

Collimator Design Meetings

Minutes of the meeting 65 (21/04/2005)

Present: Aberle, Assmann, Bertarelli, Chamizo, Kadi, Mayer, Perret, Principe

DESIGN FOR SPECIAL COLLIMATORS (2IN1)

1. A first specification draft is presented by Ralph ([Coll2beamDesignSpec\(RAW050421\).pdf](#)). This issue should be reconsidered in more detail in the coming weeks

TEST PROGRAM FOR COLLIMATOR PROTOTYPES

1. Tests on 3rd collimator should be started by beginning of May.
2. A draft list of tests will be released by Oliver in two weeks.

DESIGN OF SUPPORTS

1. The design of supports (which are split in three parts: upper sliding table ("platine"), mid plug-in plates and lower base support) is fairly well advanced. Anyhow drawings cannot be finalized as long as final decision on water and electric plug-in is taken!!!
2. The positioning of the water and electric plug-ins is complicated by limited available space and by the slope and tilt of the tunnel. Several arrangements have been studied by Roger ([T0082323PL.pdf](#) [T0082331PL.pdf](#)), but a final solution has yet to be found!
3. An updated list with the exact number of collimators to be manufactured shall be prepared (**action** Ralph/Oliver)
4. A preliminary list of support parts and their components shall be prepared by Roger, in order to optimize the procedure for the support price inquiry. Drawings will be given to Oliver to start contacts with CERN store for required material (**action** Roger).

FUNCTIONAL SPECIFICATION FOR TRANSFER LINE ABSORBERS

1. Specification for the design of absorbers shall be made available in two weeks by Yacine (presentation at CDM)
2. There could be possible timing conflicts with other ongoing design activities (e.g. 2 in 1 collimators)

WATER DISTRIBUTION SYSTEM

1. This issue has been widely discussed and several proposals have emerged. Ralph endorses a solution allowing to feed a limited number of units (3/4) with a local distributor plus a small reservoir for the purged water. Rosario envisages a scheme in which each collimator is individually connected to the main water lines and shares with a limited number of units a local drain line. To be followed-up!

TS WORKPACKAGE FOR PHASE 2

1. Discussions are ongoing in AB department with the department leader. A first draft might be released in one week.

SPRINGS FOR DIFFERENT COLLIMATOR ANGLES

1. The type of springs to be used has been defined by Alessandro and Roger (taken from available stock products). Anyhow, given the very limited safety margins in terms of spring force and allowable space, specific tests should be carried out by Patrice as soon as possible to validate the choice.

ACTION LIST to be followed up:

Play between motor spindle and jaw	#34	Roger
Updated calculation on beam optics during transients	#49	Ralph
Collimator installation and handling tools (vrs. 6.5)	#56	Keith

Manufacturing of 3rd Collimator prototype
Test program for Collimator prototypes
Water plug-in

#60 Oliver
#61 Oliver
#64 Manfred

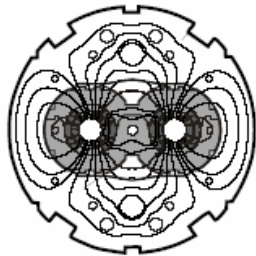
The collimator design for two beams

- Preliminary specifications –

R. Assmann
21.04.2005

CERN

CH-1211 Geneva 23
Switzerland



the
**Large
Hadron
Collider**
project

LHC Project Document No.

LHC-LJ-EC-0003

EDMS Document No.

507947

Engineering Change requested by (Name & Div./Grp.) :

**R. Assmann AB/ABP, C. Fischer
AB/BDI, D. Macina TS/LEA**

Date: 2004-11-25

Engineering Change Order – Class I

Integration of Tertiary Collimators, Beam-Beam Rate Monitors and Space Reservation for a Calorimeter in the Experimental LSS's

Table 1: TCT positions in the various experimental insertions. The reservations for the TCT's go from the tunnel floor to take into account the collimator supports.

