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FTP/P7-28: Progress in Developing a High-Availability Advanced Tokamak Pilot Plant

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Abstract - A fusion pilot plant study was initiated to clarify the development needs in moving from ITER to a first of a kind fusion power plant, following a path similar to the approach adopted for the commercialization of fission. The mission of the pilot plant was set to encompass component test and fusion nuclear science missions yet produce net electricity with high availability in a device designed to be prototypical of the commercial device. The objective of the study was to evaluate three different magnetic configuration options, the advanced tokamak (AT), spherical tokamak (ST) and compact stellarator (CS) in an effort to establish component characteristics, maintenance features and the general arrangement of each candidate device. With the move to look beyond ITER the fusion community is now beginning to embark on DEMO reactor studies with an emphasis on defining configuration arrangements that can meet a high availability goal. In this paper the AT pilot plant design will be presented. The selected maintenance approach, the device arrangement and sizing of the in-vessel components and details of interfacing auxiliary systems and services that impact the ability to achieve high availability operations will be discussed. Efforts made to enhance the interaction of in-vessel maintenance activities, the hot cell and the transfer process to develop simplifying solutions will also be addressed.

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