

Optical inspection @ DESY

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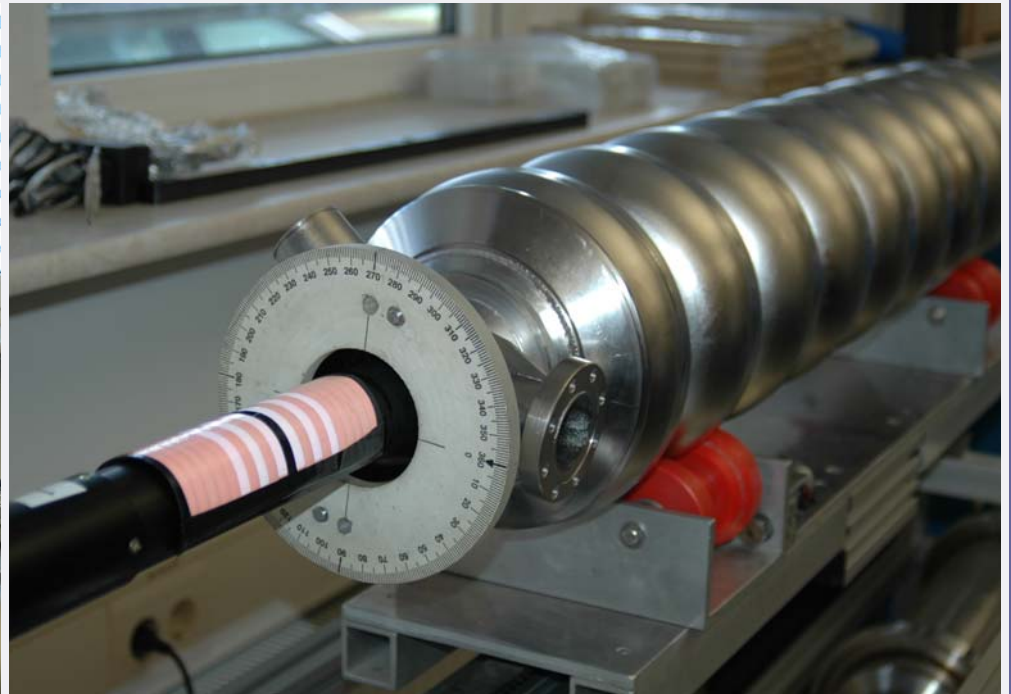
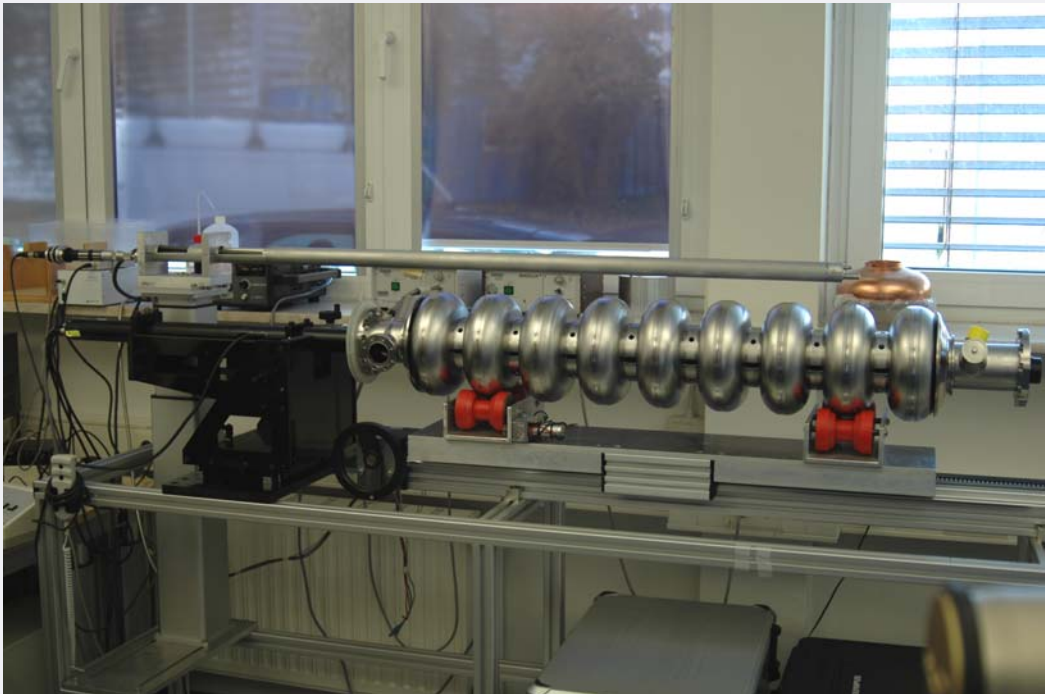
TTC-Meeting New Delhi

