

Progress of ILC cavity gradient database and yield

C.M. Ginsburg

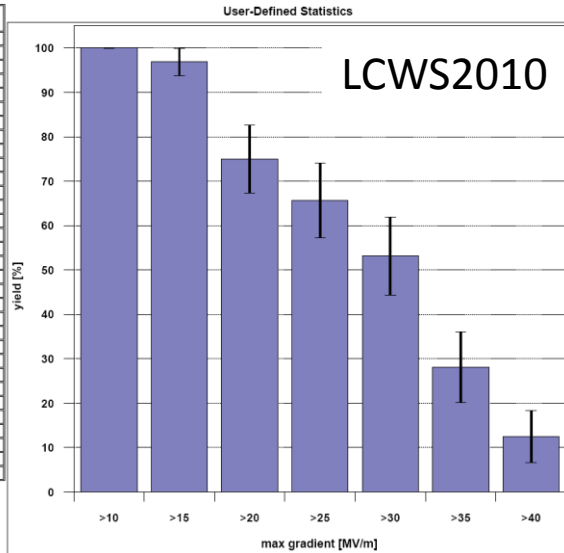
On behalf of the ILC Database Group

Baseline Assessment Workshop, Tsukuba/WebEx

September 9, 2010

1st pass (detail)

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	TB9AES010	06.Nov.09	37.70
8	TB9ACC011	21.Aug.08	37.00
9	TB9ACC012	07.Jul.08	35.10
10	Z134	13.Nov.09	34.94
11	AC125	15.Jun.08	34.59
12	AC150	30.Jan.09	34.33
13	TB9AES009	18.Aug.09	33.40
14	Z143	09.Oct.08	32.57
15	Z106	21.Feb.07	31.70
16	AC127	13.Feb.09	31.25
17	TB9ACC016	14.Dec.09	31.20
18	ACCEL7	05.Sep.06	29.00
19	AC149	28.Jan.09	26.51
20	AC124	05.Feb.09	26.01
21	Z137	24.Feb.09	25.23
22	Z139	12.Sep.08	24.93
23	Z142	01.Jul.09	20.58
24	TB9AES005	27.Mar.09	20.50
25	ACCEL6	12.Dec.06	19.00
26	Z141	16.Apr.08	18.29
27	TB9ACC015	02.Jul.08	18.00
28	Z130	01.Sep.08	17.30
29	Z131	20.Aug.08	17.17
30	Z132	19.Aug.08	16.83
31	AC126	05.Sep.08	16.37
32	TB9AES006	09.Apr.09	14.10



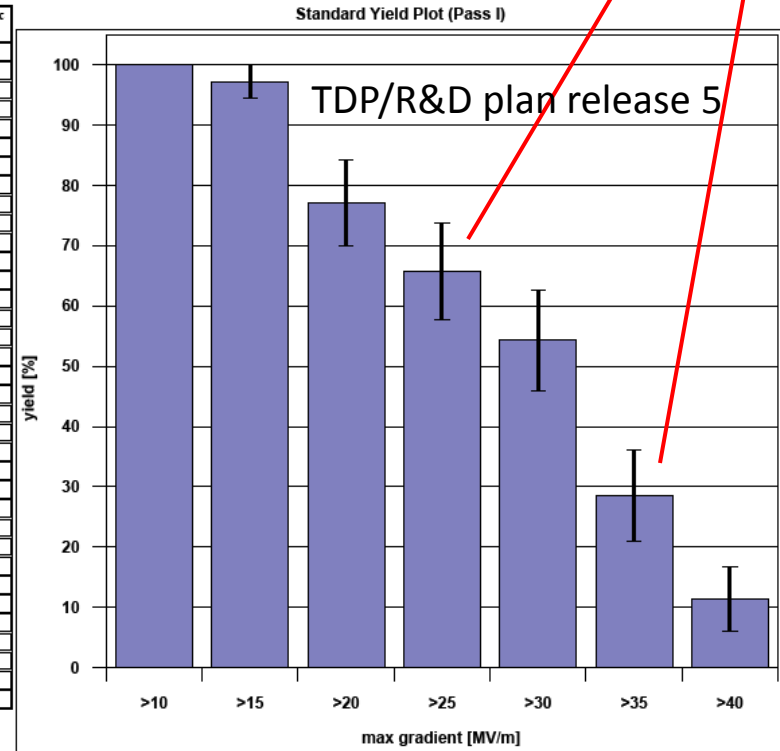
1st-pass cavity yield at >25 MV/m is (66 ± 8) %

