European XFEL

FIRST RF MEASUREMENT RESULTS FOR THE EUROPEAN XFEL SC CAVITY PRODUCTION

A.Sulimov, P.Borowiec, V.Gubarev, J.Iversen, D.Kostin, G.Kreps, K.Krzysik, A. Matheisen, W.-D.Moeller, D.Reschke, W.Singer, Deutsches Elektronen-Synchrotron, DESY, Notkestrasse 85, 22607 Hamburg, Germany.

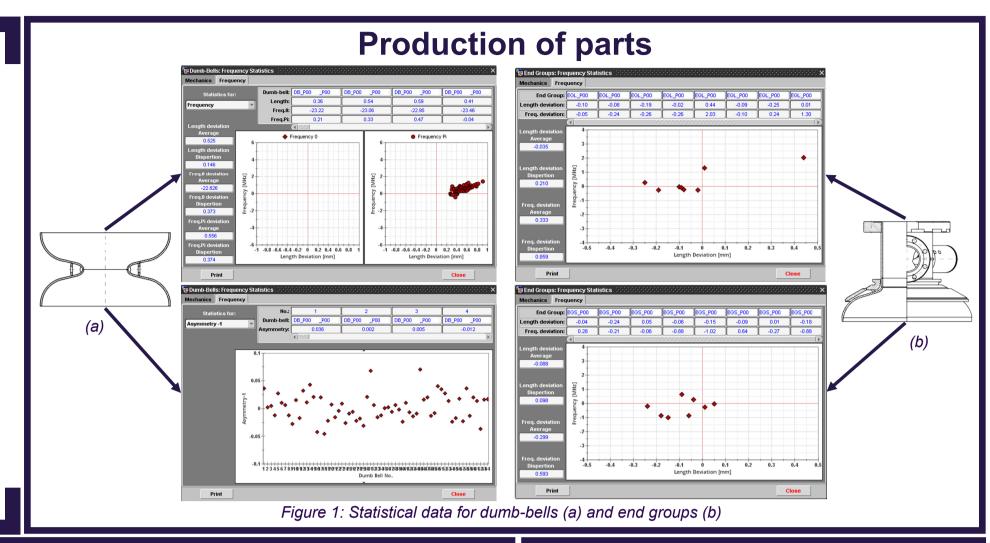
Abstract

The first reference cavities (RCV) for the European XFEL Project are being tested within the collaboration of Research Instruments (RI), E. ZANON, IFJ-PAN and DESY:

• production and warm RF measurements of cavities and their components at RI and ZANON;

- surface preparation at DESY;
- cold RF tests at DESY by IFJ-PAN.

Purpose of the RCV is to establish a stable cavity fabrication and qualification of the surface preparation infrastructure at industry. All necessary RF measurements were done, starting with mechanical fabrication in 2011, till the tuning and cold cavity RF tests in 2012. We present the first results of RF measurements within RCV production for the European XFEL.



Cavity Fabrication

Table 1: Length deviation relative to planed value

Cavity	dL, mm						
	before welding	after welding	real value				
001	1.64	1.65	0.93				
002	1.08	0.41	-0.45				
003	3.18	3.20	2.60				
004	3.03	3.07	2.18				
500	0.00	0.11	2.43				
502	0.02	0.16	1.09				
503	0.50	1.45	3.41				
506	0.49	1.12	3.10				

🚰 🛃 🦘 🛛 Marked: 14		Details: Spectrum	n / Transmission / Tur	ning /			F	rint Quit
vities 🔽	Cavity	Measurement			Field Flat.	Pi-Mode Frequency	Transmis.	
Owner: DESY	Cavity	Date	Туре	Firm	Place	[%]	[MHz]	[dB]
Owner: European XFEL	CAV00001	29.Nov.2011 00:00	Spectrum (warm)	RI	Bergisch Gladb		1299.725	
Vendor: Research Instrument	CAV00001	21.Mar.2012.09:32	Spectrum (warm)	DESY	HALL 3		1297.559	123
- 🔽 CAV00001	CAV00001	14.Aug.2012 10:44	Spectrum (warm)	DESY	HALL 3		1297.479	126
- 🔽 CAV00002	CAV00001	16.Aug.2012 10:35	Spectrum (warm)	DESY	HALL 3		1297.503	126
-IZ CAV00003	CAV00002	29.Nov.2011 00:00	Spectrum (warm)	RI	Bergisch Gladb		1299.894	
- 🔽 CAV00004	CAV00002	06.Mar.2012 09:32	Spectrum (warm)	DESY	HALL3		1297.552	130
- 🔽 CAV00005	CAV00002	05.Jun.2012 09:18	Spectrum (warm)	DESY	HALL 3		1297.553	126
- 🔽 CAV00006	CAV00003	06.Dec.2011 00:00	Spectrum (warm)	RI	Bergisch Gladb		1299.625	
- CAV00007	CAV00003	14.Mar.2012.09:54	Spectrum (warm)	DESY	HALL 3		1297.561	126
	CAV00004	06.Dec.2011 00:00	Spectrum (warm)	RI	Bergisch Glad		1299.635	
- 🔽 CAV00500	CAV00004	29.Feb.2012 11:21	Spectrum (warm)	DESY	HALL3		1297.526	128
- 🔽 CAV00502	CAV00005	07.Dec.2011 00:00	Spectrum (warm)	RI	Bergisch Gladb		1299.626	
- IZ CAV00503	CAV00006	07.Dec.2011 00:00	Spectrum (warm)	RI	Bergisch Gladb		1299.404	
- IZ CAV00504	CAV00007	13.Dec.2011 00:00	Spectrum (warm)	RI	Bergisch Gladb		1299.422)[]
- CAV00505	CAV00500	03.Apr.2012 09:47	Spectrum (warm)	DESY	HALL 3		1297.619	122
- IZ CAV00506	CAV00502	29.Feb.2012 13:54	Spectrum (warm)	DESY	HALL 3		1297.575	130
CAV00507	CAV00502	03.Apr.2012 14:21	Spectrum (warm)	DESY	HALL 3		1297.643	130
14 011400001	CAV00502	01.Jun.2012 10:23	Spectrum (warm)	DESY	HALL 3		1297.613	127
			Spectrum (warm)	DESY	HALL 3		1297.640	127

