PARALIGN®
Editor

Functional Overview
Software Version 1.9

Contents

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Version

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1) INTRODUCTION

The PARALIGN Editor can be used to view measurements taken with the PARALIGN. It can produce a graphical representation of the vertical and horizontal offsets of rolls present in various industries.

Summary of PARALIGN Editor Functions:

The PARALIGN Editor can be used for the following:

- Drawing the schematic of the plant's machine setup.
- Displaying offsets showing operator and machine side.
- Comparing measurements to a particular reference point.
- Choosing any point as the desired reference.
- Adjust the length of the rolls.
- Importing results on to an excel spreadsheet as final protocol.

PARALIGN Editor provides a number of different views that are described later in the views section. The main advantage of the PARLIGN Editor is that the software is able to calculate the offsets of the rolls compared to any chosen reference point.

2) Overview of Functions

2.1 PARALIGN Editor Window:

When the software is executed, an empty PARALIGN Editor Application window (Figure 1) appears.

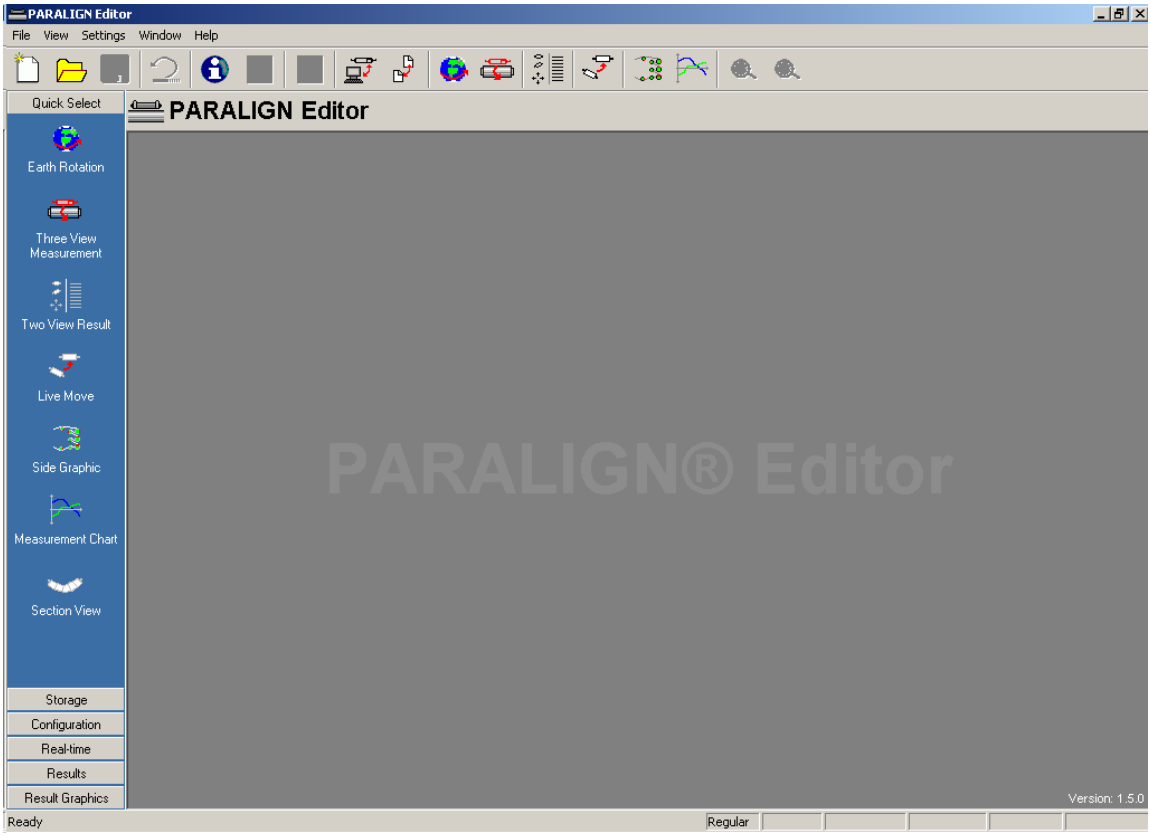


Figure 1

From this point onwards, it is also possible to choose a new file, choose an existing file or even to connect to the device by clicking on the appropriate icon or choosing the command options from the pulldown menus.

2.2 Menu Bar

The functions in the pulldown menus are also available by clicking on the icons (some of them).

This section contains the following topics:

- Pulldown Menu: File
- Pulldown Menu: View
- Pulldown Menu: Settings
- Pulldown Menu: Window
- Pulldown Menu: Help

2.2.1 Pulldown menu: File

Menu Item	Function	Icon
New	Create a new file.	
Open	Open an existing file.	
Join	To join two existing files onto one.	
Save	To save a measurement file.	
Save As	To save a measurement file with a desired name.	
Export	To export a measurement file to excel sheet.	
Import	To import measurement file from excel back to editor.	
License	Option to request and activate the PARALIGN.	
Update	To update firmware.	
Exit	To close editor.	

2.2.2 Pulldown Menu: View

Menu Item	Function	Icon
Tool Bar	Shows the toolbar with icons.	
Status Bar	Shows the bar on the bottom showing cone angle etc.	
Quick Bar	Shows different options or menu choice.	

2.2.3 Pulldown Menu: Settings

Menu Item	Function	Icon
Device	To set the device in use, cone angle, voice control, communication ports and measurement settings.	
Analysis	To check units of measurements and set the filter to be used.	
User	To input the user info like name, company, phone number etc. that will be exported on to excel sheet.	
Directory	Locations of data or templates stored.	
Excel	Desired data chosen to be exported to excel.	

2.2.4 Pulldown Menu: Window

This option helps in changing to the desired view. It is a different way to select the desired window to be displayed on the screen.

2.2.5 Pulldown Menu: Help

Menu	Function	Icon
About Editor	Shows credits	

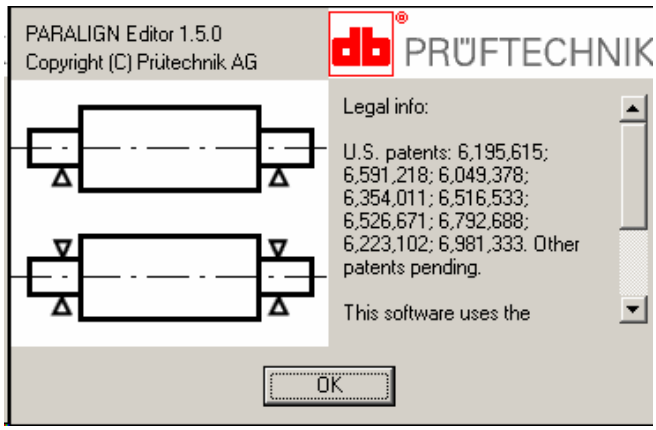
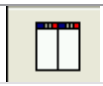


Figure 2

2.3 Tool Bar

Icon	Name	Function
	New	To create a new file.
	Open	Opening an existing file.
	Save	Save a file
	User Info	Retrieve user information.

	Tile Windows	Tiles windows horizontally if more than one is open.
	Tile Windows	Tiles windows vertically if more than one is open.
	PC Connection	To establish connection between computer and PARALIGN.
	File Transfer	To transfer files to and from PARALIGN.
	Earth's Rotation	To calibrate the rotation of the earth.
	Three View Measurement	To View the measurements being obtained with their respective roll names.
	Two view measurement	To view the results along with their positions on the operator and machine side.
	Live move	To make a live measurement using the PARALIGN (like a level reader)
	Side View	To view the results in a graphical representation.
	Measurement Chart	To view the angle of movement (of the PARALIGN on the roll)
	Zoom In	To zoom in to the picture
	Zoom Out	To zoom out of the picture.

3) Functions

The PARALIGN Editor offers a large number of different functions for creating, modifying measurement files and for viewing the results obtained. These functions are described further in this section.

This chapter contains the following sections:

- Setting up a new file
- Connecting to the PARALIGN device
- Calculating the Earth's Rotation
- Measurement Results
- Tolerance
- General Settings
- Quick Select Functions

3.1 How to activate functions

There are various methods for activating functions. In most cases, only method is described in the procedures outlined in this instruction manual.

- Using icons in the tool bar.

Example:  opens a file.

- Using keyboard shortcuts.

Example: (Ctrl + N) enables the option of creating a new file.

- Using a pulldown menu

Example: **File ►Open**

3.2 Setting up a new file

To set up a new file, it is better to have a schematic of the plant/machine to be measured in order to reproduce the drawings or outline in the software. The customer's contact information, plant location etc. can also be input.

This section can be divided in to the following topics:

- Creating a new file.
- Creating rolls in the software.
- Connection between the computer and PARALIGN.

3.2.1 Creating a new file

Click on **File ► New**

After pressing "new" you are requested to choose the application (Figure 3) where you are doing the service. Remark: For the meaning of the tolerance criterion please see chapter 7.

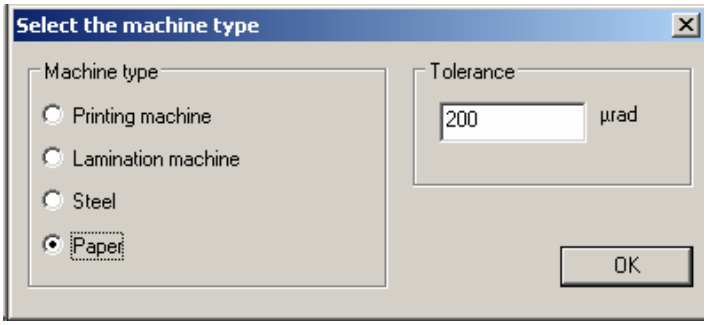


Figure 3

Following that the session-info (Figure 4) box appears where it is possible to input the customer details.

Figure 4

When the new session has been created, new windows will appear on the editor screen (Figure 5).

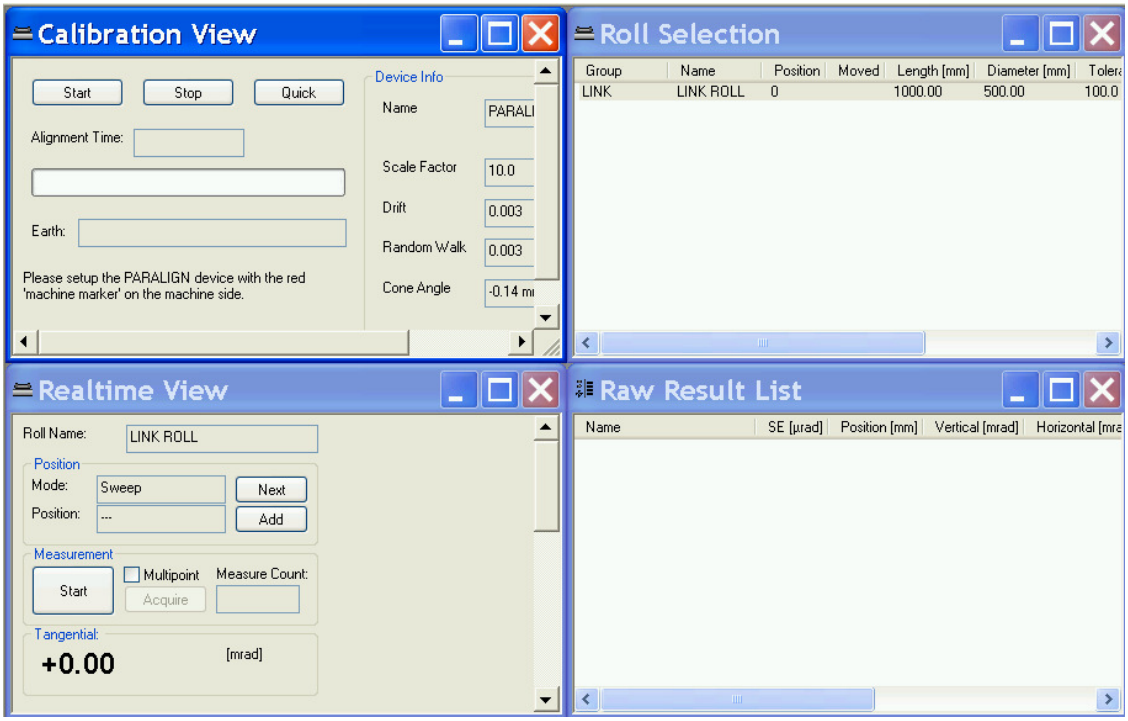


Figure 5

3.2.2 Creating rolls in the software

Click on ► **Side View/Side Graphic**

As a default roll for all applications, the link roll is automatically implemented in the software/side view (Figure 6). The link roll is the most important roll for the measurement. It serves to link different earth rotations with each other. (For details about linking itself and the repeatability requirements for measuring the link roll, please see 3.3.3.1)

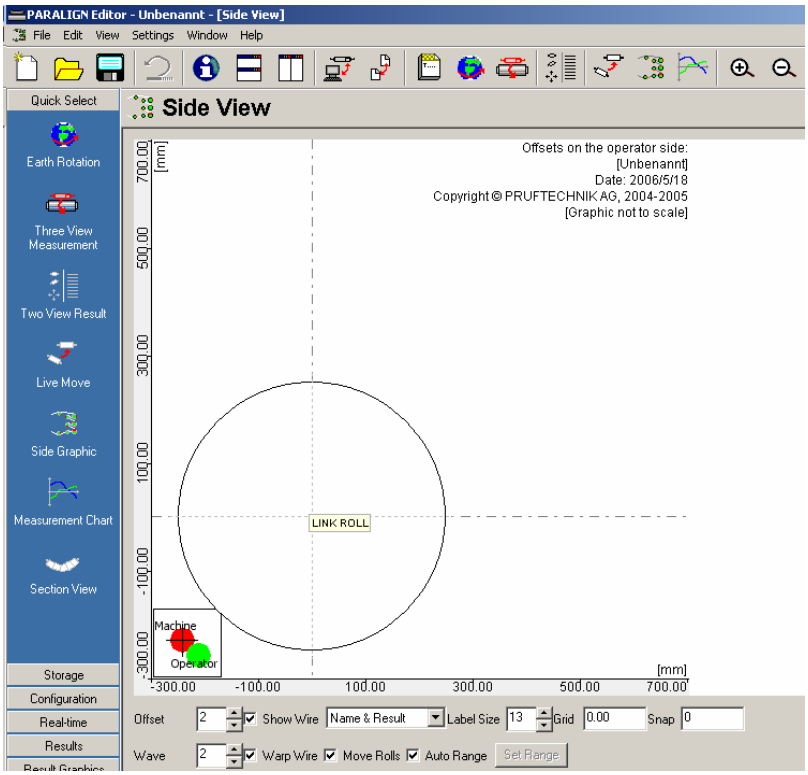


Figure 6

By double clicking on the Link Roll all information like the diameter, length, name etc. can be filled in the information dialog box (Figure 7).

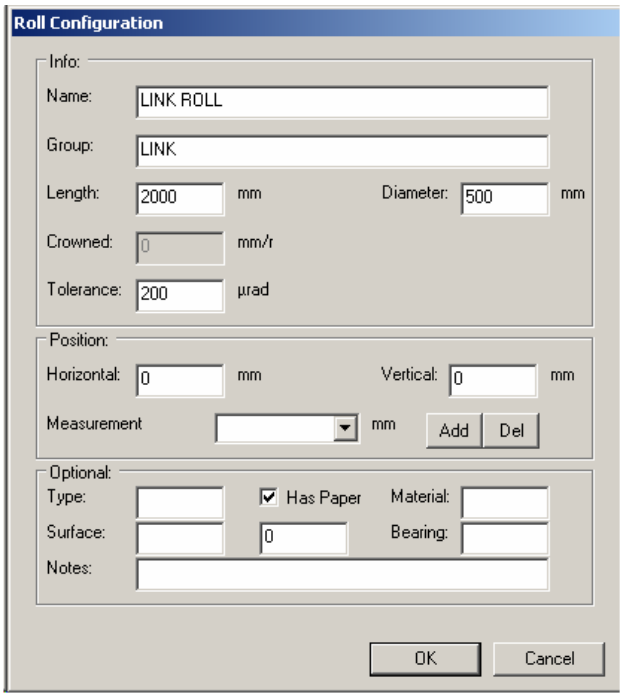


Figure 7

Name of the roll: for example Link Roll

Group: the paper flow touches only the rolls with the same group name. That makes it possible to implement more felt/wire in a drawing.

Length of the roll: The center of bearing housing to bearing housing of each roll**,** for example length 2000mm.

Diameter of the roll: for example diameter 500mm.

Tolerance: tolerance from the roll. For the meaning of the tolerance criterion please see chapter 6.5.

Measurement: Used to add different positions on the roll to be measured. (Example: Operator, Middle, Machine). By clicking the “Add” button this brings up the measurement mode window (Figure 8). By pressing the “Next” button choose the position. It is also possible to choose the measurement mode (usually Sweep). Click “ok” and the measurement mode window closes automatically. (This is also explained further in section 6.2 Segment rolls.)

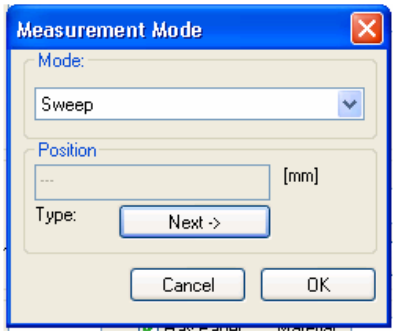


Figure8

Horizontal/Vertical: position from the roll in the coordinate system.

Has paper: By enabling the function "has paper", it makes a stylized band touch the rolls.

Set paper flow: By numbering the rolls, you can choose in which order the rolls are touched by the paper.

To add a new roll apart from the default link roll, go to the side view, click the right mouse and enter a roll by clicking “insert roll” (Figure 9). Following that the roll configuration window appears for the properties from the roll.

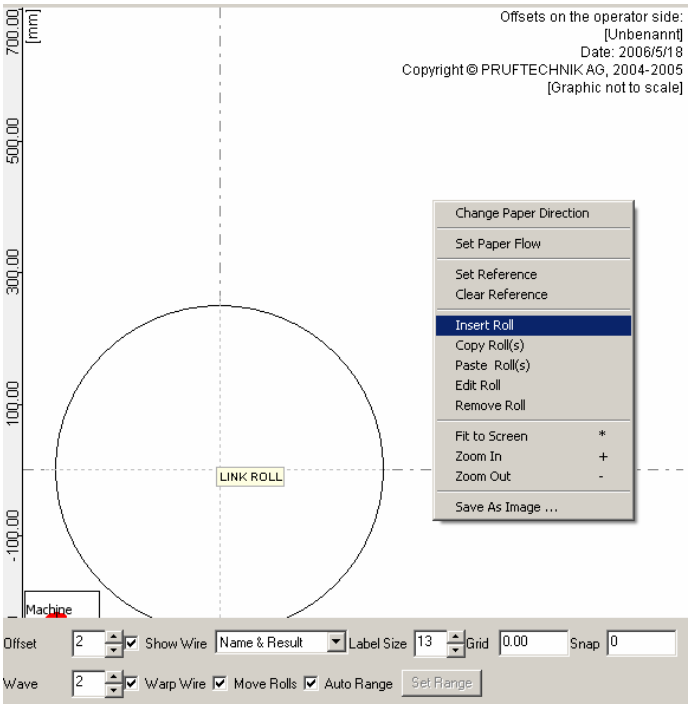


Figure9

Repeat these actions for all the rolls that need to be implemented in the side view.

As an alternative to the procedure above:
Click the right mouse or type “A” in the window « roll selection » (Figure 5). This will enable to input the characteristics of each new roll. - After the desired roll has been selected in “roll selection”, it appears in the “side-view”.

Creating rolls faster

It is possible to copy rolls. Highlight the roll(s) to copy (Figure 10) click the right mouse button and press “Copy Roll”. After this go with the mouse to the position for the copy rolls and press again the right mouse button and “Paste Roll” (Figure 11).

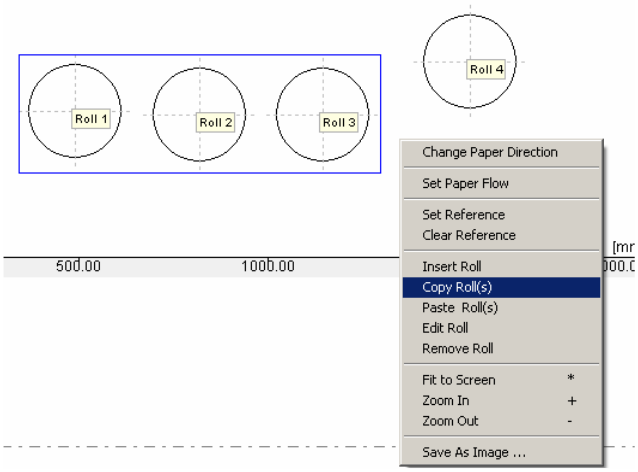


Figure 10

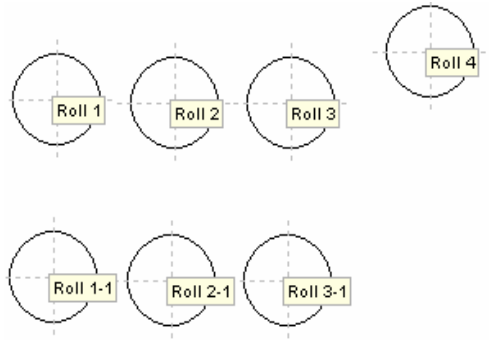


Figure 11

Multiple roll configuration

It is possible to edit more than one roll at the same time. This function is useful if for example the distance of the bearing housing distance is the same for e.g. two or more rolls, and needs to be changed.

Highlight the rolls by putting a rectangle on the rolls with left mouse, then press the right mouse button, and choose “Edit Roll” from the menu bar (Figure 12).

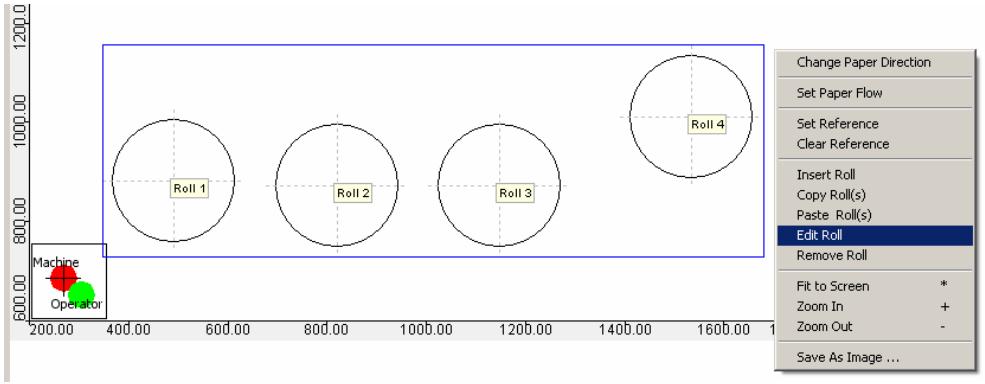


Figure 12

After this, the “Multi roll configuration” menu opens up (Figure 13), and you are able to change the group, length, diameter, tolerance, measurement position and has paper for all selected rolls simultaneously.

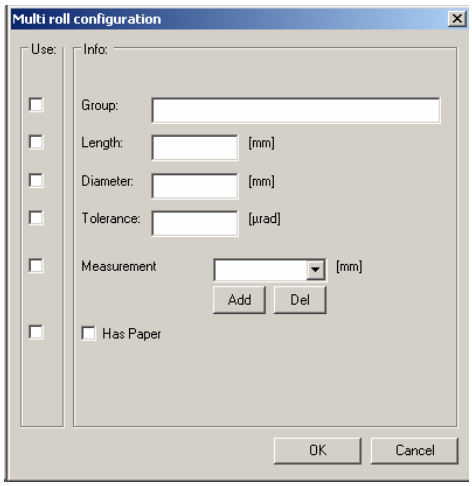


Figure 13

Groups of rolls

The paper is being transported through the paper mill with the help of wires and felts. This is the reason, why it is useful to put in different wires and felts in the side view of the software.

This is possible with the function “group”, when editing a roll (Figure 13). In this example, implement a roll with name “Roll 1”, and type in “1” for the group of this roll:

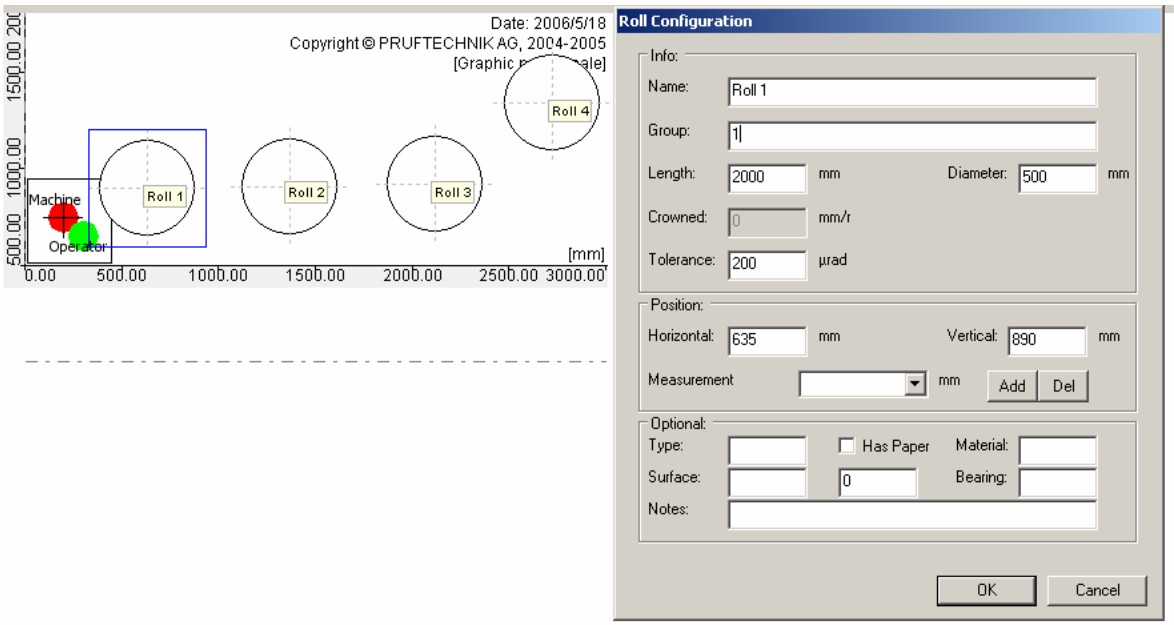


Figure 13

After this give in a second roll, named “Roll 2”, also part of group “1” (Figure 14).

