

# **ML Single Tunnel Cross Section**

### GDE Asian Regional Team KEK A. Enomoto



### **Contents of Presentation**

- -Boundary condition for single tunnel design
- LHC , XFEL Example
- Asian Team Design status



### Main Linac (ML) RF Unit in RDR

- Double-tunnel accelerator configuration -

#### **Service Tunnel**



# Global Design Effort - CFS

### **RDR ML RF Unit** - Double Tunnel Section -





### **RDR ML RF Unit** - Service Tunnel-



#### Thanks to the FNAL Facilities Engineering Services Section for AutoCAD data!



# **Cryomodule Assembly**

#### with waveguides for DRFS

(Beam Tunnel)



(Drawing y Matsushita, KEK, RF group)



# **Determination of Tunnel Diameter**

(for Single Tunnel in floor-mount DRFS)





# **ILC Cryomodule**





S1-Global Cryomodules are compatible with each other.



# **ILC Cryomodule**



12-m cryostats are combined in tunnel to form a "string".



#### Ceiling CM Example Euro-XFEL @DESY



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#### Ceiling CM Example Euro-XFEL @DESY



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#### Floor CM Example

LHC \$3800 Tunnel





#	Equipment name	#	Equipment name
1	Machine cryostat	20	General services safety
2	QRL jumper	22	General services phones
3	Helium warm ring line DN100	23	Lighting
4	Helium recovery line DN150	24	Electrical powering for transport
5	EDA DN150	26	Space reserved for transport
6	EDR DN150	28	Space reserved for survey
7	Water filling DN65	29	Protection barriers
10	Cable tray1 (general services)	#	Space reserved for an e- machine
11	Cable tray3 (power and optical fibers)	31	Beam loss monitor
12	Cable tray2 (signals)	33	Cable tray 5 (dispersion suppressors)
14	Vacuum pumps	42	Vacuum pumping mobile group
15	Electronics chassis	81	Cablefil
17	Optical fibers 640	83	Telex
19	Communications antenna cable		



#### Floor CM Example FNAL Project X Test Facility



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#### Floor CM Example FNAL Project X Test Facility







CM1\_TUNNEL (Photos from Jerry Leibfritz)



#### **Discussion at KEK for the clearance from Tunnel Wall**







### **Current Conclusion**

for Clearance from Tunnel Wall-

### ~500 mm is minimum



# **Cryomodule Position (2)**



Vacuum pump space was discussed.

The present space seems enough to have it under the module body.



## **Space Reservation for Alignment**







## **Space Reservation for Alignment**



This area should be discussed with machine alignment people.



# **Transport Space**





# **Transport Space**

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### Thanks to XFEL design team !

for STEP files

to convert design data from IDEAS to INVENTOR. Parts files exceed more than 2600.

## **Space Reservation for Alignment**



This area should be discussed with machine alignment people.



### Asian Team Design Status 3-D ML DRFS Tunnel Section





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# **DRFS** Single Tunnel Section Dimension



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### **ÜÜ** Global Design Effort - CFS

### **DRFS 2-D Plan & Elevation**



# Global Design Effort - CFS Single Tunnel with RDR-HLRF





# Global Design Effort - CFS Single Tunnel with RDR-HLRF





# Summary

- Single tunnel configuration was discussed with the RDRtype HLRF system and with the DRFS type.
- The ILC cryomodule positioning in the single tunnel was discussed referring to examples (XFEL, LHC, Project X, S1 Global)
- Asian Team design with 3-D approach has been well progressed during the half period of FY2010.

Boundary conditions and guidelines for design works

# **APPENDIX**

## **ML Single-Tunnel Configuration**

- Distribute RF System (DRFS) -



e- ML	282 RF units
e+ ML	278 RF units
Total	560 RF units

Field gradient Energy gain per RF unit (with 22% tuning overhead)

31.5 MV/m

850 MeV

## ML RF Unit - Distributed RF System (DRFS) -



11:30-12:00 Shigeki Fukuda, HLRF Requirements

## Safety Euro-XFEL @DESY



Fig. 2: Cross-section of the LINAC tunnel (with smoke extraction duct)

x



Fig. 3: View/section through the LINAC tunnel (for better presentation, without the smoke extraction duct)



Fig. 4: Principle employed for the water curtains during the installat.





Fig. 6: Separation wall with two oppositely swinging air flaps and three water jets in the passage area

#### **XFEL Design Report**