



Components affected by the Gradient Specification Range

or...

Some comments on upcoming cavity statistics, etc

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10 Sept 2010



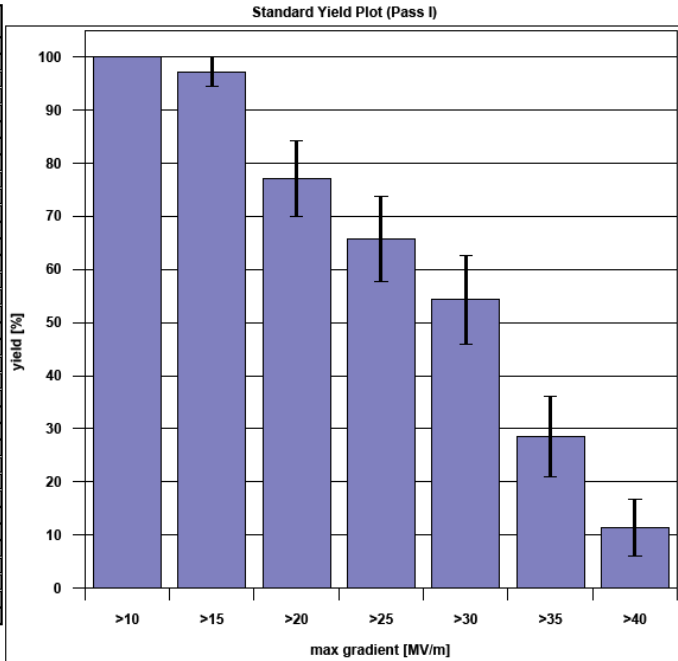
A Brief Look Forward

TDP/R&D plan release 5

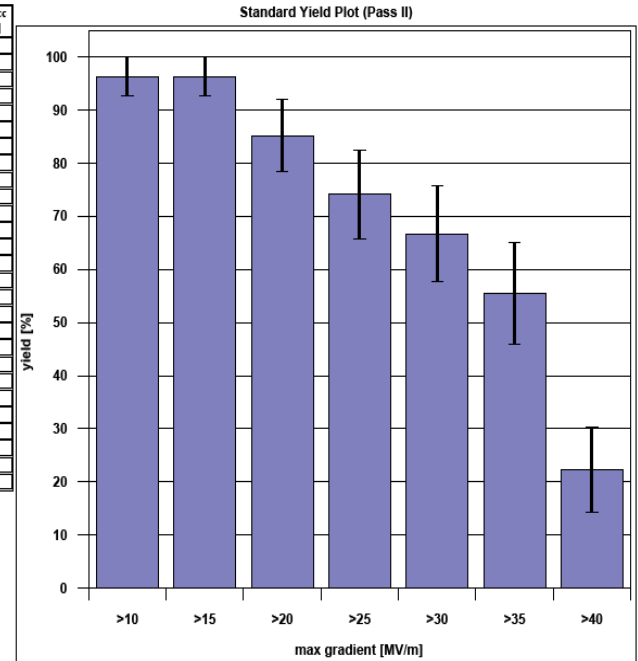
1st Pass, 35 cavities, ~29%

2nd Pass, 27 cavities, ~56%

No.	Cavity	Test Date	Max. Eacc [MV/m]
1	TB9ACC013	01.Dec.08	41.80
2	TB9ACC014	09.Feb.09	41.50
3	TB9AES008	26.Aug.09	41.10
4	TB9AES007	16.Mar.10	41.00
5	AC122	26.Aug.08	38.88
6	AC115	11.Dec.07	38.60
7	TB9RI019	11.Jun.10	38.00
8	TB9AES010	06.Nov.09	37.70
9	TB9ACC011	21.Aug.08	37.00
10	TB9ACC012	07.Jul.08	35.10
11	Z134	13.Nov.09	34.94
12	AC125	15.Jun.08	34.59
13	AC150	30.Jan.09	34.33
14	TB9AES009	18.Aug.09	33.40
15	TB9RI018	15.Apr.10	33.10
16	Z143	09.Oct.08	32.57
17	Z106	21.Feb.07	31.70
18	AC127	13.Feb.09	31.25
19	TB9ACC016	14.Dec.09	31.20
20	ACCEL7	05.Sep.06	29.00
21	AC149	28.Jan.09	26.51
22	AC124	05.Feb.09	26.01
23	Z137	24.Feb.09	25.23
24	Z139	12.Sep.08	24.93
25	AC146	06.May.10	23.63
26	Z142	01.Jul.09	20.58
27	TB9AES005	27.Mar.09	20.50
28	ACCEL6	12.Dec.06	19.00
29	Z141	16.Apr.08	18.29
30	TB9ACC015	02.Jul.08	18.00
31	Z130	01.Sep.08	17.30
32	Z131	20.Aug.08	17.17
33	Z132	19.Aug.08	16.83
34	AC126	05.Sep.08	16.37
35	TB9AES006	09.Apr.09	14.10



