# DESY Status

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1st LCC ILC Cavity Group Meeting

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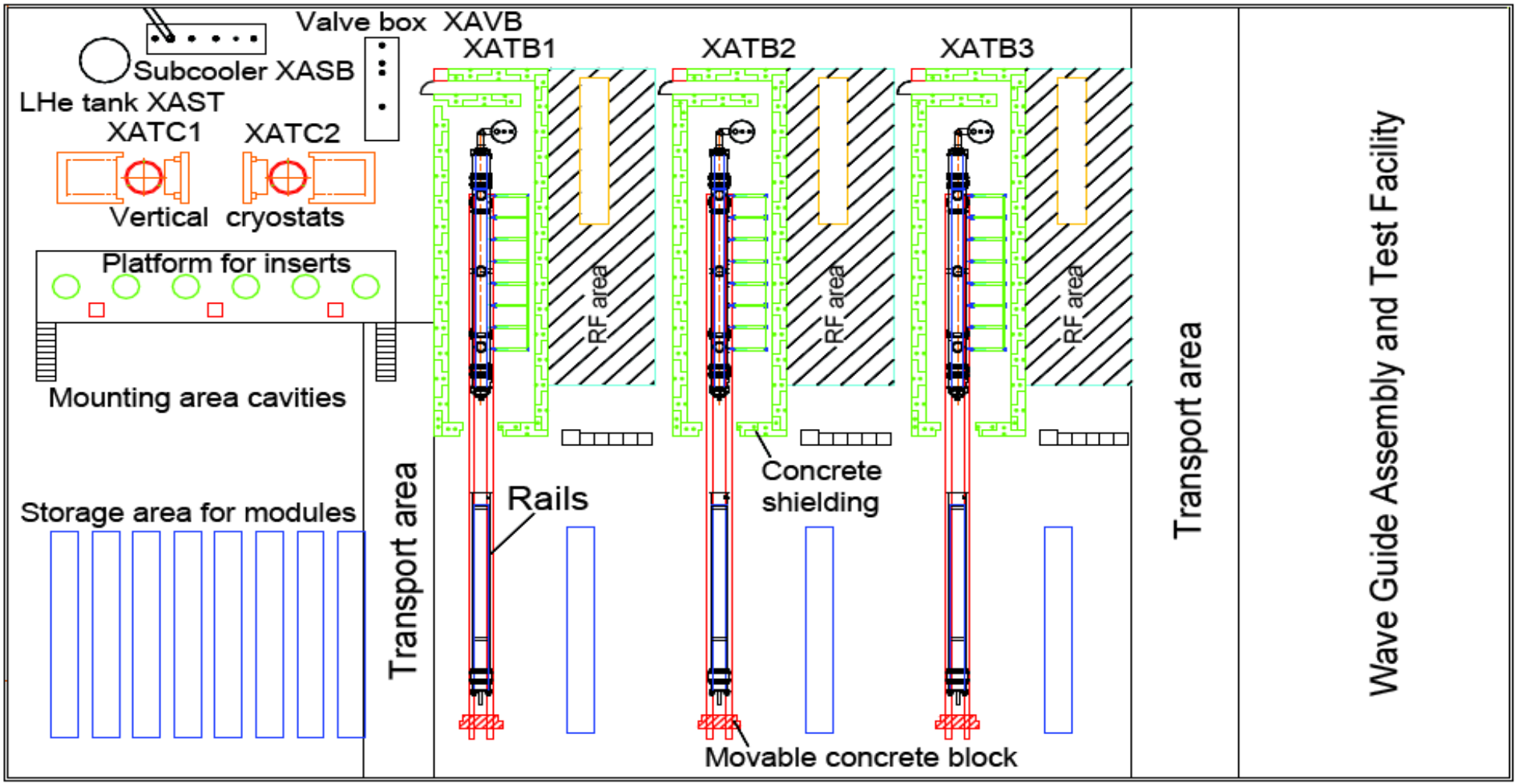
# Cavity Production for the European XFEL and more

