

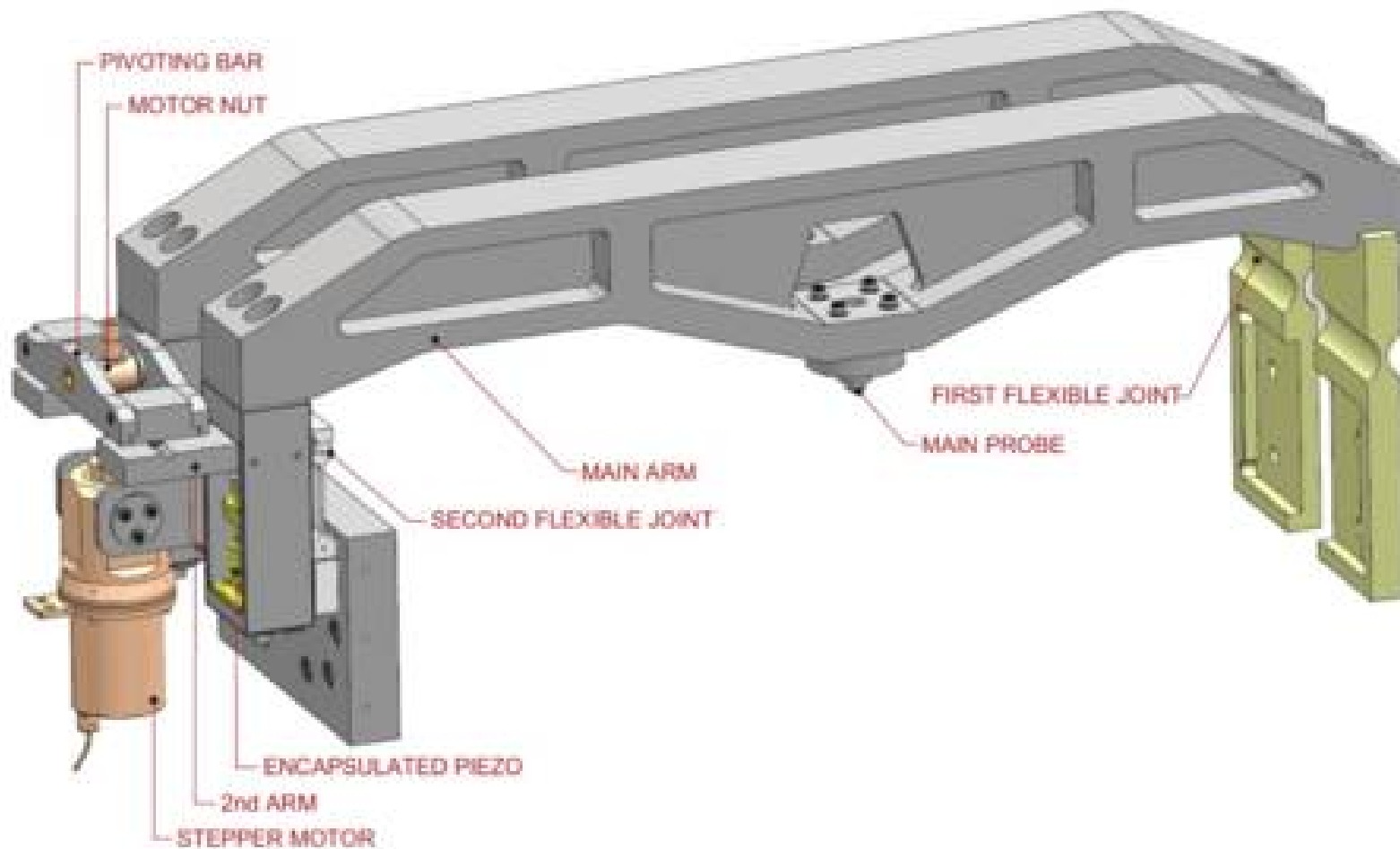


Bhabha Atomic Research Centre

Centre for Design and Manufacture

SSR-I Cavity Tuner (Production Status)

