Ansys

CASE STUDY /

Ansys + ZF Group

"Ansys medini analyze helped us to provide functional safety analysis for hardware, software and systems based on and fully compliant to architecture models."

Günter Gäbelein
Safety Assessor / ZF Friedrichshafen AG

CASE STUDY

ZF Group Harmonizes and Accelerates Functional Safety Analysis with Ansys medini analyze

Automotive systems supplier ZF Friedrichshafen AG utilizes Ansys medini analyze to drive agility, innovation, and efficiency in its embedded safety systems development and verification process. Ansys medini analyze has already reduced the time involved in functional safety analysis by up to 50%.

Today's passenger cars and commercial vehicles incorporate complex, integrated electronic systems — many of which are developed by ZF Group. ZF continually enhances its systems in the areas of digital connectivity and automation to allow vehicles to see, think, and act. The company is supporting the world's automakers in realizing their vision for autonomous driving, electric mobility, and other innovations via its best-in-class technology solutions.

Ansys medini analyze + ZF Group

According to Günter Gäbelein, Safety Assessor at ZF Friedrichshafen AG, "As a systems supplier for passenger cars, commercial vehicles, and industrial technology, ZF Friedrichshafen AG places great emphasis on agility and innovation. To support exciting developments like autonomous driving and electric mobility, our R&D process must be fast, cost effective, and technically precise. More and more projects are taking advantage of synergies provided by medini analyze. In a medium-size project, more than 300 hours of effort can be saved by the one-tool solution and the interfaces to third-party tools for architectures. ZF is a strong advocate for model-based engineering, and medini analyze helps to reduce the complexity of analysis for embedded systems."

Challenges

The global automotive industry continuously pushes to improve its time to market and reduce its costs while meeting functional safety demands. Embedded systems from automotive suppliers must be capable of operating reliably and safely under challenging environmental conditions. Since 2014, ZF has been a pioneer in applying medini analyze to its functional safety engineering practices, delivering significant benefits in terms of consistency and completeness of work products. In the past different tools were used for failure modes and effects analysis (FMEA), fault tree analysis (FTA), and hardware fault metric analysis, and the consistency between architecture models and the analyses was always a time-consuming challenge.

In the past, ZF product lines were using different standards for failure rates and modes. Therefore, the comparison of designs was difficult, although similar designs were used.

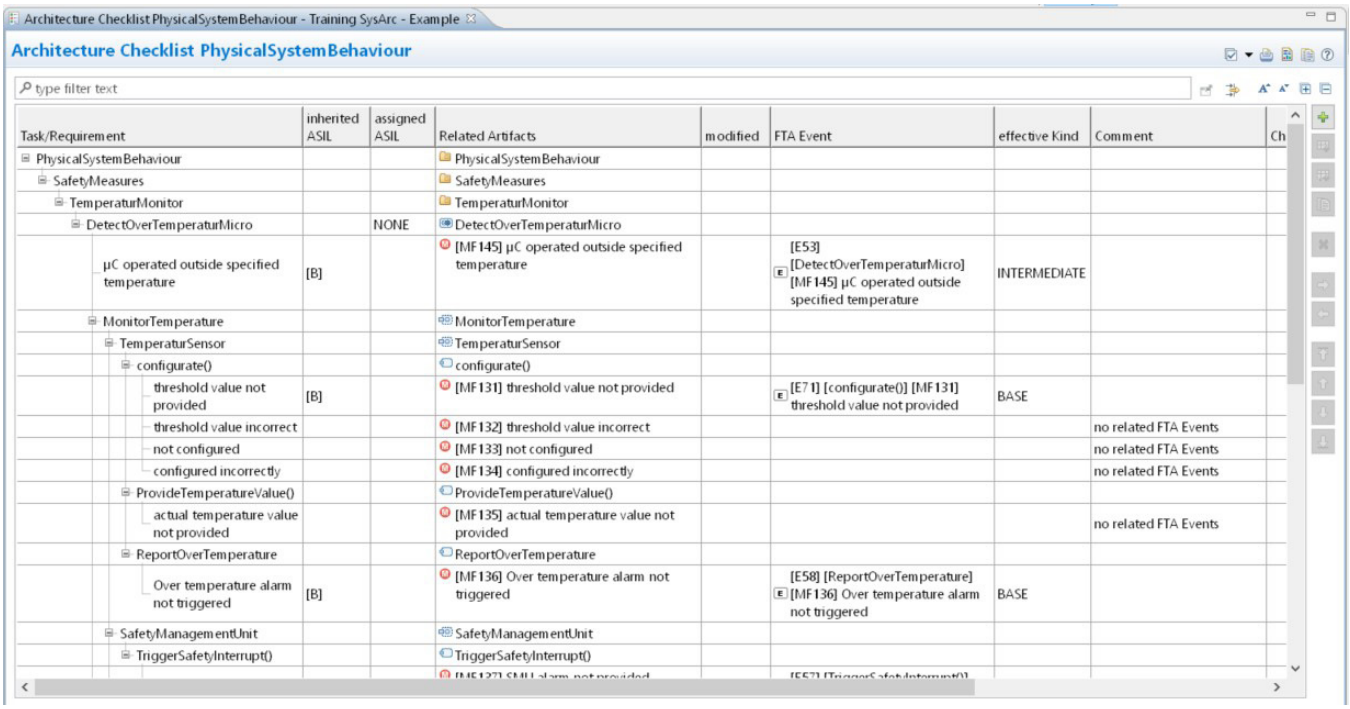
Tool classification and qualification according to ISO-26262 seem to be a challenge in every project worldwide. Although the topic "Confidence in the Use of Software Tools" is well described in ISO 26262-8:2018, project teams often do not know what to do. In most projects, the classification of software tools is based on reuse from source projects and lessons learned and are therefore well done. However, according to the qualification of software tools, evidence that measures from tool qualification have been performed is often missing.

