MOPB012

FIRST RF MEASUREMENT RESULTS FOR THE EUROPEAN XFEL SC CAVITY PRODUCTION

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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.

Production of parts

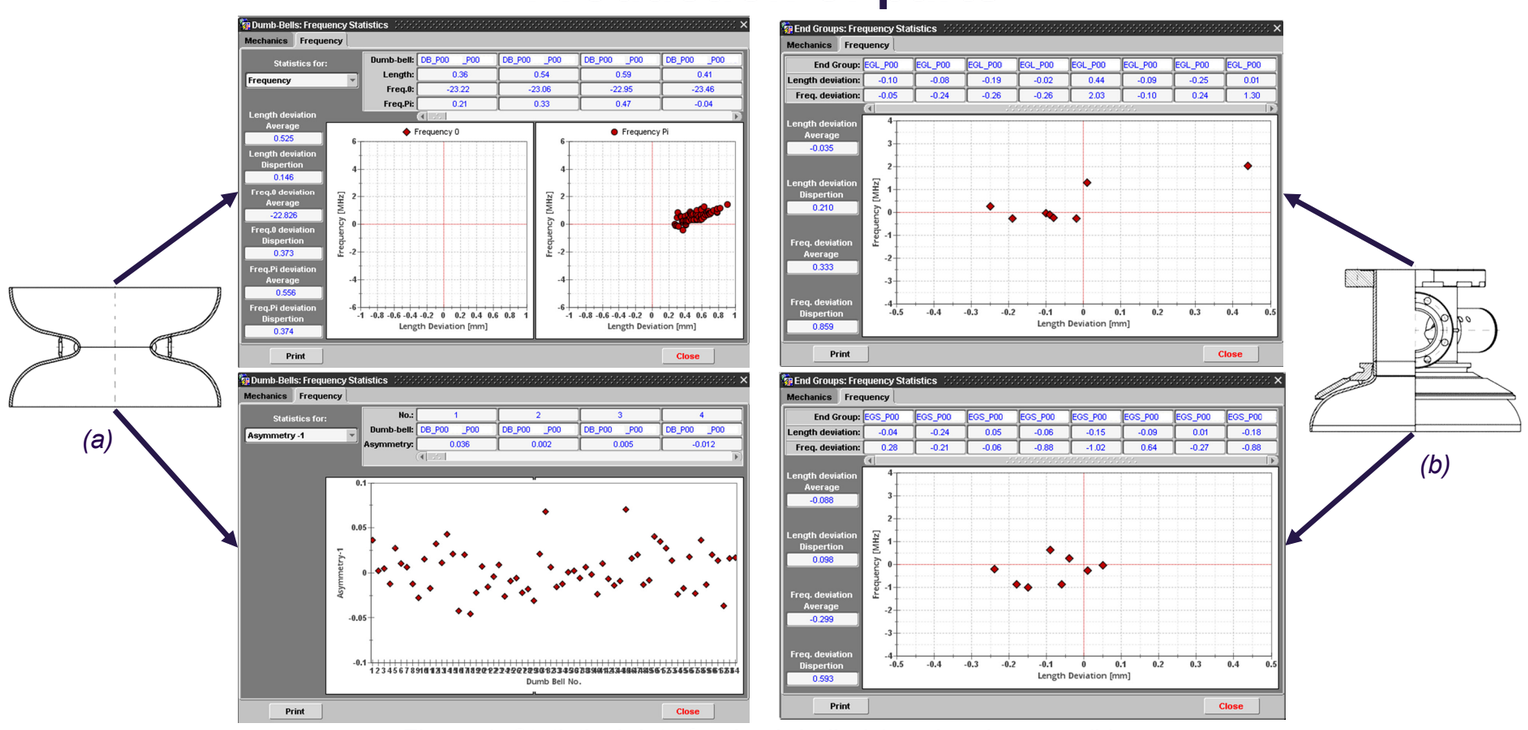


Figure 1: Statistical data for dumb-bells (a) and end groups (b)

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	0.45	3.41
506	0.49	1.12	3.10

