Definition of Work Area

Issues of Cavity and Cavity Package,
Work Package discussion

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Issues on Cavity & Cavity Package

Cavity & treatment

1. Gradient performance (S0 task)

2. HOM performance (determine Qext specification, shape, position, angle, how deep into beam pipe)
3. Wake of HOM antenna and Input coupler antenna (avoid asymmetric beam kick)
4. HOM coupler multipactor study (Is it problem or not.)
5. Vacuum seal method (Al-hexagonal, In-coated helico-flex, Sn-helico-flex, …)
6. Bolt flange or Clamp chain flange
7. Fabrication method (press&EBW, hydro-forming, end-group fabrication)
8. Materials (poly-crystal, large grain, single crystal, RRR, SQUID-scan)
9. Nb-Ti weld, Nb-SUS junction
10. High Pressure Vessel regulation (US regulation, JPN regulation, Euro-regulation; what is them and how to clear them for exchangeability)

Cavity & treatment (cont.)

11. Pre-tuning procedure (method, target, specifications)
12. Vertical test procedure (method, instruments, required data, data share(data-base))
13. Surface Treatment procedure (detail method documentation and drawings)
14. Shape (TESLA shape, LL, re-entrant, others)
15. Cavity fix (support) during treatment and vertical testing (necessity of unified support?)
16. Input coupler port diameter

Issues on Cavity & Cavity Package cont.

Cavity package

1. Lorentz detuning compensation (specification, method, required rigidities, fast tuning specification,…)
2. Tuner selection (Orsay tuner, Brade tuner, Slide-jack tuner, Ball-screw tuner,..)
3. Coupler selection (variable coupling, fixed coupling)
4. Magnetic shielding method (inside or outside vessel)
5. Alignment method (method, specification, cavity straightness, reference point,..)
6. Piezo maintenability (Piezo life, accessibility, install position, how many)
7. Tuner motor maintenability (motor inside/outside)
8. Helium vessel material (Ti or SUS, …)
9. Assembly procedure in clean room (detailed procedure in clean room)
10. High Pressure Vessel regulation (same as cavity)
11. HOM probe, monitor antenna (detail engineering for materials, treatment, insulator, brasing, RF design)
12. Coupler peripherals(arc sensor, temp sensor, pumping, coupling adjuster,etc)

High Priority Work Package

Cavity

WP-C1. Gradient Performance (S0 Task:surface treatment-vertical test)

WP-C2. Shape decision (shape-gradient-HOM-Lorentz_detuning-input_port)

WP-C3. Fabrication (material selection, method selection, junction, HPV regulation)

WP-C4. Beam dynamics (HOM-HOM_coupler-Input_coupler, alignment, straightness)

WP-C5. Flange and seal (material & method selection)

Cavity package

WP-CP1. Lorentz detuning compensation (specification, method, required rigidities, fast tuning specification,…)

WP-CP2. Tuner selection (Orsay tuner, Brade tuner, Slide-jack tuner, Ball-screw tuner,.. Fast tuner selection)

WP-CP3. Coupler selection (variable coupling, fixed coupling, port diameter)

WP-CP4. Magnetic shielding method (inside or outside vessel)

WP-CP5. Vessel material (material selection, junction, HPV regulation)

WP-CP6. Alignment method

Strategy of cavity package design

1. Baseline Engineering Design

decision of Unified Parameters (gradient, HOMs, detuning compensation ...).

down-selection of technologies (cavity shape, tuners, couplers, ...).

decision/selection of detailed engineering.

2. Baseline Fabrication & Qualification Procedure

decision on fabrication method, qualification/test procedure.

3. Cost Evaluation of Baseline Engineering Design

re-evaluation of cost if the design is changed from RDR.

The evaluated cost will be the reference for plug-in's cost.

4. Plug-in specification if candidates are there

Pick-up possible plug-in,

decision of plug-in performance spec., dimension spec.,
interface spec., material spec., qualification/test spec.,
installation spec., transportation spec., ...

Technology downselection

1. **Identify the downselection item.**

2. **Identify the proposer of the technology.**

3. **Make comparison tables for merits and points from each proposer.**

4. **PM Make fair-minded comparison table to be filled in by each proposer.**

5. **PM decide the technology according to the table.**

* Above is inspired by the on-going shape decision in KEK.

Strategy of
plug compatibility qualification

1. Qualify the Plug-in design.

2. Qualify the Plug-in product (dimension, interface, ...).

3. Qualify the Plug-in performance by unit test.

4. Actual installation into the baseline cryomodule.

5. Qualify the overall performance of the baseline cryomodule using Plug-in inside.

The report document of each qualification to PMs and experts has to be done.

Possible plug-compatible units

C1-level : Cryomodule

C2-level : Cryostat with GRP, He-pipes, and thermal shields.

C3-level: Cryostat vessel, GRP supports, Pipes, Thermal Shields, Invar fixture, Cavity support, Quad support, Cryostat Pumping system, Instruments(vacuum, temperature, etc) Installation fixture and method, Transportation fixture and method,

C2-level : Cavity package with He jacket, tuner and coupler,

C3-level: Cavity, Jacket, Magnetic shield, Tuner, Coupler, Instruments (RF cable, temperature sensor, piezo drive, etc)

C2-level : Quad-steer-BPM package,

C3-level: Quad magnet, Steer dipole coils, Current feedthrough, BPM

C2-level : HOM absorber

C2-level : Beam line pumping