Documentation and QA / QC of D1 magnet

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Outline

- Model magnets from 1 to 3
  - Updated status about EDMS and MTF
  - Updated status about drawings (CDD)
  - Quality Documents: MIP, BOM, Procedures, Reports…
- Prototype and series
  - Program about EDMS and MTF
  - Program about drawings (CDD)
  - Quality Documents: MIP, BOM, Procedures, Reports…
- Conclusions

Updated status about EDMS and MTF (1/2)

MTF => Manufacturing and Test Folder
CDD => CERN Drawing Directory
EDMS => Engineering & Equipment Data Management Service

Together with CERN help all the data were uploaded, after manufacturing, for Models #1 and #2 by KEK.

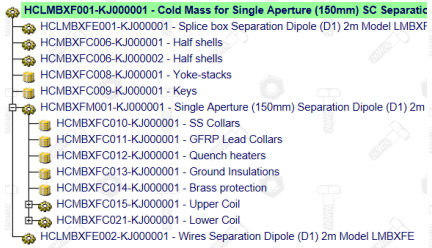
They are being uploaded for magnet #3 in parallel with the production (learning curve and very good cooperation).

Updated status about EDMS and MTF (2/2)

	HCMBXFM001-KJ000001	KEK
✓	Single Aperture (150mm) Separation Dipole (D1) 2m Model	MBXFS01 (a&b) D1
	HCMBXFM002-KJ000001	KEK
✓	Magnet (D1) 2m Model MBXFM	

All data are in MTF for Model Magnets #1 and #2

Assembly Tree



[Link to Model 1]

[Link to Model 2]

Other Identifier: **MBXFS01 (a&b) D1 (LMBXFM)**
Description: **Cold Mass for Single Aperture (150mm) SC Separation Dipole (D1) 2m Model**

Main | Made of | Equipment data | Manufacturing | Operation | Documents | History | Map

Actions : Add extra step

Workflow Diagram

No workflow diagram is defined for this equipment

Workflow Steps

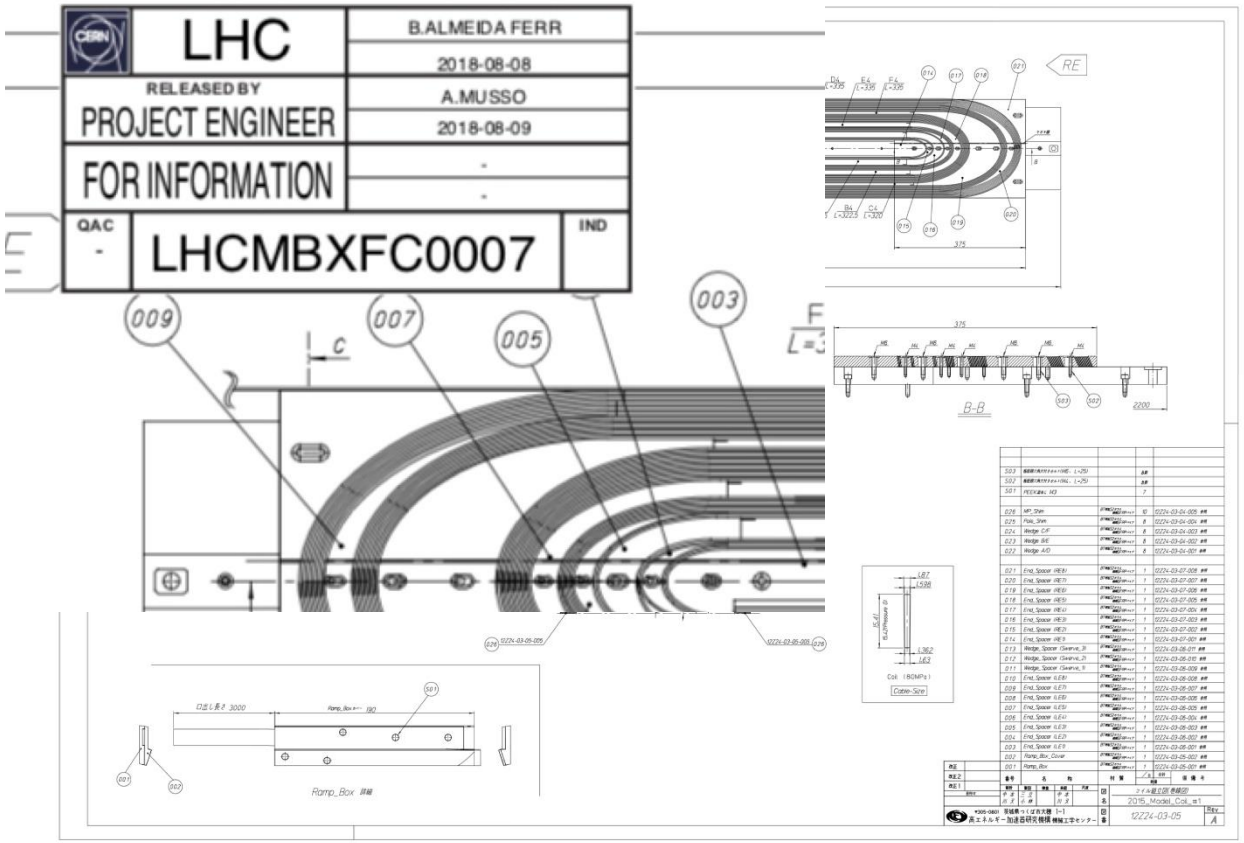
Step	R/E	Other name	Description	Status	Last Repeated Result	NC
10		0	Collared Coil (*)	Cancelled		
15		0	Collaring	Done	Ok	
20		0	Dimensional Measurement	Done	Ok	
25		0	Electrical Integrity Test	Done	Ok	
50		0	Yoke Assembly	Done	Ok	
55		0	Perform Yoking	Done	Ok	
60		0	Removal of Mandrel	Done	Ok	
65		0	Dimensional Measurement	Done	Ok	
70		0	Electrical Integrity Test	Done	Ok	
100		0	Shell Welding	Done	Ok	
105		0	Shell Welding	Done	Ok	
110		0	Inspection of Welding	Cancelled		
115		0	End-ring Welding	Done	Ok	
120		0	Inspection of Welding	Done	Ok	
125		0	Applying Axial Force to the Coil (*)	Done	Ok	
130		0	Dimensional Measurement	Done	Ok	
135		0	Alignment, Marking	Cancelled		
140		0	Holes Welding	Cancelled		
145		0	Dimensional Measurement	Cancelled		
150		0	Electrical Integrity Test	Done	Ok	
155		0	Documents for Pressure Codes	Cancelled		
200		0	Splice Work	Done	Ok	
205		0	Splice Box Assembly	Done	Ok	
210		0	SC Leads Soldering	Done	Ok	
215		0	V -tap Wires Soldering	Done	Ok	
220		0	Dimensional Measurement	Done	Ok	
225		0	Electrical Integrity Test	Done	Ok	
270		0	Alignment, Marking	Cancelled		
275		0	Electrical Integrity Test	Cancelled		
280		0	Pressure Test	Cancelled		
285		0	Documents for Pressure Codes	Cancelled		
300		0	Mechanical assembly	Done	Ok	
310		0	Electrical test	Done	Ok	
320		0	Cold test	Done	Ok	
320.1	R	0	Cold test	Done	Ok	
330		0	Magnetic measurements	Done	Ok	
330.1	R	0	Magnetic measurements	Done	Ok	
340		0	Shipping to CERN	Cancelled	Ok	

