Superconducting Cavity Fabrication for ILC in Japan

-Industrial Activities-

Masanori MATSUOKA (Mitsubishi Heavy Industries, Ltd.)
Norihiko OZAKI (Linear Collider Forum of Japan)

Contents

- Superconducting cavity development in Japan
- Collaboration with KEK
- Present actions and future plans
- Framework for ILC construction
- Conclusions

SC Cavities in Japan (1)

Superconducting Cavity installed in Accelerators

Year	Place	Project	Type of cell	Vendor	No of cavity
1982~	KEK	TRISTAN	5-cell cavity	MHI	32 cavities
1992~	JAERI	FEL	5-cell cavity and single-cell cavity	Siemens	2 cavities 1 cavities
1994~	JAERI	Heavy Ion Booster	Quarter Wave Resonator	MELCO	Data not available
1998~	KEK	KEKB	single-cell cavity	MELCO	4 cavities
2006~	KEK	KEKB	Crab mode cavity	MHI	2 cavities

SC Cavities in Japan (2)

R&D for Superconducting Cavity

Year	Place	Project	Type of cell	Vendor	No of cavities
1990~	KEK	R&D for LC	L-band cavity	Several companies	
2000~	JAERI/ KEK	R&D for Accelerator Driven System	5-cell test modules 600MHz 972MHz	 MELCO MHI	 2 cavities 2 cavities

SC Cavity for TRISTAN

Frequency	508MHz
Material	pure Niobium
Number of Cell	10 (5-Cell×2 Units)
E_{design}	5MV/m
E_{test}	16MV/m
Q value	$2\sim3\times10^{9}$
Number of cavities	32

Crab Cavity for KEKB

Frequency	508MHz
Material	pure Niobium
E_{peak}	21MV/m
Mode	TM110
Number of cavities	2

Collaboration with KEK (1)

- R&D for EB melting and purification of Niobium
- R&D for electro-polishing of cavity surface
- R&D for production technology of cavity
  - Computer simulation of hydraulic press and experimental verifications
  - Optimization of EB welding conditions
- Optimization of liquid He test procedure
- Cavity performance measurements

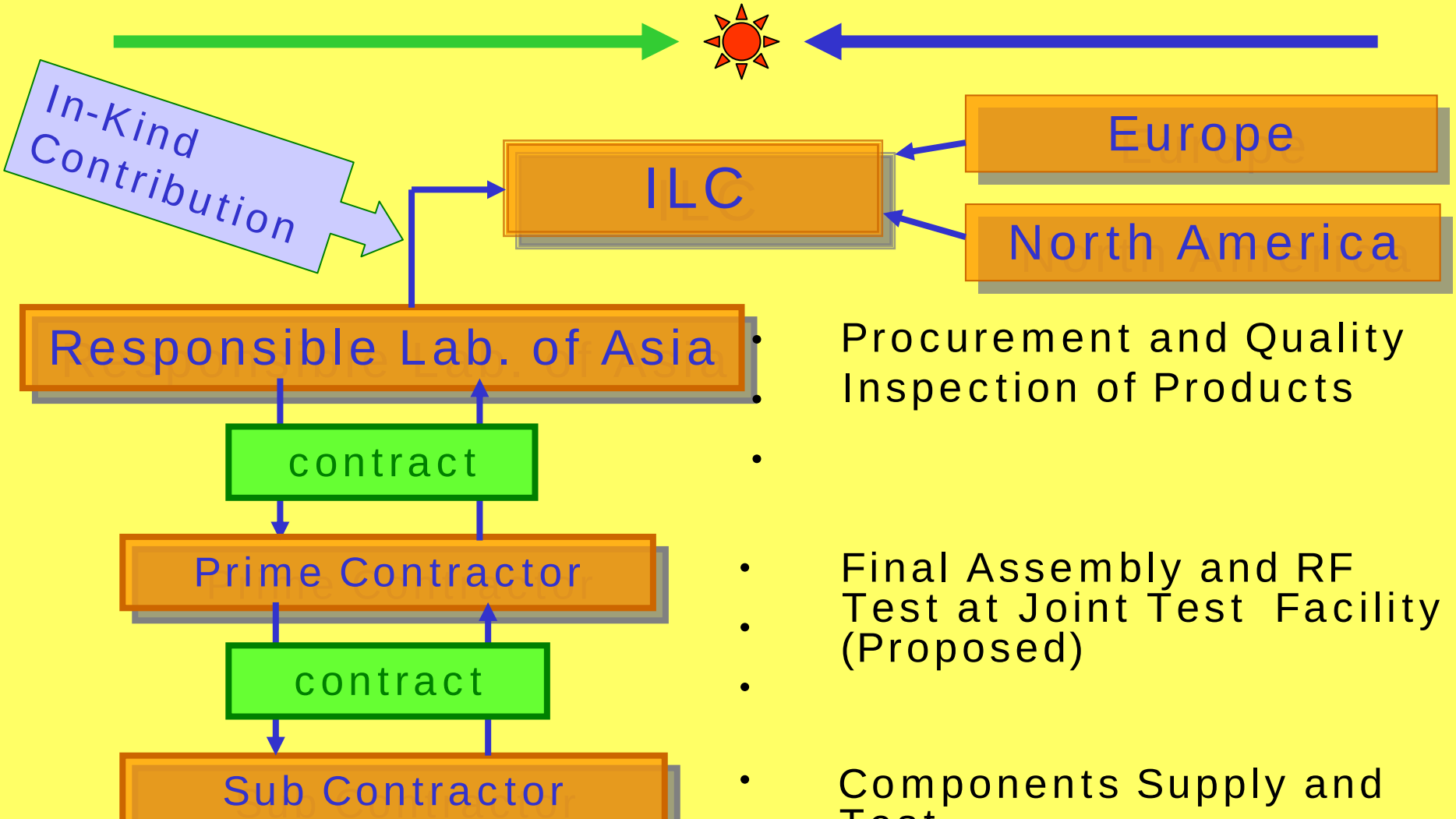
Collaboration with KEK (2)

- R&D for power coupler
  - High power breakdown test on metalizing ceramics
  - Stress analysis of power coupler structure
- Design optimization of cryomodule and tuner, and related assembly jig

Present Actions and Future Plans

- R&D Phase (2005~2007)
  - STF (Phase 1 and 2) construction
  - Production technology development for cost reduction
  - Collaboration with Asian companies, if possible
- Engineering Phase (2007~2010)
  - Mass production technology development
  - QC and QA activities
  - Construction cost estimation
- Construction Phase (2010~)
  - ILC construction by collaboration with regional industries

Framework for ILC Construction



- Procurement and Quality Inspection of Products
- Final Assembly and RF Test at Joint Test Facility (Proposed)
- Components Supply and Test

Conclusions

- Japanese industry has developed technology for superconducting cavity fabrication through collaboration with KEK and industry's own investment.
- We are ready for ILC construction from technological aspects.
- Industrialization process is to be continued for optimizing a balance among performance, cost and reliability.

Announcements

- Industrial Forum on Tuesday, Aug. 16
  - New concept of industrialization
  - Engineering demonstration facility
- GG-5 Meeting on Thursday, Aug. 18
  - Cost estimation and in-kind contribution
  - Cost reduction possibility via industrial participation