

3rd 1-cell 1.3 GHz cavity status TE1CAT003

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8 March 11

IIFC MEETING

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Half cell Assly Measurement Progress at RRCAT



During Dec 2010 we had completed the two half cell Assembly.
Status presented on 4 Jan, IIFC CCM meeting.

Nb Half cell assembly ID	Dim Before Welding	Dim after Welding	IRIS Shrinkage (after welding both side)	Parallelism (mm)	Concentricity (mm)
112	196.75	196.33	0.42	0.69	0.77
169	196.56	196.09	0.47	0.42	0.01

Mechanical inspection

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IIFC MEETING

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Parts preparation

In order to further optimize the equator weld parameter, we decided to make second set of dummy equator (based on the observation of bead on first dummy equator).

20 um Etching & Packing for Dummy Equator half cell at RRCAT.

BCP Solution used :HF(40%)+HNO₃(70%)+H₃PO₄= 1:1:2

Acid Temperature <15 °c

Also 3 um BCP etching was done on Niobium half cell assembly.

Components storage & transportation to IUAC in polybags filled with N₂ to prevent contaminations.

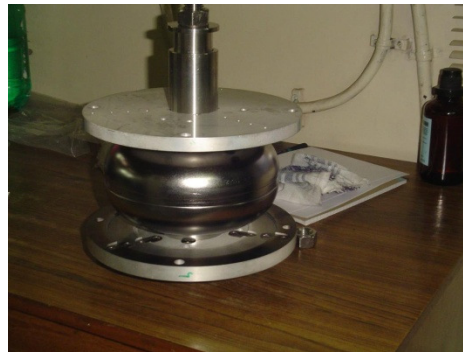
Weld parameter optimization using dummy equator (Trial)

We resumed our on making 3 single cell cavity in Feb 2011

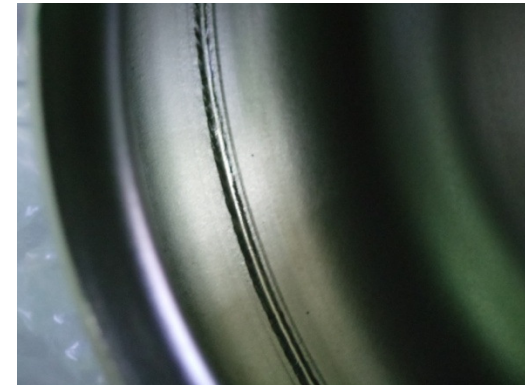
Made in collaboration –
RRCAT, Indore – IUAC, New Delhi



Pre weld Etching



Setting in Fixture



Under bead in Welded
Dummy Equator

Weld parameters were adjusted slightly.

Weld result : Upper bead is good and smooth

The inner bead is observed (possible to see due to absence of beam pie) directly.

It is noticed that the inner bead has improved considerably wrt to earlier dummy Equator .

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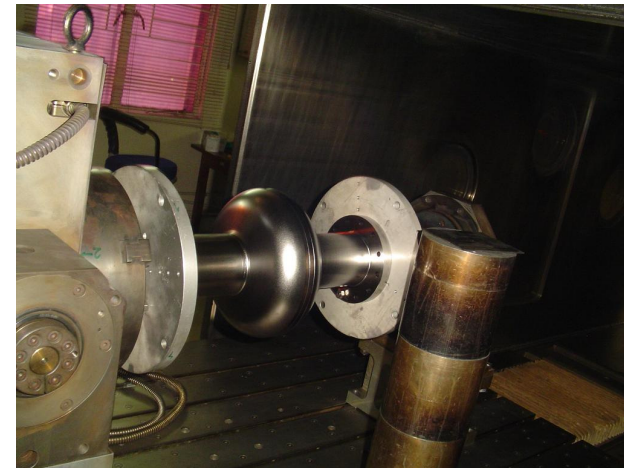
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Activities for Final equator welding

Based on the inspection of inner weld bead, we decided to go ahead & complete the final equator joint of the 3rd cavity.



3um -Pre weld Etching



Setting for equator welding

Minor adjustment on weld parameters was done..

Weld result : Upper bead is good and smooth

The under bead has improved considerably wrt to earlier two cavity .The under bead is good & uniform without any undulation.