Outline

- Current setup of Kyoto-Camera @ DESY
- Inspection of Z141
- Future plans

Current setup of Kyoto-Camera @ DESY

- Received prototype of Kyoto-Camera at DESY end of August
- current setup on mounting of „old-type“ optical inspection system



First measurements at DESY

- first measurement of Z110 in good agreement with pictures taken at KEK

Z110: EBW seam at equator of cell #1



KEK: 4 degrees



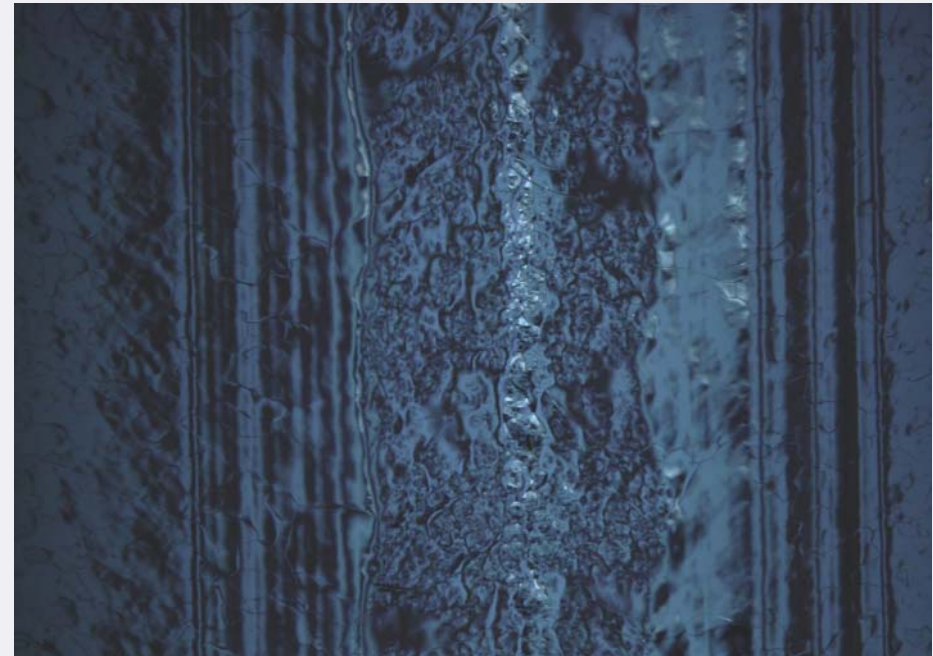
DESY: 5 degrees

EBW seam at equator of cell #7 of Z141

214 deg



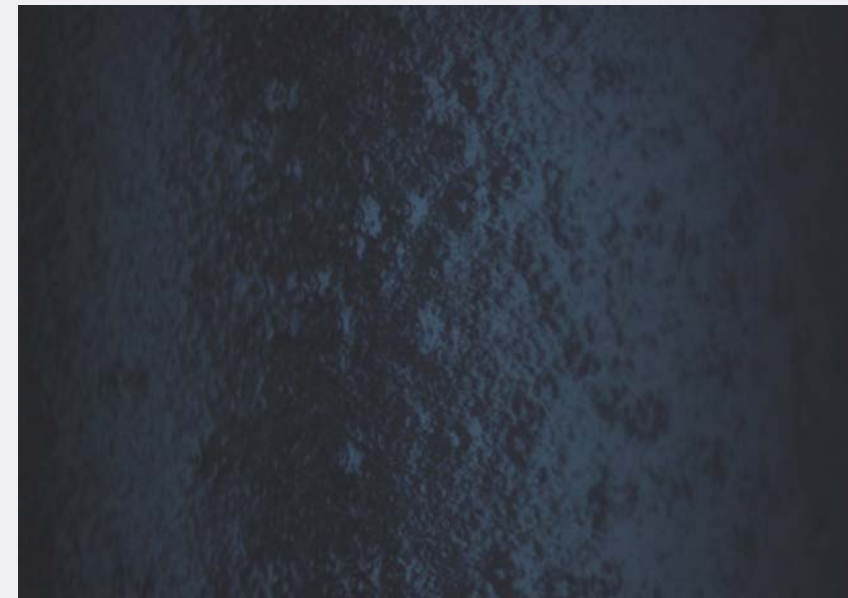
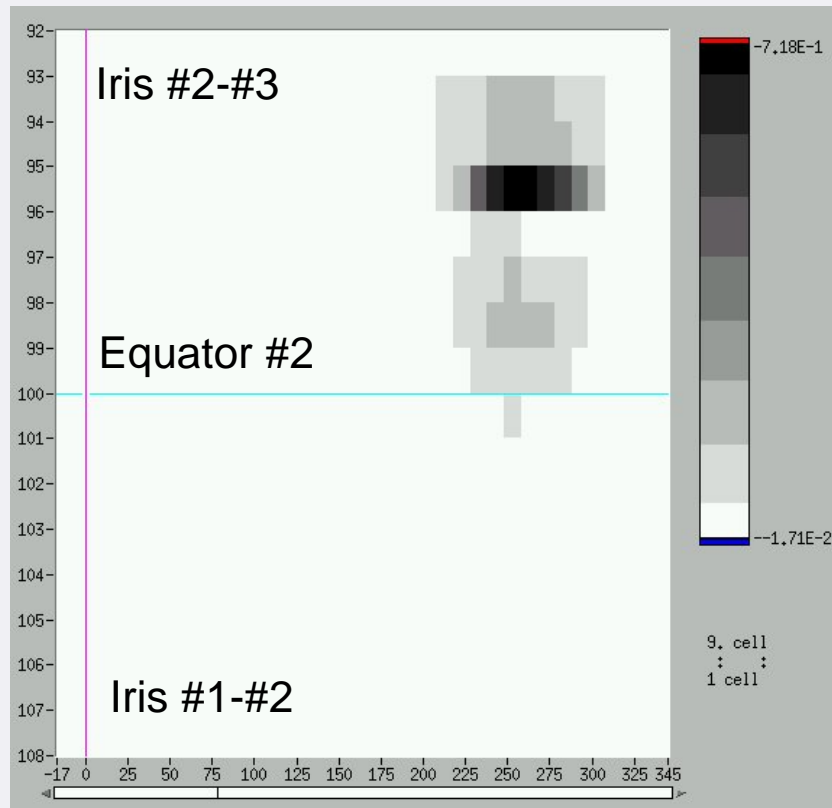
21 deg



- pictures taken in present condition after test 4
- very smooth parts, e.g. 214 deg
- large, very bumpy area: 11-34 deg
- but: quench is not located on this welding seam

