JTEKT Corp. meets international auto safety compliance standards

IBM Rational software helps support compliance with ISO 26262 and Automotive SPICE safety standards

JTEKT Corp. was formed in January 2006 as a result of a merger between Koyo Seiko Co., Ltd. and Toyoda Machine Works, Ltd. The company manufactures and sells steering systems, driveline components, bearings, machine tools, electronic control devices and home accessory equipment. Headquartered in Japan, JTEKT employs approximately 41,000 people.

Adhering to international standards for safety
The international functional safety standard ISO 26262 was established to ensure the safety of motor vehicle parts, which are continuously evolving to achieve greater performance and new functionality. To meet these standards, companies must properly manage each process of the product lifecycle such as planning, development, manufacturing, sales and decommissioning.

JTEKT has been striving to adhere to the ISO 26262 standard for many years to meet the demands of its European customers. Hirozumi Eki, team leader of development team 2 in the JTEKT system development department, says the ISO 26262 regulation creates two challenges for the company. “One is to take steps in a systematic way to progress work. The other is to quantify risks, in order to keep the risk lower than a certain probability,” he says.
The ISO 26262 regulation includes the Automotive Safety Integrity Level (ASIL) standard, intended to minimize automobile risk. “In the electric power steering systems that we develop, for example, if the torque sensor breaks, self-steering is turned on automatically, which may cause an accident. Due to this degree of consequence, the ASIL requirement standard of electric power steering is the strictest level at ‘ASIL D,’” says Eki.

“Ranked at ASIL D means we have a set point of allowed risk for event probability,” Eki explains. “We divide the system into elements and think of possible error modes, what actually happens and what measures we can take to avoid them.” However, as the company clarifies these subdivided demands and requirements of functions and performance to meet the demands, it becomes difficult to trace them. “Because each requirement is distributed to different people in charge, it becomes difficult to precisely trace the content of the original requirement, or determine if the demand was appropriate. This does not complete the job properly. Working toward the wrong demand or making mistakes in analyzing demands will not lead to the correct output. In order to prove that suitable demands are confirmed for processing, each needs to be traceable,” says Eki.

Managing requirements with IBM Rational software

JTEKT selected IBM Rational DOORS software as its requirement management tool. “I didn’t think managing the relationship between the subdivided demands and the requirements to meet the demands could be done using spreadsheets,” says Eki. “We chose IBM Rational DOORS for this purpose, as it’s widely used in Europe as the industry standard.”
Introducing Rational DOORS software satisfies the requirement management component of the ISO 26262 standard. However, to meet the configuration management and modification management requirements, JTEKT needed a deliverable management solution as well, which the company solved by implementing IBM Rational Team Concert software. “System development is not a short-term solution but will require several years to several decades of relationship with vendors,” says Eki. “Technological skill is required, but a good, lasting vendor relationship is also important. IBM listened to us sincerely, and diligently worked to help us achieve our goals.”

Supporting Automotive SPICE compliance with IBM Rational software

When selecting configuration management and modification management tools, JTEKT also considered the Automotive Software Process Improvement and Capability Determination (Automotive SPICE), which is highly compatible with the software development process in the ISO 26262 standard. Automotive SPICE is an industry-standard process model for in-vehicle built-in software development. According to the Automotive SPICE standard, organizations must strive for constant process improvement. To analyze and improve processes, companies must review and revise them appropriately.

Before using the Rational solution, JTEKT had problems with many of its processes. The test cycles were inefficient, and audits were conducted based only on the drawing and the result of the program, not on the process itself. “To solve these problems, it was important to make each step of work transparent and to improve the development process,” says Eki.
“IBM Rational Team Concert can be used as-is, not only for software development but also for large process product development.”

—Hiroaki Kato, team leader of JTEKT development group 3, system development department, JTEKT Corp.

“From our perspective, we found that IBM Rational Team Concert is a tool to be used for workflow management, in addition to configuration management,” says Eki. “IBM Rational Team Concert has a database structure, such that each work item can be used separately. Configuration management can be performed by looking at the finite difference of the workflow. Together with the information input, Rational Team Concert records all information for multiple attributes, such as date and time, operator, how the step was done and the end result. By collecting the records of what was processed in what way, the activities can be managed as a workflow. Once we review these records, we are able to audit for whether the work was done properly.”

“IBM Rational Team Concert can be used as-is, not only for software development but also for large process product development,” says Hiroaki Kato, team leader of JTEKT development group 3 in the system development department. “Systematic business procedure naturally requires management and deliverable control. IBM Rational Team Concert can be used for establishing the basic processes, guiding the workflow activities and recording them.”

Reducing rework

The Rational software helped JTEKT successfully design and implement its new business processes as well as meet ISO 26262 standard and Automotive SPICE certification requirements. The solution also facilitated significant improvement in overall efficiency and product quality, resulting in greater customer satisfaction. Further, after achieving the industry certifications and improving business processes, JTEKT increased business volumes and obtained a new customer, a vehicle original equipment manufacturer (OEM) in Europe.
According to Kato, the company is continuing trials in several projects. “There are over 100 registered users,” he says. Users on the system for about six months find the Rational tools useful. “The effect we’re really seeking is a reduction in rework,” Eki says. “It takes about three to four months to design, to conduct the trials, and to analyze the test results. In other words, we do not know the results for three months, but we continue working during this waiting time, so it’s possible we end up making three or four similar products. If rework is required, the same issues occur three or four times. If we can eliminate at least one of these instances of rework, it brings significant benefit to the company.”

**For more information**

To learn more about IBM Rational software, please contact your IBM representative or IBM Business Partner, or visit the following website: [ibm.com/software/rational](http://ibm.com/software/rational)

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