

NCSX Program Update

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briefing for

NCSX Program Advisory Committee

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Topics



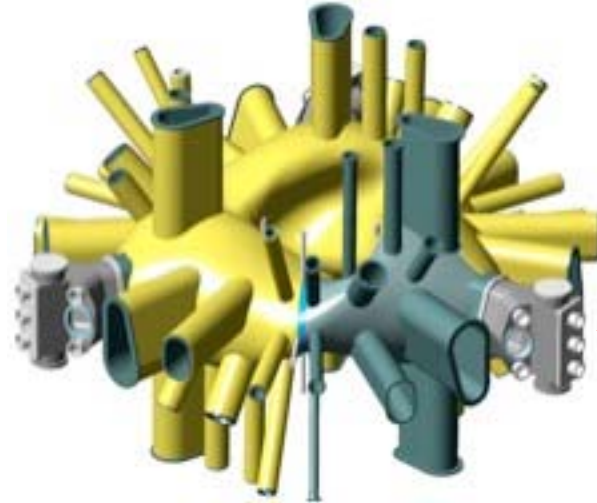
- NCSX construction update.
- New funding plan and schedules.
- Program Planning Items.

NCSX Machine Construction

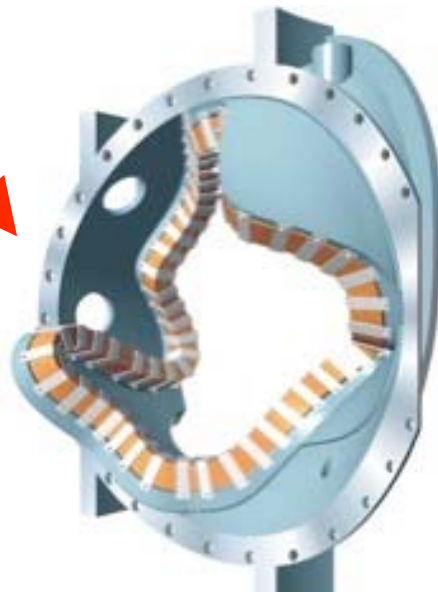
NCSX



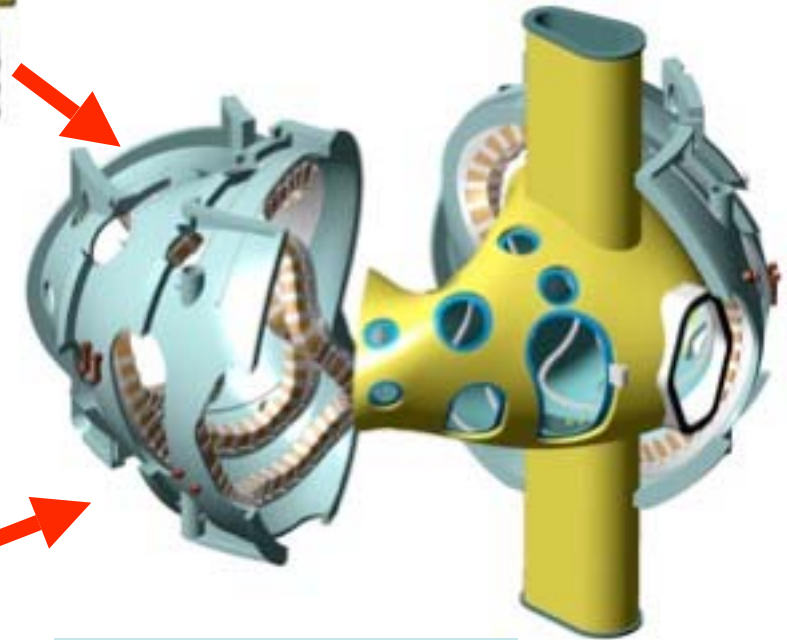
Modular Coil Winding Forms (MCWF)



Vacuum Vessel (shown with insulation)



Modular Coils



Field Period Sub-Assembly

Coil form stays with the coil as part of the machine structure.

MCWF and VV Manufacture Have Started!



