Recent Vertical Test Results of KEK Cavities

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Outline

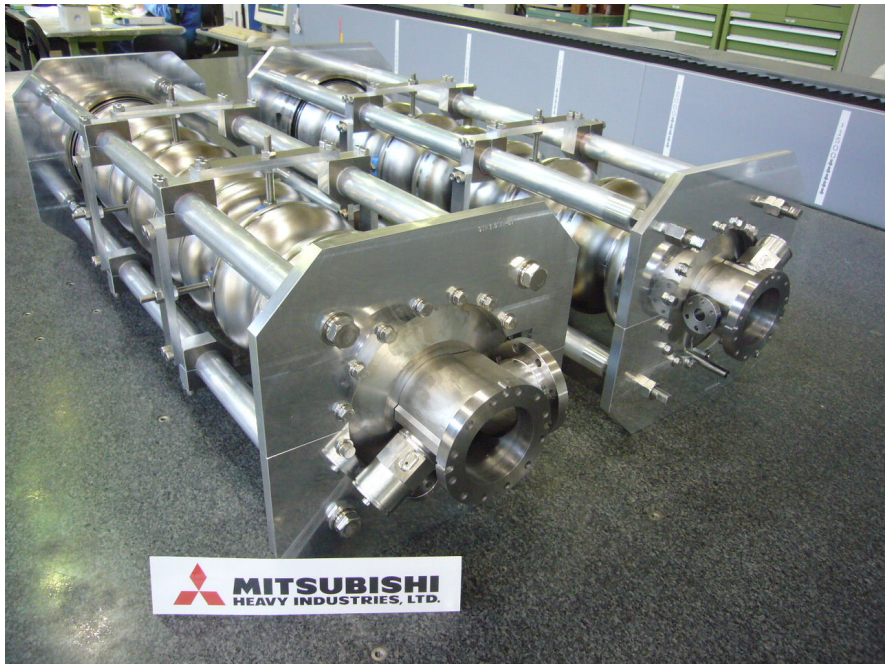
1. Cavities and Surface Preparation
2. Summary of Vertical Test Results
3. Outlook of the next cavities
4. Summary

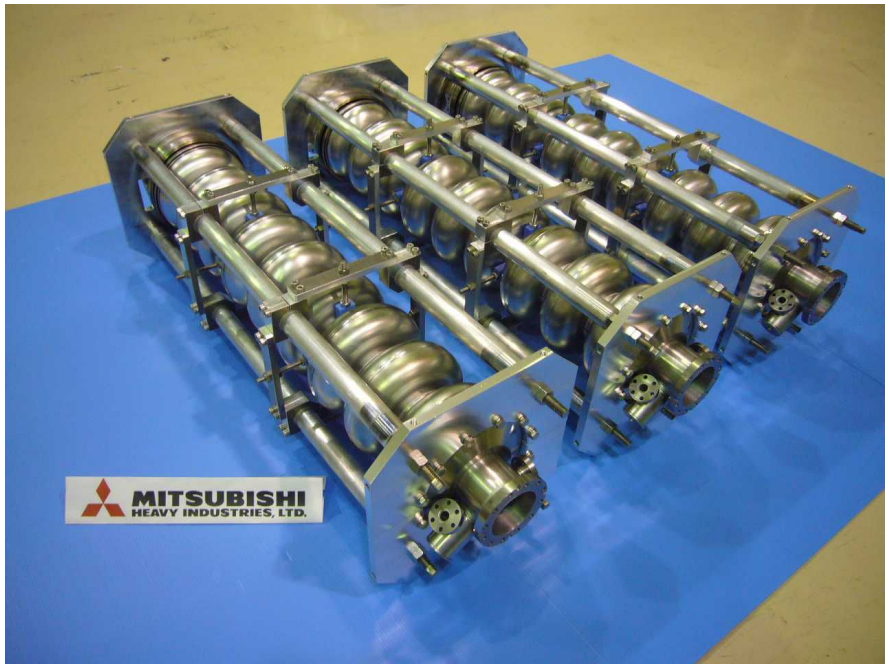
Inspection and T-map results will be presented in the other talks by K. Watanabe and Y. Yamamoto.

