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Overview of the JET Operation Reliability

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The JET tokamak has been in operation since 1983, producing ~92500 pulses so far. For the period 2000 to 2016 (not including DTE1 in 1997), information on every shutdown, commissioning phase and experimental campaign has been logged, providing unprecedented operation reliability statistics and a model for studying reliability, availability, maintainability and inspectability (RAMI) in fusion experiments such as ITER.
The JET Operation Reliability Statistics record the time taken to install major upgrades, commission systems with plasma, the downtime for maintenance and the achieved versus planned experimental campaign days. On average, JET achieves 85% of the planned experimental days and up to 180 campaign days during a calendar year.
For unplanned interventions the systems that failed are identified, the impact on machine availability is logged and the remedial actions taken are documented. A total of 12 unplanned interventions were recorded over 17 years with durations in the range 2 to 8 weeks.
Delays during operations are recorded, providing a detailed overview of faults from essential sub-systems such as computer systems, power supplies and neutral beam systems and delays attributed to human operators. On average 21% of the time is lost due to delays during experimental campaigns. This has been consistent over the last 17 years and is compensated by having 20-25% contingency for campaign planning.
Maintenance schedules and refurbishments are planned at JET, using the operation reliability data. Recently, pulsed power supplies and heating systems were refurbished, enabling continued high operational availability of JET for the upcoming campaigns using deuterium-tritium mixtures in 2019-2020.

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