Access Evaluations

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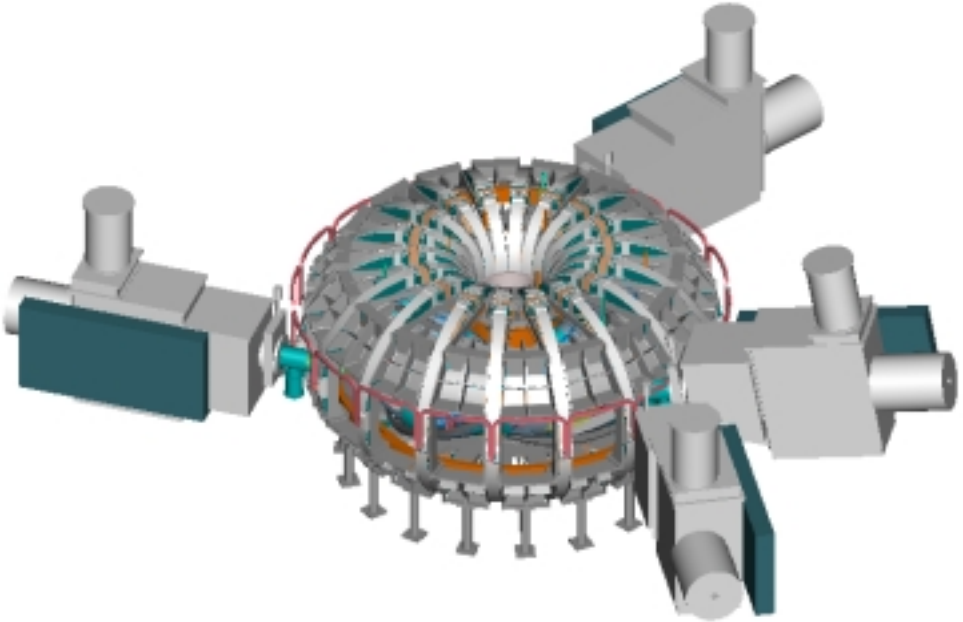
NCSX Project Meeting

September 26 – 27, 2000

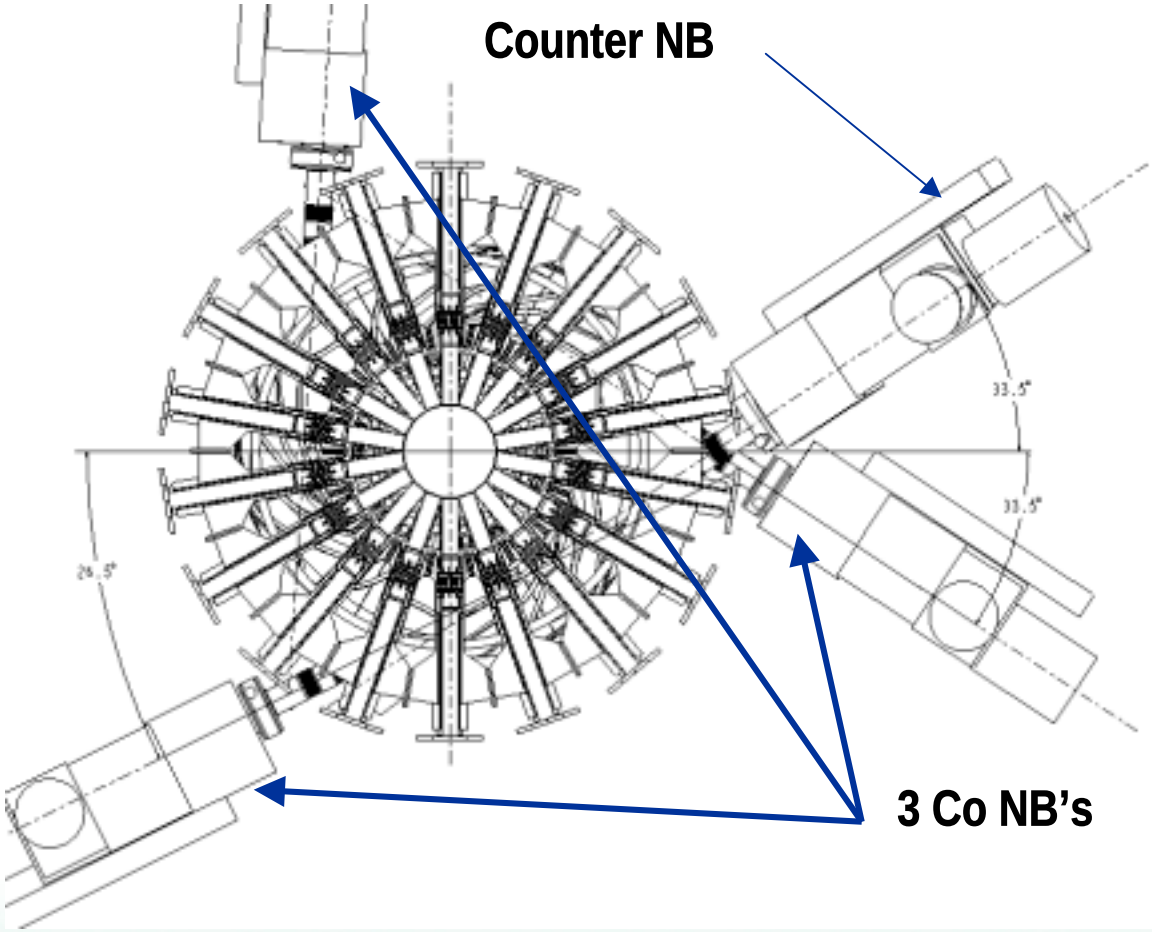
Agenda

- **NBI**
  - **Saddle Coils**
  - **Modular Coils**
- **High Harmonic Fast Wave**
- **Diagnostics**
- **Vacuum Pumping**
- **Personnel Access**