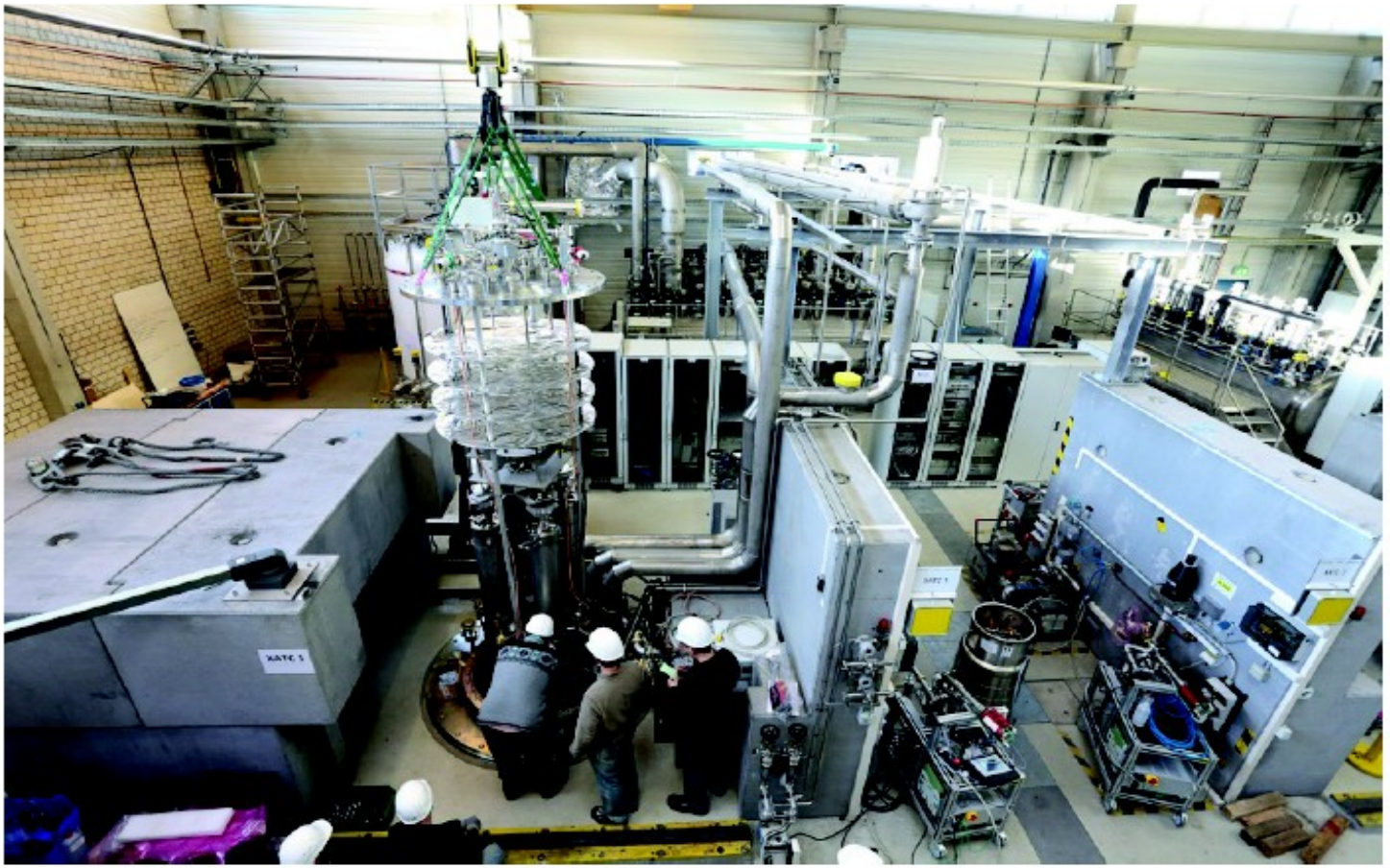
- 800 cavities are required for the European XFEL
  - cavity gradient ~24 MV/m
- 24 additional cavities will be purchased as part of the ILC-HiGrade programme (European Commission FP7) which was funded till 1/2012.
  - identical production to European XFEL except for He-Tank, which will be omitted to allow for further treatment
  - goal is to understand how to reach high gradients in industrially produced cavities
  - ILC specifies 35 MV/m in vertical test
  - if all 24 cavities were to perform excellently they could result in 3 world record cryomodules
- The industrial contracts specify production procedure. They do not include performance specification
  - Some 10% of cavities may have to receive additional treatment
  - Quality assessment is partially funded by CRISP (European Commission FP7)

# Advanced Module Test Facility (AMTF)



# SRF Infrastructure in AMTF

- 2 cryostats
- 6 mounting stations for inserts
- Insert prepared to hold cavities with and without He-tank
- moveable concrete shielding for radiation protection