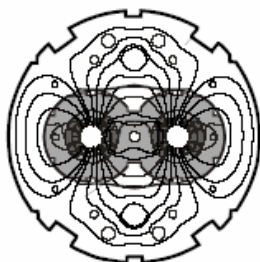
Insertion	Collimator	Acting on beam	Location (distance from IP) [m]	Number of beams in tank
1 (and 5)	TCLP.4L1.B2 ¹	2	-(150.47-148.99)	1
	TCTH.4L1.B1	1	-(148.26-146.78)	1
	TCTV.4L1.B1	1	-(146.58-145.10)	1
	TCTV.4R1.B2	2	145.10 - 146.58	1
	TCTH.4R1.B2	2	146.78 - 148.26	1
	TCLP.4R1.B1 ¹	1	148.99 - 150.47	1
2 (and 8)	TCTH.4L2.B1	1	-(118.688-117.208)	1
	TCTV.4L2.B1	1	-(74.23-72.75)	2
	TCTV.4R2.B2	2	72.75-74.23	2
	TCTH.4R2.B2	2	117.208-118.688	1

¹ For the TCLP.4 reservation in IR5 please see Section 4.

Two beam design with Copper/Tungsten!

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project

LHC Project Document No.

LHC-T-EC-0001

EDMS Document No.

494246

Engineering Change requested by (Name & Div./Grp.) :

B.Goddard AB/BT, V.Kain AB/CO