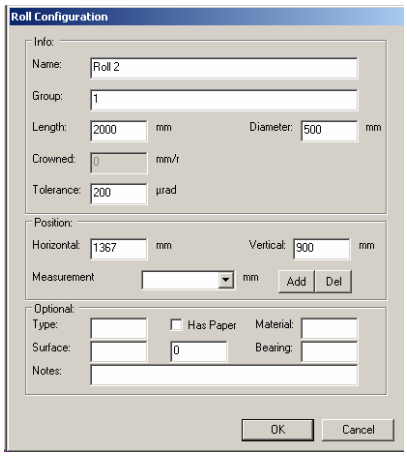


Figure 14

After clicking the ok button, the side view looks as follows (Figure 15). Has paper must be activated.

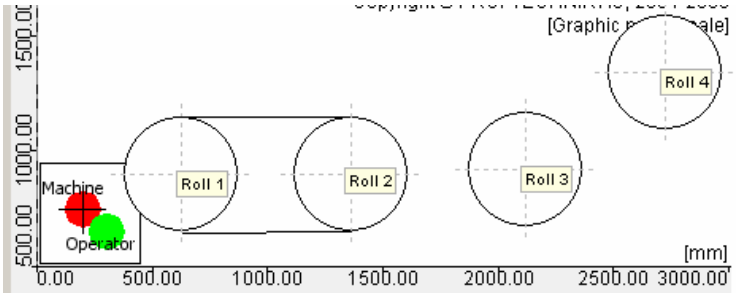


Figure 15

If editing the group name “2” for Roll 3 und Roll 4 the side view looks like this (Figure 16).

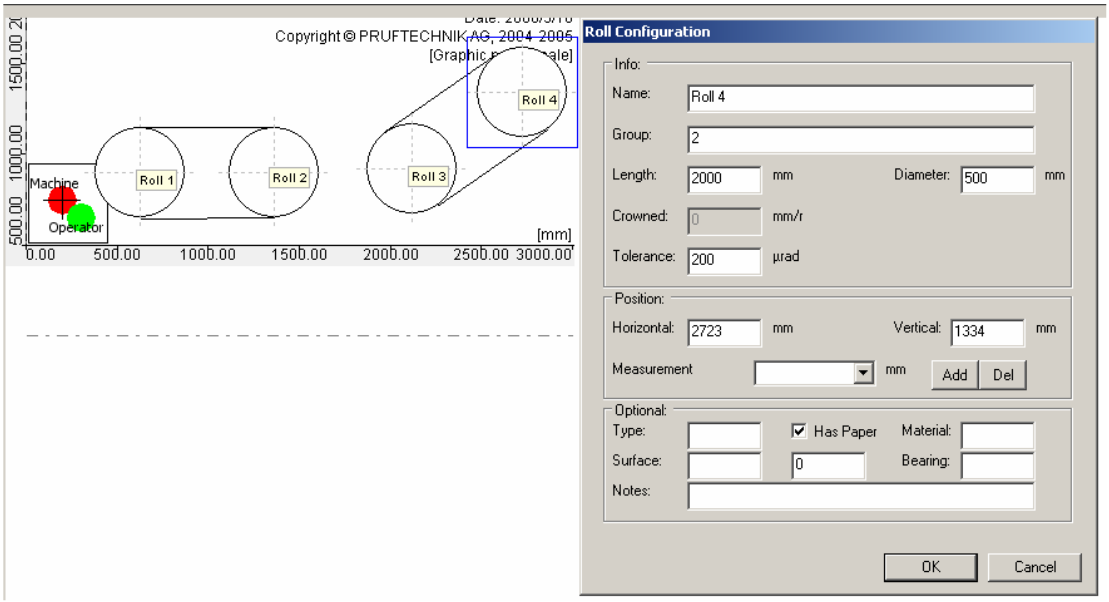


Figure 16

Side-view:

To move a roll in the side-view, “Move rolls” selection box in the menu underneath the side view has to be enabled (Figure17).

Figure 17

Before the roll is moved, click on the roll with left mouse and keep the button pressed. Then move the roll while keeping the button pressed. – As soon as the left mouse button is released, the roll will snap to the nearest grid point, which is nearest as specified by grid and Snap values.

If the function « show wire » is clicked, the rolls which have « has paper » enabled, a band will wrap around them. If the function “warp wire” is clicked on, the band will be closed to complete the circuit (Figure18).

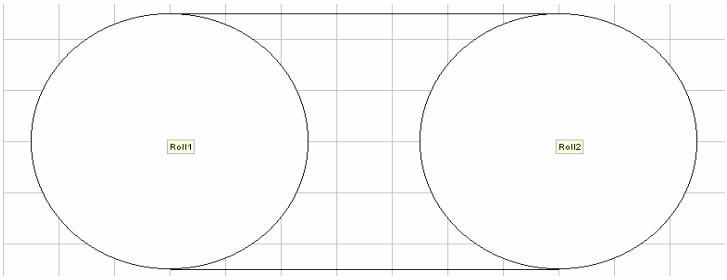


Figure 18

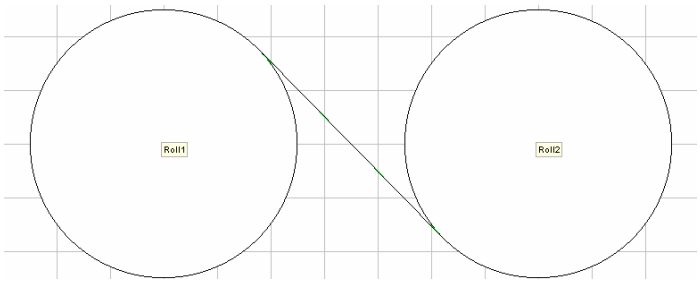


Figure 19

The direction of the paper can be changed on one roll by clicking “change paper” (right click on mouse), and the wire will run in the opposite direction (Figure 19 and Figure 20).

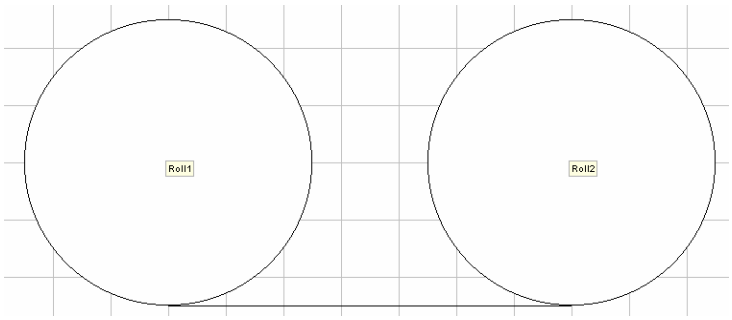


Figure 20

Set paper flow

After creating rolls and activating has paper the paper flow has not the right flow. To change the paper flow click right on the mouse and press “Set Paper Flow” (Figure 21)

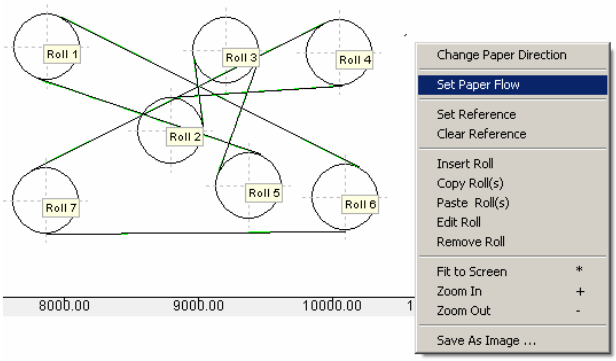


Figure 21

After this all the rolls are looking like in the picture below (Figure 22). With one click on the first roll the zero turns in to one. With one click on the second roll the zero turns in to two, etc. (or in the “Roll Configurations” window you can also change the paper flow number) The paper will follow the numbers upwards.

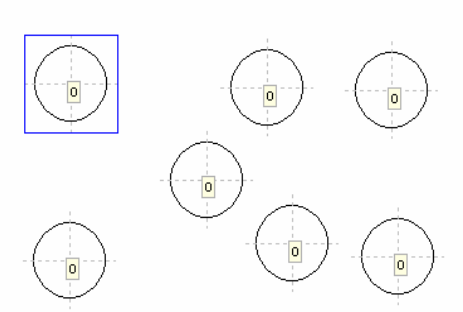


Figure 22

After you set all necessary rolls click on right mouse button and press “Set Paper Flow” (Figure 23).

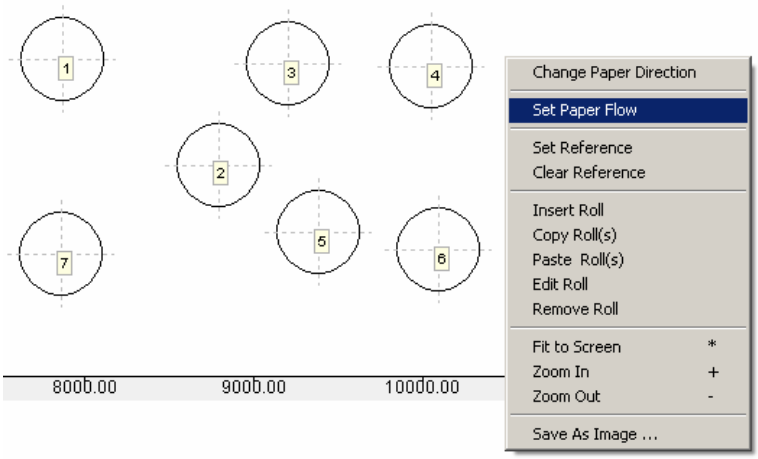


Figure 23

After clicking “Set Paper Flow”, the side view looks as follows (Figure23).

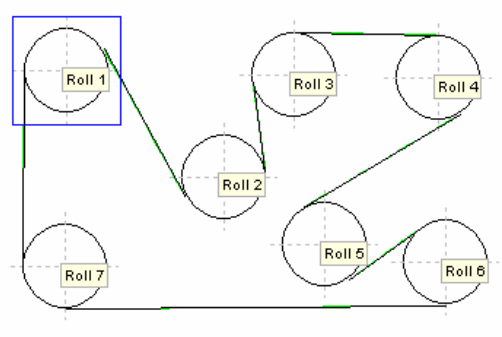


Figure 23

Remove Rolls

Select the roll(s) which need to be removed and click right on the mouse and press “Remove Roll” (Figure 24).

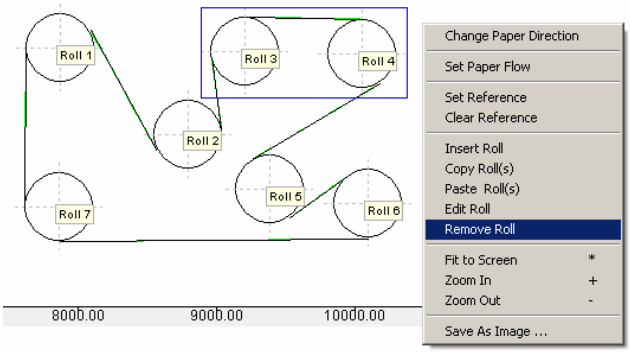


Figure 24

After clicking “Remove Roll”, the side view looks as follows (Figure25).

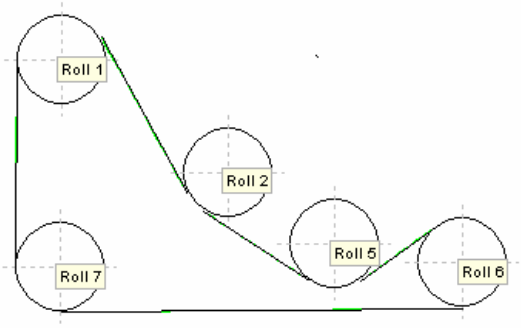


Figure25

Mirror Imaging Rolls

Often times when a customer delivers a drawing of their machine, it may be from the machine side. The side view always represents the view from the operator side. Hence there is a Mirror Rolls function in which the whole machine or a select few can be highlighted first. By clicking the right click on the mouse it is possible to select Mirror Rolls and automatically the rolls will be configured (Figure 25a, Figure 25b).

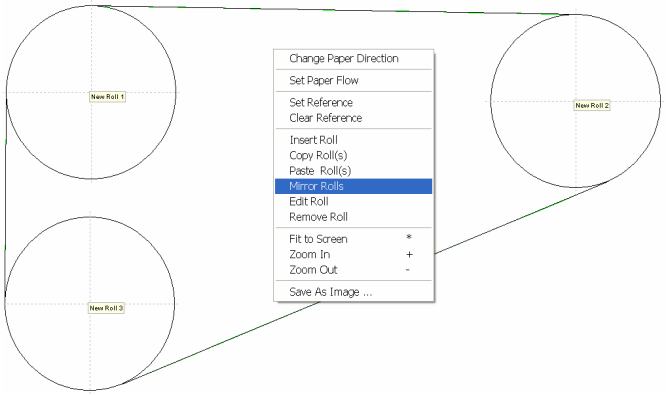


Figure 25a: Before Mirror Function

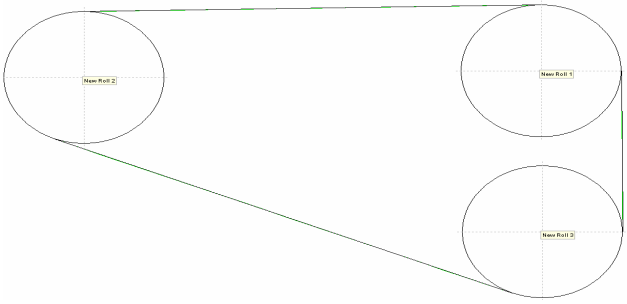


Figure 25b: After Mirror Function

3.2.3 Connection between Computer and PARALIGN

Before measurements are performed, it is necessary to establish a connection with the computer and the PARALIGN. The PARALIGN connects to the computer via Bluetooth, some computers use an external connection and some computers have a built in connection.

First step:

Switch on the laptop, plug in the bluetooth-dongle or enable the bluetooth settings on the computer.

Second step:

Switch on the PARALIGN, **Note: Do not move the device or press the touch screen until till the processor completely boots up**. When the device is boot up completely, a sound from the gyroscopes can be heard and 'READY' will be shown on the screen. Then do the following:

a) « Main Menu »
b) « Paid Mode »
c) « PC Connection »

Third Step:
On the laptop, open the Bluetooth Neighborhood by double-clicking the Bluetooth symbol and following the instructions:

In the Bluetooth neighborhood window select the menu "Bluetooth" and choose the menu item "Searching for Bluetooth devices."

When searching is complete an icon with the name PARALIGN will appear.

Click once to select the PARALIGN.

In the "Bluetooth" menu select "Looking for Available Services."

An icon that contains "Serial Connection" will be displayed in the open window.

Double-click on the serial connection icon to begin opening communication.

Fourth step:
Click on the connection-symbol in the PARALIGN-Editor. This will open up the window in the right below (Figure 26).

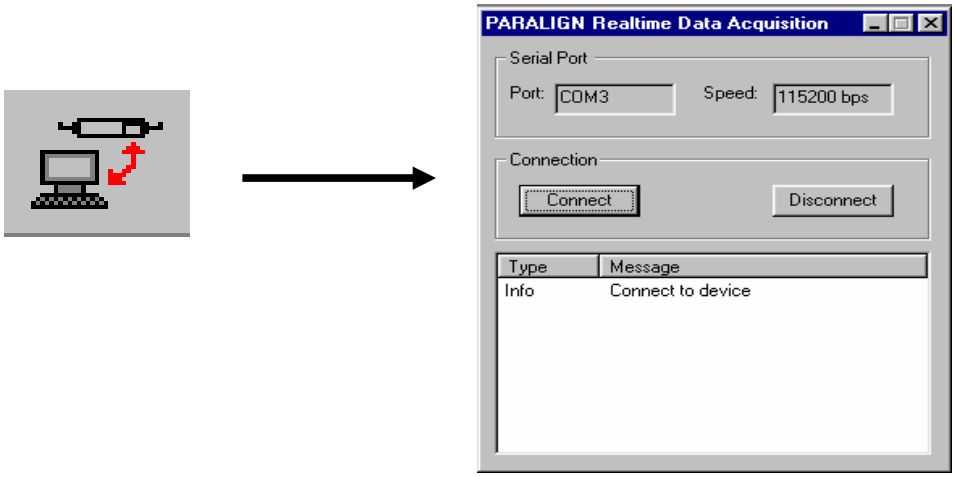


Figure 26

If the connection was successful, the info “connected to device” will appear in the right window shown above.

Remark: The connection port and the connection speed can be defined in the pulldown menu - **Settings►Device►Communication** (Check General Settings Section).

Note: **Disconnect** from this window must be used before turning off the PARALIGN or exiting the PARALIGN Editor to prevent loss of data.

3.3 Measurements

3.3.1 Earth's Rotation

Once the device is connected to the computer and a new session has been created, the PARALIGN device itself has to be aligned. The alignment process must be performed to let the device detect its orientation in relation to the earth rotation.

The earth rotates around itself (roughly) once per day, equaling about 15°/hr or ~0.25 degree per minute; therefore, PARALIGN will detect this rotation.
The minimum alignment time to detect this rotation is 5 minutes. In this time the device can detect the rotation and the detected rotation will be compensated from all following measurements.
Note: Please remember that it is essential that 5 minutes are completed before stopping the calibration. Though the earth's rotation value may be within range when stopped prior to 5 minutes the actual measurement may result to be faulty without proper procedure.

3.3.2 Determination of the earth rotation

Click on the icon (Figure27) to view the earth rotation menu (Figure28).

Figure 27

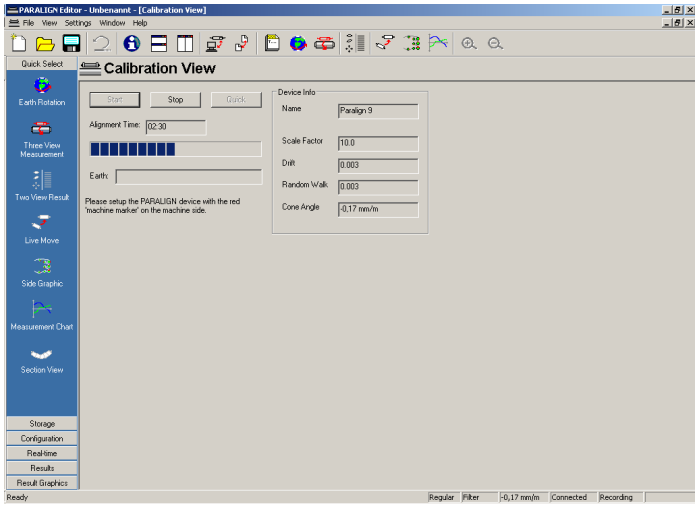


Figure 28

The earth's-rotation takes at least five minutes to calibrate, seen also when the blue bar is being filled up (Figure29). Then, press « stop », and the value of the earth rotation will be displayed in the line "earth".
For determination of the earth rotation in the calibration plate, the value should ideally be in the range of **15.031° to 15.051°**, any value in the interval of 15,021° and 15,061° is tolerable.

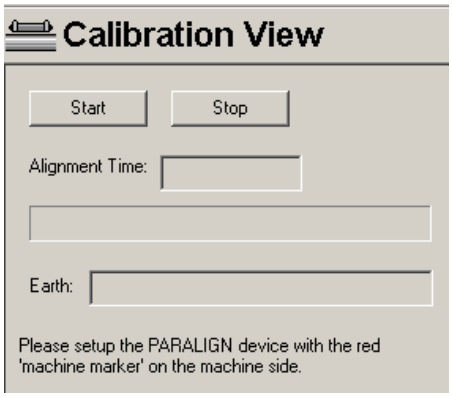


Figure 29

Once the earth's rotation has been calculated, the device can now be used to perform measurements. The first roll after stopping the earth rotation must **immediately** be the link roll.

In the Result Numbers window (Three view measurement) the earth's rotation will be displayed with any of the following colors. Each color is obtained when the reading calculated is between the shown values:

- ✓ 15.031 deg/h < Earth rotation (ER) < 15.051 deg/h
- ✓ 15.021 deg/h < Earth rotation < 15.061 deg/h
- ✓ 15.011 deg/h < Earth rotation < 15.071 deg/h
- ✗ 15.011 deg/h > Earth rotation > 15.071 deg/h

There are 2 kinds of pop up messages if the earth rotation is not a valid measurement, it will ask the user to restart the earth's rotation calculation. (Figure 29a, 29b).

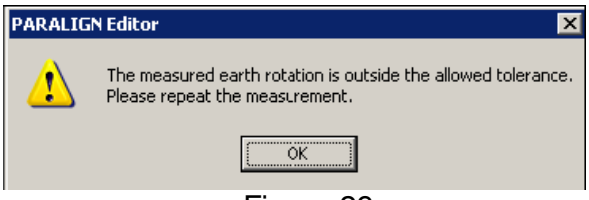


Figure 29a

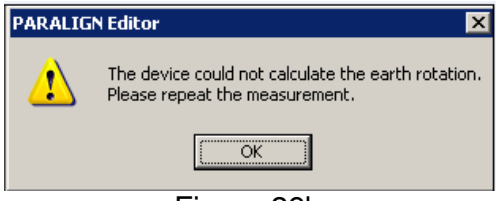


Figure 29b

3.3.3 Performing Measurements

There are a number of different modes that can be used to take a measurement, Sweep, Crowned Sweep and Survey (Figure 31). This window can be viewed by left-clicking the “add” button (Figure30) in the Realtime View window as shown below.

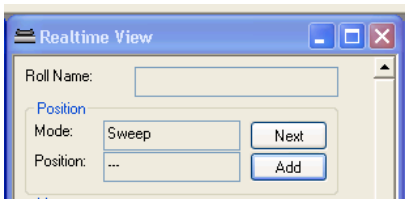


Figure 30

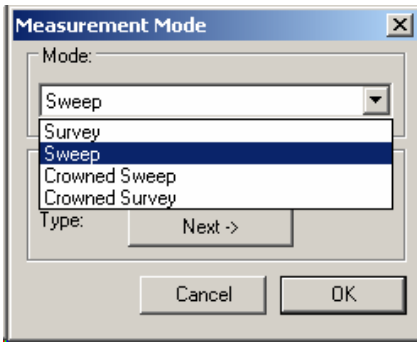


Figure 31

Sweep: General mode used for cylindrical, crowned and bowed rolls. Minimum sweep of 20°

Crowned Sweep: Mode used only for rolls with a minimum sweep of 150°. (Use it as a check when there is a problem obtaining a good repeatability using the sweep mode and the accessibility is available).

Survey: Mode used to find the relative position from a stationary point. No sweep used.

Before measurements are performed, it must be ensured that all the appropriate rolls have been drawn in to the software. Then for an accurate measurement, a particular roll is first selected by clicking the mouse on the correct name of the roll (Three View Measurement ►Roll Selection window). Once the roll has been selected, the device is placed on the roll and the START button is clicked to start the measurement (Figure32).

Figure 32

As the sweep is performed on the roll the software records all the data being measured and stores it. The software calculates the position once the STOP button has been clicked. It then shows up in the Three View Measurement ► Raw Result List.