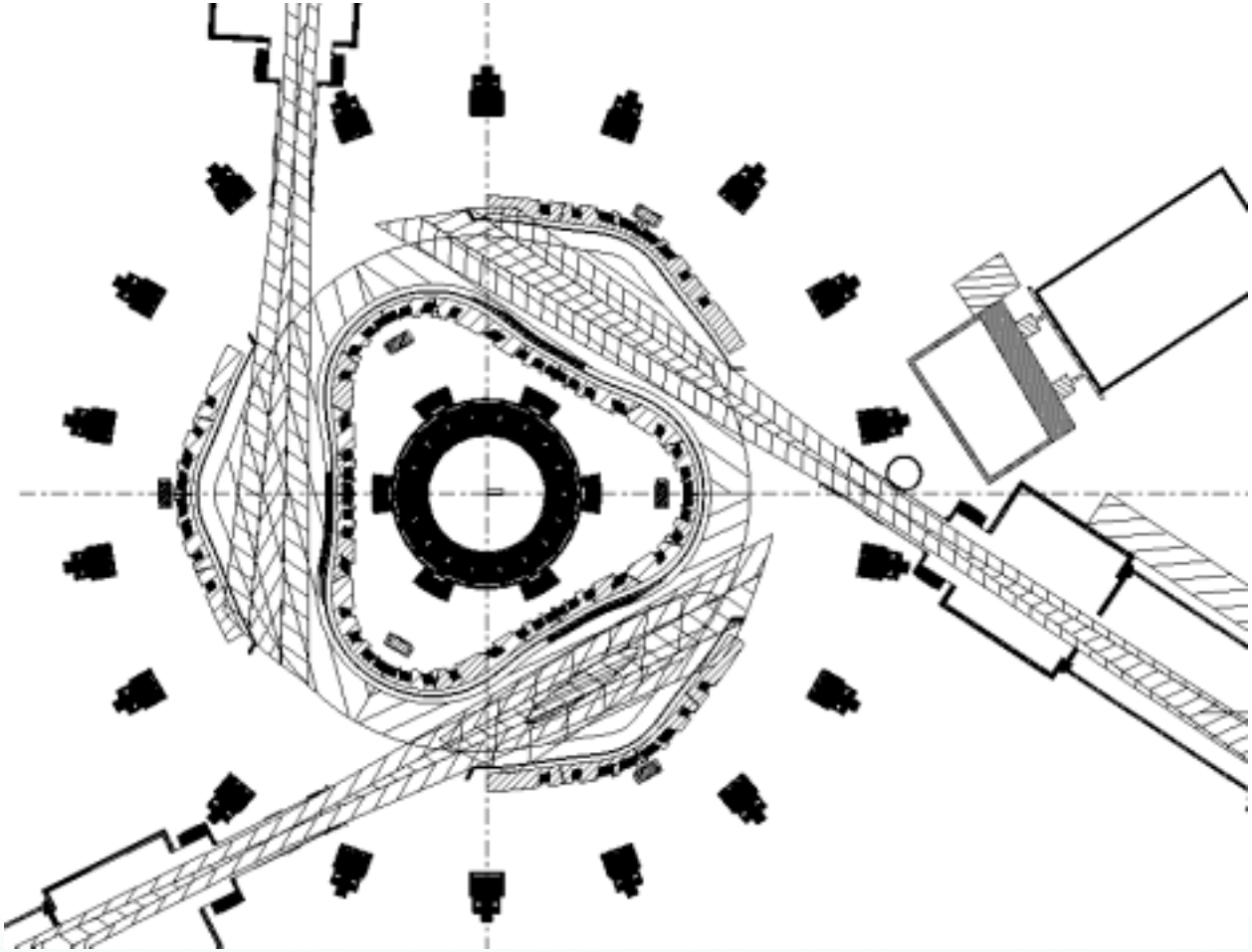
NB Saddle Coils

PLAN VIEW OF TILTED NB



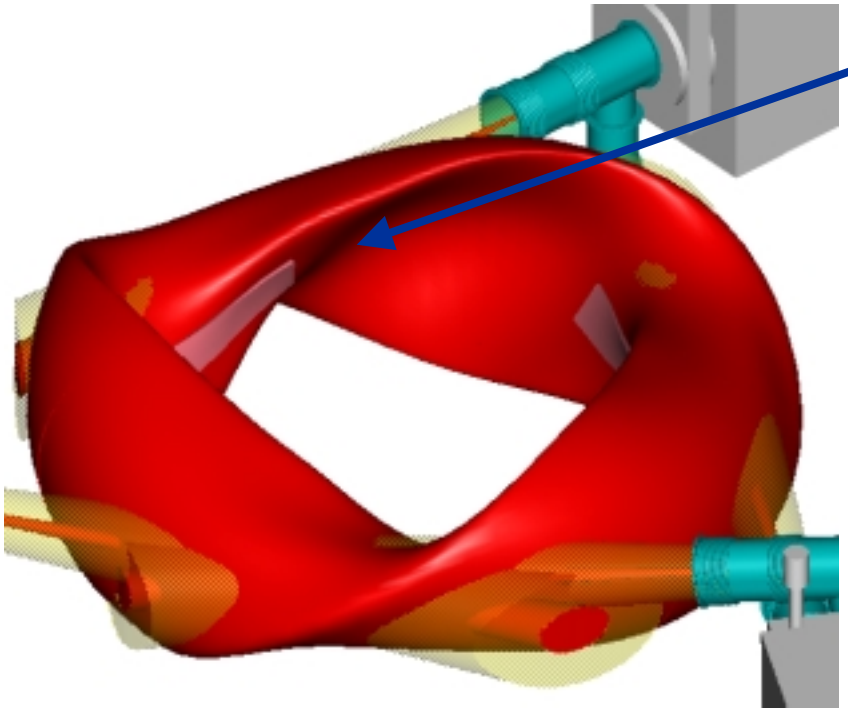
- **Four neutral beams have been assembled 3 co and one counter**
- **The counter neutral beam has been tilted to avoid shining into one of the co beams.**
- **NB have been positioned to minimize beam outside the plasma on the inboard diameter.**

NB Saddle Coils



Locations for placing the NB is limited due to the shape of the plasma.

