# WORK COLLABORATION TOOLS FOR THE DESIGN INTEGRATION OF THE ITER POWER SUPPLIES AND ELECTRICAL INSTALLATIONS

I. Benfatto[1], F. Autogue[1], D. Beltran[1], C. Boyer[1], G. Dalle Carbonare[1], J. Hourtoule[1], F. Jalabert[1], I. Kuehn[1], S. Nair[1], J. Sonara[1], W. Werner[1], R. Besrest[2], F. Papineschi[3].

[1] *ITER Organization, CS 90 046, 13067 St Paul- lez-Durance Cedex, France, www.iter.org*
[2] *CAPSIM, Les Grandes Terres, 13650 Meyrargues, France, www.capsimulation.com*
[3] *AREVA TA, CS 50497, 13593 Aix-en-Provence, France, www.technicatome.com*

*Corresponding author: Ivone.Benfatto@iter.org*

The ITER power supplies and electrical installations are characterised by a large number of electrical components interconnected by complex and wide networks of cables and busbars. The total installed power of the ITER electrical power distribution system exceeds 1.2 GVA and the total number of power and instrumentation and control cables is expected to be more than 100,000.

Most of the detailed design work will be performed in the ITER Domestic Agencies (DA) with the support of their contractors. Work coordination, design integration and standardisation are the challenges that the ITER Organization (IO) faces. The Office for Central Integration and Engineering defines and manages general integration rules, but the Electrical Engineering Division defines and applies specific rules for the electrical systems.

To ensure high efficiency in work collaboration among IO, DAs and contractors, the IO has selected a set of commercial software tools for execution of electrical engineering analyses, production of circuit diagrams and design of cable routing and layout integration. The most important are:

- ETAP (www.etap.com), PSIM (www.powersys.fr), Matlab-Simulink-SimPowerSys (www.mathworks.com) and CDEGS (www.sestech.com) for electrical engineering analyses.
- See System Design (SSD), See Cabling Manager, See Electrical Expert (www.ige-xao.com) for production of multidiscipline diagrams, including, detailed electrical circuit diagrams, cabling diagrams, cable routings and terminations.
- CATIA (www.dassault.com) for 3D space allocation of equipment and hangers, routing of Busbars and cable trays.

One of the key issues is to avoid data duplication or inconsistencies amongst the different software databases. Therefore, the 2D schematics and CAD tools have been specifically customised by IO to allow remote work collaboration, to ensure design integration and to facilitate the consistency check among different design activities.

For example, a consistency checker tool between SSD and CATIA has been developed and set up by IO to verify that equipment inserted in 2D is also declared in 3D. This checker also allows the automatic comparison between circuit diagrams and 3D models of cable trays.

Also the databases of engineering analysis tools like ETAP are linked with the central database of the SSD schematic tool.

This paper describes the integration procedures and the automatic checker specifically developed and tested by IO to support the design integration of the ITER Power Supplies and Electrical Installations, and ensure the full consistency of the project data that are shared or synchronised amongst IO and DAs.