3-D Model

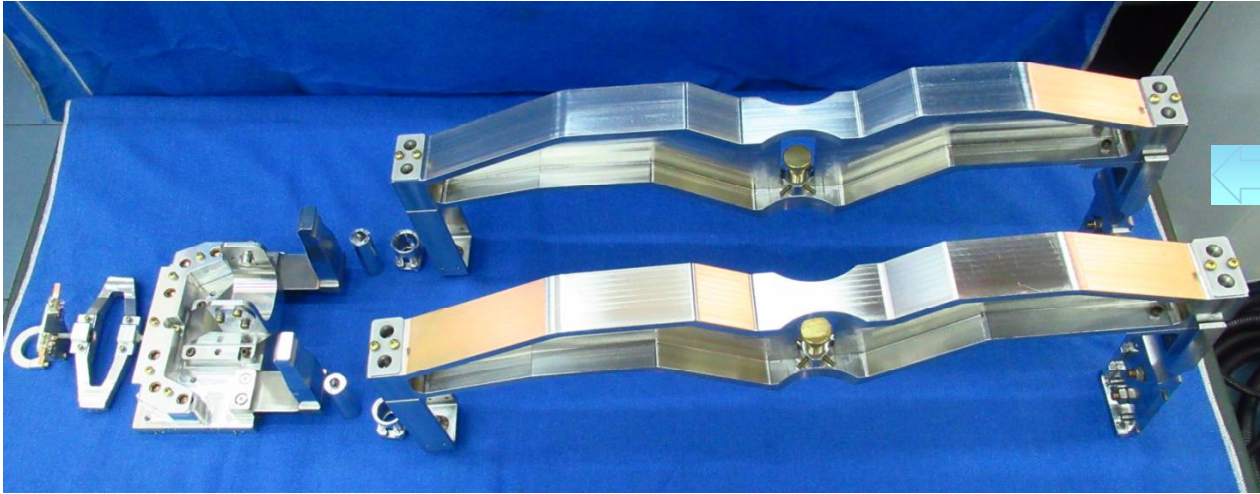


Production Status:

- Fasteners received from FermiLab
- One Tuner Assembly is completed and is ready to be dispatched.
- All components of Second Tuner Assembly manufactured except one Main Arm.
- Main Arm machining is expected to get completed by **Mid of the March.**
- Second Tuner Assembly is expected to be ready for dispatch by **End of March.**



