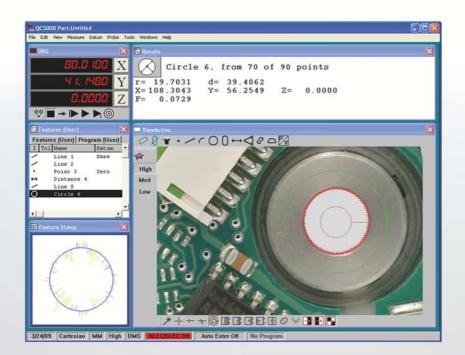


HEIDENHAIN



Addendum

IK 5000 QUADRA-CHEK

Software Version 3.4.x

English (en) 5/2017

Information Contained in this Manual

This addendum covers the operating and setup feature additions and improvements implemented in IK 5000 Software v3.0.x - v3.4.x. For OEM setup feature additions refer to the IK 5000 QUADRA-CHEK OEM Addendum (ID 1041353-2x), available by request from HEIDENHAIN.

Minimum System Requirements

Component	w/o 3D Profiling	w/ 3D Profiling	
PC	2.66 GHz dual-core Pentium	2.8 GHz quad-core Pentium	
Operating System (OS)	Windows Vista 32-bit		
	Windows 7 32-bit, Windows 7 64-bit		
	Windows 8 32-bit, Windows 8 64-bit		
	Windows 10 32-bit, Windows 10 64-bit		
RAM	1GB	2GB	
Available Hard Disk	500MB	1GB	
PCI	1 PCI slot and 1 to 3 additional empty slots (depending on the version)		
Video Display Unit	1024 x 768 resolution		
Windows users rights for installation and setup	Administrator		

Backward Compatibility

The IK 5000 QUADRA-CHEK v3.4.x software version is compatible with several previous versions down to version 2.93.0. It can be used to update any prior version starting at version 2.93.0 and up. To update a previous version refer to "Software Updates" below.

Software Updates

End users should only update the IK 5000 software after consultation with the machine manufacturer. Observe the system requirements as described in "Minimum System Requirements" above. For software updating procedures, refer to "Updating the IK 5000 Software on page 100".

Fonts Used in these Instructions

Items of special interest or concepts that are emphasized to the user are shown in bold type.

Software controls and Windows are shown in letter gothic bold type.

1 Operation 11

1.1 Operation 12 About IK 5000 window information 12 Adjusting for Change of Part Size 13 Part Scaling Example 14 Auto Probe a Plane 15 Grid Pattern Auto Probe 15 Disc Pattern Auto Probe 16 Programming Changes 17 Programming Wizards 18 Grids 18 Polar Grids 22 Random placement 24 Adding a Program Variable to a Template Header or Footer 29 Copy and Paste Special 31 Palletizing Multiple Parts 36 New run of data 37 Begin pallet 38 Prompt user for position 38 Profile Import Points 39 Measuring maximum inscribed and minimum superscribed tangent circles 41 Measuring Rectangles 44 Profile3D Measurements 45 Profile3D Measurement Screen Functions 46 Profile3D Window Menu 47 The Profile3D Measurement Process 48 Start Profile3D Measurement 49 Import Part Profile 49 Enable or Prohibit Data Shifts for Profile3D Fit 51 Assign Tolerances 52 Probe Part Surfaces 54 Perform Profile3D Fit Analysis 55 Profile3D Automatic Fit Analysis 56 Profile3D Pass Only Option 57 Six Point Alignment 58 Resetting the Fit Analysis 59 Adjust the Display Magnification of Error Whiskers 60 Add Profile3D Feature to the Feature Template 61 Auto Focus (option) 63 Autofocus Final Check 66 Manual VED Height Point Measurement 67 Optimet Laser Lens Selection 70 Keyence Laser Settings 71 Exploding the Data Cloud 73 Rotating and Positioning of VED Tools using Part Reference Frame 74 ISO Tolerance 74

Continuous Probe Firing 78 Programming Continuous Probe Firing 79 Initial settings step 79 Program Step 80 Measure Shortcuts 81 Ellipse Shortcut 81 Torus Shortcut 81 Profile Shortcut 81 Profile3D Shortcut 81 Axial Runout Tolerance Check for Plane Feature 82 Performing a runout tolerance on a circle using a cylinder as a reference 83 Symmetry Tolerance 86 Symmetry Tolerance Applied to a Line 86 Symmetry Tolerance Applied to a Plane 88 Plane Probing Technique 90 Exporting 3D CAD Model Features in STEP File Format 92 Open Database Connectivity (ODBC) Data Export 95 Microsoft Windows 7 database configuration example 95

2 Setup 101

2.1 Setup 102 Updating the IK 5000 Software 102 Backup System Settings 102 Uninstall Old Software Version 102 Install New Software Version 102 Restore System Settings 102 Support Information 103 Files and Folders 104 Use Current Reference Frame 105 Camera Parameters 107 Specify Video Probe Parameters 108 Spotter Camera Options 109 Scale Factor for Open Loop Joystick Control (Optional) 111 Shutdown 113 Debounce Parameters 114 Software Fences 115 Manually Creating a Software Fence 116 Using the Teach Function to Create a Software Fence 118 Joystick Button Assignment 122 User Fence Status Display 124 Touch Probe Regualification and Starting Point 127 Reset Template Text Colors 128 Default Fixtures Files Location 129 Disabling measurements when homing is not completed 130 External Amplifier Open Loop Control (Optional) 132 Warning on CNC movement 133 Joystick Button Assignment 136 RS-232 COM port allocations 137 Sending Feature Data 138 Sending General RS-232 Strings 139 RS-232 Connections 140 Printer Selection 140 Displaying the Software Version on Reports 141 Displaying System Units On Reports 143 Configuring an Indexible Probe System 145 Teaching (Calibrating) a Probe Tip Angle Position for CNC Systems with an Indexible Probe 147 Teaching (Calibrating) a Probe Tip Angle Position for a Non-CNC System With an Indexible Probe 151 Setting the Circle Fit Algorithm during Auto Programming 154 Configuring a Laser Pointer 156 Waiting for an External Input Line Program Step 161 Creating and Using Global Variables 164 Cross-calibrating Probe Families,

Groups/Cameras, and Tips/Magnifications 166

Example: Change the Reference of a Probe Tip from Tip1_g1 to Tip2_g1 166 Example: Set the Contact Probes to be the Reference Family 168 Master User Profile 170 Creating the Master User Profile 170 Loading the Master User Profile 171 Enabling Load Master User Profile at Startup 172 Setting Focus Offset 174 Loading an NLEC (Non-Linear Error Compensation) file 176 2D Profile Maximum Form Error 178 Editing VED Tools in a Program 180 Example: Recording a program with features measured using the circle VED tool 180 Changing the Size of Continuous Fire Function Stake Marks 182 Enabling User Access to Settings 183



Operation

1.1 Operation

About IK 5000 window information

The About window provides information about the system.

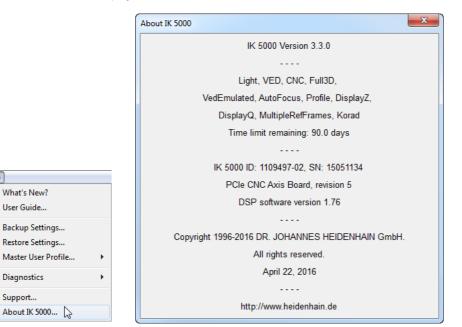
About window information includes:

- IK 5000 version number
- Configured options
- Temporary license time remaining
- IK 5000 ID and serial number (displayed with PCIe boards only)
- Axis board revision
- DSP software version
- Software copyright
- Website address

To open the About window:

Click Help>About IK 5000...

The About window is displayed.



Click Help>About IK 5000...

The About window is displayed.

Help

Adjusting for Change of Part Size

The location of features in a part under measure can change due to change in size of the part. A program can adjust to measure the features at the new locations by using the Prompt user for part scaling function. This function prompts the user for a scaling factor that repositions all features in a program. The new feature position is calculated using the recorded feature position multiplied by the scaling factor. The scaling factor is prompted for each time the program is run.

The Prompt user for part scaling function is located in the General tab of the Program Properties dialog.



The size of the features under measure in the program are not altered by the part scaling function, hence the system will probe the features at the recorded size but new scaled position.

To prompt a user for part scaling:

- Start recording a program
- > Double click Program Properties in the Program template window
- Click the General tab
- ► Check the check box next to **Pronpt user for part scaling** and then click **OK**

The operator will now be prompted to enter a scaling factor when the program is run.

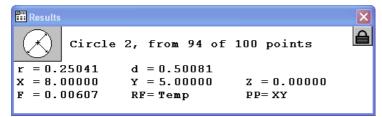


Selecting Prompt User for Part Scaling

Part Scaling Example

This example shows measurement results before and after part scaling has been applied.

- Start recording a program
- Measure a feature and note the position of the feature



Feature measurement results

- Stop recording the program
- Activate **Pronpt user for part scaling** as described on page 11.
- Run the recorded program. A prompt will appear requiring the user to enter a part scaling factor for each axis.

