



Cryomodule Assembly: Update

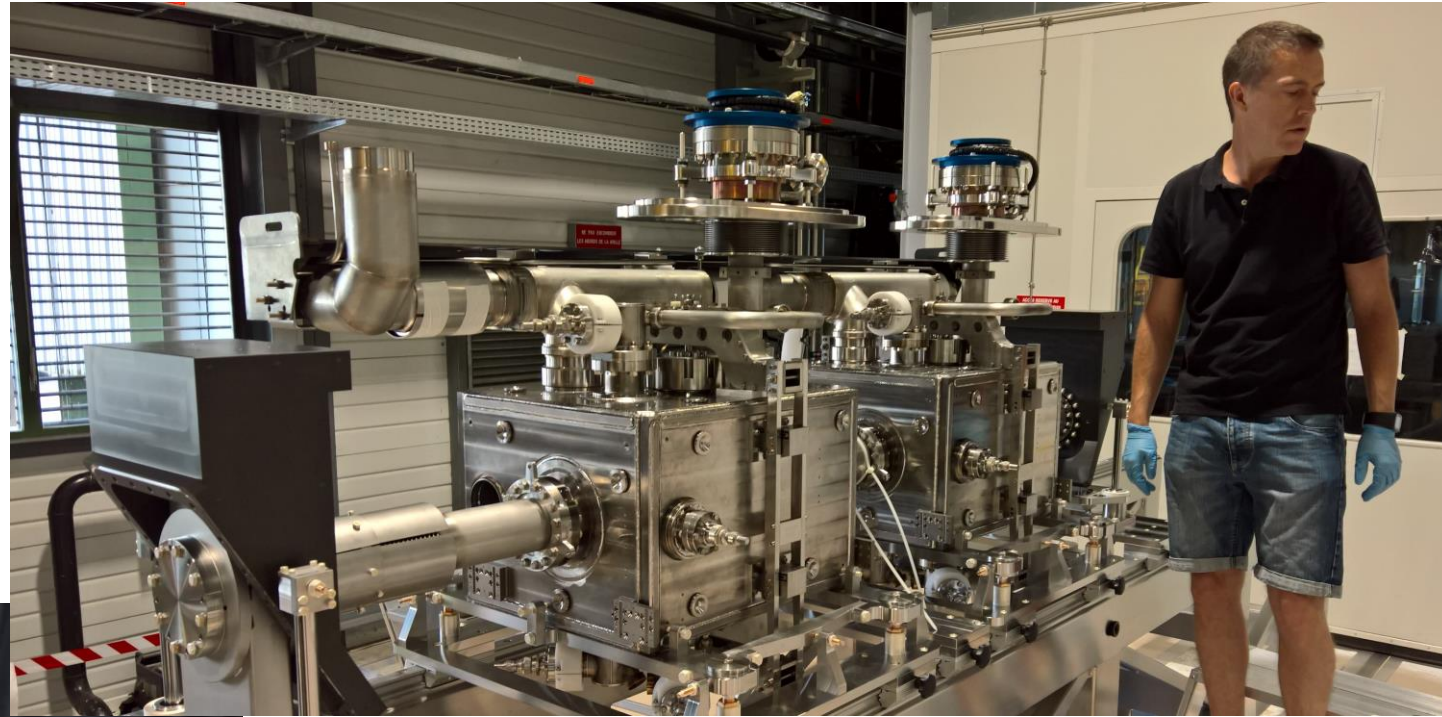
M. Garlaschè on behalf of MME



30/08/2017 – CCTC Meeting

Ongoing Activities

Preparation for Blade Support Welding



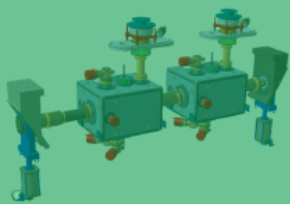
Tuner tube and bellows assembly

NEXT:

- Line Alignment (tomorrow), ref. M. Sosin
- Thermal sensors assy (this afternoon), ref. K. Brodzinski

Step 1

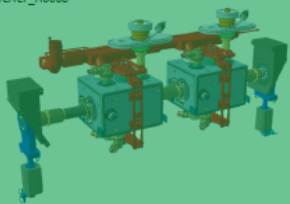
- 1 Remove clean room equipments
- 2 Mounting equipment protections
- 3 Remove FPC plate protection
- 4 Add support LHCACF_T0406
- 5 Remove support LHCACF_T0247
- 6 Insertion of FPC heaters
- 7 Set the FPC plate as high as possible
- 8 Remove the latter support