1st SSR1 Tuner Assembly

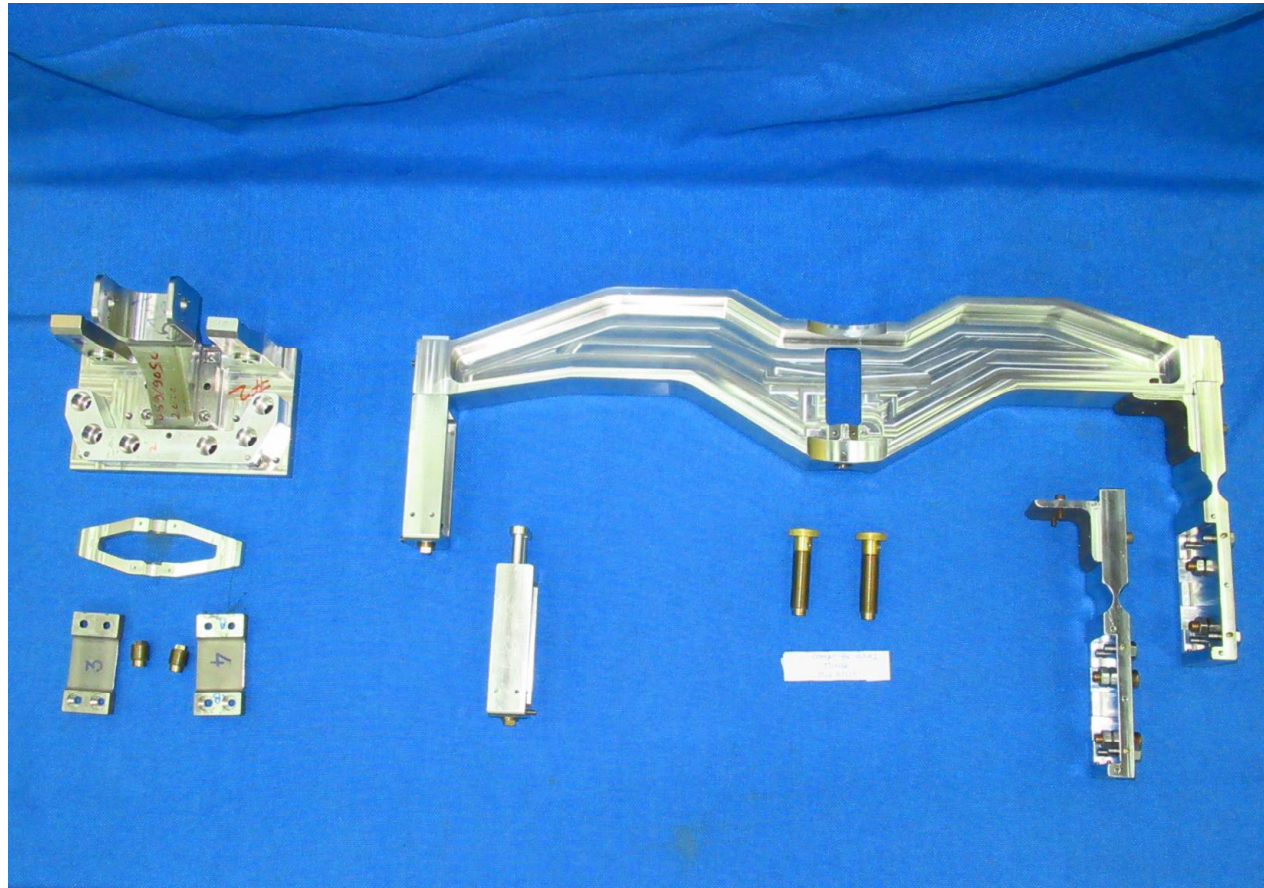


← All components of SSR1 Tuner assembly.

SSR1 Tuner assembly ready for dispatch.



2nd Tuner Assembly



All components are manufactured except one Main Arm.
Expected to be ready for dispatch by **End of March.**