- Industry teams developed solutions to fabrication challenges, built prototypes.
- **We have placed contracts for the production components.**
 - VV: Major Tool & Machine, Inc., Indianapolis, IN
 - MCWF: Energy Industries of Ohio, Inc., Cleveland, OH, with:
 - C.A. Lawton Co. (pattern)
 - Metaltek International (casting)
 - Major Tool & Machine (machining)
- Both teams are making good progress
 - First MCWF cast; expect delivery in May.
 - First VV sector expected in November.



Preparing to Wind the Modular Coils

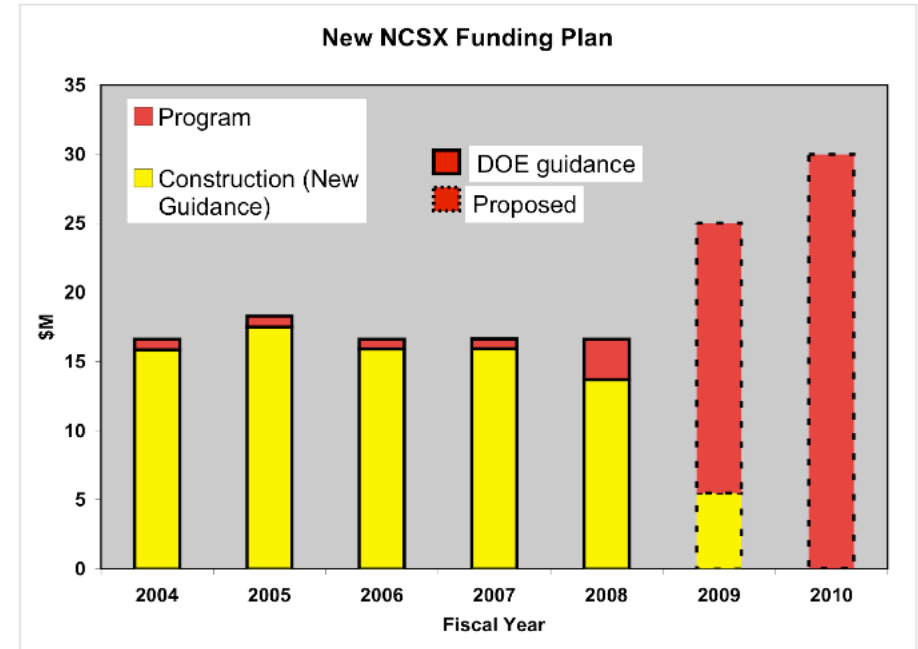
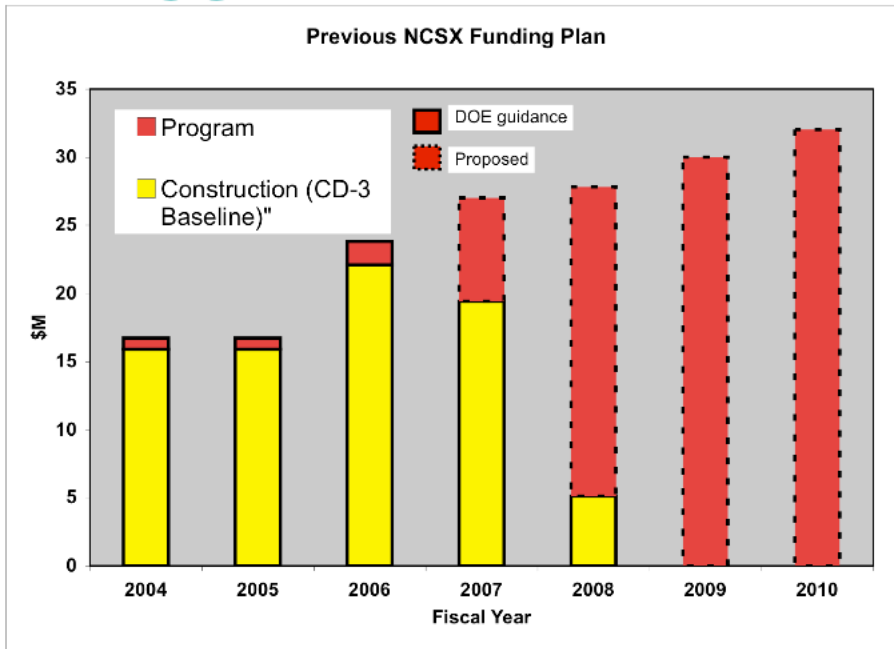


- Manufacturing facility is operating at PPPL.
- Process steps have been developed by R&D.
 - Conductor placement on 3D surface.
 - Conductor deformation during winding.
 - Tooling & fixture optimization.
 - Epoxy impregnation.
- **Twisted racetrack demo coil is under construction now.**
 - Optimizing process for accurate and efficient coil construction.



