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Assembly methodology and tools developed for Tore Supra transformation into WEST platform

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Since 2013 Tore Supra has turned to WEST (Tungsten (W) Environment in Steady state Tokamak) Platform targeted at supporting the ITER divertor detailed design, manufacturing and future operation. The major changes included the modification of the magnetic configuration (from limiter to divertor), the replacement of carbon plasma facing components by new tungsten plasma facing components (PFCs), the upgrade of the high frequency heating systems and diagnostics. This resulted in replacing 100% of the inner components and about 80% of port-plugs components.
The main technical challenges consisted in:
- Assembling interlinked new elements in the existing device;
- Designing the in-vessel interfaces and accurately positioning the components in order to maximize the plasma volume;
- Designing and in-situ manufacturing of the divertor coils.

The key phase of the assembly sequence was the in-situ Divertor coil construction, which required developing specific techniques such as in-situ brazing, wrapping, etc.···and controlling perfectly operations as no repair is possible after the divertor structure closing. The assembly work has been organized in several steps before and after the in-situ Divertor coil construction.

Sub-millimeter metrology was key to provide input data on the existing environment, to transfer the magnetic references from Tore Supra to WEST and also accurately position the elements. In addition, the CEA virtual reality room was widely used for kinematics definition and, in a second step, for generic tooling validation.

The paper will describe the main sequences defined for WEST assembly and associated qualification processes applied before and after component installation. Lessons learned in terms of design to assembly and associated tooling cycle will be detailed.

Eligible for student paper award?

No

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