Ansys Products Used

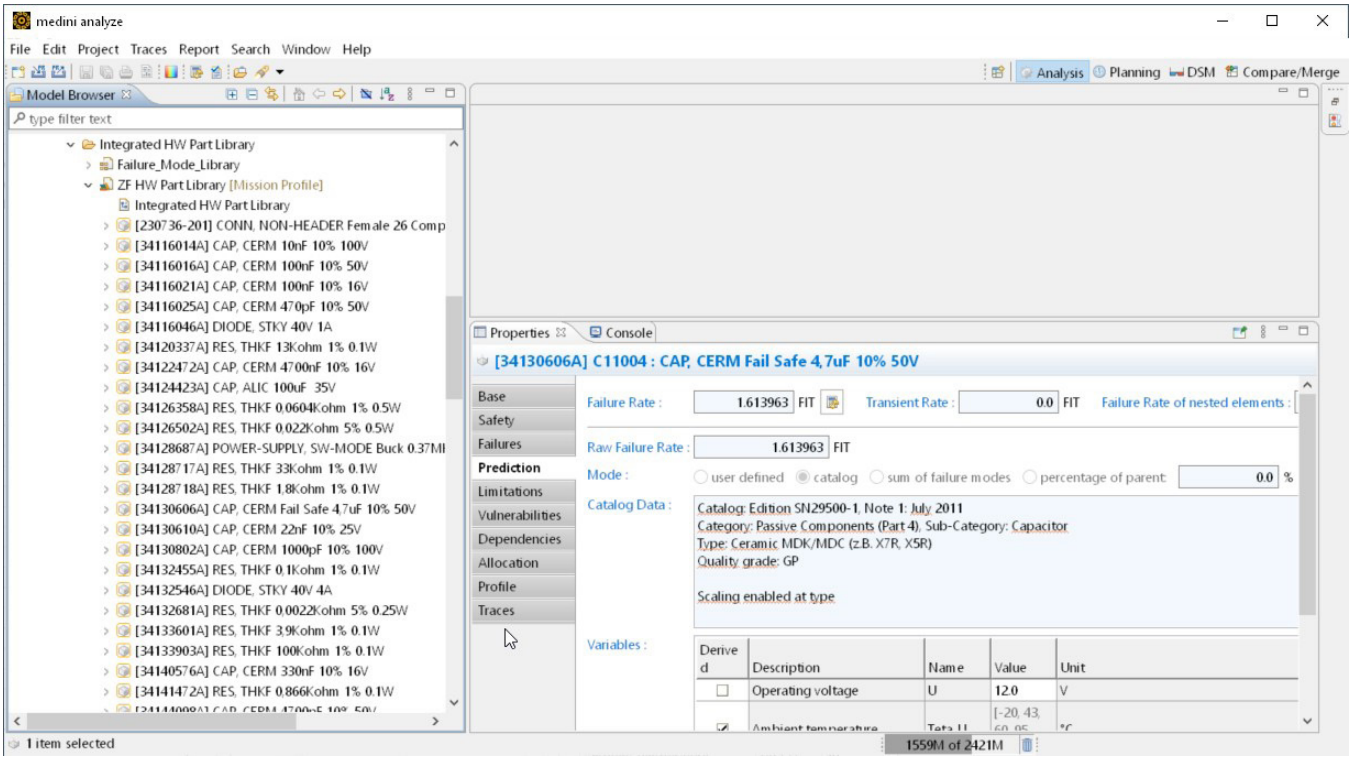
- Ansys medini analyze

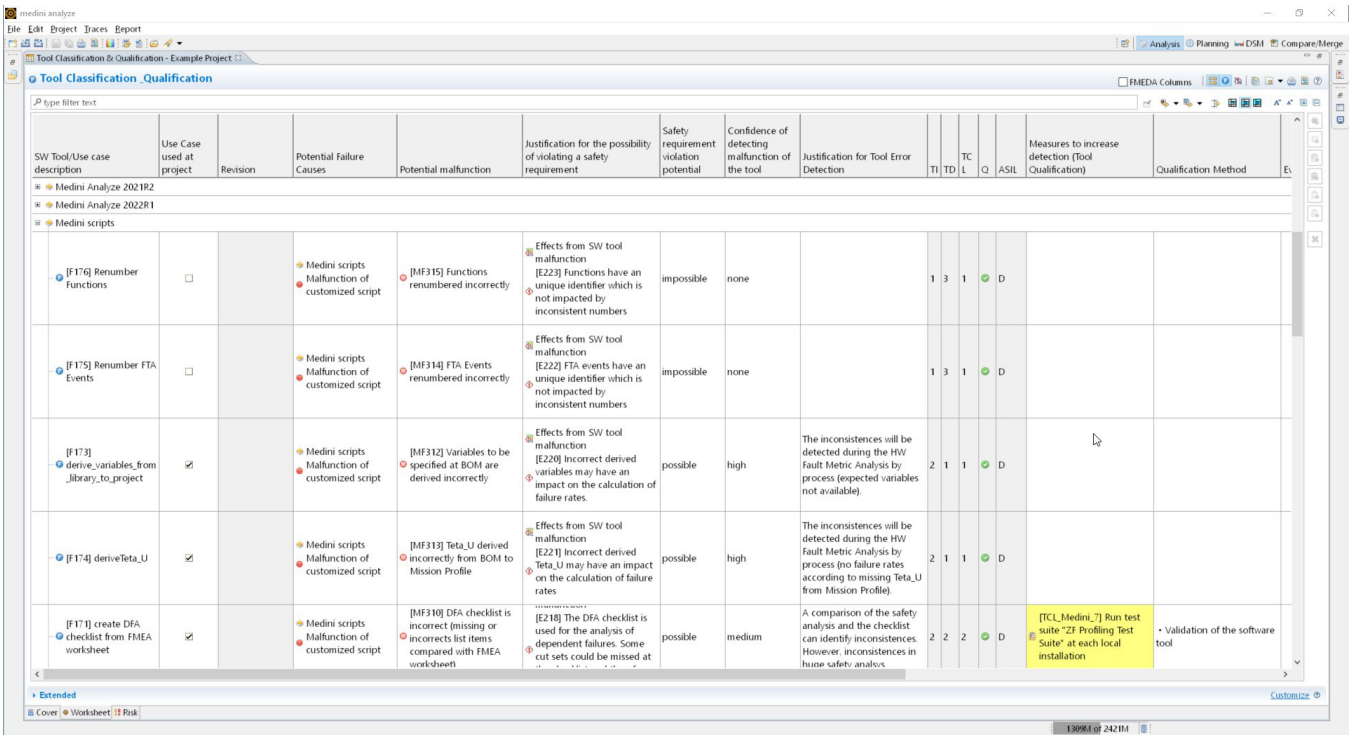
Engineering Solution

- Many systems engineering teams at ZF have used medini analyze for functional safety analysis since 2014, making ZF an early adopter.
- Customized FMEA and FMEDA worksheets derived from architecture models are always in sync.
- Evidence for the compliance between FTA and the architecture models can be provided by customized checklists derived from the architectures.
- ZF's Corporate Functional Safety Group recommends medini analyze for delivery of ISO-26262 work products.
- The ZF hardware part library provides harmonized failure modes and catalogs data for more than 22,000 electronic components based on ZF part numbers.



- A customized ZF master template provides customized worksheets supporting compliance between architecture models and all safety analyses.
- ZF has customized trainings to harmonize the use of medini analyze across projects and divisions.
- Effort for software tool classification and qualification can be dramatically reduced by an integrated prequalified tool database and a fully automated generation of the tool classification and qualification report.





Benefits

- The use of medini analyze for functional safety analysis has optimized the time involved in this process by up to 50% for the delivery of specific work products — making the entire embedded system development cycle much faster while ensuring transparent consistency, traceability, and completeness.
- Interfaces between medini analyze and SysML tools keep safety analyses (FMEA, FMEDA, FTA) and architecture models in sync.
- Time-consuming manual work for the identification of failure modes and rates is eliminated by the ZF hardware part library. ZF engineers can focus on the analysis of the failure effects.
- The effort for manual work according to tool classification and qualification can be reduced dramatically. The integrated collection of prequalified tools provides evidence for project-independent measures according to tool qualification. ZF engineers can focus on project-dependent measures only.
- ZF training courses help to harmonize safety analyses and provides a strong guideline for a further reduction of the effort.
- ZF engineers on many projects have found medini analyze's model-based approach very intuitive and user-friendly, making even the most complex of electronics architectures easy to understand and visualize.

Company Description

ZF is a global technology company and supplies systems for passenger cars, commercial vehicles, and industrial technology, enabling the next generation of mobility. ZF allows vehicles to see, think, and act. In the four technology domains — vehicle motion control, integrated safety, automated driving, and electric mobility — ZF offers comprehensive solutions for established vehicle manufacturers and newly emerging transport and mobility service providers. ZF electrifies different kinds of vehicles. With its products, the company contributes to reducing emissions and protecting the planet. In 2021, ZF had 157,549 employees worldwide with approximately 260 locations in 41 countries and achieved sales of €38.3 billion EUR.

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