Five KEK Cavities for S-1 Global

MHI-05 Cavity
MHI-06 Cavity

MHI-07 Cavity
MHI-08 Cavity
MHI-09 Cavity





Delivery in 2008' March

Delivery in 2009' March

Surface Preparation for KEK Cavities

No Barrel Polishing, EP + HPR + Assembly @ STF

preEP(5μm) + First EP (100μm) + HT at 750°C for 3 h

--- Surface Inspection in each step ---

MHI-05 ; I. EP(50)+H_2O_2 II. EP(50)+H_2O_2 III. EP(20)+C_2H_5OH

MHI-06 ; I. EP(50)+H_2O_2 II. (Mag. shield) III. (Mag. shield)
IV. EP(50)+H_2O_2 V. EP(20)+C_2H_5OH VI. EP(20)+C_2H_5OH

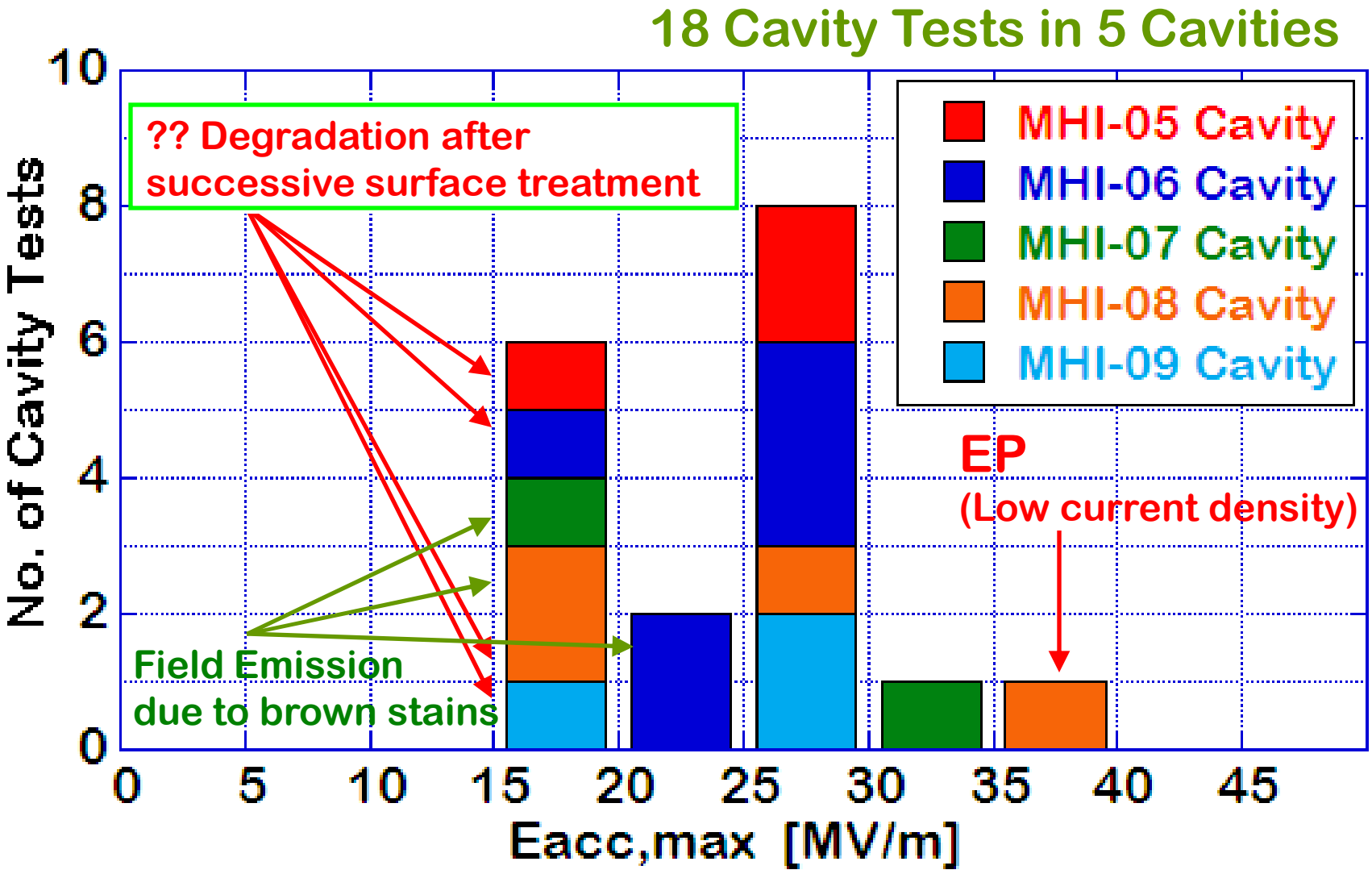
MHI-07 ; I. EP(20)+C_2H_5OH II. EP(20)+Degreaser

MHI-08 ; I. EP(20)+C_2H_5OH II. EP(20)+Degreaser
III. EP(20)+Degreaser IV. EP(20, LCD)+ Degreaser

MHI-09 ; I. EP(20)+C_2H_5OH II. EP(20)+Degr. III. EP(20)+Degr.

