Drift Tube Quality Control
CMS week – CERN – 24th February 2003

SL Production rate

Ascii file Definition and Data Base **Pablo**

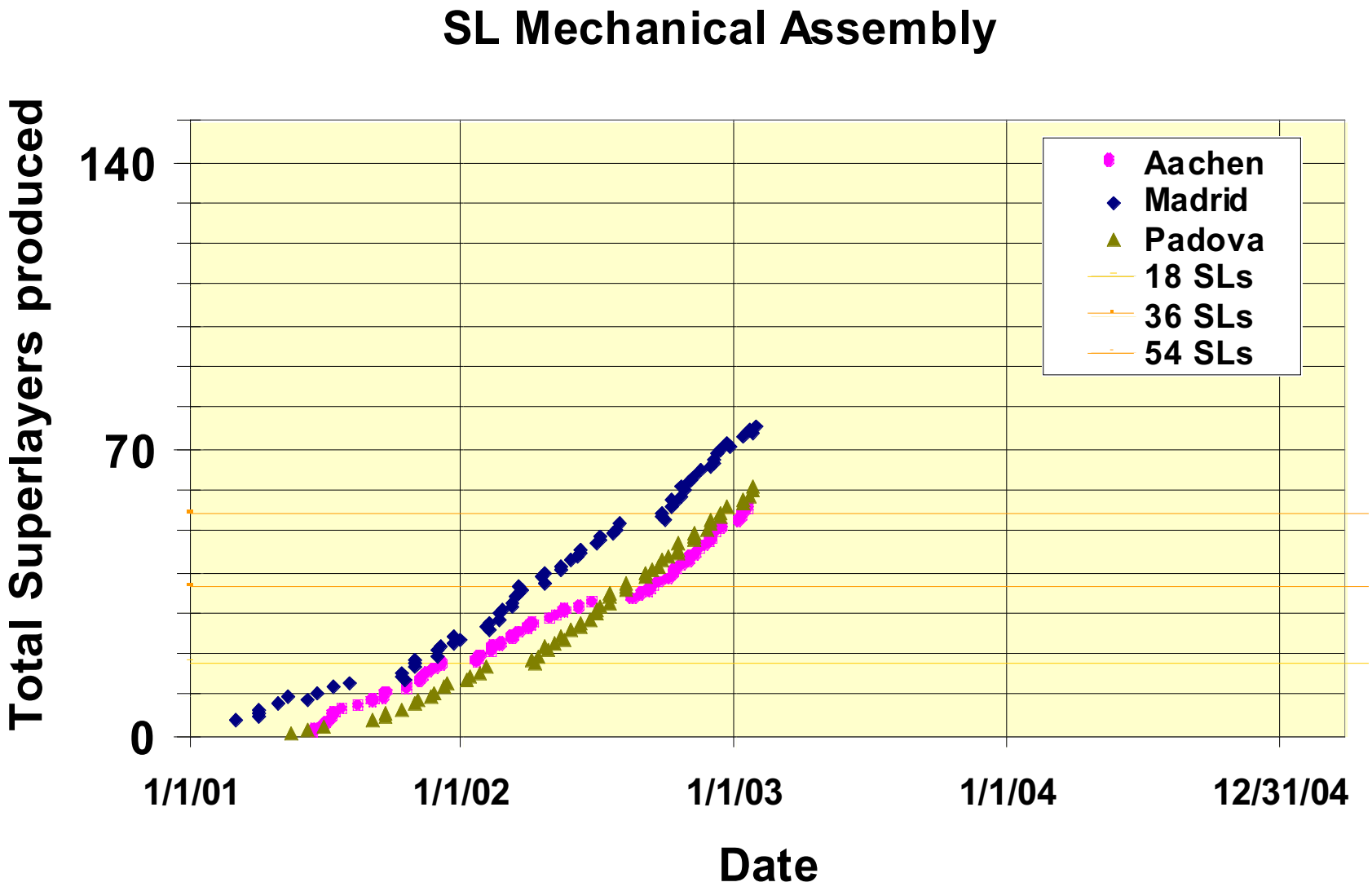
Integration Data Base

Efficiency Definition

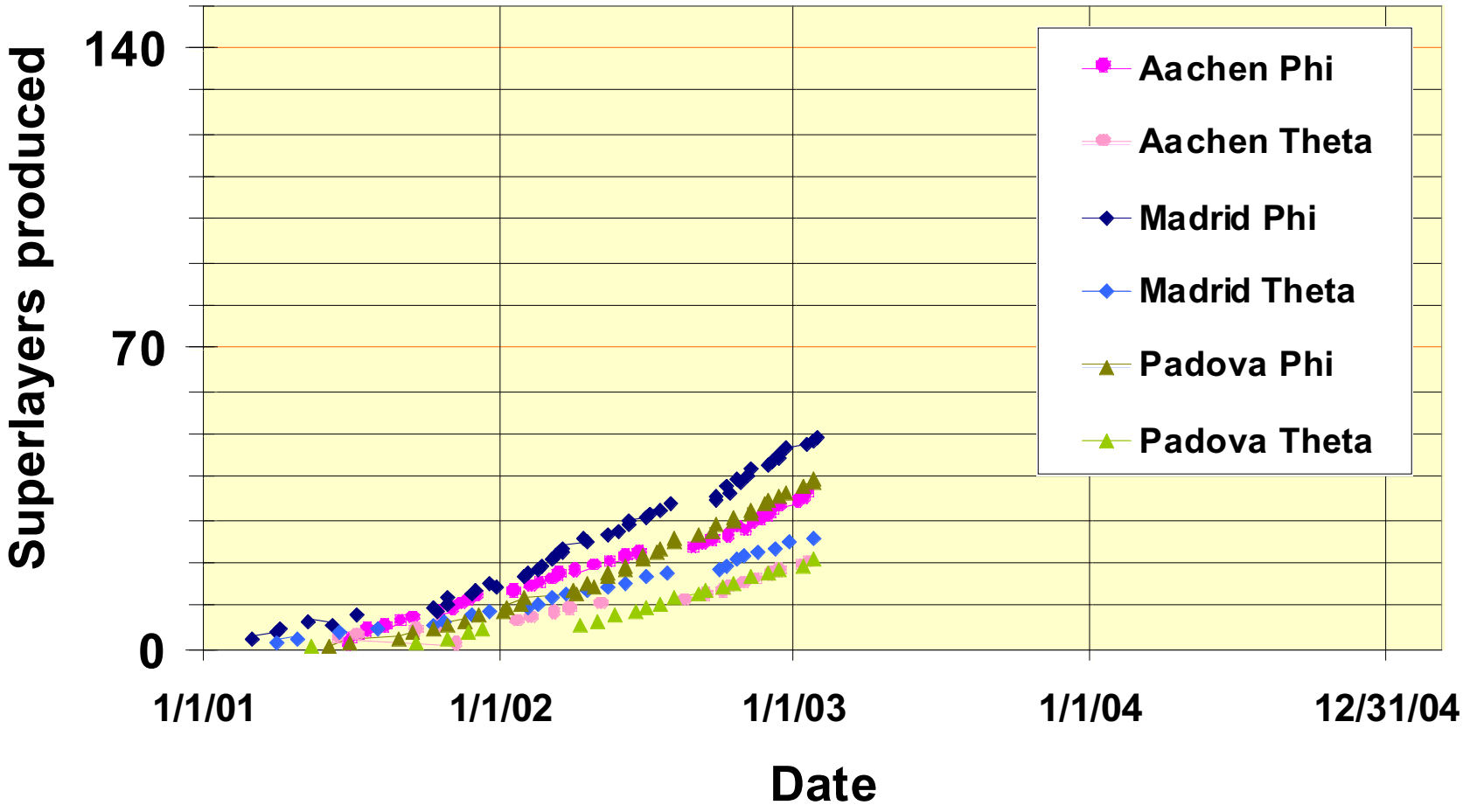
Mean Timer Definitions for QC comparisons