No.	Cavity	Test Date	Max. Eacc [MV/m]
1	TB9ACC013	01.Dec.08	41.80
2	TB9ACC014	09.Feb.09	41.50
3	ACCEL7	18.Jan.07	41.20
4	TB9AES008	26.Aug.09	41.10
5	TB9AES007	16.Mar.10	41.00
6	Z143	12.Nov.08	41.00
7	TB9ACC016	11.Feb.10	39.30
8	TB9RI018	02.Jun.10	39.00
9	AC122	26.Aug.08	38.88
10	AC115	11.Dec.07	38.60
11	TB9RI019	11.Jun.10	38.00
12	TB9AES010	06.Nov.09	37.70
13	TB9ACC011	21.Aug.08	37.00
14	TB9AES009	07.Oct.09	36.00
15	TB9ACC012	07.Jul.08	35.10
16	AC150	08.May.09	33.23
17	Z139	20.Oct.08	32.75
18	AC124	19.May.09	30.93
19	ACCEL6	23.Jan.07	29.00
20	AC127	11.Jun.09	27.85
21	TB9AES006	11.Sep.09	22.20
22	Z141	14.May.08	20.70
23	TB9AES005	09.Apr.09	20.50
24	TB9ACC015	14.Jul.08	19.00
25	Z131	25.Nov.08	17.96
26	Z130	15.Oct.08	16.60
27	AC126	21.Oct.08	6.14





A Brief Look Forward

Incoming Cavities thru 2012

Deliveries through 2012			
	2010	2011	2012
AES		10	10
Niowave Roark	6	3	7
Research Instruments			
Pavac		3	7
Japan		2	2
XFEL			300

Tests Completed				
	2010	2011	2012	Total
AES	8	10	10	28
Niowave Roark	6	3	3	12
Research Instruments	3			3
Pavac		3	3	6
Japan		2	2	453
XFEL (total)			225	225



A Brief Look Forward

Current 1st pass 35MV/m stats		
Ncav	35	
Npass	10	29%
Current 2nd pass 35MV/m stats		
Ncav	27	
Npass	15	56%

2012 ILC Only	53
2012 Hi Grade + Preproduction	20
Total	73

Assumed Incremental Yield In 2010-2012 Tests	
1st Pass	100%
2nd Pass	100%

Cumulative 1st pass 35MV/m stats		
Ncav	108	
Npass	83	77%

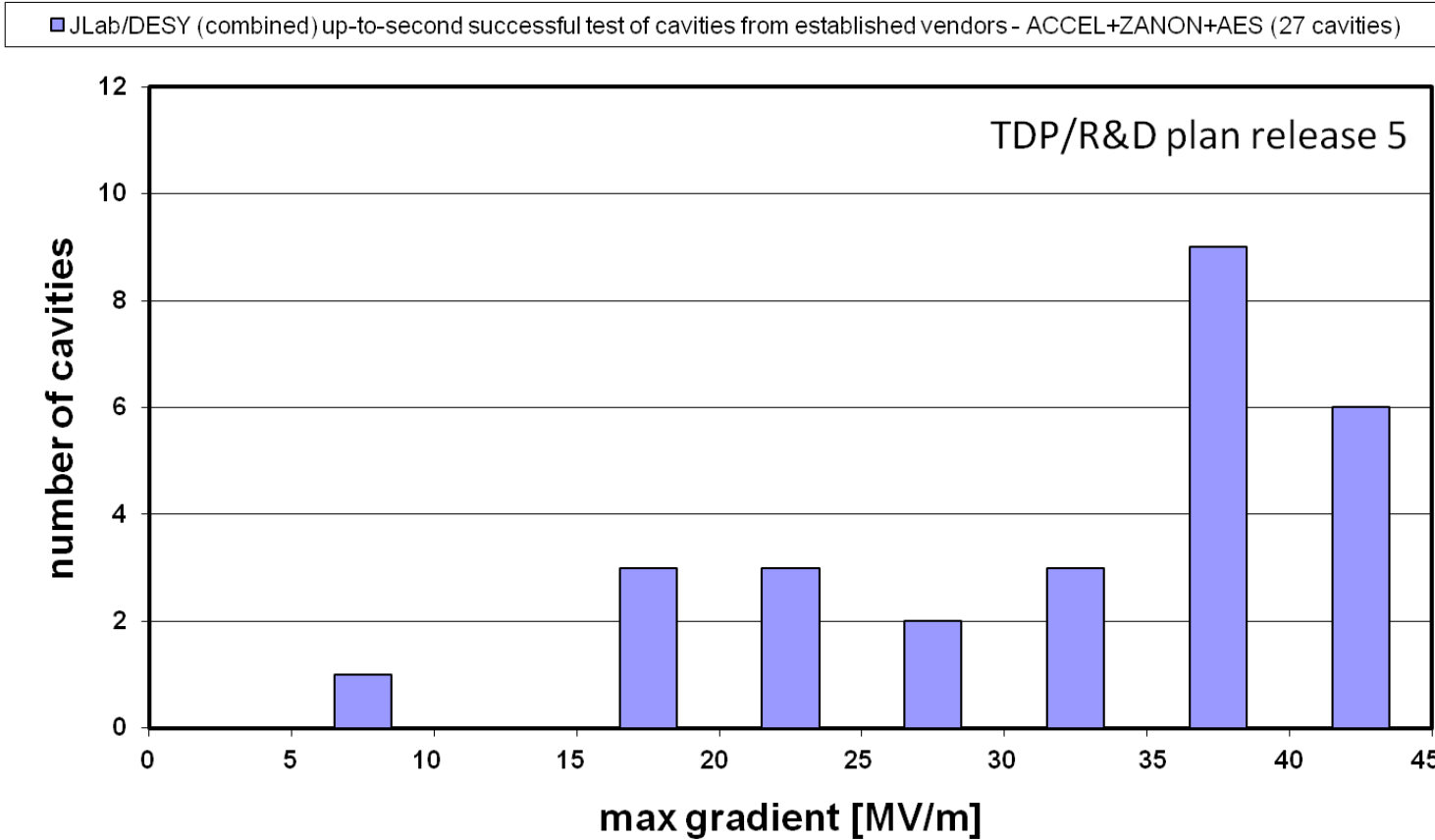
Current 2nd pass 35MV/m stats		
Ncav	100	
Npass	88	88%



