



DriftTubeQualityControl

CMSweek – CERN – 10thJune2002

Organization oftheQCTestsResults

Definition ofNoiseQCTestandQCTestswith **Cosmics**

Overview oftheQCTestResults

QCatProductionSites :

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Organization of Crucial QCTest Results

List of Crucial Tests to Qualify the Chamber

Protocol of Each Crucial Test

Format to Record the Data

List of Crucial QCTest

All QC steps which the Production Sites must follow for the assembly of the DT Chambers are described in the QC Document : <http://www.to.infn.it/activities/experiments/cms/qcqa.pdf>

For the Monitoring of the Chamber Assembly and for a fast result comparison among Site a List of Crucial QC Tests have been defined:

- Wire Position
- Wire Tension
- Reference Blocks Position
- Gas Tightness
- SL thickness ----- to be decided
- Honey Comb panel planarity ----- to be decided
- SL alignment inside chamber ----- to be decided
- Chamber thickness ----- to be decided
- Noise
- Cosmics (Efficiency, Mean Timer)

Protocol for Crucial QC Tests

- The description for all QC tests is included in the QC Document
- A precise Protocol should be defined for the Crucial QC Tests
- The Protocol must be the same in each Production Site

This includes for each test the following:

Condition to perform the Test
Tolerance Limits and Acceptance Limits
Detailed Procedure of the Test

Protocol for Crucial QCTests

QCTestsConditions	AcceptanceLimits	ToleranceLimits
WirePosition <10micronsresolutioncamera CalibrationeachLayer MeasuredateachassembledLayer MeasurebeforeclosingSL Whichheight ?	+/- 100microns 250 - 300g ?	+/- 500microns 230 - 325g ? ?
WireTension RefBlocksPos GasTightness FinalSLenclosures Manometer with<0.5mbarres. 85% Ar - 15% CO2 Overpressureof50mbar 85% Ar - 15% CO2 atmospheric pressure ? HVcondition : disconnected oratnominalvalue ?	? Tau >140min ?	? ?
Noise Scaler orCosmicRateHardwaresetup ? Quantityto measure: NoiseRa teeachchannel= numberofNoisehits/time	<200Hz 200Hz< Noise <1KHz	>1KHz

Protocol for Crucial QCTests

QCTests Conditions

Efficiency

85% Ar – 15% CO2
 atmospheric pressure ?
 1200/1800/3600V at Cern
 threshold 15mV = $V_{thr} - V_{ref}$ ($V_{ref} = 1.5V$)
 O2 < 500 ppm
 Quantity to measure:
 Efficiency per ce II
 = num of hits on fitted track / exp. num of hits
 Track angle < 15 degrees
 At least 3 hits
 Track-wire distance < 19mm
 85% Ar – 15% CO2
 at atmospheric pressure ?
 1200/1800/3600V at Cern
 threshold 15mV = $V_{thr} - V_{ref}$ ($V_{ref} = 1.5V$)
 O2 < 500 ppm
 Quantity to measure :
 MT123 and MT234 ea ch column
 4 hits tracks
 angle limit ?

Mean Timer

Acceptance Limits

> 99%

?

Tolerance Limits

?

Format for Crucial QC Tests

Summary QC Test Results

Ascii File(s)

From Production Sites Output of the QC
Test Analysis on a Local Web Page

<http://www.to.infn.it/activities/experiments/cms/SLQC/Update3s.txt>

Data Table

On the Central Web QC page in Excel
Format

<http://www.to.infn.it/activities/experiments/cms/SLQC/QCST.xls>

Plots

On the Central Web QC page. Analysis
of the Excel file

<http://www.to.infn.it/activities/experiments/cms/SLQC/SLQC.html>

Data Base

Ascii File(s)

From Production Sites
on a Local Web Page

<http://www.to.infn.it/activities/experiments/cms/SLQC/Update3db.txt>

Format for Crucial QC Tests

Summary QC Test Results

Ascii File(s)

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

Format: <http://www.to.infn.it/activities/experiments/cms/SLQC/Update3s.txt>

Wire Position ID_LayerSIDE AveragePosAverageSigma

Wire Tension ID_Layer AverageTAverageSigma

RefBlockPos ResidualPos1ResidualPos2ResidualPos3ResidualPos4

Gas Tightness TimeConstant

Noise ID_Layer HVSetupAverageNoiseAverageSigmaNoverNoutNoutCell (1)... NoutCell(Nout)

CosmEffi ID_Layer AverageEffiAverageSigmaNunderNoutNumCell (1)... NumCell(Nout)

CosmMT1 NumColumn Average(1)...Average(NumColumn)Sigma(1)...Sigma(NumColumn)

CosmMT2 NumColumn Average(1)...Average(NumColumn)Sigma(1)...Sigma(NumColumn)

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

Format for Crucial QC Tests

Summary QC Test Results

Data Table

On the Central Web QC page in Excel Format

<http://www.to.infn.it/activities/experiments/cms/SLQC/QCST.xls>

A software to fill this table starting from the Ascii file(s) is ready

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
E23		ph3	ph5	th2	ph7	ph8	th5	ph4	ph6	th3	ph9	ph10	th6	ph11	ph12
1	SI_rr														
2	Av_L1HVWireF	12.28	100.1	-8.43	-95.96	20.1	39.02	-36.16	-4.45		-1.06	11.62	13.96	33.95	-35.47
3	Av_L2HVWireF	-15.75	-60.35	13.93	9.47	13.31	71.8	57	-20.1		4.03	-0.58	11.02	36.08	22.47
4	Av_L3HVWireF	-28.18	74.18	-39.41	-16	13.25	27.07	-60.85	9.3		-25.62	12.93	31.79	45.34	-27.4
5	Av_L4HVWireF	46.9	-46.45	80.87	-0.39	-0.88	42.55	-53.35	3.7	57.79	32.15	-3.16	-16.55	24.19	48.67
6	Av_L1FEWireP	24.23	76.15	36.09	111.4	-39.59	52	-112.1	17.94		-0.58	-9.76	2.53	11.27	18.2
7	Av_L2FEWireP	-137.2	-27.47	-56.69	58.05	-16.26	51.19	-125.2	-2.79		-12.83	16.63	-10.02	21.5	-23.62
8	Av_L3FEWireP	-7.63	53.08	-27.81	90.57	-48.76	17.98	0.79	-1.18		26.66	-25.01	-59.22	-24.27	5.36
9	Av_L4FEWireP	-9.52	-7.86	24	45.55	-16.05	39.96	-88.19	21.71	-45.55	38.59	66.78	27.13	34.45	7.26
10	Sig_L1HVWire	36.17	36.1	39.04	67.86	39.52	36.3	55.45	57.92		43.01	42.43	42.86	47.01	46
11	Sig_L2HVWire	37.07	62.42	40.83	45.39	37.76	56.06	37.1	41.27		41.87	43.69	26.42	34.4	0
12	Sig_L3HVWire	31.98	49.65	53.6	59.04	37.3	45.82	57.97	54.75		33.3	40.3	35.73	37	3.06
13	Sig_L4HVWire	28.19	70.61	56.04	55.29	48.46	48.1	60.75	29.66	121.3	39.66	33.46	24.61	43.8	40.94
14	Sig_L1FEWire	33.98	40.84	32.98	39.82	30.05	42.99	52.14	44.73		45.06	42.98	47.68	31.99	44
15	Sig_L2FEWire	45.31	32.06	31.57	37.25	46.77	58.17	55.19	46.1		44.67	38.11	48.5	41.86	33.2
16	Sig_L3FEWire	40.36	54.24	33.4	58.77	47.95	39.36	46.63	37.97		39.28	25.73	22.95	38.41	53.0
17	Sig_L4FEWire	35.99	66.35	51.18	45.2	25.72	44.25	66.9	27.65	45.53	31.29	25.39	33.75	71.84	56.45
18	Av_L1T	2.75	2.75	2.8	2.84	2.92	2.96	2.79	2.66		2.82	2.99	2.84	2.94	
19	Av_L2T	2.75	2.7	2.8	2.88	2.86	3.01	2.86	2.7		2.73	3.08	2.9	2.95	
20	Av_L3T	2.75	2.68	2.78	2.87	2.8	2.98	2.86	2.82		2.79	2.89	3		
21	Av_L4T	2.74	2.65	2.76	2.83	2.83	2.94	2.83	2.82		2.82				
22	Sig_L1T	0.025	0.025	0.035	0.028	0.075	0.066	0.035	0.027	0.032	0.067	0.075	0.043		
23	Sig_L2T	0.034	0.025	0.023	0.036	0.047	0.048	0.022	0.032	0.028	0.057	0.063	0.066		
24	Sig_L3T	0.03	0.043	0.05	0.034	0.061	0.044	0.024	0.032	0.032	0.057	0.064	0.034		
25	Sig_L4T	0.021	0.05	0.023	0.044	0.044	0.045	0.033	0.033	0.033	0.033	0.064	0.034		
26	RefBlock1				-2	36	-58				-190	-192	-45	-183	-186
27	RefBlock2				-669	-703	-248				-876	-932	-399	-762	-800
28	RefBlock3				-483	-368	267				-526	-503	-31	-415	-46
29	RefBlock4				133	-17	-11				-60	-34	32	-24	-15
30	GasTight	51	69	363	635	125	277	40	25	50	592	192	76	115	800
31	DiscCell1C1										1				
32	DiscCell1C2						1								
33	DiscCell1C3														
34	DiscCell1C4														
35	DiscCell1C5			1	2									1	

Format for Crucial QC Tests

DataBase Ascii File(s)

DataSource:ProductionSitesonaLocalWebPage

Format: <http://www.to.infn.it/activities/experiments/cms/SLQC/Update3db.txt>

LayerWirePosTest ID_suplyr SL_PositionID_LayerSIDENMpos(1)...pos(NM)
LayerWireTensTest ID_suplyr SL_Position ID_Layer NMtens(1)...tens(NM)DATE
SuperlayerRefBlock ID_suplyr SL_Position NrefNmeas pos(1)....pos(Nmeas)
SuperlayerGasTight ID_suplyr SL_Position Nmeas
TimeConstant(1)...TimeConstant(Nmeas)DATE
LayerNoise ID_suplyr SL_positionID_Layer HVSetupNcell Noise(1)...Noise(Ncell)DATE
LayerEffi ID_suplyr SL_positionID_Layer NcellEffi (1)...Effi(Ncell)DATE
SuperLayerMT1 ID_suplyr SL_Position NumColumnNmeas AverageMT1(1)...
AverageMT1(NumColumn) WidthMT1(1)... WidthMT1(NumColumn)ErrorMT1(1)...
ErrorMT1(NumColumn)DATE
SuperLayerMT2 ID_suplyr SL_Position NumColumnNmeas AverageMT1(1)...
AverageMT1(NumColumn)WidthMT1(1)...WidthMT1(NumColumn)ErrorMT1(1)...
ErrorMT1(NumColumn)DATE
LayerDiscCells ID_suplyr SL_PositionID_LayerID_ChannelCAUSEDATE