Date: 2004-09-23

Engineering Change Order – Class I

NEW LAYOUT OF INJECTION PROTECTION ELEMENTS AROUND IP2 AND IP8

Brief description of the proposed change(s) :

This Engineering Change Request summarises changes to the injection protection elements around IP2 and IP8, for LHC V6.5:

- Modified layout of the TDI, TCDD and BPMSX;
- Changed positions of TCL collimators (renamed TCLIA and TCLIB), addition of 2 new TCLIM masks.

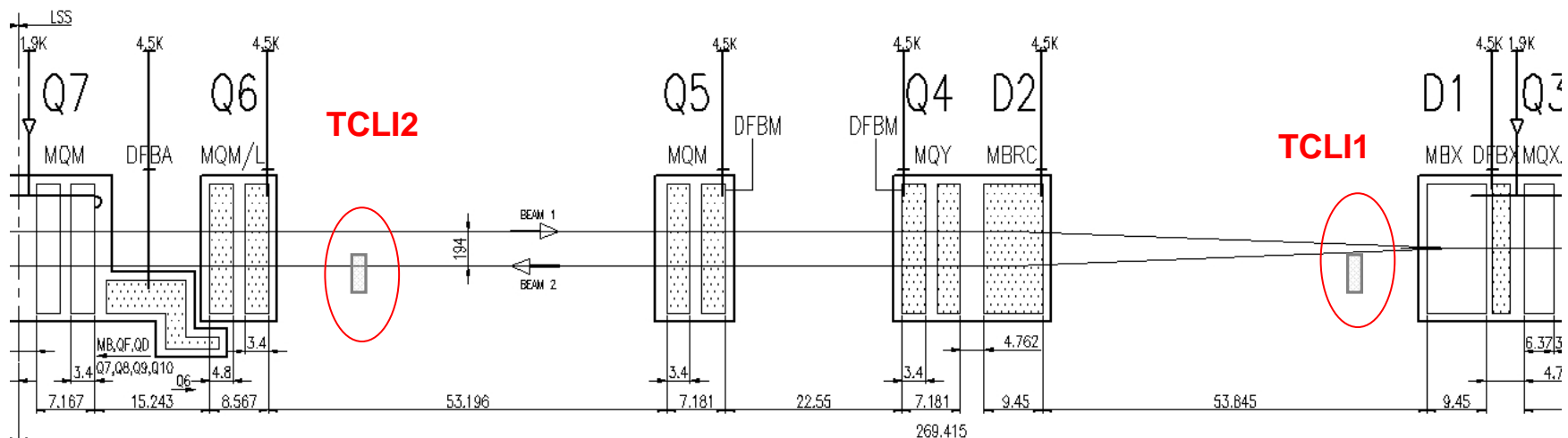
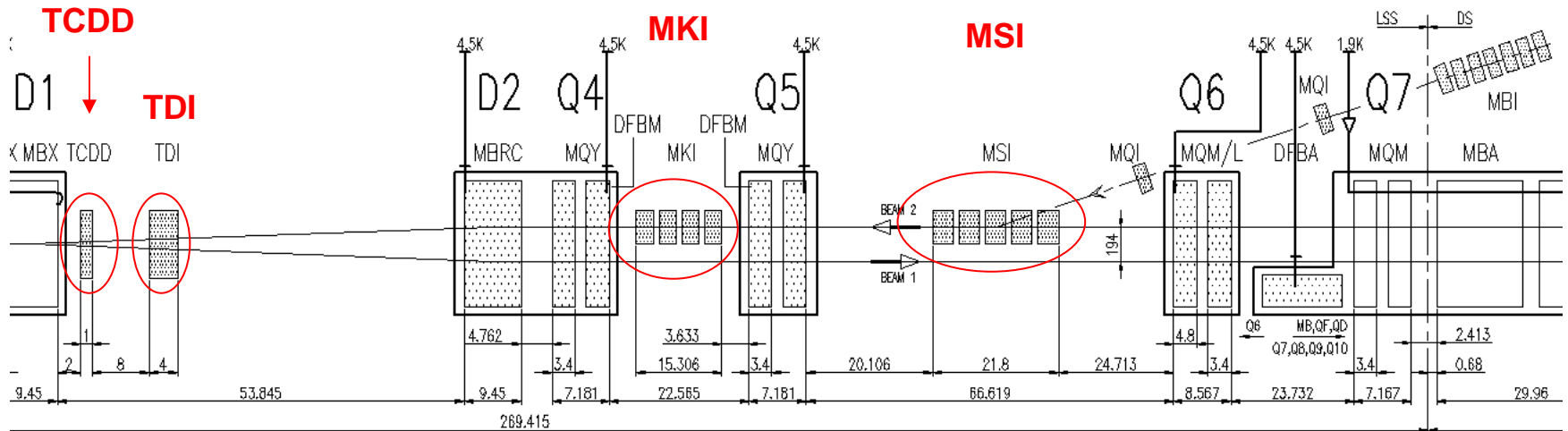
IR2R	Total Length [mm]	Element Length [mm]	Centre position wrt IP [mm]
D1 exit	0	0	69098.0
Bellows	200	200	69198.0
BPMSX	285	285	69440.5
VAEH	645	645	69905.5
[Drift]	2000	0	71228.0
TCTV.4R2	2520	1000	73488.0
TCLIA.4R2	2000	1000	75748.0
TCLIB.6R2	2520	1000	227654.0
TCLIM.6R2	1000	500	234399.0

