PTC Integrity Automotive Solution

The PTC Integrity Automotive Solution addresses the complex challenges of automotive software systems development — helping automotive manufacturers reduce the cost and time required for ISO 26262 compliance, while accelerating innovation in their software-intensive products.

Software content within vehicles is growing exponentially. Hybrid technologies, infotainment, smart sensors, safety systems, and electronic braking and suspension systems are among the technologies driving the increase in software. Additionally, the interaction and integration of mechanical, electrical/electronic, and software systems is becoming overwhelmingly complex. Organizations are further challenged by functional safety mandates that require full traceability throughout the product engineering lifecycle — from requirements, models and tests to calibrations, validation and release.

PTC Integrity is the leading Software System Lifecycle Management (SSLM) solution for managing the development of software-intensive products and systems. It is also the first development solution certified by TÜV SÜD to help automotive manufacturers streamline compliance with ISO 26262 by automating and enforcing safety lifecycle development processes.

Complex Challenges in the Development of Safety Related Automotive Systems

Functional safety is a compelling topic in the world of automotive OEMs and suppliers and several standards exist today to ensure that risk of failure or malfunction in automotive systems is at a tolerable level. ISO 26262 is the newest functional safety standard targeting product development processes for electric and electronic systems in passenger vehicles.

ISO 26262 will ultimately aid automotive OEMs and suppliers in the development of safety-related systems. However, many of these organizations are struggling with this stringent new standard as system complexity rises due to the exponential increase of software and electronics. With software and electronics driving over 90% of automotive functionality, differentiation and innovation, these organizations face a common set of challenges:

- Disconnected and disparate development tools and data across system, software and hardware
- Lack of process support and automation for the safety lifecycle
- Manual and disconnected hazard analysis and risk assessment
- Lack of reuse of software system development artifacts

The PTC Integrity Automotive Solution

The PTC Integrity Automotive Solution was purpose-built for managing software and system lifecycle processes with specific support for the ISO 26262 safety lifecycle. Figure 1 shows the traceability requirements for ISO 26262 that the PTC Integrity solution implements.

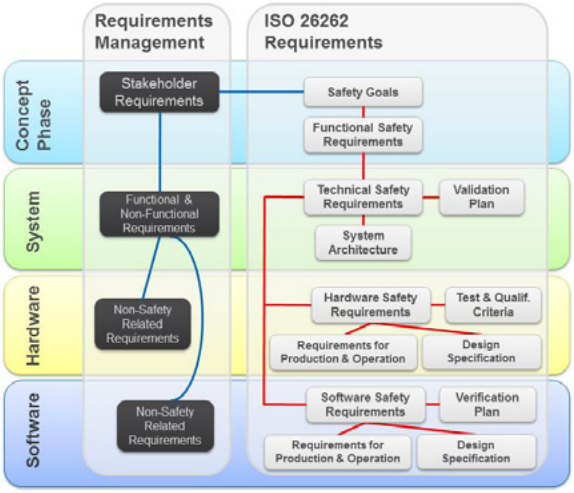

Figure 1: ISO 26262 Traceability model implemented in the Integrity Automotive Solution.

The Concept Phase – Integrated Hazard Analysis and Risk Assessment

The PTC Integrity Automotive Solution implements hazard analysis and risk assessment documents that allow organizations to describe hazardous events, exposure, severity and controllability. The solution then automatically computes the Automotive Safety Integrity Level (ASIL) according to the ISO 26262 standard. These hazards are linked to downstream safety goals and safety requirements.

