Highlights from EU

Overview

- XFEL Linac
  - **Setting up a cold linac collaboration**
    - Distribution of workload, knowledge, money… amongst several partners
  - **Working meetings start**
    - Module Assembly workshop joined by ILC
- Module ‘Crash’ Tests
  - **Goals**
    - Demonstrate compliance with high pressure vessel codes etc.
    - Understand recovery options
  - **Test finished**
    - Results demonstrate
- Nine-cell ‘standard’ results
  - **First result from 6th production**
  - **Multi-cell large-grain results to date**

Overview

- Industrial EP
  - **Two companies wanted to set up infrastructure**
    - ACCEL and Henkel
      - Henkel has done already many single-cells
    - Horizontal sytems
  - **First tests on rough EP process**
    - After EP rinse cavity with water
    - Mount transport flanges
    - Transport with water to DESY
    - Furnace treatment etc.
- Niobium vendor qualification
  - **Plansee is qualified**
- Large-grain material
  - **Electropolished nine-cell shows very good results**

Cavity production: 6th series

- (30 + add. ≈6) recent cavities by Accel + Zanon; mainly Tokyo Denkai; all eddy-current scanned

- **last production series of fine grain Nb before XFEL**

- new Nb vendors:

  Plansee qualified: 1 (of 2) nine-cell + 3 single-cells successful

  Ningxia promising (2 single-cells successful; 3 nine-cells under fabrication

- **mechanical problems** with tolerances and surface damages (Zanon)

=> intensive investigations and discussions ongoing

6th cavity production – preparation strategy

New preparation strategy:

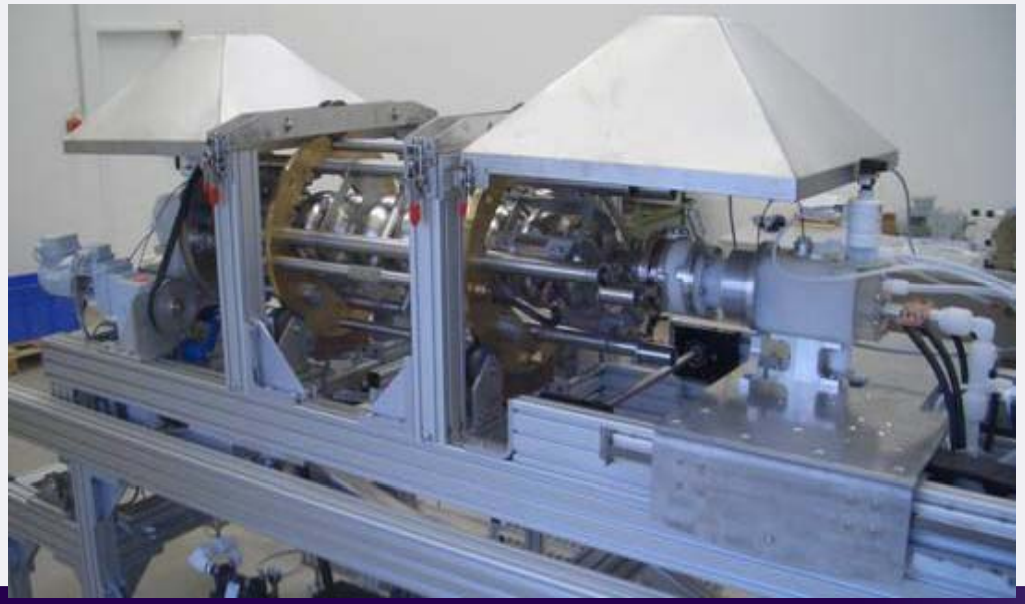
i) main (“rough”) EP **predominantly at industry** (Accel + Henkel)

ii) test of optimized final “Flash-BCP” with He-tank

iii) improved statistic on final EP with ethanol rinse

iv) most vertical tests with He-tank welded (except of few start-up cavities)

v) **uniformly distributed mixing of manufacturers and EP-companies**



EP system at Henkel

6th cavity production – preparation workflow

New workflow in preparation of XFEL production:

- main EP at industry => typical start-up problems understood / solved
- usual 800°C firing + outside BCP at DESY
- final treatment at DESY:
  - i) final EP with ethanol rinse
  - ii) final 10µm BCP ("Flash-BCP", "EP+") with He-tank
- 120C-bake consequently applied
- vertical test with He-tank for 2x 10 cavities

=> hold + review of results after 2x 10 cavities

=> expected for summer 2008

- remaining cavities: i) spare
  ii) tentatively: final EP, test, "Flash-BCP" as repair