IR8L	Total Length [mm]	Element Length [mm]	Centre position wrt IP [mm]
D1 exit	0	0	-69098.0
Bellows	200	200	-69198.0
BPMSX	285	285	-69440.5
VAEH	645	645	-69905.5
[Drift]	2000	0	-71228.0
TCTV.4L8	2520	1000	-73488.0
TCLIA.4L8	2000	1000	-75748.0
TCLIB.6L8	2520	1000	-216683.0
TCLIM.6L8	1000	500	-223428.0

Two beam design with C-C!

Slide from V. Kain

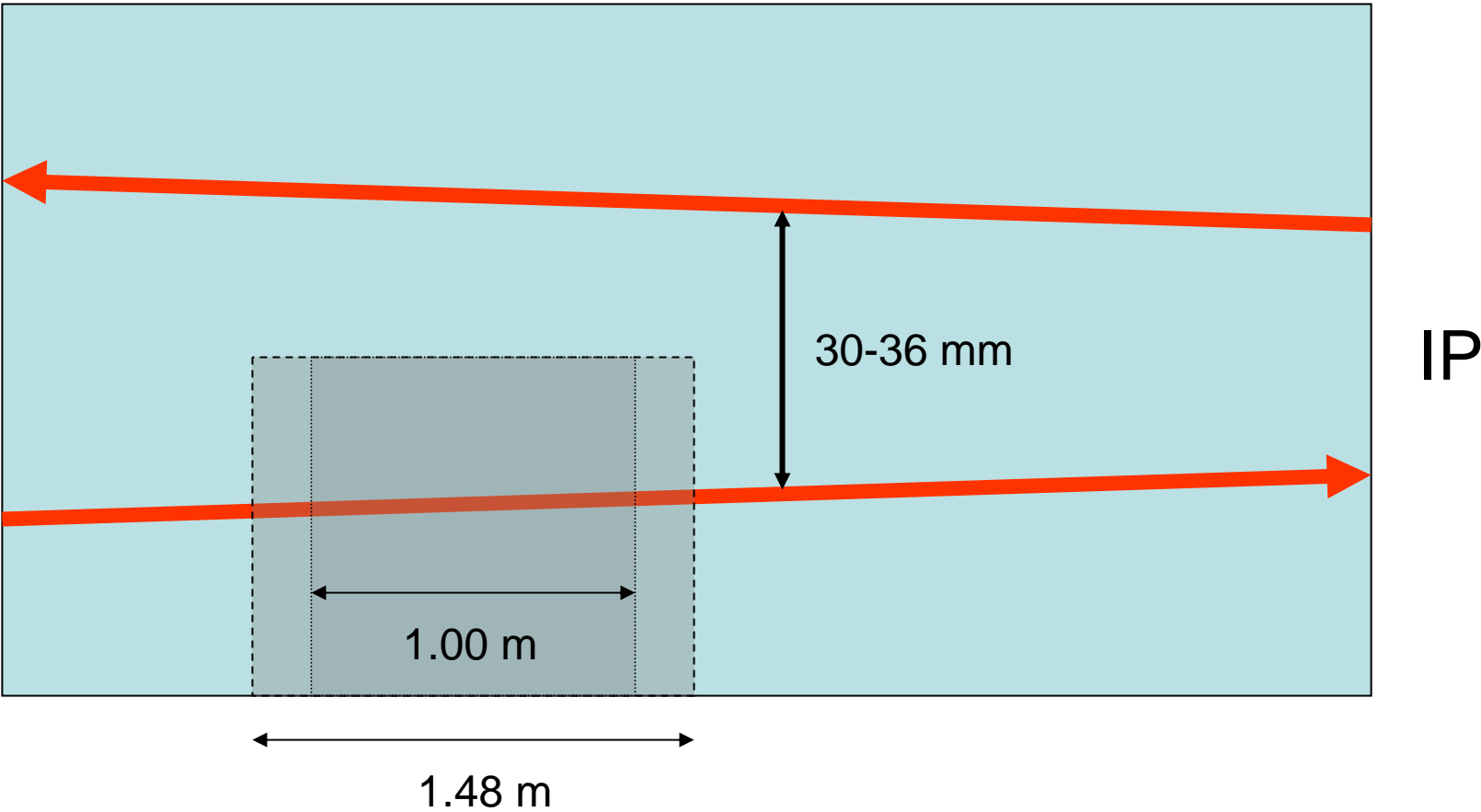
Overview of injection region (IR8)



General remarks

- All two beam collimators are active in the **vertical plane!**
- Watch out: Vertical crossing in IR2 and horizontal crossing in IR8). No effect?
- They all act on the **incoming beam!**
- They should **not perturb the outgoing beam** (keep aperture as defined close-by): for TDI 212 mm chamber ID?!
- Constraints from **experimental detectors** for outgoing beam!
 - Vacuum layout close by (→ C. Rathjen).
 - Transmission of spectator protons for the ZDC to be checked by ALICE (→ D. Macina).
- **Minimum full gaps** are (allowing 10σ setting at 7 TeV):
 - Injection (TCLIA): ~ 13 mm
 - Top energy (TCTV): ~ **2.5 mm**
- **Maximum full gaps** are: 10 mm for 40σ at 7 TeV
20 mm for 20σ at 450 GeV
→ Check with aperture for experiments!!!
- Cu/W jaw for TCTV and C-C jaw for TCLIA!