(66 ± 8) %

>35 MV/m is (28 ± 8) %

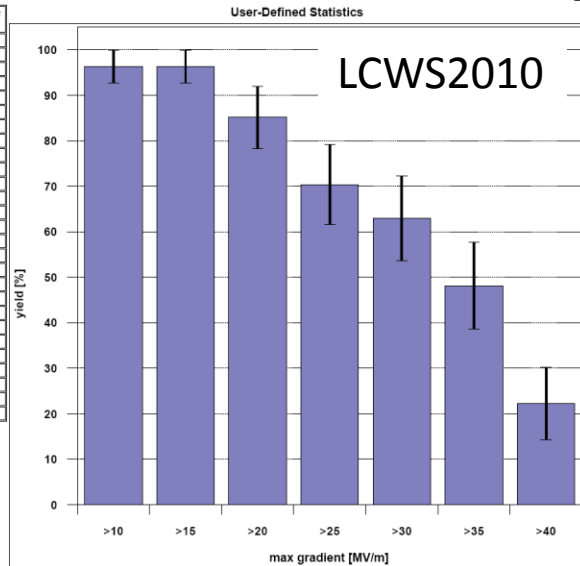
(29 ± 8) %

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



2nd pass (detail)

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	Z143	12.Nov.08	41.00
6	TB9AES007	16.Mar.10	41.00
7	TB9ACC016	11.Feb.10	39.30
8	AC122	26.Aug.08	38.88
9	AC115	11.Dec.07	38.60
10	TB9AES010	06.Nov.09	37.70
11	TB9ACC011	21.Aug.08	37.00
12	TB9AES009	07.Oct.09	36.00
13	TB9ACC012	07.Jul.08	35.10
14	AC150	08.May.09	33.23
15	Z139	20.Oct.08	32.75
16	Z106	27.Feb.07	31.50
17	AC124	19.May.09	30.93
18	ACCEL6	23.Jan.07	29.00
19	AC127	11.Jun.09	27.85
20	AC149	05.May.09	23.27
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



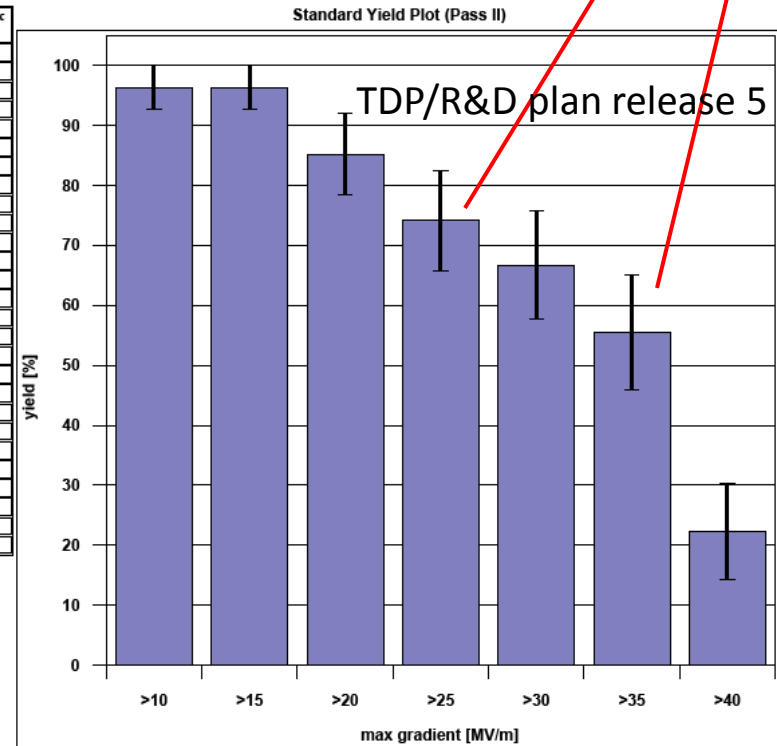
2nd-pass cavity yield at >25 MV/m is (70 +/- 9) %

