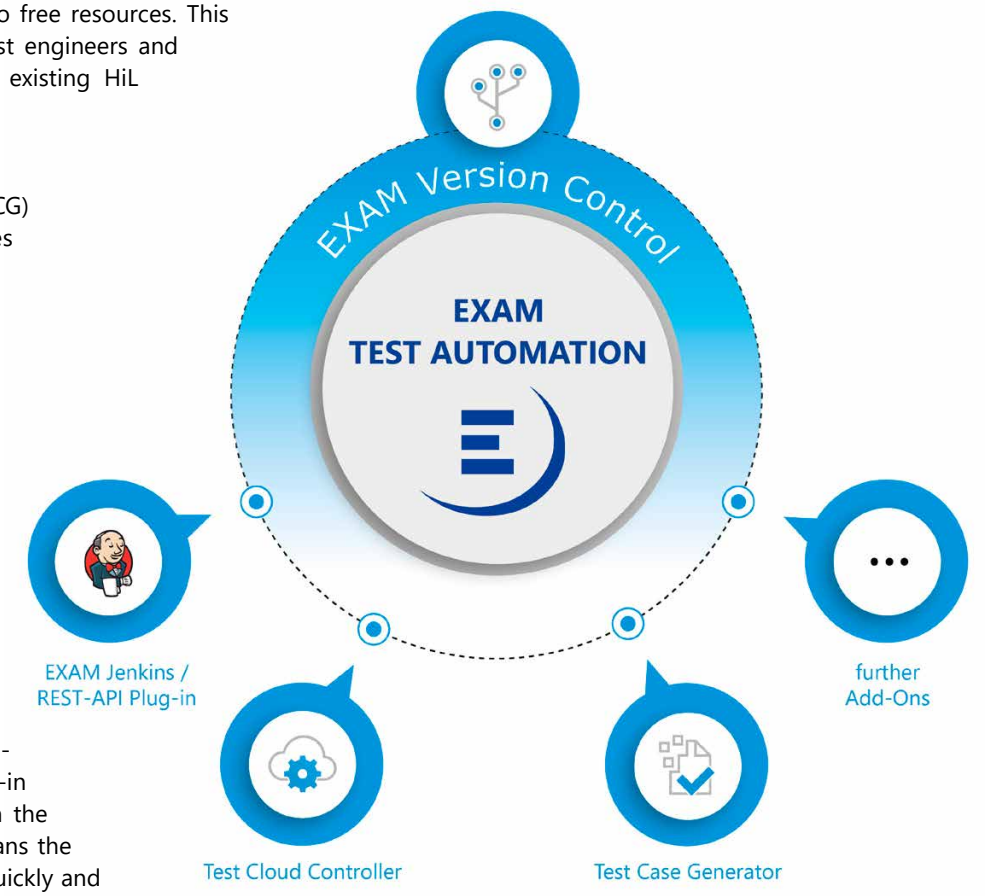
Licensed add-ons make EXAM even more versatile.

EXAM Version Control
EXAM Version Control enables model-based versioning of test cases. The Model-Domains introduced with EXAM 4.4 serve as repositories. The versioned elements are within these ModelDomains, allowing certain working states of related elements to be fixed. For example, a productive version can be used for tests on the test bench, while another version is being developed at the same time. Configurations can also be used to define the view of a model. So it is possible to define which ModelDomains should be visible to the user in which version.

Test Cloud Controller
The Test Cloud Controller (TCC) automates the global distribution of test orders to free resources. This lessens the workload on test engineers and improves the utilization of existing HiL systems.

Test Case Generator
The Test Case Generator (TCG) fully automatically creates test cases in EXAM from the test specifications. This substantially reduces costs for maintaining test cases and improves traceability, comparability and reproducibility.

EXAM Jenkins plug-in
For the Jenkins platform, the EXAM Jenkins plug-in integrates the test automation solution into the continuous development workflow (Continuous Integration, CI) via a REST interface. The REST API plug-in automates test execution in the build environment. This means the results are available more quickly and can be fed back immediately and continuously into the development process.



Detailed information about the EXAM add-ons is available at www.micronova.de/en/exam/products.

EXAM Services

As exclusive EXAM distributor, MicroNova is the central point of contact for training, support or customer-specific modifications of the EXAM tooling. We support companies with an extensive service portfolio in the professional use and seamless operation of the test automation solution and all EXAM add-ons.

Training:
As an authorized training partner, MicroNova offers professional and practical training that helps users learn how to use EXAM effectively. For further information please see www.micronova.de/en/exam/training .

Installation and configuration of EXAM:
On request, MicroNova will take care of the complete installation of EXAM, including setting up the database schema and the server components – by telephone or directly on site.

Tool and library support:
The MicroNova Support Team ensures technical operation and offers assistance in using the EXAM tooling and the associated core library.

User support and customer-specific modifications:
With a wide range of additional services, MicroNova supports companies in the optimal use of EXAM: Whether creating productive test cases, support in test creation and test concept, library changes, connecting additional software and hardware to EXAM, or one-on-one coaching of individual users – MicroNova's experts help to put customer-specific requirements into practice.

Detailed information about the EXAM Services is available at www.micronova.de/en/exam/services.

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