All data will be uploaded for model magnet #3

Updated status about drawings (CDD)

- All the DWG's about Model Magnet #1 are in CDD
- DWG's about Model Magnet #2 & #3 will be uploaded in the next future

LHCMBXFC0012	1st		A3	KE	-	ext. ref. 12Z24-03-06-005 2015 MODEL COIL - LE 5
LHCMBXFC0013	1st		A3	KE	-	ext. ref. 12Z24-03-06-006 2015 MODEL COIL - LE 6
LHCMBXFC0014	1st		A3	KE	-	ext. ref. 12Z24-03-06-007 2015 MODEL COIL - LE 7
LHCMBXFC0015	1st		A3	KE	-	ext. ref. 12Z24-03-06-008 2015 MODEL COIL - LE 8
LHCMBXFC0016	1st		A3	KE	-	ext. ref. 12Z24-03-06-009 2015 MODEL COIL - SWERVE 1
LHCMBXFC0017	1st		A3	KE	-	ext. ref. 12Z24-03-06-010 2015 MODEL COIL - SWERVE 2
LHCMBXFC0018	1st		A3	KE	-	ext. ref. 12Z24-03-06-011 2015 MODEL COIL - SWERVE 3
LHCMBXFC0019	1st		A3	KE	-	ext. ref. 12Z24-03-07-001 2015 MODEL COIL - RE 1
LHCMBXFC0020	1st		A3	KE	-	ext. ref. 12Z24-03-07-002 2015 MODEL COIL - RE 2
LHCMBXFC0021	1st		A3	KE	-	ext. ref. 12Z24-03-07-003 2015 MODEL COIL - RE 3
LHCMBXFC0022	1st		A3	KE	-	ext. ref. 12Z24-03-07-004 2015 MODEL COIL - RE 4
LHCMBXFC0023	1st		A3	KE	-	ext. ref. 12Z24-03-07-005 2015 MODEL COIL - RE 5
LHCMBXFC0024	1st		A3	KE	-	ext. ref. 12Z24-03-07-006 2015 MODEL COIL - RE 6
LHCMBXFC0025	1st		A3	KE	-	ext. ref. 12Z24-03-07-007 2015 MODEL COIL - RE 7
LHCMBXFC0026	1st		A3	KE	-	ext. ref. 12Z24-03-07-008 2015 MODEL COIL - RE 8
LHCMBXFC0027	1st		A3	KE	-	ext. ref. 12Z24-03-06-012 2015 MODEL COIL - LE 8
LHCMBXFC0028	1st		A3	KE	-	ext. ref. 12Z24-03-07-009 2015 MODEL COIL - RE 8
LHCMBXFC0029	1st		A3	KE	-	ext. ref. 12Z24-03-09 INSULATION_ASSY
LHCMBXFC0030	1st		A3	KE	-	ext. ref. 12Z24-03-09A INSULATION_LE (LEAD BOX)
LHCMBXFC0031	1st		A3	KE	-	ext. ref. 12Z24-03-09B INSULATION RAMP
LHCMBXFC0032	1st		A3	KE	-	ext. ref. 12Z24-03-09C INSULATION