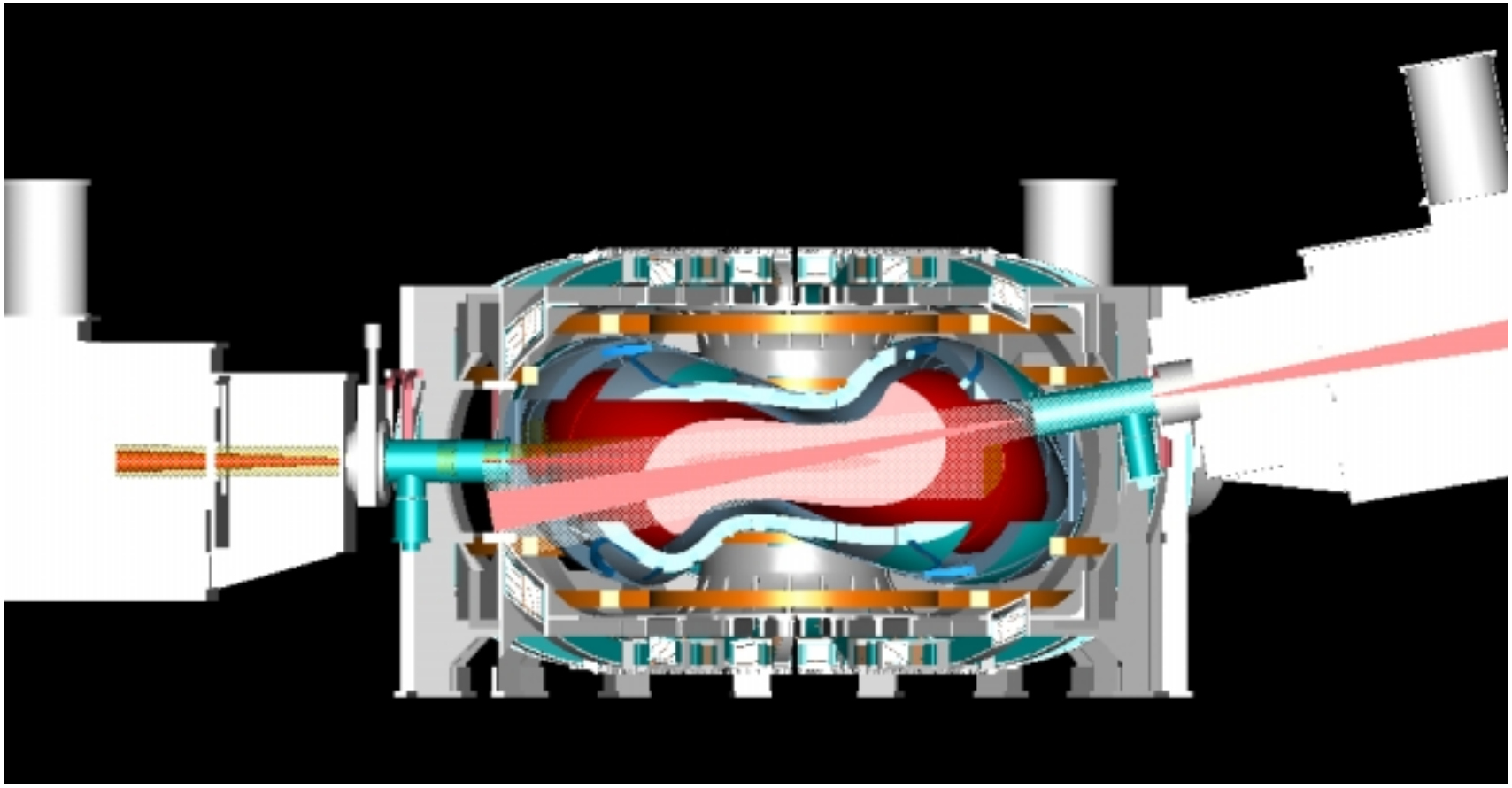
NB Saddle Coils



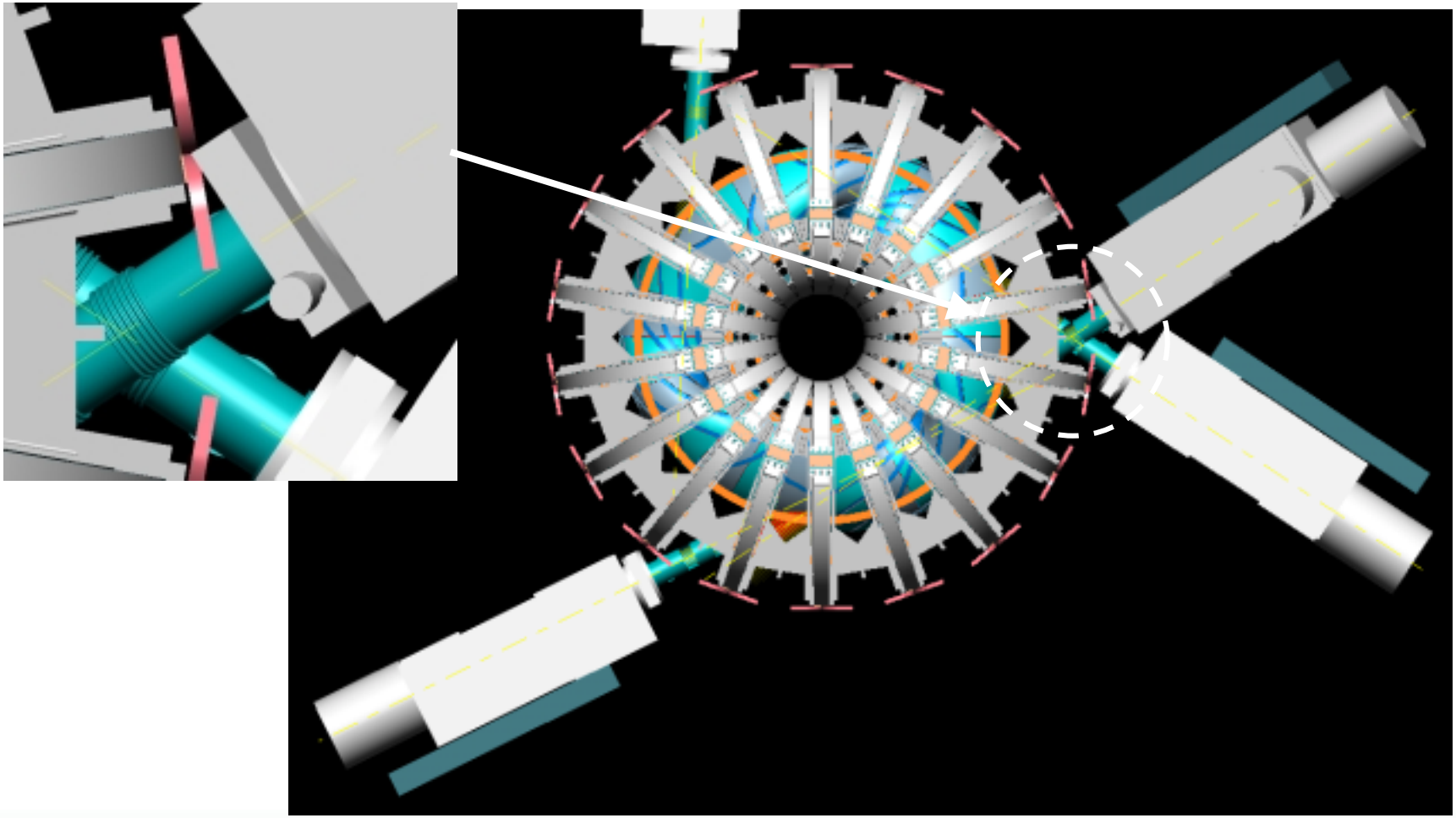
Sharp curvature makes positioning beam more challenging.

In 120 deg we go from this shape to this shape

NB Saddle Coils

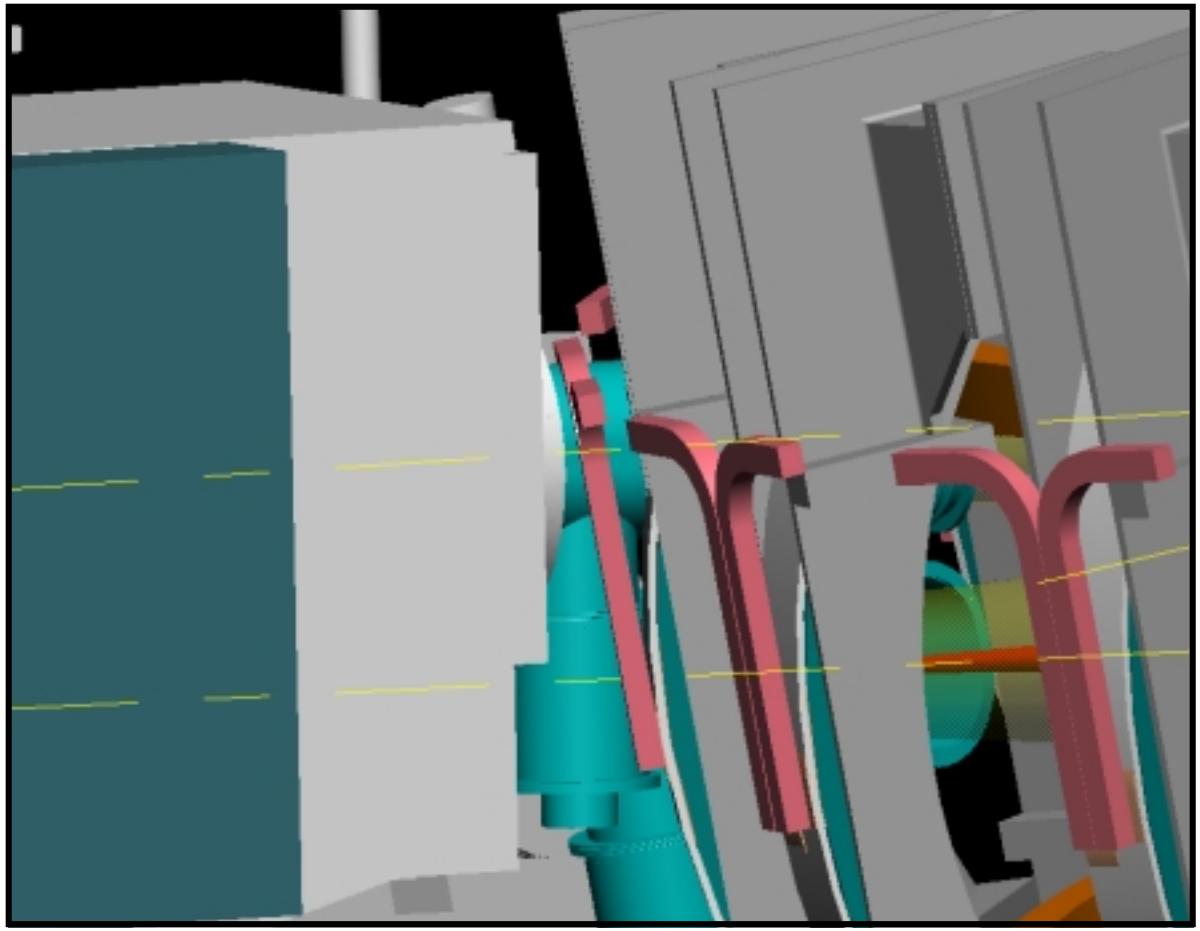


NB Saddle Coils

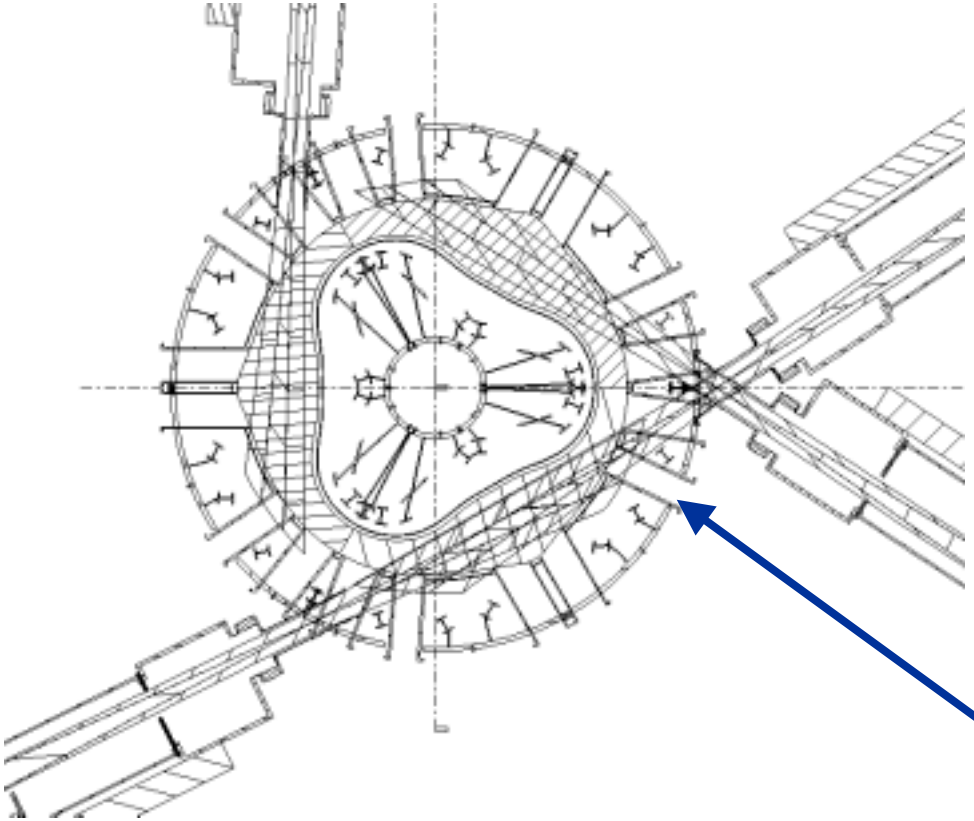


NB Saddle Coils

Clearance between TF coil and NB



NB Modular Coils



Tangential ports for NBs have not been developed.