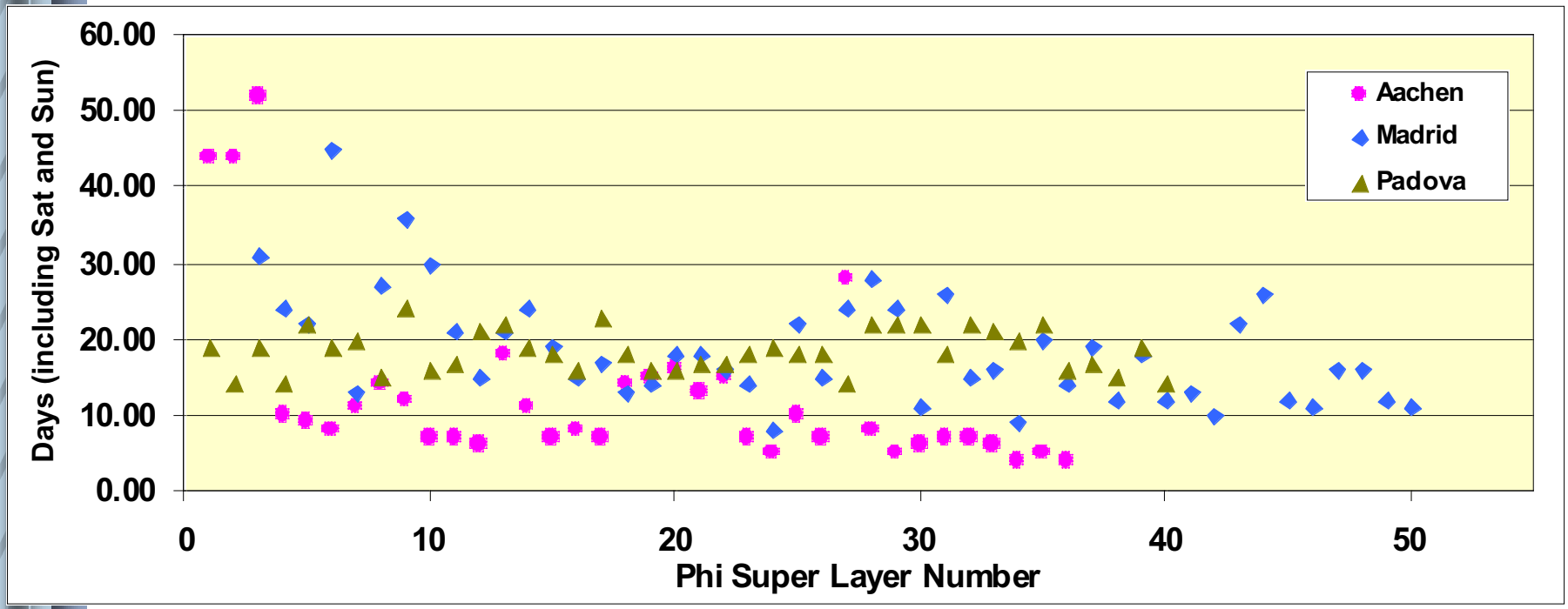
Chamber Traveler

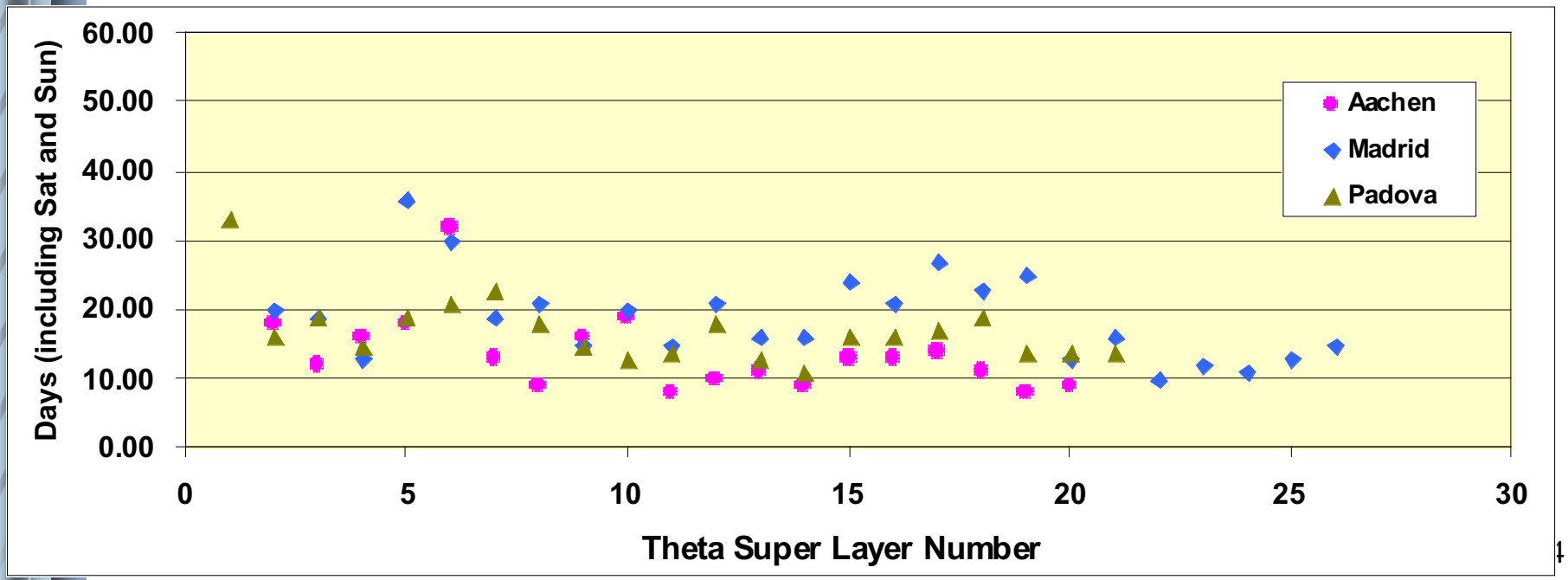
QC at Production Sites (Aachen, Madrid, Padova)