Quality Documents

MIP => Manufacturing & Inspection Plan
BOM => Bill of Material

MIP's and Procedures
have been discussed but were not available for the manufactured models

BOM
was structured and used to create MTF's Items

Quality Control Reports
They are all produced and available, updated in MTF

Nota bene: there are many additional information available if needed; they are written in 日本 and can be used for post process purposes

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Program about EDMS and MTF

All data will be updated by the manufacturer (already listed in the call-for-tender)

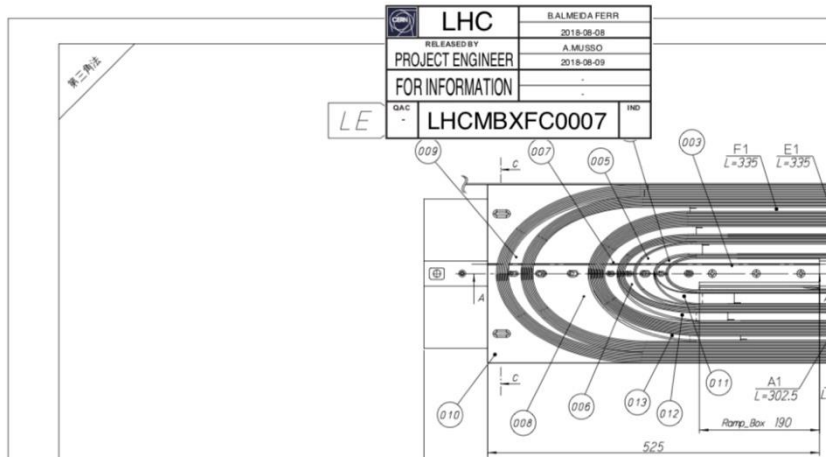
As always, CERN will give the needed support for all requests about:

- Access and editing rights
- Technical issues
- Training of personnel
- Dedicated support about Items and Assets

Program about drawings (CDD)

All drawings will be prepared by the selected manufacturer and shall:

- Include titles in English (double language allowed)
- Be uploaded to CDD as soon as they are available
- Let systematically an empty spot as agreed previously with EDMS Support colleagues



Quality Documents: MIP, BOM, Procedures, Reports…(1/3)

The call-for-tender was just finalized and the following documents are included:

- Appendix 2A: Guideline for the manufacturer to create the Quality Plan (QP) (in Japanese)
- Appendix 2C: KEK Quality Plan (draft)
- Appendix 3B: Agreement for Compliance of LMBXF Cold Masses Supplied by KEK with CERN Safety Rules (EDMS 2052040)
- Appendix 3C: HL-LHC Quality Plan (EDMS 1513591, Rev. 2.1)
- Appendix 3D: HL-LHC Superconducting Magnets Compliance with Pressure Equipment Directive (PED 2014/68/EU) Essential Safety Requirements (EDMS 1891856, Rev. 4.1)
- Appendix 4A: Guideline to create MIP (in Japanese)
- Appendix 4B: Example of MIP including KEK's MIP (draft)
- Appendix 5A: Standards and codes for D1 Pressure Vessel (in Japanese)

Quality Documents: MIP, BOM, Procedures, Reports…(2/3)

The **Quality Assurance documents** will be prepared by the selected manufacturer with the help of KEK and CERN, and in particular:

- Manufacturing and Inspection Plans **(MIP)**
- Bill Of Material **(BOM)** - this will be used for MTF structure
- Manufacturing procedures

The **Quality Control document's templates** will be prepared and filled by the selected manufacturer with the help of KEK and CERN, and in particular:

- Reception of material
- Dimensional measurements
- Electrical test
- ……

Quality Documents: MIP, BOM, Procedures, Reports…(3/3)

DATA storage policy

- All the official Procedures, Reports, MIP's, BOM's and Drawings will be stored in MTF and visible from the people involved in the entire Hi-Lumi Project.
- All these documents will be edited also in English

Holding points (HP)

- In the MIP's there will be some HP, requested either by CERN or KEK.
  - CERN requires 2 HP:
    - After magnetic measurements performed at cold
    - After leak test

Nota bene: the delivery of the magnet can be organized only if all the data and documents are filled in MTF

Conclusions

- **Thanks** to the collaboration of KEK's colleagues and CERN Quality Team, traceability of the D1 equipment in MTF is guaranteed since its early stage

- All Drawings are in CDD for the model magnet and will be uploaded for prototype and series as soon as they are available

- Documentation related to MIP's and Procedures will be prepared and will be ready before to start the manufacturing of the full-scale prototype and series

Thank you...