Manufacturing Status of SSR-2 Cavity



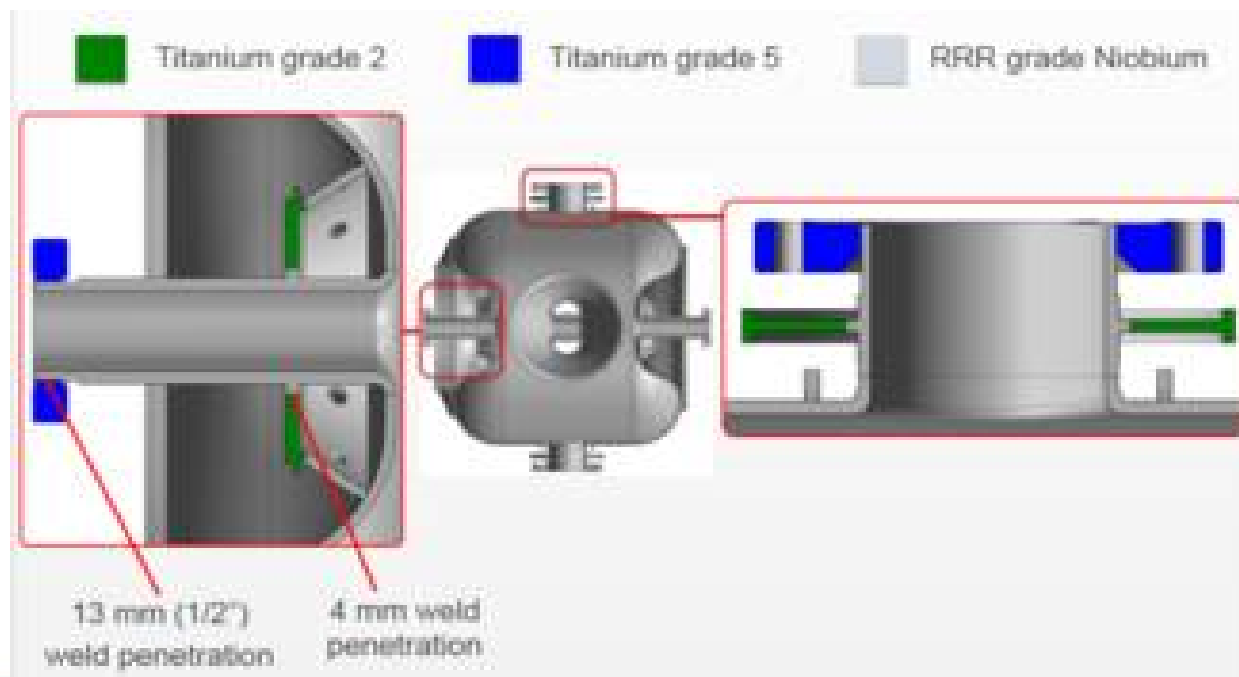
Qualification of EB Weld Joint Ti₂ - Nb



Qualification of EB Weld Joint between Ti₂ - Nb

Ti₂ - Nb EBW Details:

- Niobium – RRR grade—Bare cavity shell and tubes – Supplied by FNAL
- Ti₂ --- Specification- [ASTM-B265](#) – bare cavity stiffeners and He vessel
- Weld penetration – 4 mm
- Dia. of weldment_Sideport = 93 mm
- Dia. of weldment_Beampipe = 62.5 mm



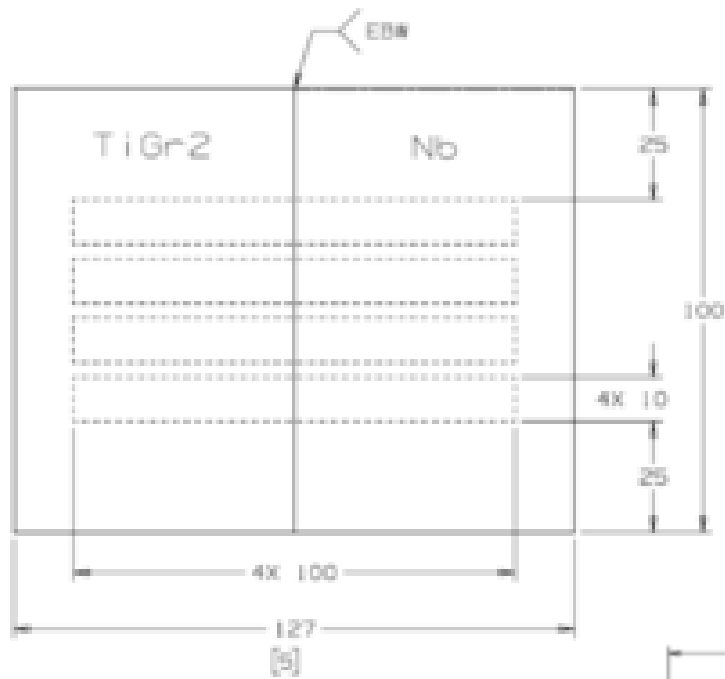
Qualification Tests to be carried out on welds:

Description	Requirements	Applicable Standard	
Dimensional inspection	Fit up and after welding dimensions	-	
Leak tightness of joint	No leak shall be detectable at 10^{-10} mbar*l/s, Full weld		
For Discontinuities			
Dye penetrant test	Full weld		
Radiography test	Full weld		
Metallurgical			
Metallography	Before and after HT	ASTM E3 for sample preparation	4 nos. of tensile test sample to be used
Grain size		ASTM E 112	
Energy-dispersive X-ray spectroscopy	Ti diffusion into Nb-- Before and after HT		
Mechanical Test			
Base metal, Nb	3 nos. – Before HT 3 nos. – After HT	ASTM E8	
Base metal, Ti-2	3 nos. – Before HT 3 nos.-- After HT	ASTM E8	
Weld sample	4 nos. – Before HT 4 nos.-- After HT	ASTM E8	

HT—Heat Treatment at 600° C for 2-10 hours.

