Post Fabrication Plans for RFD Cavity

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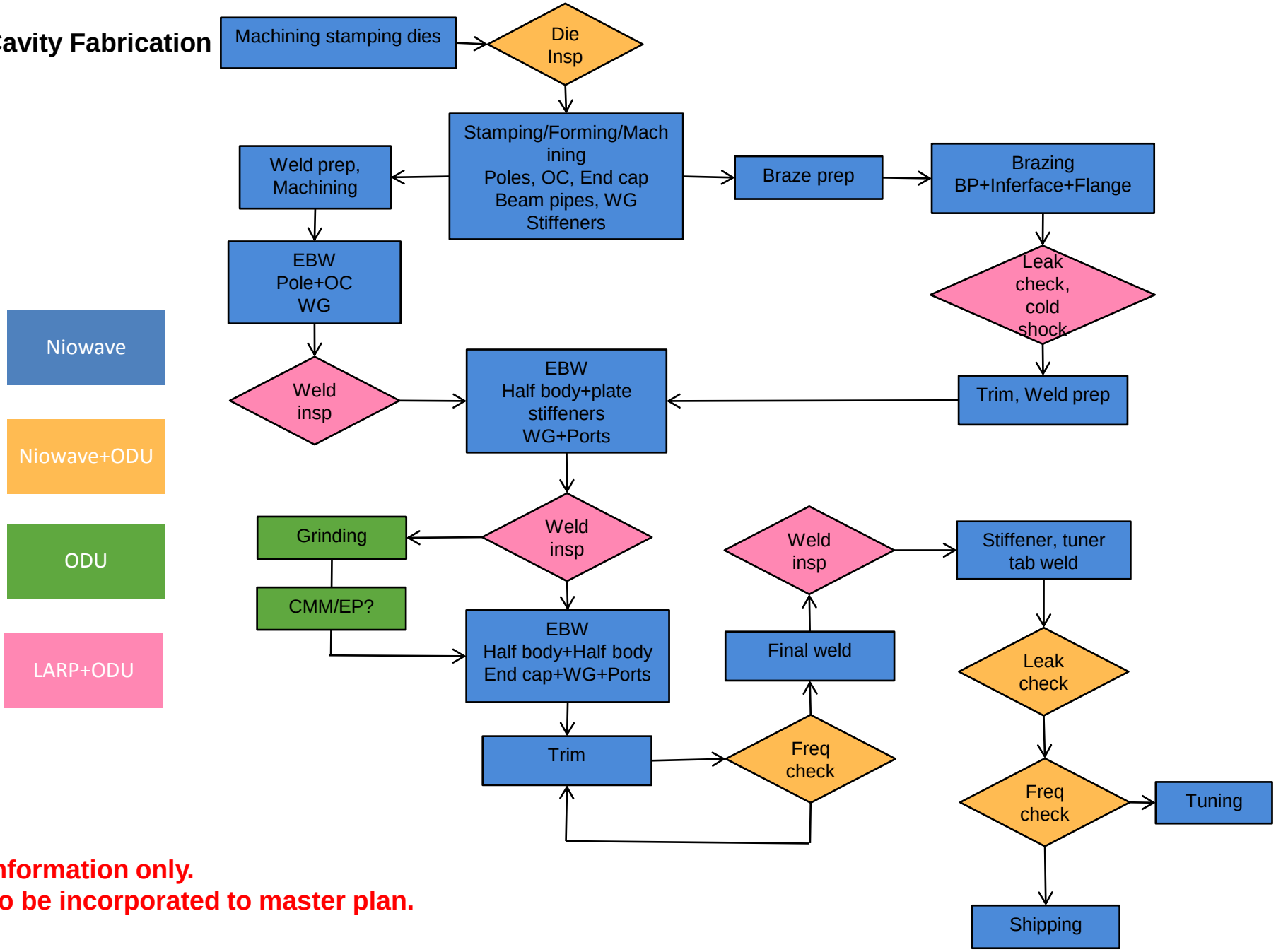
Outline

- Fabrication plans
- Incoming inspection/test
- Processing
- Cavity test
- HOM coupler test
- Cavity + coupler test
- Dressed cavity test

Cavity Fabrication

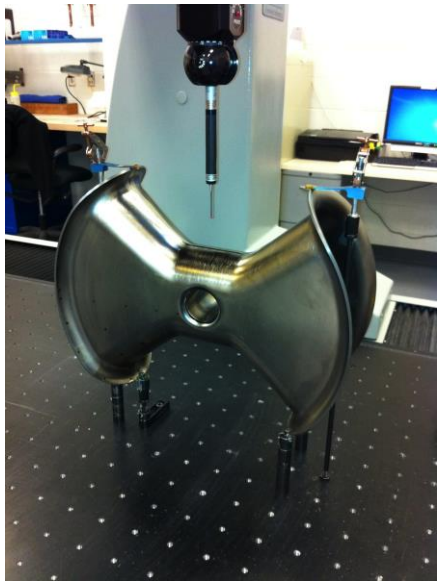


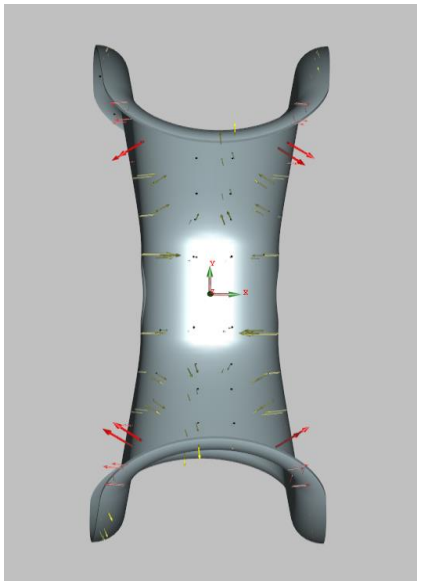
Information only.
To be incorporated to master plan.