Port geometry for the NBs has not been developed to the extent it has for the saddle coils. Work is just beginning in this area.

Vacuum Vessel

Neutral Beam Issues

NB Saddle Coils

- Because of the plasma shape the counter NB was tilted to prevent shining into the co Beam line.
- A configuration for placing the Neutral Beams is achievable.

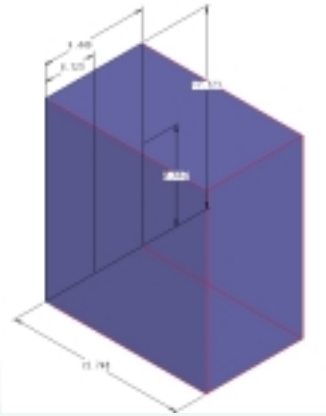
NB Modular Coils

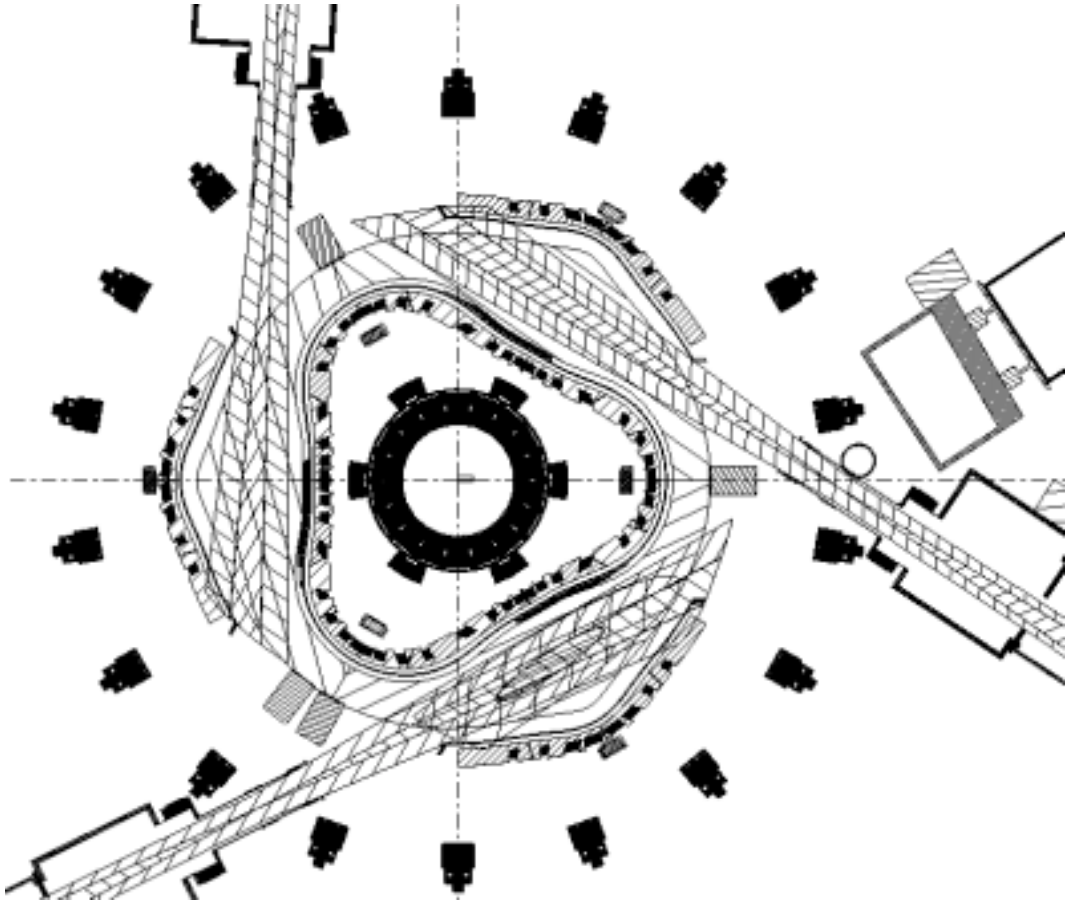
- Work is just beginning on placing the NBs.
- NB location is restricted due to the shape of the plasma.
- Tangential ports will be developed for the vacuum vessel.

High Harmonic Fast Wave

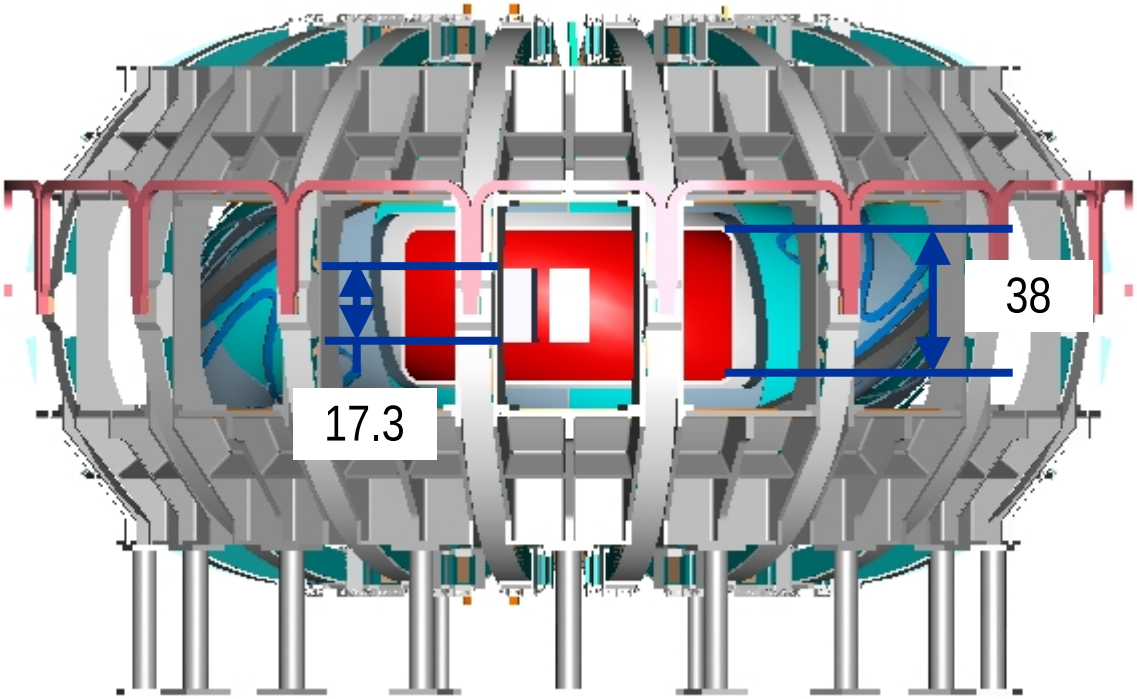
Saddle Coils

- Each Launcher requires access between the TF Coils for coax connections and maintenance.
- Basic size of Launcher is 440 mm tall, 240 mm wide and 400 mm deep.





High Harmonic Fast Wave



Issues

- **Port height is good for positioning RF launchers.**
- **Coax tubing will need to be routed around TF coils and NB.**