A sample list of measured rolls looks like the following (Figure33):

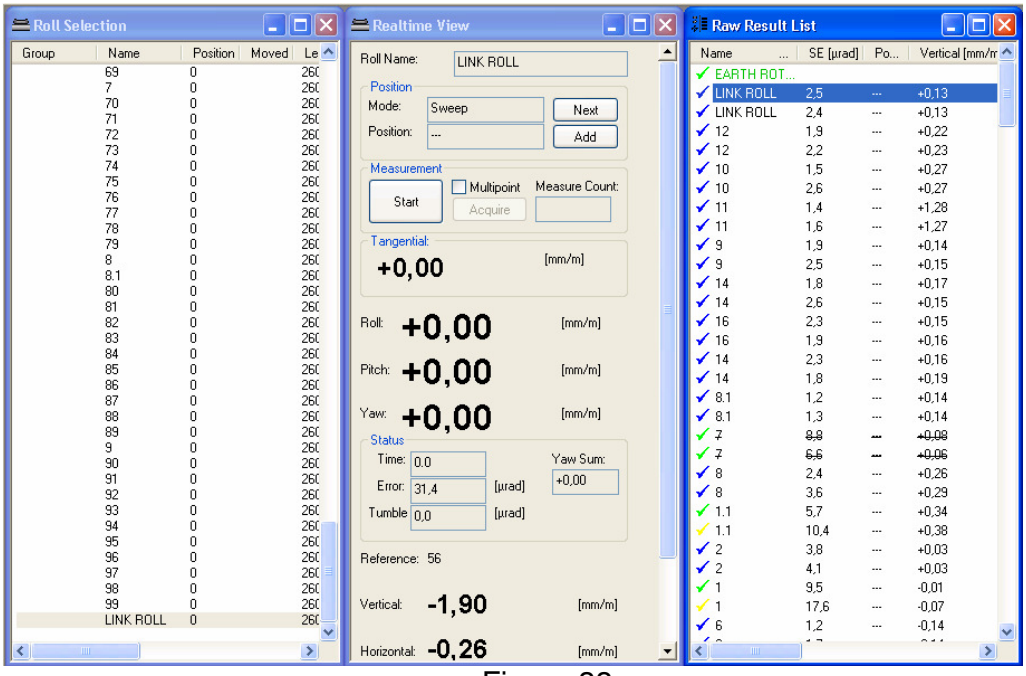


Figure 33

For each measurement a colored indicator at the raw result list can be seen (Figure 33 and 33a). This indicates the sweep error values according to range as follows;

✓	; Sweep error < 5µrad		; <= roll_tolerance/4
✓	; Sweep error < 10µrad		; <= roll_tolerance/2
✓	; Sweep error < 20µrad		; <= roll_tolerance
✗	; Sweep error > 20µrad		; > roll_tolerance

Raw Result List

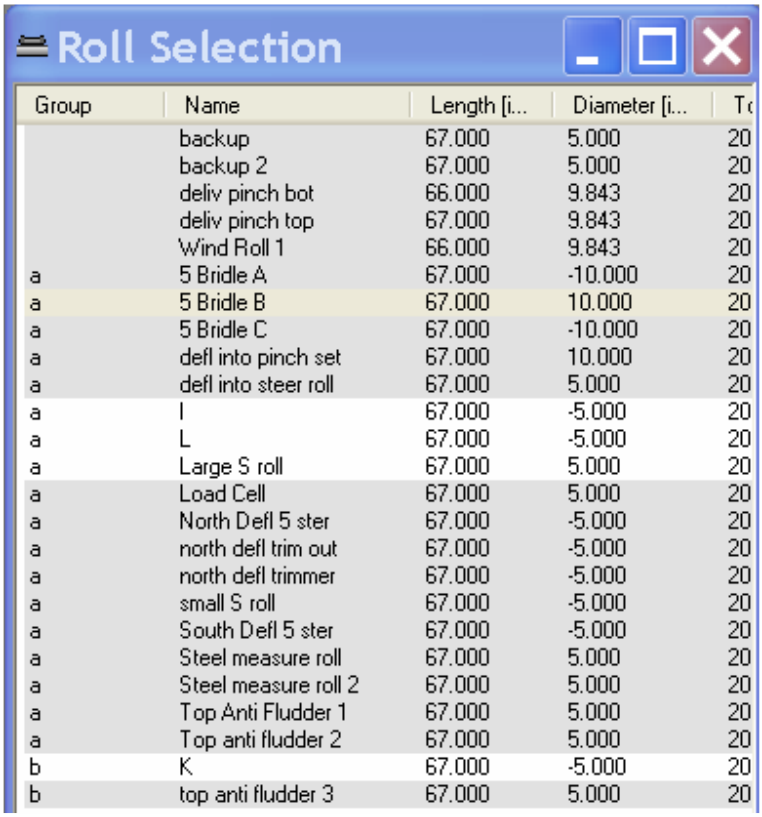
Name	S...	Positio...	Vertical [mrad]	Horizontal [mrad]	Stat...	Err...	Mod...	Eart...
EARTH ROTATION								15.034
LINK ROLL	1,4	---	+0,00	+0,00	DCL*	36,6	Sweep	
LINK ROLL	1,7	---	+0,00	-0,00	C	37,9	Sweep	
~~P2-1~~	~~1,7~~	~~Machine~~	~~+0,15~~	~~+0,14~~	~~CX~~	~~44,3~~	~~Sweep~~	
~~P2-1~~	~~2,1~~	~~Machine~~	~~+0,16~~	~~+0,14~~	~~CX~~	~~46,2~~	~~Sweep~~	
~~P2-1~~	~~2,0~~	~~Middle~~	~~+0,06~~	~~+0,19~~	~~CX~~	~~50,0~~	~~Sweep~~	
~~P2-1~~	~~2,1~~	~~Middle~~	~~+0,07~~	~~+0,20~~	~~CX~~	~~51,6~~	~~Sweep~~	
~~P2-1~~	~~1,5~~	~~Operator~~	~~+0,04~~	~~+0,20~~	~~CX~~	~~56,4~~	~~Sweep~~	
~~P2-1~~	~~1,3~~	~~Operator~~	~~+0,04~~	~~+0,19~~	~~CX~~	~~57,4~~	~~Sweep~~	
P2-3	1,9	---	+0,03	+0,86	C	65,1	Sweep	
P2-3	2,2	---	+0,04	+0,87	C	67,0	Sweep	
~~P2-2~~	~~1,8~~	~~Operator~~	~~-0,05~~	~~+0,09~~	~~CX~~	~~49,6~~	~~Sweep~~	
~~P2-2~~	~~2,3~~	~~Operator~~	~~-0,05~~	~~+0,09~~	~~CX~~	~~47,6~~	~~Sweep~~	
~~P2-2~~	~~2,2~~	~~Middle~~	~~-0,03~~	~~+0,19~~	~~CX~~	~~43,2~~	~~Sweep~~	
~~P2-2~~	~~1,1~~	~~Middle~~	~~-0,04~~	~~+0,18~~	~~CX~~	~~41,5~~	~~Sweep~~	
~~P2-2~~	~~3,4~~	~~Machine~~	~~-0,01~~	~~+0,26~~	~~CX~~	~~38,4~~	~~Sweep~~	
~~P2-2~~	~~2,8~~	~~Machine~~	~~-0,00~~	~~+0,25~~	~~CX~~	~~37,1~~	~~Sweep~~	
D-60	9,7	---	-0,30	+0,09	C	38,4	Sweep	
D-60	9,3	---	-0,30	+0,10	C	37,8	Sweep	
D-61	4,4	---	-0,23	+0,13	C	32,7	Sweep	
D-61	4,1	---	-0,24	+0,12	C	32,5	Sweep	
~~LINK ROLL~~	~~1,4~~	~~---~~	~~-0,03~~	~~+0,02~~	~~DX~~	~~111,6~~	~~Sweep~~	
LINK ROLL	1,6	---	+0,01	-0,01	C	104,7	Sweep	
P2-1	0,0	---	+0,09	+0,18		---	Manual	
P2-2	0,0	---	-0,03	+0,18		---	Manual	
EARTH ROTATION								15.042
LINK ROLL	1,5	---	+0,00	+0,00	DCL	37,5	Sweep	
LINK ROLL	1,3	---	-0,01	-0,01	C	38,2	Sweep	
D-62	3,5	---	-0,01	-0,41	C	45,4	Sweep	
D-62	5,2	---	-0,01	-0,40	C	47,1	Sweep	
D-68	2,5	---	-0,51	+0,01	C	54,9	Sweep	
D-68	1,9	---	-0,50	+0,02	C	57,6	Sweep	
D-67	1,4	---	-0,59	+0,39	C	61,4	Sweep	
D-67	1,0	---	-0,60	+0,41	C	63,1	Sweep	
D-74	5,6	---	+0,06	-0,27	C	73,3	Sweep	

Figure 33a

There must be a sweep error < 10µrad in order to get good measurement results. If the sweep error is excessive the reasons could be as follows;

1. Bad surface.
2. Measured surface is too soft. Minimum 50 shores durometer of hardness is required.
3. Impurities on the roll or on the feet of the PARALIGN.

The rolls are alphabetically sorted in the Roll Selection window (Please refer to Figure 33) making it easier to select the roll. Once the rolls are measured they are also highlighted in the Roll Selection window to better assist the user in knowing which rolls have and have not been measured (Figure 33b).



Group	Name	Length [i...	Diameter [i...	To
	backup	67.000	5.000	20
	backup 2	67.000	5.000	20
	deliv pinch bot	66.000	9.843	20
	deliv pinch top	67.000	9.843	20
	Wind Roll 1	66.000	9.843	20
a	5 Bridle A	67.000	-10.000	20
a	5 Bridle B	67.000	10.000	20
a	5 Bridle C	67.000	-10.000	20
a	defl into pinch set	67.000	10.000	20
a	defl into steer roll	67.000	5.000	20
a	I	67.000	-5.000	20
a	L	67.000	-5.000	20
a	Large S roll	67.000	5.000	20
a	Load Cell	67.000	5.000	20
a	North Defl 5 ster	67.000	-5.000	20
a	north defl trim out	67.000	-5.000	20
a	north defl trimmer	67.000	-5.000	20
a	small S roll	67.000	-5.000	20
a	South Defl 5 ster	67.000	-5.000	20
a	Steel measure roll	67.000	5.000	20
a	Steel measure roll 2	67.000	5.000	20
a	Top Anti Fludder 1	67.000	5.000	20
a	Top anti fludder 2	67.000	5.000	20
b	K	67.000	-5.000	20
b	top anti fludder 3	67.000	5.000	20

Figure 33b

Multipoint Measurements

Multipoint measurements are performed when a minimum sweep of 20° can not be taken, but if you have access to 3 or more positions on the rolls surface that exceed 20°. Also used on rolls with a rubber surface that is not possible to make a smooth sweep.

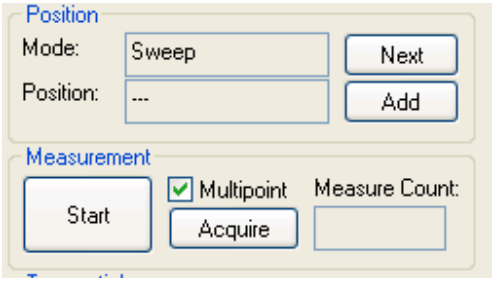


Figure 34

Make sure the measurement mode is in Sweep.

Select the Multipoint check box. (Figure 34)

Place the PARALIGN on the rolls surface.

Click on the Start button. The Acquire button will now become fully active.

Click the Acquire button for each location on the rolls surface.

When finished taking as many measurement locations on the surface of the roll, select the Stop button.

3.3.3.1 *Repeatability*

Measurements taken are usually performed about twice at one position. If the rolls are **longer than 5m (16.4 feet)**, they are measured at **two positions**, operator, and machine side. In particular, important rolls would be for example in the **press section**, measurements on **three positions** are carried out: operator, middle and machine side (Please refer Page 6-9 in Application of PARALIGN in a Paper Mill Article for further details).

Nevertheless, measurements are taken twice at the same position to check for repeatability. This is important in order to gauge the condition of the rolls.

In particular the repeatability of two measurements of the link roll performed directly after each other must be within +-0.05mm/m.

It is important to notice the repeatability of the link roll. Ensure that the link roll is cylindrical, metallic, has good accessibility and is fixed for the entire duration of the measurement (Complete day).

If the **link roll** is **longer than 5m (16.4 feet)** the same middle position must be measured every time. If the link roll is not accessible in the middle, then it is essential that where ever the measurement is performed, it has to be consistent and at the same position, e.g. the operator side.

Possible cause for low repeatability;

1. PARALIGN feet are moved away from the roll during measurement. (e.g. it slips away)
2. Roll or feet of the PARALIGN are not clean.
3. Roll is not cylindrical and measurements are not taken in the same position.

3.3.3.2 Time Factor

When performing measurements it is essential to remember that every **20 minutes**, the PARALIGN needs to be re-calibrated. The reason for this is, as time increases, there is also an increase in the drift error (Explanation of Drift 3.4.6).

The repeatability of results also changes over time. To avoid any hassle or irregularities, it is always better to follow the procedure that after **20 minutes**, the PARALIGN needs to be re-calibrated. A pop-up has been added to the software to show as a warning when the 20 minutes have passed and this helps in reminding the users to return to the calibration plate (Figure 34a).

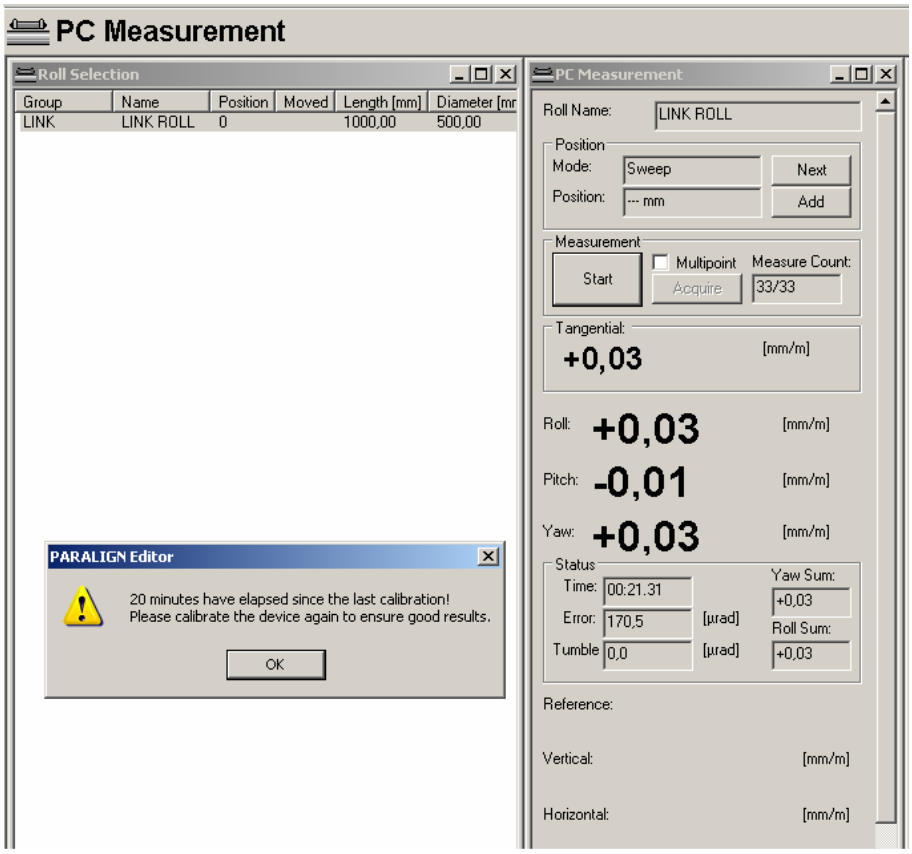


Figure 34a

3.4 Results

3.4.1 Drift/Compensate

Once a new measurement is completed or an old one is loaded all the calculated results are visible in the Result Numbers (Figure 35). The results will tell you the horizontal and the vertical angle in relation to a selected reference.

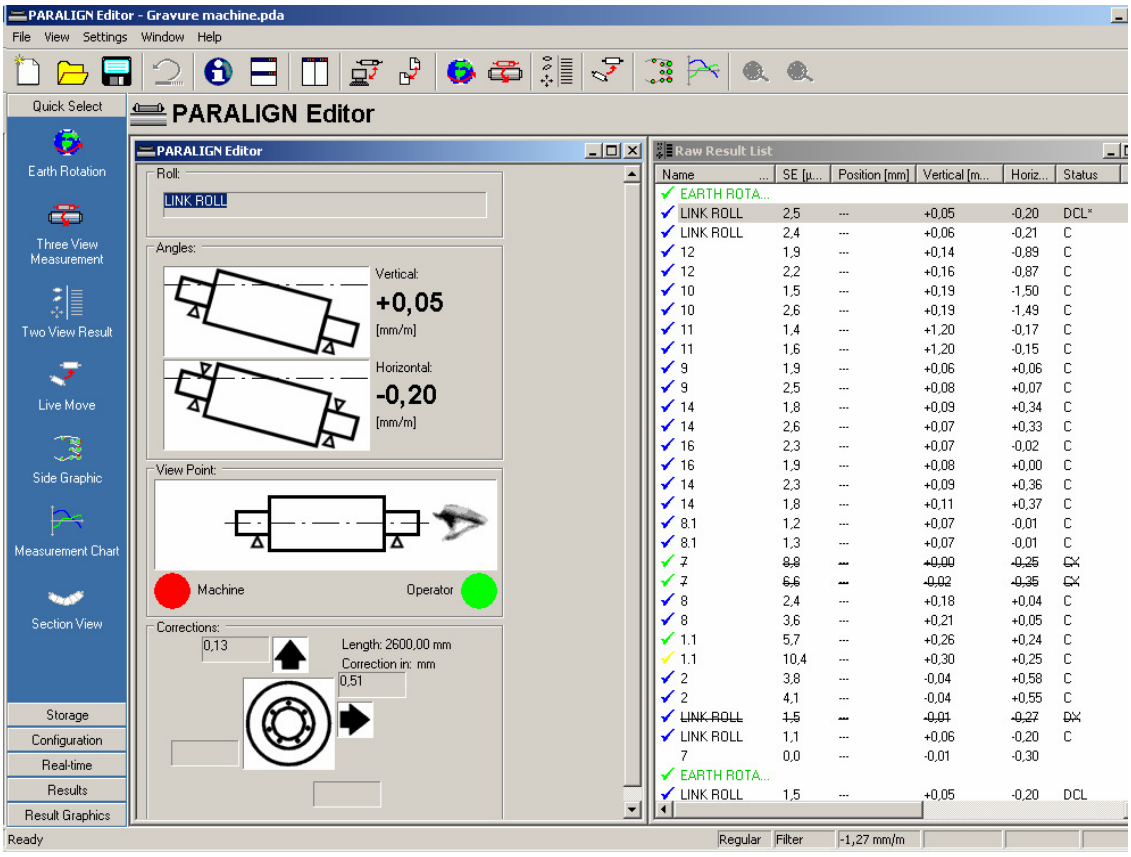
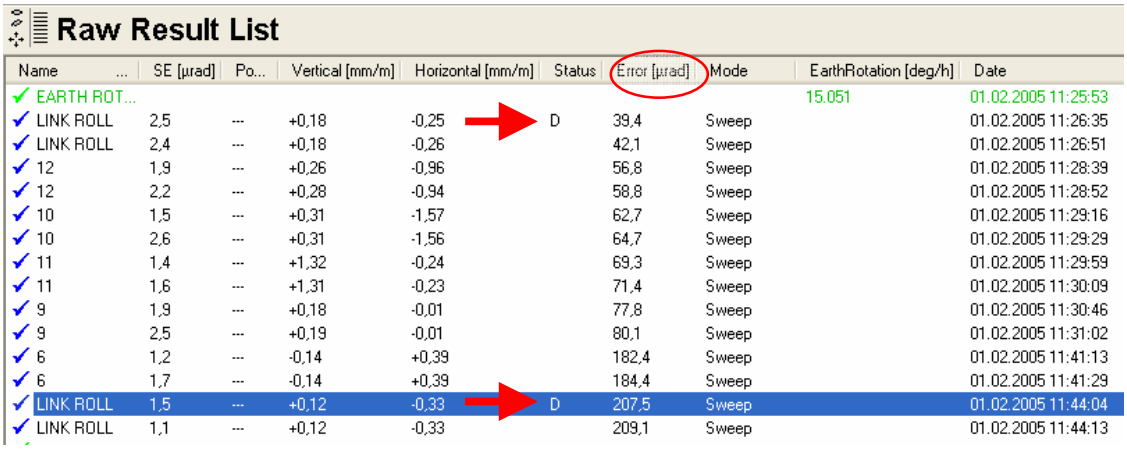


Figure 35

After each set of measurements (A valid earth rotation followed by a link roll measurement, measuring a set of rolls and ending with a link roll measurement, is considered to be one complete set of measurements), it is necessary to carry out the drift compensation and linking it to the other set of measurements. (See 3.4.6 Explanation of Drift)

The following steps will guide the user on how to choose the appropriate roll and the functions used in order to drift and compensate for the measurements performed:

1. After each complete set of measurement select the link roll results at the beginning and end of the measurement with the lowest "Total error" and put a 'D' to it. (Figure 36).

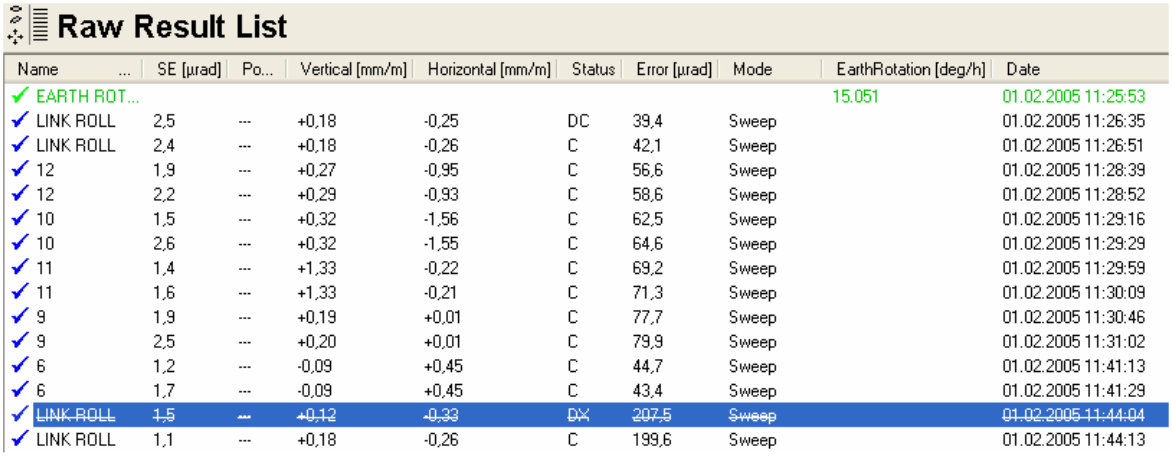


Raw Result List

Name	...	SE [µrad]	Po...	Vertical [mm/m]	Horizontal [mm/m]	Status	Error [µrad]	Mode	EarthRotation [deg/h]	Date
EARTH ROT...									15.051	01.02.2005 11:25:53
LINK ROLL		2,5	---	+0,18	-0,25	D	39,4	Sweep		01.02.2005 11:26:35
LINK ROLL		2,4	---	+0,18	-0,26		42,1	Sweep		01.02.2005 11:26:51
12		1,9	---	+0,26	-0,96		56,8	Sweep		01.02.2005 11:28:39
12		2,2	---	+0,28	-0,94		58,8	Sweep		01.02.2005 11:28:52
10		1,5	---	+0,31	-1,57		62,7	Sweep		01.02.2005 11:29:16
10		2,6	---	+0,31	-1,56		64,7	Sweep		01.02.2005 11:29:29
11		1,4	---	+1,32	-0,24		69,3	Sweep		01.02.2005 11:29:59
11		1,6	---	+1,31	-0,23		71,4	Sweep		01.02.2005 11:30:09
9		1,9	---	+0,18	-0,01		77,8	Sweep		01.02.2005 11:30:46
9		2,5	---	+0,19	-0,01		80,1	Sweep		01.02.2005 11:31:02
6		1,2	---	-0,14	+0,39		182,4	Sweep		01.02.2005 11:41:13
6		1,7	---	-0,14	+0,39		184,4	Sweep		01.02.2005 11:41:29
LINK ROLL		1,5	---	+0,12	-0,33	D	207,5	Sweep		01.02.2005 11:44:04
LINK ROLL		1,1	---	+0,12	-0,33		209,1	Sweep		01.02.2005 11:44:13

Figure 36

2. Compensate for the drift by selecting any result line and enter 'C'. The result values are compensated (Figure 37).



Raw Result List

Name	...	SE [µrad]	Po...	Vertical [mm/m]	Horizontal [mm/m]	Status	Error [µrad]	Mode	EarthRotation [deg/h]	Date
EARTH ROT...									15.051	01.02.2005 11:25:53
LINK ROLL		2,5	---	+0,18	-0,25	DC	39,4	Sweep		01.02.2005 11:26:35
LINK ROLL		2,4	---	+0,18	-0,26	C	42,1	Sweep		01.02.2005 11:26:51
12		1,9	---	+0,27	-0,95	C	56,6	Sweep		01.02.2005 11:28:39
12		2,2	---	+0,29	-0,93	C	58,6	Sweep		01.02.2005 11:28:52
10		1,5	---	+0,32	-1,56	C	62,5	Sweep		01.02.2005 11:29:16
10		2,6	---	+0,32	-1,55	C	64,6	Sweep		01.02.2005 11:29:29
11		1,4	---	+1,33	-0,22	C	69,2	Sweep		01.02.2005 11:29:59
11		1,6	---	+1,33	-0,21	C	71,3	Sweep		01.02.2005 11:30:09
9		1,9	---	+0,19	+0,01	C	77,7	Sweep		01.02.2005 11:30:46
9		2,5	---	+0,20	+0,01	C	79,9	Sweep		01.02.2005 11:31:02
6		1,2	---	-0,09	+0,45	C	44,7	Sweep		01.02.2005 11:41:13
6		1,7	---	-0,09	+0,45	C	43,4	Sweep		01.02.2005 11:41:29
~~LINK ROLL~~		~~1,5~~	~~---~~	~~+0,12~~	~~-0,33~~	~~DX~~	~~207,5~~	~~Sweep~~		~~01.02.2005 11:44:04~~
LINK ROLL		1,1	---	+0,18	-0,26	C	199,6	Sweep		01.02.2005 11:44:13

Figure 37

3.4.2 Linking Measurements

When different sets of measurements are obtained, they need to be linked to one another to make a complete set of results. Each measurement has a different coordinate system. Linking connects all earth rotations together. This means that all the coordinate systems are set to the same origin.

If they are not linked, all the results will not be displayed in the side view, except for the first set of measurements recorded. To prepare the results for linking, the active link roll result with the lowest "Total error" is selected and place an 'L'.

Important: Use this every time on one of the first LINK ROLL measurements like you see in Figure 23 and 24.

If you set the first Link (L) in the first Earth Rotation it looks like this: L*, this means it is the Link Origin. The Link origin (L*) must be set every time in the first measurement set (first earth rotation).

It is also important to keep in mind to link the rolls of the same name and the same position measured. It is not possible to link two different positions with each other, even if they are on the same roll!

When the drift compensation and linking for the next earth rotation result is performed, the results will turn from **'red'** to **'black'** wording after linking (Figure 38, 39).