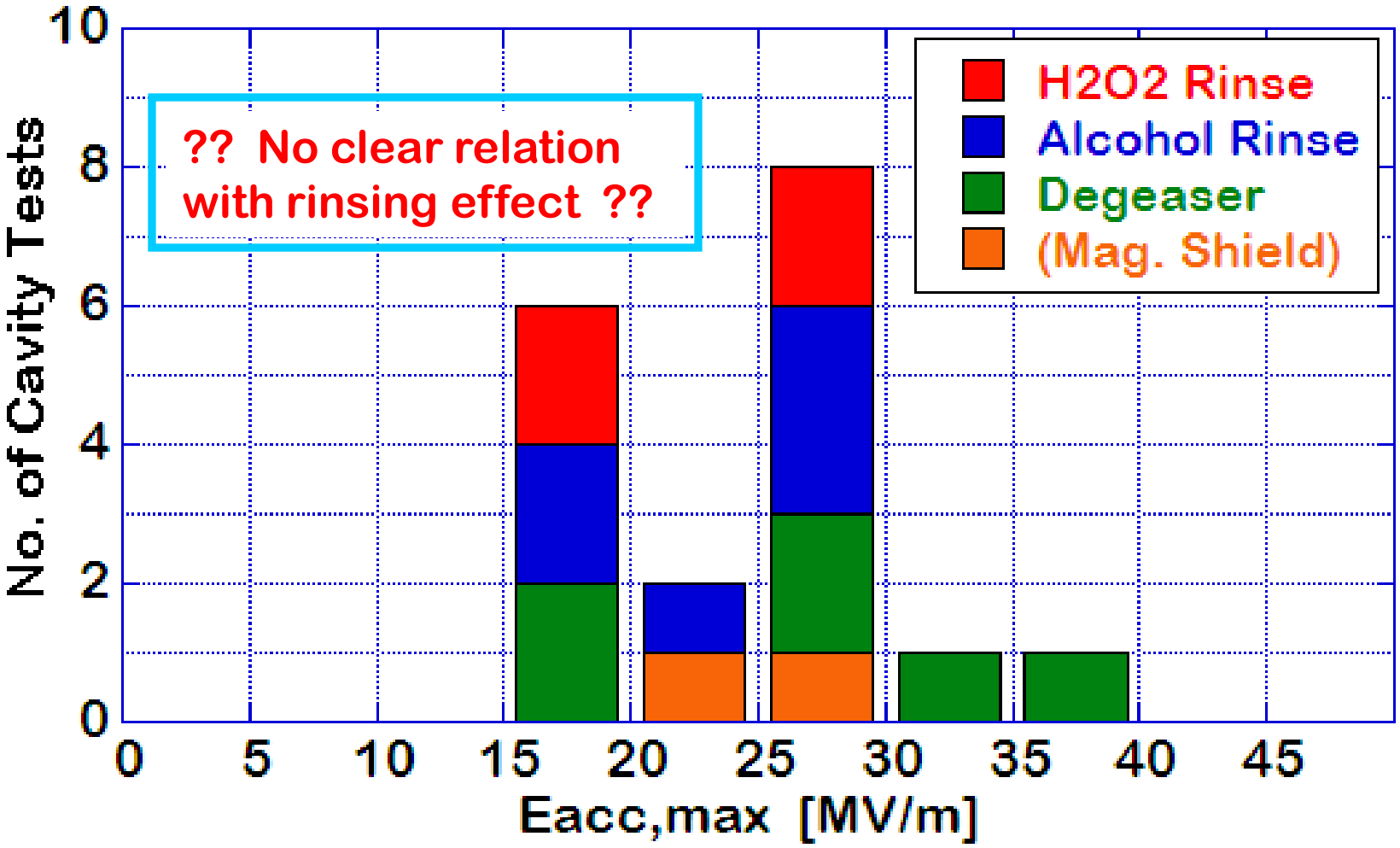
Comparison of Rinsing by H_2O_2, C_2H_5OH, Degreaser → ?