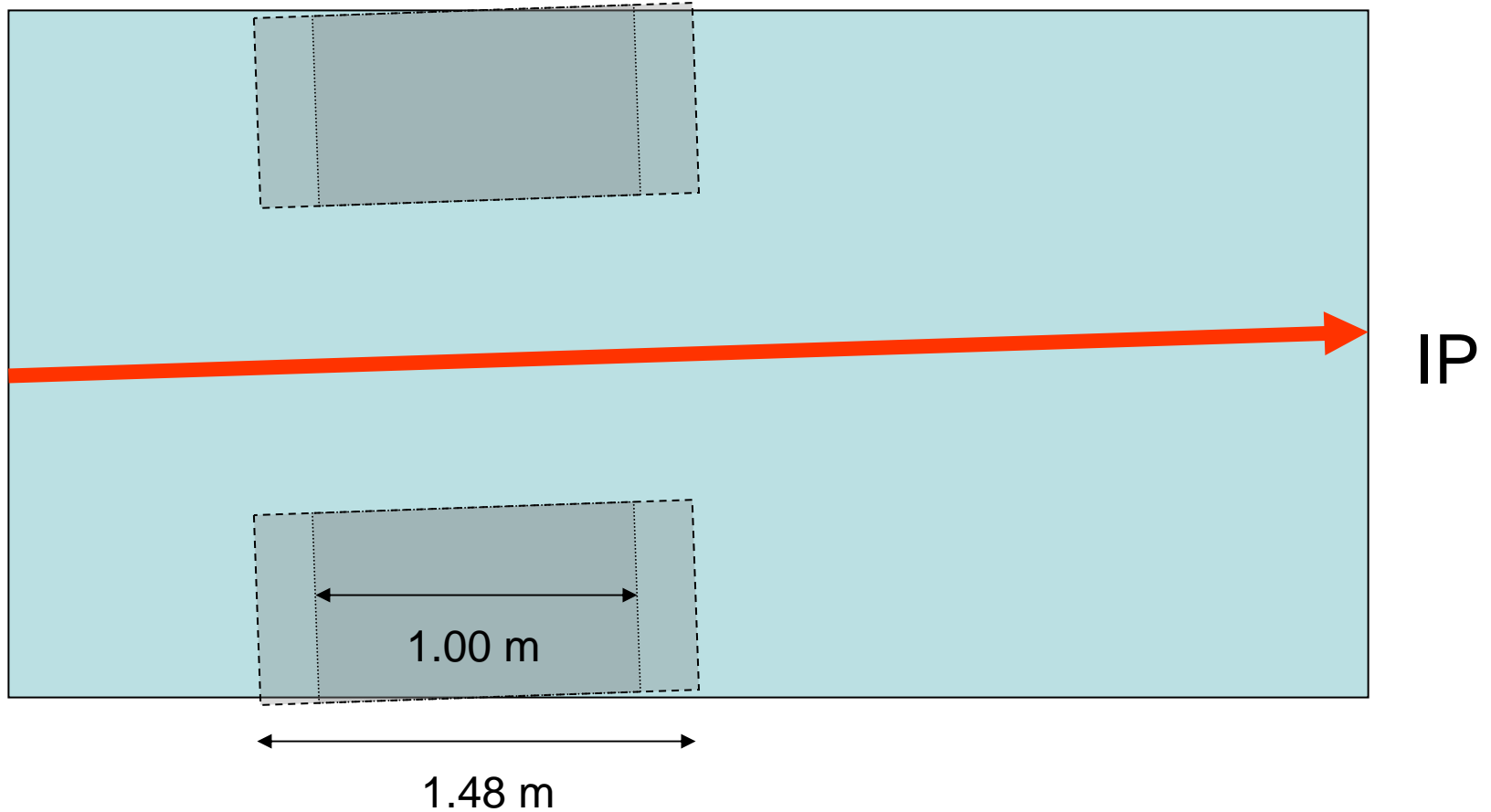
Top view



Total length of tank: 1.48 m

Length of jaw flat top: 1.00 m

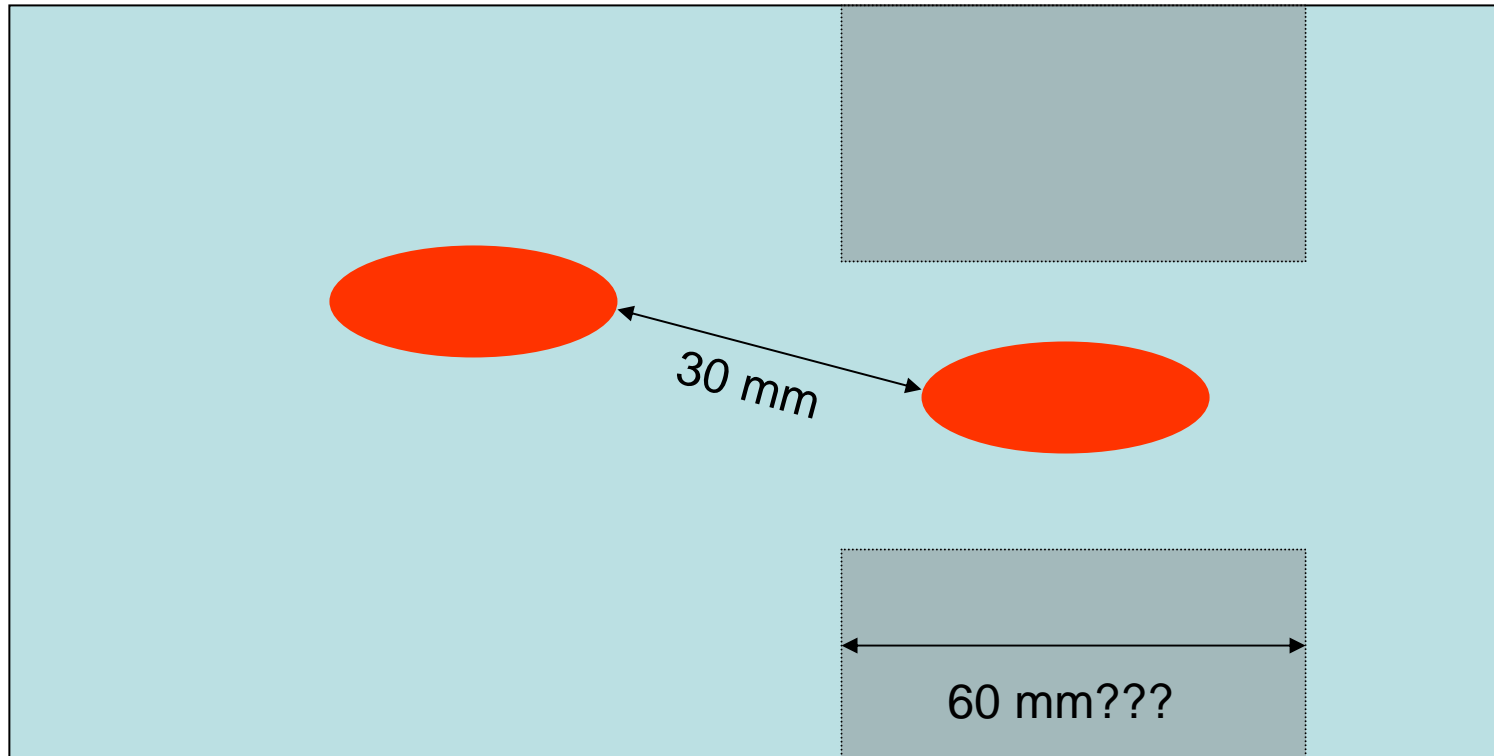
Side view incoming beam



Total length of tank: 1.48 m

Length of jaw flat top: 1.00 m

Front view



Check for impedance of the jaw edges → F. Ruggiero et al!