(74 +/- 8) %

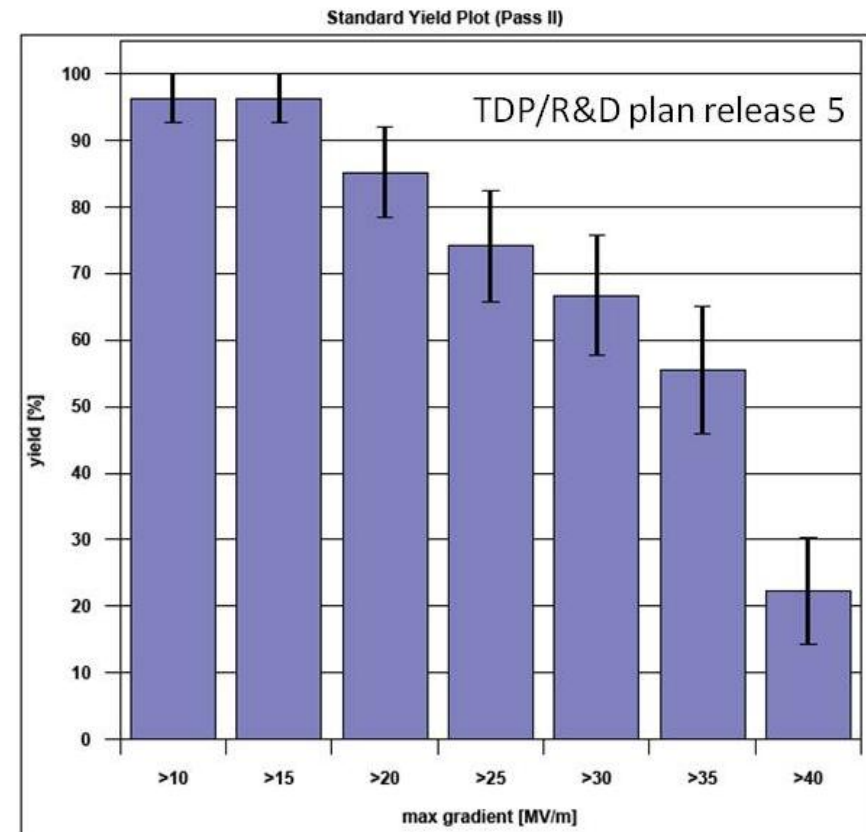
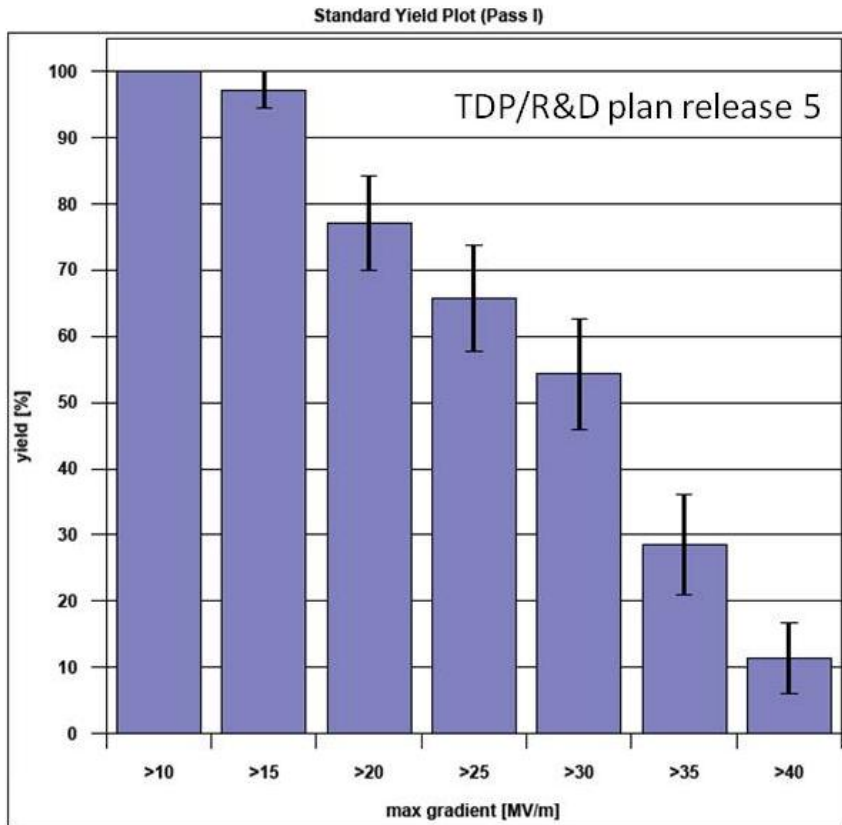
>35 MV/m is (48 +/- 10) %

(56 +/- 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
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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