(My) Comments

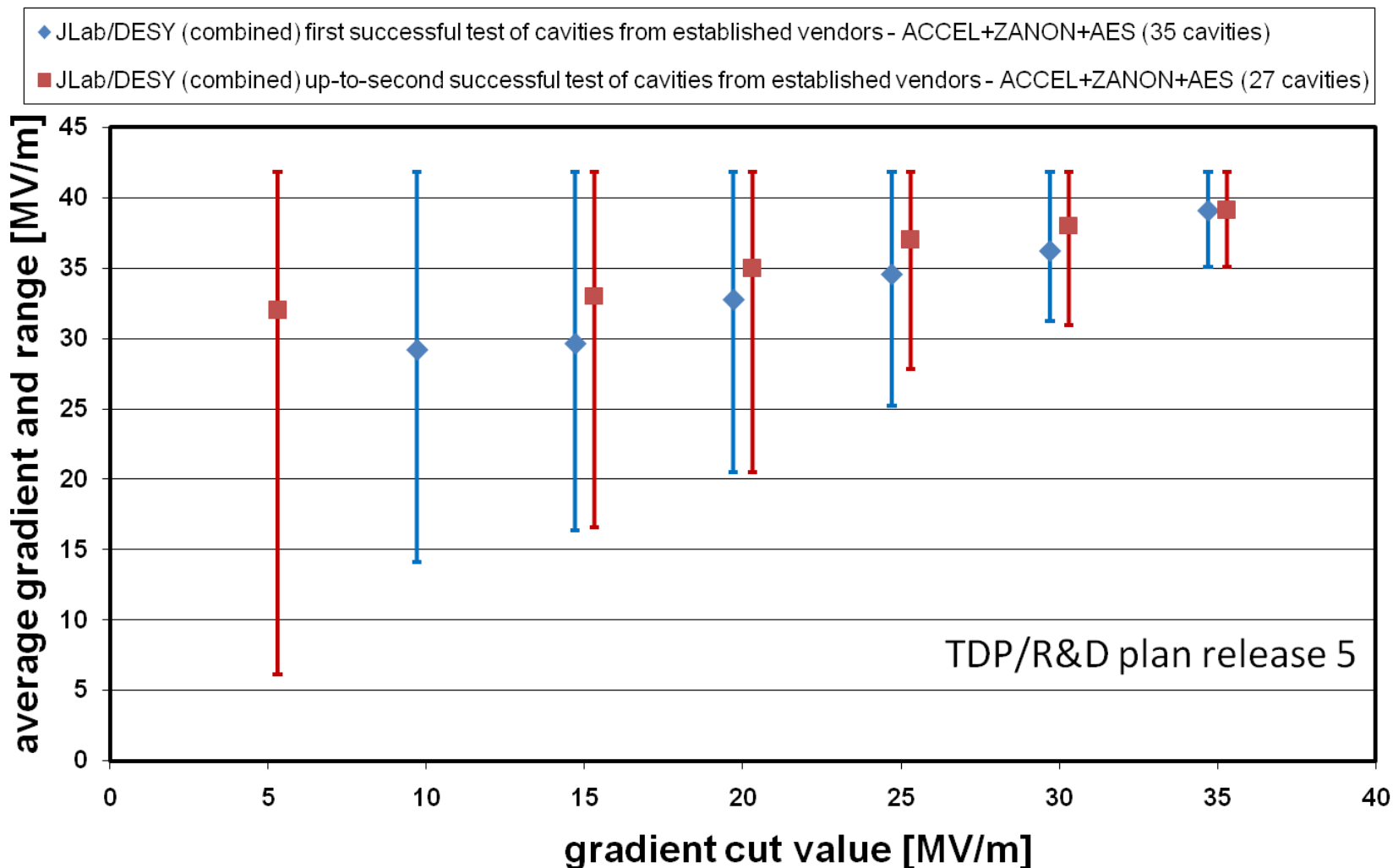
- Brute force (and exceptional performance) will not give the desired yield at 35 MV/m
 - Require trimming of the included data by time, vendor batch, or some other metric (a rolling average of some sort, tbd)
 - Following Rongli's presentation of yesterday, continue to work on early intervention methods, and remediation
 - Automated cuts keep us honest; Constant vigilance allows us to progress
- For the current 2nd pass plot, with a hard cut at 35MV/m, 15 of 27 cavities 'pass' at a relative cost of 2.12
 - where 1 = cavity+1st process; 0.3 = 2nd process;
 - 27 cavities start; 16 cavities reprocessed; 12 rejected
 - 39MV/m avg VT gradient (no upper cut)