Enter Part Scaling	×
X 0.5000	ОК
Y 0.5000	Cancel
Z 0.5000	

Enter Part Scaling prompt

▶ Re-measure the feature and complete program execution

Note that the program feature CIRCLE 2 will now be probed at a position scaled by a factor of 0.500 (X=4.00000), 0.500 (Y=2.50000), 0.500 (Z=0.00000)

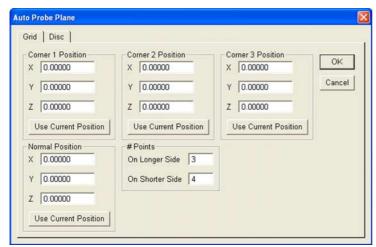
Auto Probe a Plane

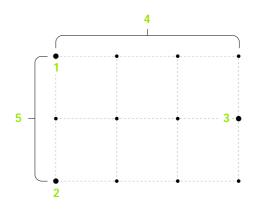
Plane measurement accuracy is increased by probing more than the three required points. IK 5000 systems with CNC and touch probe options can automatically probe multiple points by using the **Auto Probe Plane** feature in the **Measure Plane** Dialog.

To auto probe a plane:

- Click the Auto Probe... button in the Measure Plane dialog. The Auto Probe Plane dialog appears.
- Select the Grid or DISC tab
- > Probe the required positions and enter the required parameters
- Click OK

Grid Pattern Auto Probe





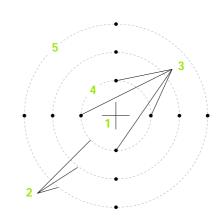
Grid dialog

	Parameter	Description
1	Corner position 1	The first corner position in the grid
2	Corner position 2	The second corner position in the grid
3	Corner position 3	The third corner position in the grid
4	# Points on longer side	The number of points on the longest side of the grid
5	# Points on shorter side	The number of points on the shortest side of the grid
	Normal position	A position above the plane for the probe to retract to after probing a point

Grid pattern

Disc Pattern Auto Probe

Center Position X 0.00000 Y 0.00000 Z 0.00000	Normal Position X 0.00000 Y 0.00000 Z 0.03937	Number of Rings 3	ok
Use Current Position Radius Inner Radius 0.50000	Use Current Position		
Outer Radius 3.00000	Calculate Radius		



Disc pattern

Disc dialog

	Parameter	Description
1	Center position	The center position of the disc pattern
2	Number of rings	The number of rings in the pattern
3	# Points per ring	The number of points probed per ring
4	Inner radius	The radius of the inner ring of the pattern
5	Outer radius	The radius of the outer ring of the pattern
	Normal position	A position above the plane for the probe to retract to after probing a point

Programming Changes

While recording a program that is intended to include a looping function (such as a loop, grid, polar grid, or random placement), it is important to record the entire program with the looping function before completing the program and running or editing it. This ensures proper handling of any datum steps in the loop, if any, and proper insertion of offset recall tags.



Tags are not displayed in the program.

When a feature is under measure during program playback, that feature is now removed from the feature list. Previously, the recorded feature was maintained in the feature list during measurement and replaced by the newly measured feature once the measurement was completed.

Grids, polar grids, and random placements are described in Programming Wizards on page 16.

Programming Wizards

Use programming wizards to create the following program steps:

- Grids
- Polar grids
- Random placements

Grids

Use the Create a Grid wizard to measure arrays or a series of like features within a single part. For example, create a grid to measure an array of evenly spaced holes on a pc board. The IK 5000 requires the user to input the X and Y offset distance, the X and Y distance from one feature to the next.

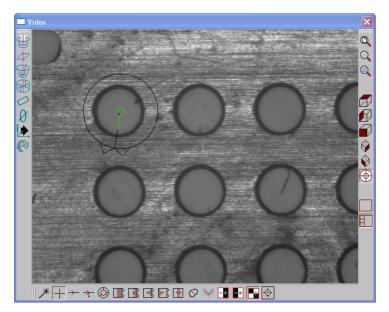


All features in a grid must be evenly spaced.

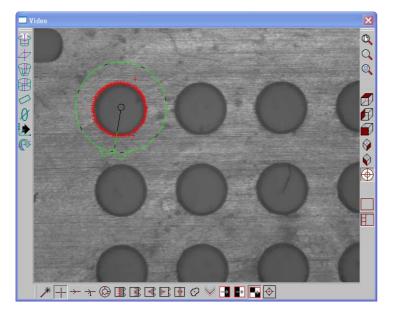
Before creating a grid begin a new part program with a datum.

To create a grid:

Position the first array feature as shown



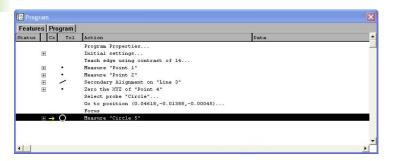
Click the center mouse button to fire the probe tool



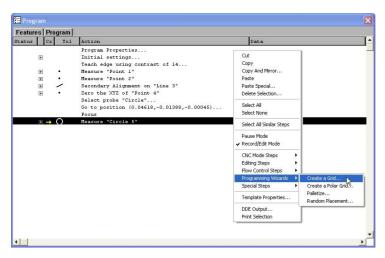
► Click **OK** in the dialog box



▶ Highlight the first array feature in the **Program**template as shown



Right-click in the Programtemplate and select Programing Wizards, then select Create a Grid



Enter the number of features and type in the desired X and Y offsets as shown

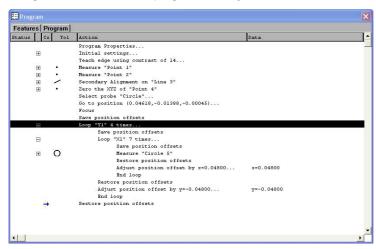


Items are the number of features in each axis direction. Offsets are the distance to the next feature relative from previous feature.

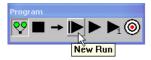
Grid Rep	eat	
X Items	7	ОК
Y Items	4	Cancel
Z ltems	1	
X offset	.048	
Y offset	048	
Z offset	0.00000	

Click **OK** in the dialog box

The grid is created and the program is ready to run



Click New Run to run the program



Polar Grids

A polar grid measures a part with like features that are in a rotational array. For example, create a polar grid to measure a bolt hole pattern. The programming wizard that creates a polar grid requires the user to input the number of features and the angle between the features.



All features in a polar grid must be evenly spaced.

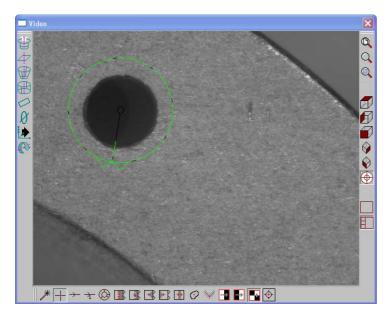
Before creating a polar grid, create a new part program. Use the center of the polar grid features as the zero point of the part.



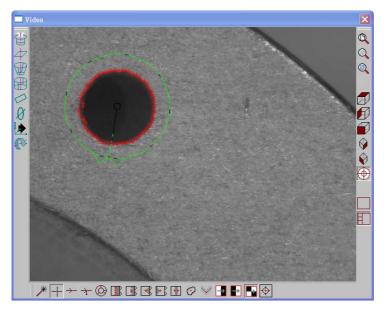
Make certain the program is recording before completing the following steps.

To create a polar grid:

Position the first feature in the polar array in the center of the field of view as shown

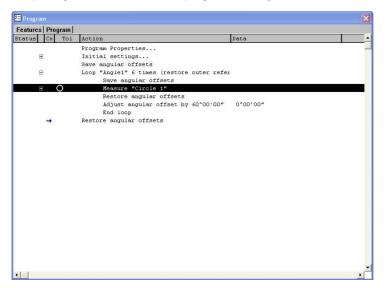


Select Measure>Circle



- Click Enter Point in the Measure Circle dialog
- Click OK
- Select the measured **Circle** in the **Program**template
- Select Tools>Programming>Programming Wizards>Create a Polar Grid
- Enter the number of times to loop in the Times to Repeat field
- ▶ Enter the loop increment angle in the Angle Increment field
- Click OK

The polar grid is created and the program is ready to run.



Random placement

Use the Random Placement wizard for multiple parts on a stage without a fixture.



1.1 Operation

All parts must have the same orientation on the stage and be square to the axes of the machine.

Before creating a random placement, create a new part program with reference steps.

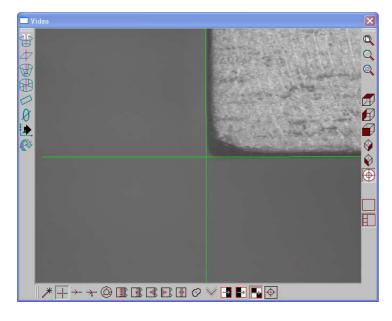
Reference Steps

To insert reference steps in a part program:

Click the Record/Edit button on the Programtoolbar



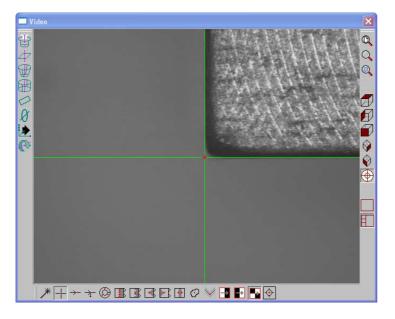
Position the desired reference feature as shown





The reference feature is a repeatable point to help the IK 5000 locate the randomly placed parts.