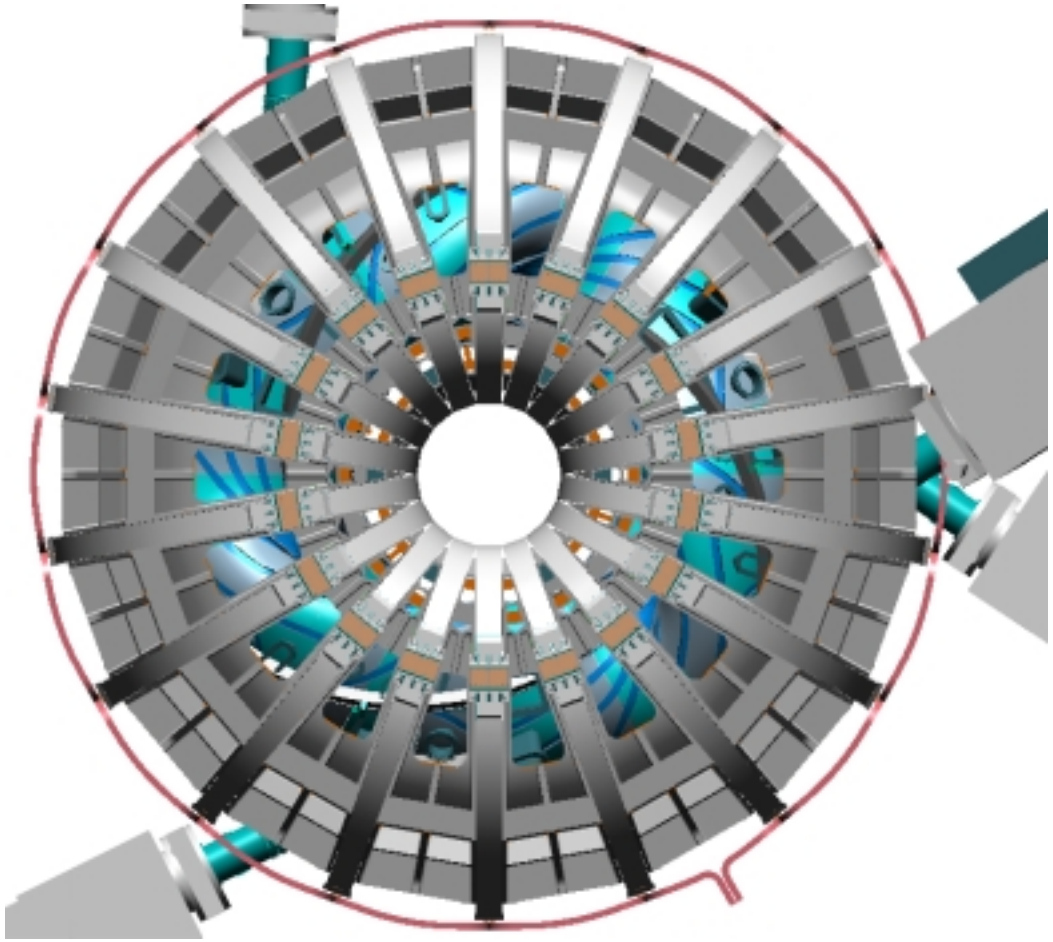
Saddle Coils

No of ports	96
24	8” Dia
6	4” Dia
12	Trapezoidal 14*11*10
6	Trapezoidal 10*7*10
12	Oblong 10” long * 4” wide
12	Oblong 12” long * 4” wide
12	Oblong 8” long * 4” wide
12	Oblong 8” long * 6” wide
96	

Diagnostics

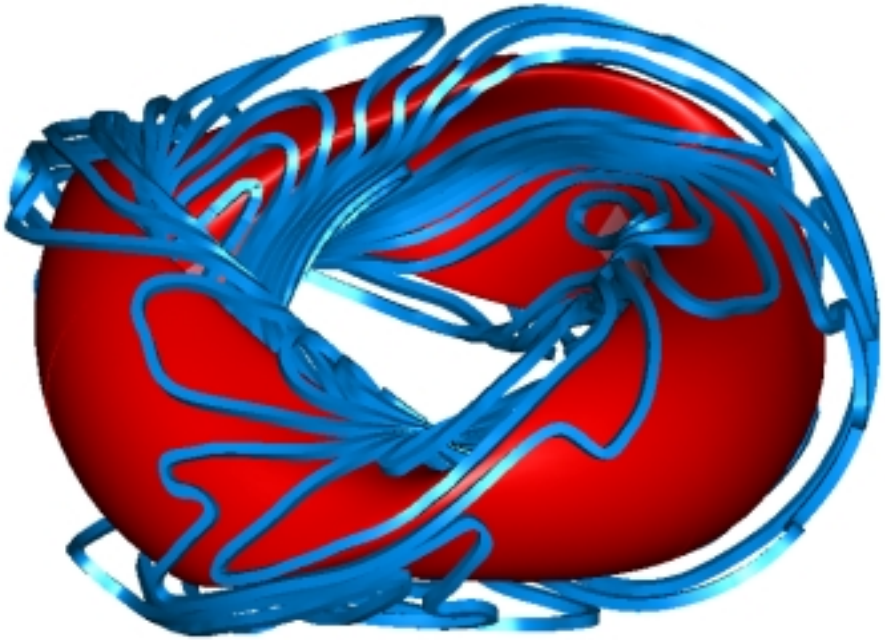
Port access from the top of the device Is good however the parting plane between the inner and outer shell restricts some access.

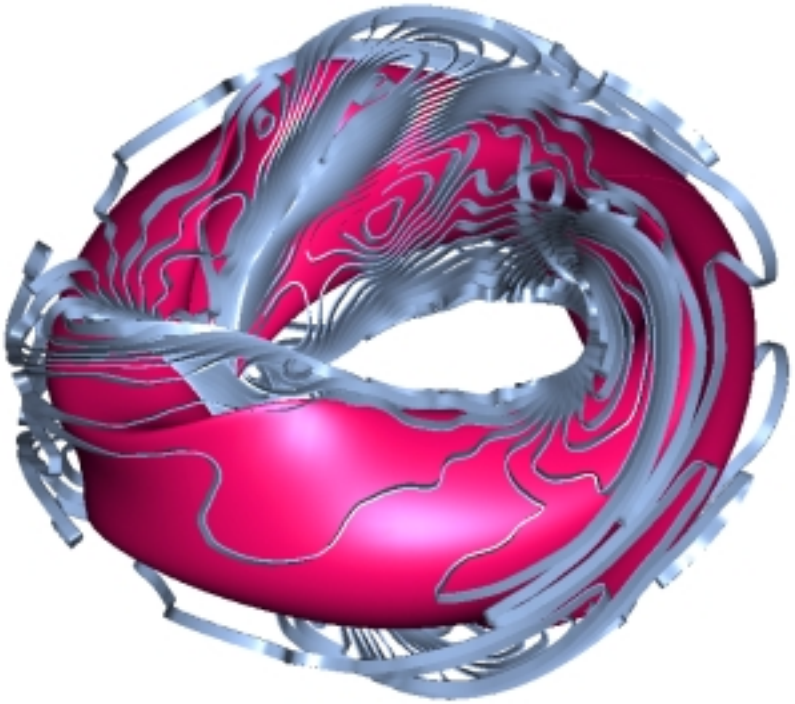
Shell segmentation also restricts some of the access.(4 bays)



Diagnostics

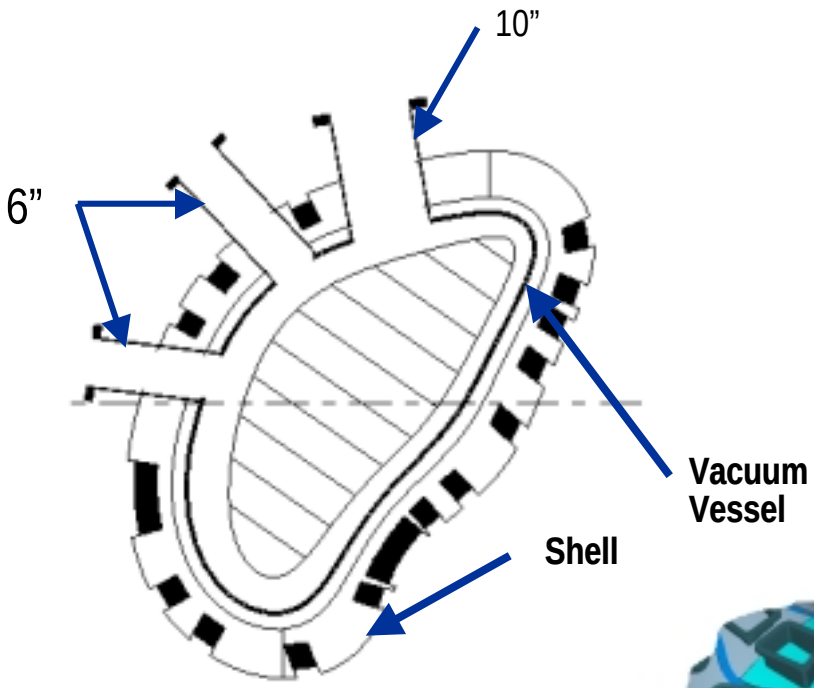
Fewer coils and different configuration have improved the access between saddle coils and PBX-M



