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Completion of the French JT-60SA Toroidal Field Magnet Contribution

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After agreement on the general and detailed design of the JT-60SA TF coil system by all the Voluntary Contributors in the project, CEA, ENEA and F4E, the manufacturing phase was engaged. The French part including the supply of 9 + 1 spare of the 18 TF winding packs and their integration in casings was entrusted mid-2011 to Alstom (France), now General Electric. Years up to 2013 were devoted to the first phases with manufacturing flow definition, manufacturing drawings and Quality Assurance documentation production as well as qualification of the critical processes on a set of mockups. The procurement and commissioning of the needed tooling was led in parallel and the production was started in January 2014. The first winding pack was ready end 2014. The integration inside the casing started in March 2015 and the coil was completed end 2015. Then the coil was delivered to the Coil Test Facility (CTF) for testing at nominal operation condition ($T=4.5K$, $I=25,7kA$) and for qualifying the coil resilience to quench events. In parallel, the successive coils were engaged in the manufacture process. Up to now, 9 coils have been completed and sent to the CTF and the last coil is now nearly completed. The paper reports the status of the manufacture and gives a feedback on the main issues discovered during the manufacture process and on the technical solutions implemented. A focus is made on the mastering of the manufacturing processes which can be clearly highlighted by the learning curve of the TF coils manufacturing which ultimately reaches the 5 month target even in including the treatment of the unexpected events.

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