Connection cryostats

- Introduction on CC
- "Known" consolidation

The problem

The solution

Status before start-up

- "New" issue

(Re)discovery

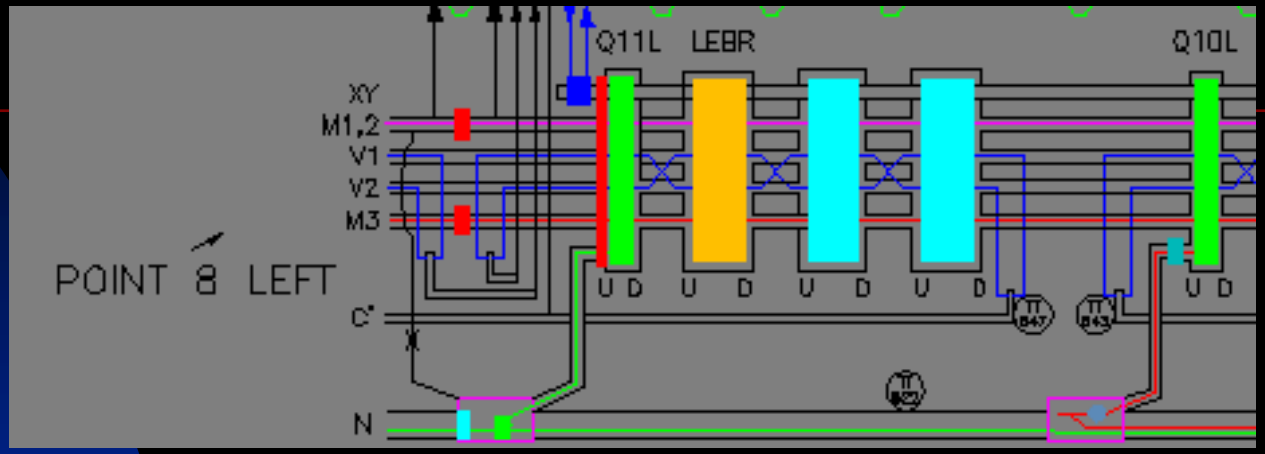
Extent of the issue