Figure 2: Presentation of warm RF measurements in XFEL DB.

Cavity Transportation

MOPB012

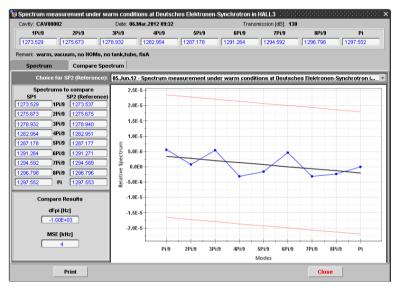
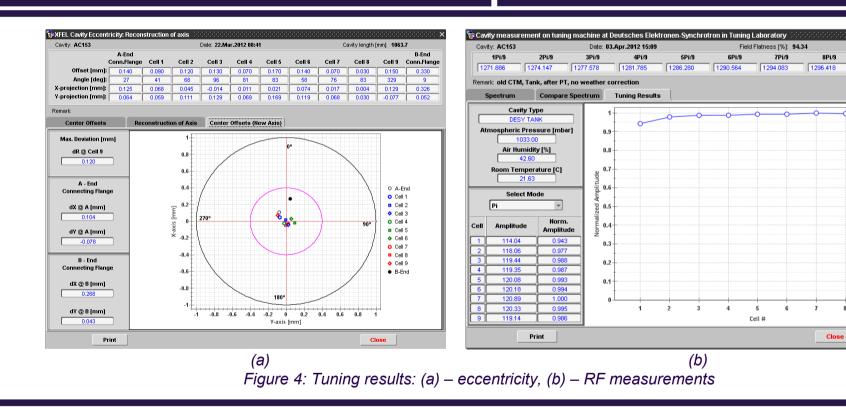


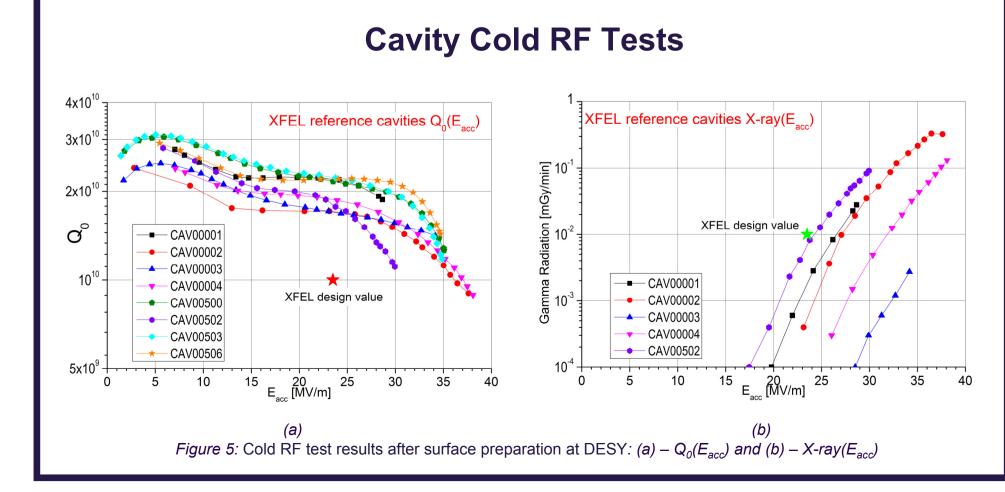
Figure 3: Comparison of two spectra for CAV00002.

Cavity Tuning

Table 2: Parameters after tuning

· ····································									
Cavity	Length, mm	Pi-mode frequency, MHz	Field flatness, %						
001	1282.34	1297.623	99						
002	1280.95	1297.644	97						
003	1284.00	1297.585	98						
004	1283.58	1297.545	99						
500	1283.83	1297.411	99						
502	1282.49	1297.419	98						
503	1284.81	1297.458	97						
506	1284.50	1297.459	98						
500 502 503	1283.83 1282.49 1284.81	1297.411 1297.419 1297.458	99 98 97						





Summary

The fabrication of 8 reference cavities by RI and ZANON allow us to test not only a test of the quality of the companies' infrastructure, but also of the communication between the members of the European XFEL Project.

The results of all measurements reflect the high quality of the so far produced cavities, which have reached accelerating gradients from 28 to 38 MV/m.

This presentation also shows the diversity of the XFEL database abilities, such as collecting of all data, their presentation and automatic calculations.

Deutsches Elektronen-Synchrotron Helmholtz Association of German Research Centers 22607 Hamburg, Germany www.desy.de, www.xfel.de