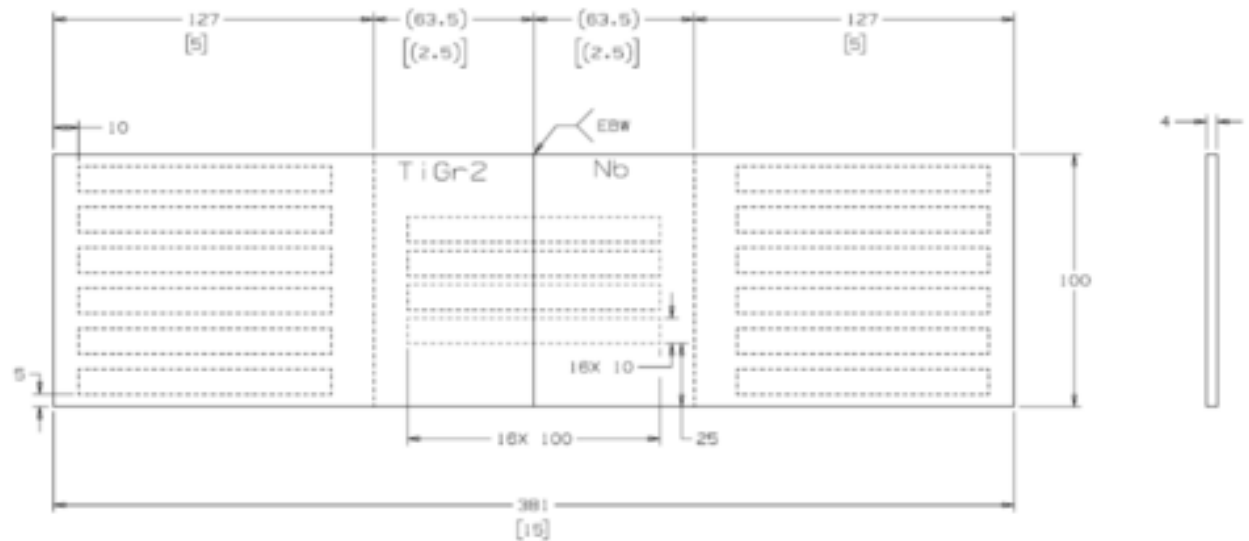


Scheme for EB welding and Cutting Sample:



Sketch-1

Sketch-2



Inputs Required from FNAL:

- 1. Design documents of SSR-2 cavity and dressing.**
- 2. Nb, Ti₂ & Ti₅ availability at CDM, BARC for SSR-2.**
- 3. Raw material for Side port tube, Spoke beam pipe and Beam pipe as it has thickness of 8.25, 11 & 11.5 mm.**
- 4. Any requirement for Standard ASTM Specification for Ti-2 and Ti-5?**
- 5. Electron beam parameter used for weld at FNAL, WPS, PQR etc which can be used as starting point to start weld.**
- 6. Test results of PQR.**
- 7. Heat treatment-- full cycle details with heating rate, soaking period, cooling rate etc.**