6th cavity production – progress

- weekly status on cavity preparation (example of Apr 23rd):

KW 17in 08	plan	process	main ep	ref bohrung	20 µm TA	alc	800C	fine ep	Alco 2	ring welding	tank welding	tank type	flash BCP	Alco 2	assemble antenna	120 C	vert test/MM no tank	vert test tank	comment [W=wait]
115			DESY		X		X	X		X		new		X		X	38.6		delivery expected 24.04.08
105	ref CV	ref Henkel	DESY					Henkel						X	X	X	27		new seals and HP before test
120	Ep	Xfel	Accel an DESY 21.1		X	X	X			X		new			W				stop due to HD 2 missalignment
113			Large grain							X		new				X	36.8		Chechia test
116	flash	no tank	Accel an DESY 15.1		X		X			X	X	old	X	X	W	X	36.5		store on rail no power coupler
117 b			DESY					X				new		X			39.5		
118			DESY		X	X	X					old	X	X	W	X	29.4		coupler from Z97 to be installed
121	flash	Xfel	Accel an DESY 21.1	X	X	X	X			X		new	X		X	X			
125	ep	Xfel	Accel an DESY 28.1		X	X	X	X	X	X	KW 17	new							
129	flash	Xfel	Accel an DESY 15.2		X	X	X			X	KW 17	new							
131	ep	Xfel	Accel an DESY 15.2		X	X	X	X	X	KW18		new							
133	flash	Xfel	Accel an DESY 18.2		X	X	X			DESY		new							
119	flash	no tank	Henkel an DESY 19.3		X	X	X					new	KW 17						test without tank 1st of Henkel
141	ep no tank		DESY		X	X	X	X	X			new				NO			problem @ weld? Bad test result
138	flash	Xfel	Accel an DESY 13.3		X	X	X			KW 18		new							
130	ep	Xfel	Accel an DESY 13.3		X	X	X	+30 Min				new							
122	ep	Xfel	Henkel an Desy 27.3		X	X						new							
123	flash	Xfel	Henkel an Desy 3.4		X	X						new							
126	ep	Xfel	Henkel an Desy 3.4		X							new							
128	flash	Xfel	Henkel an Desy 10.4		X							new							
132	ep	Xfel	Henkel an Desy 10.4		X							new							
135	flash	Xfel	Henkel an DESY 17.4		KW 17							new							
139	ep	Xfel	Henkel an DESY 17.4		KW 18							new							
144	ep		scheduled 24.4.									new							back to Accel too low removal#
134			stock																
124			stock																
127			stock																
136			stock																
137			stock																
140																			
142																			
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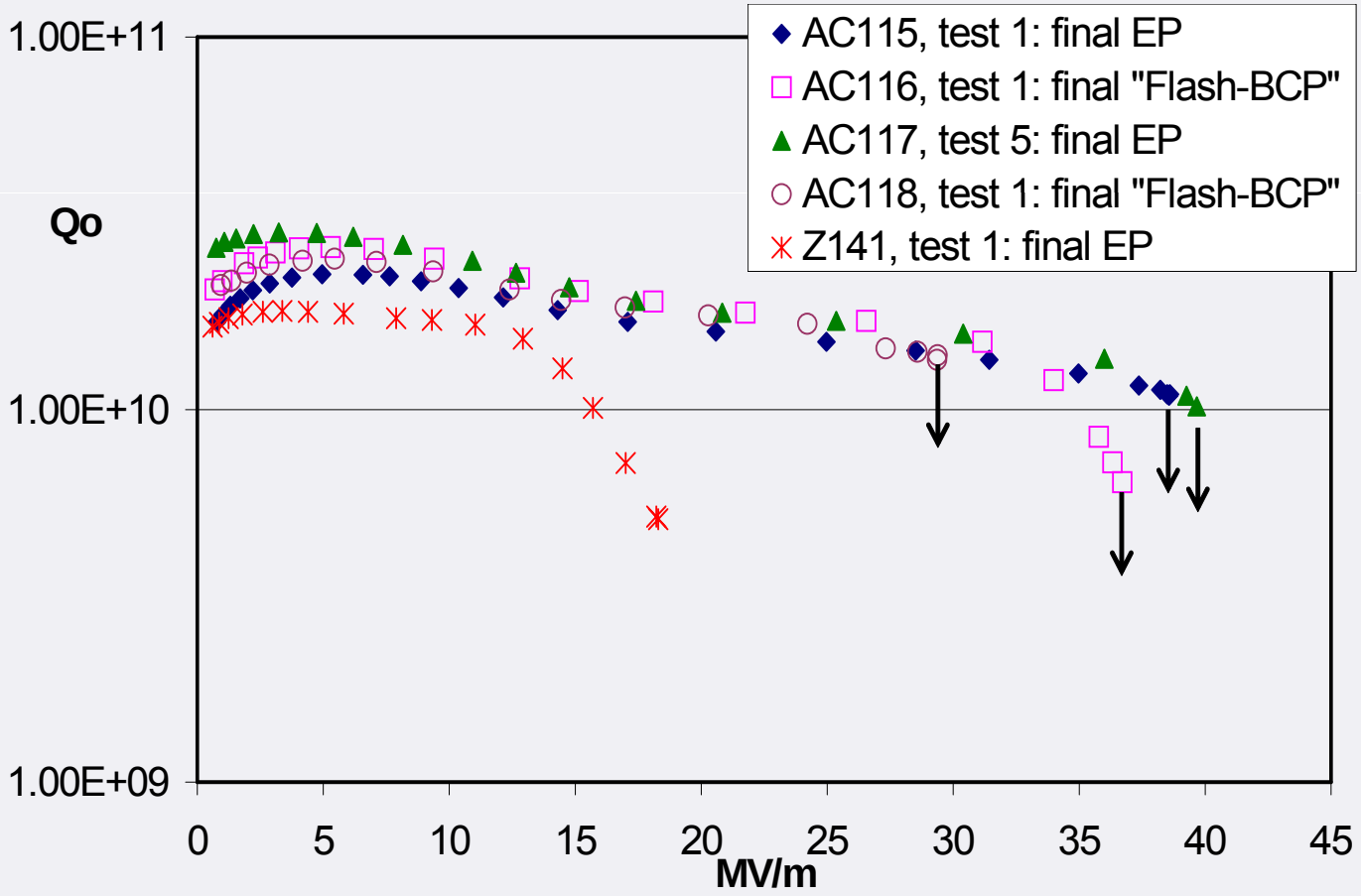
6th cavity production – rf results