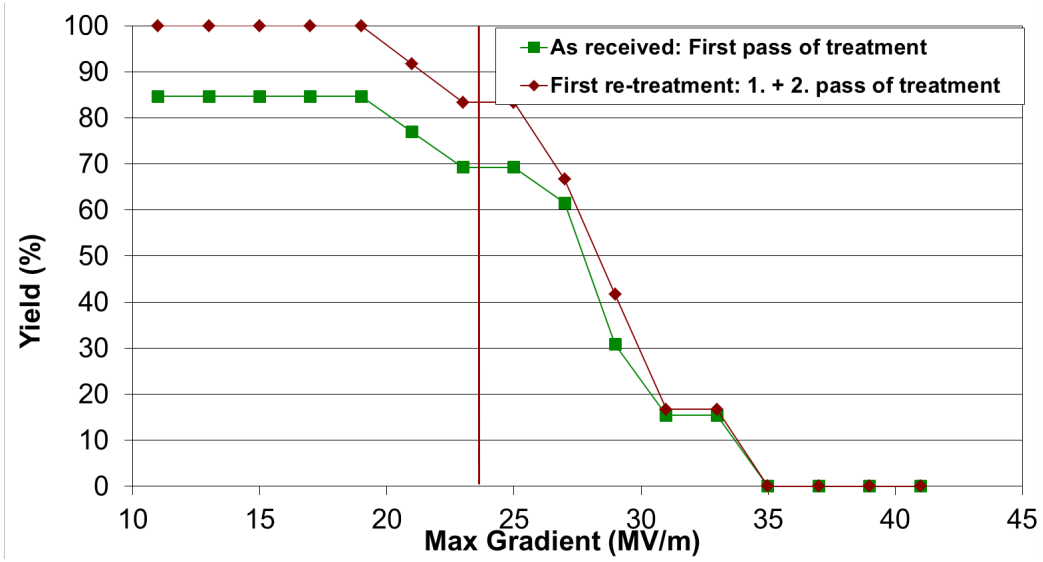


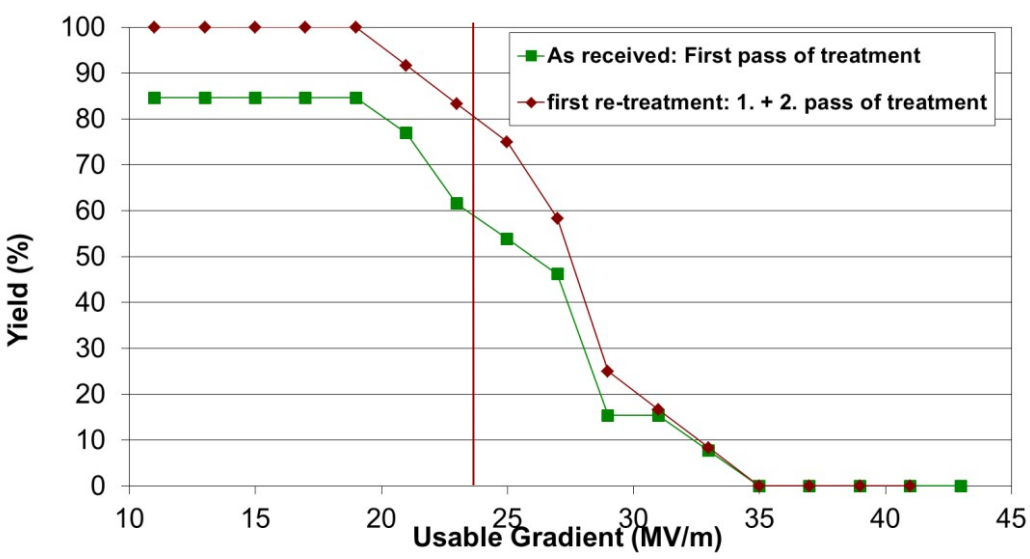
Insert with shields being moved to cryostat

# First Results of XFEL Cavities: Vertical Acceptance Tests



- Vertical acceptance test done on 13 cavities equipped with He-tank and Higher Order Mode feedthroughs
  - 8 cavities meet specification w/o re-treatment
- Re-treatment by High Pressure Ultra-Pure Water (HPR) rinsing =>
  - 2 cavity successful done at DESY
  - 1 cavities in preparation
- 2 cavities with quench at 19 MV/m and 22 MV/m, resp.




