The Institution of Engineering and Technology

Overview of the EMC for Functional Safety process for a 'Complex' EFS

http://www.theiet.org/cpd

To maintain the EM/safety performance of the EFS over its anticipated lifecycle, its EM/physical design and mitigation measures must take account of the lifecycle physical phenomena (mechanical, climatic, biological, chemical, etc.)

EFS Design

0 Overall EM safety planning
Determine who is in overall charge, aims of the project, boundaries of the EFS, budgets, timescales, and the personnel and their responsibilities and authorities. Set up activities that manage all the following steps.

1 Determine intersystem EM/physical phenomena
Determine worst-case EM/physical environment(s) that the EFS could reasonably foreseeably be exposed to (including emissions from other equipment or systems), over its anticipated lifecycle. Also determine effects of emissions on other EFS.

2 Determine intrasystem EM/physical phenomena
Determine the worst-case EM/physical environment(s) that parts of the EFS could reasonably foreseeably be exposed to, due to other parts of the same EFS over its anticipated lifecycle..

3 Specify EM/physical phenomena *vs* functional performance
Perform hazard identification and risk assessment that takes EMI into account; create a specification for the EFS, for each worst-case inter/intrasystem EM phenomenon, that also specifies relevant physical environment phenomena, over the anticipated lifecycle of the EFS.

4 Study/design the EFS
Including EM/safety design techniques and EM/physical mitigation for the EFS as a whole, and/or to commercial products incorporated within it, plus EFS user instructions to meet Step 3 EM/physical/performance specification over the anticipated lifecycle of the EFS.

5 Create EM and physical verification/validation plans
Create verification and validation plans for the EFS - and for any EM/physical mitigation measures not incorporated within it - to verify design elements as design and realisation progress, and to validate the EFS at its highest practical level of assembly against the Step 3 specification.

6a Specify EM/physical phenomena vs functional performance for each custom engineered item of hardware and/or software
Create a specification for each custon item, for each worst-case inter/intrasystem EM phenomenon, that also specifies relevant physical environment phenomena, over the anticipated lifecycle of the EFS.

Custom Engineering

Includes items made 'in-house'

6b Study and design each custom item of hardware and/or software
Including EM/safety design techniques and EM/physical mitigation for each item and/or for any commercial products incorporated within it, plus user instructions, to meet the item's EM/physical/performance specification from Step 6a over the anticipated lifecycle of the EFS.

6c Create EM/physical verification/validation plans for each custom item of hardware and/or software
Create verification and validation plans for each item - and for any EM/physical mitigation measures not incorporated within a custom item - for any EM/physical mitigation measures not incorporated within a custom item that verify individual design elements as their design and realisation progress, and validate them at their final assembly against their specifications from Step 6a.

Volume-manufactured standard products' EM and physical specifications
EM/physical/functional performance specifications offered by suppliers of standard volume-manufactured products, for equipment, modules, sub-assemblies, components, software, etc.

Includes standard products made 'in-house'

6d Select any volume-manufactured standard products for each item
So that their manufacturers' EM/physical/performance specifications plus the EM/safety designs of stage Step 6b meet the EM/physical/performance specifications from Step 6a, for each item. The required EM/physical spec's should be in their purchasing contracts. CEmarking should not be taken as evidence of EM performance.

6e Assemble/install/commission and verify each custom item of hardware and/or software
Employ QC to ensure that no problems are caused by poor quality materials, goods, services, or errors. Verify the EM and physical performance by applying the verification plans from Step 6c, for each item.

6f Validate each custom item of hardware and/or software
Following the validation plans from Step 6c, validate that the EM/physical performance of each item - and any EM/physical mitigation measures not incorporated within a custom item - meet their Step 6a specifications.

Design iteration may be required, if it is desired to use certain products

7 Assemble/install/commission and verify the EFS
Employ QC to ensure no problems are caused by errors, or by poor quality materials, goods, services, workmanship, etc. Follow the Step 5 verification plans to verify the EM and physical performance of the EFS - and any measures not incorporated within it.

8 Validate the EFS
Following the Step 5 validation plans, validate that the EM and physical perfomance of the EFS - and any EM and physical mitigation measures not incorporated within it - meet their Step 3 specifications.

EFS Creation

EFS operation, decommission, disposal

9 Maintain the EFS's specified EM/physical/performance specifications over the lifecycle
Including operation, maintenance, repair, upgrade, modification, decommissioning, disposal, etc.

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