- excellent + promising first results including first Plansee nine-cell (AC115)
- Z141 as first cavity with surfaces damages after fabrication under investigation



Large Grain cavities

- **option for part of XFEL cavities**

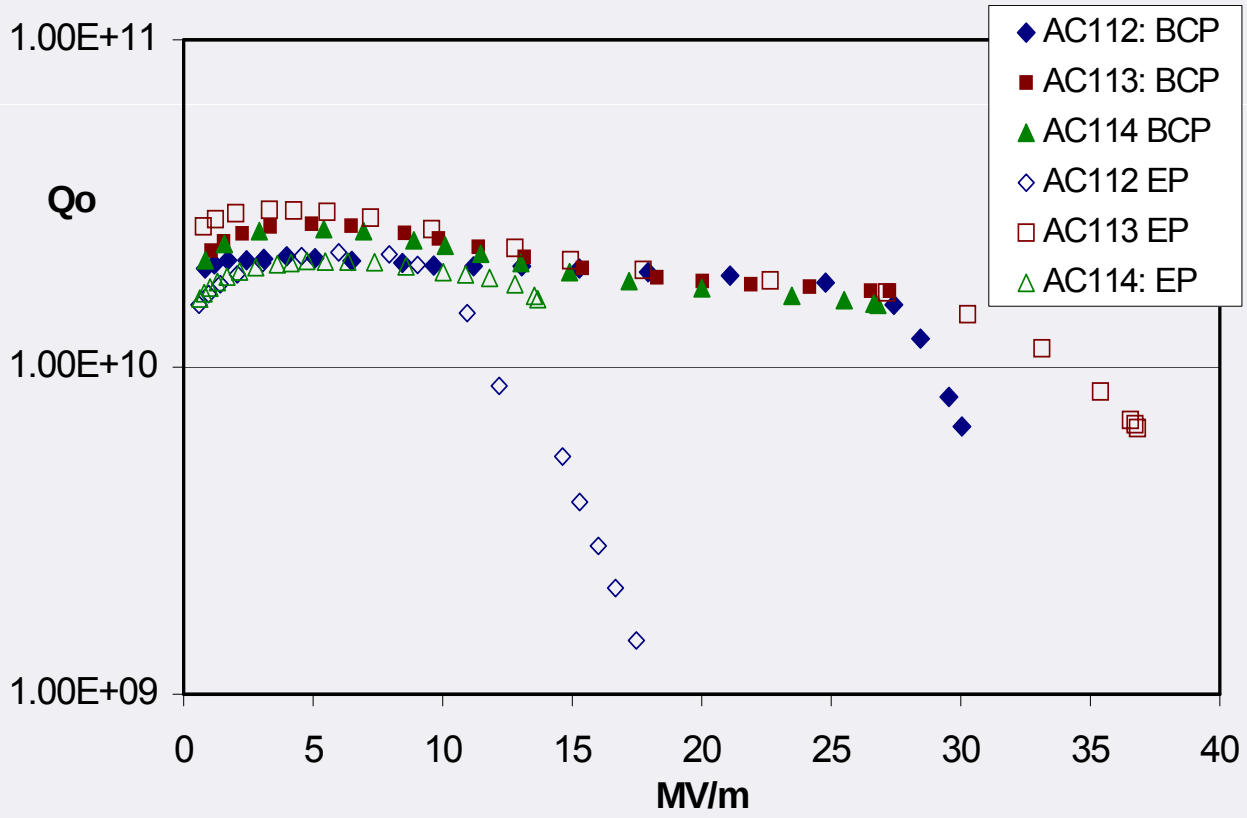
- 3 nine-cells tested (5th series) + 8 more nine-cells ordered (8th series)
  add. several single-cells tested
- all nine-cells made of Heraeus ingots; all made at Accel