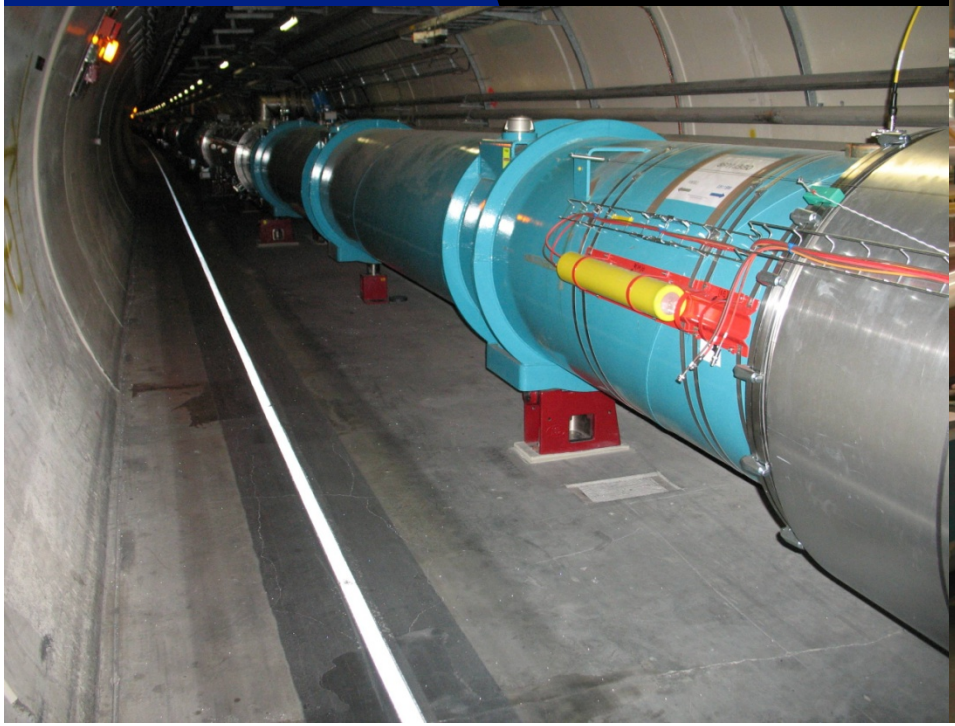
minder

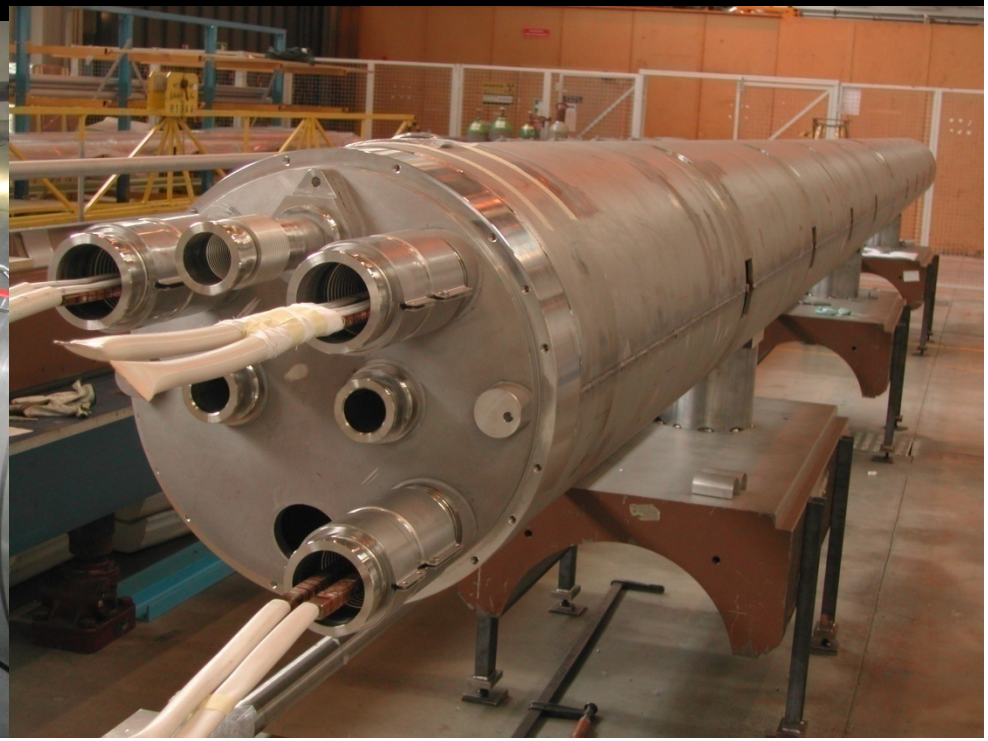
Status

(Inter)Connection Cryostats

Introduction on ICCs

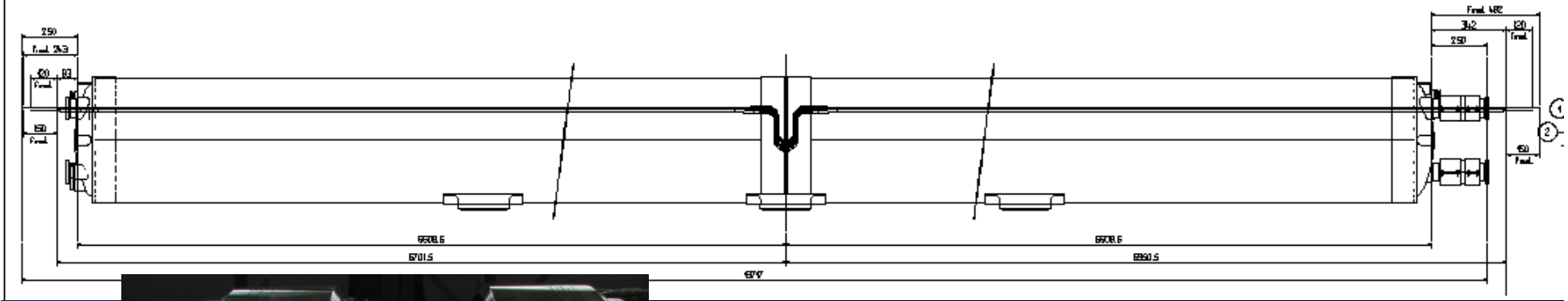


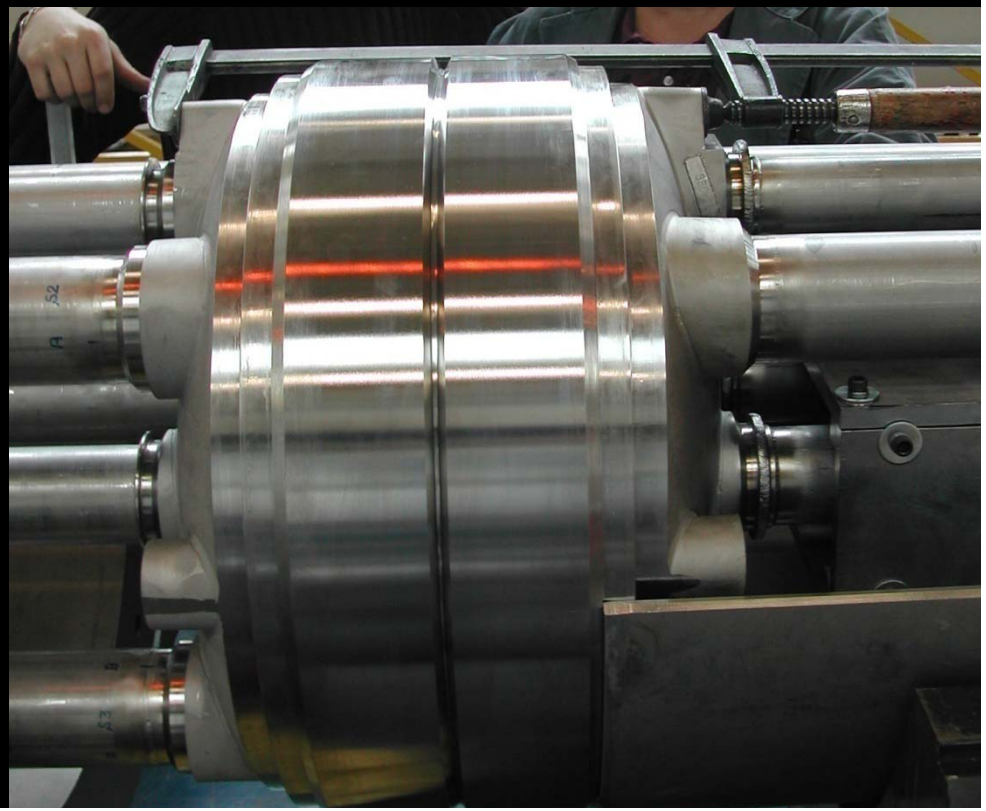