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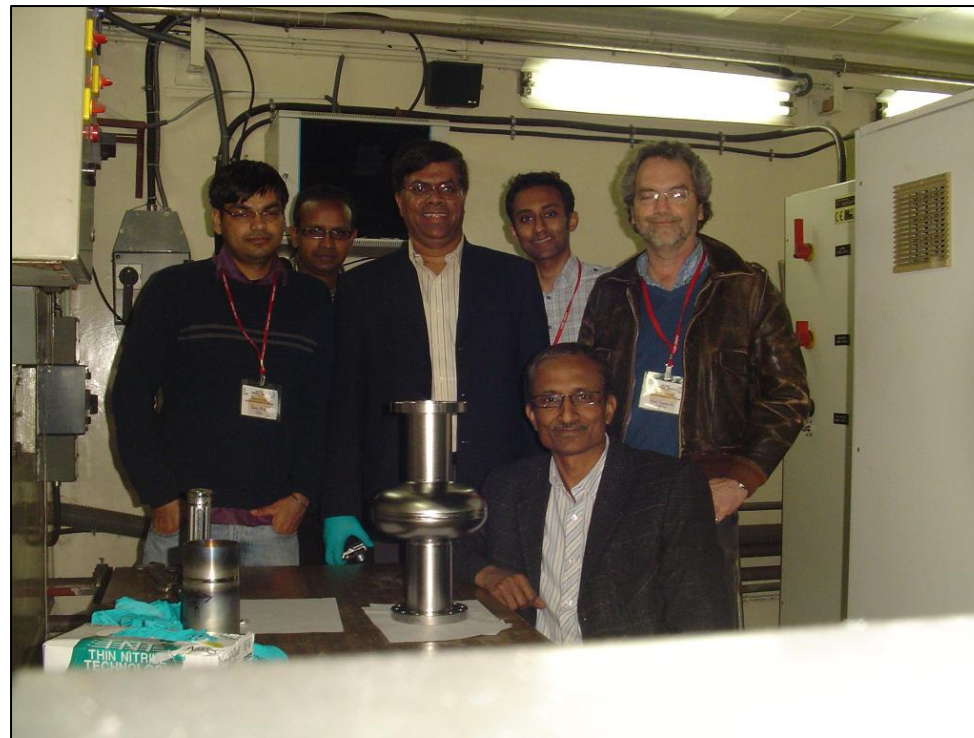
IIFC MEETING

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Activities for Final equator welding

The timing for the cavity welding was planned so as to allow the participation from Arun & Ronak as per request from Shekhar.

(Also seen in the picture is Tom Nicole, Jim just left to Hotel).



TE1CAT003 with RRCAT-IUAC & FNAL team members

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IIFC MEETING

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Mechanical Inspection and qualification of complete Single cell

Equator weld shrinkage

	Dim Before Welding	Dim after Welding	Shrinkage (mm)
TE1CAT003	392.44	391.62	0.82

Mechanical inspection

	Total length (mm)	Perpendicularity (mm)	Parallelism (mm)	Concentricity (mm)
Dwg dim	392 ±1	0.40	0.10	0.10
TE1CAT 003	391.62	Could not be checked	0.57	0.12

RF measurements (300 K)

After Equator Welding	length (mm)	Frequency (MHz) 300K	Quality factor 300 K
TE1CAT003 Cell ID # Nb-112 + Nb- 169	391.62	1299.9	9144



Leak testing

Leak testing at 300 K,

Qualified for leak rate of 1×10^{-12} mbar.l/sec .

Leak testing at 77 K: Set up under preparation



Single cell cavity
Leak testing

After this step the cavity will in principle be ready for dispatch for processing & testing at FNAL.

Further plans

➤ **4th** single cell cavity :

Welding activities at IUAC, March-April-2011 (Depends on availability of welding machine)

Plans for the Five cell:

It is with simple end beam pipe.

As suggested by Shekhar, the processing & testing of this will be done at FNAL as per standard & established recipe for the new cavities.

Later on these cavities can be brought back to INDIA for re-qualification & validation of Indian processing facilities.

Thank You
for your kind attention