Click the center mouse button to fire the probe tool



▶ Click OK in the dialog

🖫 Measure Point 🛛 🗙
1 Pt
Crosshair
Ok Enter Pt Remove Last Cancel Create

The IK 5000 will use this feature to locate the randomly place parts.

Create a the rest of the part program measuring all the features of the part.



Save the reference frame in the part program immediately after creating the datum.

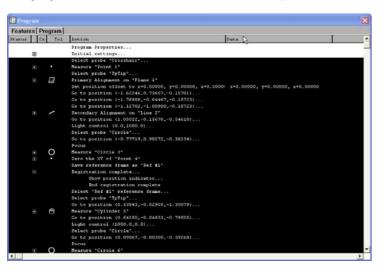
Random Placement

To create a random placement:

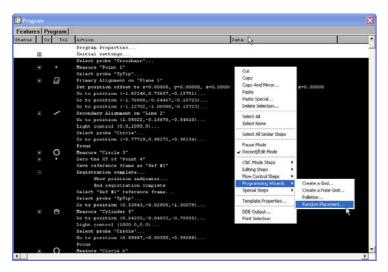
1.1 Operation

Make certain the program is recording before completing the following steps.

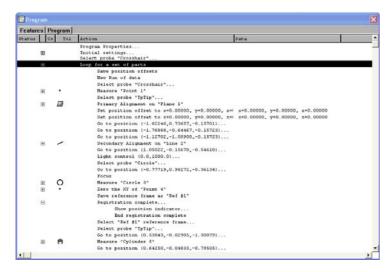
▶ Highlight the desired features, and the reference point as shown



Right-click in the Program template and select Programming Wizards, then select Random Placement

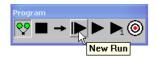


The IK 5000 inserts the required steps for the random placement.

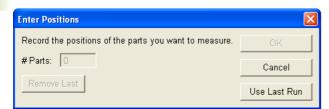


To run a parts program with a random placement:

Click the New Run button on the Programtoolbar

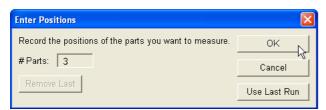


▶ Measure the reference point for the first part



Repeat these steps until all parts are entered.

Click **OK** in the dialog box





Click the **Remove Last** button to remove the last point enter. Reenter the point for that part.



Click the $\ensuremath{\textbf{Use}}\xspace$ Last $\ensuremath{\textbf{Run}}\xspace$ button to use the same offsets as the previous run.

Adding a Program Variable to a Template Header or Footer

A program variable can be added to a report template header or footer. When a variable is added to the template it will be included in the header or footer when the report is displayed and printed.

To add a variable to a report template:

- Open or record a program that includes a variable
- Right click inside the Program window and select Template Properties...
- Check the Show report header or Show report footer checkbox

Feature Properties	Template Properties	×
Cut Copy Delete Selection Select All Change Feature Tolerance Print Selection Template Properties New Template Open Template Save Templates	Display Filters Misc Display Grid Grid Image: Horizontal lines Grid size 10 Image: Vertical lines Grid size 10 Sections Set Text Color Font Name Image: Show report header Set Text Color Courier New Image: Show page header Set Line Color MS Serif Image: Show page footer Font size 10	OK Cancel
Save Template As		

Select Template Properties...

Right-click inside the header or footer area and select

Add Program User Variable...

Select the desired variable from the User Variable drop-down list and click OK

Send To Back		Program User Varia	able		×
Add Text					
Add Program	User Variable	User Variable	Prog Val1	-	OK
Font	•		<u> </u>		Cancel
Add Image					

Select Add Program User Variable... Select the desired variable

Move the variable to the desired position in the header or footer

Report						
Features Program	Report					
Princi hVadét i	IK	5000	Feature	Printout		
Date: <d> Job: <?1></d>		Part:	<n></n>	Time: <t> Operator:</t>		
Features Program	Report					
report header	IK	5000	Feature	Printout		
Date: <d> Job: <?1></d>	Pro	Part: og_Val1: <	<n> prgUserVar></n>	Time: <t> Operator:</t>	<u></u>	

Move the variable to the desired position

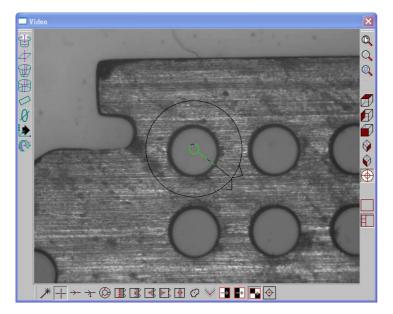
The program variable will be added to the header or footer when the report is printed.

1.1 Operation

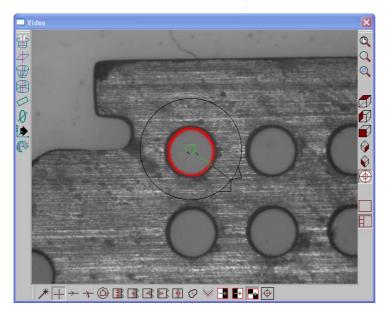
Copy and Paste Special

Before performing a copy and paste special, record a new part program with a datum.

- To copy and paste special:
- Position the first array feature as shown



Click the center mouse button to fire the probe tool

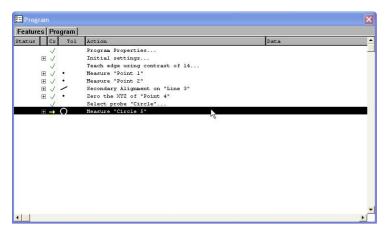


1.1 Operation

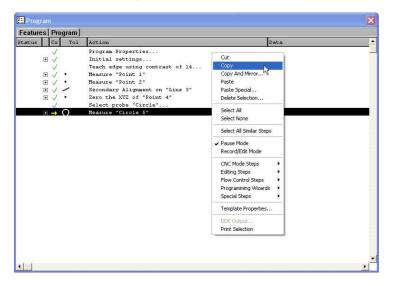
Click **OK** in the dialog box

📰 Measure Magic		X				
90 Pts						
(Circle					
<u>0</u> k	Enter Pt	<u>R</u> emove Last				
	<u>C</u> ancel					

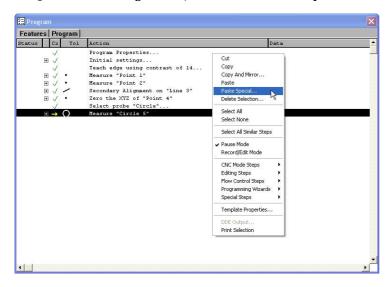
▶ Highlight the first array feature in the **Program**template as shown



▶ Right-click in the **Program**template and select **Copy**



▶ Right-click in the **Program** template and select **Paste Special**



Enter the number of Items and type the desired X and Y offsets as shown

Paste Speci	ial	
Grid F	lepeat	
X Items	7	ок
Y Items	4	Cancel
Z Items	1	
X offset	.048	
Y offset	048	
Z offset	0.00000	



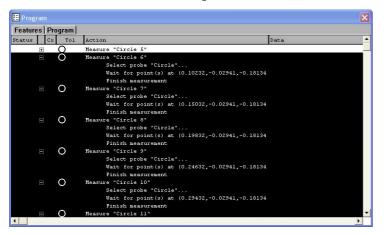
Items are the number of features in each axis direction. **Offsets** are the distance to the next feature relative from previous feature.

1.1 Operation

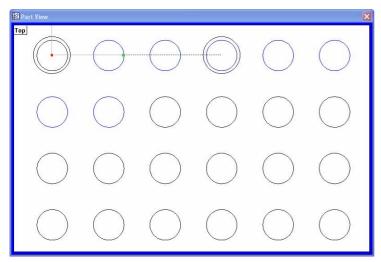
Click **OK** in the dialog box

Paste Special 🛛 🔀				
Grid F	Repeat)			
X Items	7	ОК		
Y Items	4	Cancel		
Z Items	1			
X offset	.048			
Y offset	048	-		
Z offset	0.00000			
	Grid F X Items Y Items Z Items X offset Y offset	Grid Repeat) X Items 7 Y Items 4 Z Items 1 X offset .048 Y offset 048		

The IK 5000 creates a grid on the part view and assigns a numbered feature name to each feature in the grid.



The copied and pasted parts appears in the $\ensuremath{\textbf{Part}}$ $\ensuremath{\textbf{View}}\xspace$ window as shown.



The program is ready to run.

Palletizing Multiple Parts

A pallet is a rectangular arrangement of identical parts organized into a consistent matrix of columns and rows. The X and Y offsets between parts in the matrix must be the same for all parts.

Once a part program is created and tested for a single part, it can be run on each of the identical parts contained in a pallet. The IK 5000 will begin measuring parts at the lower-left corner of the pallet, and will proceed from left to right and from bottom to top.

To specify the palletizing mode:

Double click Program Properties in the Program template. The Program Properties dialog is displayed.

