MES M-XRAY® (MXRAY)

All of MES M-XRAY®'s functions are integrated into the MES Model Examiner® v.6.x - Functional Safety Solution platform and will continue to be developed there from now on.
More information can be found in Support.

MES M-XRAY®'s fast and precise structure and complexity analysis gives you complete transparency of your Simulink®, Stateflow®, Embedded Coder®, and TargetLink® models.

ISO 26262-compliant analyses and visualization of model architecture

A sound model architecture is a vital prerequisite for safe software that is generated from these models. MES M-XRAY® helps you analyze the architecture of Simulink®, Embedded Coder®, and TargetLink® models. The analysis provides you all relevant metrics to realistically evaluate the architecture, complexity, and size of your models.

Clone detection among subsystems

MES M-XRAY® detects clones and evaluates the internal dependencies of subsystems, helping you to find complex, error-prone model parts and keep model complexity low. This provides you valuable support to meet the essential requirements of ISO 26262 regarding the design of the software architecture.

Your MES M-XRAY® benefits:

Transparency

- Identifies complex model parts (hotspots)
- Finds duplicated subsystems

Simplification

- Visualizes model structure
- Evaluates structural complexity

Metrics

- Calculates all relevant model metrics
- Calculates model volume

Compliance

- Ensures compliance with safety standards ISO 26262 (Model Architectural Design, Model Complexity)
- Ensures compliance with the quality standard ASPICE (Evaluate software detailed design, Base Practice SWE.3.BP4)

How MXRAY supports you:

1. Fast structural overview

MXRAY offers a fast and clear visualization of model structure, subsystems, and hierarchies, as well as objective figures and metrics of the analyzed systems' properties. MXRAY evaluates model complexity on the basis of proven metrics. Further details provide information on areas such as number and type of elements used in the model.

2. Realistic measurement of model size

"How big is my model?" is a question that can be answered easily and objectively with MXRAY's global complexity metrics. To calculate global complexity, all elements contained in the module are taken into account. As a metric of model volume in terms of the scope of implementation, global complexity also provides a fast measure for test and review efforts of model parts and models.

3. Analysis down to the last detail

The local distribution of the implemented functionality in the model is evaluated with the help of local complexity. MES M-XRAY$^{®}$ computes the local complexity of subsystems in Simulink$^{®}$, Stateflow$^{®}$, and TargetLink$^{®}$ models based on Halstead metrics.

A ratings scale allows complexity hotspots to be identified quickly, i.e. model parts with too high complexity due to unbalanced functionality. As a result of their complexity, these hotspots are empirically more difficult to test and are more prone to errors. Refactoring is often recommended, which can be prioritized by the MXRAY metrics.

Evaluating whether or not refactoring would be effective can be done with the help of the incoherence metric. This metric evaluates the degree to which elements in a Simulink subsystem deviate from the highest possible cohesion. The higher the degree of deviation, the more potential refactoring offers.

4. Effective search for clones

MES M-XRAY$^{®}$ detects clones in the subsystems of your Simulink$^{®}$, Stateflow$^{®}$, and TargetLink$^{®}$ models, even with layout and parameter changes. Frequently reused functions can be identified and collected in libraries. This way, model and code size is kept in check.

5. Comprehensive documentation

Comprehensive reporting allows the complexity and structural quality of models to be evaluated at a glance.

A color scale directly highlights the complexity hotspots. Detailed metric diagrams make model implementation transparent. A special report format also supports the model review.