

RETHINKING QUALITY IN THE DIGITAL AGE

Quality-to-market: Test driving a new quality management paradigm

Can automotive players cope with autonomous driving's quality implications? The autonomous driving phenomenon has introduced sophisticated new electronic components and systems into the automotive mix that could add to the burden of platforms that are already struggling under a heavy load of distributed embedded software and electronics. Without proper safeguards, these highly vulnerable systems could become the Achilles' heel of next-generation car design.

RICHARD HELL
DANIEL PARTSCH

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WANTED: A MORE ROBUST APPROACH FOR A NEW AGE

While the automobile industry has proven itself to be adept at managing traditional quality-related risk in the past, this time may be different. Autonomous vehicles (AVs) and other innovations that rely on advanced electronics and software require new robust quality management systems and advanced tools and methods capable of preventive monitoring and control. The new functional capabilities of autonomous vehicles will force automotive quality departments to assume a leading quality assurance role. This comprehensive new quality responsibility will include: taking steps to reduce extensive late-stage design changes; stabilizing the supply chain, architecture, and functionality performance; and reducing warranty problems and associated liability damages.

The launch of the precursors to autonomous vehicles and other advanced technologies has already tripled product recalls over the past five years, a clear indication of the increasing complexity of new products and complete systems. What is more, traditional problem-solving activities and methods do not support the identification of root causes in these cases due to the intermittent nature of failure events that these complicated integrated systems exhibit. Take the growing complexity of parking assistance systems, for example. Initially little more than simple ultrasonic sensor-based object detection units, they have evolved into highly complex systems that offer automated parallel parking, right-angle parking, and forward parking with

automatic braking, and rely on more than 12 ultrasonic sensors and increasingly complex algorithms.

Automakers need to manage this overall complexity tightly, and monitor it during the product development and production stages, adapting analytics, tools, and methods to achieve standardized and consistent results. Given the shift from a mechanical footing to an approach based on electronics and software, the future automotive quality-management paradigm must in the future encompass preventive digital quality controls. Today's conventional continuous improvement and visual quality management methods cannot cope with these new challenges, as illustrated by the fact that more than 30 percent of warranty cases today result from electrical and electronic components. (See Exhibit 1.)

INTRODUCING QUALITY-TO-MARKET

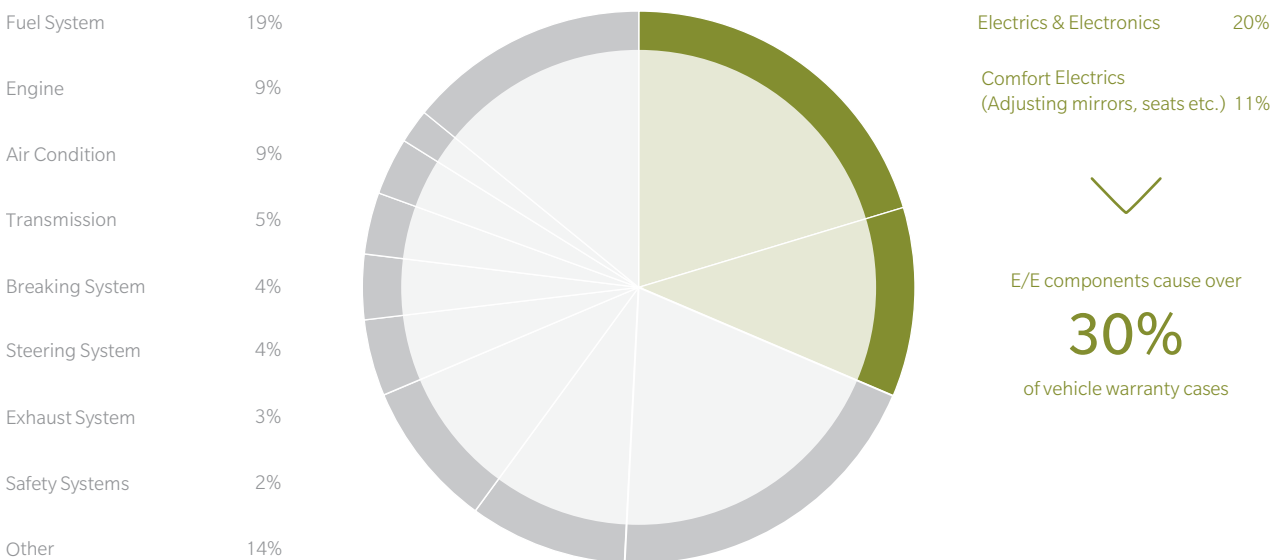
Quality-to-market is an innovative approach for assuring the soundness and reliability of highly complex electronics- and software-driven technologies. Its core philosophy is that quality ultimately drives time and cost considerations. It focuses on areas such as start-of-production (SOP) delays and overspending on deliveries, engineering, and manufacturing, as well as reliability issues and warranty claims.