Program					
Feature	Features Program				
Status		Сх	Tol	Action	
				Program	Properties
	+			Initial	settings
	+		0	Measure	"Circle 1"
	+		0	Measure	"Circle 2"
	+		0	Measure	"Circle 3"
	+	₩.	C .	Measure	"Arc 4"

Double click **Program Properties** in the **Program**template

Select the Palletize tab. The pallet setup parameters will be displayed.

Program Properties	×
Fixturing General Palletize	ОК
Number of Columns 2 Number of Rows 3 X Offset 1.5 Y Offset 4 Prompt user for position of loaded pallet elements New run of data	Cancel

Select the Palletize tab



Pallet of 12 identical parts

- ▶ Enter the Number of Columns and Number of Rows into the fields provided
- Enter the X Offset and Y Offset between parts into the fields provided
- When it is known that some pallets will not be full, the program can prompt the operator at the beginning of each run to specify the location of parts contained by the current pallet. Check the **Prompt** user for position of loaded pallet elements check box to prompt the operator.
- Click OK

Program Properties	×
Fixturing General Palletize	ок
Number of Columns 2 Number of Rows 3 X Offset 1.5 Y Offset 4 Image: Prompt user for position of loaded pallet elements Image: New run of data	Cancel

Enter pallet parameters and click OK

New run of data

New data can be entered into the runs database for every pallet instead of appending the data to the previous pallet's data.

To enter new data into the runs database:

Check New run of data in the Program Properties window

Program Properties		x
Fixturing Gene	ral Palletize	ок
Number of Colum Number of Rows X Offset Y Offset	ns 2 3 1.5 4	Cancel
Prompt user fo	or position of loaded pallet elements	
New run of dat	а	

Check New run of data

► Click **OK** to save the changes and exit the Program Properties window

Begin pallet

A **Begin pallet** step is inserted into the program when the palletize function is used.

Program 🔀			
Feature	s P	rogram)	
Status	C	(Tol	Action
			Program Properties
			Begin pallet
	+		Initial settings
	+	0	Measure "Circle 1"
	+	0	Measure "Circle 2"
	+	0	Measure "Circle 3"
	± 💥	C	Measure "Arc 4"

Begin pallet step

Prompt user for position

When **Prompt user for position of loaded pallet elements** is enabled, the system will prompt you to enable or disable elements that are available on the pallet when the program is played back.

Select loaded pall			
3 🔽	~	ОК	
2 🔽	•	Cancel	
1 🗹	₽ 2		
L	-]	

Enable or disable elements on the pallet

Profile Import Points

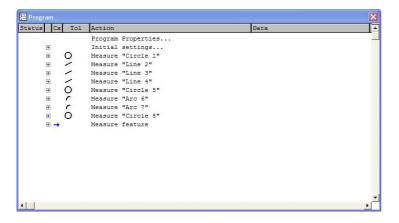
Probed points from features can be imported into a profile measurement when recording a program. This eliminates the need to re-probe points for contours that make up features already measured in the same program.



All features whose points are used in the import process need to exist during program playback or the import function will fail.

To import points into a Profile measurement:

- Start recording a program
- Measure features into the program by probing them

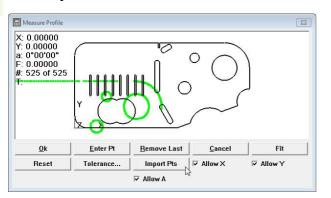


Start a **Profile** measurement

Select the features whose data cloud will be imported into the measurement as probed points

Program			
		Program Properties	
Ŧ		Initial settings	
	0	Measure "Circle 1"	
	/	Measure "Line 2"	
	/	Measure "Line 3"	
	/	Measure "Line 4"	
	0	Measure "Circle 5"	
	C	Measure "Arc 6"	
	C	Measure "Arc 7"	
	0	Measure "Circle 8"	
	5 C	Measure feature	

Click Import Pts



Points are imported into the Profile measurement.

atus	Cx Tol	Action Data	
		Program Properties	
+		Initial settings	
+	0	Measure "Circle 1"	
+	/	Measure "Line 2"	
Ŧ	/	Measure "Line 3"	
Ŧ	/	Measure "Line 4"	
Đ	0	Measure "Circle 5"	
+	C	Measure "Arc 6"	
(±	C	Measure "Arc 7"	
(H)	0	Measure "Circle 8"	
	D	Measure "Profile 9"	
		Import points from "Circle 1"	
		Import points from "Line 2"	
		Import points from "Line 3"	
		Import points from "Line 4"	
		Import points from "Circle 5"	
		Import points from "Arc 6"	
		Import points from "Arc 7"	
		Import points from "Circle 8"	

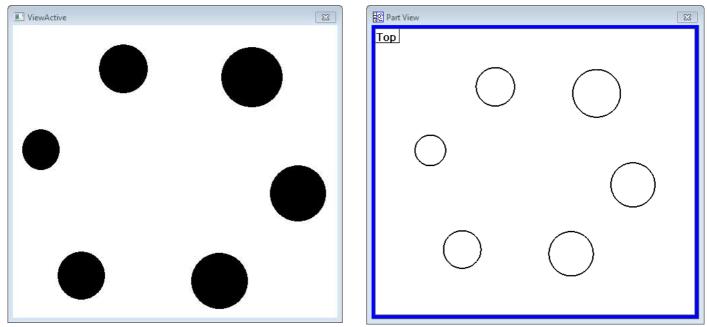
Click OK

Measuring maximum inscribed and minimum superscribed tangent circles

The IK 5000 can measure maximum inscribed and minimum superscribed tangent circles. The circles can be measured by constructing a circle from a set of circles that are in a bolt-hole pattern.

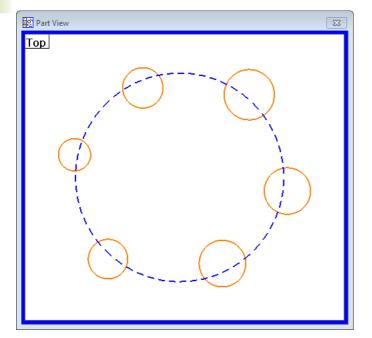
To measure a maximum inscribed or minimum superscribed tangent circle:

Measure a set of circles that are in a bolt-hole pattern



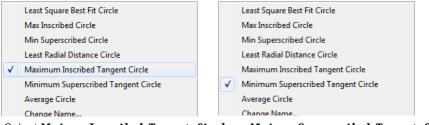
Measure a set of circles

Construct a circle from the measured circles



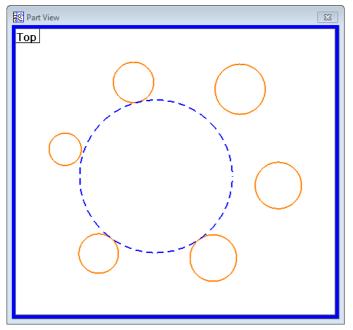
Construct a circle

- ▶ Right-click on the Results window
- Select Maximum Inscribed Tangent Circle or Mnimum Superscribed Tangent Circle

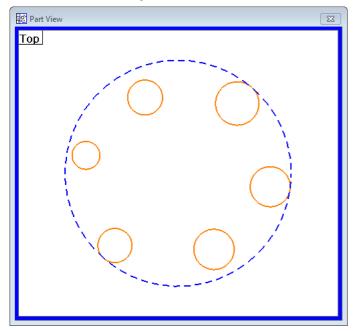


Select Maximum Inscribed Tangent Circle or Minimum Superscribed Tangent Circle

A Maximum Inscribed Tangent Circle or Minimum Superscribed Tangent Circle will be measured.



Maximum Inscribed Tangent Circle



Minimum Superscribed Tangent Circle

Measuring Rectangles

Precisely five probed points are required to measure a rectangle. The five points must be located in an exact pattern, and can be probed in either clockwise or counterclockwise order.

The correct pattern of points probed around the rectangle are:

- Two points evenly distributed along one long side
- One point on the closest end
- One point on the approximate center of the second long side
- The last point on the remaining end

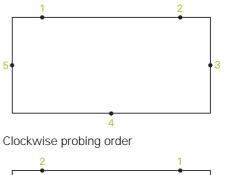


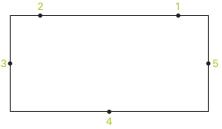
Probing a different pattern of points, or probing out of either clockwise or counterclockwise order will result in erroneous rectangle measurements.

Measurement results are shown in the Features template, Part View window and Results window. The Results window shows:

- The feature identification number
- The number of points used in the measurement
- The length and width of the rectangle
- The angular orientation of the rectangle
- The coordinate location of the center of the rectangle

Only the rectangle shape and orientation are shown in the Feature stamp of the Results window.





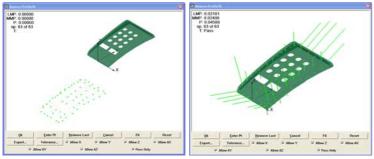


Profile3D Measurements

Profile3D measurements compare probed part surfaces to nominal part profiles from drawing or part data files. Probed surfaces and nominal profile surfaces are compared in the Measure Profile3D window.

The nominal part profile can be imported into the Measure Profile3D window from a drawing file in .IGS or .STP formats.