Format for Crucial QC Tests

DataBase Ascii File(s)

DataSource: ProductionSitesonaLocalWebPage

Format: <http://www.to.infn.it/activities/experiments/cms/SLQC/Update3db.txt>

OPTIONAL CARDS:

LayerNoiseStat ID_Suplyr SL_PositionID_LayerA VERAGESIGMAN<THR1 CELLS(1)
...CELLS(N<THR1)N>THR2 CELLS(1)...CELLS(N>THR2)

LayerEffiStat ID_Suplyr SL_positionID_LayerA VERAGESIGMAN<THR1 CELLS(1)...
CELLS(N<THR1)

----- AVERAGE and SIGMA are calculated for the good cells. (e.g. THR 1 < noise < THR2)

LayerAfterP ID_suplyr SL_PositionID_Layer NcellProb (1)...Prob(Ncell) DATE

Format for Crucial QC Tests

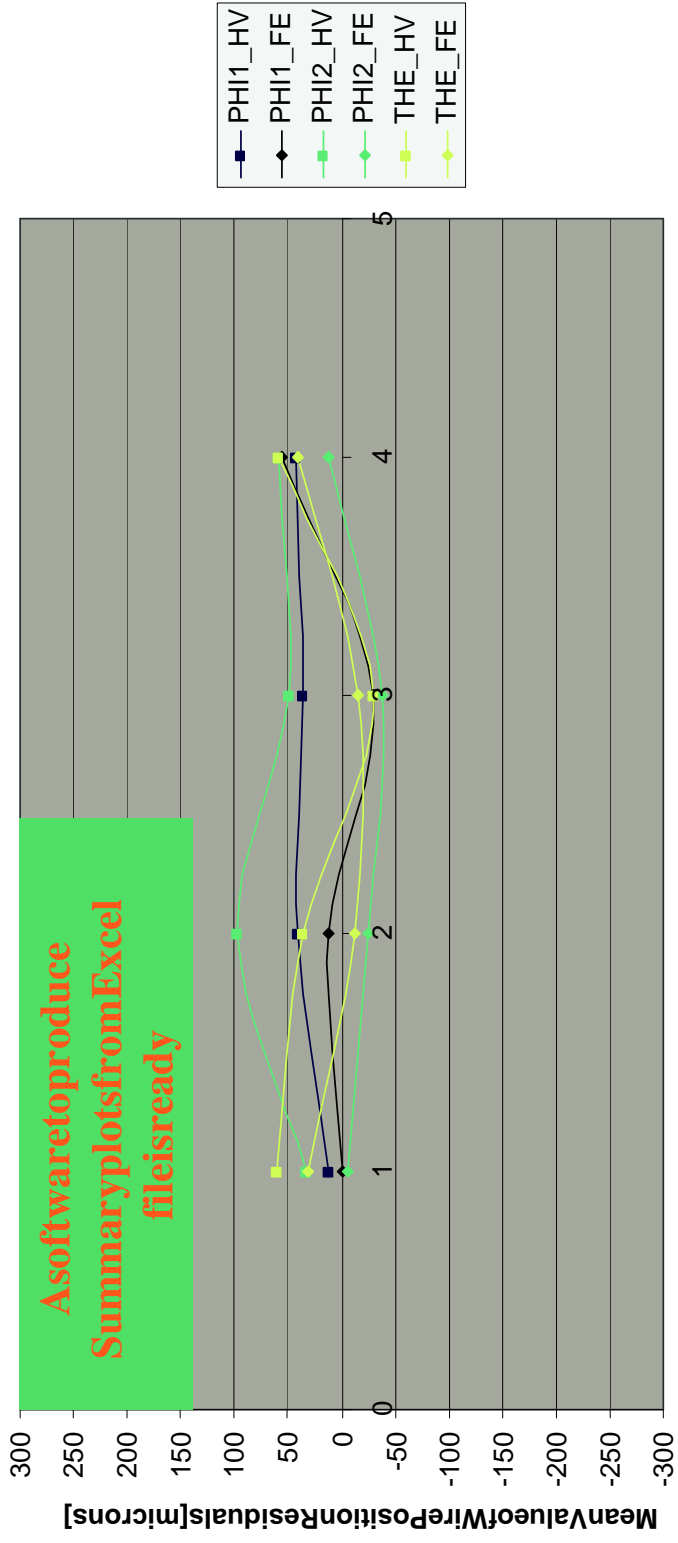
Summary QC Test Results

Summary Plots

On the Central Web QC page. Analysis of the Excel file

<http://www.to.infn.it/activities/experiments/cms/SLQC/SLQC.html>

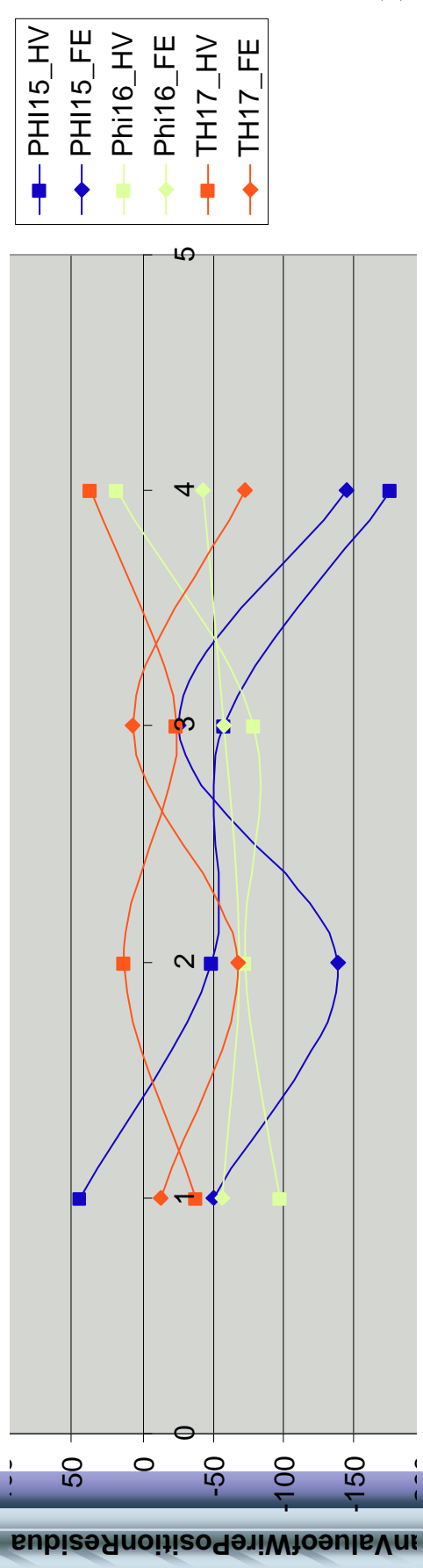
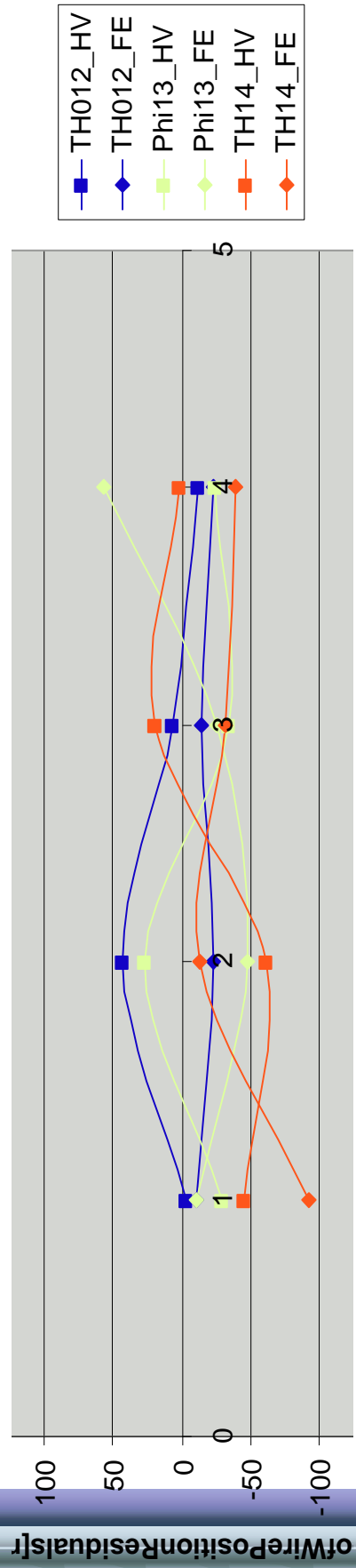
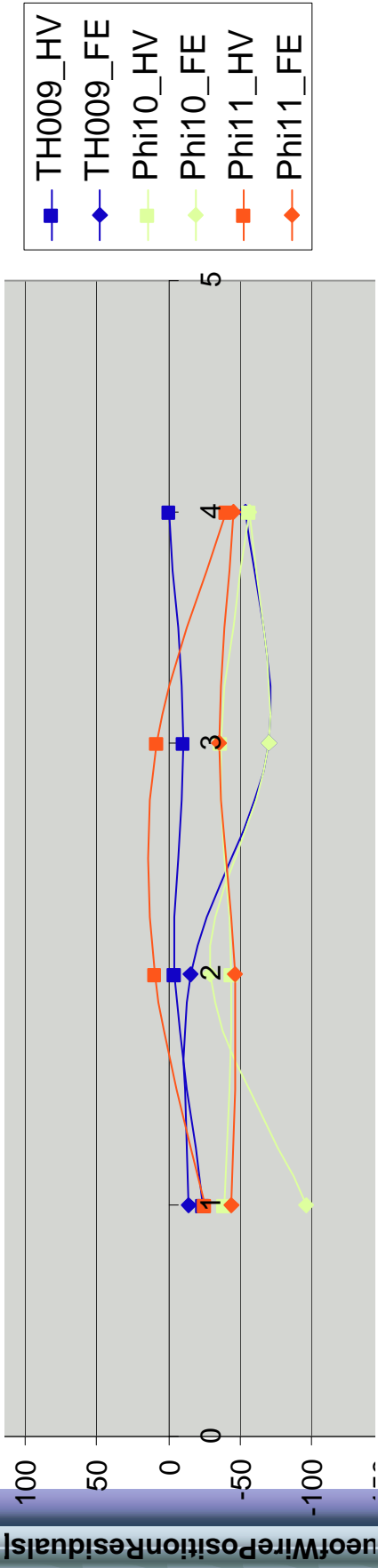
MB2_008-Mean Value of Residuals of Wire Position on FE and on HV side versus Layer Position