Comparison T-map <-> optical data: 2nd test

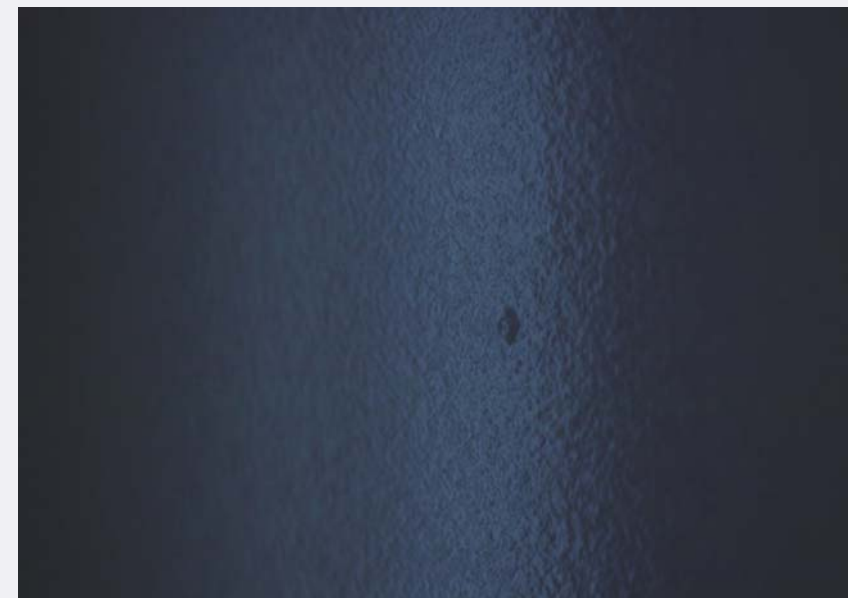
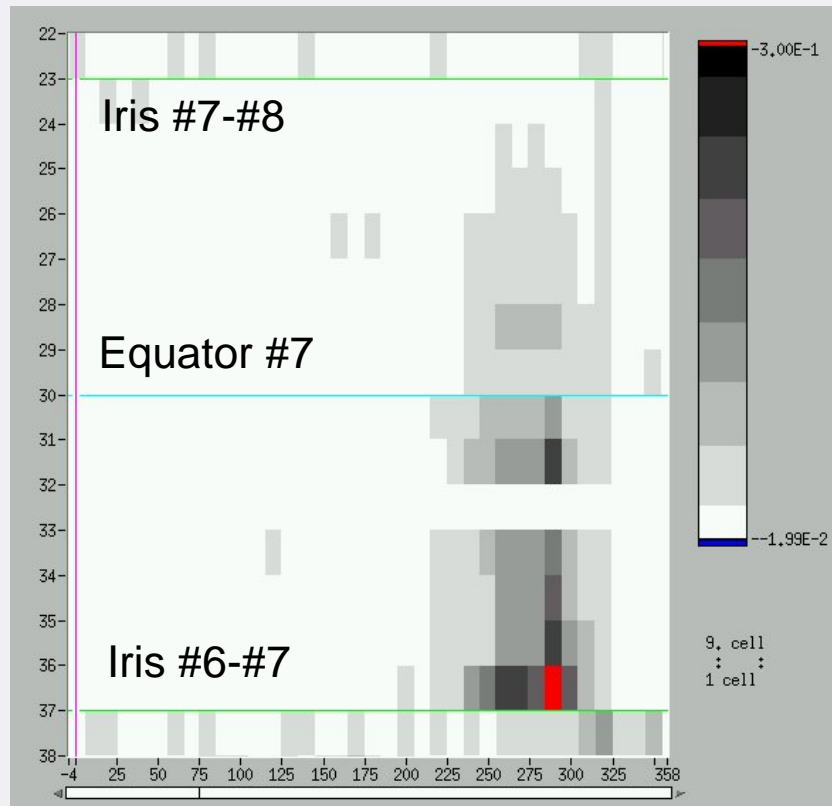
2nd test: pure EP-cavity (193 mm), BD at 20.7 MV/m with strong FE



Lots of bumps at 260 deg near iris

Comparison T-map <-> optical data: 4th test

4th test: after 10 μm BCP, BD at 27.9 MV/m with very low FE



Single spot at 288 deg near iris

Plans for the future

Mechanics:

- New mounting under planning
- will be capable to handle cavities without and with He-tank
-> possibility of optical inspection in every step of preparation
- Will be ready at the beginning of 2009

Inspection procedure:

- Procedure of inspection as automated as possible
- Problem to solve: need of changing lighting for optimal pictures along one equator

Measurements:

- Take opportunity of numerous cavities in preparation for XFEL for opt. inspection in various stages of preparation process and correlate optical data with T-map-data

Testing history of Z141

Cavity Information				CW-Test Results						Power Rise Results											
Cavity	Production No.	Firm	Ingot No.	Removed Material [µm]	Cavity Status	Last HT [°C] before Test	Test Date	Test No.	Test Location	Max. Eacc [MV/m]	Q ₀ @ Max. Eacc	Temperature [K]	Limitation	FE Onset		Eacc @ Q ₀ =1E+10	Lowest meas. Q ₀	Q ₀ @ Eacc = 23.5 [MV/m]	Lowest meas. Eacc	Eacc @ (100W/9)* cell#	Lowest Loss > (100W/9)* cell#
														@ 4E-4 [mGy/min]	@ 1E-2 [mGy/min]						
Z141	6	Zanon	32	193.2	ep	800	16.Apr.08	1	v1	19.35	3.7E+09	2	fe	12.62	15.47	17.6				19.19	
										18.07	4.5E+09	2	fe	11.26	13.61	15.33					
										18.29	5.1E+09	2	fe	11.27	13.87	15.74					
Aim: test of cavity first test										Result: not ok: Low gradient, strong FE				Remark: No Q disease. Cavity reached only 18.3 MV/m, Q=5.1E+9, strong FE (0.3 mGy/min) from 11 MV/m. MM: in 7/9 pt mode LPP, lower modes no x rays later. 4/9 pt mode long processing of 5/9 pt mode below 1 MV/m.m. Quench in cell 1 in the middle of upper half cell.							
193.2	ep	800	14.May.08	2	v1	20.79	6.9E+09	2	bd	12.75	16.37	19.87									
						20.7	6.7E+09	2	bd	12.54	15.13	18.77									
Aim: test of cavity new preparation high field emission low Eacc quench + big FE										Result: not ok: low Eacc = 20.7 MV/m quench + Big FE				Remark: Rotating T-Mapping shows the quench in the cell 2 (halfcell 4) in the material. Xrays start at 12.9 MV/m, first curve showed MP from 17 MV/m, low field Q ₀ = 2e10, quench at 20.7 MV/m with X = 0.42 mGy/min.							
203.2	ep+	800	11.Jun.08	3	v1	27.11	1.4E+10	2	bd	25.06	23.9	27.11	1.4E+10	1.7E+10							
						26.82	1.3E+10	2	bd			26.82	1.3E+10	1.7E+10							
						26.94	1.4E+10	2	bd			26.94	1.4E+10	1.7E+10							
Aim: test of cavity new preparation high field emission After 10 um BCP, 7 x HPR, 80-150 K for 17 hours										Result: ok				Remark: No Q disease. Performance: 27.0 MV/m, Q=1.3E+10, BD, low x rays at end field. In 1st run FE start at 15 MV/m, at 24 MV/m LPP seen. MM: all except 7/9pt BD limited, fields 29 to 37 MV/m. Only during 2/9 pt mode measurement stable 1/9 pt mode was observed.							
203.2	ep+	800	05.Aug.08	4	v1	27.84	1.5E+10	2	bd	27.26		27.84	1.5E+10	1.8E+10							
						27.86	1.5E+10	2	bd			27.86	1.5E+10	1.8E+10							
Aim: test of cavity new test T-mapping added or fail										Result: ok: 27.9 MV/m, quench with very low FE.				Remark: Quench at 27.9 MV/m with a very low FE, Q ₀ (low field) = 2E10. Rotating T-mapping done: quench position found in the cell 7 near the bottom iris (cells 6-7) at 275deg. Low FE/MP at 20..22.5 MV/m							