As surfaces are probed, their points are displayed in the Measure Profile3D window. When the desired surface measurements are complete, a fit operation is performed. During the fit operation, the system positions the probed data over the nominal profile and adjusts the X, Y, Z and rotational orientation of the probed points to achieve the best fit. Data points are shown as dots and form errors are shown as whiskers.



Probed points shown in Measure Profile3D window

Fit operation performed and form error whiskers shown

Tolerances can be applied to Profile3D measurements as bilateral limits or as unilateral pass/fail boundaries. Bilateral tolerances can be distributed equally or unequally on opposite sides of a surface.

The form errors, the number of data points and tolerance pass/fail results can be displayed in the Measure Profile3D window at the conclusion of the Fit operation. Upon completion of the Profile3D measurement, the Profile3D feature is listed in the Features template.

The form error of each surface point is listed in the Points Detail template and can be visually inspected using the Profile3D Feature Stamp.



 • To share how
 2

 • To share how
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

 • 1
 1

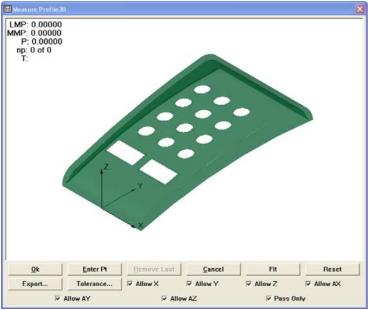
 • 1
 1

Points Detail template

Profile3D feature stamp

Profile3D Measurement Screen Functions

Functions for conducting Profile3D measurements are located across the bottom of the Measure Profile3D window. These functions are discussed in detail later in the Profile3D measurement instructions.



Measure Profile3D window

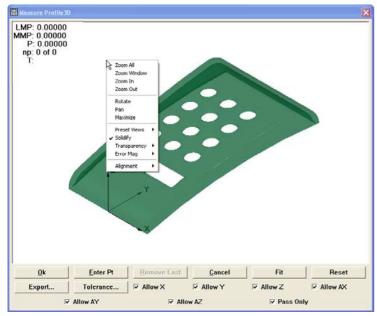
The Measure Profile3D window functions are shown below:

Functions	Function descriptions
ОК	Complete the Profile3D measurement
Enter Pt	Probe part surfaces
Remove Last	Remove the last probed points
Cancel	Cancel the Profile3D measurement
Fit	Fit probed data to the nominal Profile3D
Reset	Reset the fit operation
Export	Export the adjusted Profile3D model
Tolerance	Assign surface tolerances
Allow X, Y, Z	Allow (or prohibit) data shifts during Profile3D fit analyses
Allow AX, AY, AZ Allow (or prohibit) data rotation during Profile3D fit analyses	
Pass Only	Enable (or disable) Pass Only option

1.1 Operation

Profile3D Window Menu

Functions for evaluating and displaying Profile3D measurement results are contained in the Measure Profile3D window menu. Right-click anywhere in the Measure Profile3D window to display the Measure Profile3D menu.



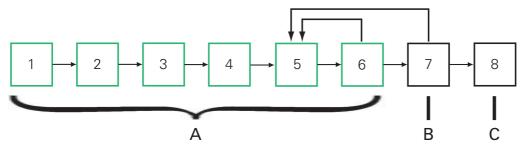
Measure Profile3D window menu

The Measure Profile3D window menu functions are shown below:

Functions	Function descriptions
Zoom Al l	Zoom to fit model in window
Zoom Window	Click and drag to select an area to zoom in on
Zoom In	Zoom in to show more detail
Zoom Out	Zoom out to show less detail
Rotate	Rotate the model around the datum
Pan	Move the model in the measure window
Maxi mi ze	Expand the measure window to the full size of the IK 5000 application window
Preset views	Set the viewpoint of the model to a predefined view
Solidify	Toggle between a wireframe and solid model
Transparency	Adjust the percentage of transparency for surfaces of a solid model
Error Mag	Magnify the display of form error whiskers
Alignment	Adjust the model to match the orientation of the part to the shape

The Profile3D Measurement Process

Typical steps required to complete a Profile3D measurement are shown below. Details regarding the use of measurement windows, menus and toolbar tools are included in the instructions.



Profile3D measurement process

Profile3D measurement process steps are shown below:

	Requirement	Step	System activity
Α	Measure	1	Start Profile3D measurement
Α	Measure	2	Import part profile
Α	Measure	3	Enable data shifts for fit
Α	Measure	4	Assign tolerances
Α	Measure	5	Probe part surfaces
Α	Measure	6	Perform Profile3D fit analysis. Go to step 5 and probe more points if needed.
В	Review and adjust results	7	Adjust display magnification of error whiskers. Go to step 5 and probe more points if needed.
С	Complete measurement	8	Add Profile3D feature to the Feature template

Start Profile3D Measurement

To begin a Profile3D measurement:

Click Measure>Profile3D

or

Click the Profile3D icon button on the Measure toolbar



Start a Profile3D measurement from the Measure toolbar

The **Import Profile** dialog will be displayed. A nominal part profile can be imported from a drawing file. Drawing files can be in the .IGS or .STP format.

Import Part Profile

Select the desired .IGS or .STP file and then Click Open

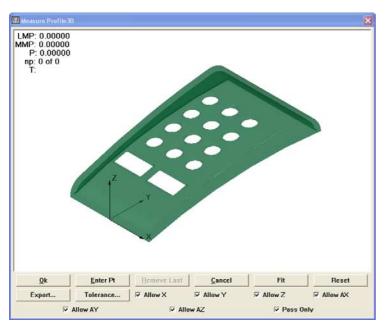


Select file

Measure Magic	F2
Point	F3
Line	F4
Arc	F5
Circle	F6
Ellipse	
Slot	F7
Blob	F8
Distance	F9
Angle	F11
Plane	Ctrl+F3
Cylinder	Ctrl+F4
Sphere	Ctrl+F5
Cone	Ctrl+F6
Torus	
Profile	
Profile3D	2
Magnetic Plane	Ctrl+F7
Part View	Ctrl+F9
Results	Ctrl+F11

Start a Profile3D measurement from the Measure menu

The nominal Profile3D will be shown in the Measure Profile3D window.



Nominal Profile3D shown in Measure Profile3D window

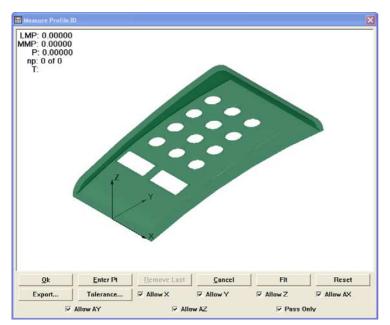
Enable or Prohibit Data Shifts for Profile3D Fit

The Profile3D fit algorithm shifts the probed data points in the cartesian or polar coordinate system to achieve the best fit between the probed points and the nominal part profile.

Maximum degrees of freedom are given to the fit algorithm by checking the **Allow X**, **Allow Y**, **Allow Z**, **Allow AX**, **Allow AY** and **Allow AZ** check boxes across the bottom of the window. Clearing a check box prohibits data movement in the indicated orientation.

To give maximum degrees of freedom to the Profile3D fit algorithm:

Check the Allow X, Allow Y, Allow Z, Allow AX, Allow AY and Allow AZ check boxes across the bottom of the Measure Profile3D window



Check all check boxes for maximum degrees of freedom

Clear a check box to prohibit movement of data in the indicated orientation

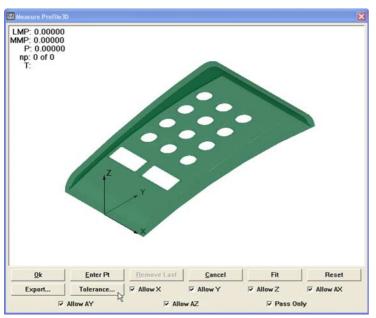


Allowing the maximum degrees of freedom for the Profile3D fit algorithm is recommended for most applications.

Assign Tolerances

Bilateral or unilateral tolerances can be assigned to Profile3D measurements. Bilateral tolerances can be equal or unequal.

- To begin applying tolerances:
- Click the Tolerance button to display the Profile Tolerance Edit dialog



Begin applying tolerances

Equal Bilateral Tolerances

Bilateral tolerance values will be centered on the surface of the nominal profile. For example, an equal bilateral tolerance of 0.005 will be applied as ± 0.0025 .

To apply an equal bilateral tolerance:

Check the **Bilateral** check box, enter the desired tolerance value into the **Tolerance** field for equal bilateral tolerances and then click **OK**

Profile Tolerance Ed	it	
🔽 Bilateral	Tolerance 0.005	ОК
		Cancel
		Delete

Apply equal bilateral tolerances

Unequal Tolerances

Unequal or unilateral tolerance values are specified by the user for Inmaterial and Out-material tolerances.

To apply an unequal tolerance:

Uncheck the **Bilateral** check box, enter the desired **In material Tol** and **Out material Tol** tolerance values in the fields provided and then click **OK**

Edit		
Out material Tol	0.001	ОК
In material Tol	0.003	Cancel
		Delete
		Out material Tol

Apply unequal tolerances

Probe Part Surfaces

As part surfaces are probed and points are collected, they appear in green in the Measure Profile3D window.