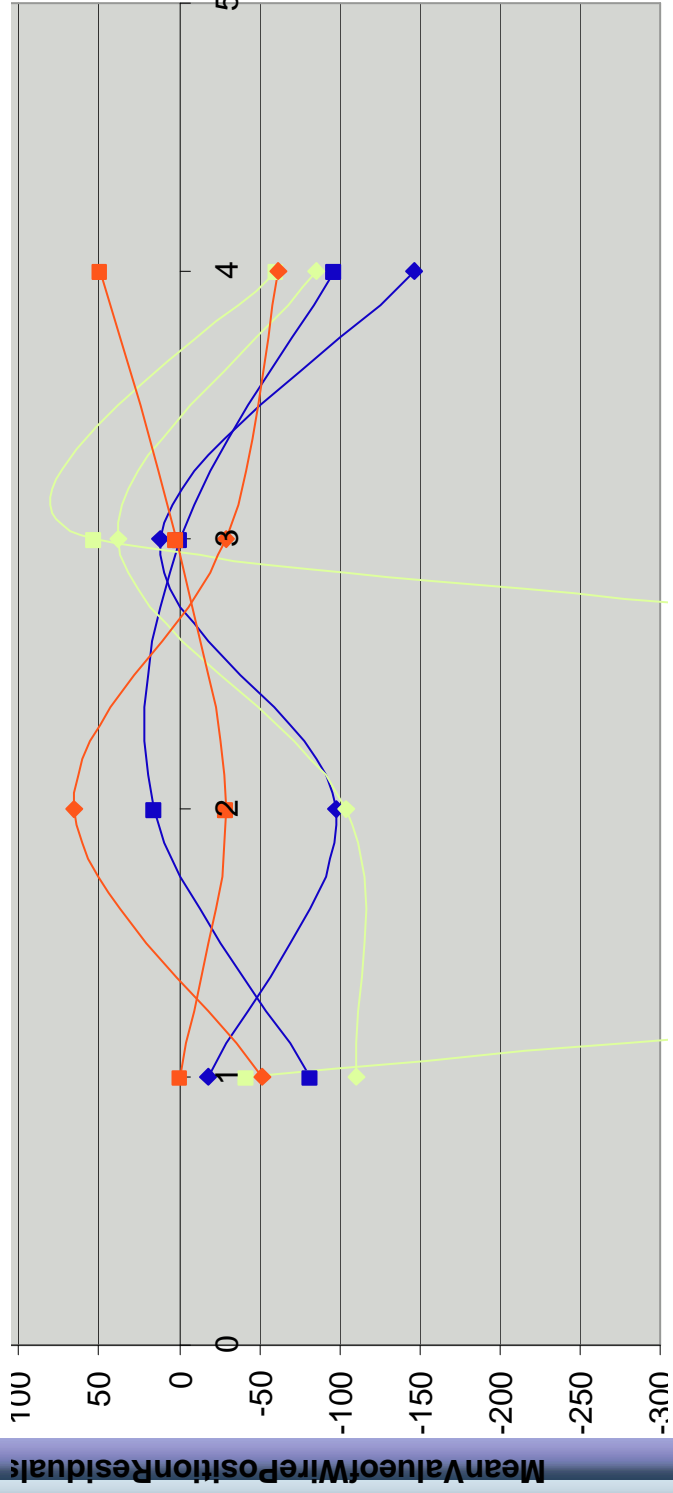
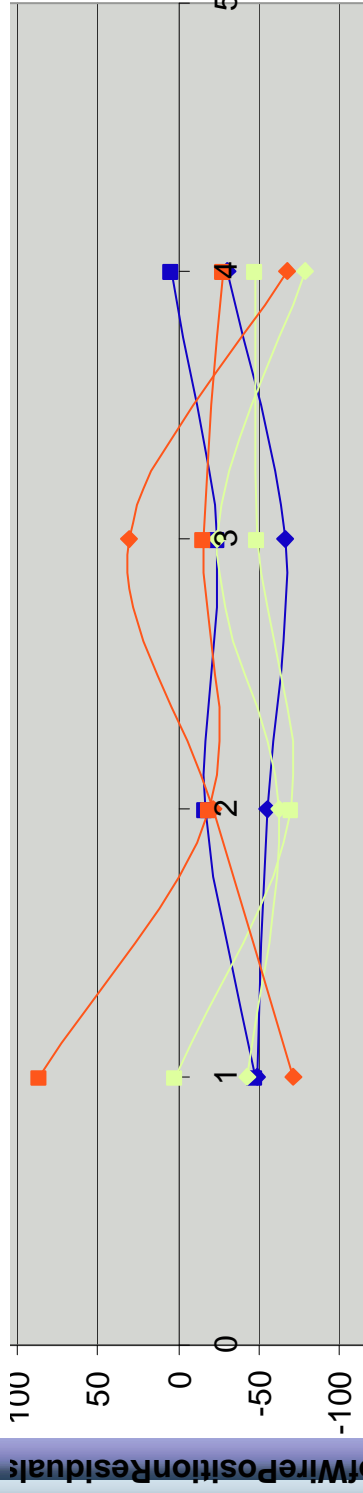


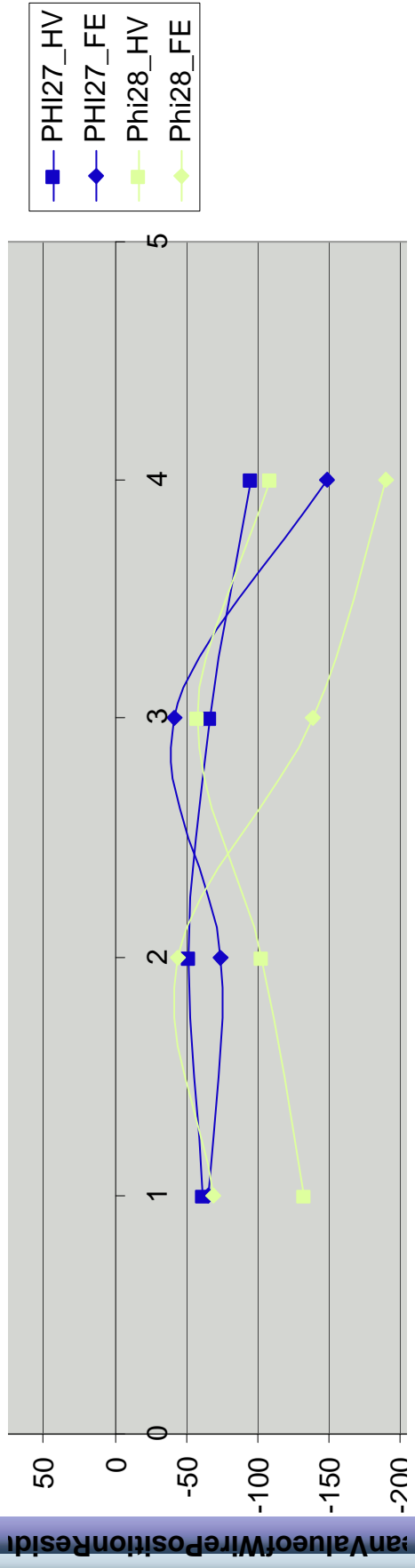
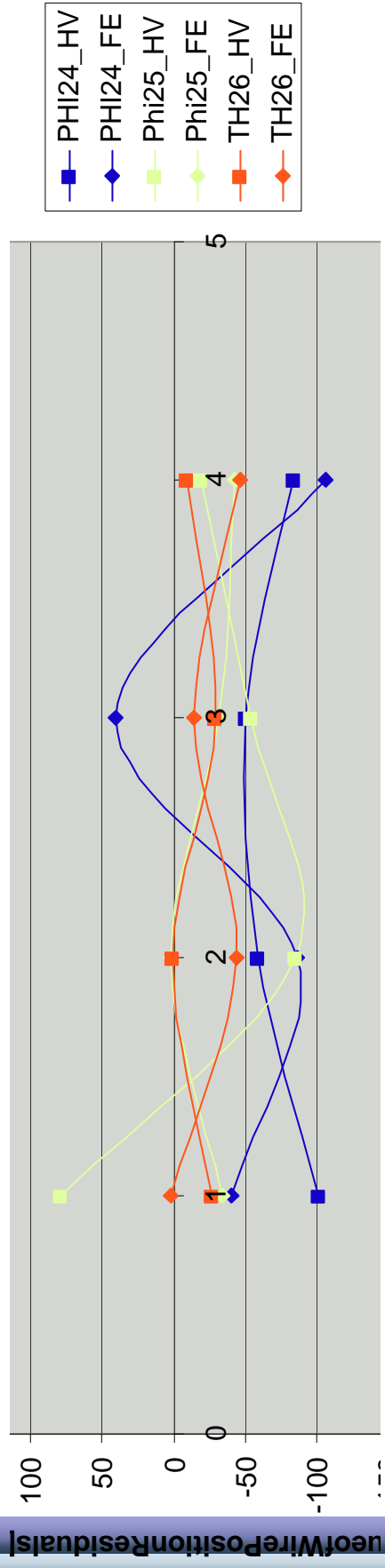