Before Linking

Raw Result List

Name	...	SE [µrad]	Po...	Vertical [mm/m]	Horizontal [mm/m]	Status	Error [µrad]	Mode	EarthRotation [deg/h]	Date
EARTH ROT...									15.051	01.02.2005 11:25:53
LINK ROLL		2,5	---	+0,13	-0,27	DCL*	39,4	Sweep		01.02.2005 11:26:35
LINK ROLL		2,4	---	+0,13	-0,27	C	42,1	Sweep		01.02.2005 11:26:51
12		1,9	---	+0,22	-0,96	C	56,6	Sweep		01.02.2005 11:28:39
12		2,2	---	+0,23	-0,94	C	58,6	Sweep		01.02.2005 11:28:52
10		1,5	---	+0,27	-1,57	C	62,5	Sweep		01.02.2005 11:29:16
10		2,6	---	+0,27	-1,56	C	64,6	Sweep		01.02.2005 11:29:29
11		1,4	---	+1,28	-0,24	C	69,2	Sweep		01.02.2005 11:29:59
11		1,6	---	+1,27	-0,22	C	71,3	Sweep		01.02.2005 11:30:09
9		1,9	---	+0,14	-0,00	C	77,7	Sweep		01.02.2005 11:30:46
9		2,5	---	+0,15	+0,00	C	79,9	Sweep		01.02.2005 11:31:02
6		1,2	---	-0,14	+0,43	C	44,7	Sweep		01.02.2005 11:41:13
6		1,7	---	-0,14	+0,44	C	43,4	Sweep		01.02.2005 11:41:29
~~LINK ROLL~~		~~1,5~~	~~---~~	~~+0,07~~	~~-0,34~~	~~DX~~	~~207,5~~	~~Sweep~~		~~01.02.2005 11:44:04~~
LINK ROLL		1,1	---	+0,13	-0,27	C	199,6	Sweep		01.02.2005 11:44:13
EARTH ROT...									15.046	01.02.2005 11:56:12
LINK ROLL		1,5	---	+0,11	-0,26		72,9	Sweep		01.02.2005 12:01:57
LINK ROLL		2,4	---	+0,10	-0,28		74,8	Sweep		01.02.2005 12:02:09
17		2,0	---	+0,24	-0,02		81,4	Sweep		01.02.2005 12:02:54
17		3,4	---	+0,26	+0,02		83,7	Sweep		01.02.2005 12:03:09
18		1,7	---	-0,14	-0,24		94,2	Sweep		01.02.2005 12:03:51
18		1,6	---	-0,18	-0,24		94,8	Sweep		01.02.2005 12:04:03
19		3,5	---	-0,09	-0,28		98,5	Sweep		01.02.2005 12:04:28
19		4,8	---	-0,09	-0,30		100,2	Sweep		01.02.2005 12:04:40
27		1,9	---	-0,10	-0,10		103,9	Sweep		01.02.2005 12:05:06
27		2,4	---	-0,13	-0,10		105,1	Sweep		01.02.2005 12:05:21
21		6,5	---	-0,97	+0,18		108,7	Sweep		01.02.2005 12:05:46
21		3,5	---	-0,94	+0,20		109,4	Sweep		01.02.2005 12:05:57
20		7,0	---	-0,93	-0,16		113,6	Sweep		01.02.2005 12:06:27
LINK ROLL		1,3	---	+0,12	-0,29		178,2	Sweep		01.02.2005 12:15:48
LINK ROLL		1,8	---	+0,12	-0,28		179,2	Sweep		01.02.2005 12:15:57

Figure 38

After Linking

Raw Result List

Name	...	SE [µrad]	Po...	Vertical [mm/m]	Horizontal [mm/m]	Status	Error [µrad]	Mode	EarthRotation [deg/h]	Date
EARTH ROT...									15.051	01.02.2005 11:25:53
LINK ROLL		2,5	---	+0,13	-0,27	DCL*	39,4	Sweep		01.02.2005 11:26:35
LINK ROLL		2,4	---	+0,13	-0,27	C	42,1	Sweep		01.02.2005 11:26:51
12		1,9	---	+0,22	-0,96	C	56,6	Sweep		01.02.2005 11:28:39
12		2,2	---	+0,23	-0,94	C	58,6	Sweep		01.02.2005 11:28:52
10		1,5	---	+0,27	-1,57	C	62,5	Sweep		01.02.2005 11:29:16
10		2,6	---	+0,27	-1,56	C	64,6	Sweep		01.02.2005 11:29:29
11		1,4	---	+1,28	-0,24	C	69,2	Sweep		01.02.2005 11:29:59
11		1,6	---	+1,27	-0,22	C	71,3	Sweep		01.02.2005 11:30:09
9		1,9	---	+0,14	-0,00	C	77,7	Sweep		01.02.2005 11:30:46
9		2,5	---	+0,15	+0,00	C	79,9	Sweep		01.02.2005 11:31:02
6		1,2	---	-0,14	+0,43	C	44,7	Sweep		01.02.2005 11:41:13
6		1,7	---	-0,14	+0,44	C	43,4	Sweep		01.02.2005 11:41:29
~~LINK ROLL~~		~~1,5~~	~~---~~	~~+0,07~~	~~-0,34~~	~~DX~~	~~207,5~~	~~Sweep~~		~~01.02.2005 11:44:04~~
LINK ROLL		1,1	---	+0,13	-0,27	C	199,6	Sweep		01.02.2005 11:44:13
EARTH ROT...									15.046	01.02.2005 11:56:12
LINK ROLL		1,5	---	+0,13	-0,27	DCL	72,9	Sweep		01.02.2005 12:01:57
LINK ROLL		2,4	---	+0,11	-0,29	C	74,7	Sweep		01.02.2005 12:02:09
17		2,0	---	+0,25	-0,03	C	80,8	Sweep		01.02.2005 12:02:54
17		3,4	---	+0,27	+0,02	C	83,0	Sweep		01.02.2005 12:03:09
18		1,7	---	-0,12	-0,25	C	92,1	Sweep		01.02.2005 12:03:51
18		1,6	---	-0,17	-0,25	C	92,7	Sweep		01.02.2005 12:04:03
19		3,5	---	-0,07	-0,28	C	96,0	Sweep		01.02.2005 12:04:28
19		4,8	---	-0,07	-0,30	C	97,5	Sweep		01.02.2005 12:04:40
27		1,9	---	-0,09	-0,10	C	100,7	Sweep		01.02.2005 12:05:06
27		2,4	---	-0,12	-0,10	C	101,9	Sweep		01.02.2005 12:05:21
21		6,5	---	-0,96	+0,18	C	105,1	Sweep		01.02.2005 12:05:46
21		3,5	---	-0,92	+0,20	C	105,7	Sweep		01.02.2005 12:05:57
20		7,0	---	-0,92	-0,16	C	109,6	Sweep		01.02.2005 12:06:27
~~LINK ROLL~~		~~1,3~~	~~---~~	~~+0,14~~	~~-0,30~~	~~DX~~	~~178,2~~	~~Sweep~~		~~01.02.2005 12:15:48~~
LINK ROLL		1,8	---	+0,13	-0,26	C	131,6	Sweep		01.02.2005 12:15:57

Figure 39

3.4.3 Reference

You can set any one measurement to zero and all other measurements will change accordingly to this new zero reference. This is done by clicking on the letter 'R' on the roll with the lowest total error (See also 6.5 Side View Graphic, (i)).

3.4.4 Visibility

It is important to know that by pressing '**X**' on any reading, the value is scratched out and '**SHIFT X**' reverses the function.

If a roll has been measured several times, the pair of readings with the smallest total error in the most recent earth's rotation, is displayed in the side view.

If a roll has been averaged a couple of times, in different earth rotations, the last averaged values is displayed in the side view.

3.4.5 Average Function

Certain rolls, during measurement, are measured more than twice. They can be measured twice at each position (operator, middle and machine) which means that the measurements need to be averaged in order to get a final measurement for the roll.

There are certain precautions to look out for while trying to perform this function. An example below illustrates the steps to follow:

This is a sample measurement (Figure 40):

Raw Result List

Name	SE [µrad]	Position [mm]	Vertical [mm/m]	Horizontal [mm/m]	Status	Error [µrad]	Mode	EarthRotation [deg/h]
EARTH ROTATION								15.038
LINK ROLL	3,0	---	+0,00	-0,51		35,9	Sweep	
LINK ROLL	2,8	---	+0,03	-0,49	DCL*	36,5	Sweep	
Walze 8.4	1,9	Operator	-0,34	-0,04	C	52,6	Sweep	
Walze 8.4	1,0	Operator	-0,35	-0,02	C	53,5	Sweep	
Walze 8.4	1,6	Middle	-0,50	+0,05	C	56,8	Sweep	
Walze 8.4	1,6	Middle	-0,50	+0,06	C	57,6	Sweep	
Walze 8.4	2,2	Machine	-0,59	+0,11	C	58,9	Sweep	
Walze 8.4	3,0	Machine	-0,60	+0,11	C	59,7	Sweep	
Walze 6	3,1	Operator	-1,33	+0,20	C	48,0	Sweep	
Walze 6	1,6	Operator	-1,32	+0,19	C	46,7	Sweep	
Walze 6	1,7	Middle	-1,47	+0,20	C	45,1	Sweep	
Walze 6	2,3	Middle	-1,47	+0,22	C	44,7	Sweep	
Walze 6	5,2	Machine	-1,60	+0,19	C	44,3	Sweep	
Walze 6	2,0	Machine	-1,61	+0,19	C	42,4	Sweep	
~~LINK ROLL~~	~~2,3~~	~~---~~	~~+0,02~~	~~-0,46~~	~~DX~~	~~93,8~~	~~Sweep~~	
LINK ROLL	2,7	---	+0,03	-0,50	C	86,7	Sweep	

Figure 40

There are six readings for Roll “Walze8.4”, the first two on the operator side, two in the middle and the last two on the machine side.

In order to average the readings, highlight the 6 measurements.
By clicking ‘A’ the average is created instantly and displayed at the bottom of the set of measurements (Figure 42).
Alternatively, it is possible to right click on the mouse (Figure 41), go to math functions and choose manual average. The average can be created this way as well and displayed at the bottom (Figure 42).
Alternatively, you can press A as a short cut.

Important: Compensate the Drift first then create the average

Points to remember with the average function:

1) It is not possible to measure a segmented roll and then average the whole roll to see one single measurement value. It is better to differentiate each segment and then average each one separately.
2) It is necessary to add positions (operator, middle, and machine) on rolls when measuring rolls greater than 5m (16.4 feet) (Refer to Segment View 6.1 to see addition of positions).
   Practicing this procedure is essential because the software is then capable of taking the sides respectively, averaging them first and then averaging the final results, increasing the chances for better values.
3) The software will display the result for the average calculated in the most recent earth's rotation. All previous averages calculated on the same roll name prior will not be displayed in the side view.
4) As a check to see which rolls have been averaged, the software adds an "A" in the raw result window. (Figure 42a)
5) If a roll is measured on the operator and machine side and not averaged, the roll will not display any values in the side view.

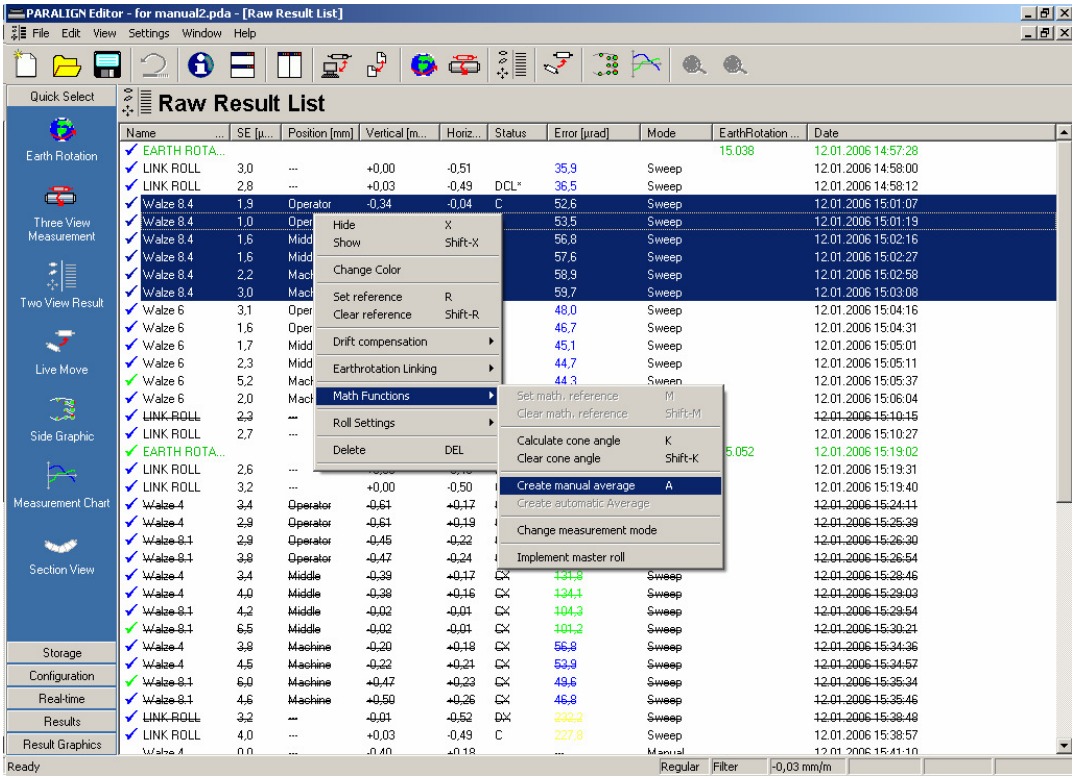


Figure 41

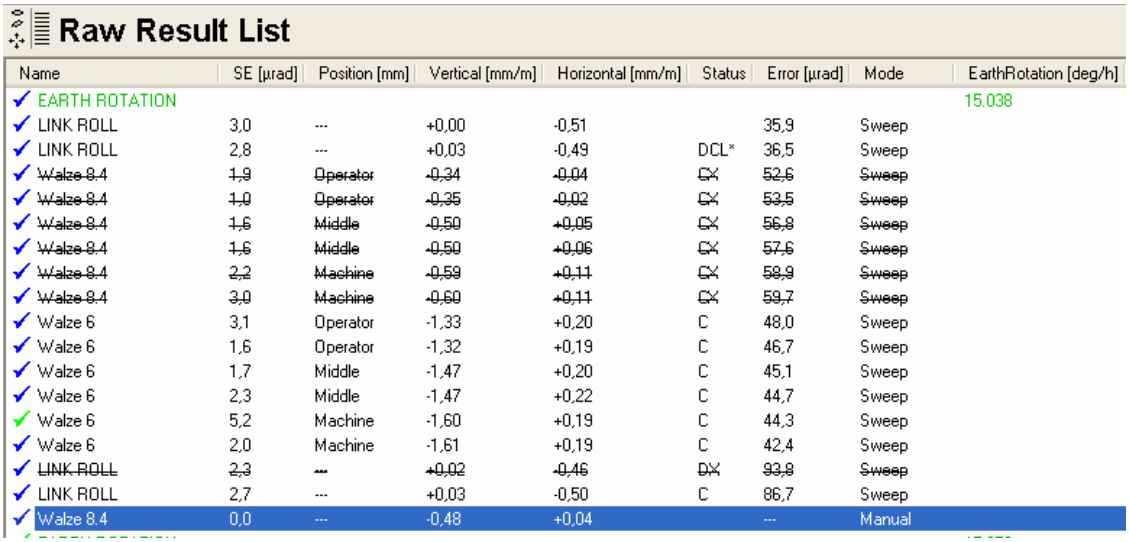


Figure 42

EARTH ROTATION						
LINK	3.8	+0.830	-0.001		36.4	Sweep
LINK	2.7	+0.811	-0.013	DCL*	37.1	Sweep
8.1	2.5	+0.477	-0.032	CXA	42.0	Sweep
8.1	3.3	+0.467	-0.041	CXA	43.2	Sweep
8.1	4.3	+0.810	-0.022	CXA	45.9	Sweep
8.1	4.8	+0.783	-0.034	CXA	46.7	Sweep
8.1	5.3	+1.112	-0.001	CXA	48.2	Sweep
8.1	5.3	+1.102	-0.010	CXA	49.1	Sweep
6.5	11.0	+0.608	+0.280	CXA	57.9	Sweep
6.5	9.2	+0.608	+0.261	CXA	57.4	Sweep
6.5	9.3	+0.895	+0.131	CXA	59.9	Sweep
6.5	10.1	+0.876	+0.133	CXA	61.0	Sweep
6.5	9.7	+0.945	-0.548	CXA	68.3	Sweep
6.5	5.8	+0.932	-0.532	CXA	68.5	Sweep
6.4	2.6	+0.330	+0.181	CXA	77.4	Sweep
6.4	3.7	+0.319	+0.152	CXA	78.6	Sweep
6.4	1.9	+0.558	+0.128	CXA	58.2	Sweep
6.4	2.4	+0.554	+0.118	CXA	57.3	Sweep
6.4	4.2	+1.042	-0.066	CXA	56.0	Sweep
6.4	3.8	+1.040	-0.088	CXA	54.8	Sweep
6.63	5.1	+0.878	-0.124	CXA	51.2	Sweep
6.63	3.8	+0.847	-0.142	CXA	50.1	Sweep
6.63	4.2	+0.673	-0.226	CXA	48.7	Sweep
6.63	4.5	+0.673	-0.218	CXA	48.2	Sweep
6.63	6.1	+0.553	-0.373	CXA	48.4	Sweep
6.63	3.6	+0.562	-0.353	CXA	46.9	Sweep
9.1	3.4	+0.641	-0.152	CXA	45.5	Sweep
9.1	3.0	+0.643	-0.148	CXA	45.0	Sweep
9.1	6.7	+0.720	-0.089	CXA	45.9	Sweep
9.1	5.9	+0.733	-0.080	CXA	45.2	Sweep
9.1	4.3	+0.805	+0.020	CXA	44.0	Sweep
9.1	5.5	+0.787	+0.021	CXA	44.3	Sweep
9.2	3.6	+2.364	-15.824	CXA	39.4	Sweep
9.2	4.1	+2.343	-15.823	CXA	39.7	Sweep
9.2	1.9	+0.299	-0.212	CXA	37.7	Sweep
9.2	1.6	+0.298	-0.210	CXA	37.8	Sweep
9.2	2.0	-0.796	+16.234	CXA	31.9	Sweep
9.2	2.1	-0.813	+16.224	CXA	31.8	Sweep
LINK	3.4	+0.833	-0.018	C	35.0	Sweep
LINK	3.2	+0.742	+0.038	DX	129.2	Sweep
8.1	0.0	+0.792	-0.023		---	Manual
6.5	0.0	+0.811	-0.046		---	Manual
6.4	0.0	+0.641	+0.071		---	Manual
6.63	0.0	+0.697	-0.239		---	Manual
9.1	0.0	+0.722	-0.071		---	Manual
9.2	0.0	+0.616	+0.065		---	Manual

Figure 42a

3.4.6 *Explanation of Drift*

The gyroscopes inside PARALIGN have two components of drift over time:

a) There is a non-linear drift, also called random walk ;
b) There is a linear drift over time and can thus be compensated after taking a set of measurements.

The measurement values on the link roll are assumed to be ideal, without a drift, identical at the beginning and at the end of a set of measurement (Figure 43):

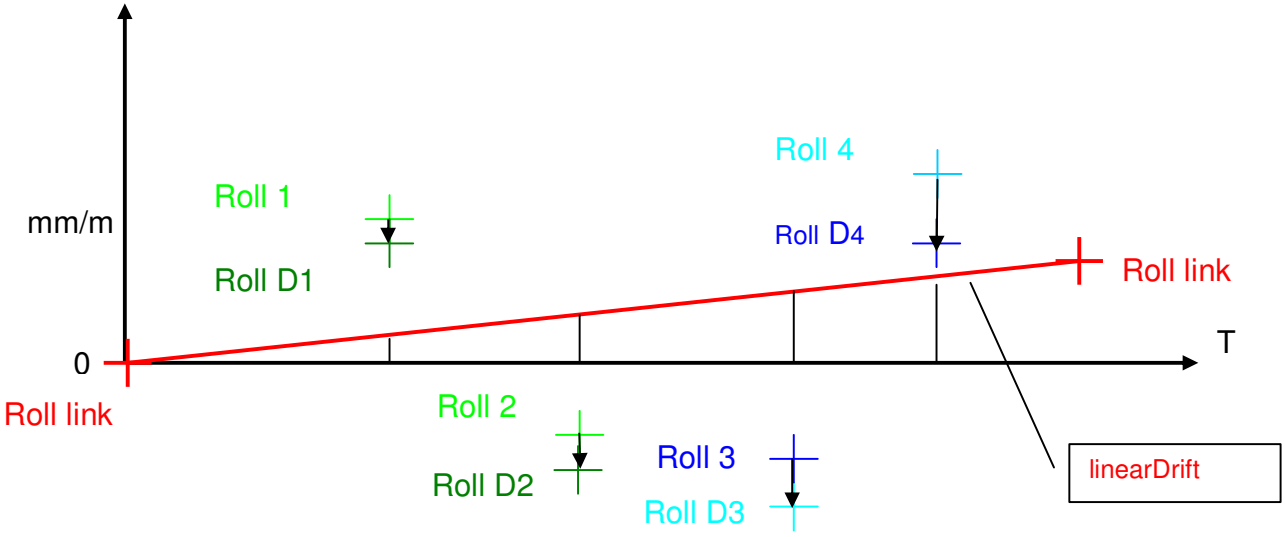


Figure 43

Note: After the drift points are set and “C” is pressed for compensation, the linear component of the drift is being subtracted as indicated in the schematic (Figure 43). In this case, the drift error subtracted from each measured roll is indicated by the black arrow.

3.4.7 Roll settings

Roll affiliation is a command that is used when a wrong roll has been selected for a measurement.

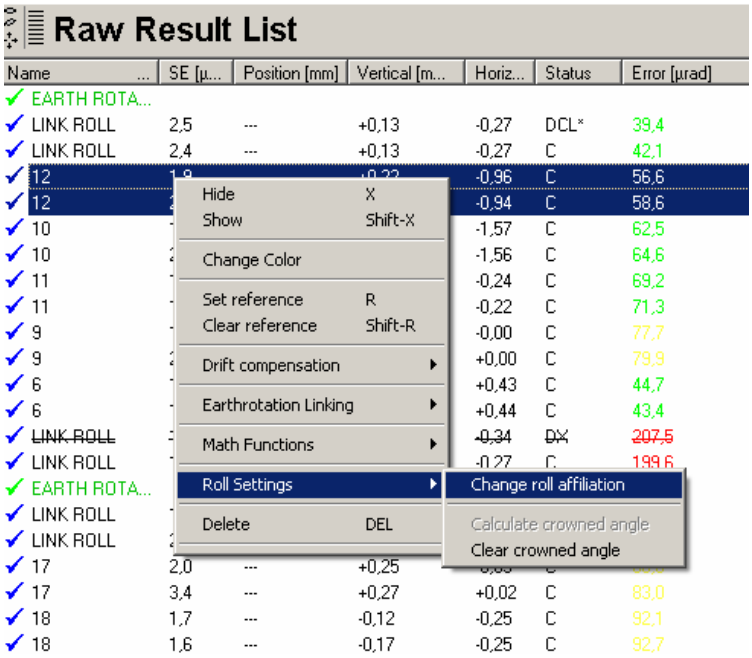


Figure 44

By choosing roll affiliation (Figure 44) the correct roll can then be selected for use (Figure 45)

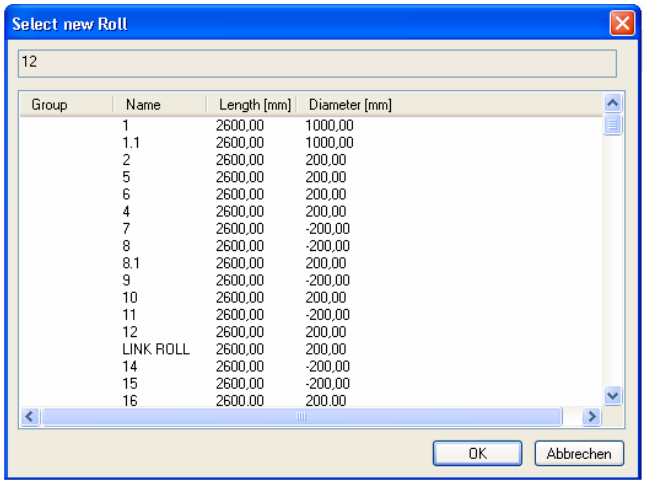


Figure 45

3.4.8 *Change measurement mode/position*

Change measurement mode is a command that is used when a wrong mode or position has been selected for a measurement

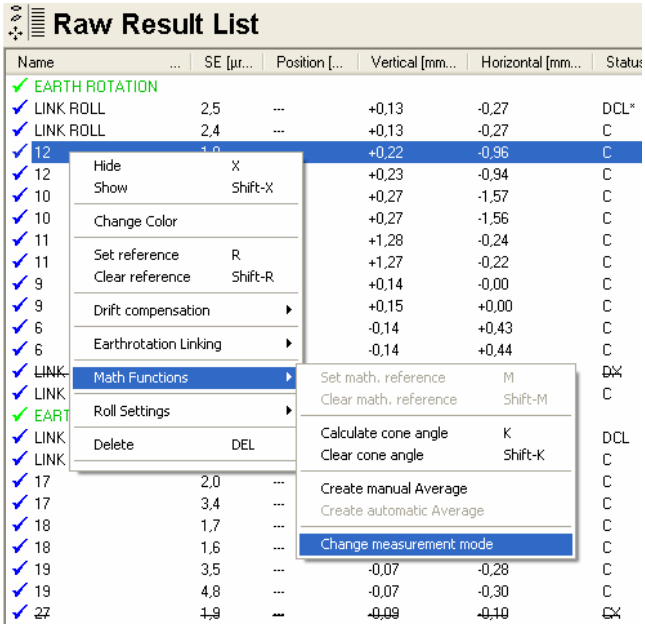


Figure 46

By choosing change measurement mode (Figure 46) the correct mode/position can then be selected for use (Figure 47).

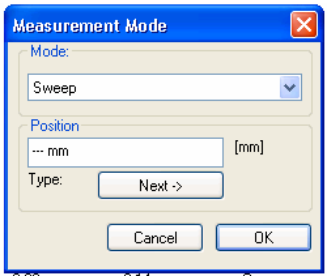


Figure 47

3.5. General Settings

There are different settings that can be edited. These settings are global on the editor and not specific to a single measurement session.

3.5.1. Device Settings

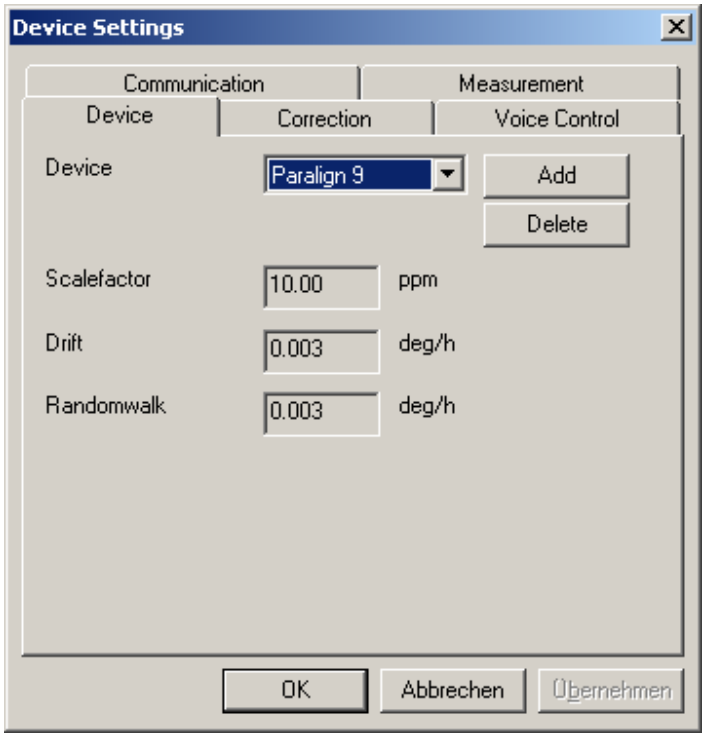


Figure 48

Under “Device” the device can be added or deleted. There is also shown information about the scale factor, the drift and the random walk of the device.
The device can be added with the respective PARALIGN name (for example PARALIGN 9) and its own cone angle (Figure 49). This way when it is time for a measurement, the correct PARALIGN with the right settings can be chosen by the user.

