

From Tore Supra to WEST : Evolution of CODAC infrastructure

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Abstract

Since 1988, the Tore Supra limiter tokamak at CEA Cadarache has been in operation, and obtained the record of the longest plasma duration of 6 minutes 30 seconds and over 1000 MJ of energy injected and extracted. In 2013 Tore Supra went through major changes to become the WEST tokamak (Tungsten Environment in Steady state Tokamak). The tokamak was upgraded into an X point divertor device. Taking advantage of its long discharge capability, WEST's goal is to minimize technological and operational risks of the actively cooled tungsten divertor for ITER.

Concerning data acquisition, the "Control, Data Access and Communication"(CODAC) system has been re-designed in order to satisfy the performance and evolutions needed by researchers. A new architecture has been developed and deployed on major plant systems all around the fusion reactor allowing to fulfill the performance requirements of acquisition units, and for greater maintainability.

This paper describes the WEST CODAC system created in 2013 and evolving since. The introduction briefly presents Tore Supra and the original CODAC based on VME technology. The main section exposes the upgrade of Tore Supra into WEST and the architecture evolution. The diskless Linux system and the attached PXI or VME systems are described with the tests realized for the CODAC system. During three WEST experimental campaigns, the new CODAC infrastructure ran over major plant systems like magnetics or power plant diagnostics. Results from those systems are shown in the last section leading to conclusion and prospects.

After two years of operation, three experimental campaigns and more than 4000 pulses, the WEST CODAC infrastructure has proven its efficiency and reliability, while the CODAC team still working on possible improvements.

Keywords

WEST; Tore Supra; CODAC; Acquisition Unit; Timing System; Reflective memory; Diskless; decentralized system

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