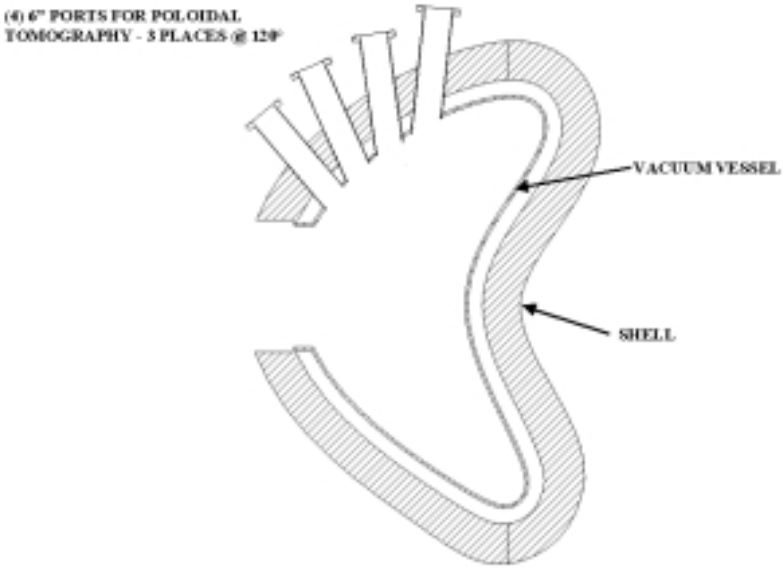


Diagnostics

Larger ports improve view angle in saddle coil design



Saddle Coils



PBX-M

Diagnostics

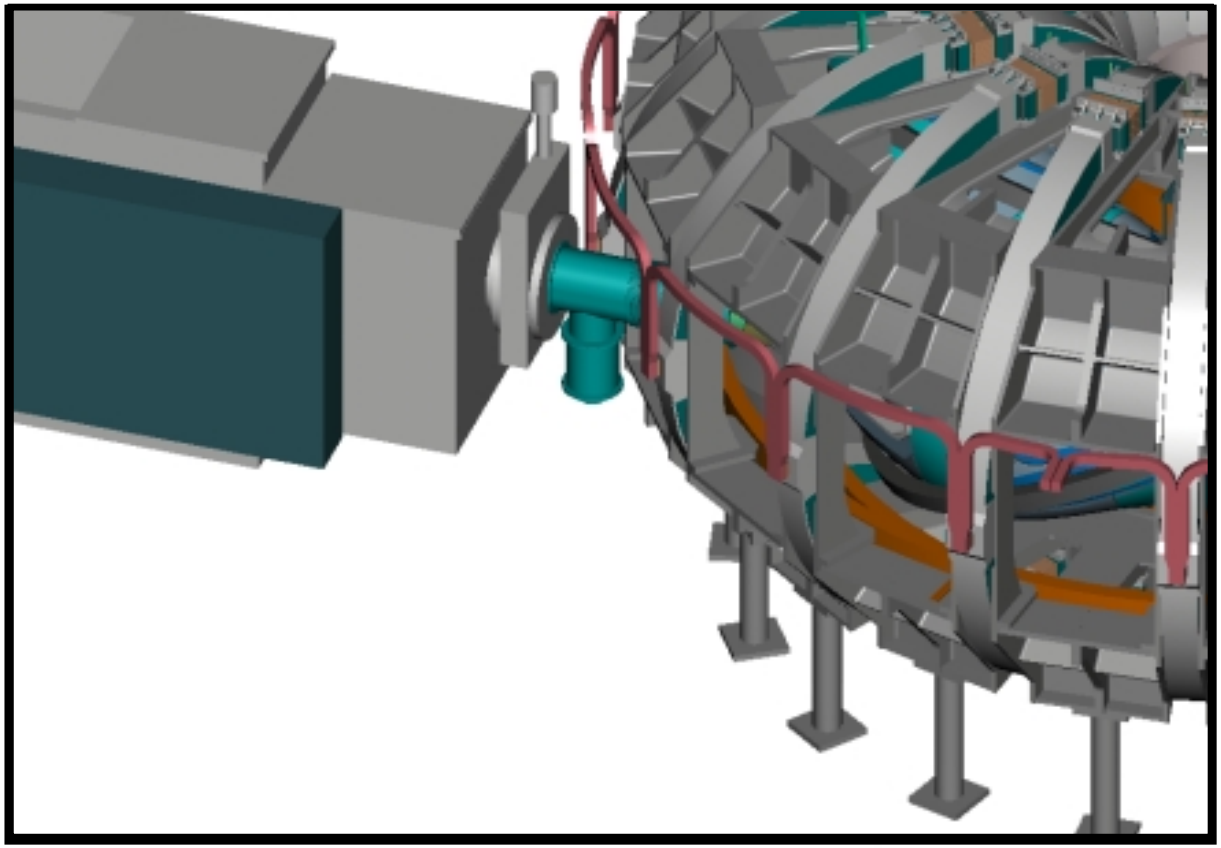
Issues

- **Better saddle coil configuration allows larger port sizes than PBX-M**
- **More room at 3 major port openings for additional diagnostics.**
- **Need to assign specific diagnostics to ports and address needs for each diagnostics.**

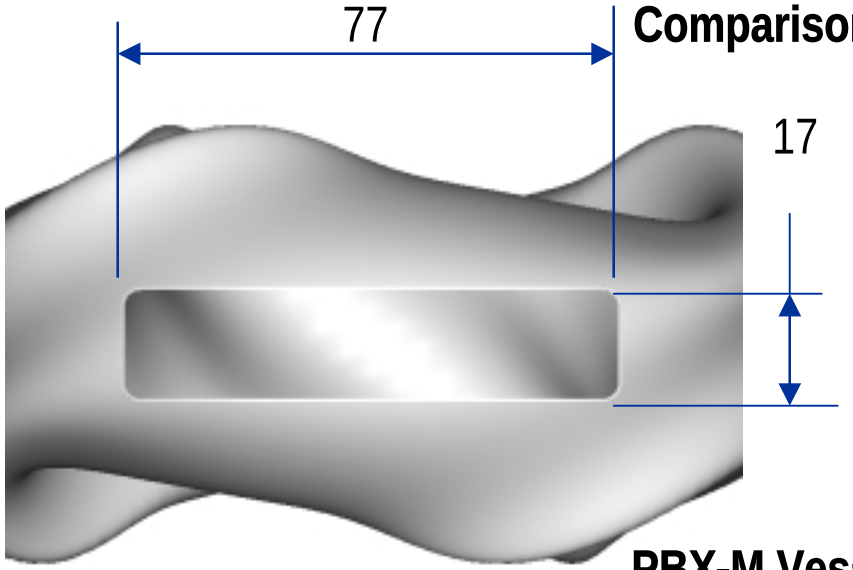
Vacuum Pumping

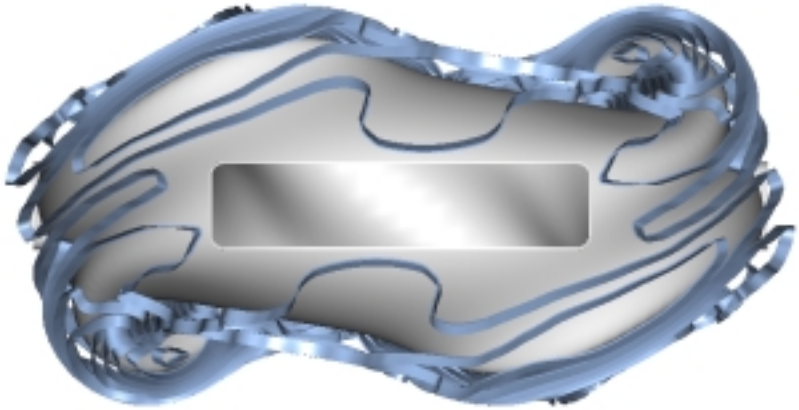
Saddle Coils

- 1500 l/s turbomolecular pump between NB enclosure and vacuum vessel has been placed.
- Neutral beam drift duct cross section has been increased for improved pumping.
- Cryo pump to added to the front end of the NB enclosure.