3.5.2. Correction

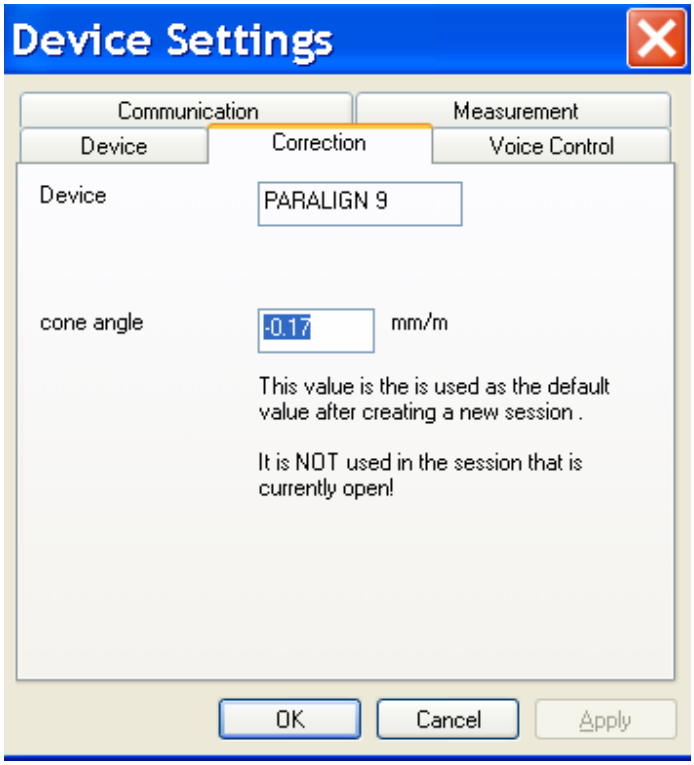


Figure 49

This is the cone angle that will be used for the currently selected device. It will **not** change the cone angle of the active measurement session! These Settings are only used, if you create a new measurement. It is recommended to check if the cone angle typed is the cone angle of the device being used since each device has its own unique cone angle.

3.5.3 Cone Angle

The cone angle is the angular offset of the internal gyroscope block to the feet of the device housing. If this angle is not set, even a perfect cylinder will look like a cone. (The difference may be in terms of µrad here, but the results will still show it).
This will affect the whole measurement.

The cone angle cannot be changed in the software. When the PARALIGN device (**Note:** Only those with the updated firmware version higher than 1.5.9) is connected to the computer, the editor can derive the cone angle directly from the device (Figure 49a). (**Note:** The editor can no longer set or calculate the cone angle for the device).

If the firmware is not updated the cone angle should be pre-set with the respective PARALIGN in the software **PRIOR** to performing measurements (**See 3.5.1 and 3.5.2**). This is very important as once the cone angle is not set, the measurements taken will be faulty.
The software displays a connection window when the connection has been made and notifies the user whether the cone angle has been retrieved from the device (See Note 2*). If the transfer is unsuccessful (Figure 49b), the user is notified (only if activated, See Note 1* below) and the correct PARALIGN device with its cone angle can be chosen before measurement.

Note 1*: The option for "Ask for cone angle" should be activated (Figure 51). If it is not activated the editor will use the cone angle from the device setting (See 3.5.2).

Note 2*: It is wise to check the cone angle retrieved from the PARALIGN device to the cone angle sticker below the device, to make sure the correct angle has been set.

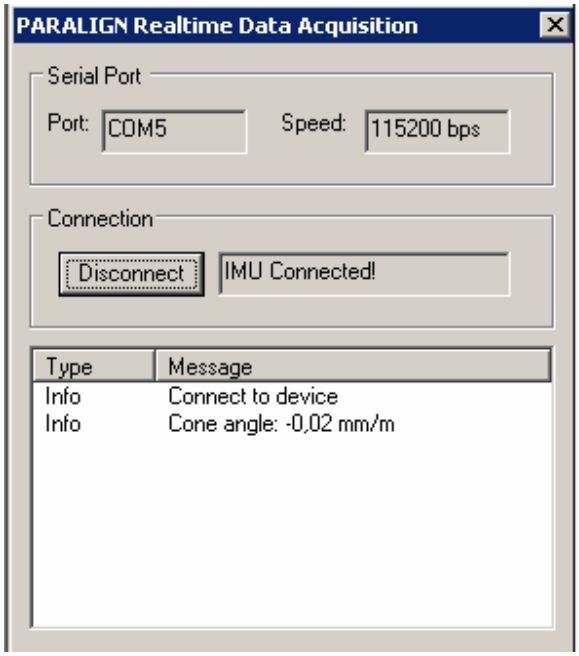


Figure 49a: Automatically retrieves cone angle from device

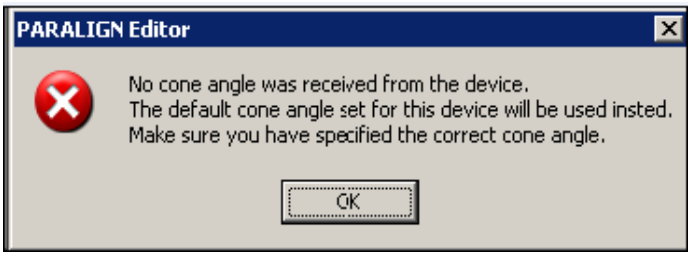


Figure 49b: Message warning incase cone angle cannot be retrieved

3.5.4 Communication

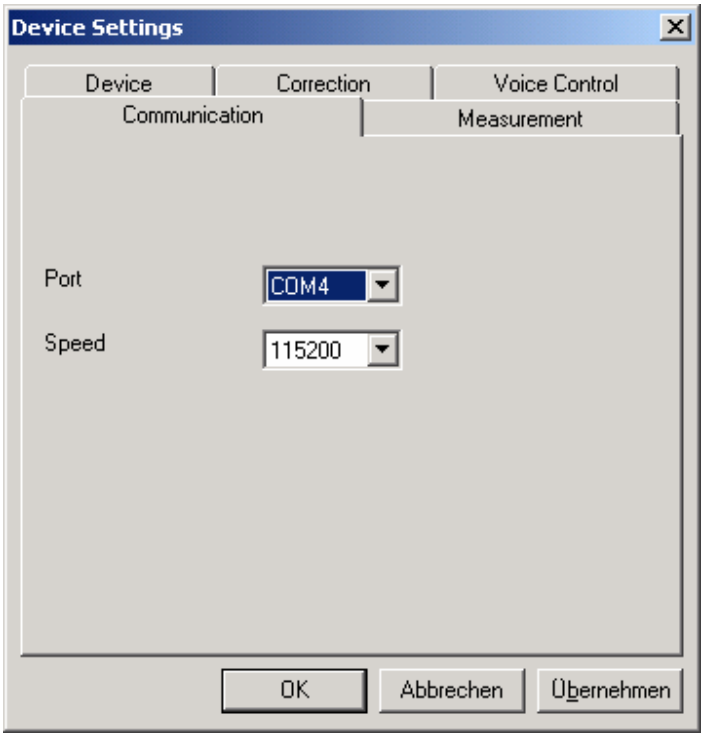


Figure 50

These are the settings for the serial communication. You can select port and speed. Usually, for the bluetooth-connection the COM port is provided in each computer's bluetooth setting properties.

3.5.5. Measurement

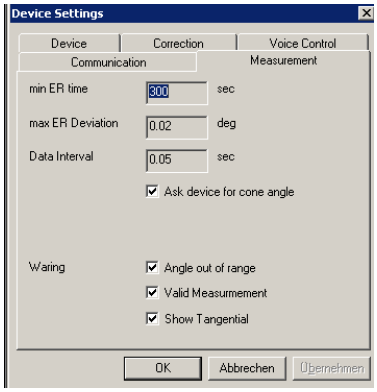


Figure 51

Under measurement the following information is displayed.

- The minimum time for the earth rotation measurement
- The maximum earth rotation deviation from the actual value 15.041 deg/hour.
- The data interval is used to record Roll Pitch Yaw values.

The following functions can be activated.

- “Ask device for cone angle”: the cone angle is retrieved from the device directly (only in newer software versions higher than 1.5.9).
- “Angle out of range” the Laptop speaker alerts if the PARALIGN is moved over a large angle from the calibration position. A pop up message also appears to warn the user.(Figure 51a)
- “Valid Measurement” the speaker from the PARALIGN clicks if the measurement is in the filter tolerance and the device has 3 lights that light up when in tolerance.
- “Show Tangential” displays the tangential angle on the screen from the PARALIGN.

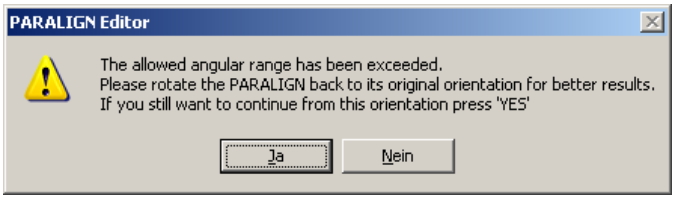


Figure 51a

3.5.6. Analysis

3.5.6.1. Measurement Units

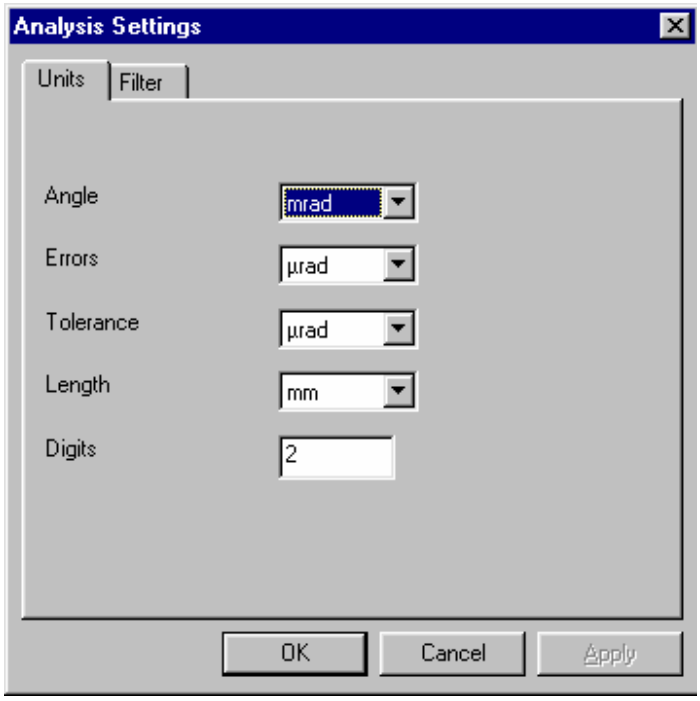


Figure 52

These selections are global settings for all units that will be displayed anywhere in the software. The settings will also be used in the excel export, as well as the excel import. Always make sure that the file you try to import uses the same units as the current editor settings. For a demonstration it might be useful to switch the units to degrees, because degree is easier to understand than mrad etc.

3.5.6.2. Measurement Filter

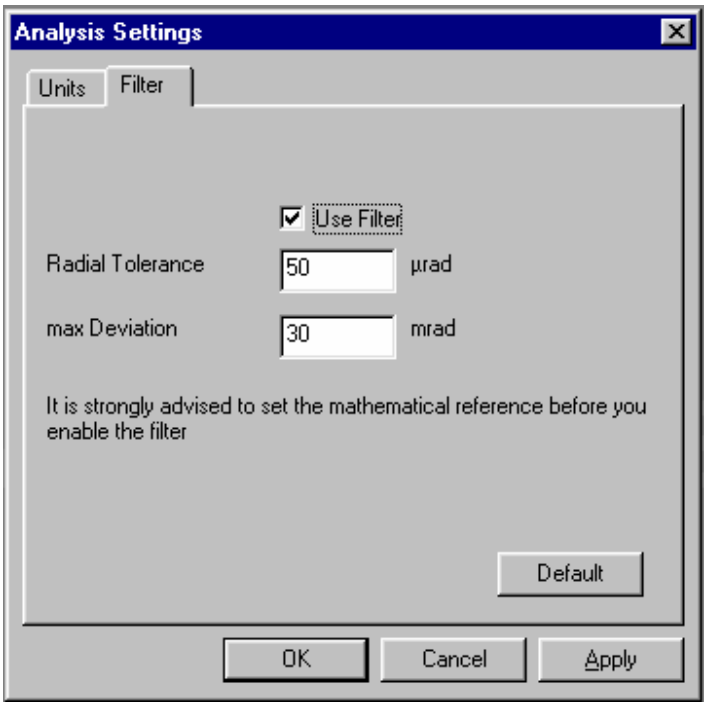


Figure 53

The Radial Tolerance is the maximum allowed difference between two following points in a measurement. The maximum Deviation is the maximum allowed deviation from the calibration plate.

Put the "√" in the "Use Filter"-box if the measurement filter should be applied to all measurements. If the filter is enabled, all points of a measurement that exceed these values will be hidden and not used for calculations. – If you perform a measurement with the calibration plate, always use the filter with radial tolerance "50µm/m" and max. deviation "30mm/m". – For a demonstration without fixing the calibration plate do not use the filter, and set the max deviation to about 150mrad. Thus, you will hear the acoustic control sound from your laptop, which is accompanying the measurement values, even if you only put the PARALIGN in parallel to the machine by your eye.

Important: With activated filter the tolerance from the Earth Rotation deviation is max **0.02deg/h**. If the filter is deactivated the tolerance from the Earth Rotation deviation is max **0.08deg/h**. That is useful if it is required to calibrate the Paralign for a demonstration.

3.5.7 User Info

The data about the user is entered. This data will be included in the excel exports.

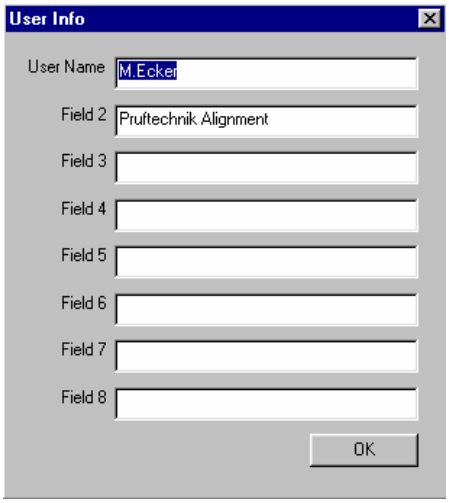


Figure 54

Session Detail

With the Info icon (Figure 54a) in the toolbar it is additionally possible to open the Session Detail (Figure 54b) where the user can change session and user information.

Figure 54a

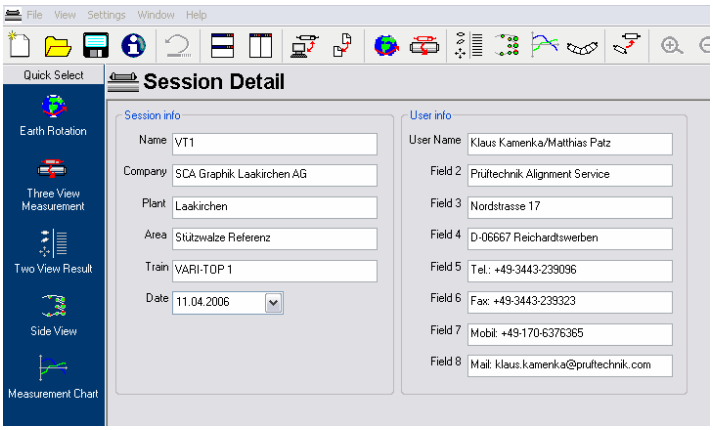


Figure 54b

3.5.8 Directories

You can specify different directories that will be used by the editor.

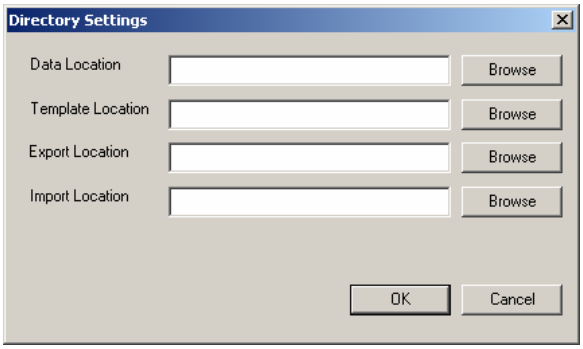


Figure 55

- The Data location is the place where all measurement files will be stored
- The Template location is the place where all measurement templates will be stored.
- The Export location is the place where the excel files will be written to
- The Import location is the place where the editor will search for excel files when trying to import them.

3.5.9 Saving Files

Files can be saved in different formats: a) ***.pda** and b) ***.pta**

.pda files are the usual extension of files that are saved and are also known as “PARALIGN Data Archive” (Figure 55a).

.pta files are also known as “Paralign Template Archive”. This option is used to save an existing file with complete drawing but with no measurement values. The measurement values are deleted and when a user returns perhaps to the same customer for a new day of service, this option avoids the need to draw the rolls again.

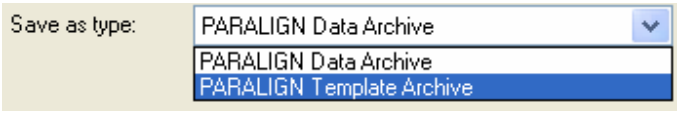


Figure 55a

To retrieve the file from the editor the user has to go to File → New From…, and point to the location the file was saved. The saved file with extension .pta opens up **without** any **measurement value** and **device information** but with the schematic.

3.5.10 Auto Backup

For safety reasons a backup file will automatically be created from the Editor after the first measurement. In case the editor shuts down the previous measurements will be stored. After the Editor starts again a window will appear (Figure 55b) with the message if the back up should be loaded.

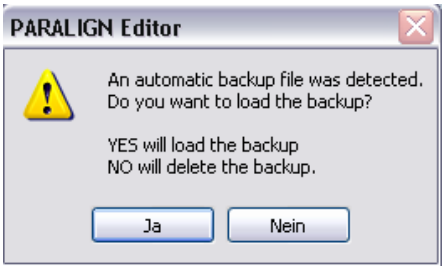


Figure 55b

4) Quick Select Bar

The Quick Bar helps to open the different views of the editor by providing a little structured organization.

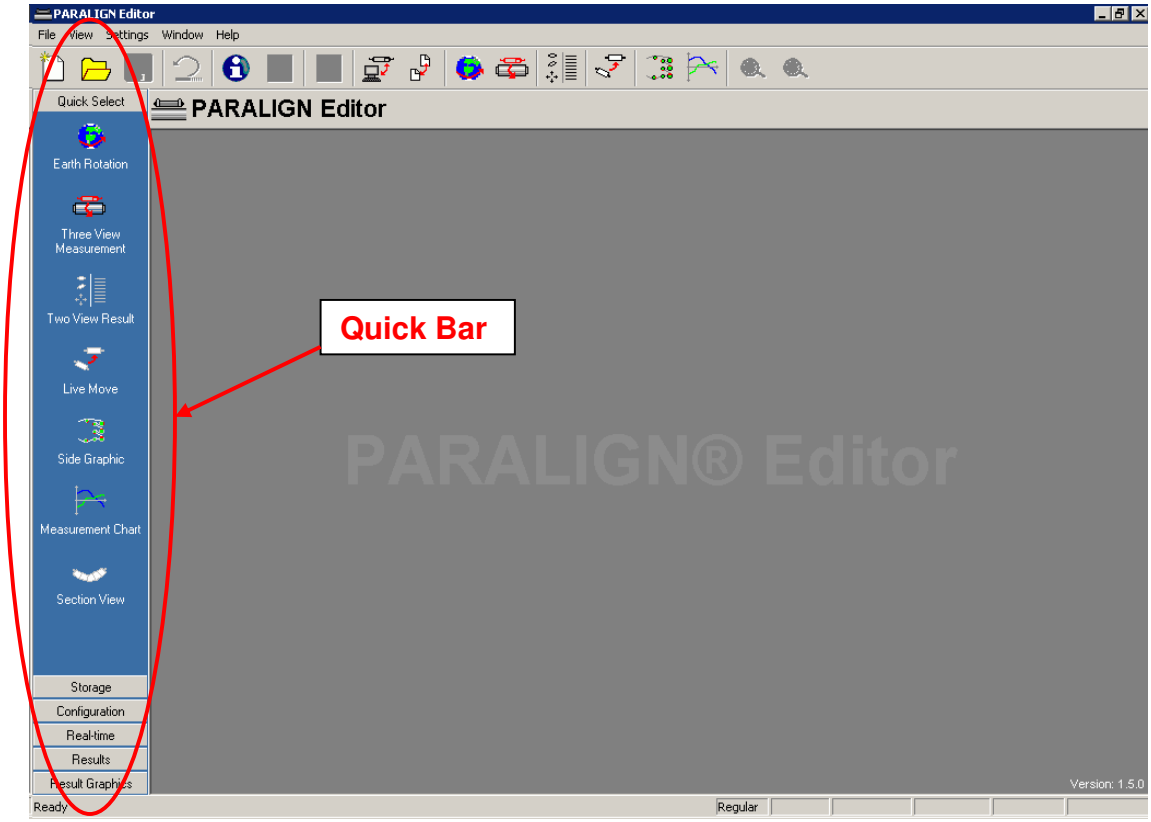


Figure 56

4.1 Quick Select

Alignment
Real-time View (3)
Result View (2)
Live Move
Side View
Measurement Chart

4.2 Storage

PC Connection
Load
Save
Excel Export
Excel Result Import

4.3 Configuration

Template Editor
Device Editor
User Info

4.4 Real Time

Connect
Alignment
Real-time View (3)
Machine (roll) Selection
Real-Time
Raw Results

4.5 Result

Result View (2)
Raw Result
Result Detail
Measurement
Sieve
Machine (roll) Selection
Device Info
Session Info

4.6 Result Gfx

Result Chart
Result Angels
Lice Move
Measurement Chart
Detail Graphic
Sieve Graphic

5) Protocol

5.1 Preparation of Results for Customers

Once all the measurements have been completed, they have to be implemented in to a report that can be given to the customer. It shows which rolls were exactly measured on their machine and the report is given to the customer to be kept in their records.

The report (also known as protocol) usually contains the following:

a) Sheet of contact information (name, company etc.)
b) Sheet with raw results (showing actual numbers measured and recommended correction, Figure 57b)
c) Side view graphic (picture of measurement)
d) Section view page, if segmented rolls have been measured (Figure 57c).

Sometimes the customer may choose more than one point to be the reference, in which case, the customer needs a report with multiple view points.

In addition to the side view in the excel export, it is possible to create a picture of the side view directly from the software (Figure 57a). This picture can be stored separately, and then imported into the excel export.

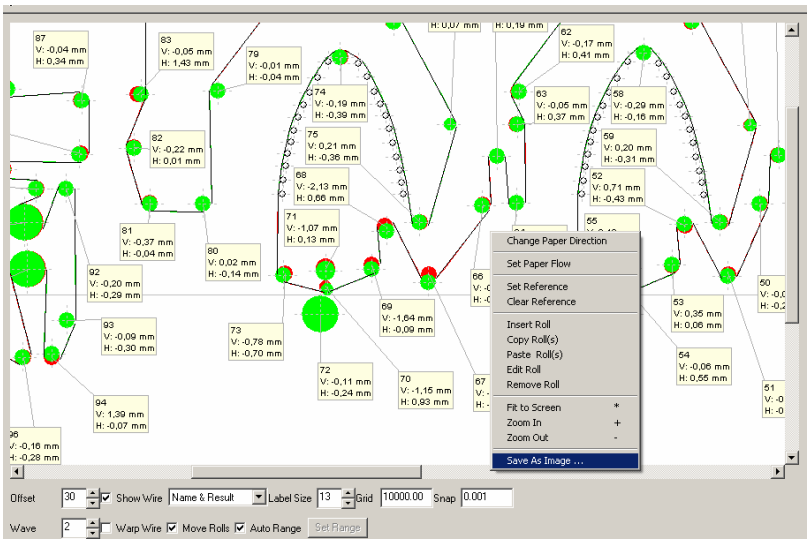
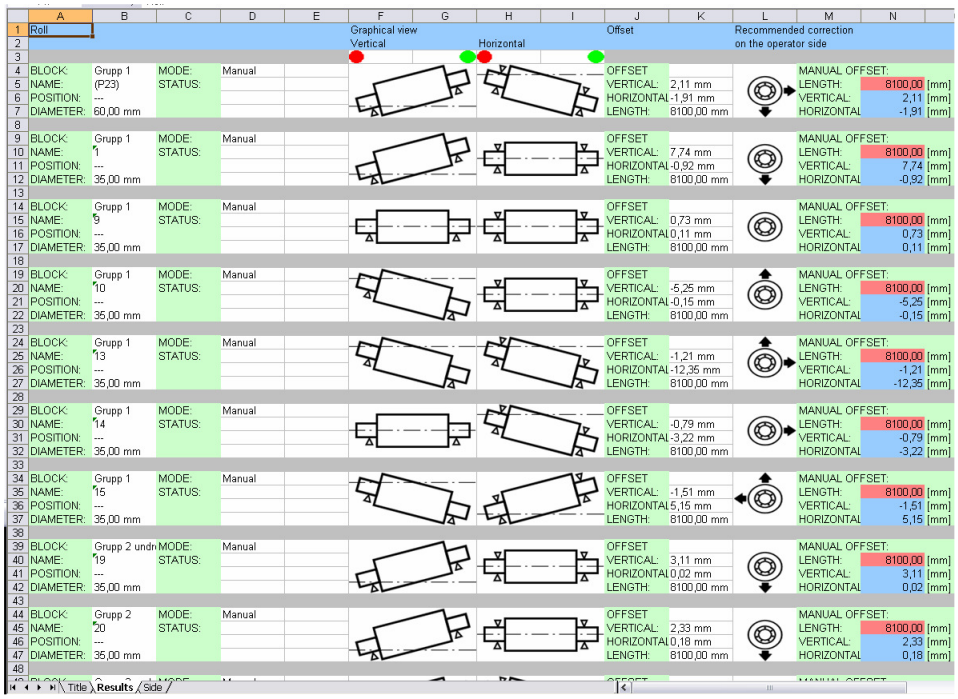