Summary QCTestResults

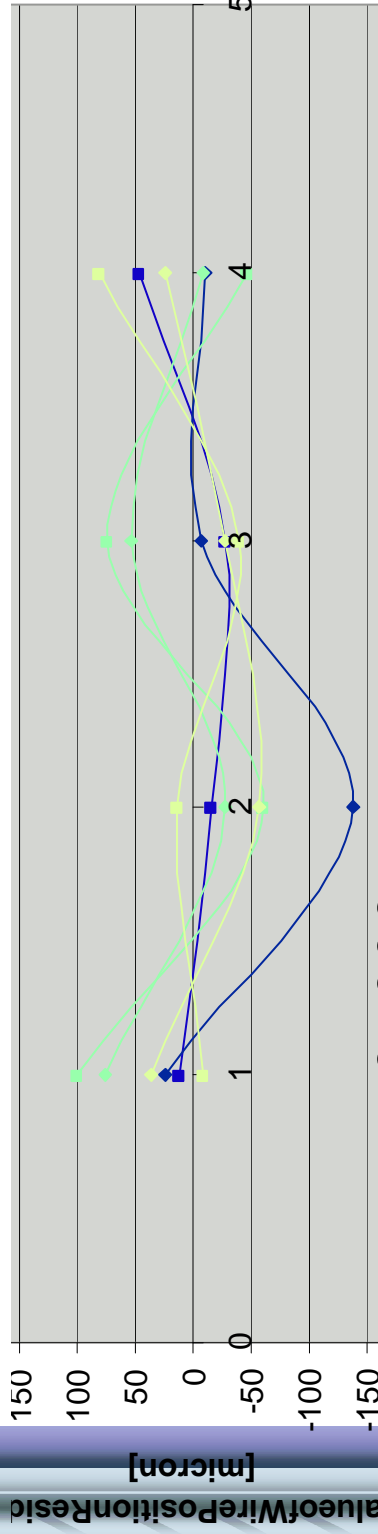
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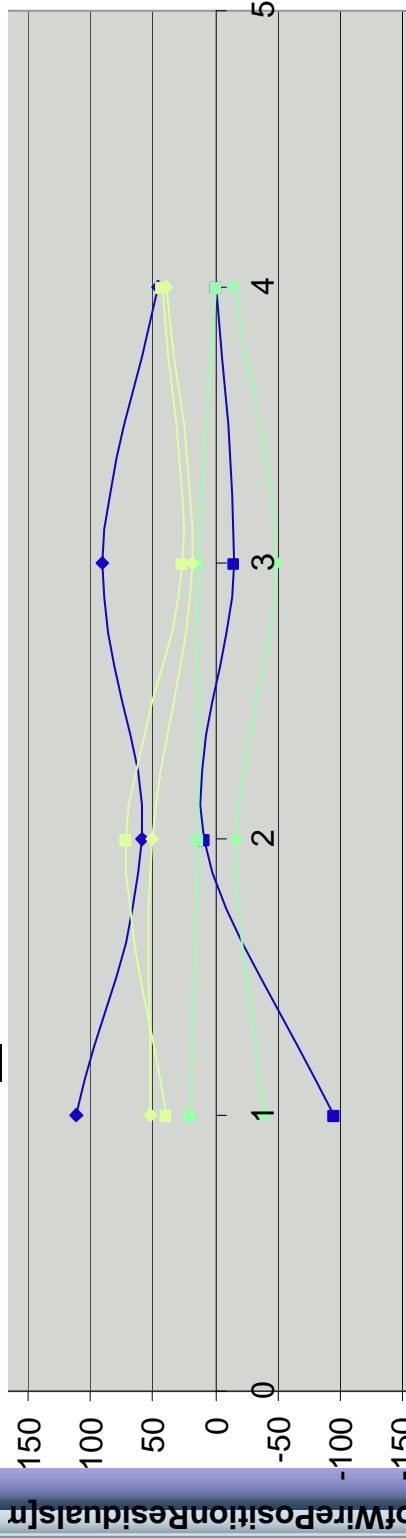




