



# QRL Modification

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# Overview

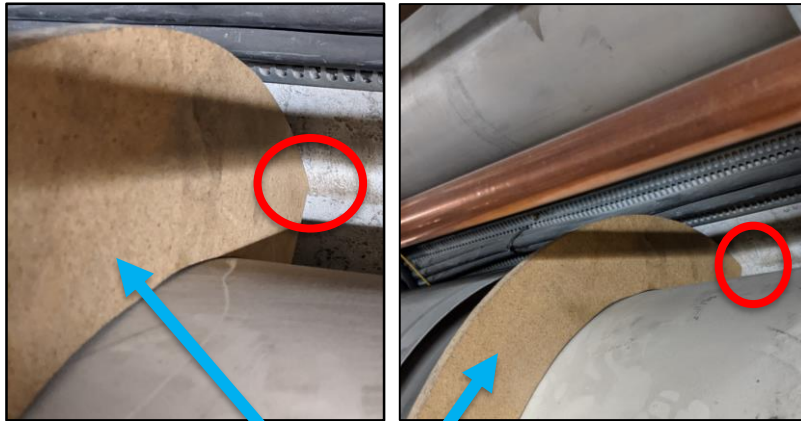
- The QRL will be significantly modified for HL-LHC upgrade during LS3
- Dismantling / moving of Service Modules, Pipe Elements, Interconnections
- Components involved are in LSS of P1 and P5, quantities:

Sector	P1L			P1R			P5L			P5R		
	SM	PE	IC	SM	PE	IC	SM	PE	IC	SM	PE	IC
Dismantle	4	12	15	4	10	13	4	11	14	4	10	13
Move	1	2	4	1	2	4	1	2	4	1	2	4

- Cuts to be performed on interconnections between components
- Standard tooling (Protem) doesn't fit in some cases

# Problem Description

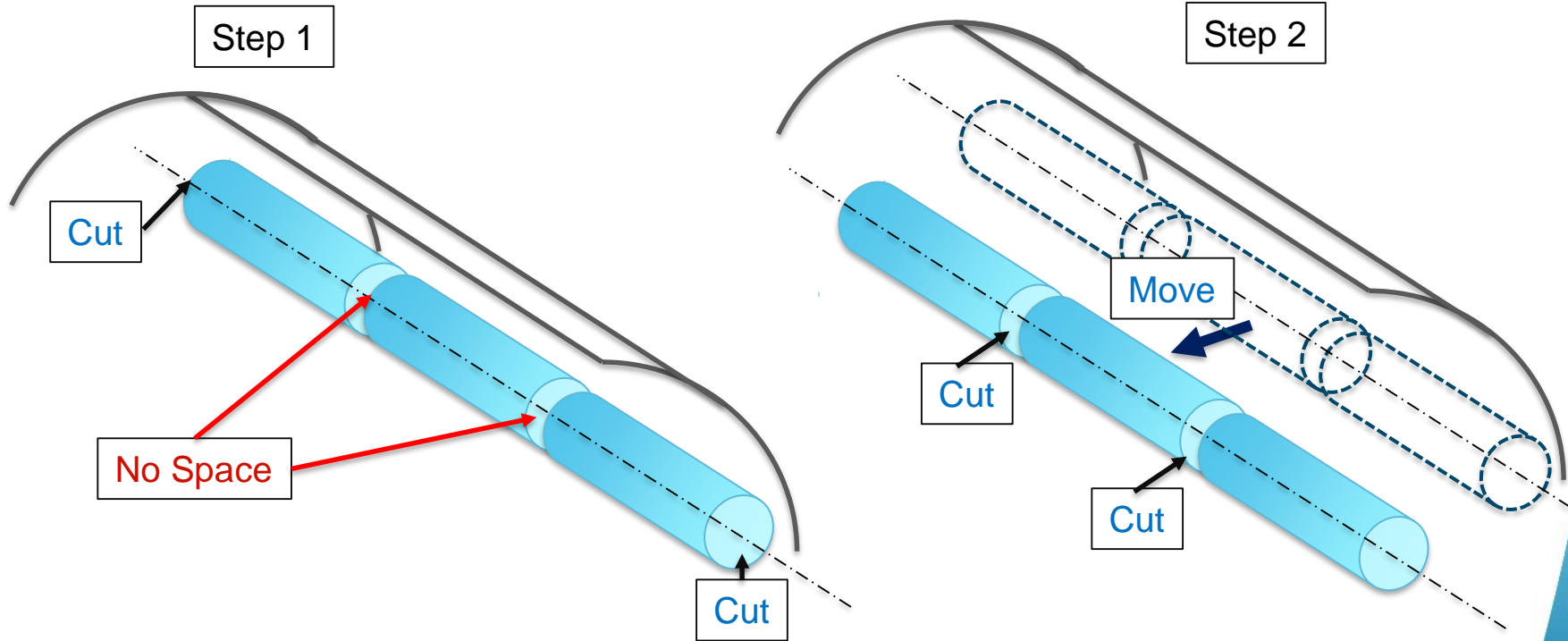
- In several interconnections there is a lack of space for the Protem tool between the QRL and the wall.