SL Mechanical Assembly
Total Superlayers produced
140
70
0
1/1/01
1/1/02
1/1/03
1/1/04
12/31/04
Date
Aachen
Madrid
Padova
18 SLs
36 SLs
54 SLs

SL Mechanical Assembly




Days (including Sat and Sun)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0
10
20
30
40
50
Phi Super Layer Number
Aachen
Madrid
Padova


Days (including Sat and Sun)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0
5
10
15
20
25
30
Theta Super Layer Number
Aachen
Madrid
Padova

SL Production Rate

The SL Production Rate has to be a quantity regularly recorded in the QC Data Base.

An explicit information can be recorded:

- **beginning date and end date of mechanical construction**
- **beginning date and end date of complete chamber**
- **location of the chamber**

How? A new card in the Data Base is a possibility.

Approved Format for QC Tests

Data Base Ascii File(s)

Data Source: Production Sites on a Local Web Page

Format:

http://www.to.infn.it/activities/experiments/cms/QUALITY/QCDB/Update3db.txt

LayerWirePosTest ID_suplyr SL_Position ID_Layer SIDE NM pos(1)...pos(NM)

LayerWireTensTest ID_suplyr SL_Position ID_Layer NM tens(1)...tens(NM) DATE

SuperlayerRefBlock ID_suplyr SL_Position Nref Nmeas pos(1)....pos(Nmeas)

SuperlayerGasTight ID_suplyr SL_Position Nmeas TimeConstant(1)...TimeConstant(Nmeas) DATE

LayerNoise ID_suplyr SL_position ID_Layer HVSetup Ncell Noise(1)...Noise(Ncell) DATE

LayerEffi ID_suplyr SL_position ID_Layer Ncell Effi(1)...Effi(Ncell) DATE

SuperLayerMT1 ID_suplyr SL_Position NumColumn Nmeas AverageMT1(1) ... AverageMT1(NumColumn) WidthMT1(1) ...WidthMT1(NumColumn) ErrorMT1(1) ... ErrorMT1(NumColumn) DATE

SuperLayerMT2 ID_suplyr SL_Position NumColumn Nmeas AverageMT1(1) ... AverageMT1(NumColumn) WidthMT1(1) ...WidthMT1(NumColumn) ErrorMT1(1) ... ErrorMT1(NumColumn) DATE

LayerDiscCells ID_suplyr SL_Position ID_Layer ID_Channel CAUSE DATE

Approved Format for QC Tests

Data Base Ascii File(s)

Data Source: Production Sites on a Local Web Page

http://www.to.infn.it/activities/experiments/cms/QUALITY/QCDB/Update3db.txt

OPTIONAL CARDS:

LayerNoiseStat ID_Suplyr SL_Position ID_Layer AVERAGE SIGMA N<THR1 CELLS(1) ...CELLS(N<THR1) N>THR2 CELLS(1) ... CELLS(N>THR2)

LayerEffiStat ID_Suplyr SL_position ID_Layer AVERAGE SIGMA N<THR1 CELLS(1) ... CELLS(N<THR1)

----- AVERAGE and SIGMA are calculated for the good cells. (e.g. THR1 < noise < THR2)

