

Digitalization of plant I&C documentation – co-use of SmartPlant Foundation and Apros

Digital instrumentation and control (I&C) has only recently been taken up in the nuclear industry. A big proportion of the nuclear power plants were constructed in the 1970's and 80's. Their automation uses analog technology, which is coming to an end of its technical life span. Many utilities are now planning I&C renewal projects.

Typically the I&C documentation of a plant is maintained as electric circuit diagrams, which unambiguously document the implementation. However it is difficult to understand the functionality of the system by only viewing the diagrams. A majority of the professionals who can fluently read the documentation are about to retire, and educating the next generation takes a lot of effort.

In a modernization project the utility must deliver a correct understanding of the plant I&C behaviour to both the supplier and the authority. For that purpose, electric circuit diagrams are not an optimal method. Function block diagrams would be far better, as long as care is taken of the traceability to the original plant documentation.

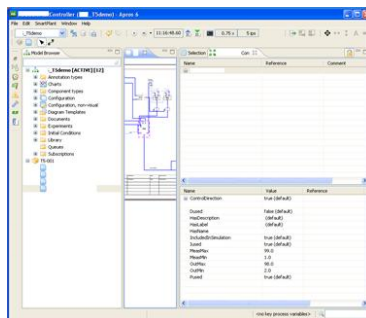
VTT, TVO, Fortum and Intergraph Finland created in collaboration a concept in which analog plant documentation is digitalized into a functional representation, which then is validated by simulating with Apros and linked to the original documentation. In case of a renewal project, the functional representation can then be processed further and used as a part of the I&C supplier's input data.

As a first step, the electric circuit diagrams are scanned to pdf files, and the files are published in SmartPlant Foundation. Next, a set of diagram files is transmitted to Apros where they can be viewed. Then an Apros modeller builds up the functional representation of the system using a standard library of I&C functions, tests the model by running simulation, and links the functions to the plant documentation diagrams.

After the model is finalised, it is transmitted back to SmartPlant Foundation. This process will publish in SmartPlant Foundation the Apros diagrams in pdf format as well as the functions and their variables, and create links to the original I&C documentation as defined by the modeller. All transmittal and publish operations are controlled by workflows, in which experts review and approve the operations.

“The method has great potential in sharing knowledge of I&C both within the plant organisation and with different stakeholders. This will in turn reduce risks in possible renewal projects.”

Mauri Viitasalo, TVO



For further information, please contact:

Matti Paljakka
Key Account Manager, Energy
VTT Technical Research Centre of Finland

Tel. +358 20 722 6423

Matti.Paljakka@vtt.fi

Visit: Vuorimiehentie 3, Espoo