2000-2010: A DECADE OF ENHANCEMENTS AND PROGRAMME ON JET IN PREPARATION OF ITER

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Since 2000, the JET facilities have been exploited under the European Fusion Development Agreement (EFDA) and have played a key role in the ITER design, in particular by operating in deuterium/tritium, by optimising remote handling and additional heating systems in view of ITER and by consolidation ITER operating scenarios.

JET has experienced a constant enhancement phase during this period, which is now approaching fruition as the present shutdown nears an end. The experimental campaigns are due to resume in November 2005 after a four month restart, and will benefit from a new divertor allowing high triangularity ITER relevant scenarios, from 17 new or upgraded diagnostic/systems, and from other enhancements of the heating, current drive and fuelling systems. A new ITER-like Ion Cyclotron Resonant Heating (ICRH) antenna will be installed in 2006.

Another enhancement programme is now under way focussed on major experiments in support of ITER. All first wall CFC tiles will be largely replaced by beryllium tiles, whilst tungsten target plates will be used in the divertor, removing all carbon from the vessel. Installation is planned for a year-long shutdown in 2008. Critical issue for ITER will then be addressed, including the control of T-retention, material erosion and migration, mixed materials effects, melt layer behaviour and impurity control, and operational scenarios compatible with a Be/W material mix. A high repetition rate pellet injector (up to 50 Hz) will be installed to exploit the ELM-spacing technique successfully developed on AUG and to provide a reliable high fuelling capability. Additional neutral beam heating power up to 36 MW during 20s will be obtained by up-grading the second existing beam box and power supplies to high current. Phasing the two beam boxes will make it possible to run plasma pulses of up to 40s at a heating power in the 20MW range.This will enable the development of ITER-like plasma scenarios at high densities, with high current and high beta.

Along with these major projects, a range of upgraded and new diagnostics is being considered in order to optimise the chances of a successful scientific outcome to this experiment as well a new system for plasma control.