Yield of max. and usable gradient based on
13 cav. for first pass of treatment; 12 cav. for 1.+2. pass of treatment

***Preliminary data; results are not published***

# European ILC-HiGrade programme

***XFEL*** order includes 24 cavities as a part of the ILC-HiGrade program:

- Initially, serve as **quality control (QC)** sample for the ***XFEL***
  - extracted regularly, ~**one cavity/month: first cavity arrived!**
  - after the **normal acceptance test** will be **taken out** of the production flow --> **R&D**

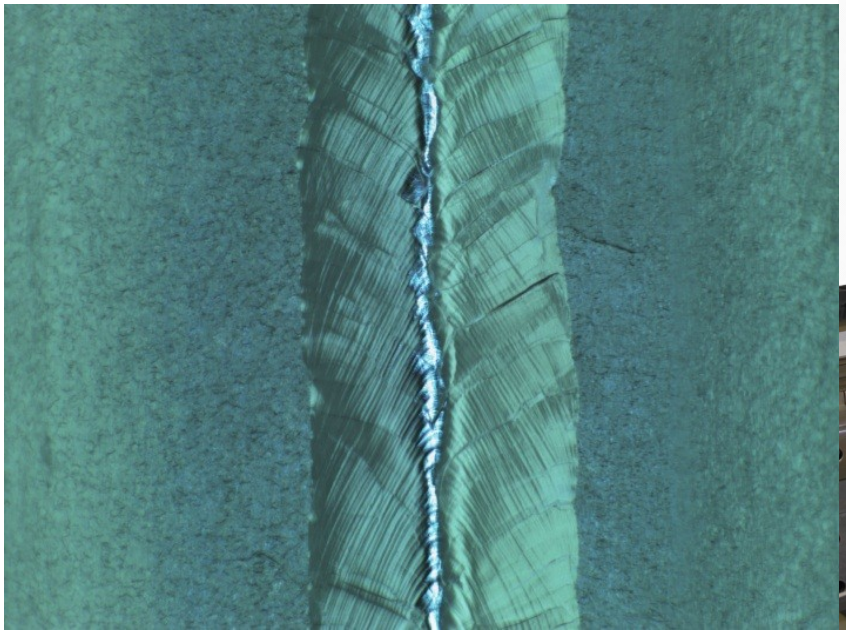
- Delivered with **full treatment** but **no helium tank**
  -> **maximize** the data output from the test

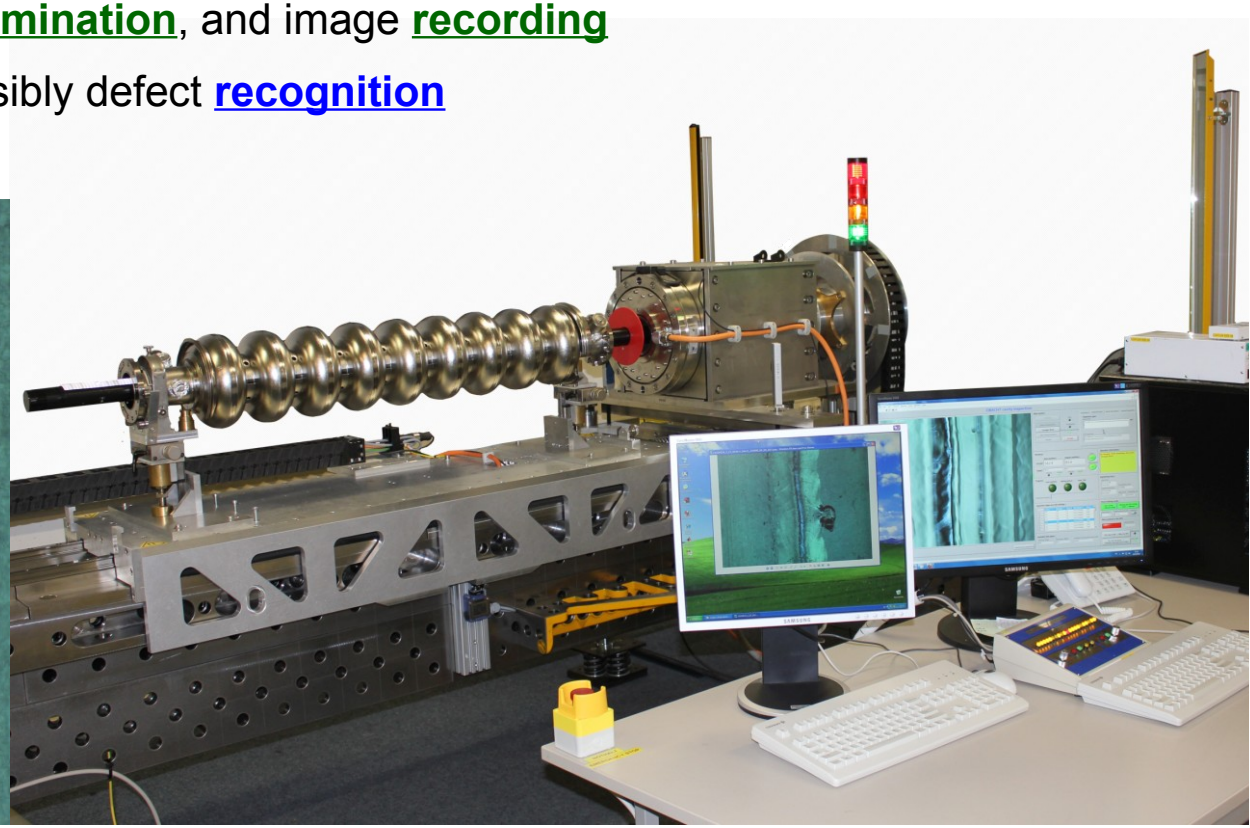
- Further handling within **ILC-HiGrade/CRISP** **as feasibility study** for **ILC goal**:
  - surface mapping from the 2nd cold RF test
  - optical inspection (OBACHT) and replica
  - Centrifugal Barrel Polishing
  - Local Grinding repair