(Inter)Connection Cryostats

Introduction on ICCs

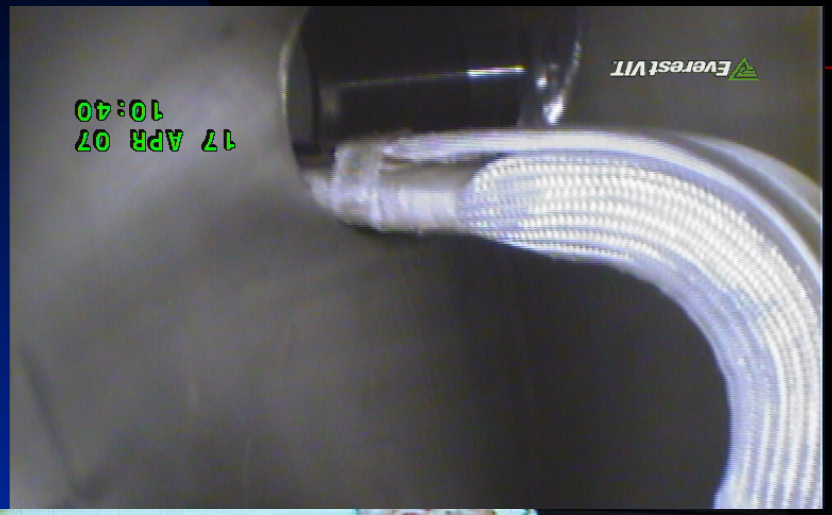


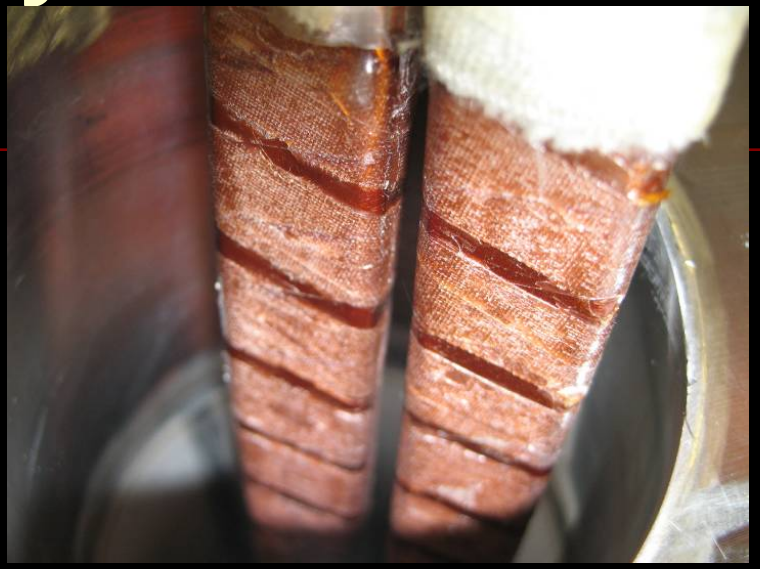


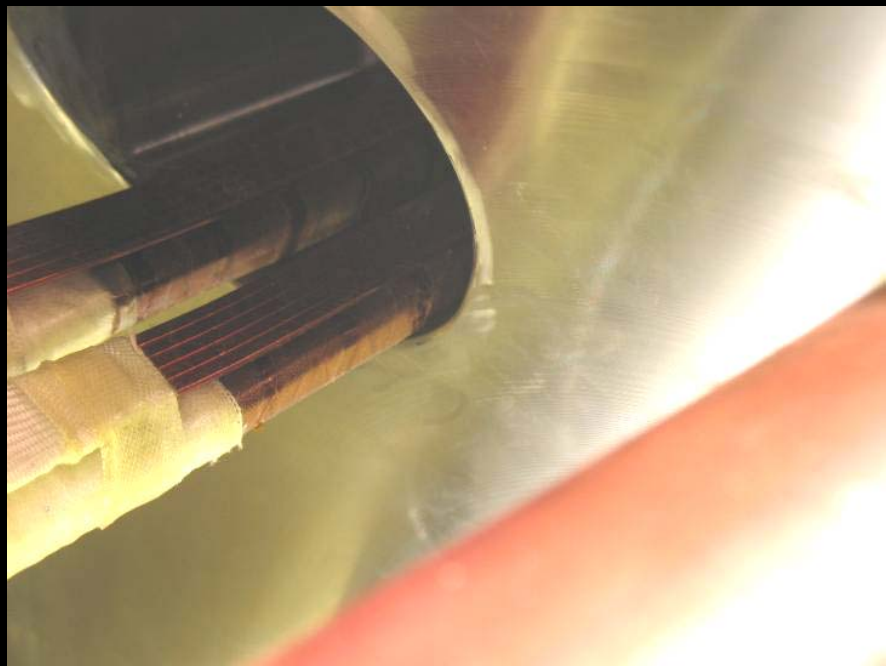
Introduction on ICCs

Connection cryostats

The problem was:

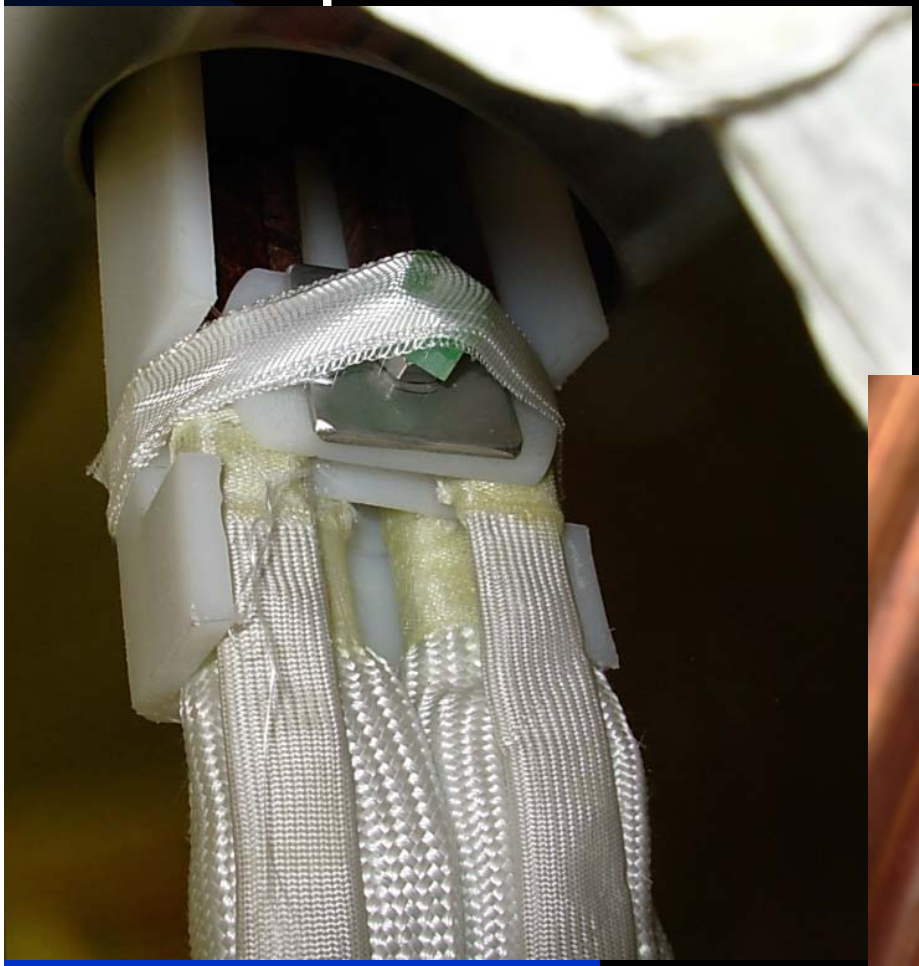


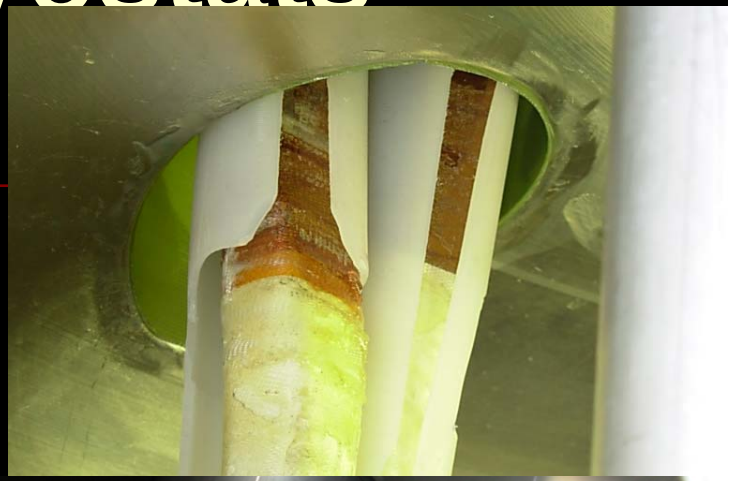


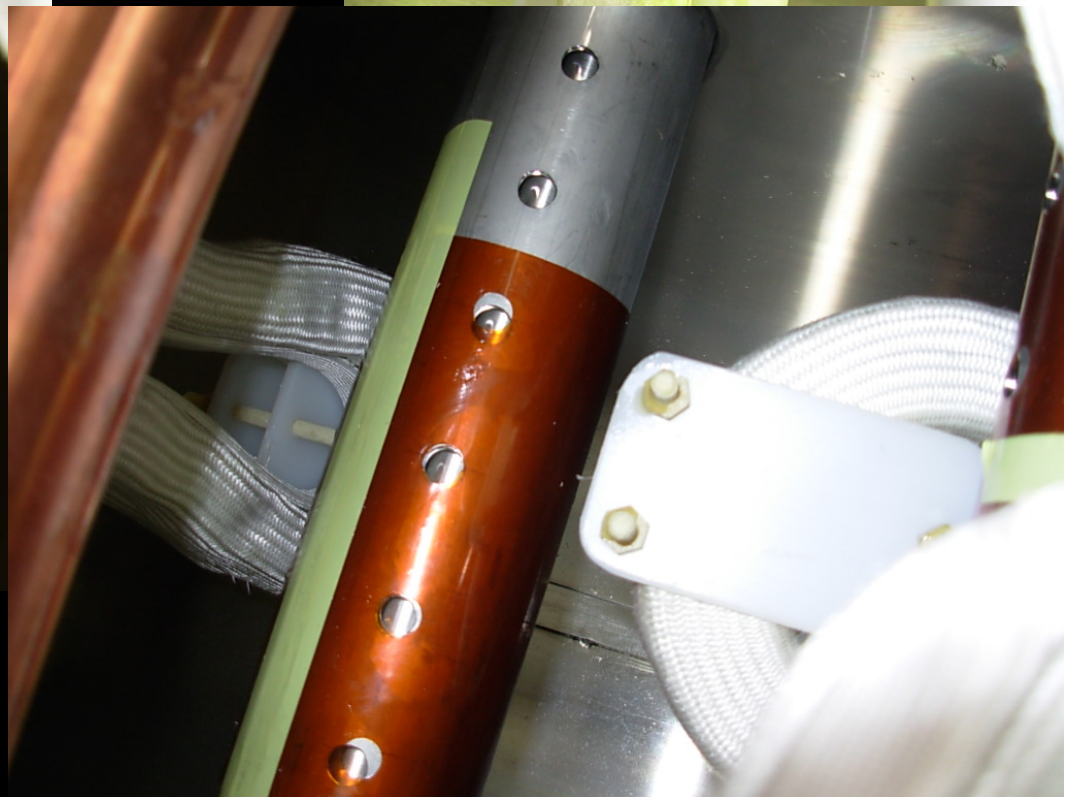


Connection cryostats

The implemented solution:



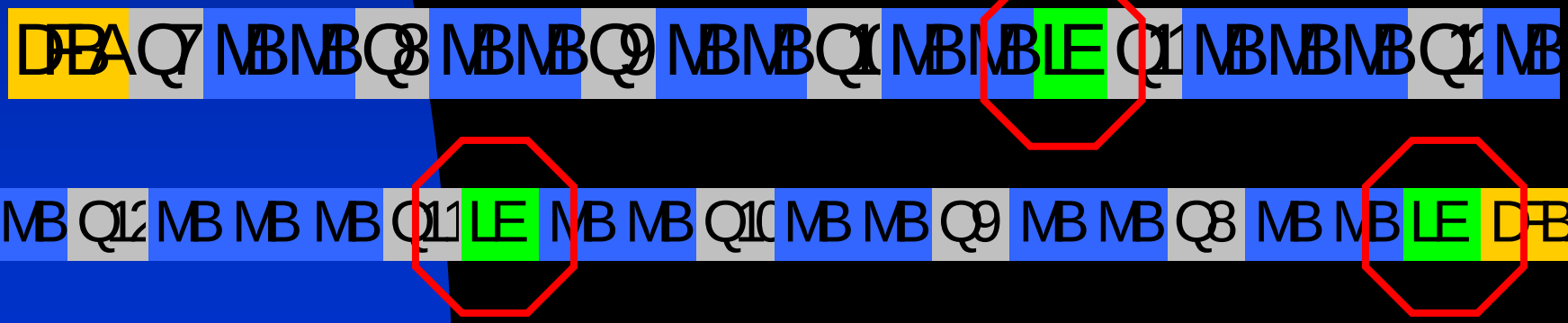




Connection cryostats

Status before start-up [30/04/2008]:

Sector	Repair of ICCs
1-2	Completed
2-3	Completed
3-4	Completed
4-5	Completed
5-6	At next warm-up - 3 units - Spare units to be built ?
6-7	Completed
7-8	Completed
8-1	Completed



Connection cryostats

Repair progress in 5-6 : About 55 % [25 operations per CC]

Necessary to repair the 3 units (including 17th)