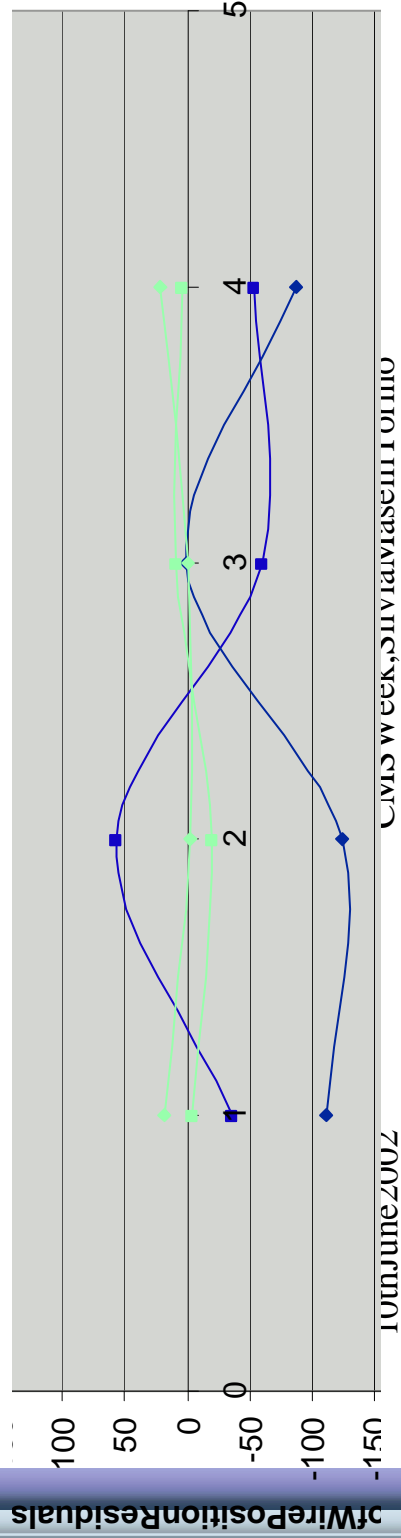
MB2_002



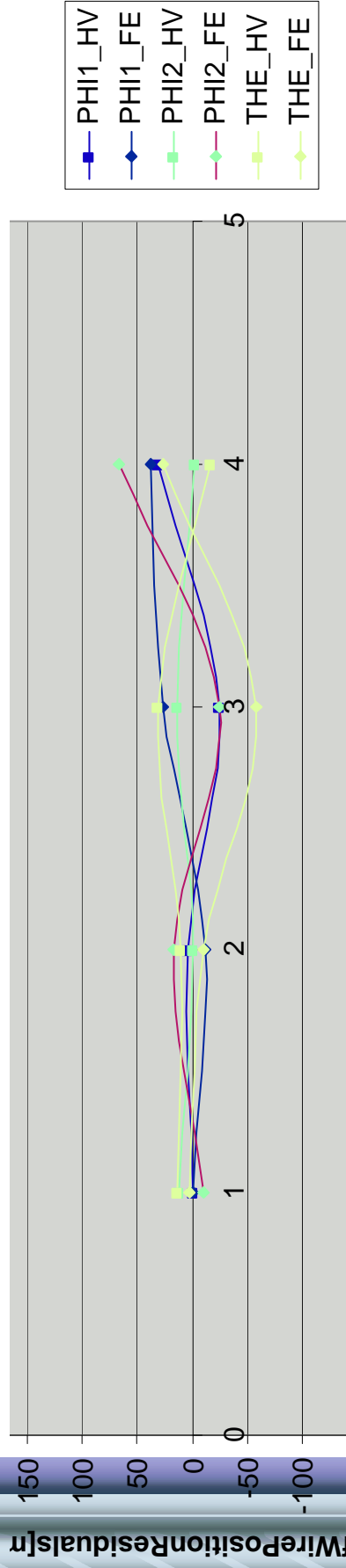
MB2_003



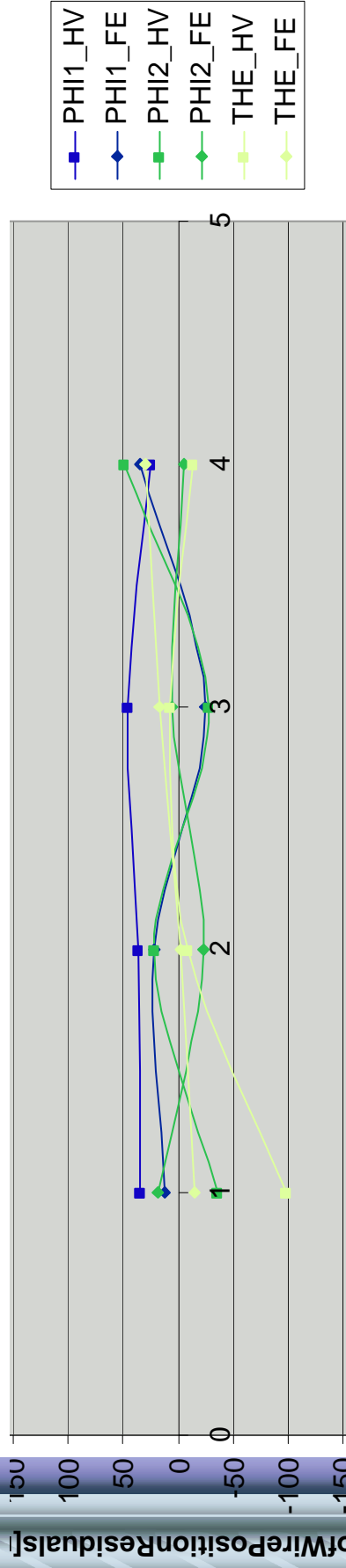
MB2_004



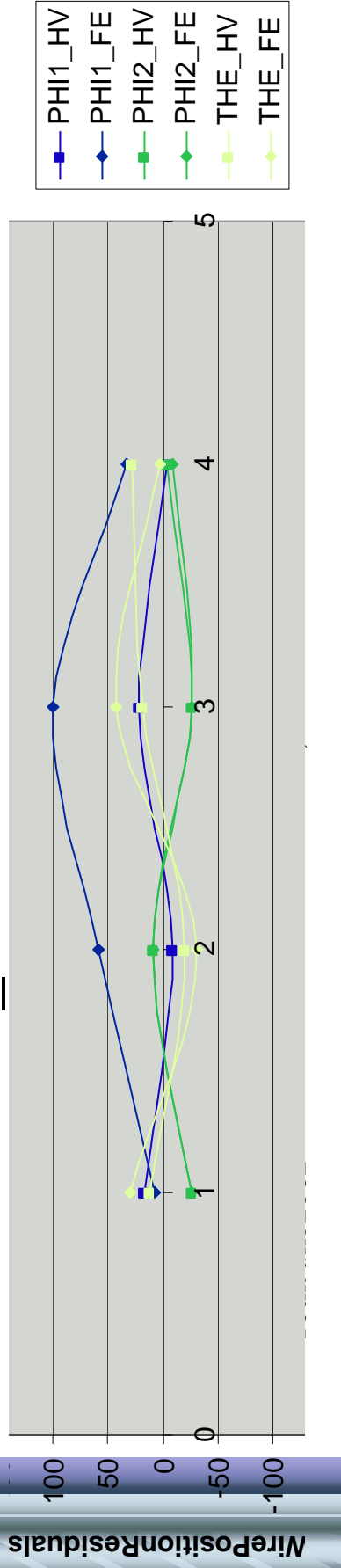
MB2_005



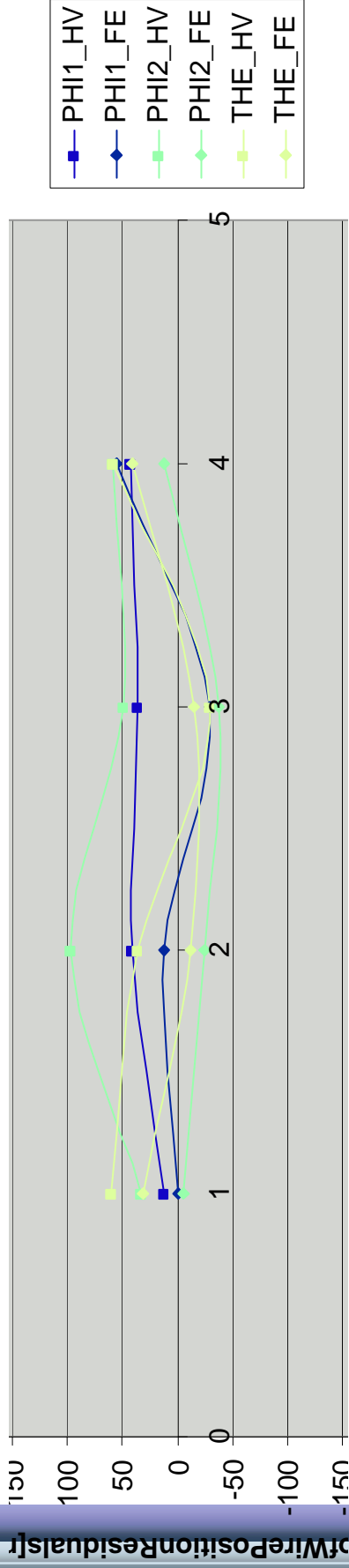
MB2_006



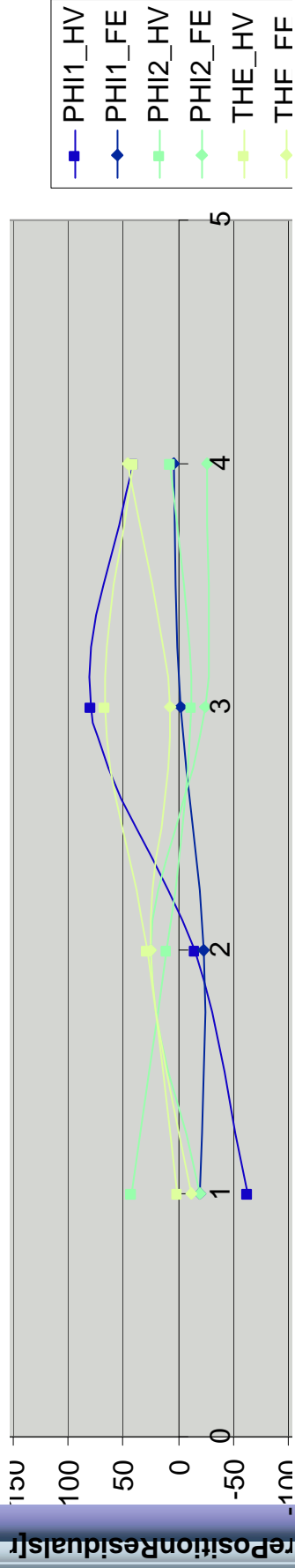
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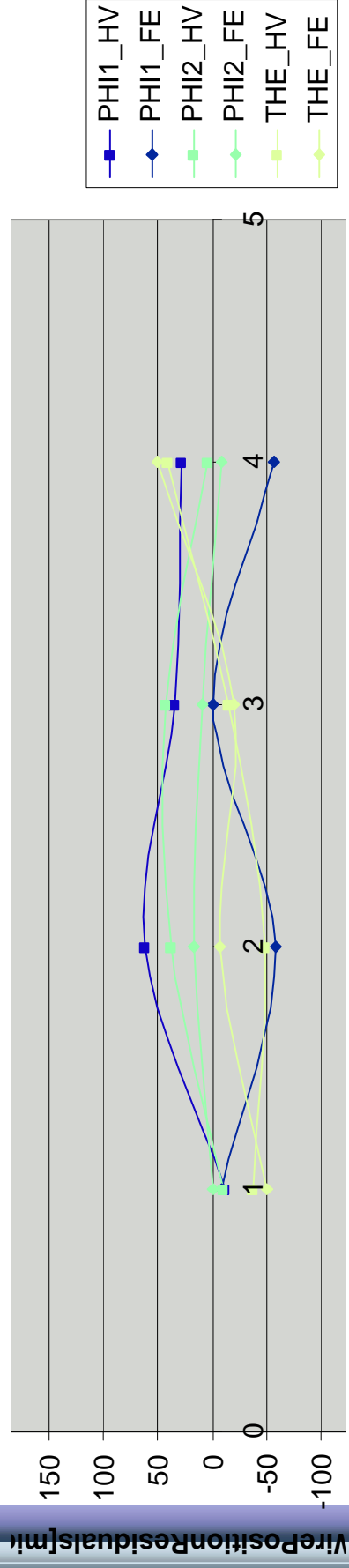
MB2_008



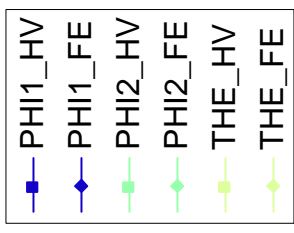
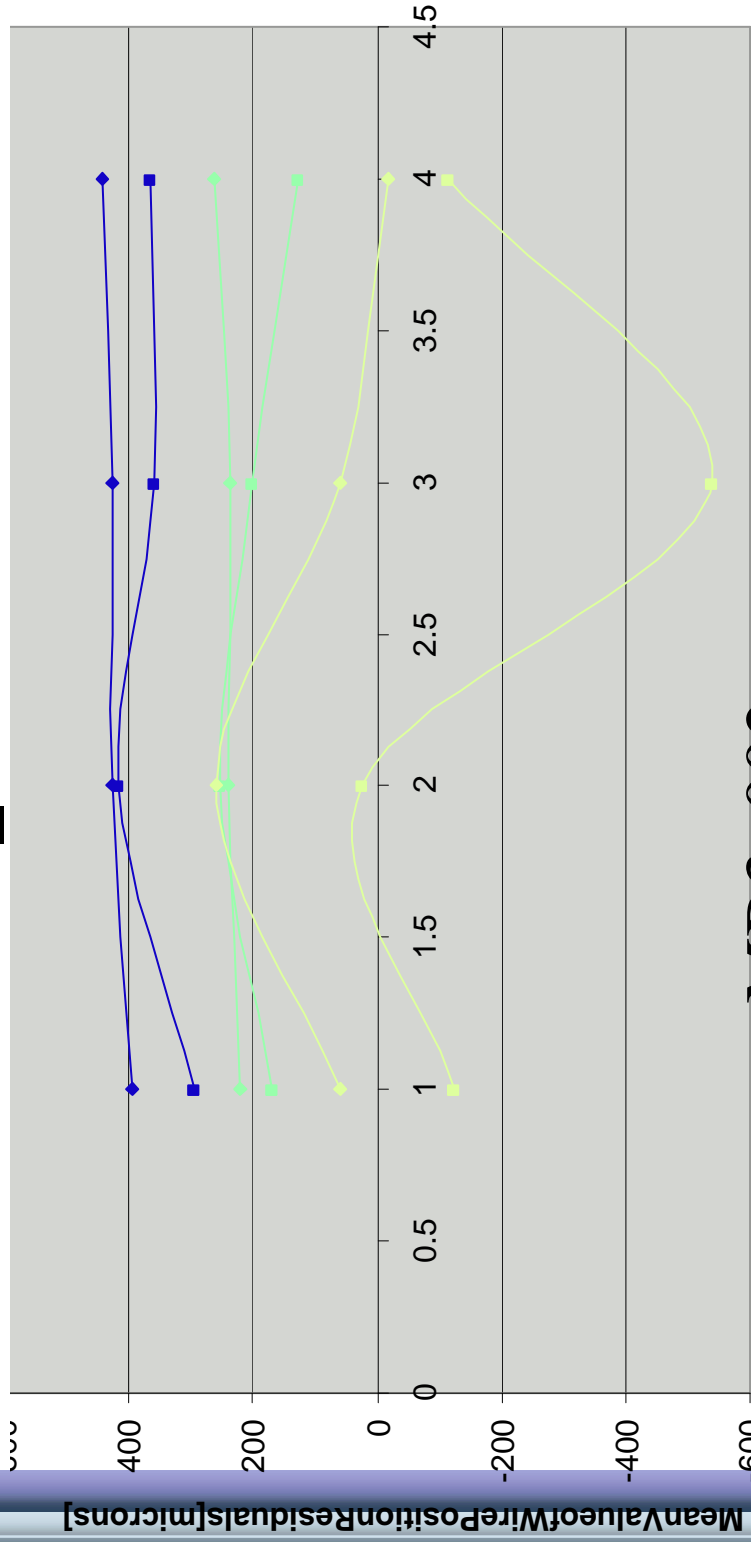
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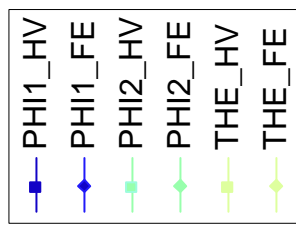
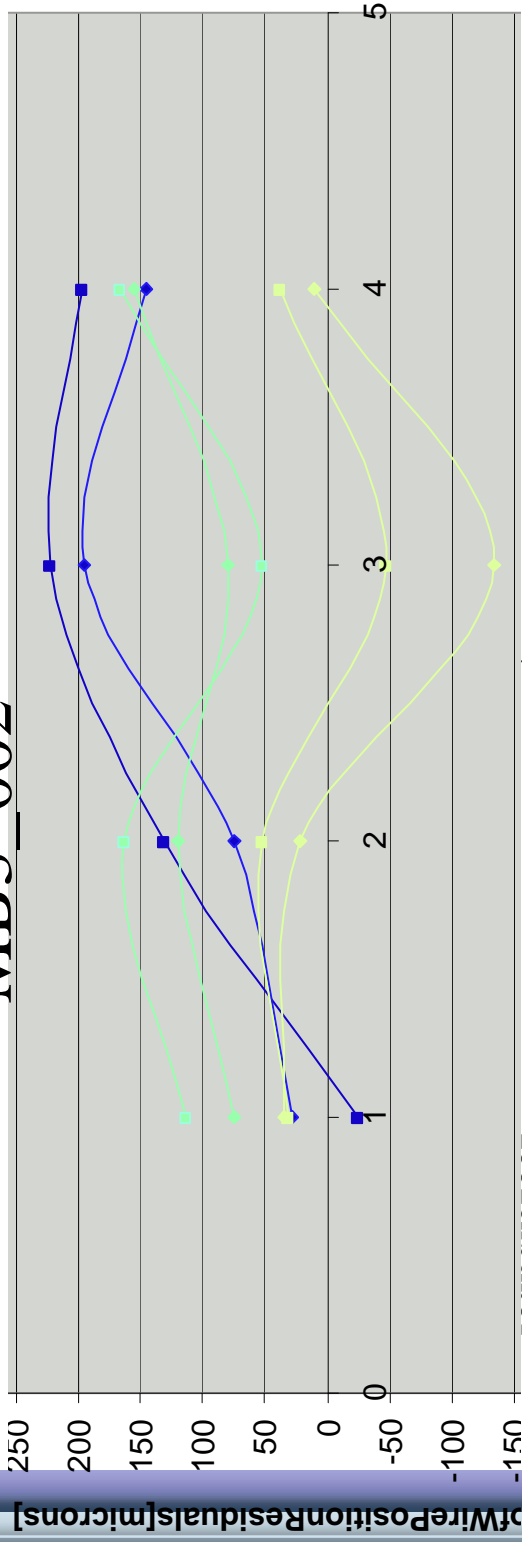
MB2_011