Summary of V.T. in Five KEK Cavities

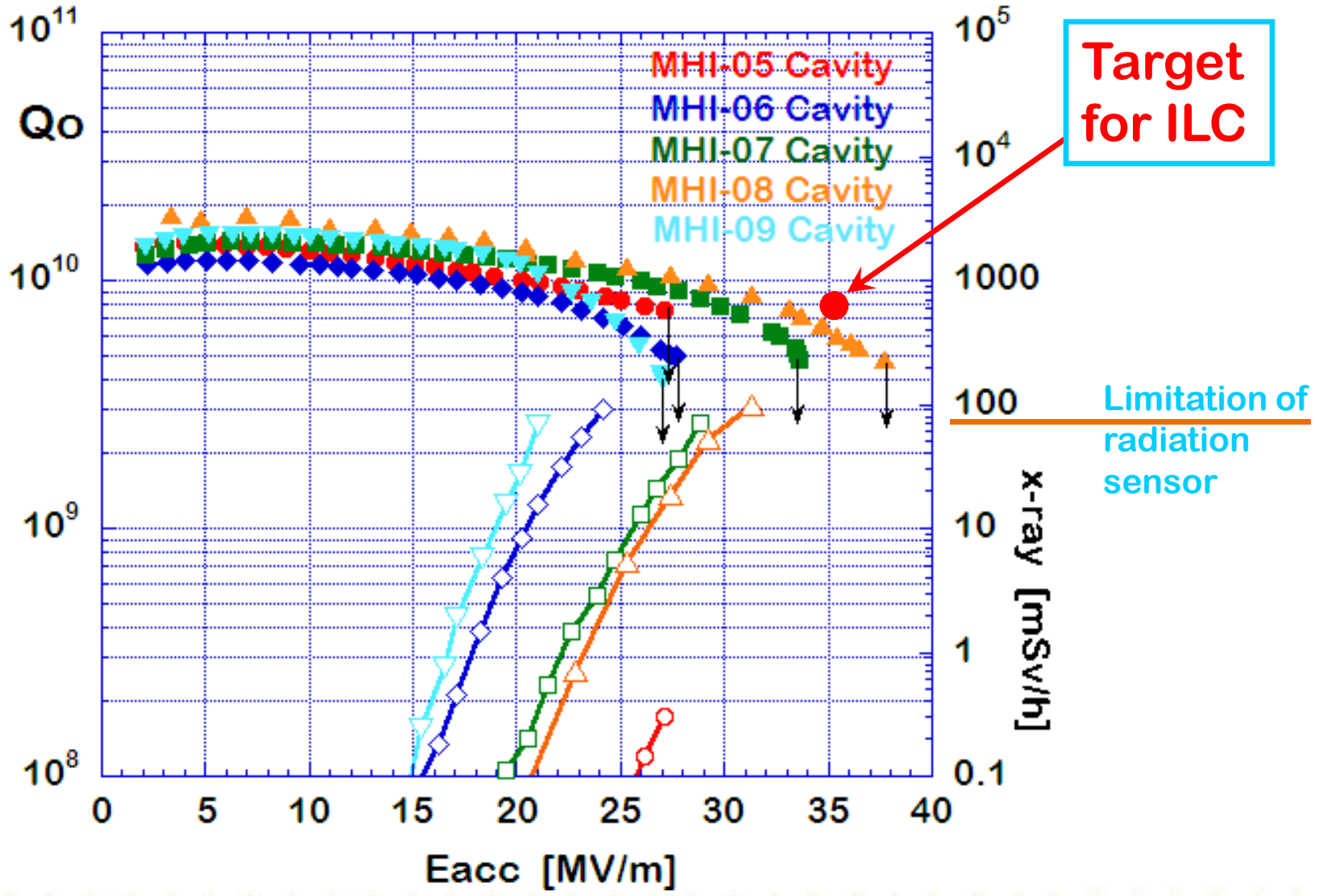


Summary of V.T. in Five KEK Cavities

18 Cavity Tests in 5 Cavities

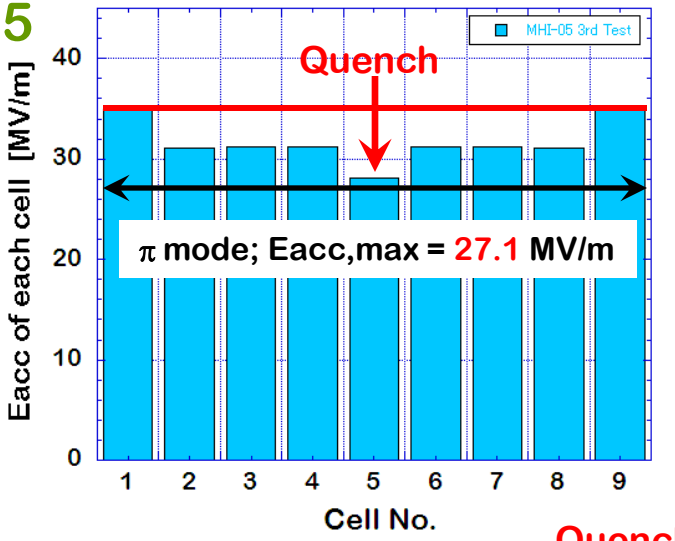


Final V.T. Results of Five KEK Cavities



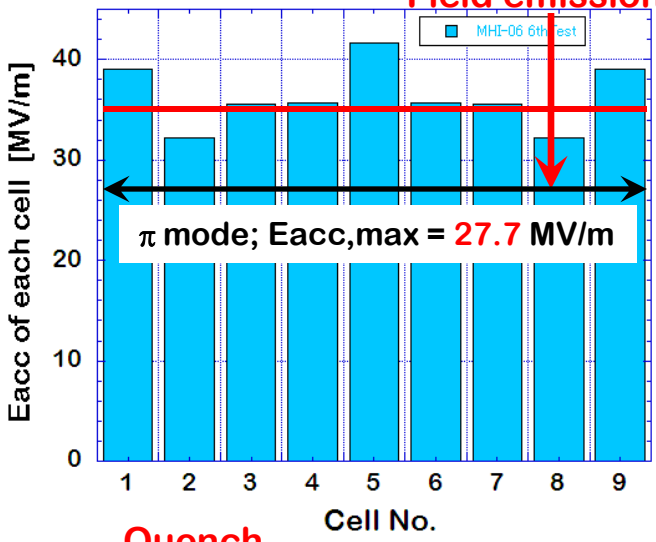
Eacc,max (cell) by Passbands modes Meas.