LayerAfterP ID_suplyr SL_Position ID_Layer Ncell Prob(1)...Prob(Ncell) DATE

Ascii File Definition

PROPOSAL DECEMBER 2002 ADDITION OF FOLLOWING CARDS

Chamber ID_cham TYPE SIGN Location Date

ChamberSuperlayer ID_cham ID_sup

ChamberHoneycomb ID_cham ID_honey

Superlayer ID_super ORIENT DATE

SuperlayerAlplate ID_super ID_pl

SuperlayerBoard ID_super ID_board

SuperlayerCover ID_super ID_cover SIDE

SuperLayerIbeam ID_super BATCH1 NGLU

SuperLayerWires ID_super BATCH NWIRES

SuperLayerEnv ID_super TEMP HUMID PRESS DATE

Ascii File Definition for SL - an example

```
Superlayer          351030200300011 phi2  09102001
SuperlayerAlplate     351030200300011 351040721100014 1
SuperlayerAlplate     351030200300011 351040721200023 2
SuperlayerAlplate     351030200300011 351040721300022 3
SuperlayerAlplate     351030200300011 351040721600015 4
SuperlayerAlplate     351030200300011 351040721800017 5
LayerEnv            351040721100014 20.93  0.0  0.0 10102001
LayerEnv            351040721200023 22.14  0.0  0.0 17102001
LayerEnv            351040721300022 20.23  0.0  0.0 19102001
LayerEnv            351040721600015 23.45  0.0  0.0 23102001
LayerIbeam           351040721100014 351030900000001 60
LayerIbeam           351040721200023 351030900000001 61
LayerIbeam           351040721300022 351030900000001 61
LayerIbeam           351040721600015 351030900000001 60
LayerWires           351040721100014 351032300000001 59
LayerWires           351040721200023 351032300000001 60
LayerWires           351040721300022 351032300000001 60
LayerWires           351040721600015 351032300000001 59
```

Ascii File Definition for SL – an example

LayerWirePosTest 351030200300011 351040721100014 FE 59 -70 ….. 11

LayerWirePosTest 351030200300011 351040721200023 FE 60 69 …… -18

LayerWirePosTest 351030200300011 351040721300022 FE 60 -26 …….-57

LayerWirePosTest 351030200300011 351040721600015 FE 59 -77 ……. -73

LayerWirePosTest 351030200300011 351040721100014 HV 59 -27 ……62

LayerWirePosTest 351030200300011 351040721200023 HV 60 63 …… 48

LayerWirePosTest 351030200300011 351040721300022 HV 60 -26 …….18

LayerWirePosTest 351030200300011 351040721600015 HV 59 -88 …… 13

LayerWireTensTest 351030200300011 351040721100014 59 0.000 ……0.000

LayerWireTensTest 351030200300011 351040721200023 60 0.000 ….. 0.000

LayerWireTensTest 351030200300011 351040721300022 60 0.000 ……0.000

LayerWireTensTest 351030200300011 351040721600015 59 0.000…..0.000

SuperlayerRefBlock 351030200300011 1 1 -183

SuperlayerRefBlock 351030200300011 2 1 -762

SuperlayerRefBlock 351030200300011 3 1 -415

SuperlayerRefBlock 351030200300011 4 1 -24

SuperlayerThickness 351030200300011 25 55 …...19

SuperlayerGasTight 351030200300011 1 800 0202

Ascii File Definition for SL – an example

```
LayerNoise          351030200300011 351040721100014 3600 72.45 0202
LayerNoise          351030200300011 351040721200023 3600 77.75 0202
LayerNoise          351030200300011 351040721300022 3600 66.52 0202
LayerNoise          351030200300011 351040721600015 3600 64.93 0202
LayerEffi         351030200300011 351040721100014 1 59 99.34  0202
LayerEffi         351030200300011 351040721200023 1 60 99.68  0202
LayerEffi         351030200300011 351040721300022 1 60 99.73  0202
LayerEffi         351030200300011 351040721600015 1 59 98.21  0202
SuperlayerMT1       351030200300011 378.5 11.95 0.02 0202
SuperlayerMT2       351030200300011 378.2 11.94 0.02 0202
LayerDiscCells      351030200300011 351040721100014 18 12 0202
LayerDiscCells      351030200300011 351040721100014 38 34 0202
LayerDiscCells      351030200300011 351040721100014 47 12 0202
LayerDiscCells      351030200300011 351040721300022 1 12 0202
```

Ascii file definition for Chambers – an example

Chamber 351030100500006 MB2 P Madrid 022002

ChamberSuperlayer 351030100500006 351030200300012

ChamberSuperlayer 351030100500006 351030200400007

ChamberSuperlayer 351030100500006 351030200300011

ChamberThickness 351030100500006 25 288.443 …..287.85

Approved Format for QC Tests

Summary QC Test Results

Ascii File(s)