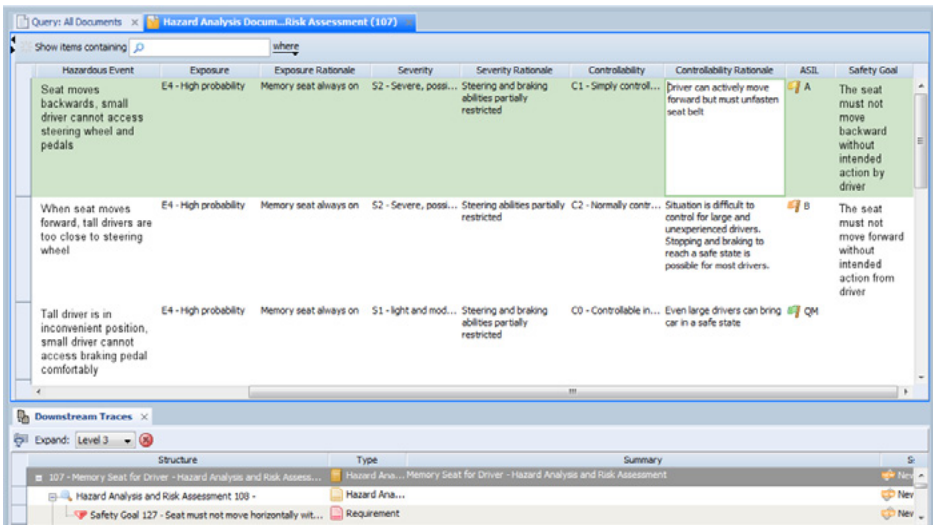

Figure 2: Hazard analysis and risk assessment document in the Integrity Automotive Solution.

The System Level – Technical Safety Requirements and System Architecture

The PTC Integrity Automotive Solution also implements the system level with a Technical Safety Concept document as prescribed by ISO 26262. With PTC Integrity's rich text document editor with automated change control, development teams can easily manage system-level requirements and architecture documents while maintaining a complete audit trail and lifecycle-wide traceability.

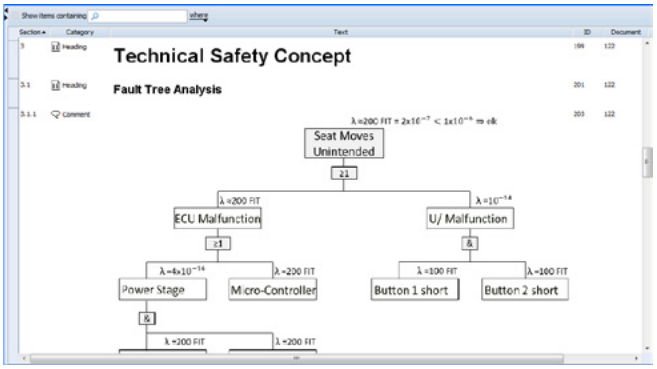

Figure 3: Tecnical Safety Concept document in Integrity's rich text editor

Software and Hardware Requirements and Design

The solution goes further than competitive products to implement both software and hardware requirements and design documents that allow engineers to work from a single source of truth. This integral solution enhances overall collaboration, thereby improving product quality, heightening team efficiency and reducing overall rework. Downstream traceability to test cases also provides a complete V model and validation for the entire set of requirements.

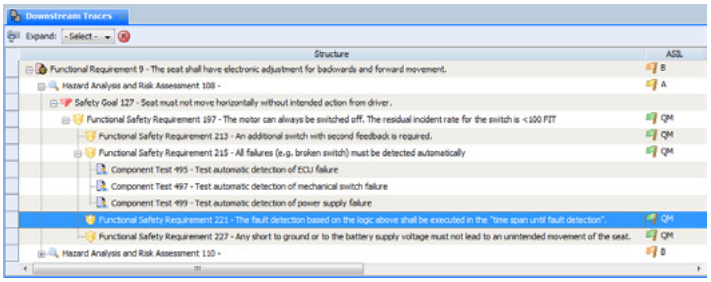

Figure 4: Downstream trace view in Integrity shows safety lifecycle relationships.

A TÜV SÜD-Certified Solution

TÜV SÜD Automotive, a global leader in technical certification services, has certified that Integrity release 2009 SP6 (9.6) is fit for purposes of developing safety-related systems for use in ISO/DIS 26262 — and IEC 61508 — compliant development processes. This independent assessment of Integrity change and configuration management capabilities enables automotive engineering organizations developing safety-related embedded systems to qualify the tool chain being used to produce systems up to ASIL-D or SIL3 — the most stringent levels of safety function as defined by the standards.

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