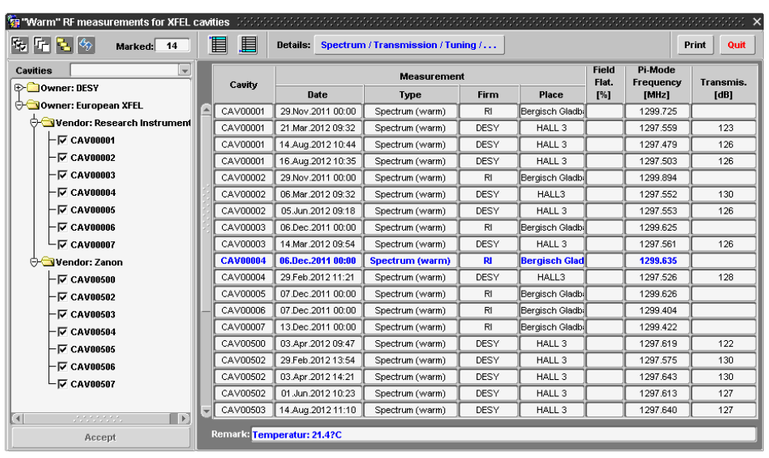


Figure 2: Presentation of warm RF measurements in XFEL DB.

Cavity Transportation

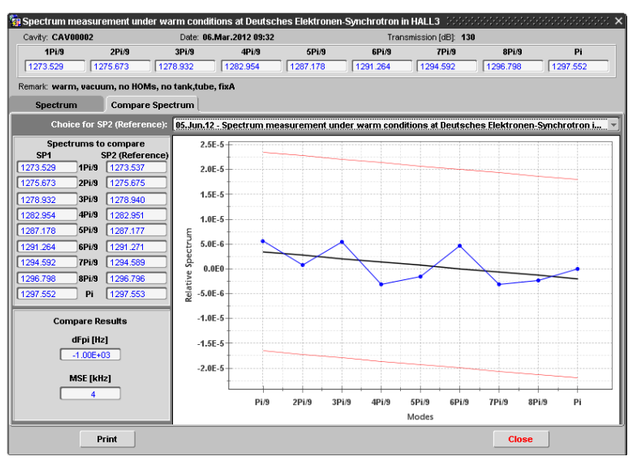
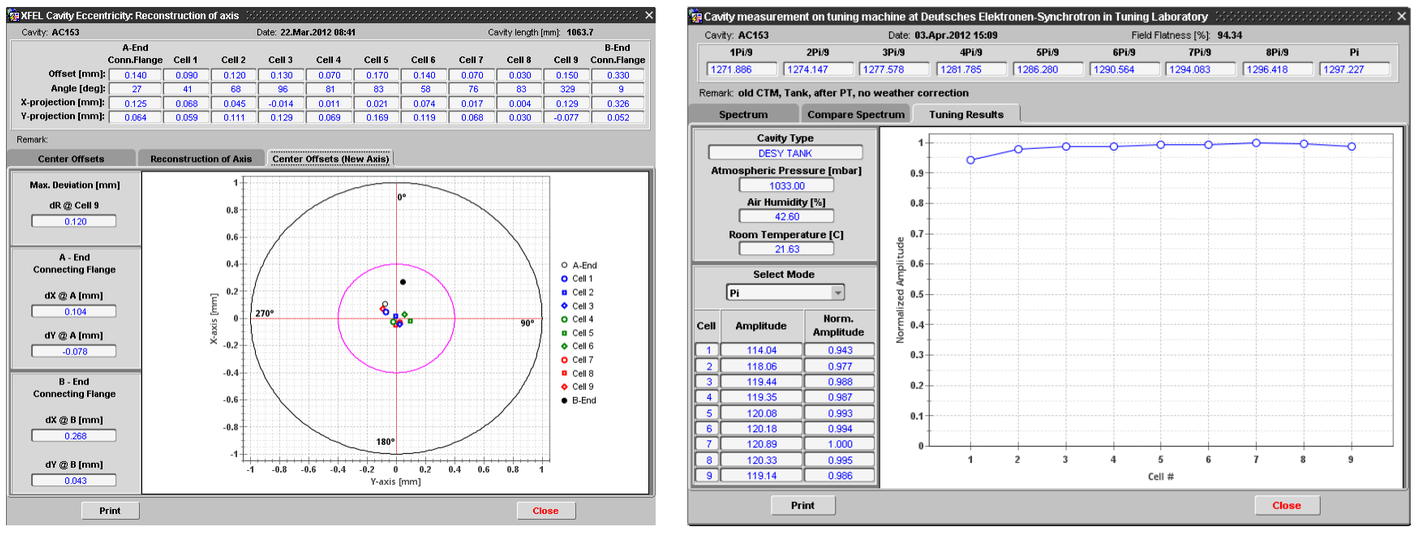


Figure 3: Comparison of two spectra for CAV00002.

