

Task 2: Support studies

Gijs de Rijk (CERN)

24th February 2009

DOW task 7.2



Task 2. Support studies

- Certify radiation resistance of radiation resistant coil insulation and impregnation
- Make a heat deposition and heat removal model for the dipole Nb₃Sn model with experimental validation and determine the thermal coil design parameters for the dipole model magnet.

Task 2. Support studies

Magnets in accelerators like the upgraded LHC and neutrino factories be subjected to very high radiation doses. The electrical insulation employed on the coils need to be resistant to this radiation. A certification program for the radiation resistance is needed in parallel to the modelling efforts for such magnets. The same radiation is also depositing heat in the coils. The heat removal from the coils needs to be modelled. These models have to be supported with measurements. A thermal design of the dipole model coil can then be made.

- **Sub-task 1: Radiation resistance certification for radiation resistant coil insulation and impregnation.**
CERN will lead this activity and provide irradiation time at its accelerators. Other irradiation facilities from the partners might be envisaged. The exact work distribution between the 3 partners PWR, CEA-DSM and CERN still has to be determined.
- **Sub-task 2: Thermal models and design.**
PWR will lead this activity. Thermal tests will be done in the various specialized cryogenic facilities at the 3 partner laboratories. All 3 partners will contribute to the modelling efforts aimed at producing a thermal model for the Nb₃Sn dipole model magnet.

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Deliverables of tasks	Description/title	Nature	Delivery month
7.1.1	HFM web-site linked to the technical & administrative databases	O	M48
7.2.1	Certification of the radiation resistance of coil insulation material	R	M42
7.2.2	Thermal model for a dipole Nb ₃ Sn model magnet	R	M36

Mile-stone	Description/title	Nature	Delivery month	Comment
7.1.1	1 st annual HFM review meeting	O	M12	
7.1.2	2 nd annual HFM review meeting	O	M24	
7.1.3	3 rd annual HFM review meeting	O	M36	
7.1.4	Final HFM review meeting	O	M48	
7.2.1	Methodology for the certification of radiation resistance of coil insulation material	R	M24	
7.2.2	Preliminary heat deposition model for a dipole Nb ₃ Sn model magnet	R	M12	publication on web

HFM coll. meeting, Febr 24 2009, G. de Rijk, Task 2

Beneficiary short name ^a	Average direct monthly salary * (€)	Rate for personnel indirect costs (%)	Rate for material and travel indirect costs (%)
WME/PWR	3,800	60	60
IRFU/CEA-DSM	5,900	63	0
CERN	5,900	60	60

MP averaged

20/02/2008 WRUT: salary 2875, pm 60, consum 121506, travel 14000, total 492.8 k, EC 225 k
 21/02/2008 WRUT: salary 3800, pm 57, consum 100000, travel 14000, total 528.980 k, EC 265.147 k
 21/02/2008 WRUT: salary 3800, pm 47, consum 88000, travel 8000, total 440.96 k, EC 220.48 k

reduction 15%

* To prevent rounding problems on the cost data, give the monthly salary as a multiple of 100 €
^a In alphabetic order

Beneficiary short name (all costs in €)	Person-Months	Personnel direct costs	Personnel indirect costs	Sub-contracting cost	Consumable and prototype direct costs	Travel direct costs	Material and travel indirect costs	Total direct costs	Total indirect costs	Total costs (direct + indirect)	EC requested funding ¹
WME/PWR	40	152,000	91,200	0	90,000	8,000	58,800	250,000	150,000	400,000	200,000
IRFU/CEA-DSM	60	354,000	223,020	0	210,000	14,000	0	578,000	223,020	801,020	241,000
CERN	42	247,800	148,680	0	210,800	14,000	134,880	472,600	283,560	756,160	218,763
0		0	0	0			0	0	0	0	0
0		0	0	0			0	0	0	0	0
0		0	0	0			0	0	0	0	0
0		0	0	0			0	0	0	0	0
0		0	0	0			0	0	0	0	0
0		0	0	0			0	0	0	0	0
Totals:	142	753,800	462,900	0	510,800	36,000	193,680	1,300,600	656,580	1,957,180	659,763
FIXED TARGETS										1,957,200	662,200
CHECKING THE CONDITION										OK	OK

¹ In principle 30% of total costs