Incoming Inspection/Test

- Visual inspection – Weld and flanges, documentation
- Leak check
- Thickness measurements – Ultrasonic thickness gauge
- Frequency measurements
- Bead pull
- CMM measurements – Identify deviation and its location (or after VTA test)

Bead pull





CMM

Cavity Processing

- Cage design and support brackets – done before cavity delivery.
- Ultrasonic degreasing
- Bulk BCP 150 μm with real time thickness measurement every 3 seconds (If EP done, directly light BCP)
- Heat treatment 10 hours at 600 °C with partial pressure monitoring
- Test probe calibration
- Light BCP 10-30 μm
- Manual HPR for ports – effectiveness tested by double spoke cavity
- HPR – 1300 psi pressure, top to bottom 3 passes
- Clean room assembly
- Bake 48 hours at 120°C with RGA monitoring

Cavity VTA Test

- Self excited loop, 500 W high power amplifier used for Pop cavity test.
- Dewar pressure, Helium level, and cavity vacuum monitoring during test.
- Cool down rate to be decided.
- Cable calibration.
- 4K test.
- Surface resistance measurement during cool down from 4K to 2K.
- 2K test.

Cavity and Coupler Assembly Test

- CMM measurement for coupler before test.
- Coupler only at room temperature – Transmission test using test box (design to be determined).
- At least for one cavity, the cavity and coupler assembly test is planned.
- The test procedure is similar to the cavity only test.
- Observe multipacting behavior and survey HOMs.

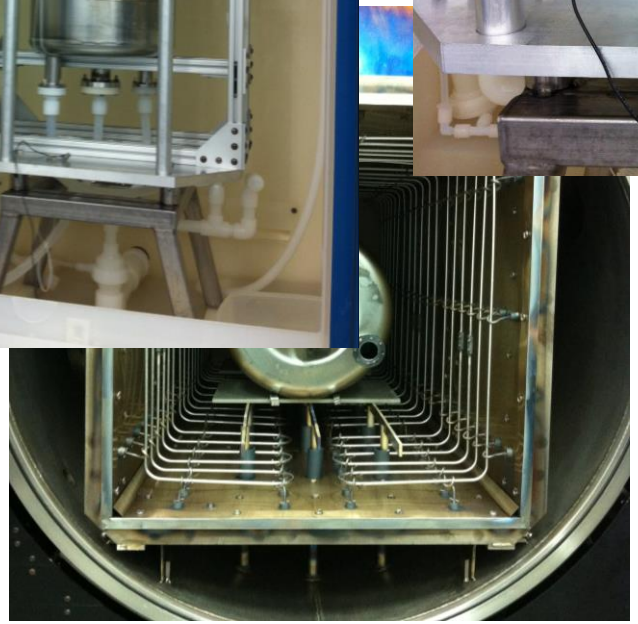
Dressed Cavity Test

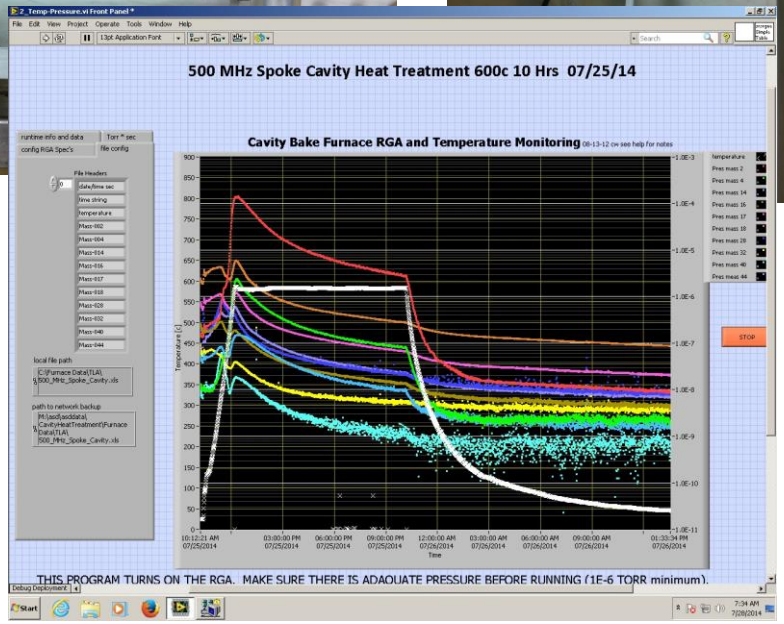
- Upon receiving – Leak check, frequency measurement, light BCP to be determined, HPR.
- Clean room assembly with couplers.
- Bake 48 hours at 120°C.
- 4K test
- 2K test

Thank You

- Ed Daly, Joe Preble / Jefferson Lab

Cavity Processing





Heat Treatment

Cavity Processing

	Frequency (MHz)	Frequency Shift (kHz)
Welded Cavity (At room temp in air)	400.029	
After Bulk BCP Processing	399.969	– 60.0
Bulk BCPed Cavity in Vacuum	400.087	+ 118.0
Cooled Down Cavity (Detuned by half tuning range of 100 kHz)	400.660	+ 573.0
Operational SPS Cavity	400.760	+ 100.0

Heat Treatment