**Twisted Racetrack
Being Wound**

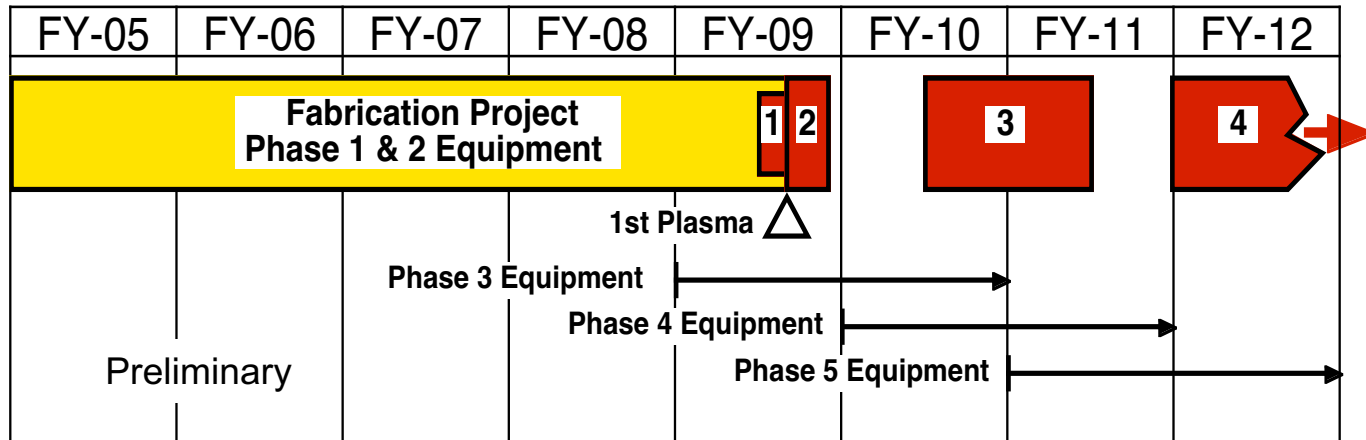
New DOE Plan Provides “Flat” Funding for NCSX



- FY-06 budget affects all parts of U.S. Fusion program, including NCSX.
 - NCSX construction and research both reduced from FY05 levels.
- DOE guidance to NCSX: plan on constant annual funding through FY08.
- Impacts are being analyzed to support DOE re-baselining. Preliminary assessment:
 - Extends construction by ~1 year: First Plasma delayed to mid-2009.
 - Delays research upgrades by more than 1 year.

Priority: complete construction as fast as possible within funding constraints. 6

Research Plan is Unchanged Except for Timeline



Phase / Research Goals	Key Equipment
1. Stellarator Acceptance Testing <ul style="list-style-type: none"> • Verify construction accuracy • First Plasma 	<ul style="list-style-type: none"> • Stellarator @B = 0.5 T • Ohmic heating, 150 C bake. • E-beam & ex-vessel magnetics
2. Magnetic Configuration Studies <ul style="list-style-type: none"> • Vacuum flux surface documentation. • Magnetic configuration control w/ coils. 	
3. 1.5MW Initial Experiments <ul style="list-style-type: none"> • Explore plasma operating space • Confinement, stability, operating limits 	<ul style="list-style-type: none"> • Stellarator @B = 1.2 T • 1.5 MW NBI, NB Armor, 350 C bake • Thomson scattering, in-vessel magnetics, interferometer/polarimeter, SX arrays
4. 3MW Heating Experiments <ul style="list-style-type: none"> • Confinement vs. 3D shape • Stability at moderate β vs. 3D shape • Local transport, effects of quasi-symmetry • SOL characterization. • Transport barriers & enhanced confinement. 	

Program Planning Topics



- Current research prep. activities. (MZ)
- International collaboration. (MZ)
- Stellarator White Paper Update. (JL)
- QPS. (JL)
- Timing of research forums. (HN)
- PAC Meetings. (HN)