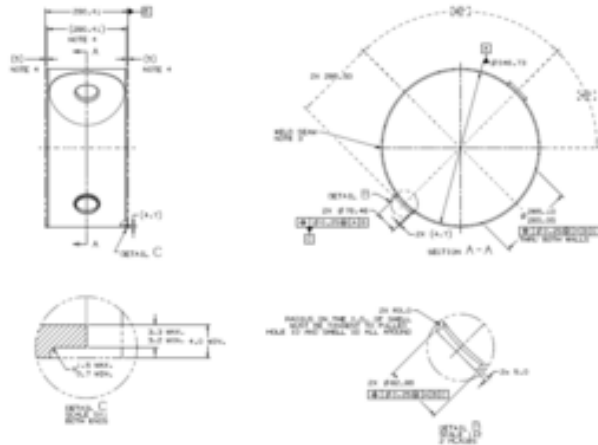


Formed Components of SSR-2 Cavity

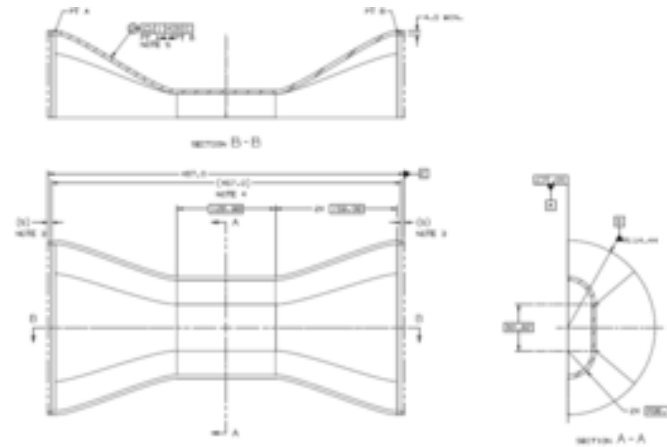


Status :

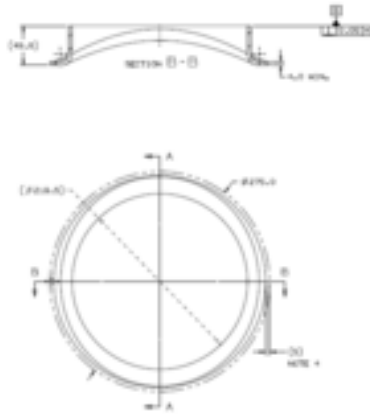
1. 4 components will be out sourced for forming - Shell, Half Spoke, Spoke Collar & End Wall.



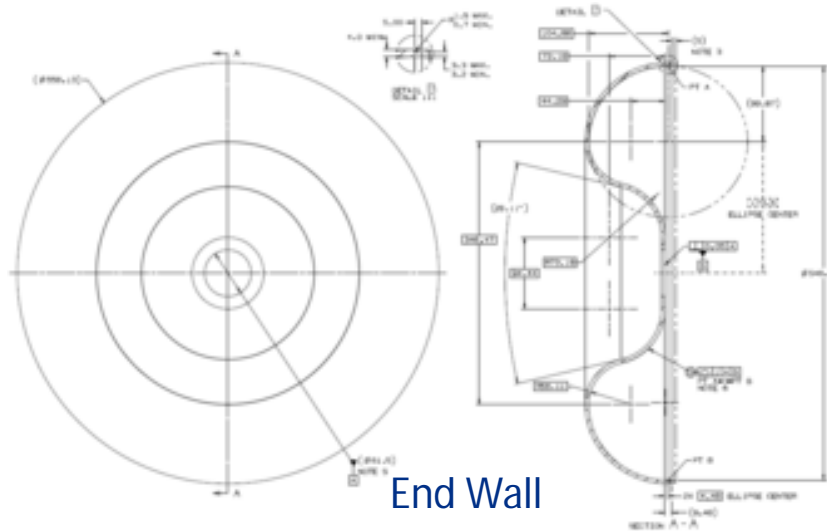
Shell



Half Spoke



Spoke Collar



End Wall



Status :

2. Discussion with the supplier is under progress.
3. Manufacturing specification documents for SSR-2 cavity and jacketing is required from FNAL.
4. Details of test – Iron contamination by immersion in water.
5. Lubricant details which can be used during forming.



Thanks



Bhabha Atomic Research Centre