

Importance of Auditing Automation in Safety Applications

Many oil and gas, petrochemical, and specialty chemical companies invest millions of dollars on automation in safety applications with the desire to reduce the likelihood of safety incidents. Investment starts early. Hundreds of engineering hours are used to brainstorm potential events and to identify safety gaps. Even more engineering hours are spent determining the best way to lower the event likelihood, such as the use of safety controls, alarms, and interlocks (SCAI). Unfortunately, expending engineering resources does not guarantee safe operation long-term. Return on investment can be significantly reduced by simple mistakes made during design, installation, testing, maintenance, and operation. Mistakes related to engineering and maintenance practices are often replicated across projects, increasing site-wide risk. If design assumptions in early project phases are not consistent with reality, the likelihood of incidents can be greater than anticipated. Eliminating mistakes and correcting performance gaps requires sustained organizational discipline, effective administrative controls, and rigorous management systems.

Functional safety auditing looks for evidence that the site's management systems are sufficiently rigorous to sustain SCAI performance over its lifetime. Some evidence will be familiar to process safety management auditors, such as checking maintenance schedules or examining management of change records. However, there are calculations, inherently safer design techniques, assessment requirements, modern automation design methods and configuration controls that are likely not understood by the process safety community. Verification, validation, bypass control, change management, and instrument reliability programs are among the specialized management systems cited with unfortunate frequency in incident investigation reports. A quality audit needs an independent auditor with significant SCAI design and management expertise, who can ferret out the underlying problems and propose implementable cost-effective solutions.

An audit execution plan addresses how the audit is carried out and how timely and satisfactory resolution of recommendations is assured. Major activities involve the review of information, documentation, and records for evidence that each safety management system is active and effective. Each audit finding and recommendation, whether positive or negative, is justified by good engineering practice. Key findings typically include: inadequate execution of functional safety assessments; inconsistent process safety information; missing verification and validation records for approved changes; gaps between actual process control and safety system performance and design assumptions; excessive use of SCAI bypasses; and poor SCAI awareness among assigned personnel.

The documentation review is supplemented by interviews with personnel assigned SCAI responsibility and the inspection of the field hardware and application programs of a small sample of individual SCAI loops. This inspection spot-check helps detect potential errors that are not readily apparent in the documentation, such as below average instrument reliability, inconsistent procedure use, or poor change management discipline. The spot-check ranges from 2% of the SCAI loops for very large populations to near 100% for populations of 25 or fewer. The auditor may use detailed checklists to ensure coverage of applicable good engineering practices.

Functional safety audits may take place at any time. Robust and timely audit execution can identify and correct mistakes made by personnel. Performing more frequent audits may be particularly beneficial at a site where new or unfamiliar technology is being used, where there is frequent turnover of personnel assigned SCAI roles, or when personnel are challenged with new SCAI practices. For example, an audit at the end of each project stage ensure that the documentation and records being generated are correct. Finding design and implementation gaps early saves money over the SCAI installed life.

Sustaining safe automation is essential to successful and productive operation of oil and gas facilities. Since 1992, numerous incidents on a global scale have demonstrated the importance of rigorous management systems to safe operation. Functional safety auditing is an indispensable tool in maintaining the effectiveness and safety integrity of SCAI.