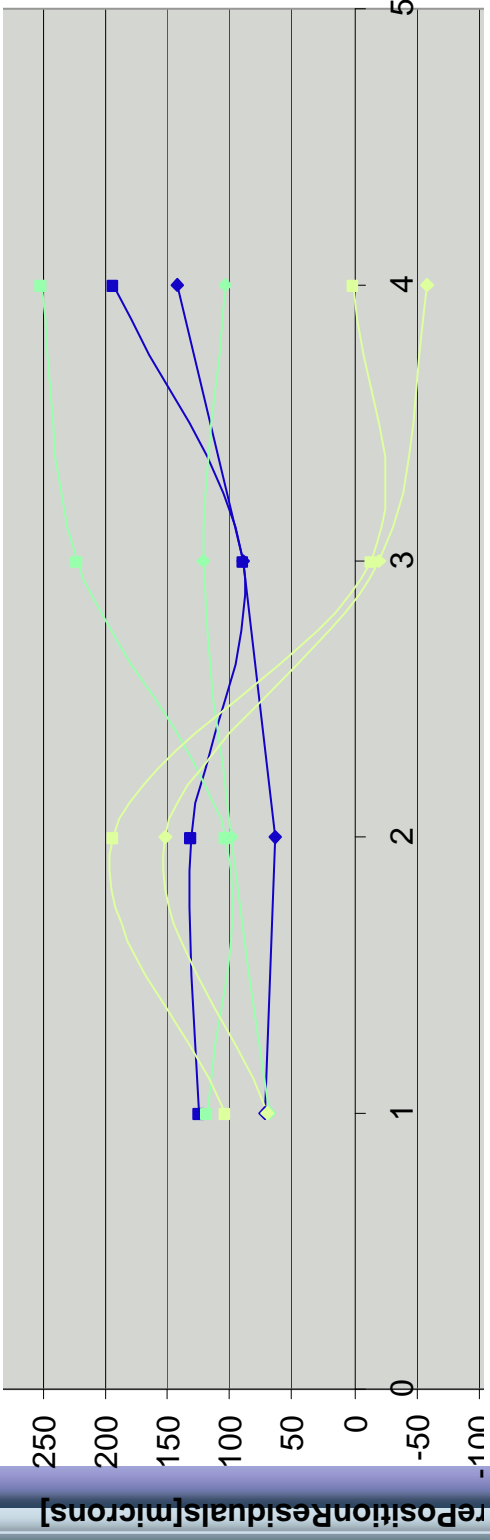
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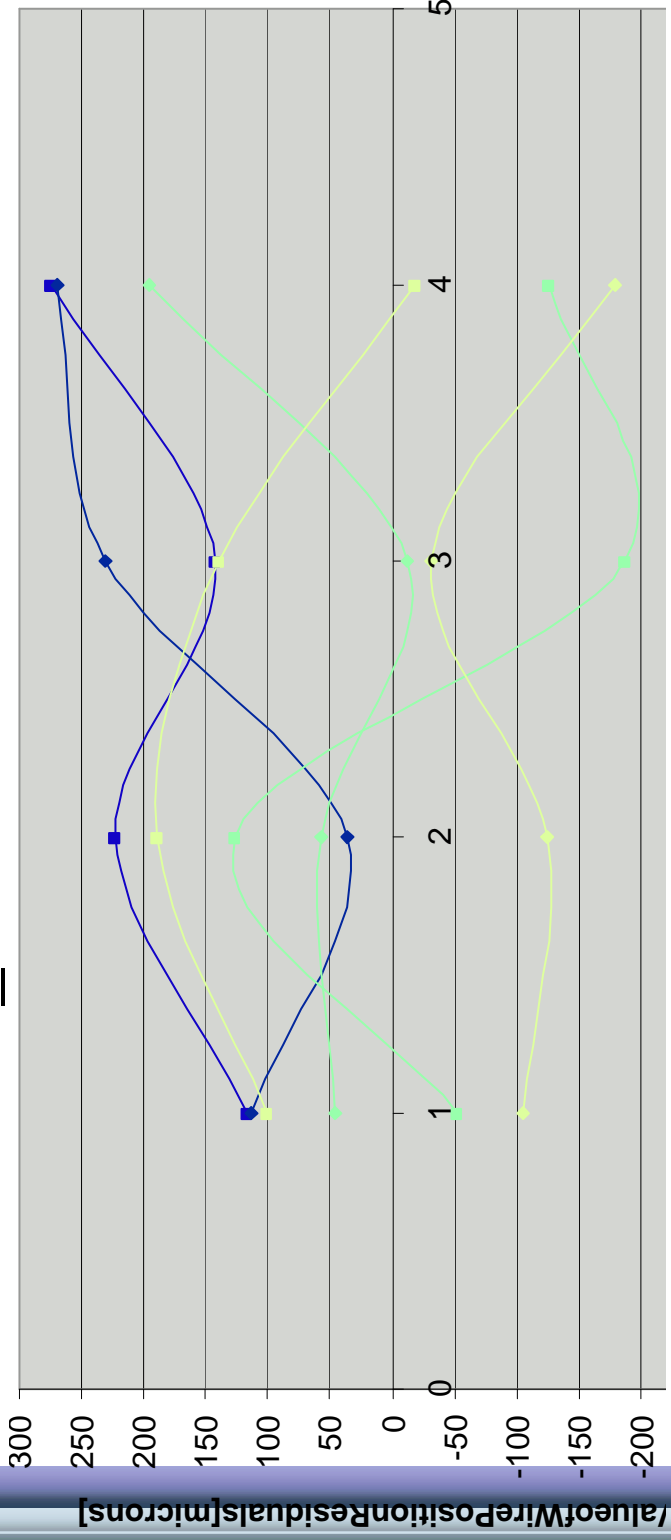
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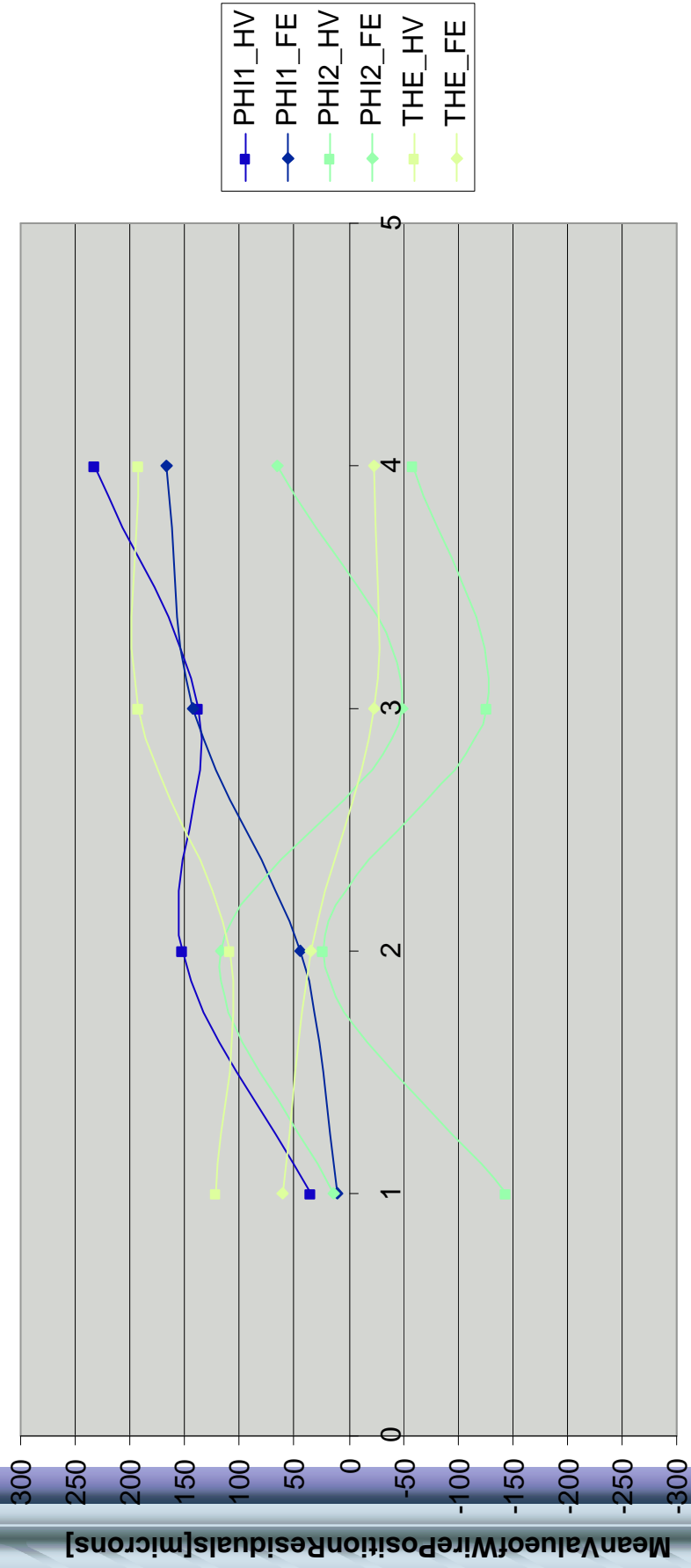
MB3_003



