CERTIFIKAT

No. 46 24 01

PLUS+1 Development tools, version 4.1.X

Holder / Issued for / Manufacturer

Sauer-Danfoss (Älmhult) AB, Teknikgatan 1, SE-34334 ÄLMHULT, Sweden

Product name and description

The PLUS+1 development tools, version 4.1.X are support tools used for code generation, where high level graphical symbols are transferred to source code and in addition supports the assembling, linking and downloading of the source code to the hardware. The PLUS+1 Development tools, version 4.1.X, consists of two main parts, namely:

- GUIDE tool, that handles the translation of graphical symbols to executable code
- Service Tool, that handles the download of executable code to hardware

Certification

The product described above fulfils the requirements placed on support tools for use in the development of application software up to and including SIL2 according to the standard IEC 61508:1998 Functional safety of electrical/electronic/programmable electronic safety-related systems, Part 1 and 3.

The certification is based on a functional safety assessment according to IEC 61508 described in SP report P605106A and SP report P906053 supplemented with a separate evaluation of the PLUS+1 Development tools described in SP report P605106B and the user documentation in the currently valid revision described in:

- PLUS+1 GUIDE User Manual
- Service Tool User Manual
- Development guidelines

Marking

Each sample that conforms in all respects with the original item certified may display the text "Type-examined by SP". In addition, manuals and marking shall also show the number of the standard, the reached SIL (Safety Integrity Level) of the item, the number of this certificate and the serial number or equivalent of the item.

Validity

This certificate is valid until not later than 30th June 2012.

Miscellaneous

Other terms and conditions are set out in SP's certification rules for type-examination, SPCR 123. This is the fifth issue of this certificate, replacing earlier issues.

Borås, 26th November 2009

SP Technical Research Institute of Sweden
Certification

Lennart Månsson
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Review of version 4.1 and 4.1.7 of PLUS+1

Commission

SP has earlier performed a SIL 2 functional safety assessment, according to IEC 61508, of version 4.0 and 4.03 of PLUS+1 Development tools. This work is described in the following SP report:

- Review of version 4.0 and version 4.03 of PLUS+1 (SP report ELp P901755)

The commission is to check that the conclusions drawn for version 4.0 and version 4.03 of PLUS+1 Development tools in this report is still valid for version 4.1 and 4.1.7 of PLUS+1 Development tools.

Client

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Reference: Mr. Claes-Göran Svensson

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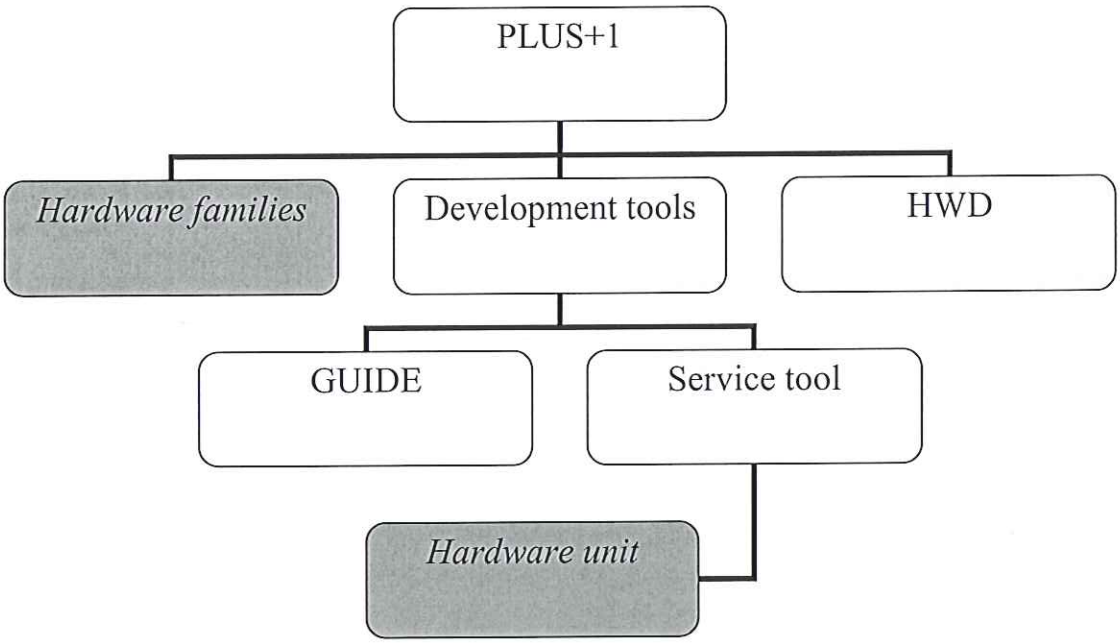
SP 302

Test object

PLUS+1 is a development environment for developing programmable control systems. The complete PLUS+1 concept consists of the following parts:

- Hardware families, supported hardware that runs the application
- Development tools, translate graphical symbols to executable code and download it to hardware
- Hardware Description (HWD) file, file that defines the interface between hardware and software

This functional safety assessment is only focused on the Development tools part of PLUS+1 and those parts of the HWD file that influence how the translation of graphical symbols to executable code is performed. Those parts in the HWD file that are related to the kernel are excluded.



(Boxes in red/cursive are not part of the test object)

The review has been performed on version 4.1 and 4.1.7 of PLUS+1 development tools.

Performance

SP has reviewed the changes implemented in version 4.1 and 4.1.7 of PLUS+1 and checked that the procedures used is in accordance with the requirements in IEC 61508.

How to handle software defects is described in GUIDE development management in chapter Defect management. Defects found in PLUS+1 are reported in a reporting tool called Clear Quest. All defects found for a certain version of PLUS+1 is summarized in a Sauer Danfoss document called Defect resolution SIL lifecycles. For each defect found following information could be found in the document Defect resolution SIL lifecycles:

- Defect description
- Defect resolution
- Risk analysis (to check if the defect fix is safety related or not)
- Risk-related requirements
- Architecture (if the defect fix will lead to a new implementation it will be described here)
- Validation (validation of that the requirements listed in the above point Risk-related requirements are fulfilled)

SP has reviewed that each identified defect is handled correctly in version 4.1 and version 4.1.7 of PLUS+1 and if the defect is regarded as safety related that relevant parts of IEC 61508 have been applied correctly.

SP has reviewed that each new feature in version 4.1 is handled correctly and if the new feature is regarded as safety related that relevant parts of IEC 61508 have been applied correctly.

The changes between version 4.0.and version 4.1 of PLUS+1 Development tools are described in Sauer Danfoss documents GUIDE 4.1 SIL lifecycles and Defect resolution SIL lifecycles 4.1.

The changes between version 4.1 and version 4.1.7 of PLUS+1 Development tools are described in Sauer Danfoss document Defect resolution SIL lifecycles 4.1.7.

The assessment was made by Mr Johan Hedberg based on the PLUS+1 Development tools documentation and a meeting held at Sauer Danfoss in Älmhult in Sweden 20 October 2009.

Result

The conclusion drawn for version 4.03 of PLUS+1 Development tools are still valid for version 4.1 and 4.1.7 of PLUS+1 Development tools.

The functional safety assessment performed shows that the PLUS+1 Development tools fulfil the applicable requirements in IEC 61508-1 and IEC 61508-3 for SIL2.

SP Technical Research Institute of Sweden
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Johan Hedberg
Technical Manager