2-M LONG MODEL PROGRAMME FOR THE 11 T DIPOLE PROJECT

WP11

Conceptual specification EDMS 1370117

Ref. LHC-MBH-ES-0002

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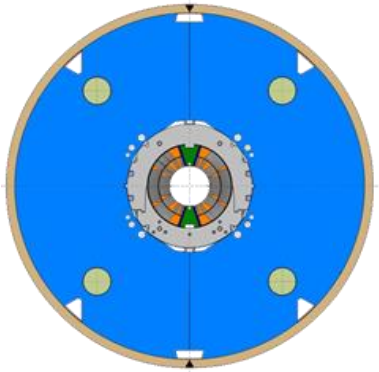
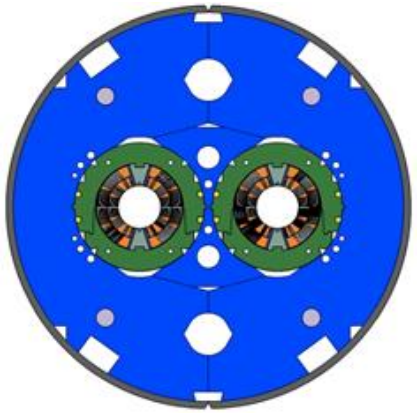
Scope

- The CERN model programme comprises the fabrication of 10 models of 2 m length in two configurations: a single aperture structure, and a two-in-one
- Based on the technology developed at FNAL
- Started effectively in the middle of 2011
- Will allow setting up at CERN the necessary infrastructure, and developing know-how for the construction of high field magnets made of Nb_3Sn conductor
- Mandatory step prior to designing and fabricating full length magnets
- A major step towards the development of high field magnets for future accelerators

Models



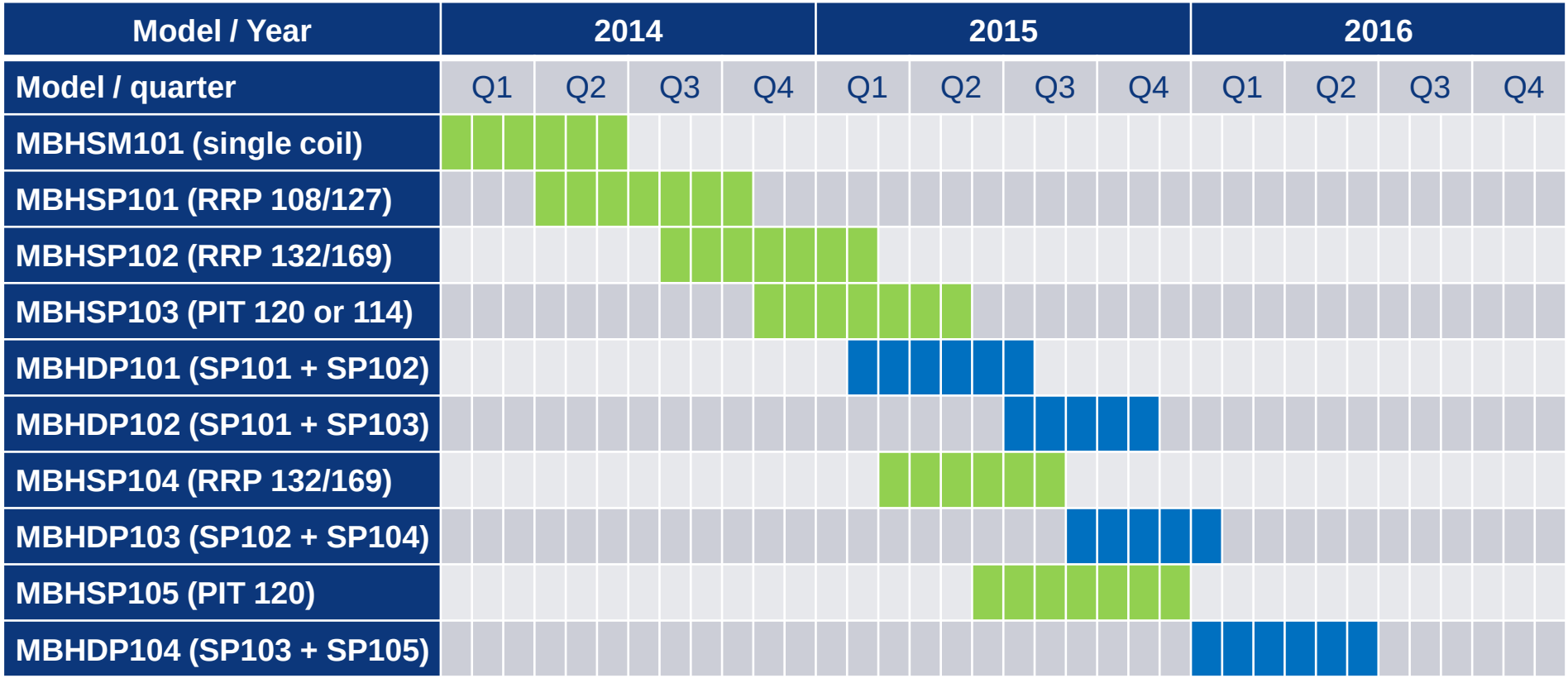


Identification	Single / Two-in-One	Type of SC Strand
MBHSM101 (single coil)	Single	RRP 108/127
MBHSP101	Single	RRP 108/127
MBHSP102	Single	RRP 132/169
MBHSP103	Single	PIT120 (or PIT114)
MBHDP101	2-in-1	RRP 108/127 – RRP 132/169
MBHDP102	2-in-1	RRP 108/127 – PIT120
MBHSP104	Single	RRP 132/169
MBHDP103	2-in-1	RRP 132/169 – RRP 132/169
MBHSP105	Single	PIT120
MBHDP104	2-in-1	PIT120 (or PIT114) – PIT120

Objectives

- Produce an integrated field of 119 Tm at 11.85 kA, which is the nominal operation current of the LHC main dipoles, i.e. a nominal magnetic flux density of 11.23 T at the center of the bore, with a margin of ~20% on the magnet load line
- A geometric field quality with low-order field errors below 10^{-4} unit
- Develop further the technology currently available at FNAL, and adapt it to meet the requirements of the accelerator sector (e.g. robustness, reliability, maintainability) … taking into account the need of industrialization in view of the future series production
- Test two variants of SC strands made from different manufacturing routes, namely RRP and PIT
- Understand the quench behavior and field quality of Nb_3Sn magnets
- Study solutions to critical problems or processes like the magnet protection, the fabrication of quench heaters, the reaction treatment, and the coil impregnation

Schedule



- Duration of 6 to 7 months for a single aperture model
- Duration of 5 to 6 months for a two-in-one aperture model
- A dummy coil will be inserted between SP102 and SP103