MB3_004

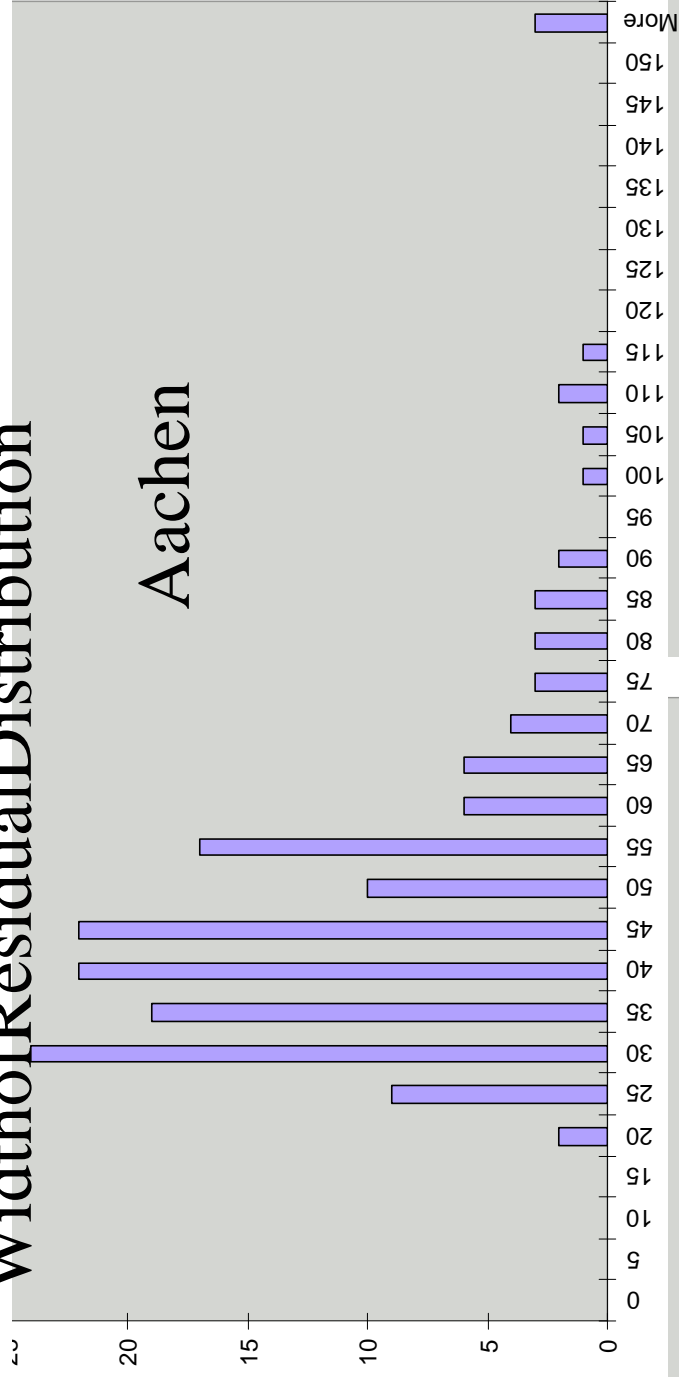


MB3_005-MeanValueofResidualsofWirePositiononFEandonHVsideversusLayerNumber

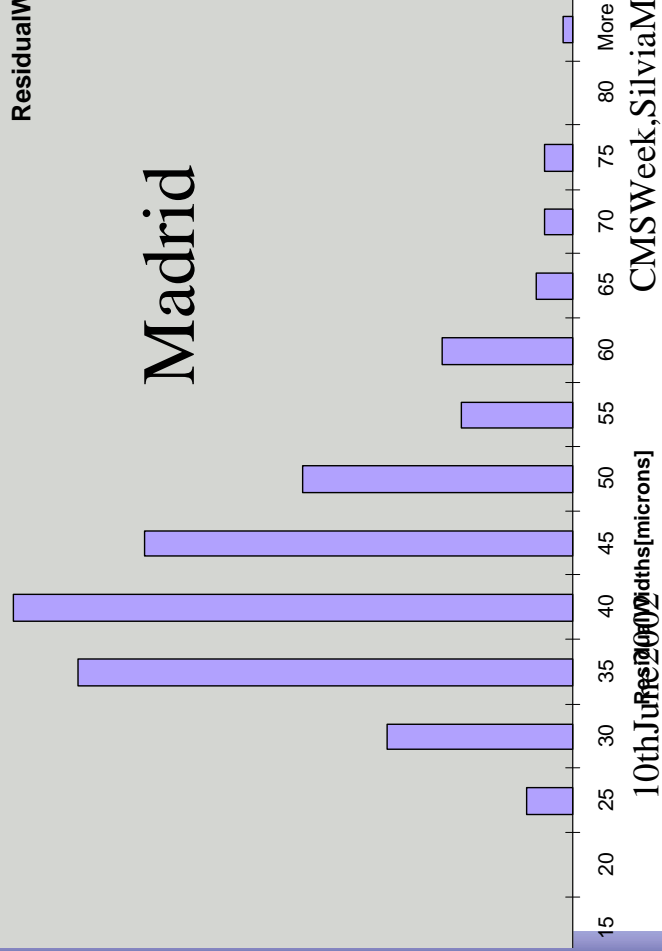


Width of Residual Distribution

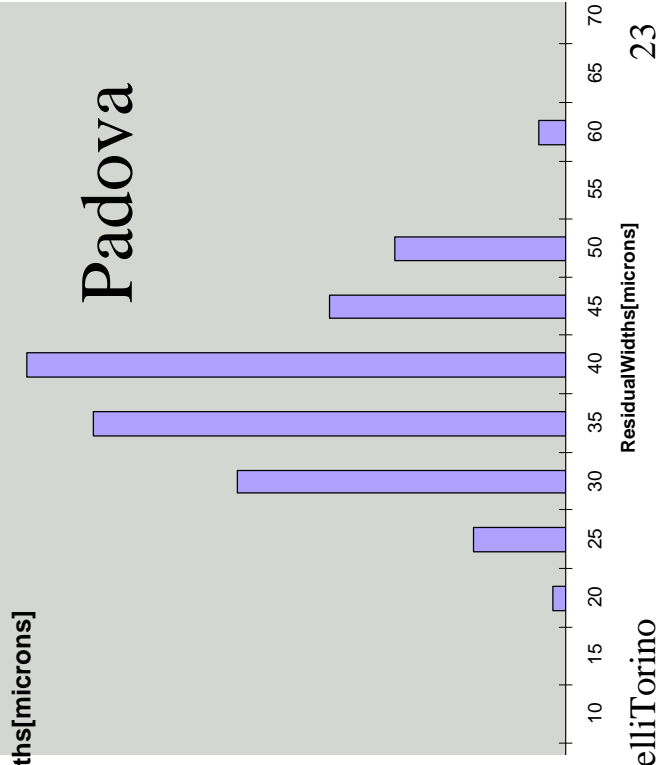
Aachen

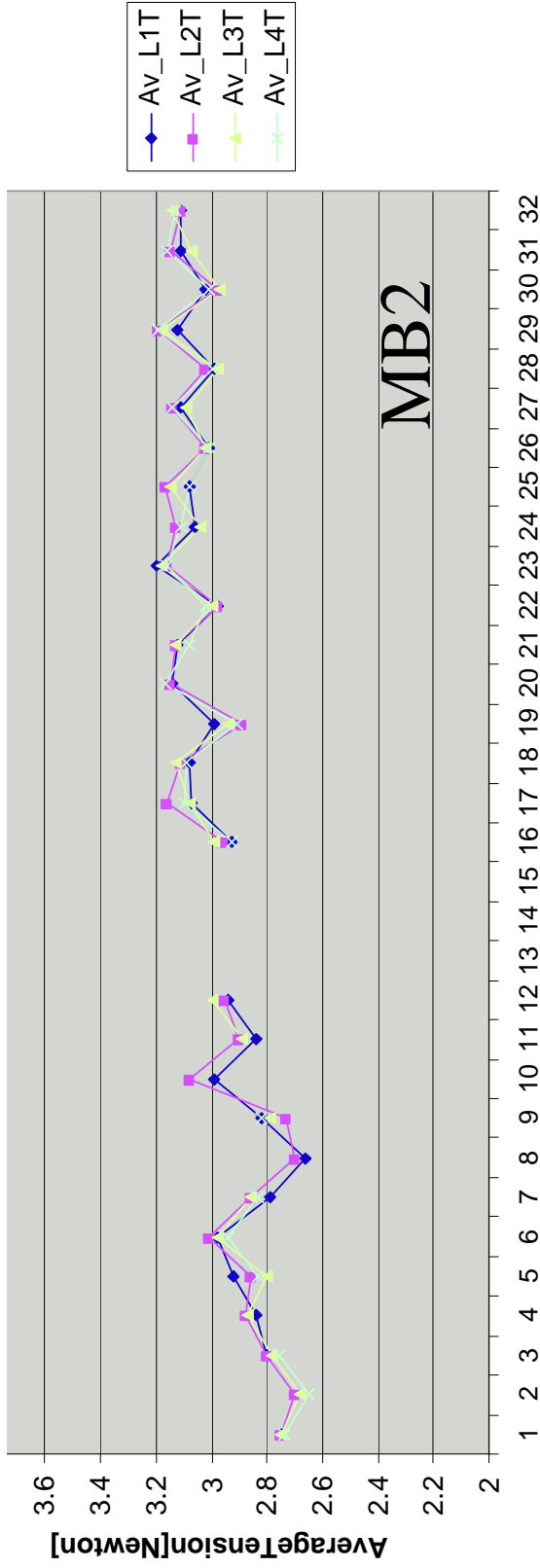
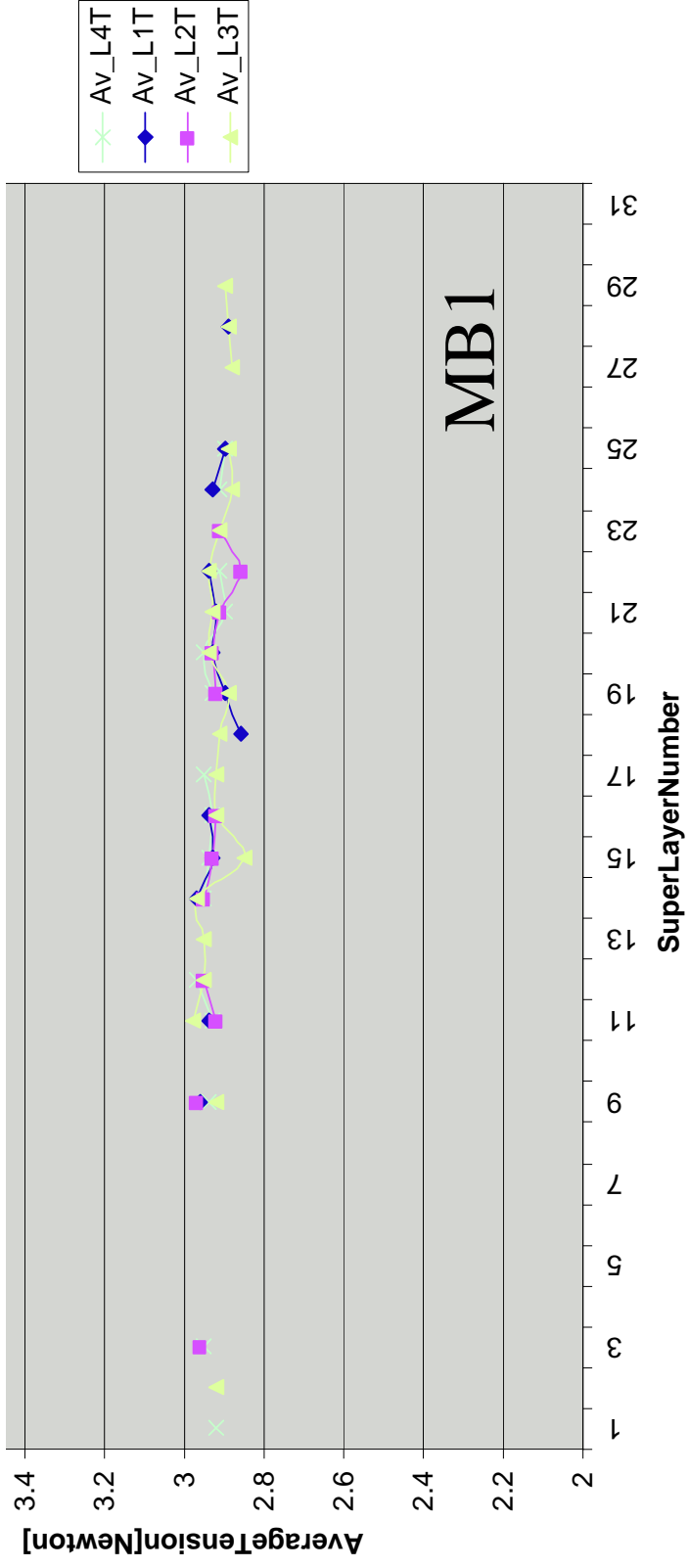


