TS-MME WORKPACKAGES

Presented by V. Vuillemin/TS-MME .

Abstract

TS-MME holds two main workpackages in collaboration with the AB Department:

- Beam Instrumentation
- Collimators

BEAM INSTRUMENTATION

The beam instrumentation workpackage (WP) concerns the beam diagnostics elements required for the first LHC beam operations.

This WP comprises:

- Design studies.
- Manufacturing drawings.
- Construction and some assembly work of the beam instrumentation elements, except for some BPM's and the BLM's (CECOM/BINP), either directly in the main assembly workshop or by outsourcing some mechanical construction to external industries.

The coordination managed by TS-IC of the installation in the tunnel of the elements (except for BLM's) is also included in this global WP.

The Table 1 describes the overall organisation of the WP.

Table 1

WP ORGANIZATION:

Project Leader: C.Fischer / AB-BDI
Coordination between Departments: R.Garoby / AB-BDI, V.Vuillemin / TS-MME

Design: WP owners C.Menot, A.Bouzoud / TS-MME + 11 designers
Design studies and manufacturing drawings for the

>>Monitors:

Beam Position Monitors	BPM
Profile TV Screen Monitors	BTV
Profile Gas Ionization Monitors	BGIH/V
Profile Wire Scanners	BWSH/V
Beam Loss Monitors	BLM
Current Transformer Monitors	BCT

[BSRT, BGIH/V, BTV: 600 blueprints realized]

>>Profile Synchrotron Radiation Telescopes BSRT

Manufacture: WP owners J.P.Bacher, M.Polini / TS-MME
Estimated at least 3500 hours internal until mid-March, not total
All except some BPM's and BLM's

Installation: TS-IC. All except BLM's

Essentially all design work is either finished or nearly finished, except for the BQK and two BSRT elements, for which the design work has been scheduled later. Manufacturing drawings are well advanced and some designs have been already forwarded to the main CERN workshop for construction

The Table 2 below summarizes the status of the design activities at the time of the Chamonix XV workshop.

Table 2

		DESIGN			
Elements	N.(models)	Study	Details	Construction	Assembly
BPM (Beam Position Monitors)					
Cold BPMs	144	100%	95%	Cecom / BINP	TS-MME
Warm BPMs	24	100%	95%	Cecom / BINP	TS-MME
BPLX	2	100%	60%		
BPLHV	12	100%	60%		
BPAWT	2	100%	60%		
BQK	4	0% (start février 2006)	0%		
Support BPM	6	100%	80%	Outsourced	
BLM (Beam Loss Monitors)					
BLM		100%	100%	Russia	
BCT (Current transformer monitors)					
BCT (ring point 4)	*2 lignes 4 transfos / ligne*	100%	100%	TS-MME	*AB-BDI, AT-VAC*
BCT(dump point 6)	*2 lignes 2 transfos / ligne*	100%	70%	TS-MME	*AB-BDI, AT-VAC*
BSRT (Profile Synchrotron Radiation Telescope)					
BSRT (General study)		85%	85%	TS-MME	*AB-BDI*
BSRTA, M, S	3	100%	100%	TS-MME	*AB-BDI*
BSRTL	1	0% (start sept 2006)	0%	TS-MME	*AB-BDI*
BSRTT	1	0% (start sept 2006)	0%	TS-MME	*AB-BDI*
BWS (Profile Wire Scanners)					
BWSHV	1	100%	80%	TS-MME	*AB-BDI*
BGI (Profile Gas Ionisation Monitors)					
BGIHV	4	100%	100%	TS-MME	*AB-BDI*
BTV (Profile TV screen Monitors)					
BTVSI	1	100%	100%	Russia	
BTVSS,ST, SE	3	100%	100%	TS-MME	*AB-BDI*
BTVD	1	100%	100%	TS-MME	*AB-BDI*
BTVDD	1	60%	0%	TS-MME	*AB-BDI*

Below are shown interesting examples of the designs of the beam instrumentation elements:

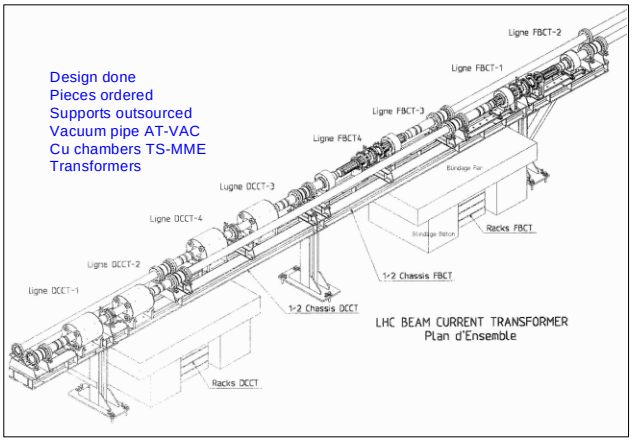


Figure 1: Beam Current Transformer

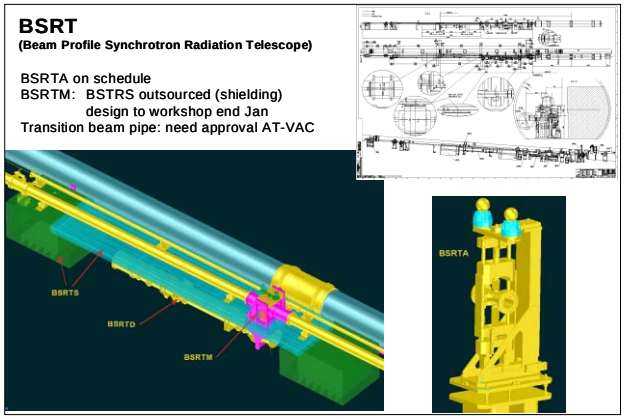


Figure 2: Beam Profile Synchrotron Radiation Telescope

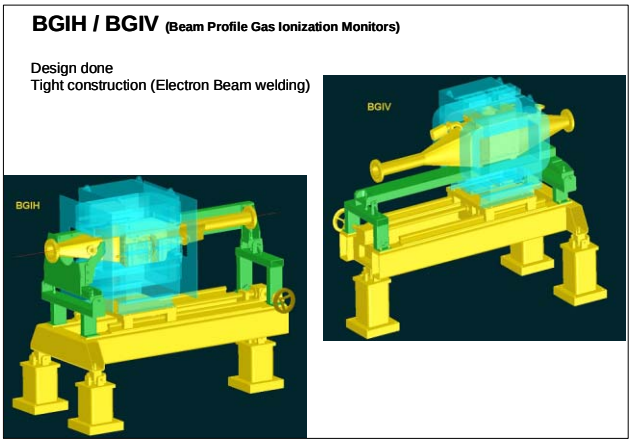


Figure 3: Beam Profile Gas Ionization Monitor
(H = horizontal, V = Vertical)

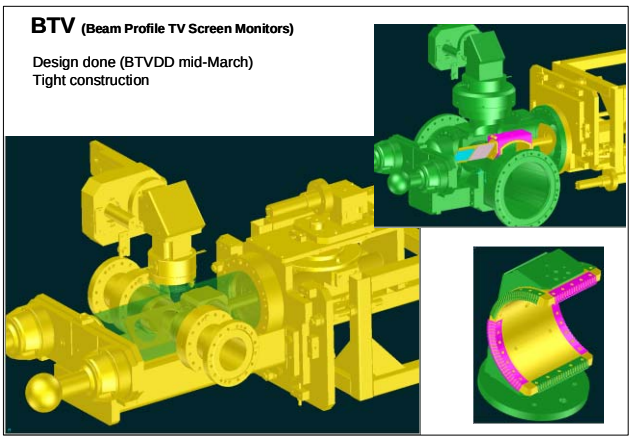


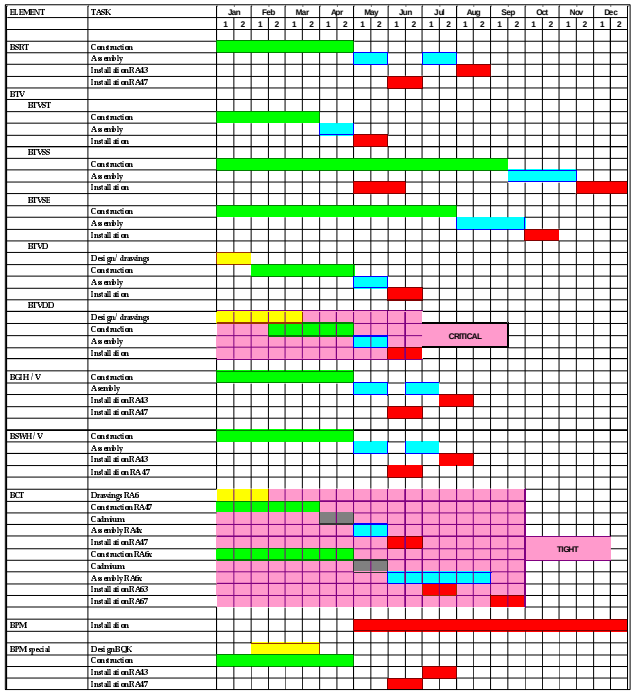
Figure 4: Beam Profile TV screen Monitors

The construction of several elements is on a very tight schedule. The priority in construction will be given to those parts of the elements that are connected to the LHC vacuum. Presently, up to mid-march 2006 (the WP is not yet complete) 3500 hours of construction and assembly have been scheduled in the main workshop, following the main LHC installation schedule. The most critical point is due to the fact that TS-MME has only one large folding press, with one expert technician. The press will have to work more than 8 hours/day in order to meet the production schedule.