- Aim for **3 world record modules** from the **24 ILC-HiGrade cavities**

# OBACHT – Optical Bench for Automated Cavity Inspection with High Resolution on Short Time Scales

- **Large amount** of cavities (also dressed) can be **inspected**: ILC-HiGrade, (European XFEL)
- **Fully automated** (LabView) cavity inspection with Kyoto Camera System yields
  - 2790 pictures in ~8 hours: welding seems of equator (iris) every 4°(10°) + equator left/right
  - ~12 x 9 mm pictures (2488 x 2616 pixels, ~10 µm/pixel) in *.bmp, *.png and/or *.jpg
- Movable sled with cavity (axial posit. ~10 µm) and Kyoto camera (angular posit. ~0.01°),
- Collision free movements assured by optical tests (**to be upgraded now**)
- Fully **automatic** cavity **positioning**, **illumination**, and image **recording**
- **Automatic** image **processing** and possibly defect **recognition**





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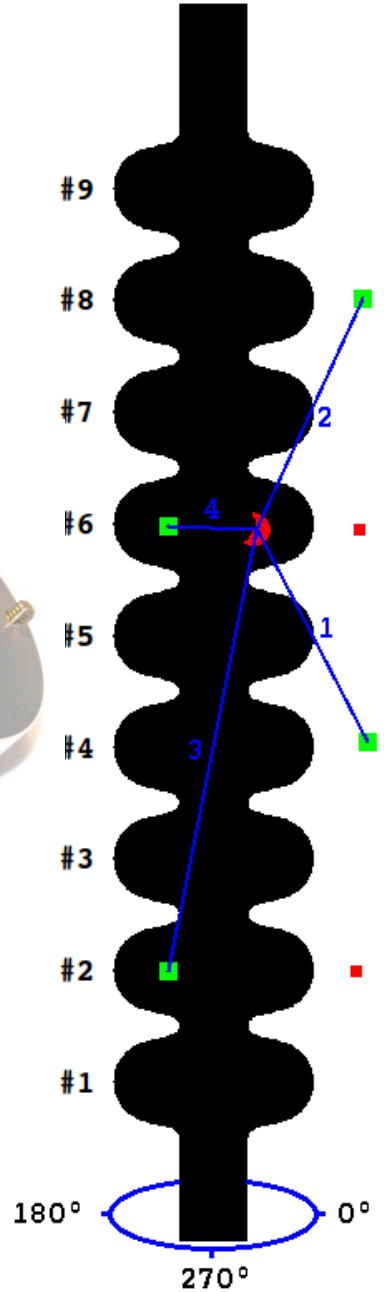
# Upgrade of „Second sound“ quench detection system