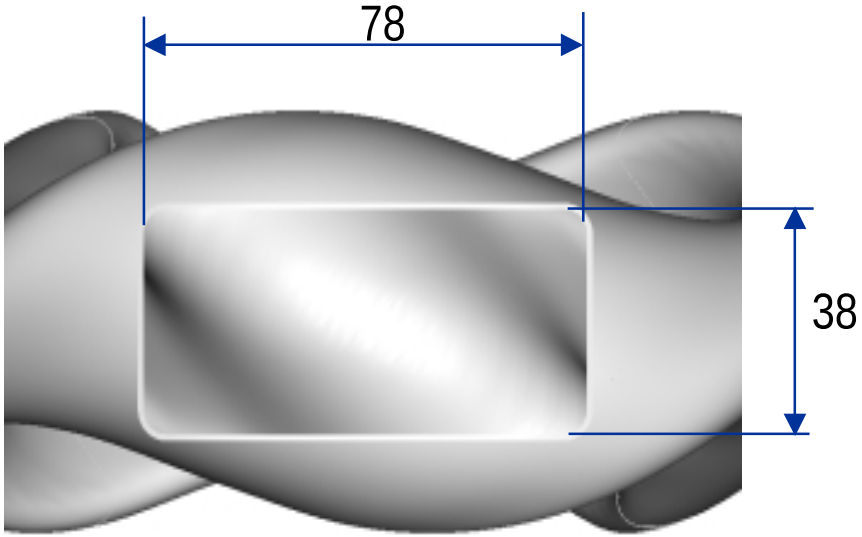


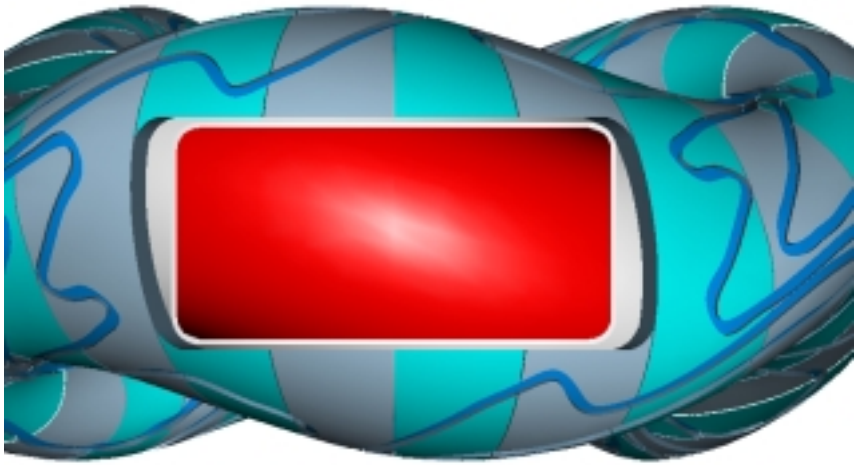
Comparison of opening between PBX-M and Saddle Coils