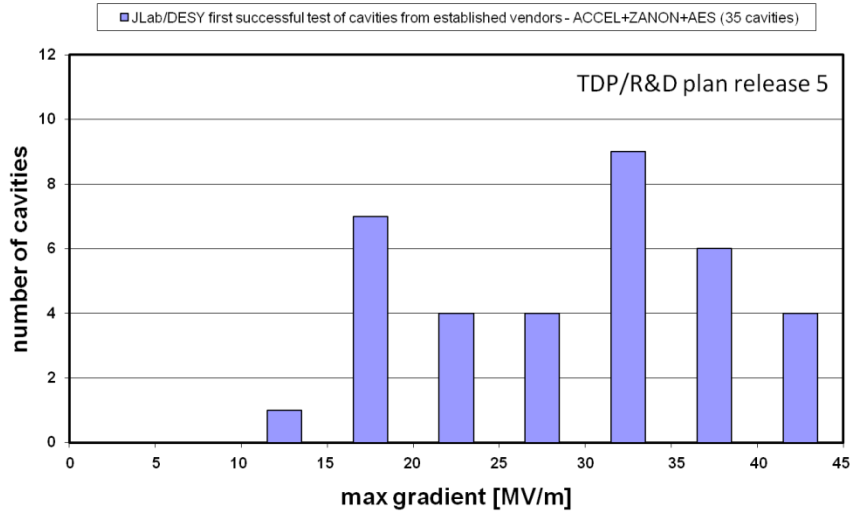


Plots for the document

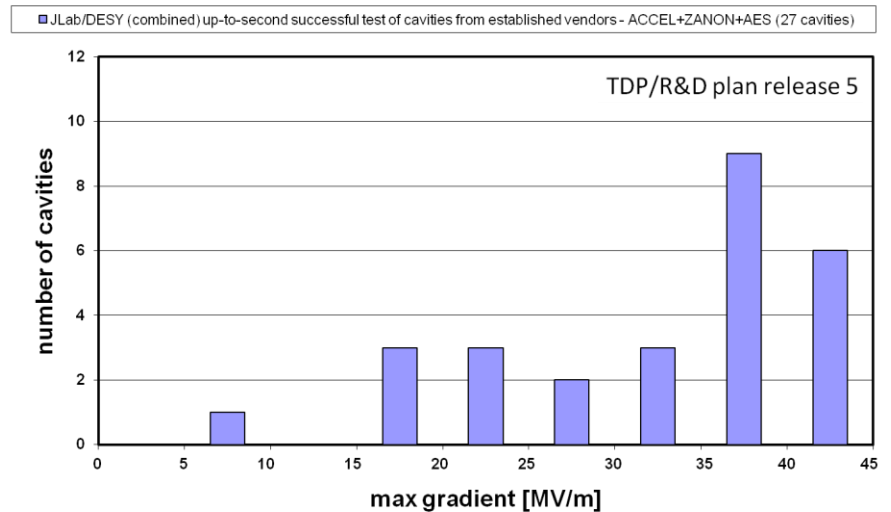


More plots for the document

Electropolished 9-cell cavities

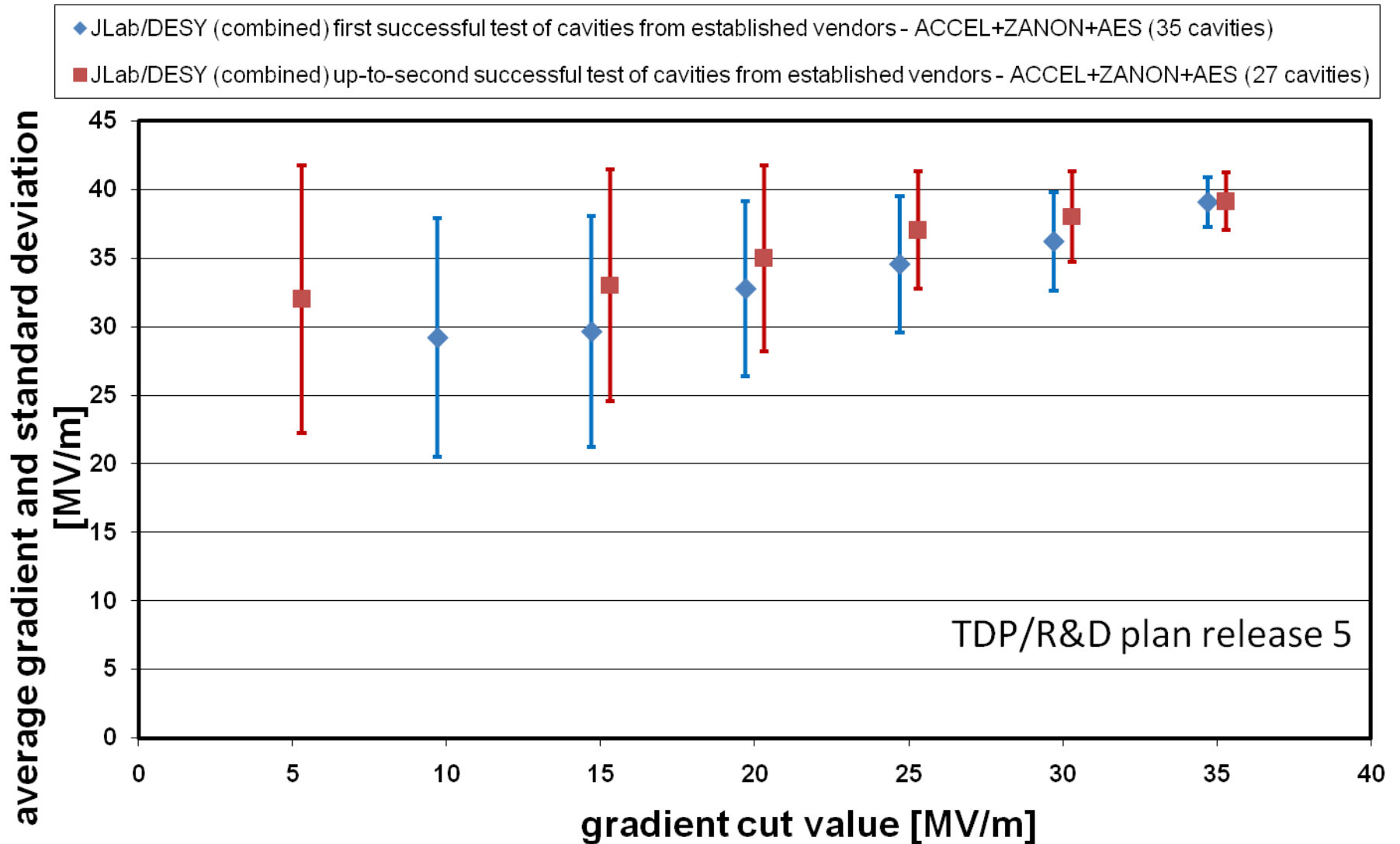


Electropolished 9-cell cavities



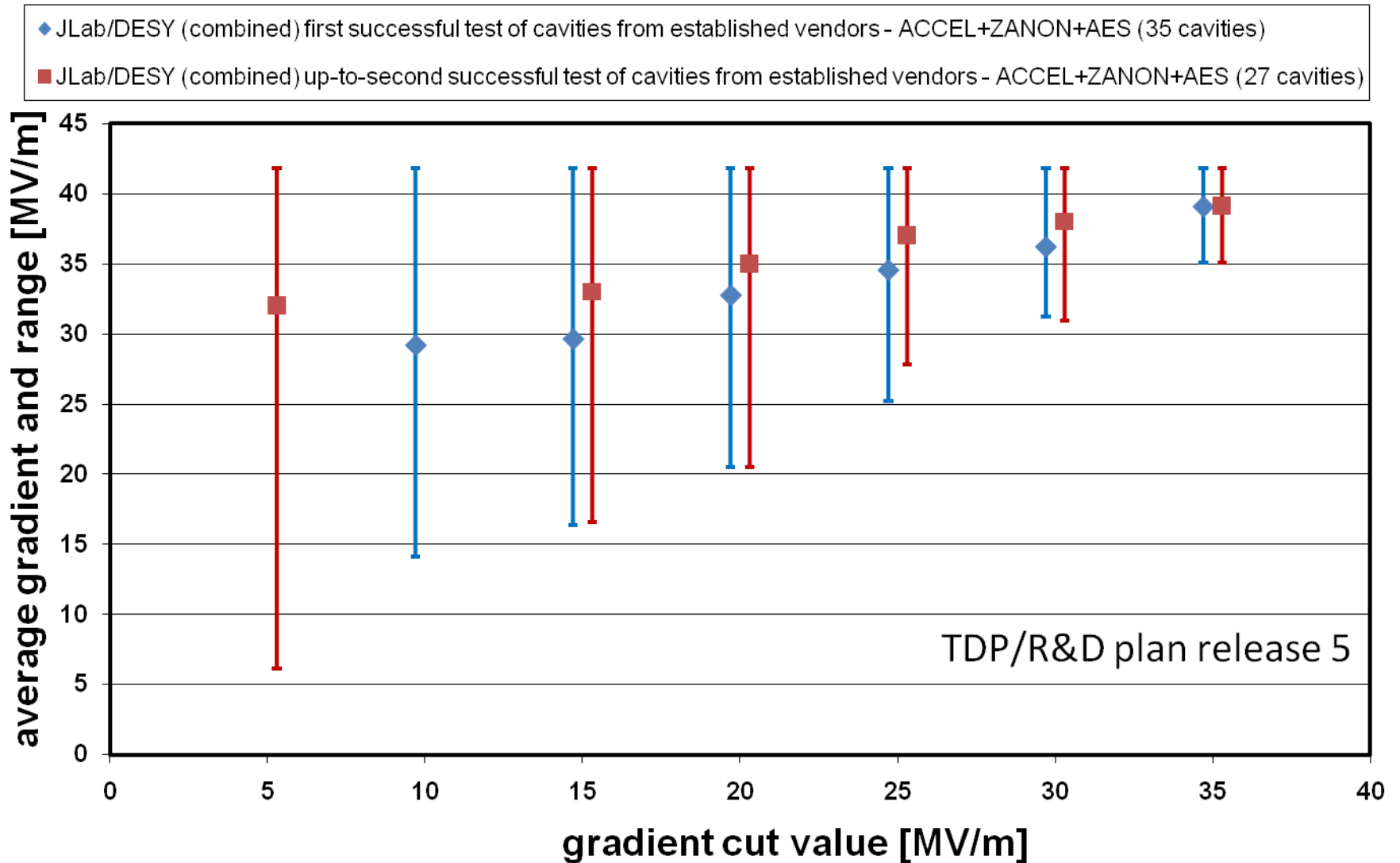
More plots for the document

Electropolished 9-cell cavities



More plots for the document

Electropolished 9-cell cavities



Cavity yield history

		yield for			
		>25 MV/m		>35 MV/m	
		1st pass	2nd pass	1st pass	2nd pass
ALCPG-Albuquerque	01.Oct.2009	63+-10	67+-10	23+-9	33+-10
AAP-DESY	06.Jan.2010	63+-9	64+-10	27+-8	44+-10
LCWS2010-Beijing	28.Mar.2010	66+-8	70+-9	28+-8	48+-10
TDP/R&D plan release 5	30.Jun.2010	66+-8	74+-8	29+-8	56+-10

NB: errors are very strongly correlated

Comments on the plots

- In LCWS2010 plots, two cavity tests were mistakenly included in the 2nd pass plots which shouldn't have been
 - Z106 and AC149 had no surface treatment in between 1st and falsely-labeled 2nd passes
 - automation is an excellent thing