Automobile manufacturers and tier-1 suppliers have always focused on the quality of products and systems, but time and cost issues have dominated their processes and the decisions

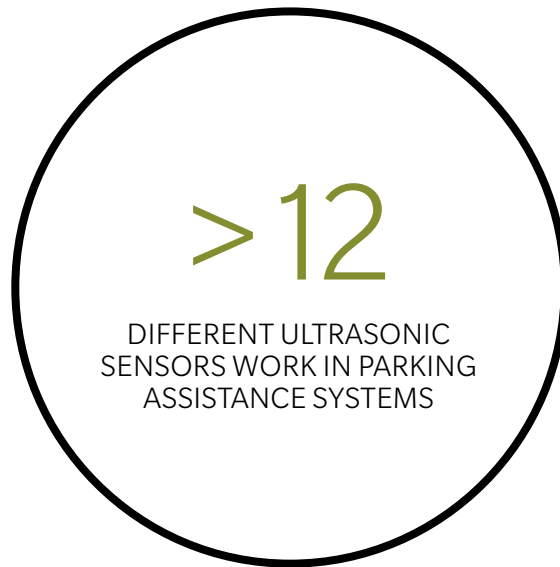
EXHIBIT 1: E/E COMPONENTS ARE STILL THE MOST VULNERABLE PARTS OF A VEHICLE

Over 30% of warranty cases are caused by E/E components

COMPONENTS CAUSING WARRANTY CASES
2014, IN % OF ALL ANALYZED WARRANTY CASES



Source: CG Car Garantie AG Statistics based on ~1 Mio. warranty cases in 2014



made in executive boardrooms. Quality organizations, on the other hand, have concentrated on single problems or the provision of methodical support. Liability damages, which could hurt the company's overall brand image and ultimately shareholder value, were events where the quality department played the role of independent auditor, taking neither responsibility nor accountability. To establish a balanced link between quality, time, and cost (QTC), companies need to make a shift to the mindset of quality-to-market as a guiding management paradigm, which covers the entire extended supply chain.

Research reveals that the number and proportion of software-related recalls in the US has increased steadily – unmistakable evidence that the automotive industry is not ready for this rapid influx of technology embedded in vehicle structures. The complexity involved in embedding new technologies in existing vehicle real estate has raised new challenges for automotive manufacturers and their tier-1 suppliers. Consequently, companies need to adjust the new processes involving digital quality controls, technical risk management, and quality predictive systems so that they mesh with newly designed product development processes.

ADOPTING A ROBUST QUALITY MANAGEMENT SYSTEM

Transitioning to this new paradigm will require a fundamental change in mindset that enables the company's central quality function to perform as a neutral authority, delivering a transparent and traceable quality control "dashboard." Because the robustness of these processes will have an impact on product quality, companies need to align their quality management systems to future assumptions and requirements. One example would involve the collection of field failure data into a common structure in a "data ocean" to classify failure patterns or other

algorithms in real time, enabling companies to solve technical problems faster.

A collaborative and fully transparent supplier management approach will help companies to diagnose and resolve bottlenecks and identified problems more rapidly. Organizations will be able to map product field and production data directly to new product development cycles, enabling engineering to make better, smarter, and more cost-efficient decisions. And by adopting a structured risk mitigation method that focuses on key at-risk variables, organizations can identify high-risk areas and monitor them tightly throughout the entire development process.

Companies should adopt a recurring, closed-loop approach to enable the identification and mitigation of technical risks on systems, processes, or supply chains. Experience suggests that recurring weaknesses along the product development process cause most technical problems.

The quality-to-market approach redefines the quality department's traditional role in the digital age, but moving to this paradigm will require significant changes in roles, responsibilities, and behaviors. In the end, one needs the right mindset, established tools, structured methods, and the absolute willingness to live the quality guru mantra of "do-it-right-the-first-time" across the entire value chain, since one does not always get a second chance. ●