MISE A JOUR		5-Mar-09																							
CRYOSTAT		OUVERTURE I.C.	DEMONTAGE PIED CENTRAL	GEOMETRES	METROLOGIE	DECOUPE CRYOSTAT + ECRAN	TREPANAGE MASSE FROIDE	METROLOGIE	ENDOSCOPIE + NETTOYAGE	ISOLATION	ENDOSCOPIE	SOUDURES PIQUAGES	TEST DE FUITE PIQUAGES	SOUDURES BOUCHONS	TEST DE FUITE BOUCHONS	METROLOGIE	CONTRÔLE U.S.	ELQA	MONTAGE MLI + ECRAN	SOUDURE PLAQUE CRYOSTAT	METROLOGIE	FERMETURE PIED CENTRAL	FIDUCIALISATION + ALIGNEMENT	METROLOGIE	FERMETURE I.C.	Last ELQA test
11R5	DATE	13-Jan-09	20-Jan-09	20-Jan-09	22-Jan-09	28-Jan-09	30-Jan-09	2-Feb-09	5-Feb-09	6-Feb-09	10-Feb-09	11-Feb-09	12-Feb-09	13-Feb-09	13-Feb-09	18-Feb-09	17-Feb-09	27-Feb-09	20-Feb-09	3-Mar-09	4-Mar-09	9-Mar-09	9-Mar-09	11-Mar-09		
	EQUIPE	E Cevik, K Kallat	M Dupont, A Bastard	M Dupont, A Bastard	A Cherif, A Bastard	JMHubert, L Gillardino	JMHubert, F Kolakowski	A Cherif	P Borowiec	D Etiembre	P Borowiec	M Jamain	A De Saever	M Jamain	A Grimaud	A Cherif	JM Dalin	N Catalan	A Bastard	A Cadoret	A Cherif	A Bastard, R Masciottra	M Dupont	A Cherif	R Menolascina	N Catalan
11L6	DATE	12-Jan-09	15-Jan-09	15-Jan-09	16-Jan-09	20-Jan-09	6-Feb-09	11-Feb-09	Not Done	10-Feb-09	13-Feb-09	25-Feb-09	26-Feb-09	12-Mar-09				27-Feb-09								
	EQUIPE	E Cevik, K Kallat	A Bastard, E Cevik	M Dupont, A Bastard	A Cherif, A Bastard	JMHubert, L Gillardino	JMHubert, F Kolakowski	A Cherif		D Etiembre	R Haber, J Brzezicki	M Jamain	A Grimaud	M Jamain	A Grimaud	A Cherif	JM Dalin	N Catalan	A Bastard	A Cadoret	A Cherif	A Bastard, X	M Dupont	A Cherif	R Menolascina	N Catalan
5L6	DATE	12-Jan-09	Not Applic	26-Jan-09	28-Jan-09	10-Feb-09	18-Feb-09	18-Feb-09	19-Feb-09	26-Feb-09	4-Mar-09	12-Mar-09		16-Mar-09												
	EQUIPE	E Cevik, K Kallat		Mdupont	A Cherif, A Bastard	JMHubert, F Kolakowski	JMHubert, F Kolakowski,R Vaglio	A Cherif	R Haber, J Brzezicki	D Etiembre, J Mazet	R Haber	M Jamain	A Grimaud	M Jamain	A Grimaud	A Cherif	JM Dalin	N Catalan	A Bastard	A Cadoret	A Cherif	A Bastard, X	M Dupont	A Cherif	R Menolascina	N Catalan

Cut of M3 line in QEDI.5L6 ; more news next week

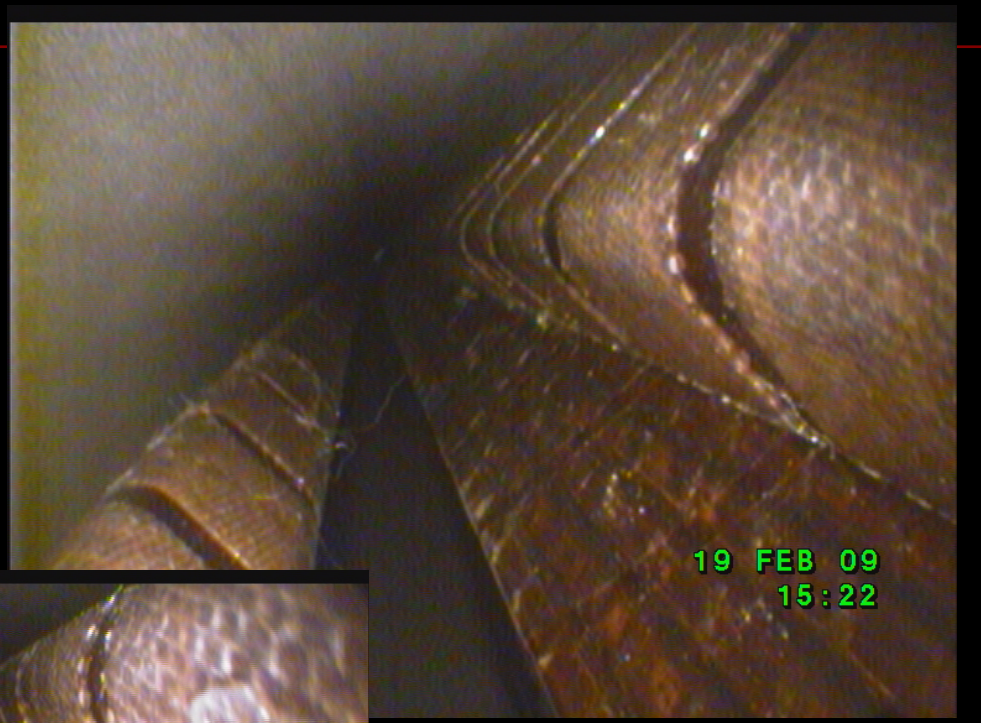
Connection cryostats

Repair of CC in 5-6 started:

Endoscopy from center of 11L6:

Connection cryostats

Endoscopy from downstream IC:



Connection cryostats

Summary of support position status

Maximum distance between support (Nominal : 1000 +/- 5 mm)

[m]	InspDate	M1Up	M2Up	M3Up	M1Ds	M2Ds	M3Ds
11R1	28-Feb-08	OK	OK	OK	OK	OK	OK
11L2	6-Mar-08	OK	OK	OK	OK	OK	OK
11R2	10-Mar-08	OK	OK	1.39	OK	OK	1.01
11L3	12-Mar-08	OK	1.17	1.76	OK	OK	1.5
11R3	27-Mar-08	OK	OK	OK	OK	OK	OK
11L4	1-Apr-08	OK	OK	OK	OK	OK	OK
11R4	4-Apr-08	OK	OK	OK	OK	OK	OK
11L5	9-Apr-08	OK	OK	2.07	OK	OK	OK
11R5	3-Feb-09	OK	OK	OK	OK	OK	1.57
11L6	13-Feb-09	1.52	OK	1.28	1.87	OK	2.16
5L6	20-Feb-09	OK	OK	OK	OK	OK	OK
11R6	18-Feb-08	OK	OK	OK	OK	OK	OK
11L7	19-Feb-08	OK	OK	1.5	OK	OK	1.67
11R7	7-Feb-08	OK	OK	OK	OK	OK	OK
11L8	Not done	?	?	?	?	?	?
11R8	25-Feb-08	OK	OK	OK	1.14	OK	1.16
11L1	26-Feb-08	OK	OK	1.7	OK	OK	OK

Only bent busbar seen is in 11L6 M1 downstream

Endoscopy done AFTER powering cycle for : 4-5 (Up to 10.273 kA for RB& & 10897 for RQ)

Endoscopy done AFTER powering cycle for : 5-6 (7-8)

Endoscopy done before powering cycle for : 1-2, 2-3,3-4,6-7, 8-1 (7-8)

Connection cryostats

Endoscopy of M3 11L7:

Connection cryostats

Assumptions : I = 12 kA centred ; Annealed copper characteristics (to check)

Allowable sag : 12 mm (TBC in 3D and defined for Dip and Quad)

Nominal spacing : 1000 +/- 5 mm

To do :

-Check actual copper characteristics

-Refine model for dip and quad allowable sag and exact inertia

-Check plastification !

-Model for multi supports

Connection cryostats

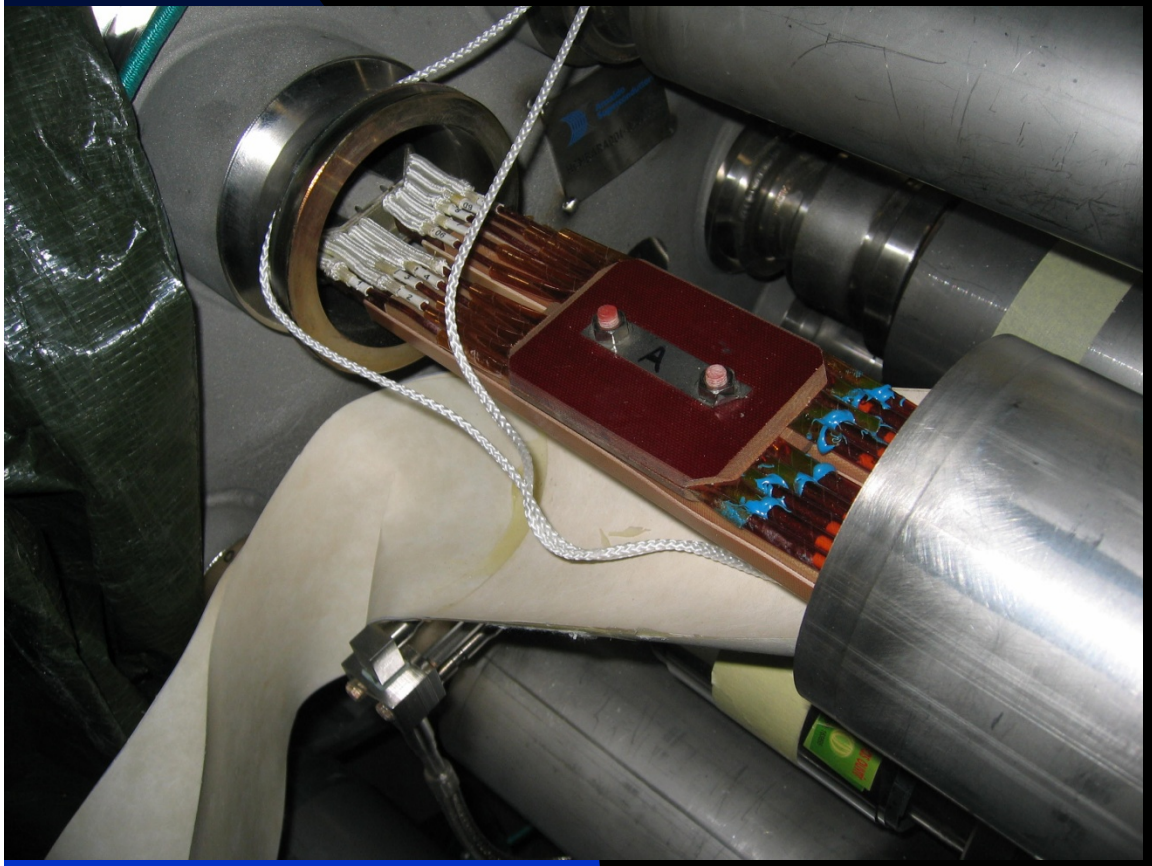
Potential repair solution presently under test in 11L6 (i/iv)