MHI-05 3rd

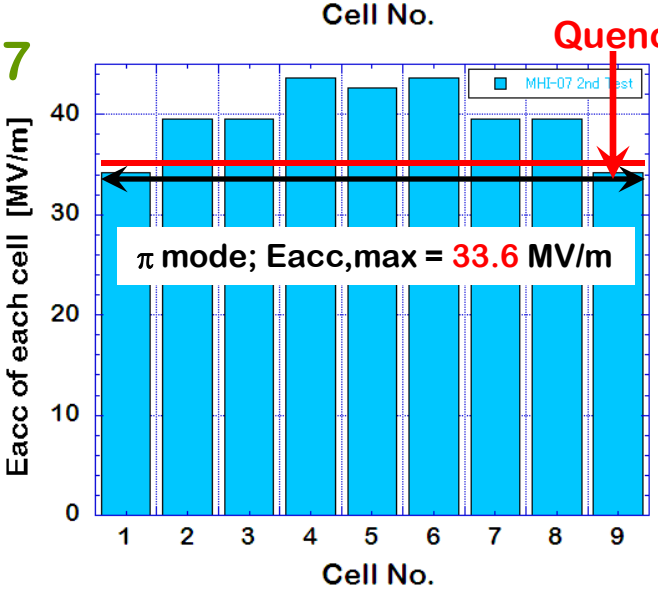


MHI-06 6th

Quench by Field emission

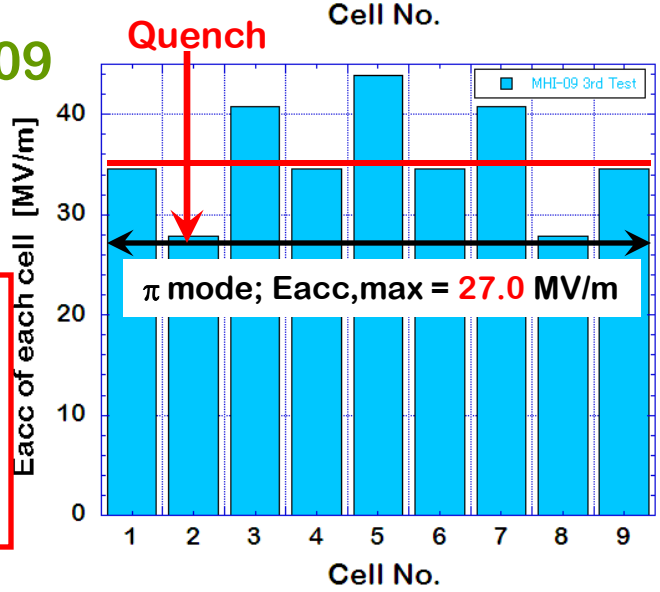


MHI-07 2nd



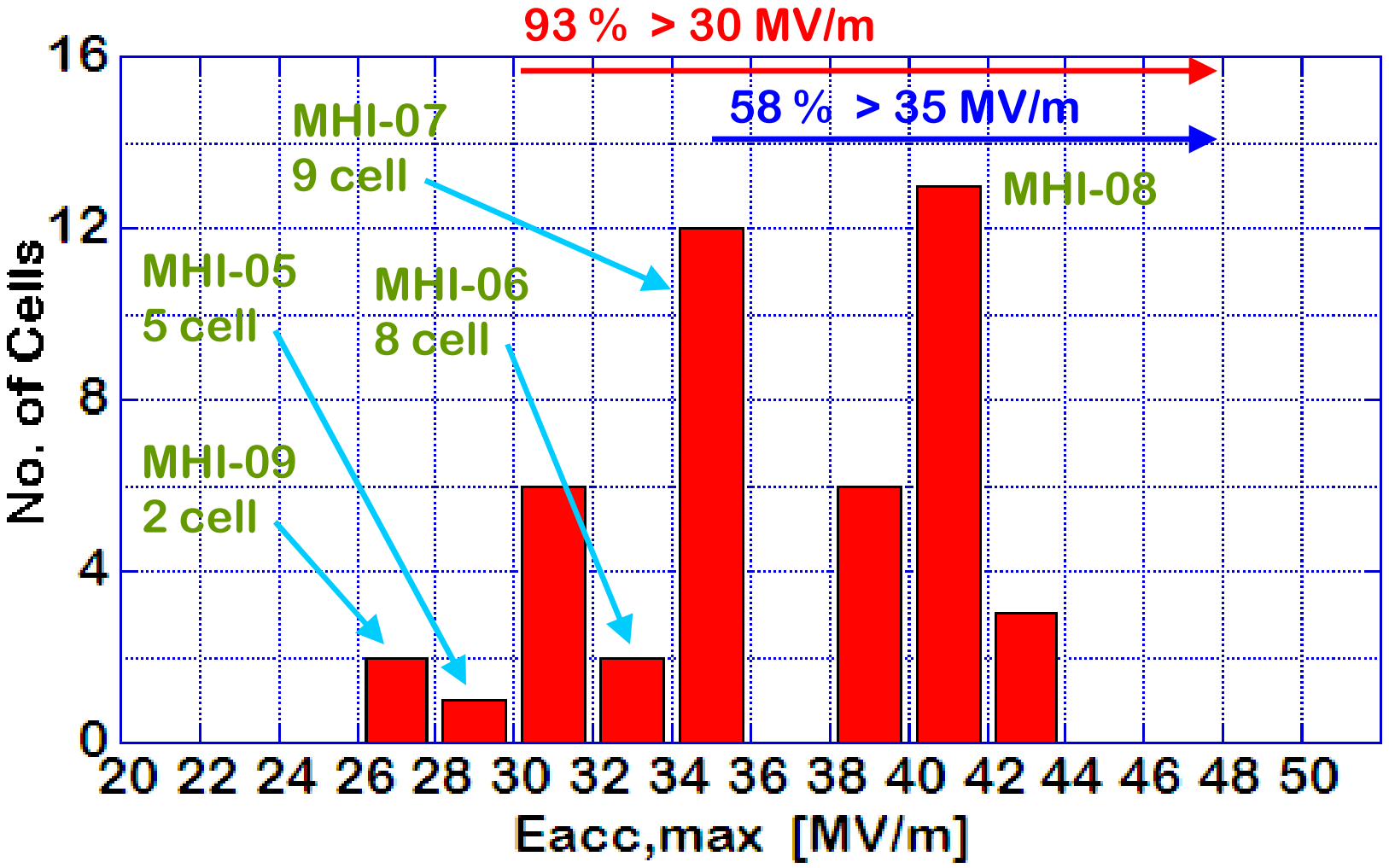
MHI-08 4th all cells > 40 MV/m

MHI-09 3rd



Eacc,max of each cell in Five Cavities

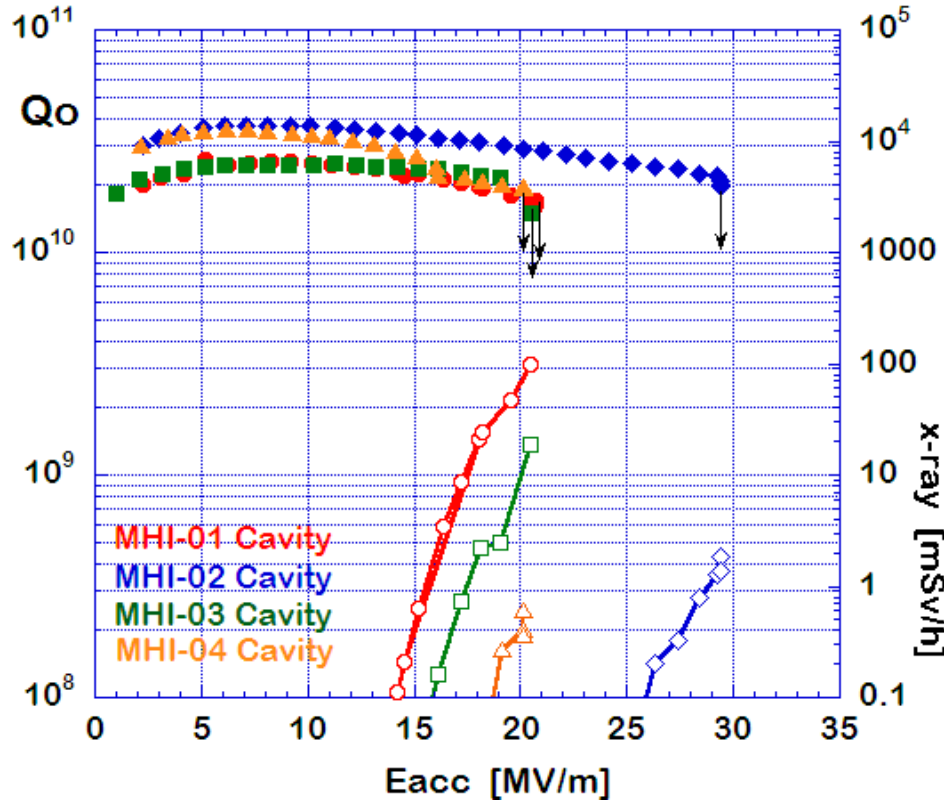
Total 45 cells in 5 Cavities

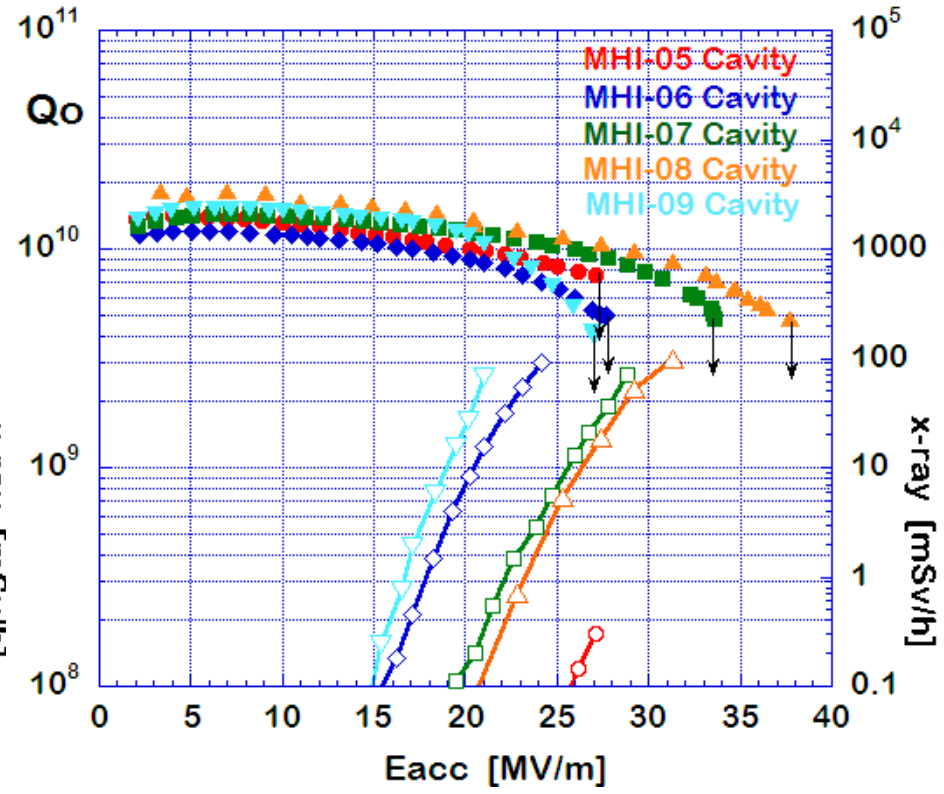


Final V.T. Results of 9 KEK Cavities