- large grain (LG) material with different spring-back behavior during deep-drawing

  => different (difficult?) mechanical weld preparation for precise tolerances

Large Grain cavities – rf results of nine-cells

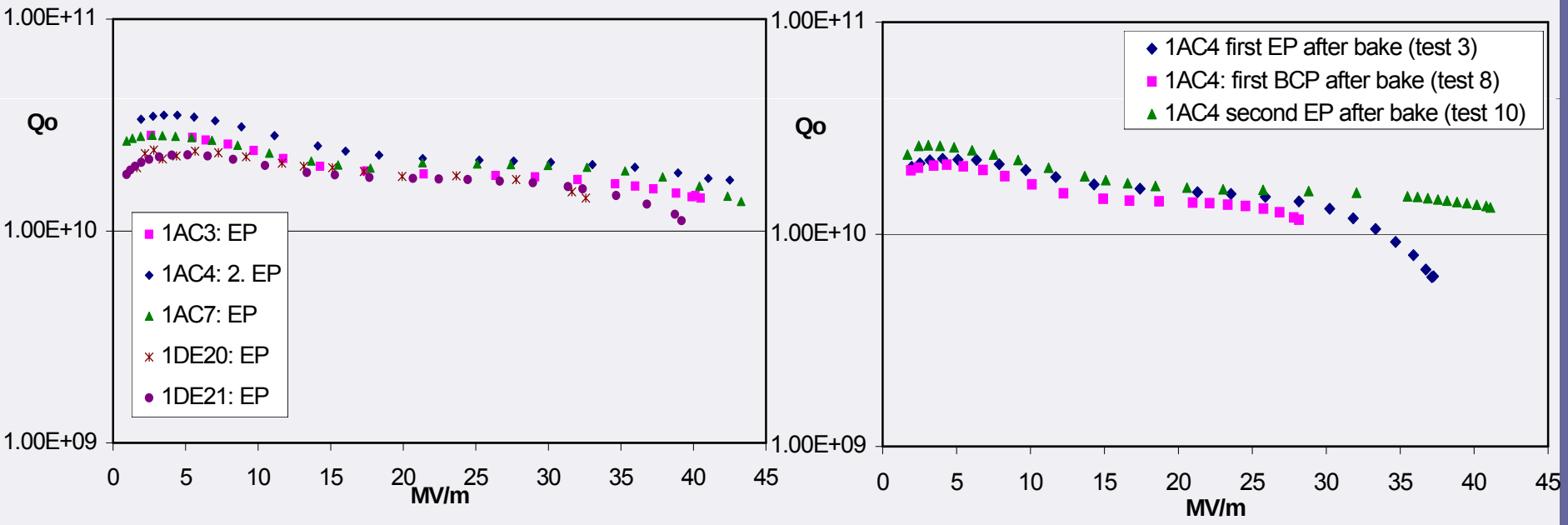
- **BCP**: good max. gradients of (27-30) MV/m with low field emission
- **EP**: one excellent cavity with 37 MV/m, but strong FE at high gradients;
  two cavities disappointing with (14-20) MV/m => FE + quench => **???**



Large Grain cavities – rf results (ctd.)

- all deep-drawn LG single-cells show:

  after EP: high gradients (33 – 43) MV/m with low/no FE
  after BCP: reproducible lower gradients (25 – 30) MV/m with low/no FE



Summary: **- rf results of LG cavities very promising**

- first Chechia test of LG nine-cell upcoming soon