

產品和系統的功能安全驗證流程

Functional safety certification process for products and systems

接洽階段 Contact phase	
生產商 Manufacturer	德國萊因TÜV TÜV Rheinland
<ul style="list-style-type: none">生產商提供驗證產品說明書和功能方塊圖 Manufacturer submit product manual and block diagram	<ul style="list-style-type: none">針對驗證產品報價，簽訂合約 Quotation for product and sign the contract

概念階段 Concept phase	
生產商 Manufacturer	德國萊因TÜV TÜV Rheinland
<ul style="list-style-type: none">安全需求規範 Safety requirement specification (SRS)安全概念 Safety concept (SC)安全計畫 Safety plan (SP)驗證和確認計畫 Verification and validation plan(V&V plan)	<ul style="list-style-type: none">首次會議，偏差分析，提出偏差報告 Kick off meeting, deviation analysis and report評審概念相關文件 Concept review for related documents確認相關環境(包括EMC)測試條款 Confirm environment testing (including EMC) requirements

主檢階段 Main inspection phase	
德國萊因TÜV TÜV Rheinland	
<ul style="list-style-type: none">產品文件審核功能性測試、故障插入測試失效模式及影響分析(FMEA)安全完整性等級相關參數計算用戶文件審核，如使用手冊、安全手冊等	<ul style="list-style-type: none">Product documents assessmentFunction test, fault insertion testFailure modes and effects analysis (FMEA)Safety integrity level (SIL) related parameters calculationUser documents assessment, including user manual, safety manual, etc.

發證階段 Certification phase	
德國萊因TÜV TÜV Rheinland	
<ul style="list-style-type: none">簽發工廠審核報告簽發評估報告頒發證書	<ul style="list-style-type: none">Issue factory inspection reportIssue assessment reportIssue certificate

關於德國萊因TÜV集團	About TÜV Rheinland Group
	<p>總部位於德國科隆的德國萊因TÜV集團擁有140多年的經驗。德國萊因TÜV集團是國際上領先的技術服務供應商，它在全球60多個國家設有500家分支機構，擁有超過19,000名員工，服務涵蓋工業服務、交通服務、產品服務、生命科學、培訓與諮詢服務以及系統驗證服務。</p> <p>TÜV Rheinland Group has more than 140 years of experience and is headquartered in Cologne. TÜV Rheinland Group is a leading group for the provision of technical services worldwide. It has 500 locations in over 60 countries with a workforce of over 19,000. The business scope covers Industrial Services, Mobility, Products, Life Care, Training and Consulting, Systems.</p>



機械領域的功能安全 Functional Safety of Machinery



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機械領域控制系統的功能安全標準

Standards for functional safety in control systems of machinery

隨著科技的日新月異，機械控制系統的基本標準EN 954-1已被EN ISO 13849-1及EN/IEC 62061所取代，因此機械設備的安全評估也面臨改變。以往，安全功能評估主要著重於安全相關的架構(回路設計、組成元件、控制程式、安全等級)，但現在軟/硬體產品的可靠度(可能的危險失效)也必須通過更複雜的功能安全驗證程式來加以評估。並且機械領域的功能安全相關標準(EN 62061、EN ISO 13849-1、IEC 61800-5-2及IEC 61496)也已成爲歐盟機械指令中的協調標準。因此，盡早爲您的機械設備取得相關功能安全驗證將可帶來更多的商機!

The generation change for standards on safety in machinery control systems introduces new concepts and assessment for machine industry. The EN 954-1 standard is being superseded by EN ISO 13849-1 and EN/IEC 62061. Previously, safety function analysis in the machinery field focuses on the safety-related category. However, the reliability of hardware and software has been considered by a more thorough process now. Moreover, EN 62061, EN ISO 13849-1, IEC 61800-5-2 and IEC 61496 have been published as harmonized standards under the Machinery Directive. It is beneficial to start applying a certificate of functional safety for your products as soon as possible!