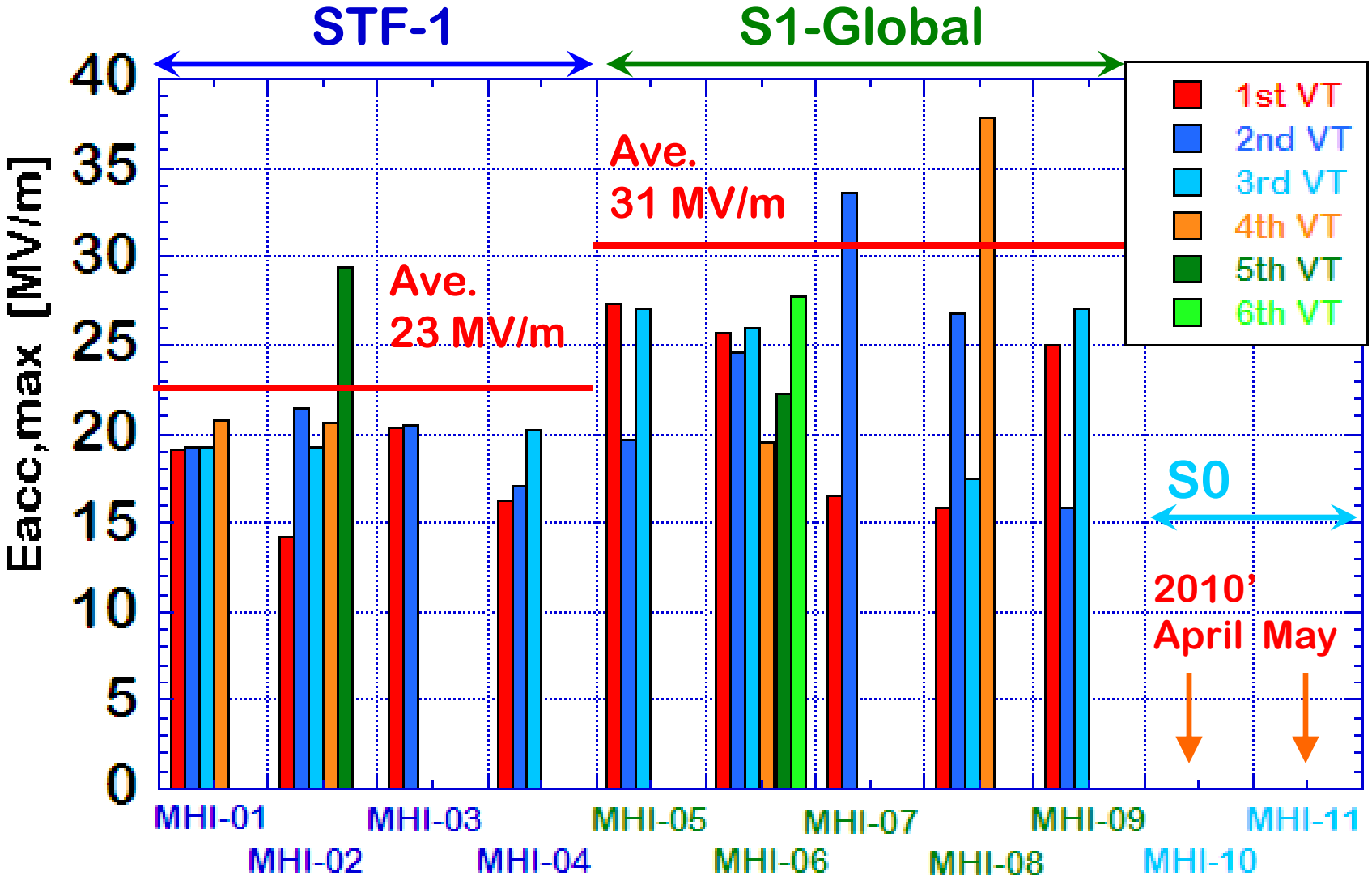
4 MHI cavities for STF-1
ave. Eacc,max = 22.7 MV/m
(2006, Feb. ~ 2007, Feb.)

5 MHI cavities for S1-G
ave. Eacc,max = 30.6 MV/m
(2008, Dec. ~ 2010, Feb.)





All V.T. Results of 9 KEK Cavities



Plan of V.T. in the next Cavities

MHI-10 ; for S0 (VT in 2010'Apr. – July) → go to JLab

MHI-11 ; for S0 (VT in 2010'May – July) → go to JLab

MHI-12 ; for Capture Cryomodule (VT in 2010'Sept.- Dec.)

MHI-13 ; for Capture Cryomodule (VT in 2010'Sept.- Dec.)

MHI-14 ~ 22 ; for STF-2 #1Cryomodule
(VT in 2011'Mar. – 2012'Feb.)

R & D Cavities (without HOM couplers)

Hitachi-01 ; will be completed in 2010'April

Toshiba-01; will be completed in 2010' May

IHEP-01 ; (Large grain niobium, Low-loss shape)
will be delivered at KEK in 2010'May

SUMMARY

- Obtained Eacc,max in 5 KEK-MHI cavities were ave. 30.6 MV/m. Eacc,max > 35 (30) MV/m were achieved in 58 (93) % of 45 cells in 5 cavities.
- Qo values at 25 MV/m was less than 1x 10^{10} due to field emission in 5 cavities. Suppression of field emission at higher gradients is essential to attain 8x10^{9} at 35 MV/m, target in ILC.
- Vertical tests of the next MHI cavities and R&D cavities are planed in 2010'- 2012', and they will be a very tight schedule.