

## Functional Safety

A new generation of robots is being introduced into the manufacturing and the service industries that allows direct interaction between humans and machines. This collaboration of machine and person makes new applications a reality, but it also presents new challenges as to how to protect people from the hazards of the machine and/or the task.

The introduction of the latest editions of ANSI / RIA 1740 (4th Edition, January 2018) and ANSI / RIA R15.06:2012 (ISO 10218) paves the way for collaborative robots and other new technologies that bring us into the 21st century by allowing safety functions to be more reliably implemented and controlled. In order to protect the machines and the people who work next to them, manufacturers, integrators and users need to be aware of the concept of functional safety (FS). Functional safety is integral to reducing the potential risks involved with any technology, including operator errors and machinery failures. A FS management system regulates the safety processes of any piece of electrical equipment based on human interactions, environmental factors, and its own hardware and software. Functional safety certification provides a quantifiable method to ensure a level of reliability for safety functions.

### **MANUFACTURER CHALLENGES**

The lifecycle of a safety system needs to be controlled in accordance with functional safety standards. A documented functional safety management system needs to be in place to ensure this. Part of a functional safety certification includes an audit of the FS management system to ensure it is being properly followed. In addition to the FS management system, manufacturers are tasked with documenting the entire lifecycle of the safety functions, including but not limited to a risk assessment (RA), a SRS (System Requirements Specification, including hardware requirements specification and software requirement specification), functional safety calculations, a verification and validation plan, Failure Mode Effects and Diagnostics Analysis (FMEDA), as well as a host of other details. Manufacturers that are new to functional safety may not have any of these documents or controls in place at the time certification is needed, which can greatly complicate the process. In reality these documents should be in place when the product is simply a concept. TÜV Rheinland is able to work with manufacturers every step of the way to ensure systems are properly documented and tested so integrators, users and other interested parties, such as Authorities Having Jurisdiction (AHJs), can have confidence in the safety system.

## **INTEGRATOR CHALLENGES**

Robot and machine integrators need to look at safety from the perspective of the application. A risk assessment (RA) that considers the application must be carried out. Machines and systems are then selected that can provide safety functions with a level of reliability that matches what is determined by the RA process. The integrator must also apply FS management techniques and document the system in a similar way to a manufacturer. This could be especially challenging for integrators who may not be familiar with the requirements. TÜV Rheinland can work with integrators to help ensure the safety of installed systems