

Sept. 3, 2008
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Plug Compatibility for SCRF in the ILC Technical Design Phase

Introduction

This document intends to provide basic guide-line for the plug-compatibility of SCRF cavity packages and cryomodules, and practical plan for the plug-compatibility.

It first scope the effective and efficient R&D in the Technical Design Phase (TDP). The plug-compatibility will be further optimized in the next step after completing the TDP R&D.

1. Basic Guide-line

- Cavity package to be plug-compatible and replaceable with any other cavity packages,
- Cavity package envelope include:
 - Cavity, beam-pipe, LHe vessel, Tuner, Input coupler,
- Flexible R&D and improvement can be made within the envelope,
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- Cryomodule unit to be plug-compatible and replaceable with any other cryomodule packages,
- Cryomodule unit include:
 - Vacuum vessel, cold-mass support, pipes, (5K shield), 80 K shield, etc ...

2. Boundary conditions

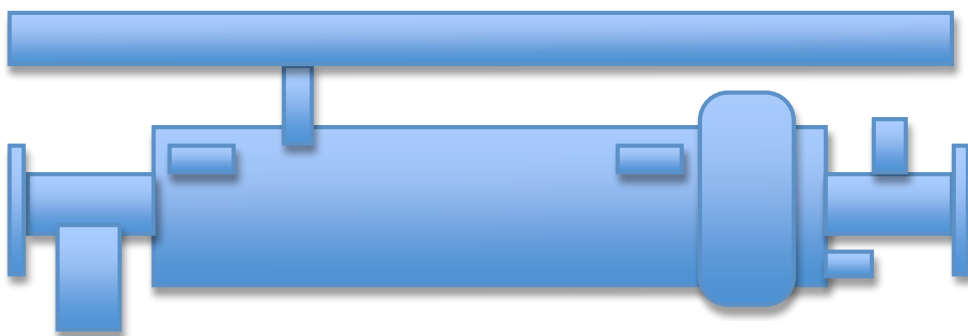
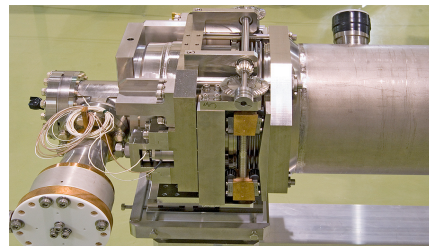
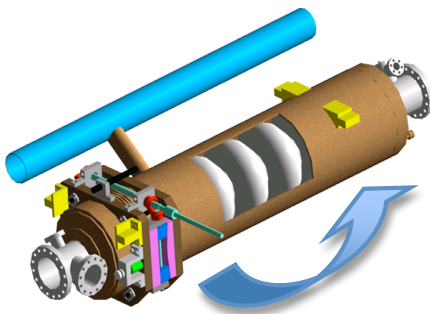
We assume the following boundary conditions,

- Three regions need to share tasks in production/construction to share intellectual knowledge in fair balance,
- R&D works are still required to improve the field gradient,
- Multiple sources/productions may be necessary and important to prepare for redundant production capability with holding “insurance”,

3. Plug compatibility for the ILC-SCRF Development

Cavity

Cavity	Plug-compatibility Standard	Can be flexible R&D remain	Alternate design need to fit to
Material		large/fine grain	
Shape		TESLA/LL/RE	
Length	1,247		
Beam pipe dia.	78 mm		(80 mm)
Beam pipe seal	Al-hex,		(In, Helicoflex)
Jacket/cone	NbTi / Ti		SUS
He-vessel OD	xxx		
Tuner type		Blade / slide-jack	
Tuner slow	Control/wiring spec.		
Tuner fast (piezo)	Control/wiring spec.		
Mag. shield		Inside / outside	
Coupler position	e ⁻ : downstream-end e ⁺ : upstream end		
Type	Fixed/tunable		
Diameter (cold)			
(warm)			
High pr. code			
Design pressure	2 bar (delta-P)		
Material	Nb, SUS	NbTi, Ti,	



Coupler
e⁺ upstream end

Bellow and tuner at
downstream end

Cryomodule	Plug-compatible	Flexible	Note
Diameter	xxx		
Length	xxx		
Joint/Seal	xxx		
Piping	xxx		
5K shield	Envelope to be kept	may be simplified	

