Design Tasks

This workplan is intended to summarizedesign tasks required for the Conceptual Design Review

1 Stellarator Core   **Estimated manweeks by performer**

WBS	Task Area	Subtask	Task Description	Deliverable(s)	start	finish	Cole	Fogarty	Goranson	Jones	Nelson	Williamson	Subcontract	Brooks	Brown	Chrzanowski	Dahlgren	Fan	Heitzenroeder	Reiersen	PPPL Designer	Subtotal / task
110	**Plasma Facing Components**																					
111	First Wall	a	Define geometry, ie stayout zone, convert to fourier representation	Design memo and coordinate geometry																		
		b	Divide FW into tile shapes	Pro-E model																		
112	Divertor	a	Define geometry, including pumping zone, slot, baffles	Design memo and coordinate geometry																		
		b	Define divertor baffle tiles, add pumping slot	Pro-E model																		
113	NBI armor		Define geometry for ultimate and day-1 operation	Pro-E model																		
114	Support ribs	a	Define ribs: Confirm number and spacing of ribs, attachment scheme to VV, cooling line integration	Pro-E models and 2-D sketches																		
115	Limiters	a	Confirm inboard limiters are just FW tiles between divertors, create day-1 geometry	Design memo and coordinate geometry																		
116	PFC Cooling lines	a	Define cooling line routing	Pro-E model																		
		b	Define feedthroughs for cooling lines	memo and Pro-E model																		
117	PFC Local I&C	a	Define number and type of T/C, strain gages, etc. required for PFC instr.	Design memo and sketches of locations																		
120	**Vacuum Vessel**																					
121	Vessel shell	a	Define geometry, convert to fourier representation, create Pro-E surface	Pro-E surface																		
		b	Divide vessel into half periods and spacer parts	Pro-E model																		
		c	Define assembly flanges, seals, bolt spacing	design memo and Pro-E model																		
		d	incorporate input from manufacturing studies	Pro-E model																		
122	VV Ports & Extensions	a	Develop layout of port locations, sizes, and extensions	Pro-E model																		
		b	Provide port reinforcement scheme	Pro-E model																		
		c	Select basic seal types	design memo (table)																		
		d	incorporate input from manufacturing studies	Pro-E model																		
123	Thermal insulation	a	Confirm choice of microtherm, solomide foam	design memo																		
124	VV Heating and Cooling tracing	a	Confirm spacing of cooling lines, manifolding	design memo																		
		b	Develop method for heating port extensions	design memo																		
		c	incorporate input from manufacturing studies	Pro-E model																		
125	VV Local I&C	a	Define number and type of T/C, strain gages, etc. required for VV instrumentation																			
130	**TF Coils (background coils)**																					
131	TF Winding Pack	a	Confirm geometry of TF coil set	Pro-E model																		

		b	Develop winding pack definition (turns, spacing, cooling, etc.)	Pro-E model
132	TF Cases	a	Provide design of any integrated TF support system	Pro-E model
133	TF Assembly		*included in assy sequence, tasks 711a,b*	
134	TF Power and Cooling Interfaces (leads)	a	Provide lead and cooling line routing concept	Pro-E model
		b	Provide vapor cooled lead concept	design memo

140 PF Coils (VF, EQ. OH)

141	PF - OH Solenoid	a	Confirm PF coil geometry	design memo and 2-D sketch
		b	Develop winding pack definition (turns, spacing, cooling, etc.)	Pro-E model
142	PF - Ring Magnets	a	Develop winding pack definition (turns, spacing, cooling, etc.)	Pro-E model
143	PF power and cooling interfaces (leads)	a	Provide lead and cooling line routing concept	
		b	*Provide vapor cooled lead concept (related to task 134b)*	

150 Cryostat

151	Cryostat Shell and Structure	a	Confirm design concept for cryostat	memo
		b	Re-do geometry of cryostat	Pro-E model
152	Cryostat Thermal Insulation	a	*same as 151a*	
153	VV / cryostat boots	a	confirm boot design, clearances for ports	memo, 2-D sketch
		b	provide typical penetration model	Pro-E model
154	Temp control / heaters	a	Determine number and location of heaters, blowers, etc.	memo
155	Local I&C	a	Define number and type of T/C, strain gages, etc. required for VV instrumentation	memo and sketch of locations

160 Machine Support Structure

161	Base assembly (includes gravity supports to floor)	a	Confirm base assembly system still works, modify as required to compensate for elimination of radial plates	Pro-E model
162	TF coil support structure	a	Provide new support scheme in lieu of radial plate structure	Pro-E model
163	PF coil supports	a	Provide new support scheme in lieu of radial plate structure	Pro-E model
164	Modular coil interface structure	a	Provide new support scheme in lieu of radial plate structure	Pro-E model
164	Vacuum Vessel supports	a	Provide vacuum vessel support and adjustment system	Pro-E model

170 Modular Coils

171	windings and coil assembly	a	Develop new modular coil geometry, including twist, bend radius mods., etc.	Pro-E model and geometry files
		b	Provide new coil pack dimensions, including cable dimensions, insulation thickness, ground wrap, and chill plate arrangement and overall stackup tolerances. Determine system for accommodation of keystoning	2-D sketch, memo
		c	Develop details of crossover and lead region for typical coil pack	Pro-E model
		d	Provide winding clamp concept and approximate clamp distribution around machine	Pro-E model

		e	Provide local manifolding for typical coil pack, but not for each type of six types unless time permits	Pro-E model
		f	modify design as required to integrate suggestions from manufacturing studies	design memo and Pro-E model
172	winding form / structure	a	Provide new shell surfaces, inside and outside, convert to fourier representation	Design memo and coordinate geometry
		b	Re-do Pro-E model based on fourier representation	Pro-E model
		c	Provide coil form machining details	Pro-E model
		d	Develop bolting interface, including electrical insulation scheme	design memo and Pro-E model
		e	modify design as required to integrate suggestions from manufacturing studies	design memo and Pro-E model
173	leads	a	Provide lead and local buswork routing concept	Pro-E model
			Provide vapor cooled lead concept (related to task 134b)	
174	cooling system inside cryostat	a	Provide coolant manifold routing	
175	local I&C	a	Define number and type of T/C, strain gages, voltage taps, etc. required for modular coil instr.	
180	**Trim Coils**			
181	coil assemblies	a	Develop Pro-E model of coil shape	Pro-E model
			Develop winding pack details, including number and size of turns, insulation type and thickness, etc.	Pro-E model
		b	Develop coil form/can concept and support scheme to vessel wall	Pro-E model
182	leads and cooling	a	Provide lead concept inside vessel	Pro-E model
		b	Provide lead routing outside vessel to boundary of cryostat	Pro-E model
183	local I&C	c	Define number and type of T/C, strain gages, voltage taps, etc. required for trim coil instr.	memo and sketch of location

7 Machine Assembly

711	New Machine Core Assembly	a	Develop core assembly sequence, confirm components can be assembled	