Cavity Tuning

Table 2: Parameters after tuning

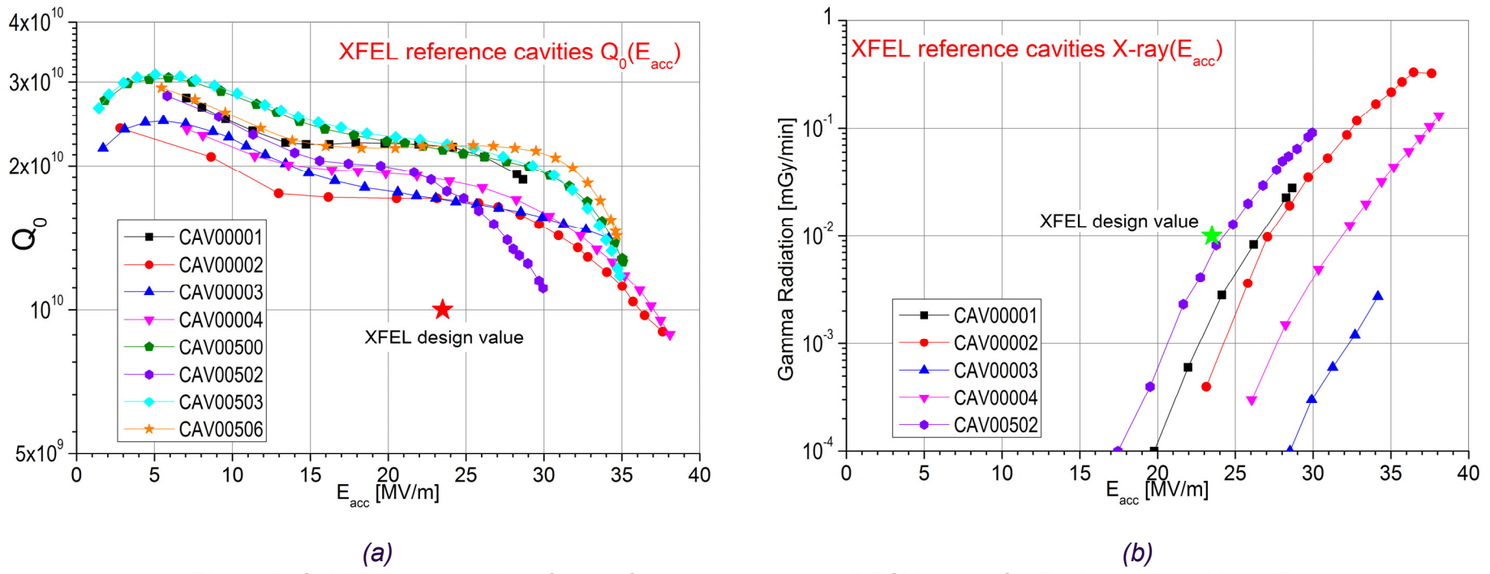
Cavity	Length, mm	Pi-mode frequency, MHz	Field flatness, %
001	1282.34	1297.623	99
002	1280.95	1297.644	97
003	1284.00	1297.585	98
004	1283.58	1297.545	99
500	1283.83	1297.411	99
502	1282.49	1297.419	98
503	1284.81	1297.458	97
506	1284.50	1297.459	98



(a) (b)

Figure 4: Tuning results: (a) – eccentricity, (b) – RF measurements

Cavity Cold RF Tests



(a) (b)

Figure 5: Cold RF test results after surface preparation at DESY*: (a) – $Q_0(E_{acc})$ and (b) – X-ray(E_{acc})*

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.

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