PBX-M Vessel and Coils

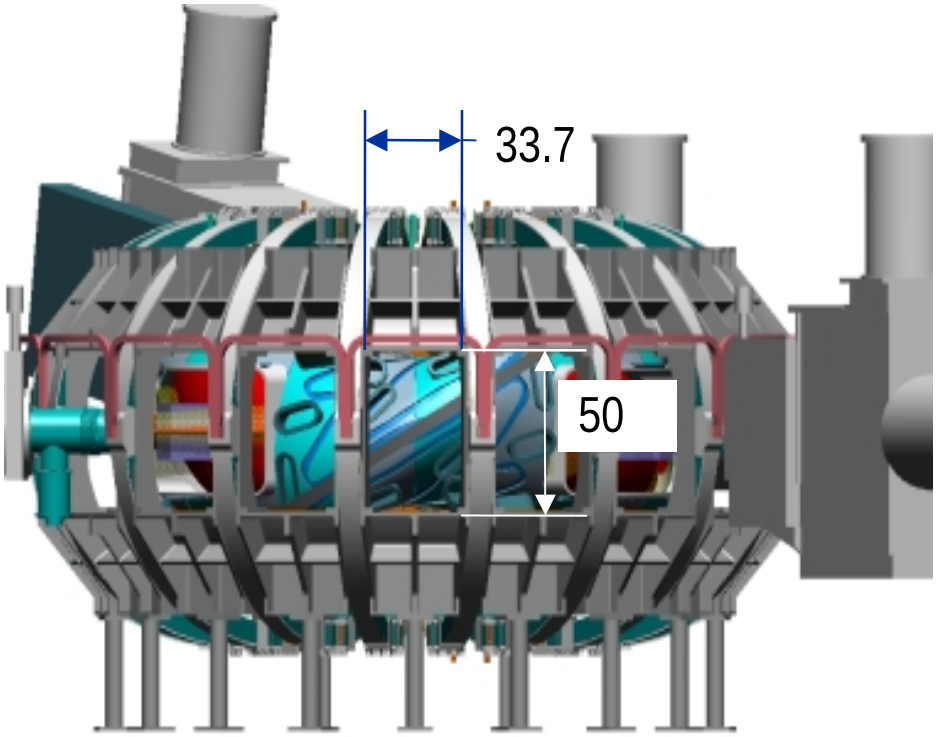




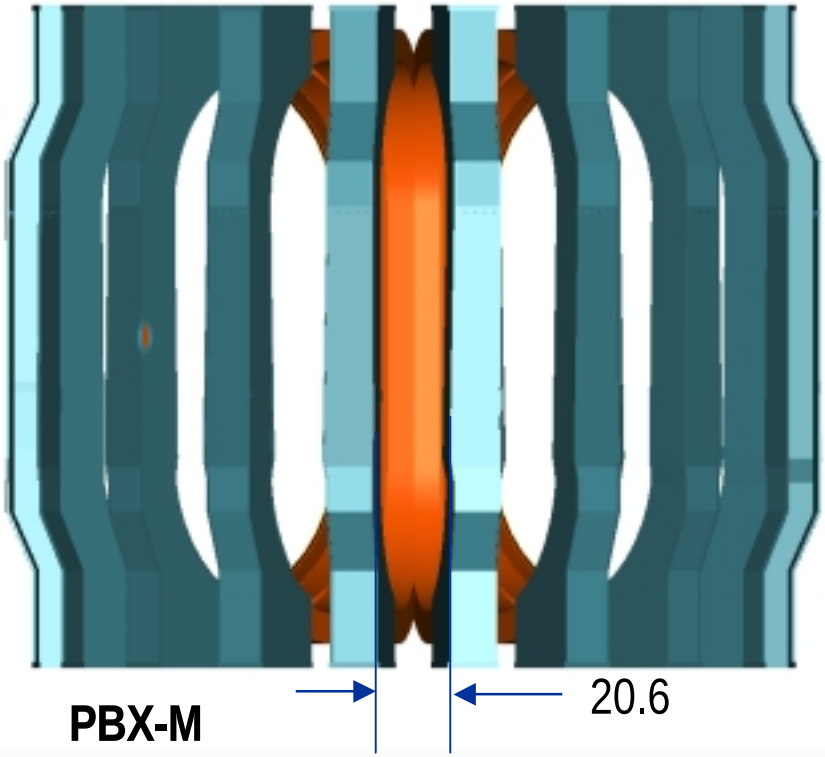
Saddle Coil

Vacuum Pumping

Difference between Saddle Coils and PBX-M for access to Ports

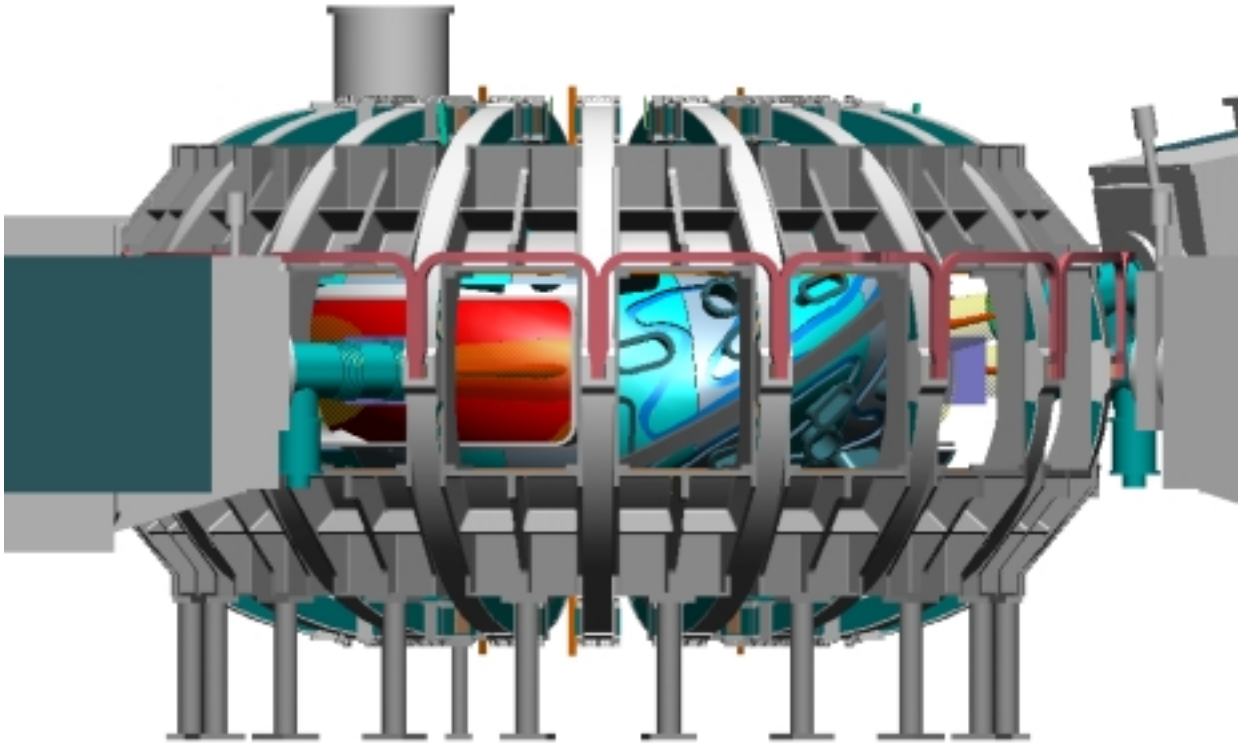


Saddle Coils



PBX-M

Vacuum Pumping



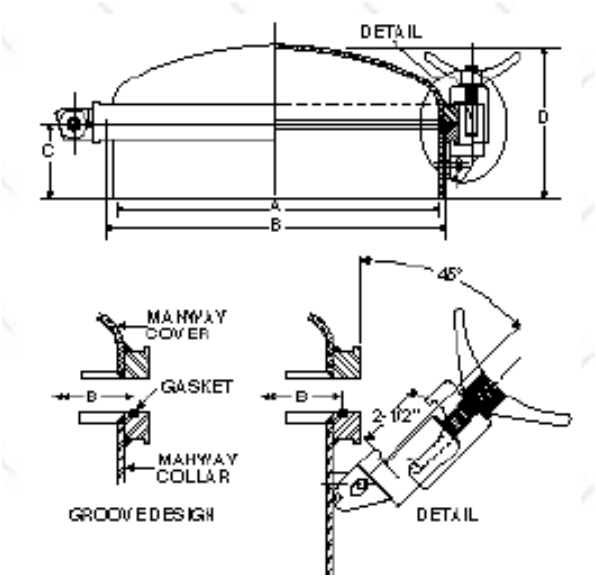
Issues

- **No major access issues for vacuum pumping.**
- **Details for the Cryo pump in the front of the enclosure should be developed.**
- **Pump duct could be resized based on more access around the duct.**

Personnel Access

Conformal Coils/Modular Coils

- Will use std configuration and sizes of man access ports.

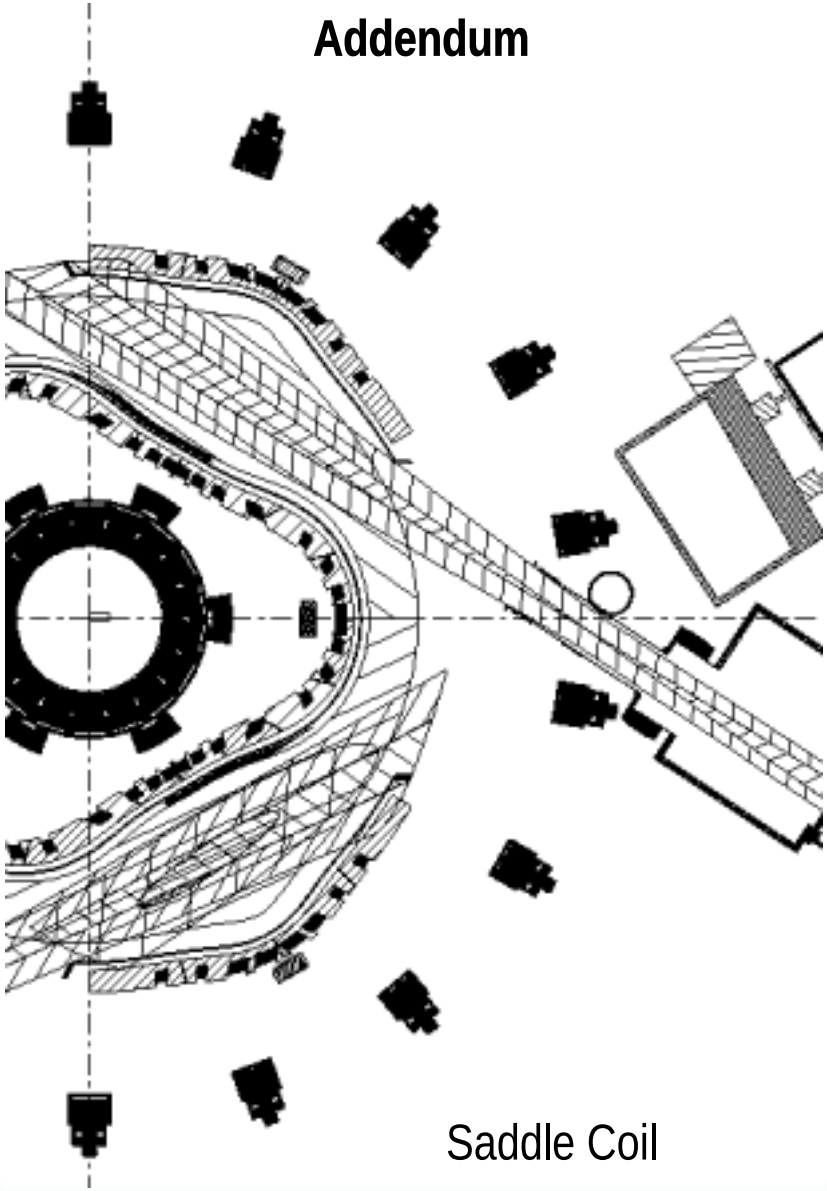


Size	A ID	B Gasket C/L	C Collar Hgt	D Overall Hgt	Approx Weight
18"	18"	19-1/4"	6"	10-1/4"	116 lbs
20"	20"	21-1/4"	6"	10-13/16"	129 lbs
24"	24"	25-1/4"	6"	11-7/16"	160 lbs

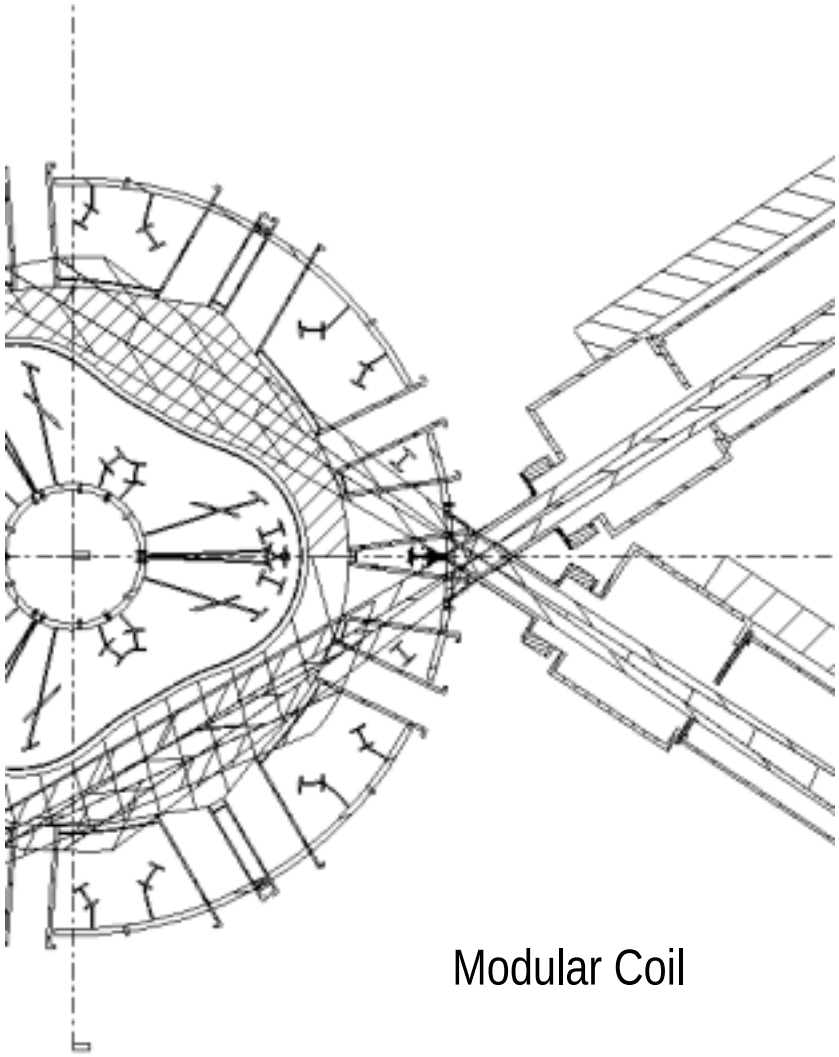
Summary

- An acceptable configuration for placing the NB has been shown for the Saddle Coils
- Larger ports for the diagnostics will improve the limited line of sight that was seen in the PBX-M design.
- Larger ports on the vacuum vessel will improve the access for the RF launchers, NBs, Diagnostics, and personnel access.
- Reducing the number of TF coils from 21 in PBX-M to 18 for the Saddle coil configuration has improved access for systems.
- In general the access for the Saddle coils has been improved because of the increased spacing between the TF coils, larger port openings, and a more open saddle coil configuration.

Addendum



Saddle Coil



Modular Coil