Madrid



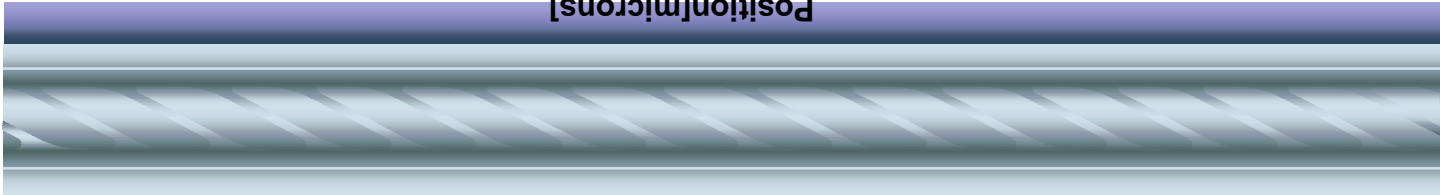
Padova



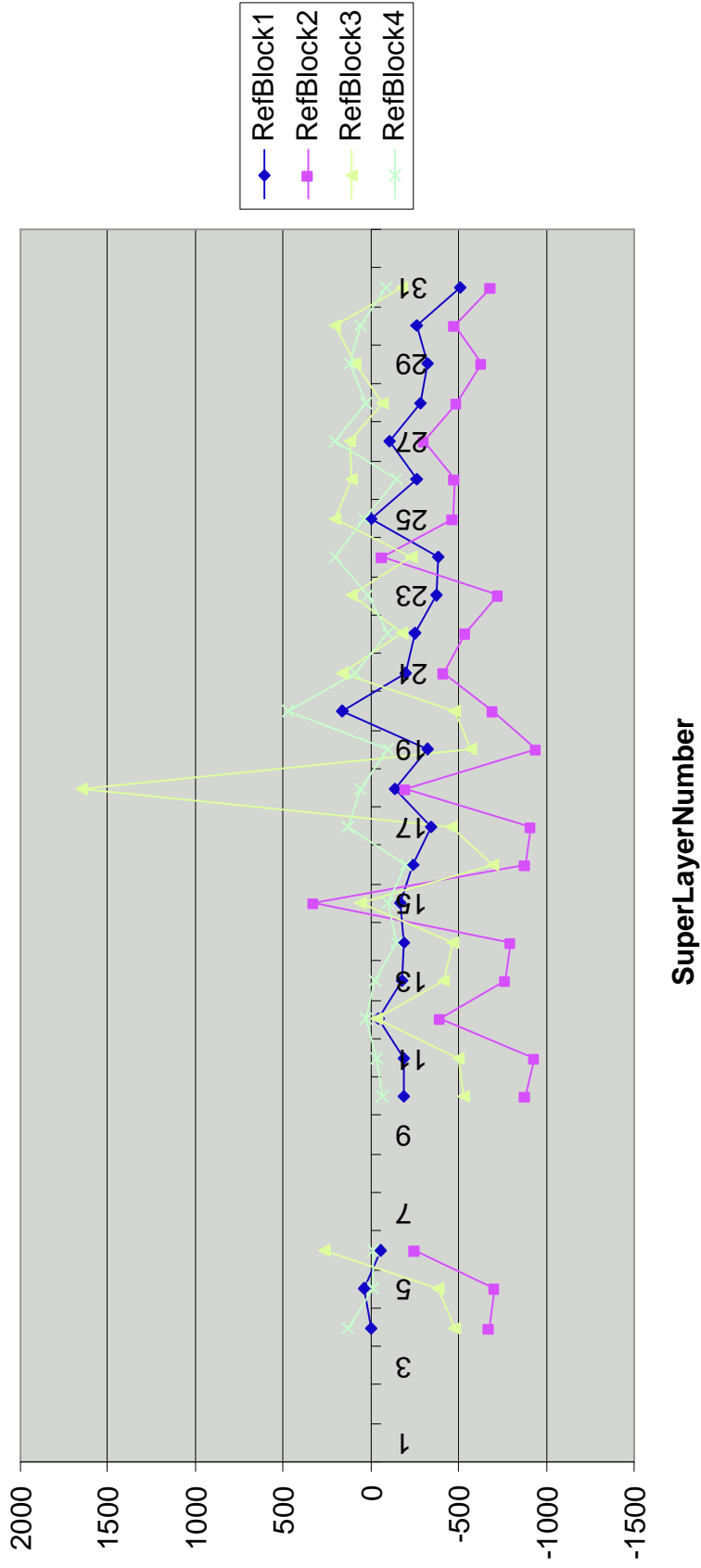


10thJune2002

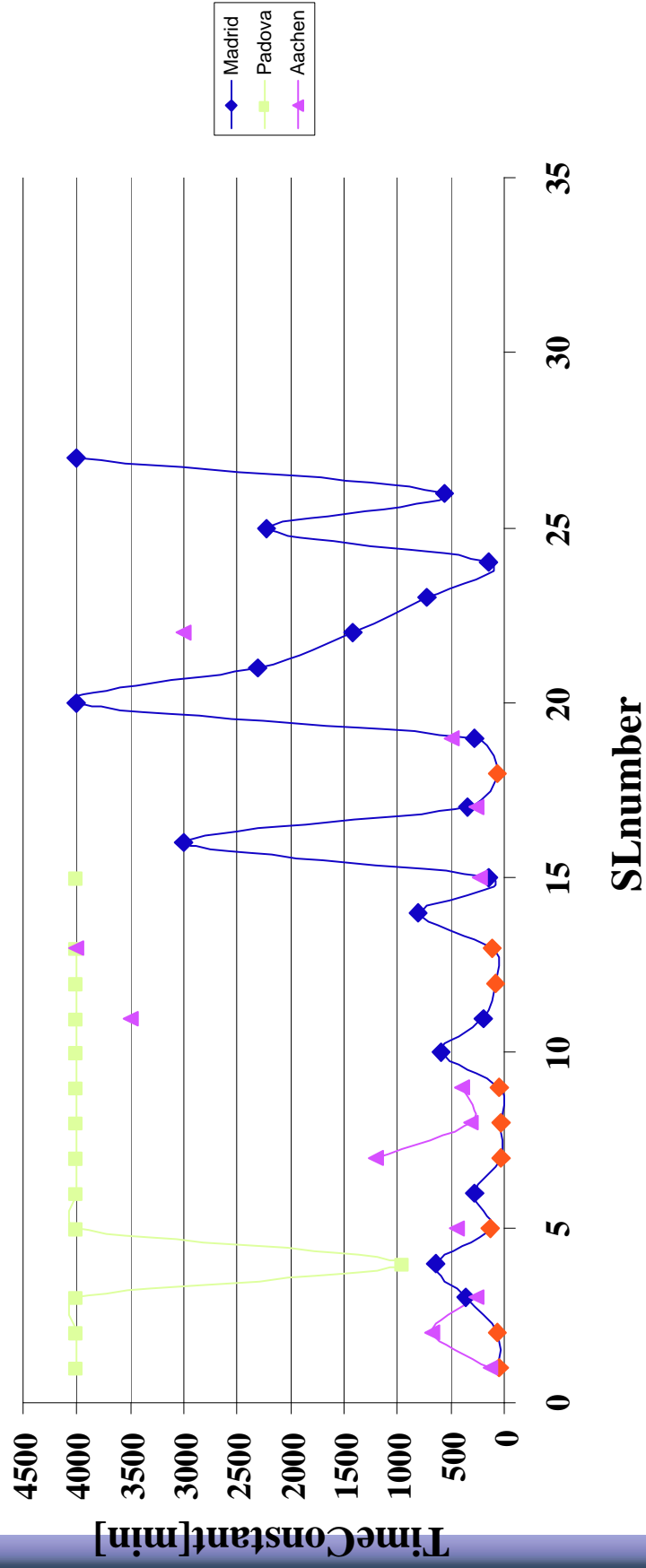
SuperLayerNumber
CMSWeek,SilviaMaselliTorino



MB2ReferenceBlocksPositions



GasTightnessQCTest



NumberofDisconnectedChannelsineachSL