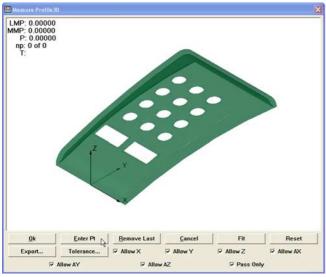


1.1 Operation

When Auto Enter is enabled points will be entered automatically as they are probed.

To enter a probed point manually:

Click Enter Pt in the Measure Profile3D window



Enter points from the Measure Profile3D window

To remove the last point(s) collected:

Click Remove Last

To cancel the Profile3D measurement:

Click Cancel

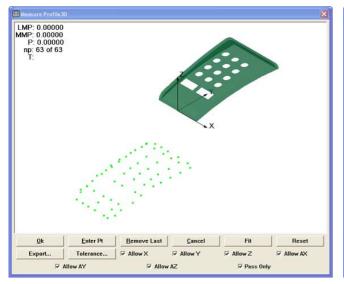


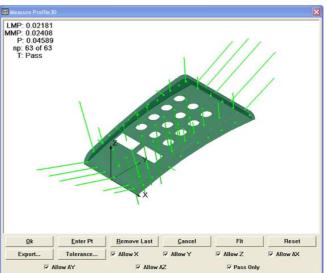
If a point was probed in a non-perpendicular direction to the surface during program recording, the system will probe that point orthogonal to the surface during program playback as long as the fit analysis was done and completed.

Perform Profile3D Fit Analysis

When all the required points have been probed, the points can be fit to the nominal part model.

When the fit operation is complete, the green probed points will be shifted to match the part model as closely as possible and form error whiskers will indicate differences between the probed locations and the nominal part surfaces.





Points shown before fit calculation

Form error whiskers shown after fit operation

To perform a fit analysis:

Click Fit



To decrease the fit analysis time, well distributed points all around the part under measure are recommended. In addition, part alignment and datum can be performed before commencing the Profile3D measurement or using the Six Point alignment function in the Profile3D measurement.

Profile3D Automatic Fit Analysis

The fit analysis can be set to be performed automatically once the measurement is completed by clicking the **OK** button.

To select the Profile3D automatic fit analysis option:

- Select Tools>Options...
- ▶ Select the Measure tab
- Select the Automatically fit Profile3D when measurement complete checkbox

ptions	×
Probes Programming Runs SLEC Sounds	ОК
Square Supervisor VED	Cancel
Locks Measure NLEC Part View Point Filtration	In als (\$4\$4
Feature defaults Probed □ Probed □ Phantom □ Hidden □ Show name Constructed □ Phantom □ Hidden □ Show name Created □ Phantom □ Hidden □ Show name	Inch/MM
Distance type	
✓ Start Measure Magic on a probe hit ✓ Allow pre-selection of features for constructions ✓ Always display distance values as positive Treat work planes as magnetic planes ✓ Automatically finish a point measurement after 1st point Maximum number of points in a measurement 1000 ✓ Add InsideDiameter and OutsideDiameter information to all probed	
Display intermediate feature results as they are measured Enable use of previously measured feature for point vector compensation	
Automatically fit Profile3D when measurement is complete Profile Fit Timeout 30	
Minimum Points Point 1 Arc 3 Angle 2 Cone 6 Plane 3 Line 2 Circle 3 Sphere 4 Cylinder 6 Torus 6 Ellipse 5 5 5 5 5 5	
I User settable	

lool	s Windows Help	
	Tolerance Fundado Data Claud	•
	Explode Data Cloud	
	Filter	
	Adjust Contrast and Brightness	
	Goto Worm	
	Goto Worm Stop	
	Goto	•
	Joystick	•
<	Motors Off	
	Release Probe	
	Deactivate Touch Probe	
	Capture Image	Ctrl+F8
	Programming	•
	Customize	
	Options	
	CNC	
	Language	+

Select Tools>Options

Click OK

0

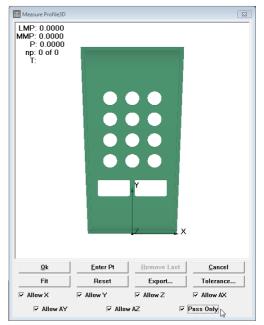
Profile3D Pass Only Option

The **Pass Only** option on the **Profile3D Measure** window specifies that the fitting algorithm terminates the fitting process when it finds a fit that is within all specified surface tolerances. If the **Pass Only** option is checked, and a tolerance has been specified for every surface on which points have been probed, then the fitting algorithm will terminate as soon as it finds a fit in which all probed points pass their tolerance. If no such fit can be found then the fitting algorithm will continue the process of fitting until it either finds the best fit it can or none is found.

The **Pass Only** option is used to improve performance in cases where time is a more important factor than accuracy. This is to be used when a tolerance pass/fail is all that is required and not the exact amount of the error. The amount of performance improvement varies depending on how loose the tolerance is, and how close the part is to its nominal form. The fitting of a part that fails its tolerance will not have any performance improvement by using the **Pass Only** option.

To select the Pass Only option:

- Select Measure>Profile3D
- Select the **Pass Only** checkbox
- Click OK



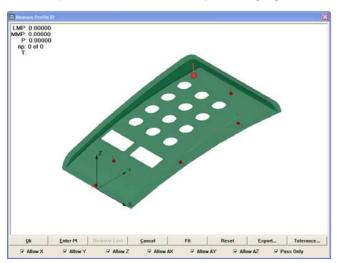
Select the Pass Only checkbox

Six Point Alignment

A six point alignment allows the operator to align the model with the orientation of the part on the stage.

To perform a six point alignment:

- Right click in the Measure Profile3D window
- Select Alignment>Six Point. A prompt appears with directions for marking points on the model.
- Select **OK** in the prompt
- Mark three points on the model surface to define a primary plane
- Mark two points on the model on a surface that is close to perpendicular to the first surface to define a secondary line
- Mark one point on the model on a surface that is close to perpendicular to both the first and second surfaces to define a zero point



When six points are selected the first point is highlighted on the model

Six points selected and first point highlighted

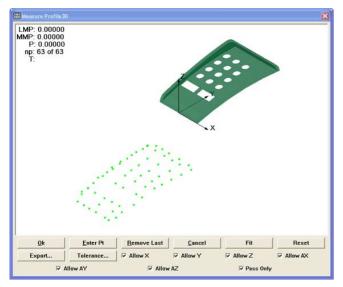
- Probe the first point on the part. The next point is highlighted on the model.
- Repeat probing the remaining five points
- Select Fit in the Measure Profile3D window. The six point alignment is completed and the initial fit is done.

Resetting the Fit Analysis

The results of a fit analysis can be reset and the point data refined in preparation for revised fit operations. The user can review the positions of data points, remove data points or change the degrees of freedom for the fit analysis.

To reset the fit analysis back to the original probed point locations:

Click Reset



Points shown after resetting the fit analysis

Adjust the Display Magnification of Error Whiskers

During the fit analysis, probed points that do not fall precisely on the nominal profile generate form errors. When tolerances are specified, the errors are divided into two groups, those that pass (Passed) and those that fail (Failed) tolerance criteria.

The passed and failed form errors can be displayed as whiskers that extend from the nominal surface. The length of each whisker is proportional to its magnitude of error.

Typically, the magnitude of most form errors is so small in proportion to the part displayed that without magnification they would not be visible. The **Measure Profile3D** window menu and toolbar include fixed, automatic and user-definable levels of magnification for displaying error whiskers.

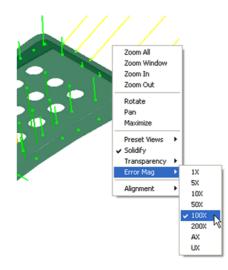
Fixed magnifications: display magnifications are selected directly by the user.

Automatic magnification (AX): the system optimizes the display of error whiskers based on the maximum form error value.

User-defined magnification (UX): A data field will be displayed for specifying the level of magnification.

To adjust the display magnification of form error whiskers:

- Right-click the Measure Profile3D window to display the Measure Profile3D window menu
- Click Error Mag to display a menu of magnification alternatives
- Click the desired magnification selection

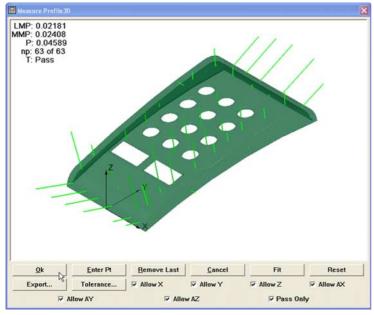


Select error magnification from Measure Profile3D window menu

Add Profile3D Feature to the Feature Template

When the final fit analysis is finished, the Profile3D measurement can be completed and the Profile3D feature can be added to the Feature template.

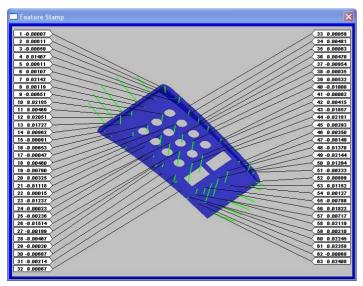
- To complete the Profile3D measurement:
- Click OK in the Measure Profile3D window



Complete the Profile3D measurement

To view the Profile3D measurement results:

Click on the Feature Stamp Icon in the results window



Profile3D feature stamp

Measurements results are also available in the **PointDetails** template.

