



ISO 25119, ISO 13849 and the EU Machinery Directive

Functional safety training for engineers working on earth moving machinery and agricultural tractor control systems

Course overview

This 2.5-day technical training course will cover functional safety standards and concepts related to earth moving machinery. Applicable standards covered in this training include the EU Machinery Directive, ISO 13849, Safety of Machinery – Safety-Related Parts of Control Systems, and ISO 25119:2018, Tractors and machinery for agriculture and forestry – Safety-related parts of control systems. UL experts will cover such topics as hazard identification and risk assessment in accordance with ISO 12100:2010, Safety of Machinery – General principles for design – Risk assessment and risk reduction. Case studies on a range of topics, including motor drives and safety product life cycles, will also be used to provide examples of how the requirements and concepts of the standards are applied.

Training topics

- Role of ISO 13849 and ISO 25119 in machine safety regulations
 - EU Machinery Directive
 - Tractor Mother Regulation (TMR)
- Comparative overview of ISO 13849 and ISO 25119
- Hazard identification and risk assessment according to the ISO 12100 standard
- Design in accordance with ISO 13849
 - Performance level (PL) assignment
 - Risk reduction and required performance level
 - Determination of required performance level
 - Parameters of performance level
 - Mean time to dangerous failure (MTTF), diagnostic coverage (DC)
 - Measures to avoid common cause failures (CCF)
 - Failures to be considered and fault exclusion
 - How to perform failure modes, effects and diagnostic analysis (FMECA)
 - Evaluation of performance level (simplified procedure)
 - Software safety requirements
 - Software-based parameterization
 - Combination of safety-related parts of control systems (SRP/CS) to achieve PL
- Design in accordance with ISO 25119 (considering overlaps with ISO 13849)
 - Agriculture performance level (AgPL) assignment
 - Specification of requirements for safety related control functions (SRCFs)
 - Functional decomposition
 - Realization of subsystems
 - Determination of the safety performance of the subsystem
 - Estimation of the rate of dangerous failure per hour (PFHD) of subsystems
 - Contribution of CCF
- The future of ISO 25119 and ISO 13849
- Identify the required risk reduction and functional safety ratings (PL and AgPL) to be provided by control systems
- Develop a safety concept that satisfies the requirements of both ISO 13849 and ISO 25119
- Apply the steps required by both ISO 13849 and ISO 25119 to achieve the required risk reduction and validate it



Optional UL Certified Functional Safety Professional Exam

Participants who complete all 2.5 days of training are eligible to take a two-hour certification exam in the afternoon of the third day. Those who pass the exam are individually certified as a *UL Certified Functional Safety Professional (UL-CFSP)* in Agricultural Machinery.



Upon the successful completion of the *UL-CFSP* exam, participants will receive a certificate and badge that they can use to demonstrate their competence in agricultural machinery functional safety. The certification is good for three years, after which individuals may recertify.

Why choose UL?

From materials testing to supply chain management, new energy options to security and interoperability solutions, leverage our expertise and insights to navigate the global regulatory landscape and bring your products to market.

Our global network of technical experts and state-of-the-art facilities, along with our longstanding relationships with regulatory authorities, partner laboratories and industry technical leaders, helps manufacturers gain the compliance credentials they need to compete in a more complex global supply chain.

Knowledge you can trust – Our experienced staff will support you from the initial design stage of product development through testing and production. Our experts can assist you in understanding the certification requirements for your specific markets.

Speed and efficiency – Our cost-effective systems and state-of-the-art facilities cut through the red tape and help accelerate your time to market.

Objectives

Upon successful completion of this workshop, you will be able to:

- Identify the required risk reduction and functional safety ratings (PL and AgPL) to be provided by control systems
- Develop a safety concept that satisfies the requirements of both ISO 13849 and ISO 25119
- Apply the steps required by both ISO 13849 and ISO 25119 to achieve the required risk reduction and validate it

Target audience

- Hardware/firmware designers
- Development managers
- Project and product leaders
- Compliance engineers
- Design and manufacturing engineers

Single-source provider – UL meets your compliance needs and, by bundling safety, performance and interoperability services, also helps save you valuable time and money.

Global reach and access – Our global network of expert engineers helps you understand the various national and global requirements for your specific market application.

For more information, call 1.864.630.5373,
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