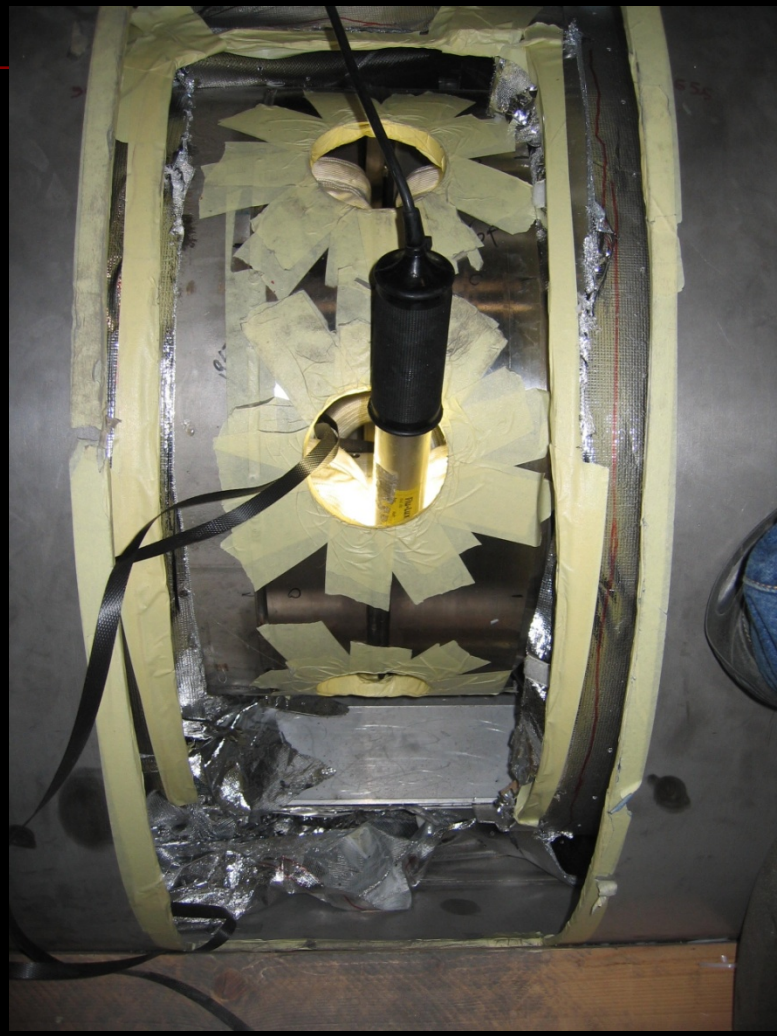
Insertion of insulation (2 Nomex layers between BB and tube) to cover the lower part (about 180 deg).

It is inserted on (almost) the whole length of the tube (6 m) and held in place with bands of Nomex to be glued to avoid displacement

Connection cryostats

Potential repair solution presently under test in 11L6 (ii/iv)





Difficult access (> 6 meters in between)

Connection cryostats

Potential repair solution presently under test in 11L6 (iii/iv)

Endoscopy after insertion ; before gluing

Connection cryostats

Potential repair solution presently under test in 11L6 (iv/iv)

Next actions:

- Validate in-situ (11L6) the possibility to cover the 360 degrees

[Access from extremity and the centre in this case]

- Present solution to the “EEWG” this week
- Make sample and test mechanical resistance of fixation by gluing also after thermal cycle (LN2)
- Check resistance to radiation (theoretical)
- Inspect some of the accessible CCs in other warm sectors
- Assess consequences of short to ground of a BB in a CC (Who ?)
- Make the computations for the energy planned for next run and actual copper characteristics with a refined model (multi-supports,...)
- Proposes a strategy for the other CCs

Impact on schedule : (being very optimistic)

- W11 : Repair of insulation in 11L6 and solving of NC in QEDI.5L6
- W12-13 : Completion of standard repair and reclosure of Ics
- W14-15 : Pumping of insulation and vacuum and leak test