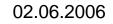
R&D Board Task Force on High Gradient SCRF Cavities

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Overview

- ILC R&D framework
- Gradient Task Force Charge
- 'S'-issues
- Workplan



ILC R&D Framework

- The need of making gradients more reproducible is a top priority
- Single-cell cavities in various labs obtain very high performance
 - Yield rates vary between labs
 - Probably we are not far away from the good parameter set
- Looking at the history of TTF some significant effort is needed to transfer results to multi-cells
 - Three cavity productions (20-30 each) were done to improve the gradient from the level of 5-10 MV/m to 25 MV/m with classical etching
 - This included especially the training of companies to provide the required niobium and electron beam weld quality
 - Currently, we are in EP Production No.1 at DESY
 - Other regions are in the process of being able to do research, they are not yet ready for a production-like run
- A dedicated facility in each region with sufficient redundancy and flexibility is needed to have fast turn-around of cavity tests.
 - Waiting for the repair of infrastructure is painful
 - From the TTF experience the bottleneck is typically the cavity preparation, not the cryogenic testing

Gradient Task Force Charge

- The RDB is asked to set up a Task Force to carry out a closely coordinated global execution of the work leading to the achievement of the accelerating gradient specified in the ILC Baseline.
- A definition of the goals for the cavity performance in terms of gradient and yield and a plan for achieving them should be proposed by this group, which should take account of the global resources available and how they may be used most rapidly and efficiently.
- The accelerating gradient performance and yield should be specified both for an individual 9-cell cavity and for an individual cryomodule, and the plan should cover the demonstration of this performance in both cases.
- The GDE will facilitate the coordination at the global level to achieve this vital goal as soon as possible.

S: Definitions

- These details are still under discussion to some degree, final version by Vancouver
- S0
 - Achieve 35 MV/m in a sufficiently large sample (~20-30) of 9cell cavities in the low-power vertical dewar testing in a production-like operation e.g.
 - all cavities get the same treatment
 - Re-treatment of cavities should be limited to 2 or 3 preparations
 - Final goal:
 - BCD assumption: 37 +/- 5% MV/m (95% yield)
 - Could be optimised
 - Intermediate goal
 - more than 90%(80%) achieve 35 MV/m
 - assumed in the costing exercise
 - First step:
 - achieve 31.5 MV/m in a sufficient number of cavities to pursue S1

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S1: Definition

- Achieve 31.5 MV/m@10^10 as operational gradient as specified in the BCD in more than one module of 8 cavities including e.g. fast tuner operation and other features that could affect gradient performance
- Final goal (following the Snowmass definition):
 - 31.5 MV/m including enough overhead as described in the BCD (all cavities are 35 +).
 - At least three modules
 - Could include re-assemblies
 - Does not need to be final module design
 - Operation for a few weeks
 - Long-term is in S2
- Intermediate goals
 - Achieve 31.5 MV/m average operational gradient as a proof-ofexistence

Workplan: Organisaton

- Accumulate information of regional programs
 - That's one reason why we are here today
- Involve TTC
 - Could help in organizing forums
 - TTC Meetings
 - Monthly teleconference with America and Europe started
 - » Seeking to integrate Asia soon
 - A lot of expertise is accumulated there
 - Steps towards accumulation of various parameters of EP has started
- Involve Industry for surface preparation
 - In America maybe directly on multi-cells?

Workplan: Topics

- Data assesment
 - What has been achieved?
 - What not?
- Define tests needed on a multi-cell cavity e.g.
 - Passband modes measurement
 - Check for Q-disease
- Assessment of infrastructure
 - Availabbility for testin
 - Cavities available



S0 Work Plan I

- Assessment of data
 See example for TTF cavities (preliminary!)
- Assessment of production and preparation capacity
 - Infrastructure status and plan
 - Industry involvement



Assessment of data

		# of	Gradient	(all	Gradient	(best		Spread (last tests)		Fabrication		with Q-	, v	Field emission onset (all tests)	Field emission onset (best tests)	L, L	Field emission	Spread (last tests)	Comments
TTF (9 cells)	1 BCP 1400	27			19.7	8.1	17.8	7.6	3.0	9.0			4.7	,	16.9	5.4	15.9		Nb material not scanned, weld preparation not done to spec. At one company
TTF (9 cells) TTF (9 cells)	2 BCP 1400	27			25.6 26.6		24.0 26.6	4.0	1.0	1.0			4.1		19.4 20.3		19.2	3.8	Hole burnt during EBW
TTF (9 cells)		11			34.7	4.5	28.9	7.4			2.0	3.0	8.4	L .	27.3		22.1		Tests before and after bake
TTF (9 cells)	4 EP 800	30			28.5	4.4	27.6	4.3		3 (1400 C treated)	2.0	5.0	2.9		21.8	5.4	. 22.7		Weld preparation not done properly,Tests before and after bake





S0 Work Plan II

- Arrive at the best recipe
 - Start to work with TTC on EP parameters in Labs
- Adress contamination issues
 - 5 um EP a la Kenji
 - Alcohol rinse
 - Other Options?
- Optional 1400 C postpurification



S0 Work plan III

- Definition of treatment
 - Distribution of variations on recipe e.g.
 - alcohol rinse at DESY
 - Short EP at KEK
 - Distribution of
 - Production-like effort (many cavities ~20-30, one turn) vs.
 - Tight-loop (one cavity, many turns)
- Definition of required data set on X years (Hasan: X=3?)
 - Number of cavities needed
 - Number of tests needed
- Distribution of work load
 - There are obvious data points we will get:
 - XFEL: EP+ 800 C
 - There are trickier ones
 - Who does tight-loop in US?
 - JLab, Cornell, ANL?
 - Who does production effort in US?
 - JLab, ANL?
 - Can we do production-like effort at KEK?

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S1 Work Plan

- Gather information
 - TTF module assembly
 - SNS module assembly
 - Need to look on how much useful information is there, some difference in asssembly
- Define Goals
 - First Goal: Proof-of-existence
 - DESY module 6 (I hope so...)
 - Second Goal: Reproducible yield
 - Look at DESY data
 - Can possibly done by re-assembly of the same module