Step 2

- 1 Weld the cryo extension and stoppers (DN100 x2 + HOM UP x2 + HOMS Up stopper x2)
- 2 Intermediate leak test
- 3 Positionning and welding of upper cryoline
- 4 Intermediate leak test
- 5 Insertion of tuning frame upper part
- 6 Assembly and positioning of tuning frame
- 7 weld hom cooling line (HOM UP x2)
- 8 Leak test

See assembly drawing
LHCACF_A0008



Step 3

- 1 Installation of tuner BELLOWS (WITH SUPPORT TOOLING)
- 2 Magnetic shield on FPC plates (x2)
- 3 Installation of Tuner double pipe on tuning frame
- 4 Adjust the FPC oblong plate to the nominal height
- 5 Connect the tuner double pipe to the tuner bellows
- 6 Installation of FPC and tuner braids on FPC & TUNER
- 7 Installation of FPC thermal screen on FPC and TUNER
Instrumentation cryo -> cavities CERNOXs, PT100 on thermal screen ?
- 8 Installation pieces supports -> for cavity blades and valve supports

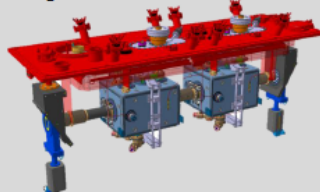
See assembly drawing
LHCACF_A0008



Step 4

- 1 Low the cryostat top plate to the nominal position
- 2 Connect support blades x4 (remove tooling for support of blade)
- 3 Connect valve box to top plate x2
- 4 Connect cryolines to top plates with tirants
- 5 Attach FPC thermal screen to cryostat thermal screen

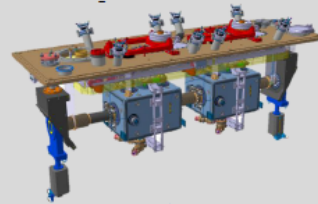
See assembly drawing
LHCACF_A****



Step 5

- 1 Assembly of the cavity support system
- 2 Assembly of RF coaxial lines for HOMs top x2 + protection on ceramic
Remove clean room tooling (inter cavities bellows blocking système, valves tool..etc)
- 3 Remove clean room trolley

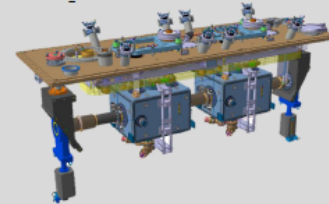
See assembly drawing
LHCACF_A****



S.6

- 1 Load transfer from trolley to Cryostat top plate
- 2 Alignment check
- 3 Remove clean room trolley

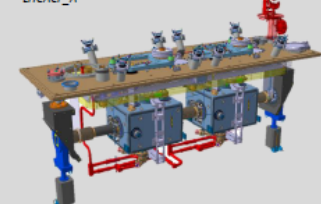
See assembly drawing
LHCACF_A****



Step 7

- 1 Weld the cryo extension and stoppers (DN25 x2 + HOM LOW x4 + HOM LOW stopper x4)
- 2 Weld of lower cryoline
- 3 Installation of cryogenic pressure measurement set up
- 4 Weld of pressure measurement lines
- 5 Leak tests

See assembly drawing
LHCACF_A****



Oblong plate support

LHCACF_T0409



Upper cryoline

LHCACFQC0149



Protections HOMS & Pick Up

LHCACF_T0643 – HOM feedthrough protection
LHCACF_T0694 – Pick up feedthrough protection



Cryo extensions

LHCACFQC0054 – HOM weld jaw
LHCACFQC0091 – HOM stopper
LHCACFQC0053 – DN100 weld jaw



Tuning frame

LHCACFTU0054 – Tuning frame assembly



HOM cooling line

LHCACFQC0162 – HOM cooling line



Tuner bellows + double pipe

LHCACFTU0053 – Tuner bellows
LHCACFTU0057 – Rod Flange
LHCACFTU0066 – Tuner double pipe



Magnetic shield

LHCACFWM0011 – FPC half plate 1/2
LHCACFWM0018 – FPC half plate 2/2
LHCACFWM0020 – Special washers



Thermal screen + MLI

LHCACFTS0073 – Half oblong plate type 1
LHCACFTS0074 – Half oblong plate type 2
LHCACFTS0075 – Half oblong plate type 3
LHCACFTS0055 – Fixation ring tuner
LHCACFTS0050 – Fixation ring FPC
***** - MLI



Thermalisation braids

LHCACFTS0018 – Braids for FPC & blades
LHCACFTS0019&28 – Braids for tuner

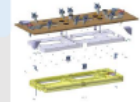


Partial support

LHCACFAH0021 – Blade base
LHCACF_T0255 – Valve box base



Cryostat upper plate



LHCACF_A0007 - Overall top plate assy
LHCACF_A0001 - Top plate welded
LHCACFTS0061 - Top thermal screen
LHCACFWM0013 - Warm magnetic shield