🔚 Poir	ntDetails		×			
Features Program Report PointDetails						
ID	Actual	A	Nominal 🔺			
1	X	-0.10802	x			
	Y	0.89038	Y			
	Z	-3.58387	Z			
2	Х	-0.41754	х			
	Y	0.48294	Y			
	Z	-3.24546	Z			
3	X	-0.14409	X			
	Y	0.30019	Y			
	Z	-3.58450	Z			
4	X	-0.48716	x			
	Y	1.10483				
	Z	-3.64014	Z			
5	X	-0.41741	X			
	Y	-0.13469				
	Z	-3.29735	Z			
6	X	-0.88362				
	Y	0.48129				
	Z	-3.25731				
7	X	-1.09714	X			
	Y	1.11903				
	Z	-3.63164	Z			
8	X	-1.37649				
	Y	0.48298				
	Z	-3.26448				
9	X	-1.15433				
	Y	-0.13029	Y			
	Z	-3.32163	Z 🗸			
<u>ال</u>		1 85010	••• •			

PointDetails template



If the **PointDetails** template is not open it can be viewed by clicking **Windows>Open Template...** and selecting **PointDetails.5ft**.

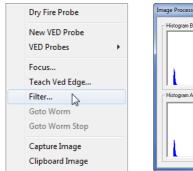
Auto Focus (option)

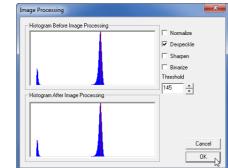
The Auto Focus teach function has been removed from the IK 5000 software. The focus search distance is now entered directly into the search distance field. The previous Auto Focus algorithm used the teach function to teach the optimum search distance and Z axis velocity, depending on the connected camera's frame rate. This could cause an intermittent Auto Focus failure when used on a significantly different surface from the surface used during the teach process. The algorithm now automatically adjusts the Z axis velocity depending on the camera frame rate and the user specified search distance.

High resolution cameras may produce less than optimal results which can be improved by decreasing the search distance. Decreasing search distance also speeds up the focal point acquisition time but requires initial position to be closer to the targeted focal point. On some cameras turning on the despeckle filter prior to performing auto focus will improve results, despeckle filter can then be turned off after focus.

To turn on the despeckle filter:

- ▶ Right click on the Video window and select Filter...
- Check the **Despeckle** checkbox
- Click OK





Right click the Video window and select Filter...

Check the Despeckle box and click OK

To set Auto Focus options:

- Click Tools>Options
- Verify the Supervisor Password is entered and the Keep privileges until program is exited option is checked
- Click Probe>Probe Library
- Click on the target camera

	Probe Tools Windows Help	Probes
Supervisor VED	✓ Ved Probes Circle ►	─ <mark>camera_1</mark>
Password ^{★*****} ✓ Keep privileges until program is exited	Light Control Associate Light w/Mag Set Lights w/Mag Changes	
	Teach Ved Edge	
Change Password	Probe Library	
	Magnifications mag_1 > Probe Path Data	

Verify the Password is entered and Keep Click Probe>Probe Library privileges until program is exited is checked

Click on the target camera

- ▶ Click on the target magnification
- Click the Auto Focus tab
- ▶ Enter the desired search distance in the Search Distance field
- Click **OK** to save the changes and exit the **Probe Library**

Name Date mag_16/1/12	Who us4116	Properties Offset Resolution Auto F Search Distance:	Focus Offset Resolution Auto Focus Search Distance: 2.5
Click on the target mag	gnification	Click the Auto Focus tab	Enter the desired search distance and click OK

Auto focus will search and make as many passes as necessary until a optimum focus point is found. The **Max two passes** feature limits the number of auto focus passes to two. Selecting this feature can speed up the auto focus process but may result in less reliable repeatability of the auto focus height.

To enable Max two passes:

Select the **Max two passes** check box

Properties		
Offset	Resolution	Auto Focus
Search Distan	ice: 2.5	
	,	
Max two pa	asses	

Select the Max two passes check box

Autofocus Final Check

An option to perform a final autofocus check is available from the Auto Focus tab in the Probe Library.

Enabling a final check helps to avoid missing an optimum focus point when autofocusing with a search distance smaller than 1 mm and a magnification greater than 20 x. An optimum focus point can be missed due to skipping of the focus frames during the focus search, machine drive mechanics, changes in lighting, or the objective lens being used.

A final check compares the difference in contrast values of frames in the range of 5 μ m above to 5 μ m below the initial focus point. If there is a point with a larger contrast value found the system will focus on the point of greater contrast.

To enable the autofocus final check:

- Select Probe>Probe Library...
- Select the target camera and target magnification
- Select the Autofocus tab
- Check the check box next to Enable final check

| TpTip 🕨

| None ▶

| Cardinal ►

Probes	Name	Date	Who	New
⊟ Ved	mag_1	10/15/13	Tester	 -
camera_1	mag_2			Delete
VedProbes				
⊡ ContactProbes				Set Curren
				Disqualify
				ОК
Descrition				
Properties	colution) Auto	Encue) Ms	a l	
	solution Auto) Focus Ma	ng	1
Offset Res	solution Auto) Focus Ma	ng	1
Offset Res) Focus Ma	nd j	

Click Probe>Probe Library...

Probe Tools Windows Help ✓ Contact Probes

Probe Compensation

Associate Light w/Mag ✓ Set Lights w/Mag Changes

Ved Probes

✓ Light Control

Probe Library...

Check the check box next to Enable final check

Manual VED Height Point Measurement

The VED height probe can be used to measure height points in a VED configured system. This is done automatically in a motorized stage system. In a manual system this function must be performed manually using the VED height probe.

To perform VED height point measurement manually:

Click Measure>Point...

The Measure Point window opens.

Select the VED Height probe

Measure Datum Probe Measure Magic	Tools Win F2	$\stackrel{Ved}{\not =} + \rightarrow \stackrel{Ved}{\rightarrow} \blacksquare \blacksquare \blacksquare \blacksquare \oslash \checkmark \blacksquare \oslash \blacksquare \blacksquare$
Point	F3	
Line	F4	Height Prot

Click Measure>Point...

Select the VED Height probe

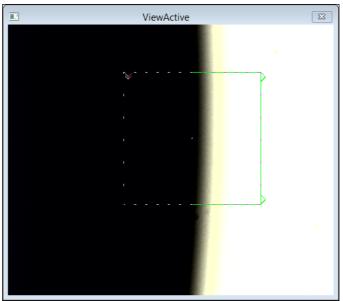
Press Enter Pt in the Measure Point window

	83
To measure a point, you may probe a point or construct a point from previously measured features. When probing a point, default probe compensation will occur along the part axis which is closest to the direction the probe was moving when the point was entered (and which is appropriate to the projection setting). A midpoint of the part may be measured by probing the opposing surfaces on either side of the part (a two point measurement). To construct a point, select the features to be used to construct the point and press OK. In those cases in which there may be more than one answer, the change item in the edit menu may be used to generate the desired points. One example is finding points from	E
Ok & Repeat Enter Pt Remove Last	1
<u>Cancel</u> Cre <u>a</u> te	

Press ENTER PT

Follow the prompt on the screen to slowly move up and down in the focus zone

Once the system finds focus, it will fire the probe and take a point measurement which will be posted in the Measure Point window.



Manual Focus Point
Slowly move up and down in the focus zone

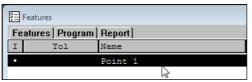
Follow the prompt

Slowly move up and down in the focus zone

Measure Point
1 Pt
Height
Ok Enter Pt Remove Last Cancel Create

The system will fire the probe and take a point measurement

Press **OK** in the Measure Point window. The Point height measurement is complete.



<u>O</u>k

Press OK in the Measure Point window

The Point height measurement is complete

Optimet Laser Lens Selection

The Optimet laser is a laser measuring probe supported by IK 5000. Multiple laser lenses are available for probing different types of surfaces and materials. Each lens has an ID.

The **Lens** settings in the IK 5000 software must match the physical lens that is attached to the probe. These settings allow the IK 5000 to adjust the laser beam properties to match the physical lens. When attaching a physical lens to the probe, verify that the settings match the physical lens.

To verify the Optimet laser lens:

Click Probe>Probe Library...

Prot	e Tools Windows Help			
	Contact Probes	None 🕨		
	Probe Compensation	Cardinal 🕨		
<	Ved Probes	Height ►		
	Light Control			
	Associate Light w/Mag			
	Set Lights w/Mag Changes			
	Teach Ved Edge			
	Probe Library			
	Magnifications	mag_1 •		
✓	Auto Enter			

Click Probe>Probe	Library
-------------------	---------

- Select the **Optimet** probe
- Select the ID for the physical lens attached to the probe from the Index drop-down list
- Verify that the Focal Distance setting matches the focal distance of the physical lens

Lens Index 2 V Save
Focal Distance 75
Minimum Distance 61.055840
Maximum Distance 79.055443
Range 17.999603



Verify that the Focal Distance setting matches the focal distance label on the physical lens

Click OK

Keyence Laser Settings

The Keyence LK-G5000 Series laser is a laser measuring probe supported by IK 5000. The Keyence laser can be used to measure features that require a laser probe for acquiring a feature data cloud.

