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Global Machine Design and Double X-point Equilibrium Configurations for Ignitor* A. BIANCHI, B. PARODI, ANSALDO Ricerche, Italy, B. COPPI, M.I.T. — The detailed design of the Ignitor machine has been carried out by considering extended limiter plasma configurations that are up-down symmetric and whose outer magnetic surfaces follow closely the cavity of the toroidal magnet over most of the vertical cross section. This provision minimizes the out-of-plane forces produced by the plasma current and acting on the toroidal magnet. When, instead, the adopted plasma equilibrium configuration is of the double X-point type the out-of-plane forces increase, and a complete structural analysis to take this increase into account becomes appropriate. The reference maximum plasma current I_p , in order to maintain an acceptable magnetic safety factor, is reduced from 11 MA in the extended limiter to 9 MA in the double X-point configuration while the magnetic field on axis ($R_0 \cong 1.32$ m) is maintained at $B_T \cong 13$ T. The reduced scenario involving $I_p \cong 6$ MA and $B_T \cong 9$ T does not present a problem. Both 3D and 2D drawings of each individual machine component are produced using the Dassault Systems CATIA-V software. After their integration into a single 3D CATIA model of the Core (Load Assembly), the electro-fluidic and fluidic lines which supply electrical currents and helium cooling gas to the coils are included and mechanically connected to the main machine components.

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