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Challenges During Manufacture of Reactor Components of PFBR

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BHAVINI is constructing Prototype Fast Breeder Reactor (PFBR), forerunner of FBRs, a 500 MWe sodium cooled, pool type, mixed oxide (MOX) fueled reactor at Kalpakkam. Presently PFBR is in the commissioning phase. The reactor assembly consists of large dimensional vessels viz., Safety Vessel, Main Vessel and Inner Vessel made of Austenitic stainless steel. The top shield is a box type structure comprising of Roof Slab, Rotatable plugs viz., Large and Small plugs made of Carbon steel A48P2 material and Control Plug at the center. The entire core is placed over the Grid Plate which in turn is supported by Core Support Structure equipped with Core Catcher at the bottom. The control and shutdown mechanisms are housed inside the Control Plug with necessary provisions for core instrumentation. The vessel houses the primary heat transport circuit which consists of Primary sodium pump, Primary Pipe and Intermediate heat exchanger transferring the primary heat from the core. The in-vessel and ex-vessel core handling are performed by Transfer Arm and Inclined Fuel Transfer machine. The decay heat is removed by passive systems consisting of Decay Heat Exchanger and associated components. The reactor is equipped with in-vessel and ex-vessel in-service inspection devices. These components had undergone many stages of manufacturing viz. forming, rolling, welding, machining etc. meeting the stringent specification requirements as neither repairs nor replacement can be possible at the later stages of reactor operation for major components. The dimensional tolerances were achieved at various stages of manufacture and the interfaces of these Over Dimensional Components were meticulously matched to avoid interferences during final assembly inside the reactor vessel. This paper presents the challenges faced during the manufacture of critical reactor components which serves as a vital input to future fast reactor program in India.

Country/Int. Organization

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