Table 3 below describes the present schedule in terms of construction, assembly and installation.

A more precise scenario concerning the installation of the elements will be discussed in the beginning of 2006.

Table 3



COLLIMATORS

The TS-MME WP owners are: A. Bertarelli, M. Mayer and R. Perret. This WP was defined already when the EST Division existed:

"The EST provided output will be the required number of prototype collimators within the required schedule and drawings for the series production",

namely the technical specification, the thermo-mechanical calculations, the design and drawings for series production as well as the production of 2 prototypes, including some testing.

As the years have passed, the original requirements have gone through an evolution and the number of collimators/masks required have increased compared to what was defined at the beginning of the project. Including the prototypes, more than 1000 drawings have been realized in 2 years for 30 different variants and geometrical configurations, test benches and paloniers.

The Table 4 summarizes the list of the collimators, masks and absorbers.

All design work for the primary and secondary collimators (TCP and TCS) are finished and the production drawings have been delivered on time. The work on the masks has started with additional designers allocated to this task.

Table 4

Name	code	description	where	numbers
Main collimators	**TCP**	Primary collimator	LHC	8
	TCSG	Secondary collimator	LHC	32
	TCTA	Tertiairy collimator 1 beam	LHC	12
	TCDI	Collimator in Transfer tunnel	TL	14
	TCDQ	Collimator absorber block for Q4 Protection (IR6) 6 m length	LHC	2
	TCLIA	Injection collimator 2 beams "2in1"	LHC	2
	TCLP	Absorber for physics debris - as TCSG but with Cu - 0.5m	LHC	8
	TCTB	Tertiairy collimator 2 beam	LHC	4
	TCDD	Secondary collimator for TCDI (mobile) 2 beams	LHC	1
	TCLIB	Injection protection 1 beam **phase 2**	LHC	6
	TCSM	Secondary collimators **phase 2**	LHC	33
	TCION ?	Ion primary collimator (only space reservation for Alice+LHCb)	LHC	
Masks transfer line	**TCDIM-B**	Mask for bending magnet 1 beam	TL	2
	TCDIM-QF	Mask for focussing quadrupole magnet 1 beam	TL	3
	TCDIM-QD	Mask for defocussing bending magnet 1beam	TL	4
	TCDIM-S	Mask for septum magnet 1 beam	TL	2
Masks Injection	**TCDDM**	Mask fixe for TCDD 2 beams	LHC	1
Masks tunnel	TCDQM	Mask absorber block for Q4 Protection (IR6) 2 beams	LHC	2
	TCLIM	Mask after the TCLI 2 beams	LHC	2
Active absorbers	TCLA	as TCSG (mobile) but with W/Cu instead of CFC	LHC	20
Passive absorbers	TCLAP	Fixe 2 beams	LHC	10
	TDE	main extraction beam dump in cavern (650m downstream)	cavern	2
	TCDS	"Diluter" to protect the extraction septum magnet MSD	LHC	2
Scrapers	TCHSV	Motorized scrapers Vertical	LHC	2
	TCHSS	Motorized scrapers Scew	LHC	2
	TCHSH	Motorized scrapers Horizontal	LHC	4

In addition to the tasks originally defined in the WP, TS-MME has accepted the responsibility to write the technical specifications and order the components or the series production for the water couplings, the high precision Carbon jaws, the water hoses, the supply of Glicop and the supports for the collimators.

A new Research and Development WP for the Phase 2 LCH collimators has been accepted by TS-MME. Its aim is to develop a new secondary collimator concept and manufacture one or two full size prototypes in 2007-2008. However the present WP will cover only the development stage, namely:

- Mechanical engineering, preliminary studies, thermal and mechanical calculations, new material research.
- Test of materials, coatings, optimisation of vacuum, heat conductance coating.
- Design and manufacture of test devices.
- Functional tests.

After the completion of the development stage, a prototype stage will follow to cover the detailed design for a prototype production, the handling of radioactive collimators and their new integration.

CONCLUSION

A large number of persons from the TS-MME group is working in an integrated way on these two WP's: 17-19 designers, 6-7 persons in the assembly workshop, as well as the project coordinators and engineers. All the specific technologies and know-how required for thin-film coating, brazing, welding, surface treatment and analysis as well as materials expertise and metrology, are provided by the TS-MME Group to complete successfully these two challenging LHC WP's..

Figure 5: supports of collimators