Figure 57a



	A	B	C	D	F	H	J	K	L	M	N
1	Roll				Graphical view		Offset		Recommended correction		
2					Vertical	Horizontal			on the operator side		
3											
4	BLOCK:	Grupp 1	MODE:	Manual			OFFSET			MANUAL OFFSET:	
5	NAME:	(P23)	STATUS:				VERTICAL:	2,11 mm		LENGTH:	8100,00 [mm]
6	POSITION:	---					HORIZONTAL	-1,91 mm		VERTICAL:	2,11 [mm]
7	DIAMETER:	60,00 mm					LENGTH:	8100,00 mm		HORIZONTAL	-1,91 [mm]
8											
9	BLOCK:	Grupp 1	MODE:	Manual			OFFSET			MANUAL OFFSET:	
10	NAME:	1	STATUS:				VERTICAL:	7,74 mm		LENGTH:	8100,00 [mm]
11	POSITION:	---					HORIZONTAL	-0,92 mm		VERTICAL:	7,74 [mm]
12	DIAMETER:	35,00 mm					LENGTH:	8100,00 mm		HORIZONTAL	-0,92 [mm]
13											
14	BLOCK:	Grupp 1	MODE:	Manual			OFFSET			MANUAL OFFSET:	
15	NAME:	9	STATUS:				VERTICAL:	0,73 mm		LENGTH:	8100,00 [mm]
16	POSITION:	---					HORIZONTAL	0,11 mm		VERTICAL:	0,73 [mm]
17	DIAMETER:	35,00 mm					LENGTH:	8100,00 mm		HORIZONTAL	0,11 [mm]
18											
19	BLOCK:	Grupp 1	MODE:	Manual			OFFSET			MANUAL OFFSET:	
20	NAME:	10	STATUS:				VERTICAL:	-5,25 mm		LENGTH:	8100,00 [mm]
21	POSITION:	---					HORIZONTAL	-0,15 mm		VERTICAL:	-5,25 [mm]
22	DIAMETER:	35,00 mm					LENGTH:	8100,00 mm		HORIZONTAL	-0,15 [mm]
23											
24	BLOCK:	Grupp 1	MODE:	Manual			OFFSET			MANUAL OFFSET:	
25	NAME:	13	STATUS:				VERTICAL:	-1,21 mm		LENGTH:	8100,00 [mm]
26	POSITION:	---					HORIZONTAL	-12,35 mm		VERTICAL:	-1,21 [mm]
27	DIAMETER:	35,00 mm					LENGTH:	8100,00 mm		HORIZONTAL	-12,35 [mm]
28											
29	BLOCK:	Grupp 1	MODE:	Manual			OFFSET			MANUAL OFFSET:	
30	NAME:	14	STATUS:				VERTICAL:	-0,79 mm		LENGTH:	8100,00 [mm]
31	POSITION:	---					HORIZONTAL	-3,22 mm		VERTICAL:	-0,79 [mm]
32	DIAMETER:	35,00 mm					LENGTH:	8100,00 mm		HORIZONTAL	-3,22 [mm]
33											
34	BLOCK:	Grupp 1	MODE:	Manual			OFFSET			MANUAL OFFSET:	
35	NAME:	15	STATUS:				VERTICAL:	-1,51 mm		LENGTH:	8100,00 [mm]
36	POSITION:	---					HORIZONTAL	5,15 mm		VERTICAL:	-1,51 [mm]
37	DIAMETER:	35,00 mm					LENGTH:	8100,00 mm		HORIZONTAL	5,15 [mm]
38											
39	BLOCK:	Grupp 2 und	MODE:	Manual			OFFSET			MANUAL OFFSET:	
40	NAME:	19	STATUS:				VERTICAL:	3,11 mm		LENGTH:	8100,00 [mm]
41	POSITION:	---					HORIZONTAL	0,02 mm		VERTICAL:	3,11 [mm]
42	DIAMETER:	35,00 mm					LENGTH:	8100,00 mm		HORIZONTAL	0,02 [mm]
43											
44	BLOCK:	Grupp 2	MODE:	Manual			OFFSET			MANUAL OFFSET:	
45	NAME:	20	STATUS:				VERTICAL:	2,33 mm		LENGTH:	8100,00 [mm]
46	POSITION:	---					HORIZONTAL	0,18 mm		VERTICAL:	2,33 [mm]
47	DIAMETER:	35,00 mm					LENGTH:	8100,00 mm		HORIZONTAL	0,18 [mm]
48											

Figure 57b

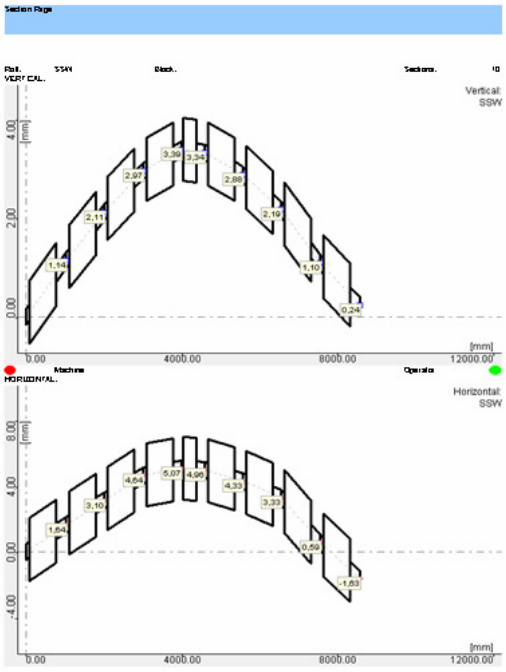


Figure 57c

5.2 Export/Import results to Excel File

These are the settings (Figure 58) for the excel export. You can select what pages should be included in the export.

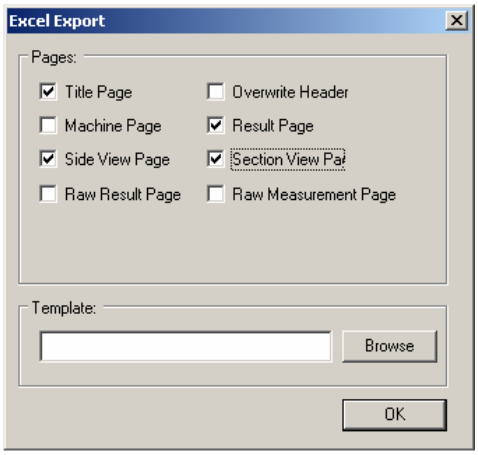


Figure 58

- The *Title page* includes username and session information.
- The *Machine page* holds a list of all prepared machines.
- The *Result page* shows a detailed description of all the measured rolls including the offsets in values and graphics. The result page will only give the values shown in the side view.
- The *Side View page* shows a graphical overview of all the parts of the machine viewed from the operator side.
- The *Raw Result page* gives a list similar to the raw result screen in the editor. It will display the measured angles together with some other data.
- The *Raw Measurement page* will include every single value that was measured in the session. This might be a very massive amount of data, so this option should only be selected when it is really needed.
- The *Template* is an additional excel file that will be adapted to the customer report.
- The *Section view page* will include the picture of the segmented roll, with the measurement results.
- The Overwrite Header implements a header and footer.

5.3 Adaptation of a Customer Report

If an additional logo or company name should be shown in the Excel Report (Figure 58a) it is possible to create a template and insert there the additional objects.

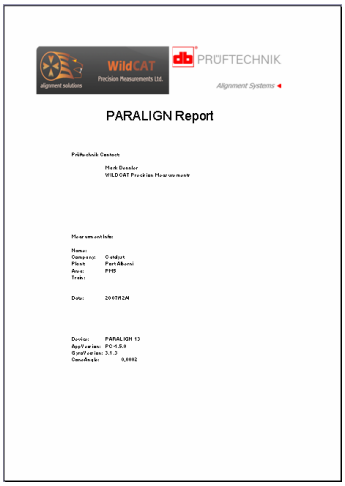


Figure 58a

The objects can only be implemented on positions which are not used by the protocol (Figure 58b). To create an Excel template it is necessary to open a new Excel file in which all the information will be inserted and stored (Figure 58c).

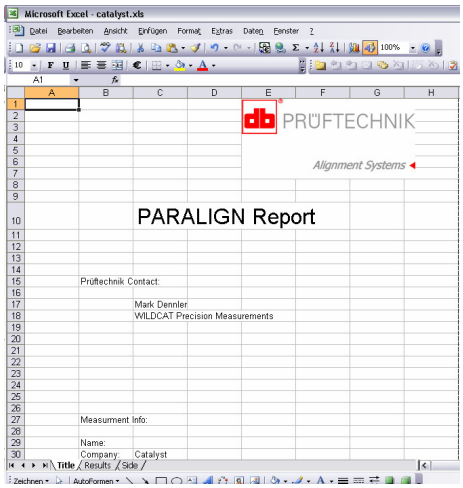


Figure 58b

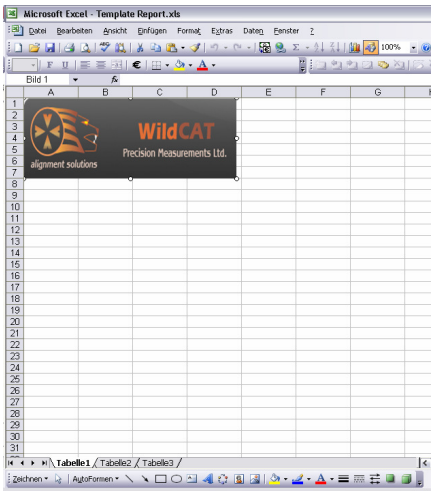


Figure 58c

The generated excel template can be loaded in the settings of the excel export (Figure 58d). Afterwards the Report will show the additionally inserted objects (Figure 58a).

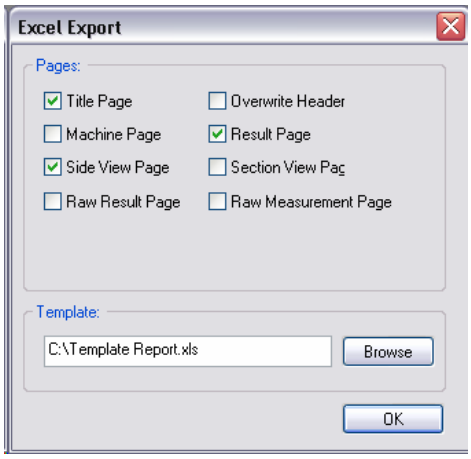


Figure 58d

6) Views

6.1 Machine axis implementation by Master Roll Implementation

When is a master roll import done? (Figure 59)

To display a roll's position according to the machine axis, with data input from an optical measurement team (e.g. theodolite). The machine axis will be implemented by including a "Master Roll" in the editor.

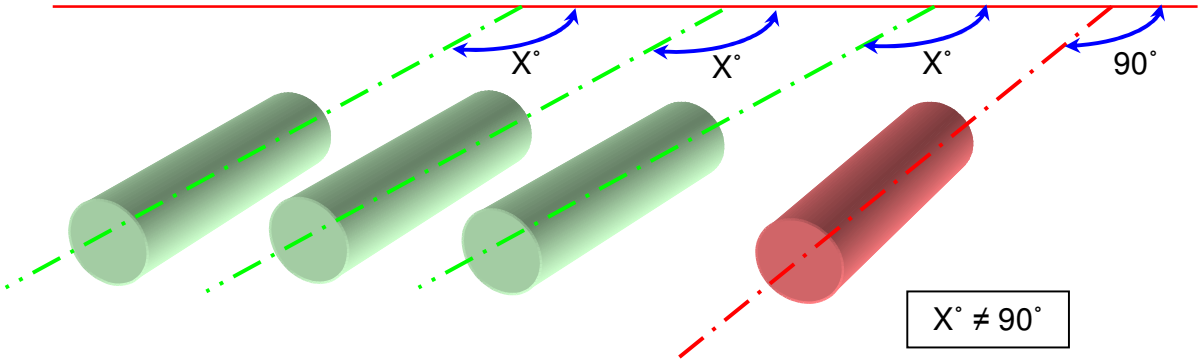


Figure 59

*Note: PARALIGN is able to measure only parallelism but not level.

Steps to get the angle and sign of the Master roll representing the machine axis:

Obtain horizontal and vertical deviation (mm/m; deg) from the machine axis by an optical team (Figure 60).
Once the values are determined for the master roll by the optical team, the team will specify which way the roll has to move (e.g. either towards wet end or dry end and similarly which side of the roll to move up or down).

Depending on which way the roll has to be moved in reference to the center line, the sign can be determined for the vertical and horizontal values.

Important Step 1: Make the roll measured by the optical team the reference.

I. $H_{\measuredangle} = \partial/L$ (mm/m); $V_{\measuredangle} = \partial/L$ (mm/m)

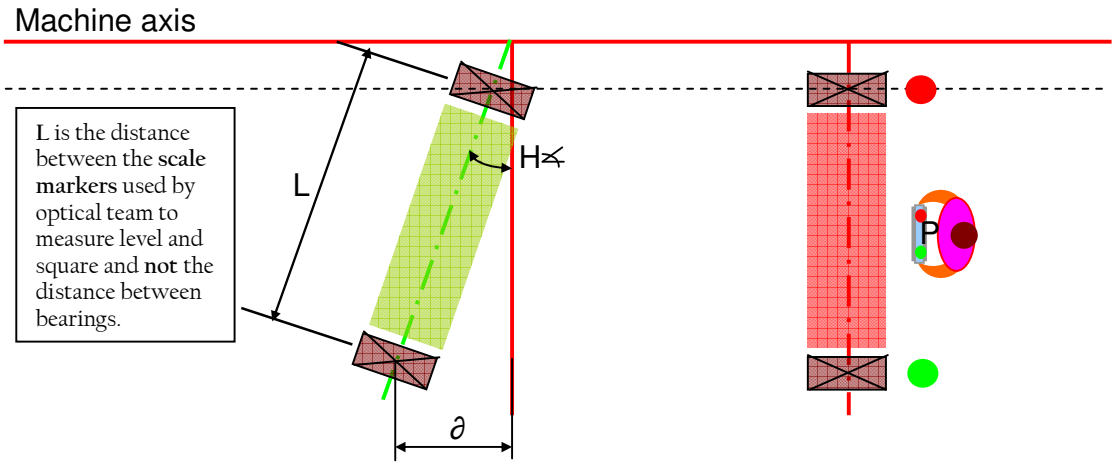


Figure 60

II. The sign '+' or '-' for the implementation of the horizontal value of the Master Roll will be determined as follows:

The operator side should be used as a fixed reference point.

If the reference (roll measured by optics) is to be moved clockwise in order to make it parallel with the centerline: horizontal sign of master roll is negative, '**-ve**'.
If the reference (roll measured by optics) is to be moved counterclockwise i.e. to make it parallel with the centerline: horizontal sign of master roll is positive '**+ve**'.

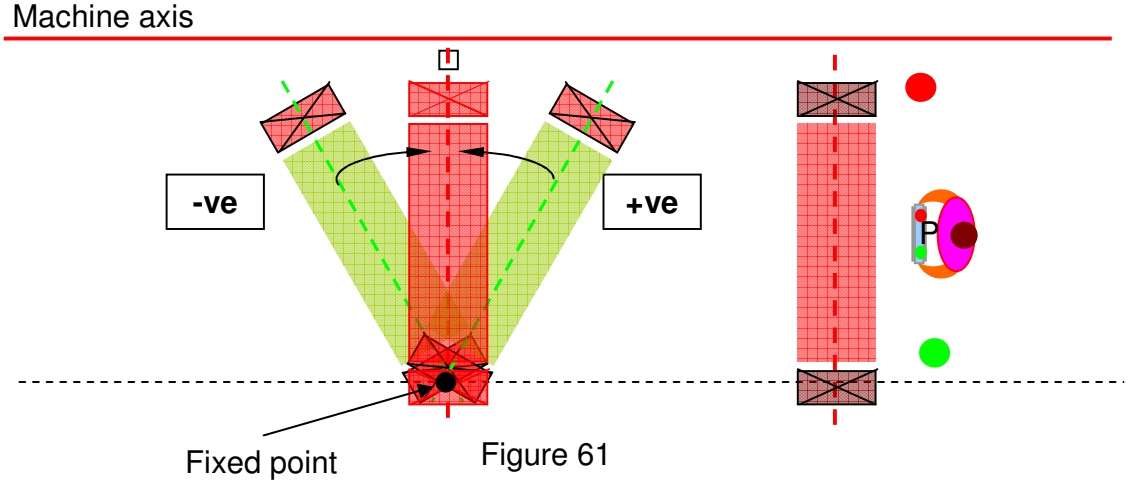


Figure 61

III. The sign '+' or '-'for **vertical** will be assigned as follows.

The operator should be used as a fixed reference point.

If the reference (roll measured by optics) is to be moved clockwise i.e. to make it parallel with the centerline: vertical sign of master roll is negative: '**-ve**'.

If the reference (roll measured by optics) is to be moved counterclockwise i.e. to make it parallel with the centerline: vertical sign of master roll is positive: '**+ve**'.

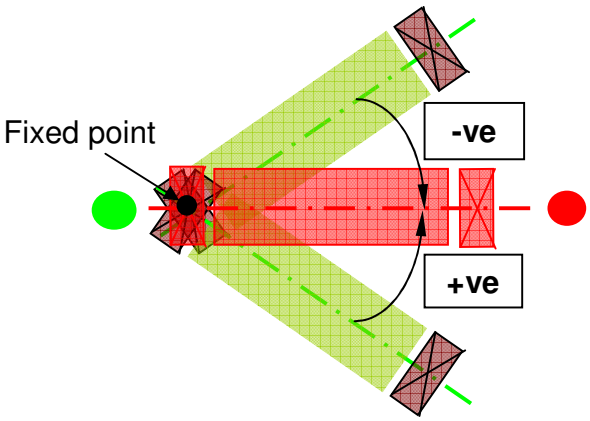


Figure 62

Application of the angle and sign from the Master roll in the Editor:

Make sure that the roll measured by the customer (as stated above in Step1) is set as reference.
(V=H=0.00mm/m)

Highlight the measurement in the “Raw Result List”, click the right mouse button -> Math Functions-> Implement master roll (Figure 63).

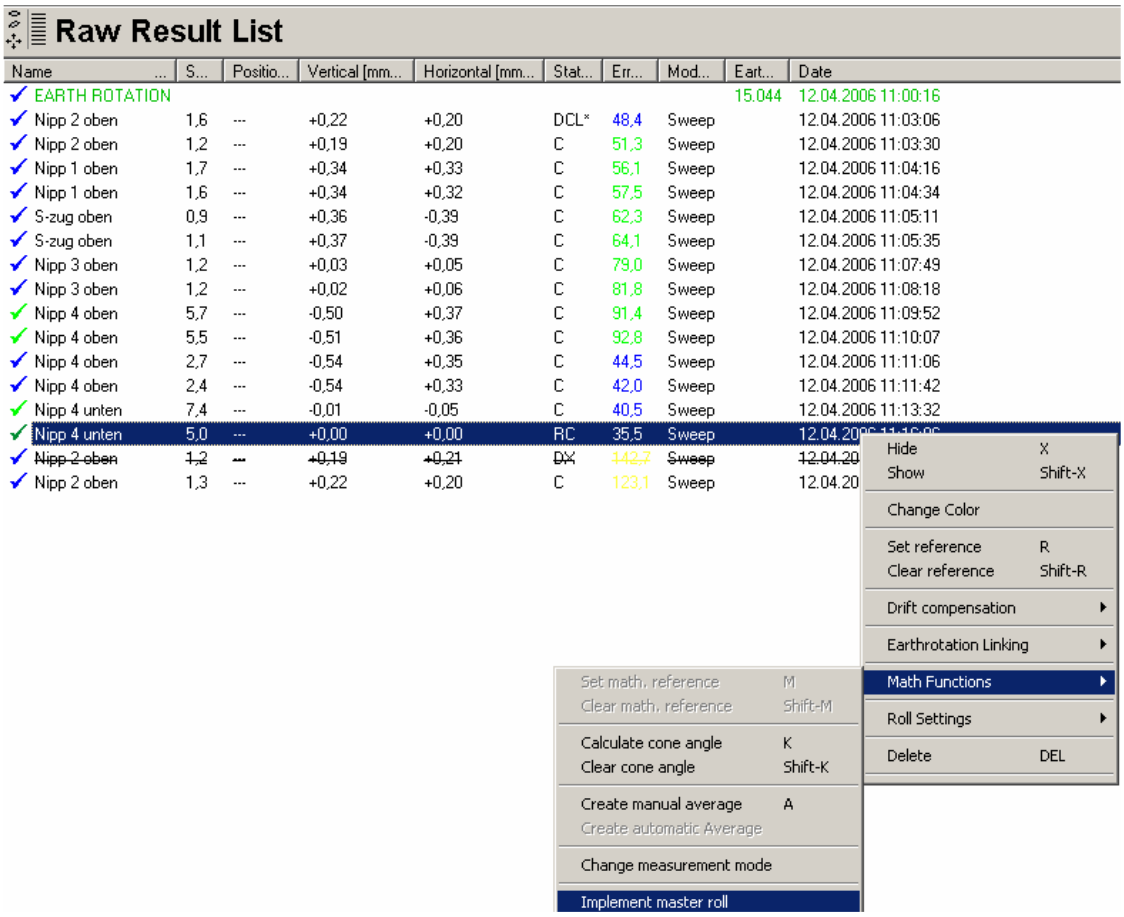


Figure 63

In the following window enter the angular offset from the master roll to the reference roll (Figure 63.1).

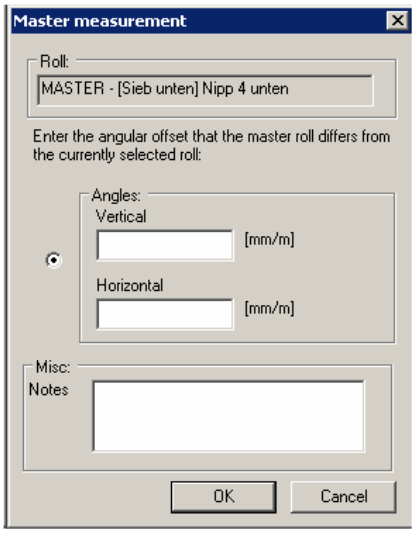


Figure 63.1

Afterwards the master values are shown on the bottom from the “Raw Result List” (Figure 63.2)

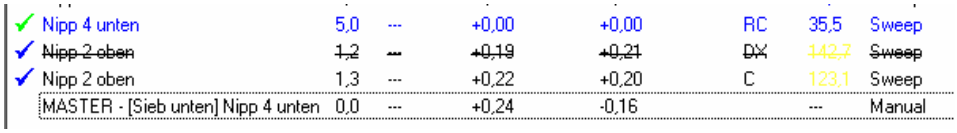


Figure 63.2

Set the master roll as the reference and the results will indicate how much correction is required to bring all the other rolls in line with the master roll. (Figure 63.3, 63.4)

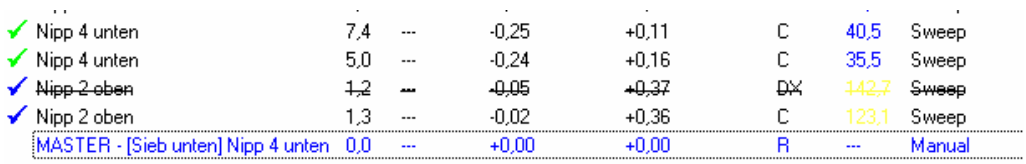


Figure 63.3

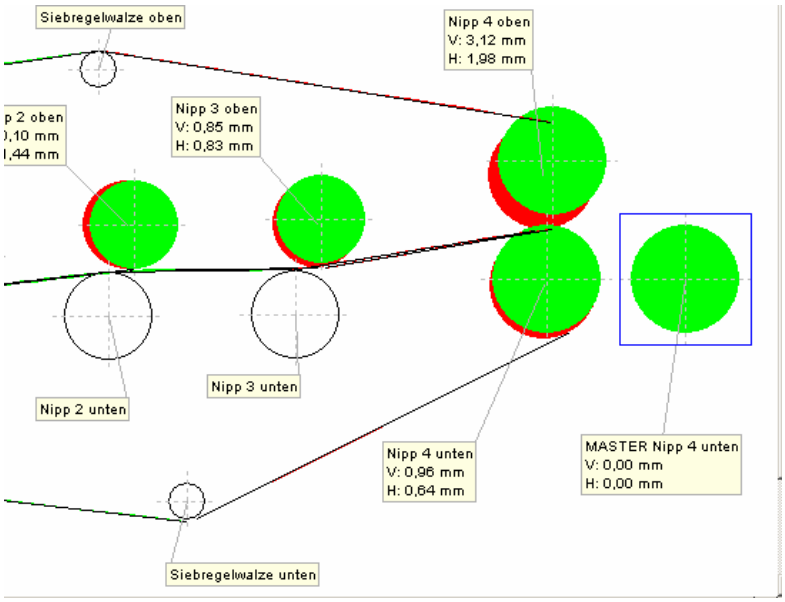


Figure 63.4

6.2 Reimport of measurements intro the Editor

When is it necessary to make a reimport?
Occasionally it happens that the LINK ROLL has changed during a measurement over several days or a second measurement after a long time.

Requirements:
To join the files it is necessary to have one roll (bridge roll) which has not moved over the whole time. To be sure that the position of the bridge roll has not changed it is necessary to measure a few rolls in all files which are to be joined.

How to do this:
Some rolls which had been measured in the first measurement (Figure 63a) have to be remeasured in the second measurement (Figure 63b), in order to compare the relative positions in the past with the up-to-date ones. The offsets between these rolls from the first and second measurement have to be similar. One of these rolls can then be used as Bridge roll. The properties from the bridge roll should be the same as the ones from the Link Roll (cylindrical, metallic, good repeatability).