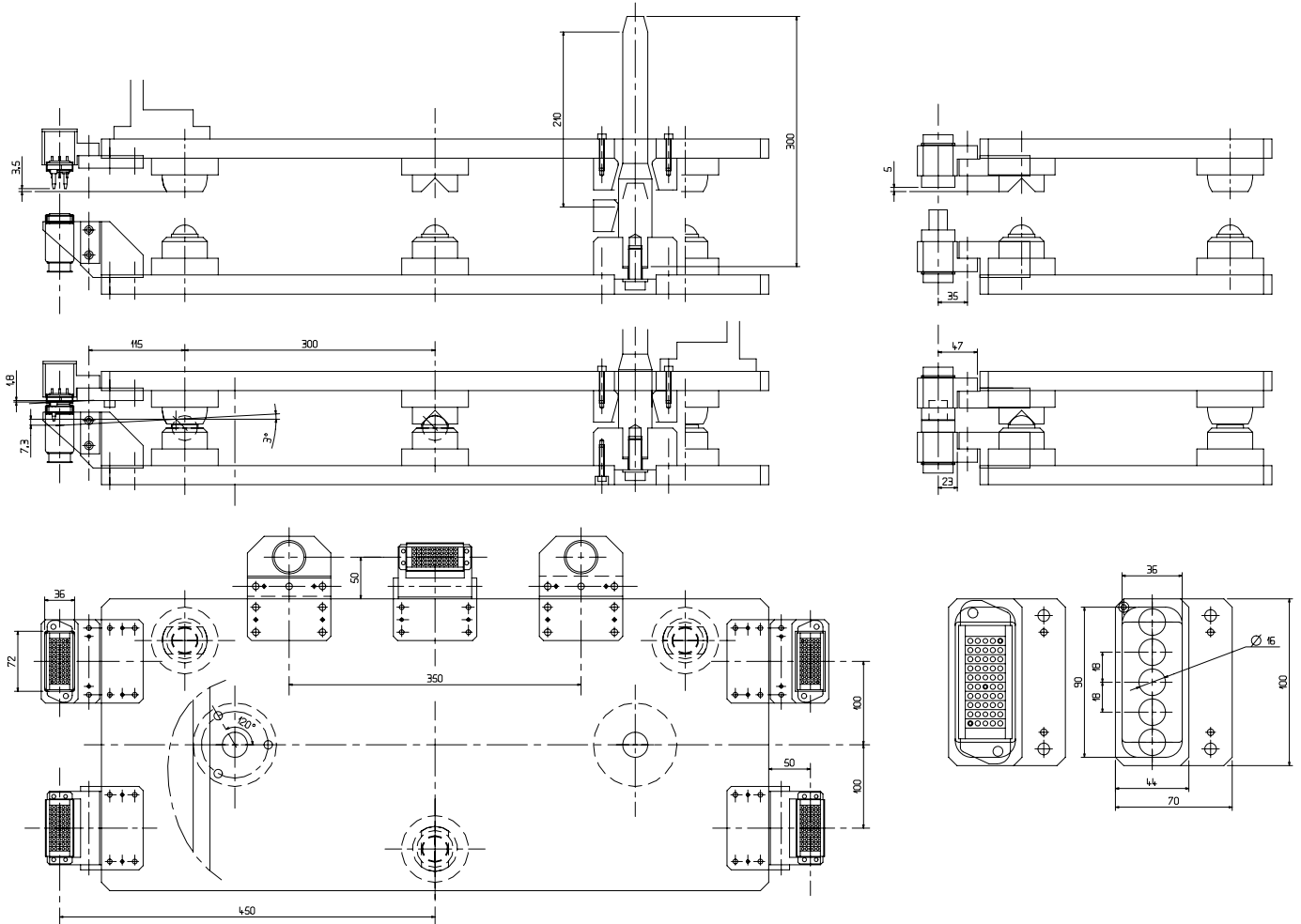
Degrees of freedom

- Same as for TCP/TCS:
 - position at each end of jaw.
 - movement of whole tank to adjust edge of collimator with respect to outgoing beam!?

AUTEUR : PERR-EST
 DATE CREAT : 18-APR-2005
 HISTORIQUE : PERR*18-APR-05, PERR*19-APR-05
 COEF POLYGON : 2.00000
 ESPACE : 500.00000
 UNITE : 0.10000

