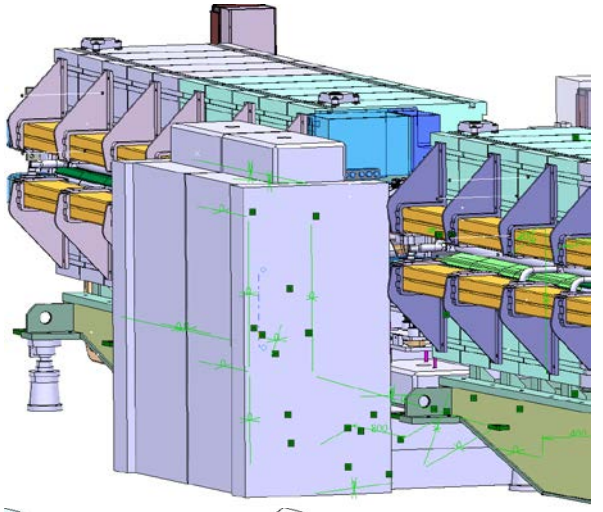
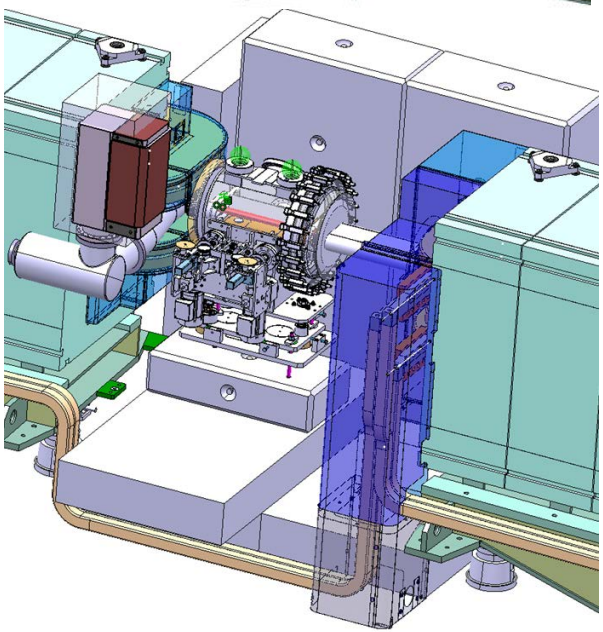
Intervention Scenarios TPS15

Failure	Classification	Operation
1. Blade damage	Catastrophic	Replacement of complete system
2. MU14 or 15 Failure	Catastrophic	Removal (?) and reinstallation of complete system
3. Vacuum leak	Catastrophic / local Intervention	Shielding dismantling + Diagnostics
4. Beam Instrumentation failure	Medium - Bad	Dismantle roof shielding or manual removal of blade (Manivelle)
5. Drive system	Medium - Bad	Manual removal of blade (Manivelle)
6. Water leak on cooling circuit	Medium	Replace joint or cooling hose, or isolate and run “hot”
7. Other failure modes??	??	??





1 & 2, REPLACEMENT OF COMPLETE SYSTEM	Specialist	Time and distance	Comments
Venting of sector	TE-VSC	10 mins, remote intervention	
Dismantling of shielding	EN-HE-HH	1 hour, distance >1m	
Disconnection of upstream and downstream flanges	TE-VSC	5 mins, contact	
Disconnect cabling, compressed air, water cooling, etc	TE-ABT, BE-BI, TE-VSC	10 mins, distance -contact	
Removal of tank assembly	TE-ABT, EN-HE-HH	10 mins, distance 1m	Includes removal of support locking mechanisms
Installation of spare	TE-ABT, EN-HE-HH	15 mins, contact	This spare is non radioactive
Reconnection of flanges	TE-VSC	10-15 mins	
Reconnection of cables, air, and water cooling.	TE-ABT BE-BI TE-VSC	10 mins	
Leak test	TE-VSC	30 mins	
Installation of shielding	EN-HE-HH	1 hour	
Testing			

3. Vacuum leak	Specialist	Time and distance	Comments
Diagnostics, leak test upstream and downstream flanges	TE-VSC	15 mins close proximity to tank (<1m)	Upstream and downstream areas can be tested without dismantling of the shielding.
Dismantling of shielding	EN-HE-HH	30-60 mins mins,	To check tank
Leak test on tank	TE-VSC	30 mins (<1m)	
Venting of sector	TE-VSC	10 mins, remote intervention	
Depending on results of leak test, quick fix (joint replacement or total system replacement)	TE-VSC or go to Slide 3		Quick fix could be 15 mins or total replacement, …not easy to define but slide 3 is a strong possibility.
Note: possible failure areas are joint failure, vacuum gauge replacement, bellows leak, wheeler flange leak, pumping port leak on PS vac chamber,			

4 & 5, BI failure or Drive System Failure	Specialist	Time and distance	Comments
Dismantling of shielding	EN-HE-HH	1 hour, distance >1m	
Diagnostics	TE-ABT	30 mins (close proximity)	
Option 1: Repair or replace	BI or TE-ABT	30 mins – 60 mins? BI equipment is on radioactive side of assembly. Blade displacement is on inside of ring	Repair option? If repair in-situ is chosen, then dismantling of roof and some side shielding will be necessary
Option 2: Displace the blade manually (Manivelle)	TE/ABT	15 mins	Operator protected by shielding
If replace, the procedure is same as in “replacement of complete system” (slide 3)	Slide 3	Slide 3	Total replace option
01/11/2012		Mike Hourican TE-ABT	

6, Water Leak on cooling circuit	Specialist	Time and distance	Comments
Dismantling of shielding	EN-HE-HH	1 hour, distance >1m	
Diagnostics	TE-ABT	10 mins (close proximity)	
Repair or replace	TE-ABT	30 mins ? Cooling connections are on radioactive side of assembly.	Repair option?
Isolate the cooling and run “warm” ?	TE/ABT	10 mins (>1m)	Operator protected by shielding

In conclusion, it is not easy to identify all possible failure modes and since the system is currently being designed with reliability as paramount, we do not expect to encounter catastrophic failures during normal operation.
Since the BI equipment has not been designed or finalised then it is impossible to identify specific failures. Possible general failures such as leaking bellows, seized actuators, valve failures (air) and broken linkages could be possible failure modes.