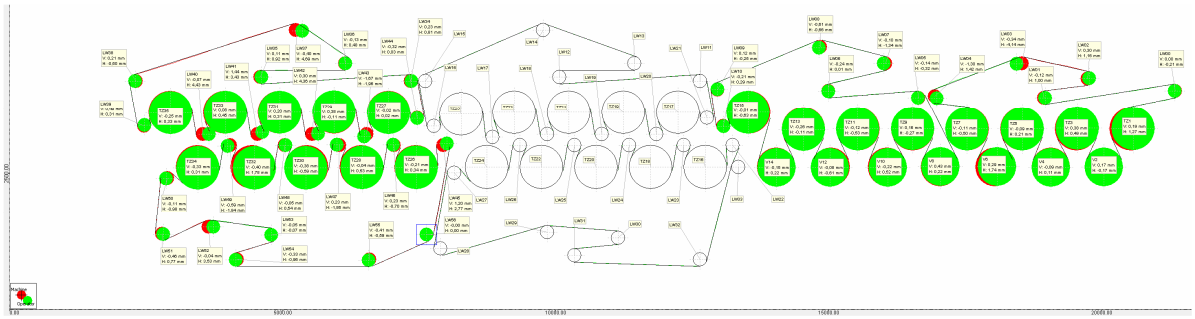


Figure 63a

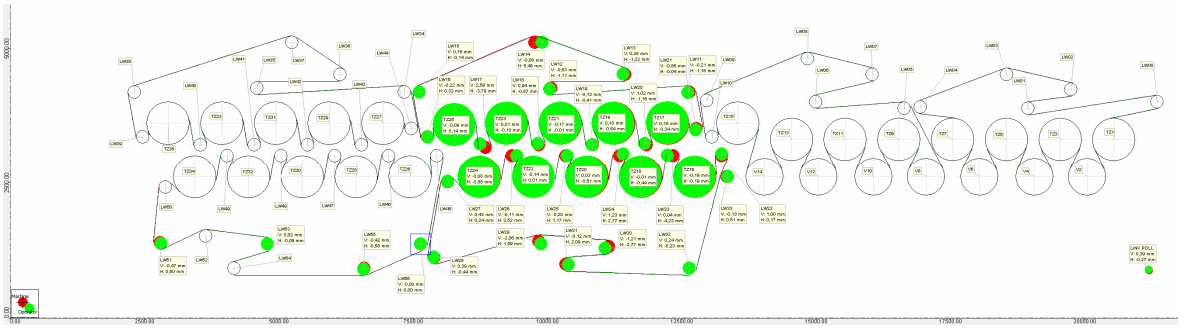


Figure 63b

Preparation:
First of all it is necessary to set the bridge roll as reference in all files that have to be joined (Figure 63a and Figure 63b). Afterwards the measurements have to be exported to excel. Previously the settings of the excel export have to be set to the following pages: Title and Machine Page (Figure 63c).

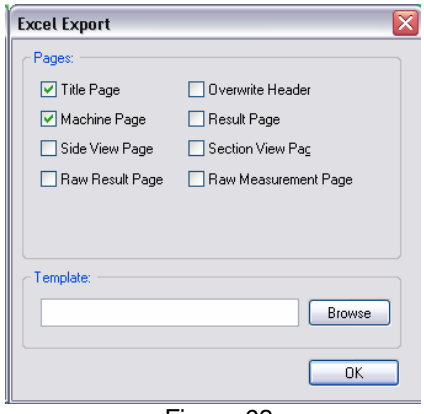
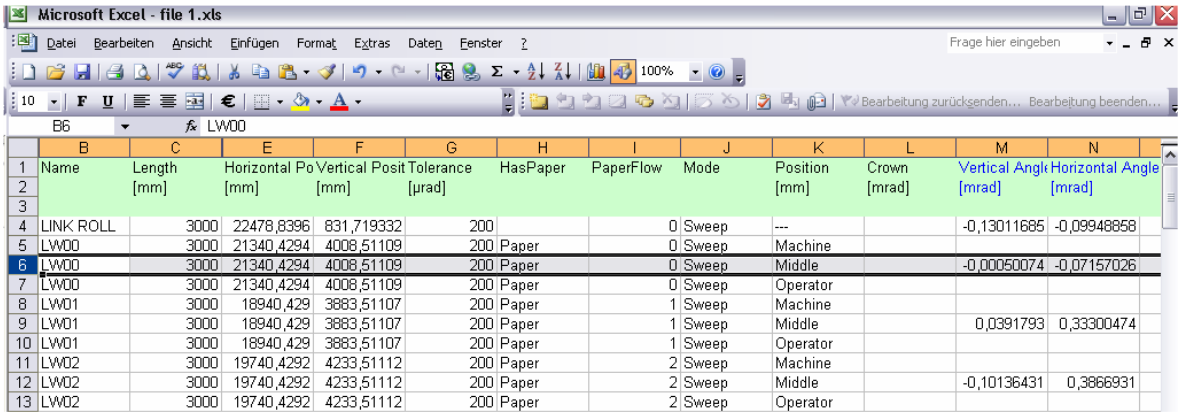


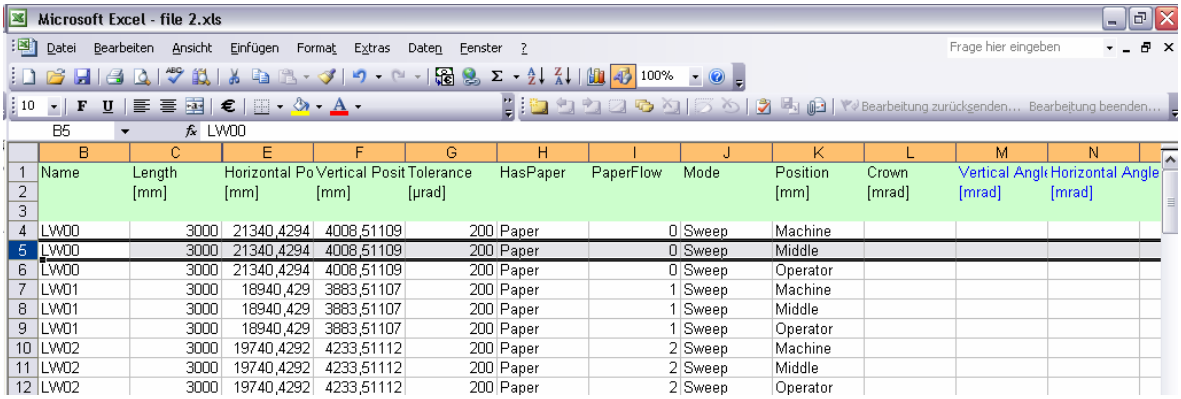
Figure 63c

Excel:
Now **one** “machine list” has to be created, by copying the vertical and horizontal values from the rolls in the previous measurement (Figure 63d) into the machine list of the latest excel file (Figure 63e). Make sure that you copy the right vertical and horizontal angle values to the respective roll.



	B	C	E	F	G	H	I	J	K	L	M	N
1	Name	Length	Horizontal Po	Vertical Posit	Tolerance	HasPaper	PaperFlow	Mode	Position	Crown	Vertical Angl	Horizontal Angle
2		[mm]	[mm]	[mm]	[µrad]				[mm]	[mrad]	[mrad]	[mrad]
3												
4	LINK ROLL	3000	22478,8396	831,719332	200		0	Sweep	---		-0,13011685	-0,09948858
5	LW00	3000	21340,4294	4008,51109	200	Paper	0	Sweep	Machine			
6	LW00	3000	21340,4294	4008,51109	200	Paper	0	Sweep	Middle		-0,00050074	-0,07157026
7	LW00	3000	21340,4294	4008,51109	200	Paper	0	Sweep	Operator			
8	LW01	3000	18940,429	3883,51107	200	Paper	1	Sweep	Machine			
9	LW01	3000	18940,429	3883,51107	200	Paper	1	Sweep	Middle		0,0391793	0,33300474
10	LW01	3000	18940,429	3883,51107	200	Paper	1	Sweep	Operator			
11	LW02	3000	19740,4292	4233,51112	200	Paper	2	Sweep	Machine			
12	LW02	3000	19740,4292	4233,51112	200	Paper	2	Sweep	Middle		-0,10136431	0,3866931
13	LW02	3000	19740,4292	4233,51112	200	Paper	2	Sweep	Operator			

Figure 63d



	B	C	E	F	G	H	I	J	K	L	M	N
1	Name	Length	Horizontal Po	Vertical Posit	Tolerance	HasPaper	PaperFlow	Mode	Position	Crown	Vertical Angl	Horizontal Angle
2		[mm]	[mm]	[mm]	[µrad]				[mm]	[mrad]	[mrad]	[mrad]
3												
4	LW00	3000	21340,4294	4008,51109	200	Paper	0	Sweep	Machine			
5	LW00	3000	21340,4294	4008,51109	200	Paper	0	Sweep	Middle			
6	LW00	3000	21340,4294	4008,51109	200	Paper	0	Sweep	Operator			
7	LW01	3000	18940,429	3883,51107	200	Paper	1	Sweep	Machine			
8	LW01	3000	18940,429	3883,51107	200	Paper	1	Sweep	Middle			
9	LW01	3000	18940,429	3883,51107	200	Paper	1	Sweep	Operator			
10	LW02	3000	19740,4292	4233,51112	200	Paper	2	Sweep	Machine			
11	LW02	3000	19740,4292	4233,51112	200	Paper	2	Sweep	Middle			
12	LW02	3000	19740,4292	4233,51112	200	Paper	2	Sweep	Operator			

Figure 63e

After completing all the measurement values into the excel sheet save the file and import it into the Editor (Figure 63f). In the Editor all import values will be shown under Result Numbers (Figure 63g).

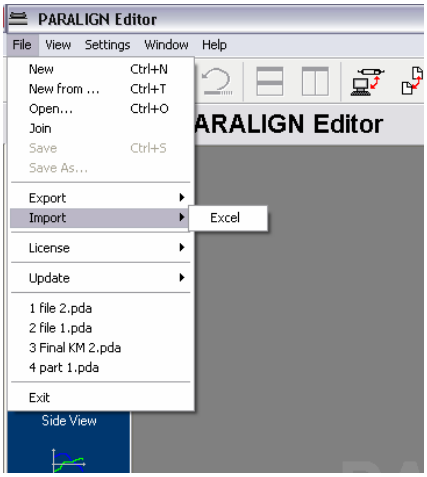


Figure 63f

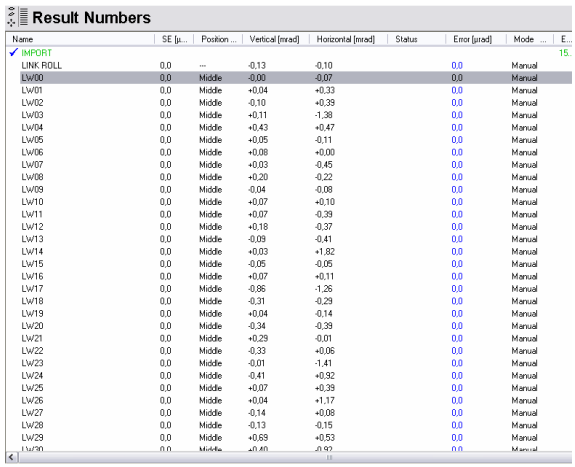


Figure 63g

The Side View displays now all the done measurements on the machine (Figure 63h).

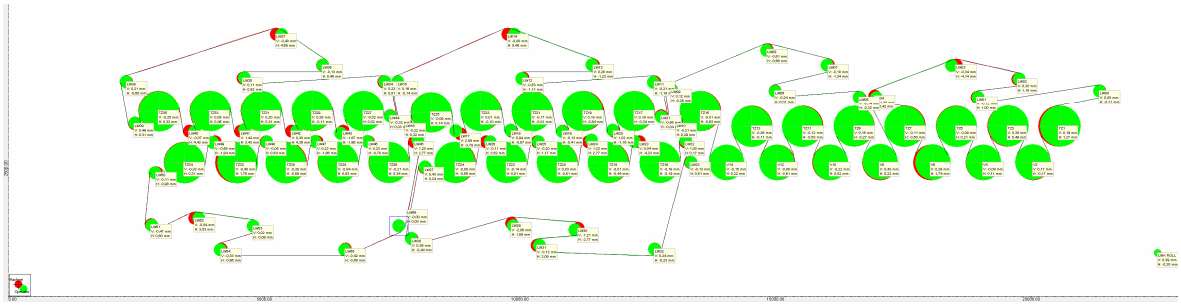


Figure 63h

6.3 Joining of measurement files

When is it necessary to join files?
If it is required to connect files of measurements that were made over several days or that are done again after a period of time.

Requirements:
The position of the Link Roll has to be the same over the whole time. To be sure that the position of the link roll has not changed it is necessary to measure a few rolls in all files that need to be joined.

How to do this:
Some rolls which are measured in the first measurement (Figure 63i) have to be remeasured in the second measurement (Figure 63j). The offset to the Link Roll has to be similar.

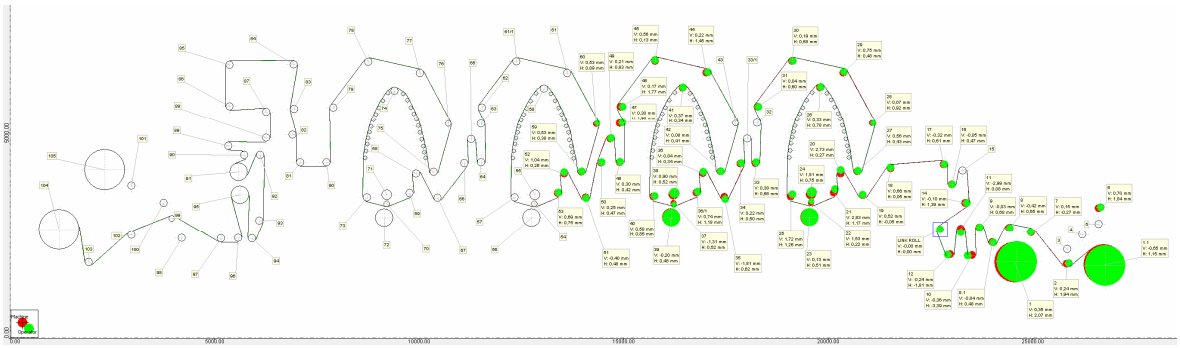


Figure 63i

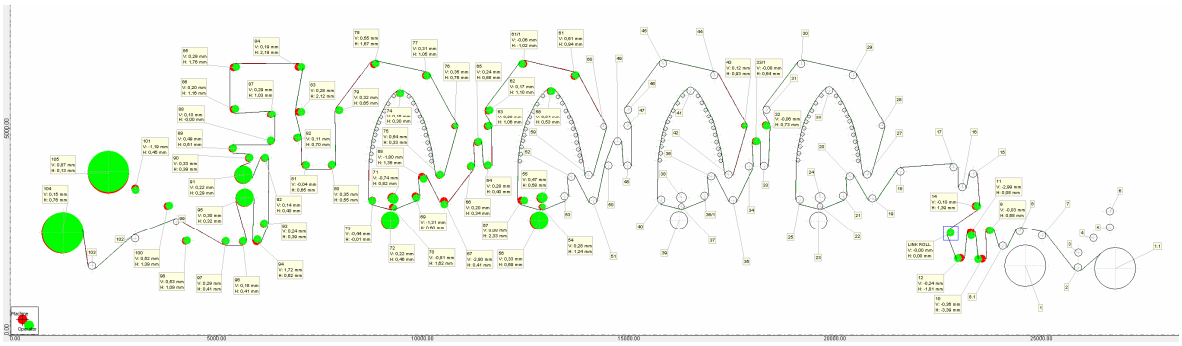


Figure 63j

Open the latest file and select the Join function (Figure 63k). In the window that appears select the file that will be joined (Figure 63l).

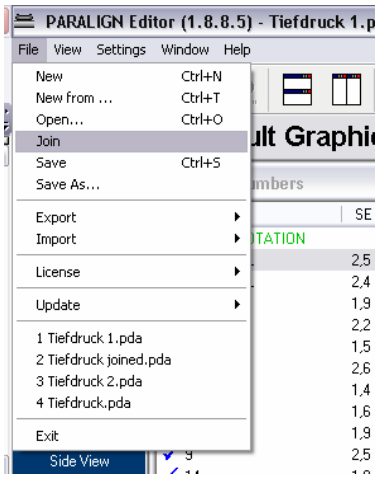


Figure 63k

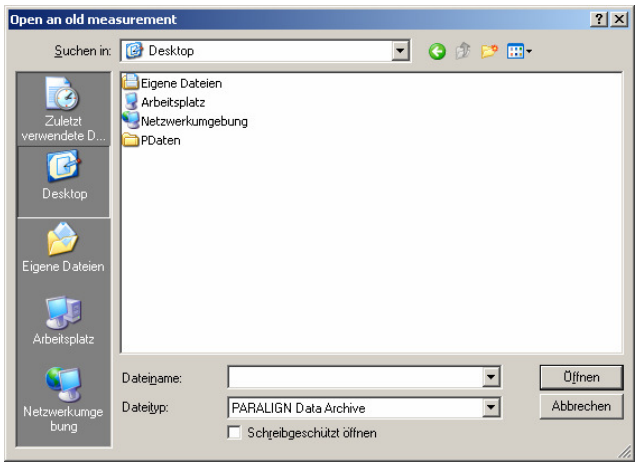


Figure 63l

A window with a warning message is shown to remind that the Link Roll has to be in the same position (Figure 63m).

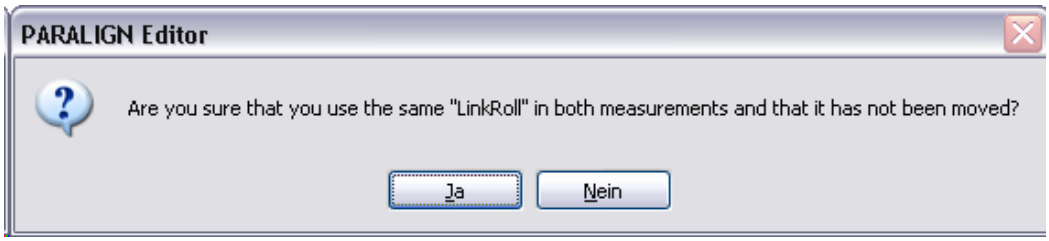


Figure 63m

Afterwards all values will be shown under Result Numbers (Figure 63n).

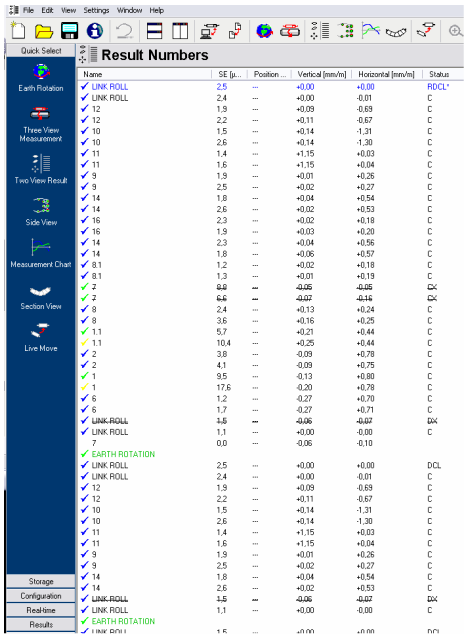


Figure 63n

The Side View displays now all the done measurements on the machine (Figure 63o).

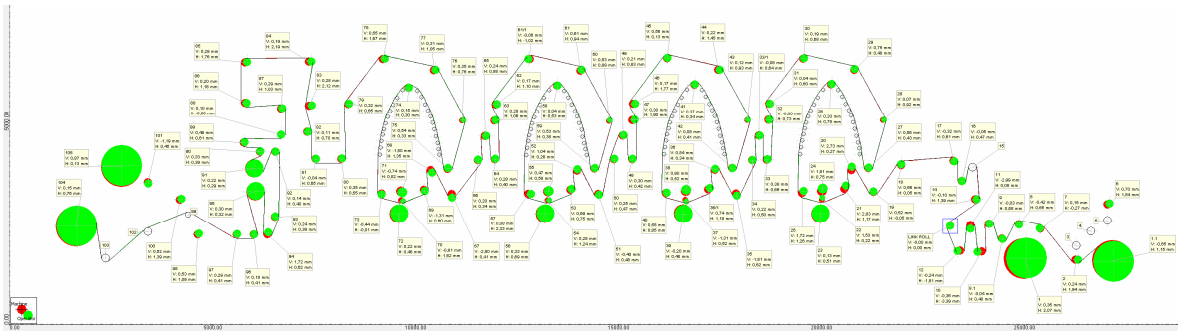


Figure 63o

6.4 Segment View

To measure a segmented roll (assuming each segment is 1000mm):

In the Roll selection or also side view window: Left click on the roll name. This brings up the roll configuration screen (Figure 64).

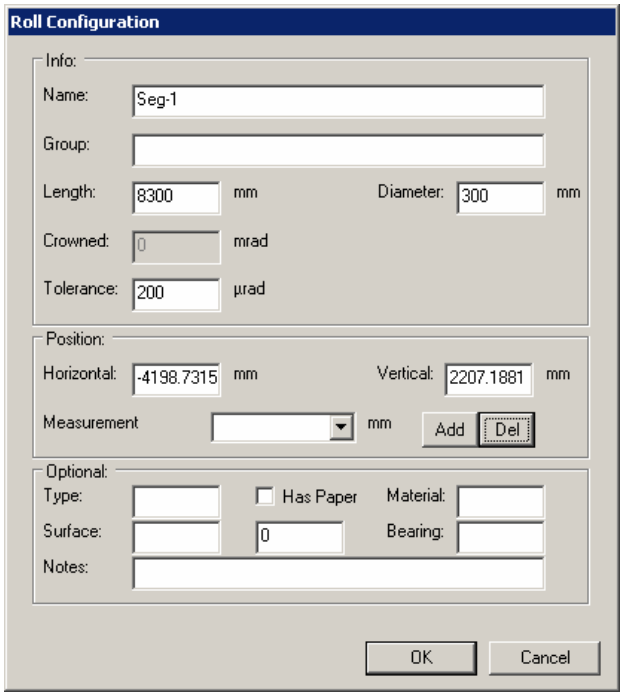


Figure 64

Click the “Add” button located in the middle of the Roll configuration window. This brings up the measurement mode window. Type the position of the end of each segment starting from the **machine side**. An example for 1000mm can be seen (Figure 64a and 65).

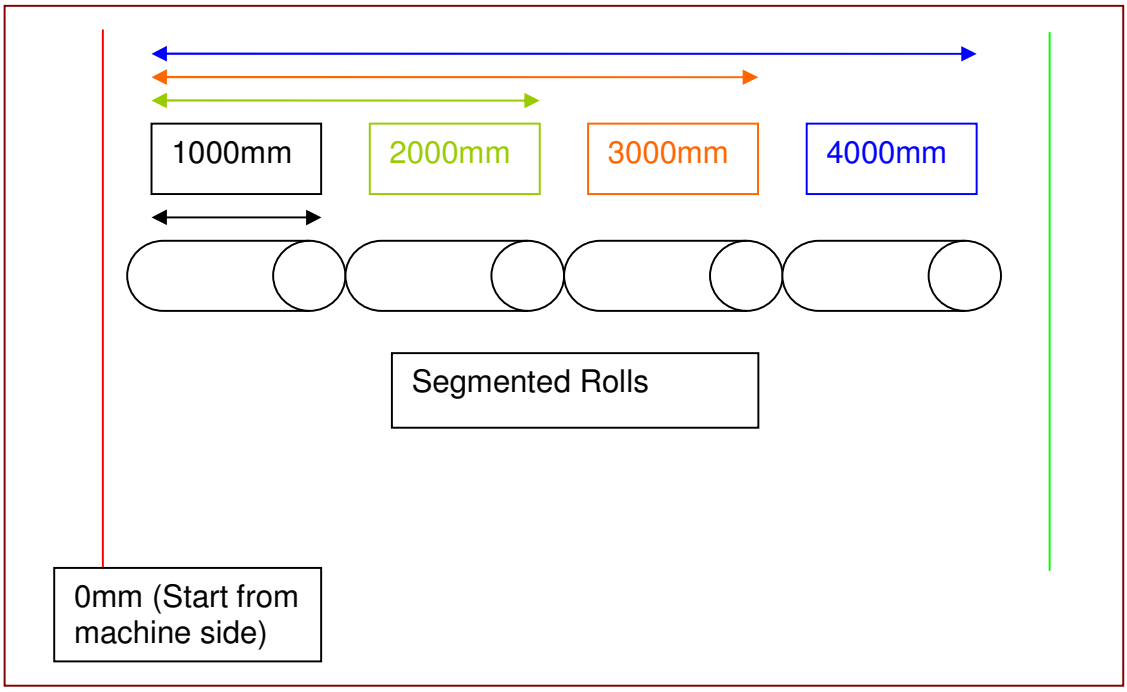


Figure 64a

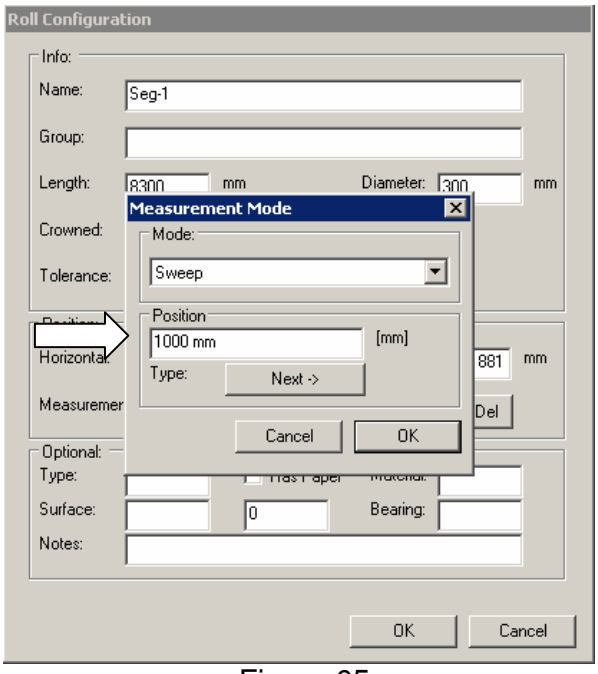


Figure 65

Click “ok” and the measurement mode window closes automatically. Click “add” and repeat the process. In this example the next segment length would be 2000.

After adding all of the segments measure each segment. By pressing the “Next” button in the “Realtime View” the position changes (Figure 65a).

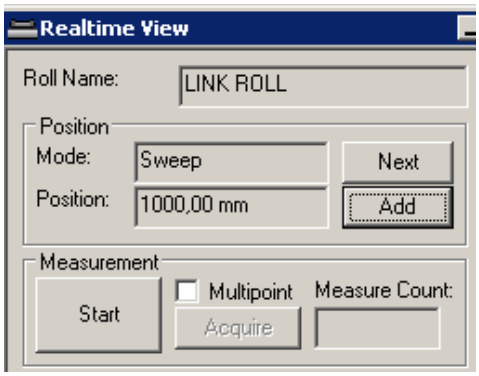


Figure 65a

After having measured all positions the “Section view” shows the results (Figure 66, 67). The position of each segment is on the right side. The left side is the end of the previous segment.

The segmented roll will not be shown in the Side View, but the complete view of the segmented roll can be exported to the Excel-file.