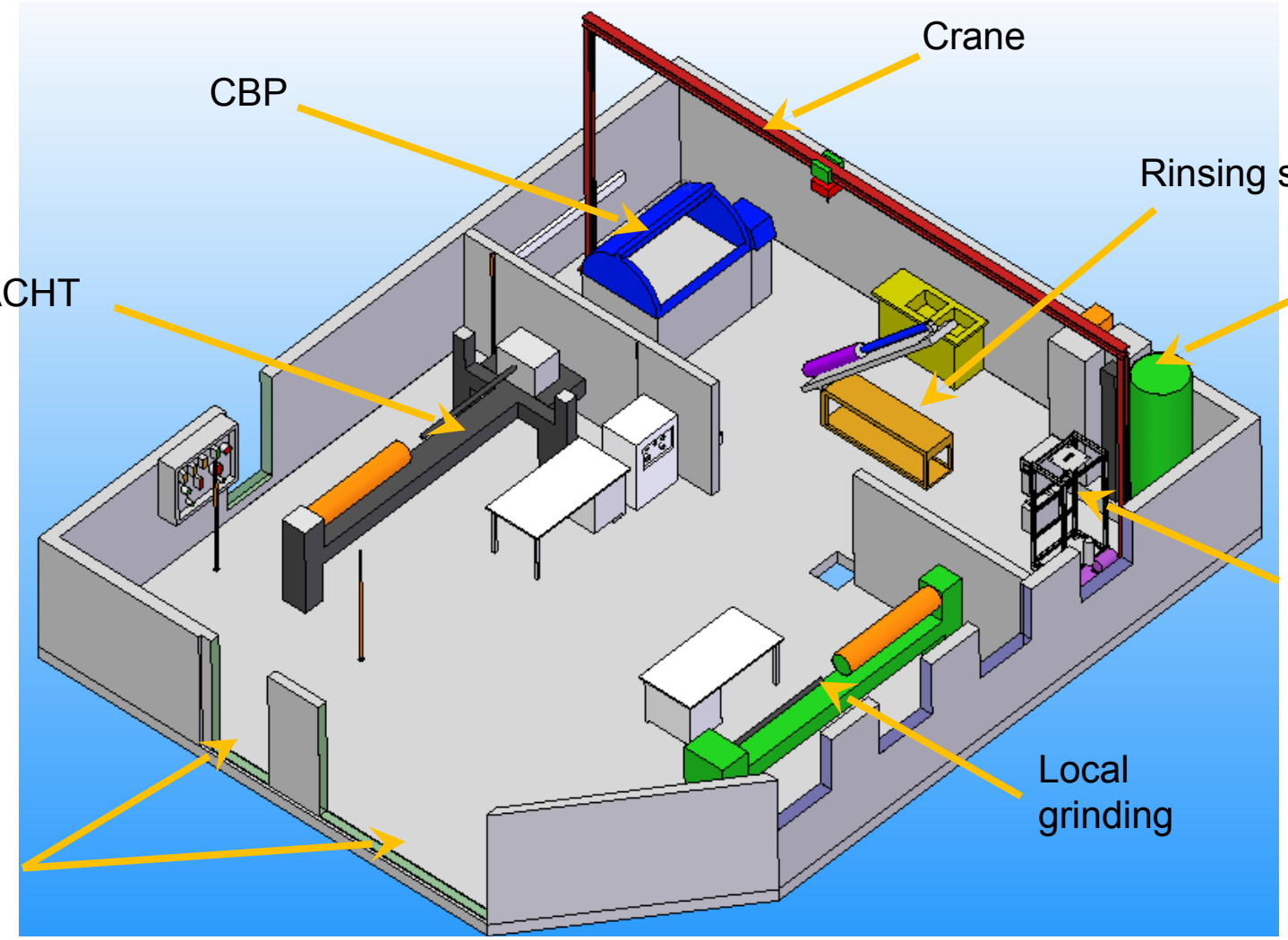
- **Currently** all VT inserts @ DESY equipped with 8 OSTs to detect „second sound“
- **Upgrade** to 16 OSTs for the ILC-HiGrade cavity tests:
  - Better localization accuracy (< cm)
  - Allow additional R&D




## Required modification:

- New DAQ with more channels
- More feedthroughs on the cryomodule inserts
- Update of the evaluation software with better accounting of the cavity shape and wave propagation in Nb

# HiGrade Lab




- 100 m2
- 2 rooms
- to be ready around June 2013