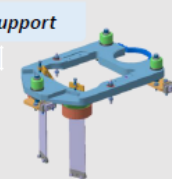
Upper RF-lines

LHCACFRL ****

Waiting for final design

Cavity support

LHCACFAH0030



3d view to be updated

LHCACFQC0108

Cryo measurement line

A3 Preparation of cryogenic measurement set up
Welding of pipes
Assemble with pressure transmitter and flanges



Lower cryoline

Cryostating NOW

Step 7

Step 8

Step 9

Step 10

Step 11

Step 12

Step 13

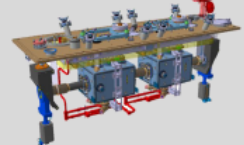
Step 14

Step 15

- Weld the cryo extension and stoppers (DN25 x2 + HOM LOW x4 + HOM LOW stopper x4)
- Weld of lower cryoline
- Installation of cryogenic pressure measurement set up
- Weld of pressure measurement lines
- Leak tests

See assembly drawing

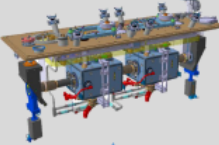
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- 1 Installation of bottom RF lines (half assemblies (stop after elbow))
- 2 Connection of the Pick up coaxial cable
- 3 Instrumentation connection and check (LOWER HEATER, CERNOX, PT1500... etc)

See assembly drawing

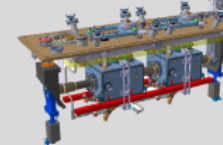
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- 1 Installation of BCAM equipment (mask + fingers)
- 2 Mechanical mesurement ?

See assembly drawing

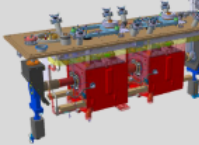
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- 1 MLI 2K around each cavity + cryolines

See assembly drawing

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- 1 Thermal screen assembly top + U panel
- 2 Weld of cooling circuit
- 3 Leak test

See assembly drawing

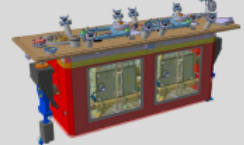
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- 1 Installation of thermal screen lateral panels x4
- 2 Installation of thermalisation braids on cold/warm transition chambers
- 3 Installation of thermalisation braids on upper cryoline supports
- 4 Installation of magnetic shield small panels (on the side above CWI)
- 5 Installation of MLI 50K

See assembly drawing

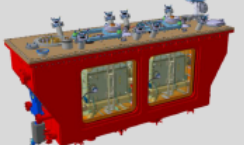
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- 1 Install the gasket in the cryostat lower assembly
- 2 Install the gasket on the valve box (x2)
- 3 Insertion in the cryostat
- 4 Load transfer from Portique to cryostat
- 5 Screw the top assembly to the lower cryostat
- 6 Adjust and screw the valve box to the lower cryostat x2
- 7 Remove the temporary valve box support and close the opening with a SOF flange
- 8 Finalize the installation of the lower RF lines (x6) + protection on ceramics
- 9 Connect the RF lines to thermalisation braids

See assembly drawing

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- 1 Move the cryostat outside the portique area
- 2 Jumper assembly sequence

See assembly drawing

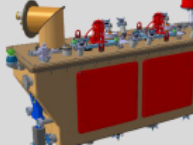
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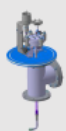
- 1 Assembly of tuner Actuation
- 2 Alignment Check
- 3 Thermal shield and MLI closure
- 4 Vacuum tank closure

See assembly drawing

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LHCACFQC0108



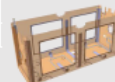
Cryo measurement line

- A3 Preparation of cryogenic measurement set up
- Welding of pipes
- Assemble with pressure transmitter and flanges

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Lower RF-lines

LHCACF750124- Thermal screen bottom assembly
LHCACF750122- Thermal screen overall assembly



Thermal screen

- A4 Preparation of thermal screen U panel
- Assembly of thermal screen with stiffeners
- Installation of thermalisation (RF lines x6)
- Installation of instrumentation

LHCACF_A0002



Thermal screen (bottom)

- A5 Preparation of cryostat lower assembly
- Installation of FSS x8
- Installation of BCAM windows
- Installation of closed ports
- Installation of warm magnetic shield
- Jack adaptor ?

LHCACFQC****

Jumper

LHCACFV10049



Doors

- A6 Preparation of doors
- Tooling for handling ?
- Assemble doors with magnetic shield