Data Source: Production Sites Output of the QC Test Analysis on a Local Web Page

http://www.to.infn.it/activities/experiments/cms/QUALITY/QCDB/Update3s.txt

WirePosition ID_Layer SIDE AveragePos AverageSigma

WireTension ID_Layer AverageT AverageSigma

RefBlockPos ResidualPos1 ResidualPos2 ResidualPos3 ResidualPos4

GasTigthness TimeConstant

Noise ID_Layer HVSetup AverageNoise AvarageSigma Nover Nout NoutCell(1) ... NoutCell(Nout)

CosmEffi ID_Layer AverageEffi AverageSigma Nunder Nout NumCell(1) ... NumCell(Nout)

SuperLayerMT1 ID_suplyr SL_Position NumColumn Nmeas AverageMT1(1) ... AverageMT1(NumColumn) WidthMT1(1) ...WidthMT1(NumColumn) ErrorMT1(1) ... ErrorMT1(NumColumn) DATE

SuperLayerMT2 ID_suplyr SL_Position NumColumn Nmeas AverageMT1(1) ... AverageMT1(NumColumn) WidthMT1(1) ...WidthMT1(NumColumn) ErrorMT1(1) ... ErrorMT1(NumColumn) DATE

DiscCells ID_Layer NCause Ndisc NumCell(1) ... NumCell(Ndisc)

Integration Data Base - DT Chambers

keep track of the material irradiated in the cavern.

Answers to the F. Glege mail:

In DT all parts are classified with a Bar Code. See definition in the Quality Control Document http://www.to.infn.it/activities/experiments/cms/QUALITY/QCMANUAL/qcqa.pdf

DB type ? Central DB based on Oracle

At the moment only few Chambers inside, but all chambers record an Ascii file in a standard format which will be read by DB.

Does your DB hold parameters needed for configuring/setting up your detector,processing your detector raw data,do physics reconstruction?

Parameters are fixed for all DT chambers (HV values, Thresholds, Mechanical Tolerances) and they are defined in the above mentioned QC document.

All QC tests results are recorded and can be used for physics reconstruction (not performed for the moment).

Do export tools exist already ? Web interface and PERL scripts exist to dump all DB informations

Hans discussion with F. Glege and A. Ball:

The aim is to keep the interface with this DB as simple as possible

Basic unit of material to be traced for irradiation:

complete chamber and not its detailed components

minicrates

(Cabling and piping is a fixed installation and will be surely treated in a different way.)

Efficiency Definition

Efficiency calculation at SL level

At least 3 different layers are hit

Fix drift velocity (55 microns/ns)

Fix a window for extrapolation - fix the width

All possible combination of hits fitted – cut on $\chi 2$

What to do with the I-beam region

Which efficiency may be defined?

layer efficiency

cell efficiency

efficiency inside cell

Which efficiency is used to compare QC data?

Inefficient channels definition (<50%, <95%, <97%)

Mean Timer Definition

$$MT_{i,\,L(R),\,j} = \frac{Ti(j)+Ti(J+2)}{2} + T_i(J+1)$$

i is semicell number
j is layer number
L,R right, left

SL divided in semicells

MT for tracks with 4 layers hit in the same semicell

Correction of TDC Time T (not fundamental for uniformities studies)

Which quantities in the MT analysis:

MT for each semicell is computed → Gaussian fit → Sigma MT

At SL level:

MT1, σMT1, MT1(L),MT1(R)

MT2, σMT2, MT2(L),MT2(R)

Which MT quantity is used to compare QC data?

Chamber Traveler A fast and clear Identity Card of the Chamber

FILE NAME: xxxxxx.txt
CHAMBER_TYPE MBX+ Serial:X Barcode
PHI1 Serial X Barcode StartDate -EndDate
THE Serial X Barcode StartDate -EndDate
PHI2 Serial X Barcode StartDate -EndDate
TIME_CONSTANT PHI1 xxx Date (mmyy)
TIME_CONSTANT THE xxx Date (mmyy)
TIME_CONSTANT PHI2 xxx Date (mmyy)
THICKNESS CHAMBER: minValue maxValue
O2 PHI1 xxx(ppm) Date(mmyy)
O2 THE xxx(ppm) Date(mmyy)
O2 PHI1 xxx(ppm) Date(mmyy)
HV_DISCONNECTED sl IBEAM Cell+/- Layer Date Comments
HV_DISCONNECTED sl STRIP Cell Layer Date Comments
HV_DISCONNECTED sl WIRE Cell Layer Date Comments
FE_DEADCHANNEL sl Cell Layer Date Comments
FE_DISTORT sl Cell Layer Date Comments
FE_NOISE sl Value Cell Layer Date Comments
LOW EFFICIENCY sl Value Cell Layer Date Comments
Comments