德國萊因TÜV，您值得信賴的合作夥伴

TÜV Rheinland is your reliable partner



德國萊因TÜV爲您提供全面的品質保證，確保產品設計充分符合國際機械功能安全標準的相關要求，如IEC 61508、ISO 13849及IEC 62061，並且符合安全完整性等級(SIL)或性能等級(PL)要求。

在初始階段，我們會對產品主要性能和設備要求進行評估，以盡早發現概念階段的不符合標準項目，減少專案後期可能產生的修改費用。而在主檢階段，會對產品進行更加詳細的理論和實踐評估。此外還會對驗證、確認、管理文件方面進行評估。

TÜV Rheinland provides you with quality assurance to ensure that your products are adequately designed according to the requirements of international standards, such as IEC 61508, ISO 13849 and IEC 62061, and meet the requirements for the intended safety integrity level (SIL) or performance level (PL).

During the initial concept review, the principal performance and requirements of the equipment are assessed. This facilitates early detection of deviations in the concept, reducing the probability of costly modifications later in the project. The main inspection phase includes more detailed theoretical and practical evaluations of the product. In addition, verification, validation, management and documentation aspects are evaluated.

測試標準

Standards

- EN/IEC 61508: 電氣/電子/可程式設計電子安全相關系統的功能安全
EN/IEC 61508: Functional safety of electrical/electronic/programmable electronic safety-related systems
- EN ISO 13849-1: 機械安全—控制系統的安全相關零件
EN ISO 13849-1: Safety of machinery-Safety-related parts of control systems Part 1
- EN/IEC 62061: 機械安全—安全相關電氣/電子/可程式設計電子控制系統的功能安全
EN/IEC 62061: Safety of machinery-Functional safety of safety-related electrical, electronic and programmable electronic control systems
- IEC 61800-5-2: 可調速電氣驅動系統—功能安全相關要求
IEC 61800-5-2: Adjustable speed electrical power drive system-functional safety requirements
- EN/IEC 61496-1: 機械安全—電子感應防護設備
EN/IEC 61496-1: Safety of machinery-Electro-sensitive protective equipment Part 1



我們的服務

Our services

產品驗證 Product certification

安全相關的產品驗證服務

Examples of our safety-related product certification service

- 功能安全管理系統審核
- 失效率計算 (PFH/PFD)
- 失效模式及影響分析 (FMEA)
- 安全完整性等級 (SIL) 或性能等級 (PL) 判定
- 軟體評估和環境測試 (含EMC)
- 故障插入測試
- 文件審核，包括使用說明書和安全手冊
- V&V的確認
- Functional safety management system audit
- Calculation of probability of dangerous failure (PFH/PFD)
- Failure modes and effects analysis (FMEA)
- Determination of safety integrity level (SIL) or performance level (PL)
- Software assessment and environmental tests (including EMC)
- Fault insertion test
- Review of documentation including user manual and safety manual
- Verification and validation confirmation

功能安全工程師培訓 Functional safety engineer training

基本培訓、內部培訓、功能安全工程師培訓計畫

Basic training, in-house training, functional safety engineer programme



德國萊因TÜV功能安全課程是世界上功能安全領域中唯一一個長期職業培訓課程。我們作爲中立的協力廠商機構對人員的知識和能力資格進行認可，並頒發證書。

參加德國萊因TÜV功能安全IEC61508或ISO 13849-1/IEC 62061培訓課程的學員如果通過考試，並具有3年以上的相關工作經驗，就能取得德國萊因TÜV功能安全工程師證書，獲得功能安全工程師資格的學員可以在www.certipedia.com線上證書查詢平台找到相關資訊。

The TÜV Rheinland functional safety programme is the world's only extended vocational training programme in the area of functional safety in which knowledge and competencies are approved by a neutral third party and after which certificates are issued.

Participants in the TÜV Rheinland functional safety programme who pass the IEC 61508 or ISO 13849-1/ IEC 62061 training exam, and have more than 3 years related working experiences, will be awarded a TÜV Rheinland FS engineer qualification. The names of all qualified TÜV Rheinland FS engineers will be listed on www.certipedia.com.

如何獲得更高級別證書?

How to get an advanced qualification?

具備8至15年的功能安全相關經驗
Have 8 to 15 years of functional safety experience

在培訓後通過德國萊因TÜV功能安全工程師考試
Pass the TÜV Rheinland FS engineer exam

提交兩個實際案例分析論文，且通過論文考核
Submit two real case studies and pass the assessment

接著您可申請德國萊因TÜV功能安全培訓教師資格
You can then apply for the TÜV Rheinland FS Engineer training tutor qualification

您可申請德國萊因TÜV功能安全專家資格
You can apply for the TÜV Rheinland FS expert qualification