T0082323PL

LHCT, TCP2_PROTOCOL, T008

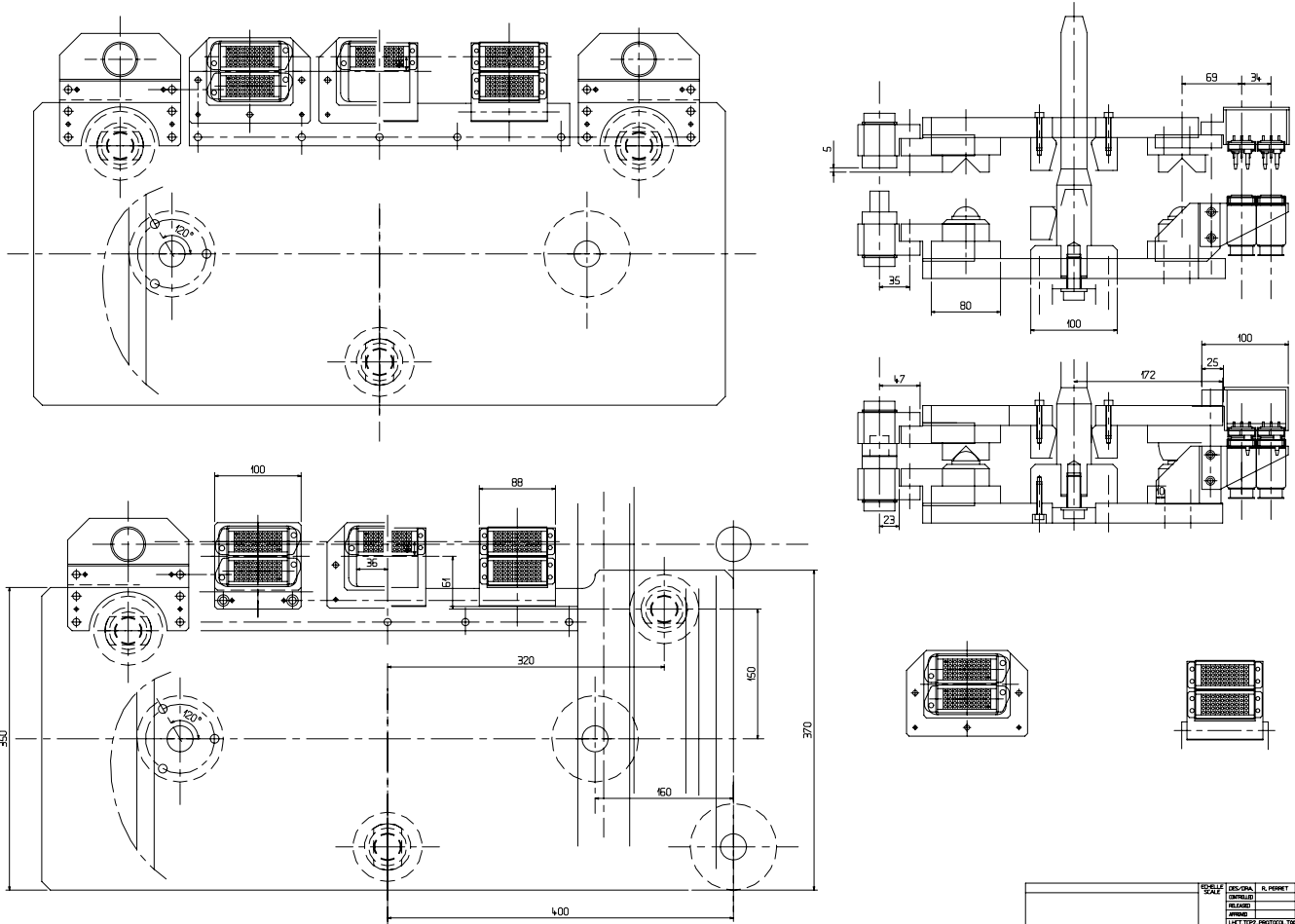


TYPE : PLAN
 VERS EUCLID : E32.4000 MODIF:E32.4000
 MACH/OUVR : LARGE HADRON COLLIDER
 ACTIVITE : INSTRUMENTATION FAISCEAU
 FONCT-UTIL : COLLIMATEUR
 DESIGNATION : ETUDE SUPPORT PLUGING ELECTRIQUE COLLIMATEUR TCS
 CODE EQU/BAT :
 REMARQUES :
 :
 :
 :

AUTEUR : PERR-EST
 DATE CREAT : 20-APR-2005
 HISTORIQUE : PERR*21-APR-05, PERR*25-APR-05, PERR*26-APR-05, PERR*27-APR-05
 COEF POLYGON : 2.00000
 ESPACE : 500.00000
 UNITE : 0.10000

T0082331PL

LHCT,TCP2_PROTOCOL,T008



16 INCL DATE NOM/AUME ZONE MODIFICATION
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TYPE : PLAN
 VERS EUCLID : E32.4000 MODIF:E32.4000
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 FONCT/UTIL : COLLIMATEUR
 DESIGNATION : ETUDE PLUGIN EAU ET ELECTRICITE MONTAGE SUR UN SEUL COTE
 CODE EQU/BAT :
 REMARQUES :
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