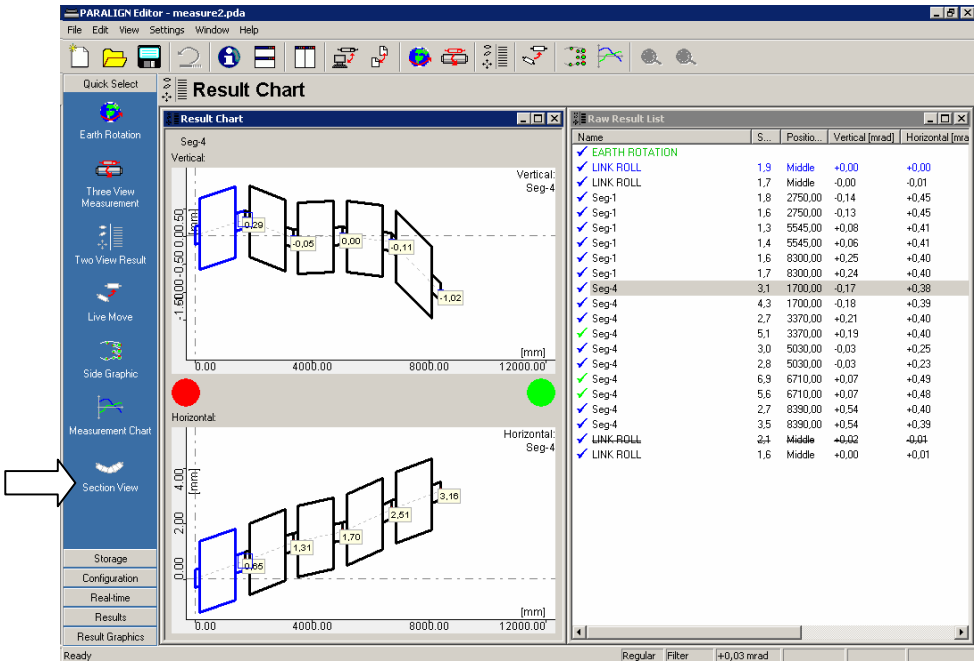


Figure 66

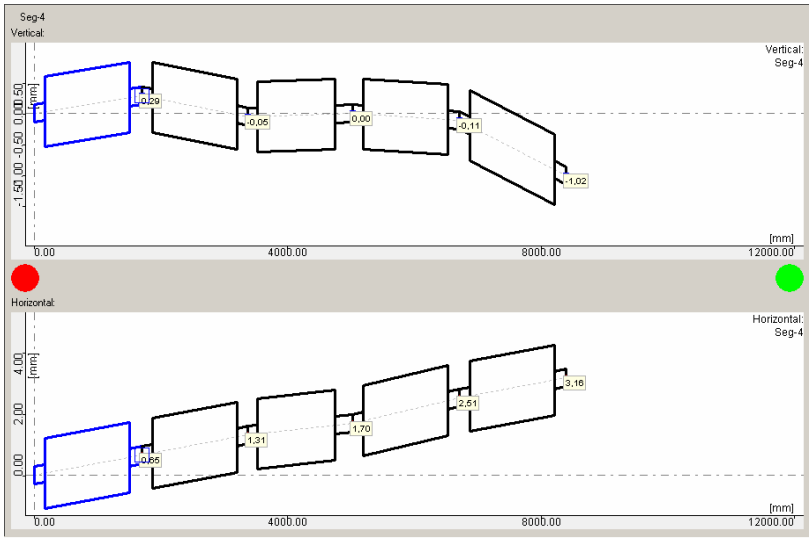


Figure 67

Important:

- Measure the complete segmented roll in one Earth Rotation
- Don’t make an average from all segments of a segmented roll
- from a single segment with a bad repeatability it is possible to make an average

6.5 The Side View Graphic

The side view helps portray a good impression about the whole machine. It will show all the rolls as well as the flow of the paper. It also indicates some information about the “tension” in the paper flow.

The red circles mark the position of the machine side and the green circles mark the position of the operator side of the cylinders. The offsets between the machine side and operator side of the cylinder are in relation to a selected reference roll.

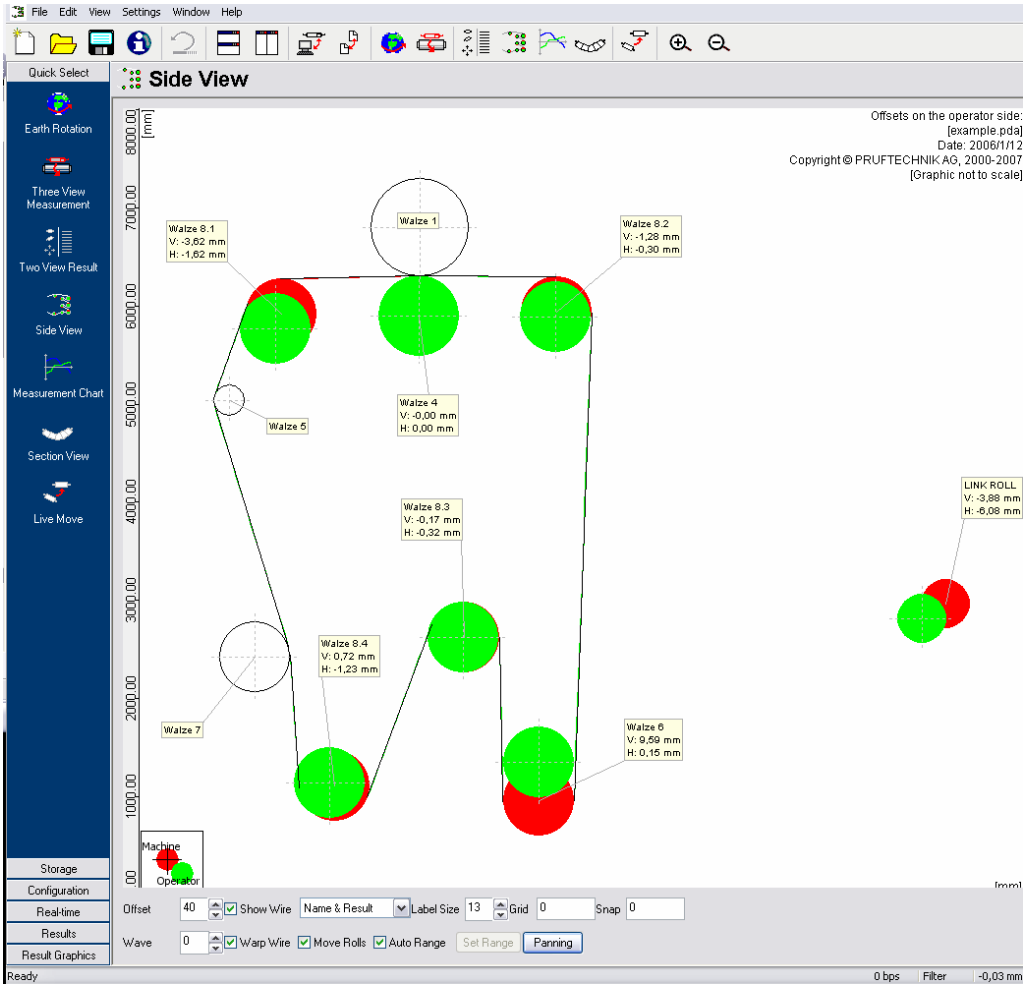


Figure 68a

The diagram (Figure 68a and Figure 68b) shows other options in the side graphic that can be changed to represent the measurement according to the customer's requirement.

Figure 68b

a) **Offset** Amplification sets a factor that will be used to display the cylinder offsets.
b) **Wave** Amplification sets a factor that will be used to display the tensions in the paper flow.
c) **Label Setting**: none|name|name and offsets|all infos.
d) Check **show paper/wire** to see the paper flow,
e) **Warp wire** will connect the fist and the last cylinder.
f) If the **move rolls** box is checked, the position can be changed by selecting a cylinder and just double clicking the left mouse button.
g) **Auto Range** automatically adjusts the coordinate system. If auto Range is not activated, set range is active, and you can put in the coordinate by yourself.
h) The **grid** is symbolized by the grey horizontal and vertical lines in the side view. It gives you a first orientation to place the rolls. The snap is in addition an invisible grid, which allows you to put rolls also in between visible grid lines; according to the value you chose the snap.
i) You can determine the **reference** you want to choose directly in the side view: select the respective roll with the left mouse, and press "R"
j) Pressing "Shift" and "*" at the same time, allows you to **fit the side view to screen.**
k) Pressing + or - will allow you to **enlarge** or to **minimize** the side view graphic.
l) The button **label size** enables you to enlarge the labels of the rolls
m) With activated **Panning** function it is possible to move the coordinate system with the cursor

6.5.1 Which measurement results will be shown in the Side View?

- Every time the last measurement value with the best total error from the latest Earth Rotation will be shown
- The last averaged result from the last Earth Rotation is used in the Side View
- If more than one position (operator, machine; operator, machine, middle) or only operator or only machine is measured, only after averaging a result will show up in the side view
- Results from a roll which were generated only at the measurement position “Middle” or “---“ will be shown without averaging in the side view.

6.6 The Tile view

To obtain a split screen view of the raw result list and graphics at the same time:

a. Click “Three view measurement”
b. Close “roll selection” (left window) and “realtime view” (middle window). The following screen (Figure 69) will be shown:
c. Click on “side graphic”
d. Click on “tile windows” icon

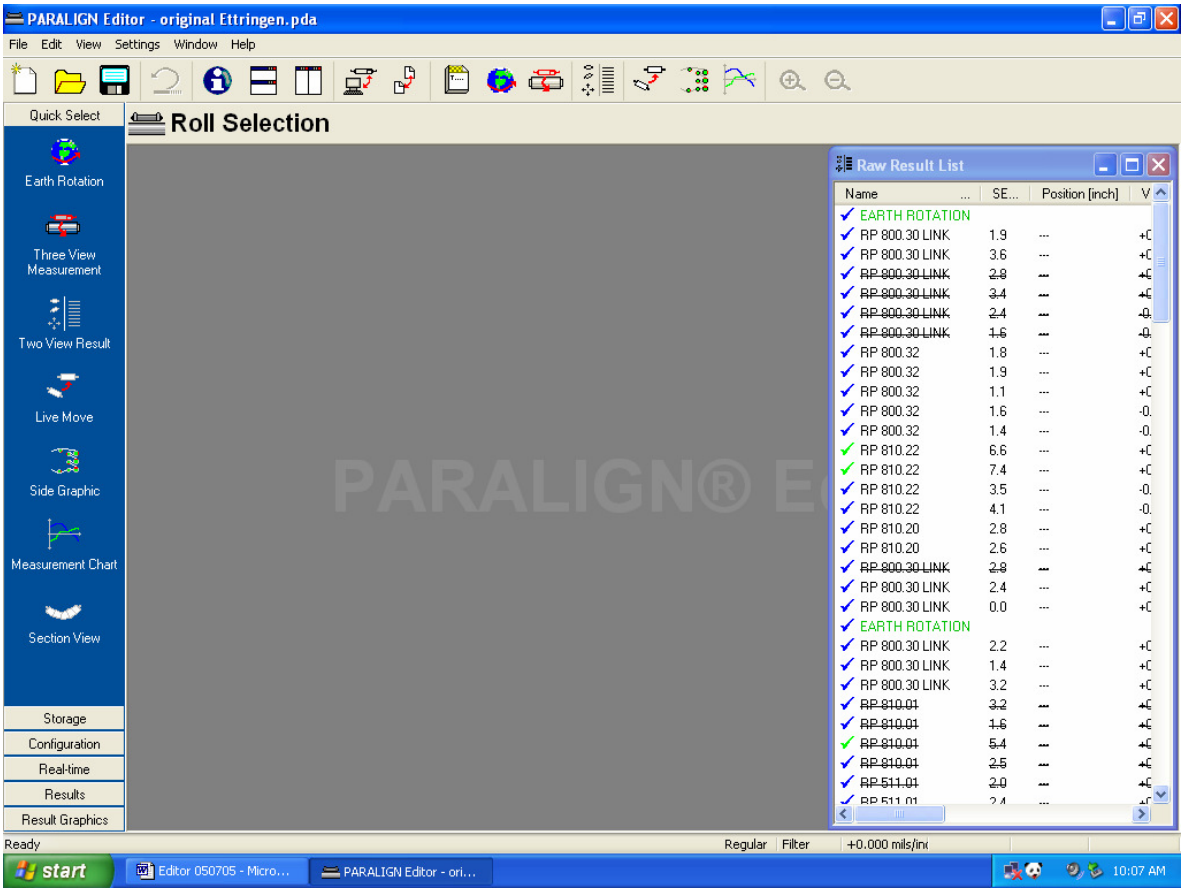


Figure 69

The picture that comes is shown in Figure 70. Both windows appear simultaneously.

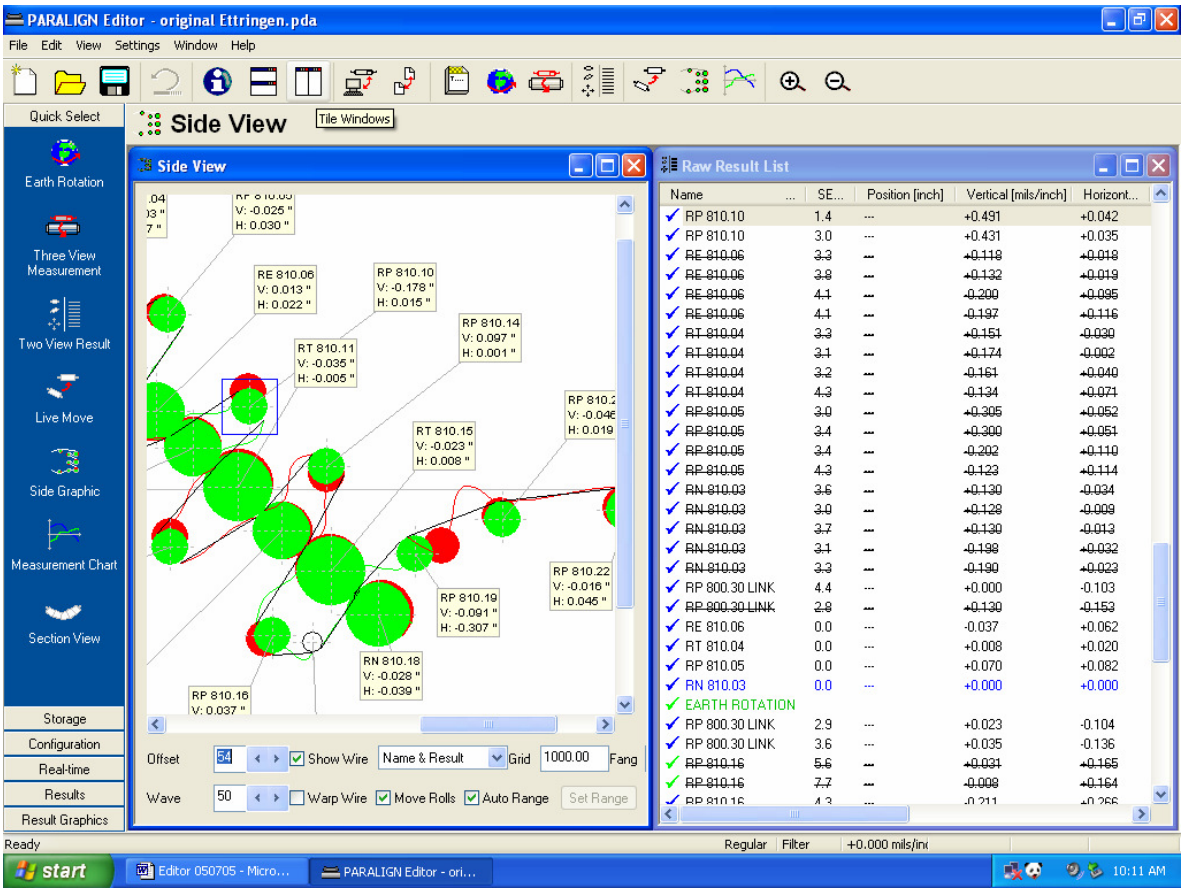


Figure 70

6.7 The measurement chart view

This view (Figure 71) shows the same data as the Raw Measurement view except that it shows a graphical chart. The data to be displayed can be chosen by the user.

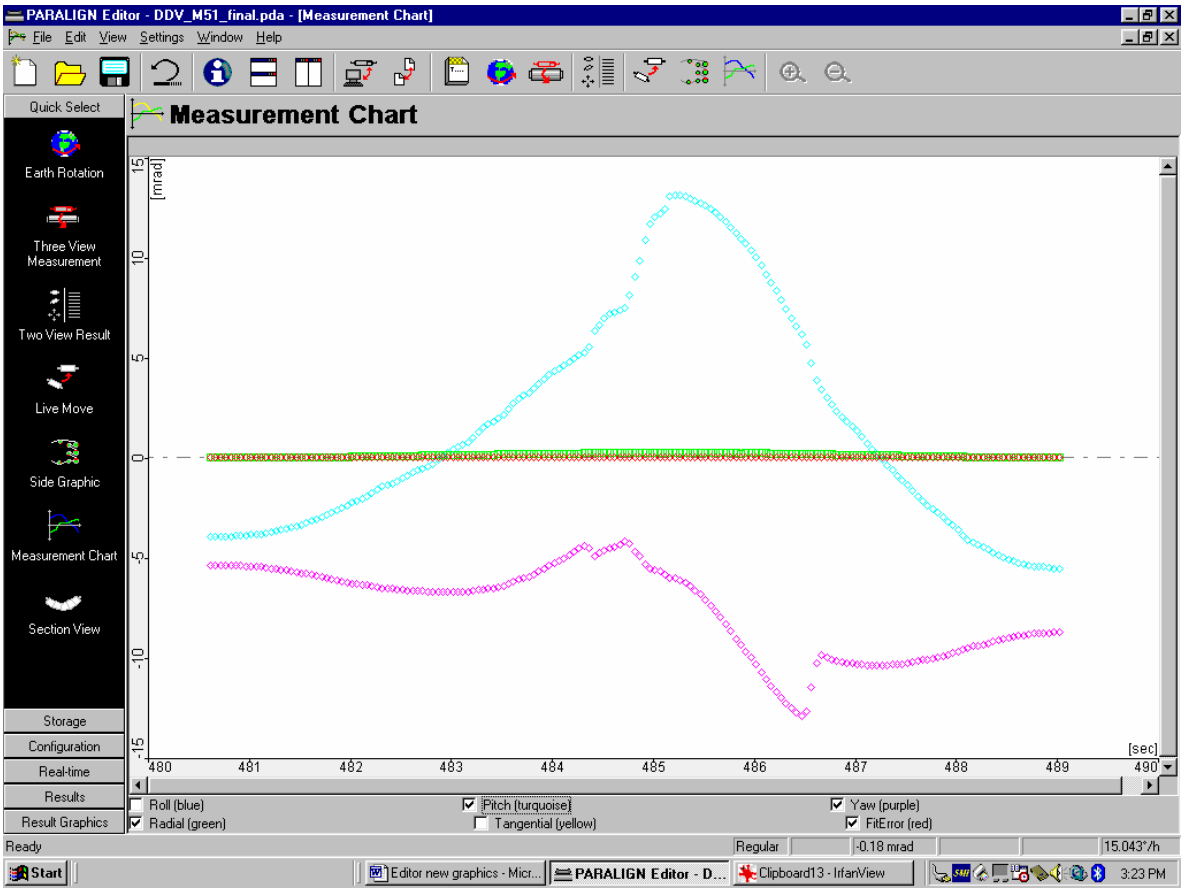


Figure 71

From this diagram it is possible to determine the sweep angle taken on the roll (or sweep performed).

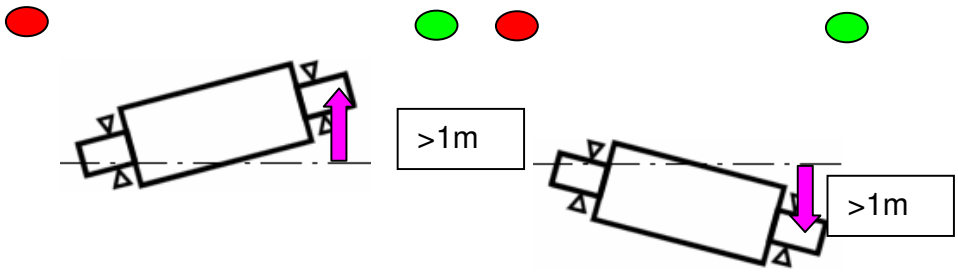
7) Tolerance

Meaning of the tolerance value chosen for the respective application

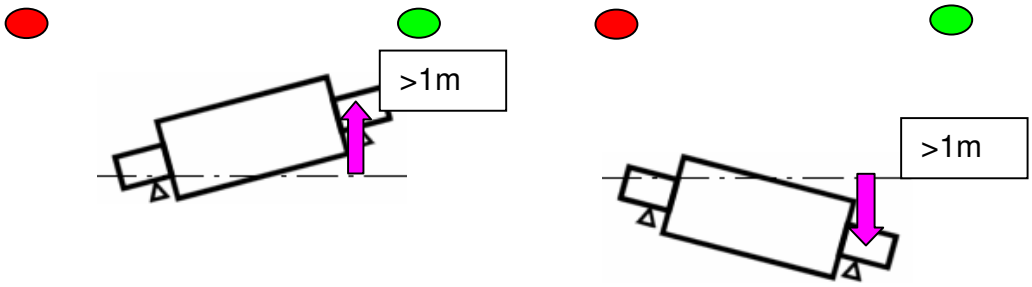
Example:
What does a tolerance criterion of 0.2mm/m for the paper industry mean?

It means, that rolls with a bearing housing distance of for e.g. 5m is given a tolerance criterion for their parallelism of +/- 5m * 0,2mm/m = +/-1mm for the horizontal and vertical values. The rolls are shown in the **Result list** of the Excel Export with an offset and if they have an offset compared to the chosen reference roll of more than 1mm the variance is depicted graphically. If the offset is less than 1mm it will show the roll on the line meaning that the rolls still have an offset but are not critical enough to be moved.

Horizontal:



Vertical:



What does this mean for the PRÜFTECHNIK-internal "Error report", which is being automatically generated when exporting from the PARALIGN Software to Excel?

As soon as the total error of a measurement value of a roll (after compensation of drift) exceeds the measurement tolerance of 0,150mm/m for the printing application, (that means it does not show a blue, green or yellow colour for the total error any more, please see below).

The measurement values are then shown in red, as shown in the example below (Figure 72), indicating that the measurement must be repeated. If the measurement values of the link roll at the very end of a set of readings, in an earth rotation are not compensated from drift, the time error will also not be corrected.

	Group	Name	Position	Mode	Tolerance [µrad]	Total Error [µrad]	Sweep Error [µrad]	Tumble Error [µrad]	Drift Error [µrad]
1									
2									
3									
4		Link Roll	---	Sweep	150	44,5765234	1,48429897	9,88549693	12,2515425
5		Link Roll	---	Sweep	150	45,8296048	2,80533622	9,94971124	13,0950899
6	2	B6	---	Sweep	150	53,1383564	2,41798637	11,2040907	18,1053252
7	2	B6	---	Sweep	150	54,2073646	1,19530091	11,192805	19,0042585
8	2	B5	---	Sweep	150	57,5984677	1,81828421	12,0245559	20,8508908
9	2	B5	---	Sweep	150	59,1270558	1,48923959	12,1015517	21,8768524
10	2	B4	---	Sweep	150	61,0685593	3,23672515	12,0562633	23,0167816
11	2	B4	---	Sweep	150	61,6532929	2,15816141	12,1079098	23,5006993
12	2	B7	---	Sweep	150	65,7658582	1,81418759	13,2052973	25,6295874
13	2	B7	---	Sweep	150	66,8306379	1,43519916	13,2759765	26,2969973
14	2	B8	---	Sweep	150	69,8209883	10,564836	8,26860393	28,1427949
15	2	B8	---	Sweep	150	71,063829	11,0357825	8,4149307	28,691066
16	2	B9	---	Sweep	150	79,1803272	5,10684026	19,0567512	30,5188687
17	2	B9	---	Sweep	150	80,2680223	2,950566	19,114986	31,4628384
18	2	B10	---	Sweep	150	258,631851	8,09902176	123,657787	33,4518468
19	2	B10	---	Sweep	150	259,011126	7,33457469	123,719152	34,1280841
20	2	B11	---	Sweep	150	265,113055	2,76759586	126,776864	35,2769041
21	2	B11	---	Sweep	150	265,438581	2,13863172	126,832338	35,7303009
22	2	B12	---	Sweep	150	269,892243	1,27967415	128,77141	37,1483788
23	2	B12	---	Sweep	150	270,170246	1,22968253	128,769682	37,6577638
24	2	B13	---	Sweep	150	247,266887	6,44865945	115,716756	40,0816108
25	2	B13	---	Sweep	150	247,847137	5,67289801	115,893159	40,5820715
26	2	B14	---	Sweep	150	223,489332	8,84381613	102,099987	41,6834485
27	2	B14	---	Sweep	150	223,850065	8,40428908	102,106964	42,2375251
28	2	B15	---	Sweep	150	114,120329	1,19256695	32,5557772	44,1341297
29	2	B15	---	Sweep	150	115,140428	1,38215069	32,6045069	44,7507008
30	2	B16	---	Sweep	150	87,4227672	4,47124619	27,7996785	-29,5149245
31	2	B16	---	Sweep	150	87,9162202	9,17415504	27,7694957	-28,8143248
32	2	B17	---	Sweep	150	85,527227	3,72052011	29,3804163	-26,5506193

Title | Errors | Machines | Results | RawResults

Figure 72

In order to keep the total error low, please keep in mind the following points:

Keep the measurement time short: Try not to exceed the measurement time of 20 minutes.

Reduce the movement of the device to a minimum: Try to hold the device as parallel to the rolls as possible. When walking upstairs, the device may be held in one hand while the user can hold on to the railing for safety.

Remarks:

The colours of the errors in the “Raw Result List” are assigned as follows:

 ; <= roll_tolerance/4

 ; <= roll_tolerance/2

 ; <= roll_ tolerance

 ; > roll_ tolerance

The Error report was created for two reasons:

a) Firstly, documenting the total errors in each measurement in the Error report is to ensure proper usage of the device, which reduces some possible sources of error:

   For e.g. the tumbling error and exceeding the measurement time for a lot more than 20 minutes can add discrepancy to the readings.

b) Secondly, the given tolerance criteria should be used, unless there are sharper tolerance requirements from the machine manufacturer or the owner of the production facility.

8) General information on the PARALIGN Editor

This software must be registered to gain full access to all functions available with the PARALIGN editor. Personnel with sufficient training are the only authorized users of this program.

9) Support

In case of any problems or questions, please contact PRUFTECHNIK Alignment Systems, GmbH.
011 49 89 99616 - 0

10) Index