Electropolished 9-cell cavities



Gradient Range

Electropolished 9-cell cavities





2nd Pass Gradients

CUT	None	15MV/m	20MV/m	25MV/m	35MV/m
	41.8	41.8	41.8	41.8	41.8
	41.5	41.5	41.5	41.5	41.5
	41.2	41.2	41.2	41.2	41.2
	41.1	41.1	41.1	41.1	41.1
	41	41	41	41	41
	41	41	41	41	41
	39.3	39.3	39.3	39.3	39.3
	39	39	39	39	39
	38.88	38.88	38.88	38.88	38.88
	38.6	38.6	38.6	38.6	38.6
	38	38	38	38	38
	37.7	37.7	37.7	37.7	37.7
	37	37	37	37	37
	36	36	36	36	36
	35.1	35.1	35.1	35.1	35.1
	33.23	33.23	33.23	33.23	
	32.75	32.75	32.75	32.75	
	30.93	30.93	30.93	30.93	
	29	29	29	29	
	27.85	27.85	27.85	27.85	
	22.2	22.2	22.2		
	20.7	20.7	20.7		
	20.5	20.5	20.5		
	19	19			
	17.96	17.96			
	16.6	16.6			
	6.14				
Number of Cavities	27				
2nd Process	16				
Rejected	0	1	4	7	12
Average	32.0	33.0	35.0	37.0	39.1
Rejection	0%	4%	15%	26%	44%
"Cavity Base Cost"	1.00	1.04	1.17	1.35	1.80
"Cavity Unit Cost"	1.18	1.22	1.38	1.59	2.12



2nd Pass Comparison

CUT	None	15MV/m	20MV/m	25MV/m	35MV/m
	41.8	41.8	41.8	41.8	41.8
	35.1	35.1	35.1	35.1	35.1
	33.23	33.23	33.23	33.23	
	32.75	32.75	32.75	32.75	
	30.93	30.93	30.93	30.93	
	29	29	29	29	
	27.85	27.85	27.85	27.85	
	22.2	22.2	22.2		
	20.7	20.7	20.7		
	20.5	20.5	20.5		
	19	19			
	17.96	17.96			
	16.6	16.6			
	6.14				
Number of Cavities	27				
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Rejected	0	1	4	7	12
Average	32.0	33.0	35.0	37.0	39.1
Rejection	0%	4%	15%	26%	44%
"Cavity Base Cost"	1.00	1.04	1.17	1.35	1.80
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←-13 suppressed rows



(Some more) Comments

- Very Limited Statistics! Careful.....but they will get better.
- Hopefully the change in 'my' Cavity Unit Cost measure by lowering the acceptance cut makes the drive for such a change clear
- The averages calculated are the VT limit averages. There will be an RF limit in operation, but in these tables I think it would be double counting of the margin
- Sorting by gradient before installation in cryomodules strikes me as very reasonable given the number of cavities that would be in parallel production
- There may be some increase in VT risk by pushing each cavity to a quench limit as opposed to an administrative goal