Protem Mock-up

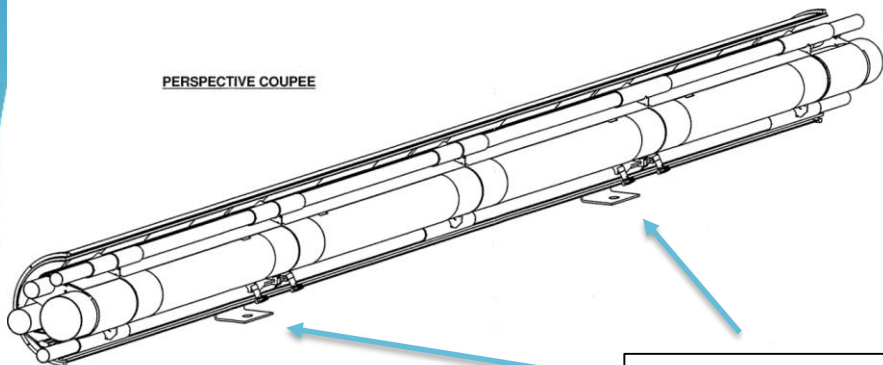
- Changing the cutting tool or opening a space in the wall would form dust, we want to avoid it for R.P. related reasons.

# Possible Conceptual Solution



# QRL Components: Pipe Elements

PERSPECTIVE COUPEE

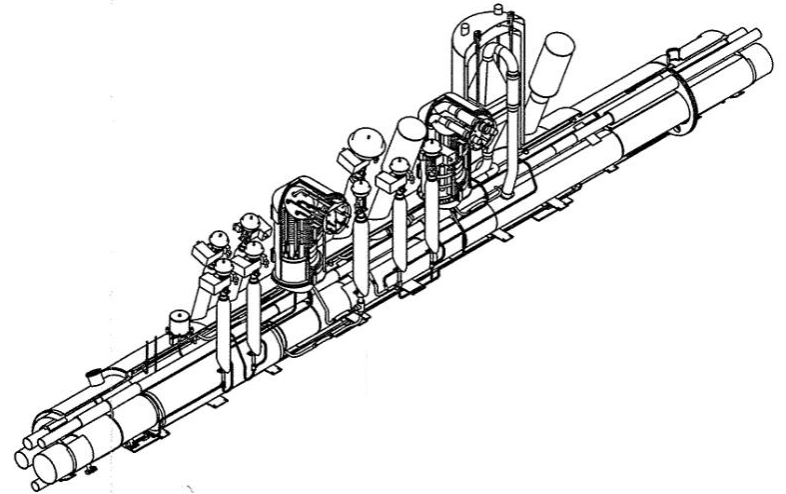
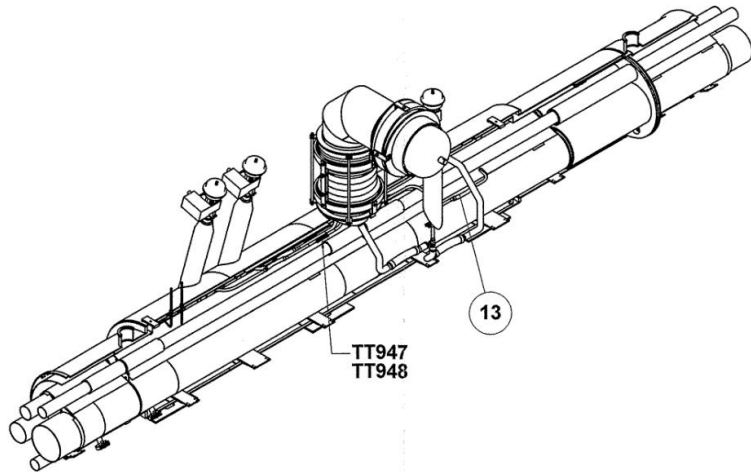


2 supports



- Length: 7 m – 11 m
- Mass ~ 2000 kg

# QRL Components: Service Modules



- Length: 6 m – 8 m
- Mass ~ 2000 kg - 3000 kg
- Fixed point to the ground