- For TDP/R&D plan release 5, three additional new cavities are included: TB9RI018 and TB9RI019 from JLab (1st and 2nd pass plot), and AC146 from DESY (1st pass only)
 - 35 cavities for 1st pass, 27 cavities for 2nd pass

To Do List for BAW-1

- The key issues to address for the cavity performance evaluation are:
 - Reduction in the horizontal bin size, if justified by the gradient measurement error
 - Work not yet done by Camille
 - Cavity performance tracks/changes from vertical test to horizontal test to cryomodule test in current data samples
 - Work in progress by Sebastian; first iteration by BAW (to be shown tomorrow)
 - Cavity performance evaluation to be extended to 3rd pass process, if a sufficiently useful data set become available
 - Only one data point applies; not useful statistics
 - Radiation emission to be added as further quantitative evaluation of the cavity performance.
 - Insufficient specification so far

Further To Do List for BAW-1

- **The primary tasks** planned for completion by September 2010 are:
 - To create a standard plot tracking cavity performance for new vendors if there are new data available.
 - No new data available since July
 - To study Q_0 at the 31.5 MV/m operating gradient and Q_0 at the 35 MV/m vertical qualification gradient for data in the first- and second-pass data selections, for cavities which reach these gradients. This requires the adoption of a common algorithm to interpolate between measurements. As a later step, we will include this information in the ILC database.
 - Algorithm specified by DESY DB group to be used: linear interpolation between neighboring points below and above
 - Data partially available
 - To evaluate annual progress of the maximum field gradient, at least, at the first-pass evaluation, which can be widely and easily applied to cavity production in various projects (e.g. XFEL, Project-X) in a consistent fashion with the ILC R&D cavities.
 - To be completed by Camille; usually vendor batch is more useful data collection than year