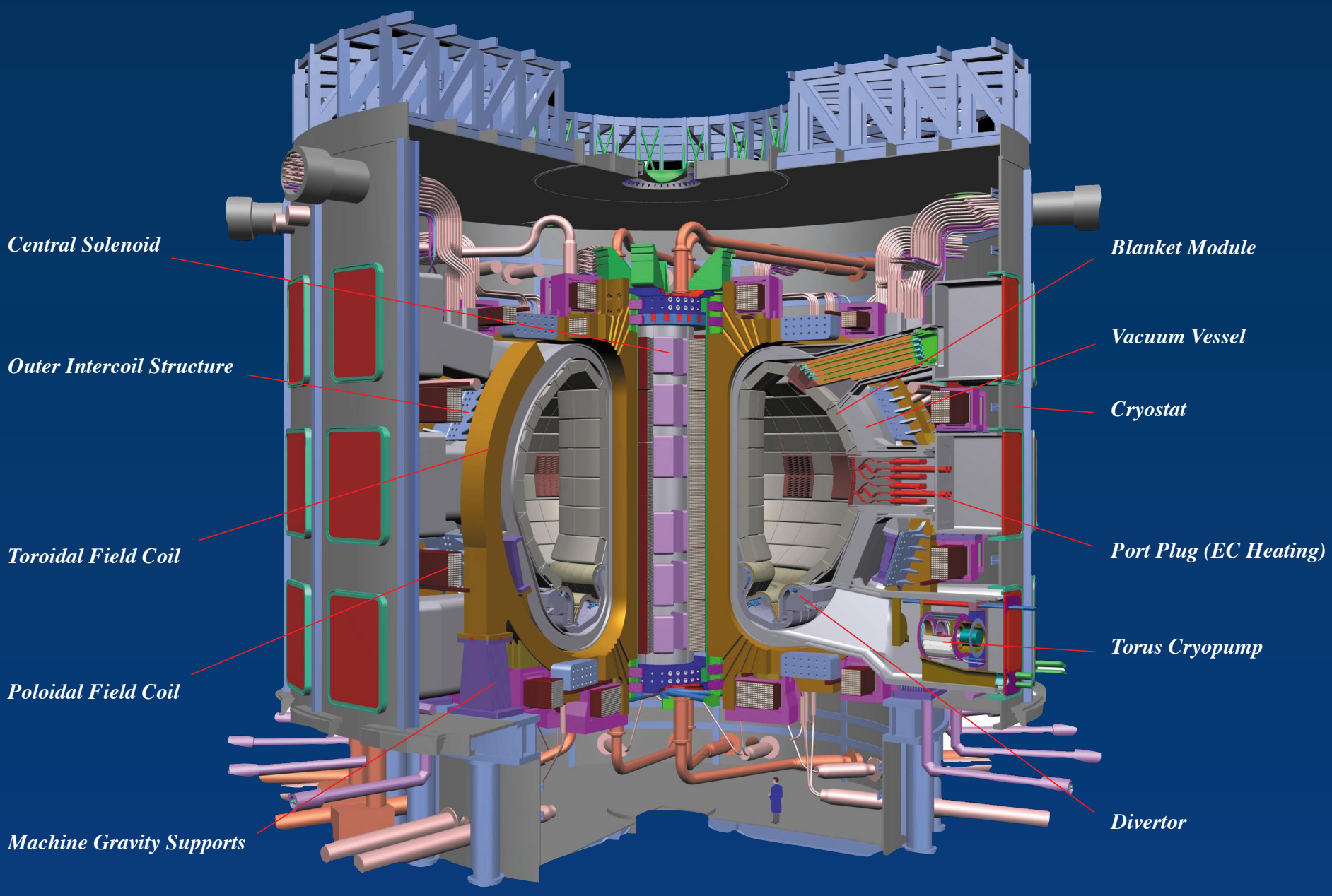
ITER Engineering Design Activities - Design



Main Engineering Features of ITER

Superconducting Toroidal Field Coils (18 coils)	
Superconductor	Nb_3Sn in circular stainless steel (SS) jacket in grooved radial plates
Structure	Pancake wound, in welded SS case,wind, react and transfer technology
Superconducting Central Solenoid (CS)	
Superconductor	Nb_3Sn in square Incoloy jacket, or in circular Ti/SS jacket inside SS U-channels
Structure	Pancake wound, 3 double or 1 hexa-pancake, wind react and transfer technology
Superconducting Poloidal Field Coils (PF 1-6)	
Superconductor	NbTi in square SS conduit
Structure	Double pancakes
Vacuum Vessel (9 sectors)	
Structure	Double-wall welded ribbed shell, with internal shield plates and ferromagnetic inserts
Material	SS 316 LN structure, SS 304 with 2% boron shield, SS 430 inserts
First Wall/Blanket (421 modules)	(Initial DT Phase)
Structure	Single curvature faceted separate FW attached to shielding block which is fixed to vessel
Materials	Be armour, Cu-alloy heat sink, SS 316 LN structure
Divertor (54 cassettes)	
Configuration	Single null, cast or welded plates, cassettes
Materials	W alloy and C plasma facing components, copper alloy heat sink, SS 316 LN structure
Cryostat	
Structure	Ribbed cylinder with flat ends
Maximum inner dimensions	28 m diameter, 24 m height
Material	SS 304L
Heat Transfer Systems (water-cooled)	
Heat released in the tokamak during nominal pulsed operation	750 MW at 3 and 4.2 MPa water pressure, ~120°C
Cryoplant	
Nominal average He refrig. /liquefac. rate for magnets & divertor cryopumps (4.5K)	55 kW/0.13 kg/s
Nominal cooling capacity of the thermal shields at 80 K	660 kW
Additional Heating and Current Drive	
Candidate systems	Electron Cyclotron, Ion Cyclotron, Lower Hybrid, Negative Ion Neutral Beam
Electrical Power Supply	
Pulsed power supply from grid: total active/reactive power demand	500 MW/400 MVAr
Steady-state power supply from grid: total active/reactive power demand	110 MW/78 MVAr