Address how to handle software in the MR scheme

The MR group identified the imperative need of how to go forward with EU RO MR Type approved products to be integrated in systems and what effect such integration does have on the software. We are therefore continuing to develop how software should be handled in the MR scheme. This question will be discussed further by the MR Group, e. g. to state software limitations on the certificates, which would require not to change the versioning…"

Objective

The objective of addressing software in the context of MR is to ensure control of installed software versions based on requirements to, and audit of, the manufacturer's QA system, as well as a uniform specification of software versions in the MR TA certificates.

However, the objective with addressing software in the MR scheme is not to develop any requirements to the software itself.

Executive summary - software in the context of MR

Firmware is fixed for the product type, meaning that the same firmware version is installed in each product in a serial production line, and is therefore subject to type approval. Application software tailor-made for each vessel and is therefore not subject to type approval.

Thus, firmware can be handled within the MR scheme whereas application software is not subject to MR but to be unit certified by the Class society classing the ship.

Types of software

Firmware

More and more maritime products are today provided with microchips with software controlling the functions of the product. This includes several of the products that are already included in the MR scheme. Examples of such products are circuit breakers with electronic devices, screens, insulation monitoring devices, etc.

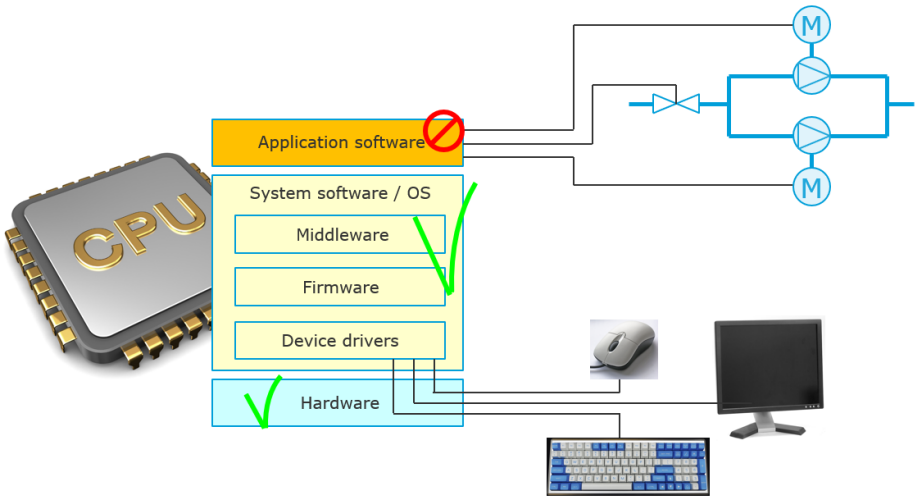
This type of software is only controlling the basic functions of the product itself, and not any processes external to the product. Such software is in general referred to as firmware. This firmware is fixed for the product type, meaning that the same firmware version is installed in each product in a serial production line (i.e. becoming part of the scope of a type approval). The firmware is not changed depending on the application of the product in the system it is installed. The only adjustments for each product are user parameter settings, such as trip current setpoints for circuit breakers with electronic devices, brightness for a screen and resistance alarm setpoint for an insulation monitoring device.

Application software

Software is also used in the control of ship functions such as propulsion control systems, power management systems, integrated control and monitoring systems for engine room and cargo systems, etc.

Such control systems consist of a CPU (or redundant CPUs). The CPU has a corresponding firmware as described above, as well as other system software controlling the functioning of the CPU itself and its communication with attached units such as

screens, keyboards and I/O units. These CPUs typically comes with a standard system software (Operating System), which is not application dependent. A type approval of a CPU from the CPU manufacturer should thus cover (address) any system software that comes with the CPU.



On top of the system software from the manufacturer of the CPU, the buyer of the CPU installs its own software that is controlling external systems/processes. In the maritime industry these buyers are the manufacturers of the propulsion control systems, power management systems, integrated control and monitoring systems for engine room and cargo systems, etc. The software they install is referred to as the application software.

This application software is not a serial production, but is tailor made for each vessel. It is accordingly not suitable to include such application software in the scope of any type approval but should be left to the scope of unit certification of the control system for each vessel by the Class society classing the ship as outlined in IACS UR E22. The CPU itself (hardware and system software) may however be covered by a (MR) type approval, ref. UR E22, paragraphs 3.1.4 and 4.

Factual situation

As mentioned above, products that typically include firmware / system software are already included in the MR scheme. TRs have been developed for these products without addressing the possible software that may be installed to control the functions of the product.

The firmware / system software is assessed during the type tests in the way that it is witnessed that the functioning of the product is as described/required. However, the function verified during the type tests may change when a new version of the software is installed at a later stage in the life cycle of the product. When there is no evidence of which software version that was installed during the type tests, it cannot be ensured at a later stage in the life cycle that the product still confirms with the required functionality as verified during the type tests.

The objective with addressing software in the MR scheme is not to develop any requirements to the software itself. The objective is to ensure control of installed software versions based on requirements to, and audit of, the manufacturer's QA system, as well as a uniform specification of software versions in the MR TA certificates.

Implications

Control of software versions is already addressed in UR E22, implemented by the individual Class societies and the manufacturing industry. It is thus assumed that implementing this in the MR scheme will have no major implications.

The implementation of this in the MR scheme will require some efforts. This may be implemented e.g. by establishing a document defining the types of software to be covered/addressed by MR certification, and the related requirements (e.g. software version control as part of a QA system). The relevant existing TRs where software may be an issue would then need to be updated with a reference to this document (alternatively a standard reference paragraph in all TRs).

In case software would not be addressed in the MR scheme, the potential implications would raise:

- Quality issues related to uncontrolled installation of new software versions onboard vessels.
- Unaligned or missing software version control during MR certification of a product, which may cause issues during in-operation surveys by the other Society classing the vessel.
- The Technical Requirements are not giving the most rigorous requirements to the products.

Consequence

The effective implementation of the control of installed software versions based on requirements to, and audit of, the manufacturer's QA system, as well as a uniform specification of software versions in the EU RO MR TA certificates are a significant progress to respond to the situation that software is playing an increasingly important role in the functionality of maritime products.

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