

# Cavity Yield Re-Evaluation Plan

**C.M. Ginsburg (Fermilab)**

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- **Zack Conway (Cornell University)**
  - **Sebastian Aderhold (DESY)**
  - **Rongli Geng (JLab)**
  - **Kirk (Yasuchika) Yamamoto (KEK)**
  - **CMG (Fermilab)**
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- **Thanks to all of the Lab management groups for agreeing to provide resources and assist with this effort**

- Put world data into a common “database” for inclusion in global data analysis
- Rules:
  - All 9-cell cavities, all RF tests are to be included
  - The starting point for inclusion is "the vendor says this cavity is built according to the buyer's specification."
  - Lab responsibility:
    - Assign person in-charge
    - Submit data periodically
    - Mark the data as included or excluded (e.g., in case of system failure) from global analysis
- Make the data available to all via a web interface
- Make plots which anyone could reproduce, given the stated cuts on the data

## • Database Status

- For now, this is an Excel spreadsheet
- Fermilab-TD is willing and able to make a web interface from the spreadsheet showing some standard (TBD) plots; future cavity data would be entered via electronic travelers
- It would be ideal if all Labs could use a real database, such as the DESY database, to store all the data together – longer term
  - KEK-baseline group did it!
  - Is it possible for all Labs to agree to do this?
  - I would like to work with DESY database colleagues, if DESY can contribute additionally to this effort
    - What tools are required?
    - What changes are permitted (e.g., diff process techniques)
    - What info must be added (e.g., flag for ILC analysis inclusion)?
    - What web interfaces might be set up?

## • Plots don't exist yet



# Implementation: Initial Data Spreadsheet



Cavity Information											
text (<=250 chars)	text strings separate	Cornell DESY	ACCEL/R AES		S-cell other (please specify in remark)	TESLA (EU and US) TESLA (KEK)	Fine-grain Large-grain other (please specify in remark)	Wah Chang Tokyo Dental Heraeus	JLab-bulk EP DESY bulk BCP DESY bulk EP	JLab-600C 600-800 1400 with getter None	text (<=250 chars)
		Fermilab	MHI			LL					
		JLab	ZANON			Ichiro			KEK tumbling		
		KEK				other (please specify in remark)					
Cavity Name	Alias	cavity owner	cavity vendor	date cavity received from vendor	#cells	Cell shape	Material	Material vendor	Bulk surface removal technique	High temperature heat treatment	Cavity Remarks
AES001	AES1,TB9AES001	Fermilab	AES	2/1/2007	S-cell	TESLA (EU and US)	Fine-grain	Wah Chang	JLab-EP	JLab-600C	First AES Tesla-shape cavity. Will be first Fe

Process/Test Result									
integer	JLab#1 KEK#1 DESY#1 HPR only none	integer	date (MM/DD/YYYY)	decimal	decimal	yes no	Quench FE/quench Field emission Q-slope System other (please specify in comment)	text (<=250 chars)	
RF test #	lastest surface treatment	total material removed [um]	RF test date	max gradient [MV/m]	Q0 at max gradient [10^10]	Field emission observed?	Limitation	Process/Test Result Comment	
1	JLab#1	213	3/6/2007	17.5		no	Quench	mode measurements: quench on cell 3 or 7	
2	JLab#1	236	3/28/2007	18.0		no	Quench	mode measurements: quench on cell 3 or 7	
3	JLab#1	252	4/16/2007	17.0		no	Quench	no diagnostics used	
4	JLab#1	269	5/21/2007	16.0		no	Quench	mode measurements: quench on cell 3 or 7	
5	none	269	9/7/2007	15.6		no	Quench	mode measurements: confirm quench on cell 3 or 7; fast thermometry: confirm quench on cell 3 near equator	
6	none	269	9/18/2007	15.0		no	quench	fast thermometry: confirm quench at cell 3, around 17.0 deg in HAZ	
7	none	269	11/9/2007	15.0		no	Quench	fast thermometry: confirm quench at cell 3, around 17.0 deg in HAZ	
8	HPR only	269	9/3/2008	0.0		no	System	test aborted due to cold leak at beam pipe flange	
9	HPR only	269	10/9/2008	15.9		1.5	Quench	KEK thermometry: #3 cell equator	
10	KEK#1	295	11/7/2008	21.8		1.28	FE/quench	Mode measurements: Max Eacc = 40 MV/m at cell2, 5 and 8, cell1, 9, 4, 6 was Eacc = 35 MV/m	

Two types of info:  
 (1) Cavity based  
 (2) Process/test based

We can abandon this after FALC if DESY DB becomes a viable option

Database Information		
yes		text (<=250 chars)
no		
Additional information known about cavity limitation and source understanding	knows this cavity lecture included in data analysis?	if no, please explain
yes		
yes		
yes		
yes		
yes		
yes		
yes		
yes		
no		system problems; test not completed
yes		
yes		
Coil inspection: #3 cell equator	158deg, 17in bump	

- **Elvin Harms heads Fermilab database development**
  - **Elvin and Dieter Gall ported some 3.9-GHz Fermilab vertical RF test data into DESY database**
    - **2 (of 4) 3.9-GHz cavities in the string now at DESY**
    - **Not all of the tests, not all of the recorded data**
    - **Developed a program to re-arrange text from test data file, plus manually removed faulty data points**
    - **Dieter Gall uploaded the specially formatted data into database**
    - **Data on the remaining cavities to follow**
  - **Full database at Fermilab is in (slow) progress; data are currently distributed around the test stands**
- **So it may be possible, also for Fermilab, with DESY assistance, to put 1.3-GHz 9-cells test data into DESY database...**
- **What about JLab, Cornell?**

- **Vertical axis: fraction of cavities satisfying criteria**
  - **Denominator (logical and of the following):**
    - **Qualified vendor**
    - **Delivered to lab within last 2-3 years**
  - **Numerator (logical and of the following):**
    - **Denominator**
    - **Accepted by the lab after incoming inspection**
    - **1<sup>st</sup> successful RF test, excluding any test with system failure, has max gradient > (horizontal axis bin) MV/m; ignore Q-disease, field emission**
- **Horizontal axis: max gradient MV/m**
- **Exclude cavities which are work-in-progress, i.e., before rejection or 1<sup>st</sup> successful RF test**

- FALC meeting July 13, 2009
  - Provide an example plot of production yield (p.7), citing caveats (whatever they are at the time)
    - Using preliminary and incomplete data for past 2-3 years from the simple Excel spreadsheet format, no web interface
  - Provide the people list (p.2) , and the plan (below, with updates)
- End July 2009: Determine whether DESY DB is viable option, and timescale for implementation
- ALCPG/GDE Sept. 28 - Oct. 2, 2009
  - Dataset is web-based (support by Fermilab-TD or DESY)
  - Some well-checked, easily explainable, and near-final plots available for discussion such as
    - Production yield
      - Qualified vendors
      - All vendors
    - Process yield
    - Time evolution of some quantities
- End Nov. 2009: With colleagues' input, finalize DB tool, web interface, standard plots, possibly with longer-term tool improvement plans