How the Keyence laser acquires data points can be controlled by changing settings in the IK 5000 software.

To edit Keyence laser settings:

Click Tools>Keyence Settings...

Tools Windows Help Develop	
Tolerance	+
Explode Data Cloud	
Focus	
Filter	
Adjust Contrast and Brightness	
Goto Worm	
Goto Worm Stop	
Goto	۱.
Joystick	+
Motors Off	
Keyence Settings	
	Ch-1 - 50

Click Tools>Keyence Settings...

Edit any settings that require changes

Keyence Settings	X			
X override for velocity when laser is probing 10	ОК			
Y override for velocity when laser is probing 10	Cancel			
Z override for velocity when laser is probing 5				
Radius of the laser calibration artifact 6.35				
X override for velocity when laser is calibrating 1.000	00000000			
Y override for velocity when laser is calibrating 1.000	00000000			
Z override for velocity when laser is calibrating 1.000	00000000			
Laser part following z axis scale reversal				
Return highest point of a line measurement				
Return highest point of a patch measurement				
Return first valid point of a patch measurement				
Calibration artifact is a bore				
Override part following in patch measure mode				
☑ Allow laser to turn on and off lights when probing				
Throw away the first laser measurement to synch with late	ched values 0			
Max number of missed laser positions before an error is g	generated 1000			
Milliseconds between laser graph window refresh	250			
Frequency	25 💌			
Median filter	15 🔹			
Measurement mode	Normal 🔹			
Mounting method	Diffuse 🗨			

Edit any settings that require changes

Click OK

The changes are saved and the **Keyence Settings** window closes.

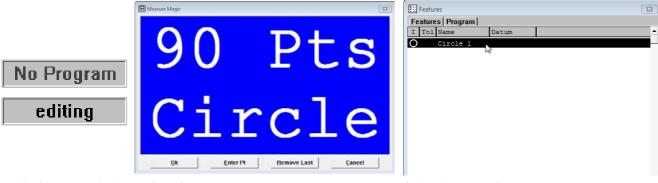


Refer to the documentation provided with the Keyence LK-G5000 for additional information regarding the **Frequency**, **Median filter**, **Measurement mode** and **Munting method** settings.

Exploding the Data Cloud

Explode Data Cloud is used to extract point features from the data cloud used in a probed feature.

- To extract point features from the data cloud:
- ▶ Verify the system is in **No Program**or **Editing** state of programming
- ▶ Probe a feature
- Select the target feature

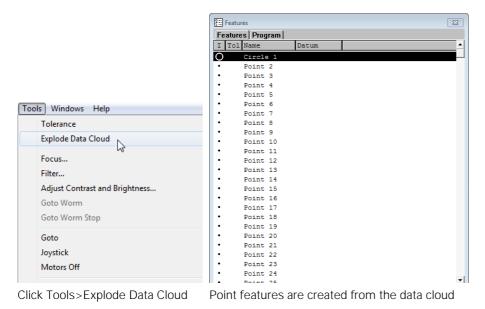


Verify the system is in No Program or Editing state Probe a feature

Select the target feature

Click Tools>Explode Data Cloud.

The **Features** List is populated with point features created from the data cloud of the selected feature.



Rotating and Positioning of VED Tools using Part Reference Frame

If a part datum has been performed, the system will rotate and position the VED tools, including the Video Charts, to the part reference frame.

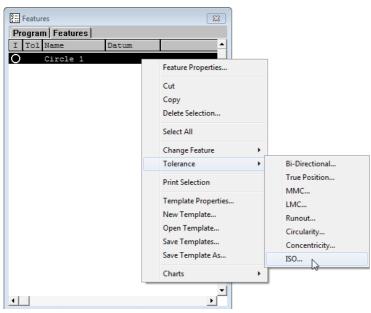
ISO Tolerance

The ISO tolerance enables the use of data stored in ISO 286-2 Standard tables.

The ISO tolerance can be added to the following features:

- Point
- Circle
- Arc
- Sphere
- Line
- Slot
- Torus
- Rectangle

The ISO tolerance is applied to a feature similar to other tolerances, for instance by right-clicking on a feature in the **Features** list template.



Right-click on a feature in the Feature list

Once the ISO tolerance is selected the **ISO Tolerance Entry** dialog box appears. The **ISO Tolerance Entry** dialog box is used to select which ISO tolerance table entry will be used to tolerance each applicable feature parameter.

ISO Tolera	nce Entry			×				
Positio	n							
	Nominal	ISO Table	ISO Index	ОК				
Х	0.74634	CD 💌	5 💌	Cancel				
Y	0.25853	-	•	Delete				
Z	0.00000	-	-					
Size]				
	Nominal	ISO Table	ISO Index					
R	0.15167	•	-					
Named	Named Tolerances							
Save	e Dele	t D 1/3						
		EF 🔻						

ISO tolerance entry table

Available parameter selections are:

■ ISO table

ISO Index

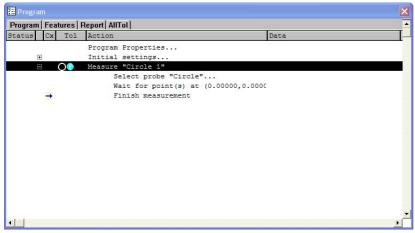
The ISO index entry can be used to select which column, 1 through 18, to use for the selected ISO tolerance table. For questions about the ISO tolerance table selection please refer to the ISO 286-2 standard.

The nominal value for the feature parameter along with the selected ISO tolerance table and index entries are used to determine the low and high limits to be used when tolerancing the feature. These limits are calculated through a look-up into the ISO tolerance table. If no ISO tolerance table entry or ISO tolerance index entry is specified then the tolerance is considered empty and the tolerance will pass. Also, if the nominal value for the feature parameter is outside of the range of nominal values found within the selected tolerance table, then the tolerance will also pass.

ISO Toler	ance Results								×
Posit							2		ОК
	Nominal	Actual	Deviation	ISO Table	ISO Index	Low limit	High limit		
X	0.74634	0.74634	0.00000	CD	5	0.78034	0.78434	F	Edit
Y	0.25853	0.25853	0.00000					Р	
Z	0.00000	0.00000	0.00000					Р	
Size									
	Nominal	Actual	Deviation	ISO Table	ISO Index	Low limit	High limit		
R	0.15167	0.15167	0.00000					P	

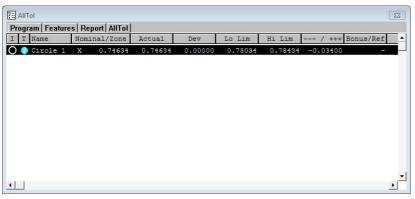
ISO tolerance results

Similar to all tolerances, the ISO tolerance can be added to features within a program.



ISO tolerance added to a feature in a program

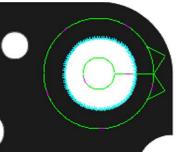
The ISO tolerance results can also be viewed in reports when using the $\ensuremath{\textbf{AllTol}}$ template.



AllTol template

Continuous Probe Firing

Probes can be dry-fired continuously to show data points that would be acquired under the current light, focus, part alignment and other current measurement conditions if the probe were actually fired. The data points are shown in blue until the probe is fired to acquire points, then the acquired points are shown momentarily in red.



Continuous Fire enabled



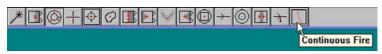
Continuous probe firing is useful for setup and troubleshooting activities, but requires substantial system resources and should be avoided during routine use to maintain high throughput.

To enable Continuous Fire:

- ▶ Right-click the Live Video window to display the Window menu
- Select Other>Continuous Fire

or

Click the Continuous Fire button on the VED toolbar



Enable Continuous Fire from VED toolbar

Other 🕨	 High Accuracy Continuous Fire
Goto Worm Stop	
Goto Worm	
Filter	
Focus	
VED Probes	·
New VED Probe	
Auto Finish	_
Cancel	
Ok	
Remove Last	
Enter Pt	

Enable Continuous Fire from menu

Programming Continuous Probe Firing

Continuous probe firing is programmable. A Continuous Fire mode step is recorded in the Initial settings program step when a new program is recorded. Continuous probe firing is turned off in the Initial settings step by default.



After a program is run the state of Continuous Fire returns to the same state that was in place before the program was executed.

Initial settings step

📰 Program		X					
Status Cx Tol	Action	Data					
	Program Properties						
E	Initial settings						
	Display part view map						
	Hide position indicator						
	Teach edge using a contrast of 40						
	Probe path data						
	Switch to magnification "Mag_1"						
	Select probe "Circle"						
	Shape Cal: Off						
	Filtering: Despeckle=0 Sharpen=0						
	Turn off high accuracy mode						
	Turn on continuous fire mode						
	Focus lock off						

Enable Continuous Fire from Initial settings... step

To turn Continuous Fire on in the Initial settings:

- Click the + sign next to Initial settings... to expand the Initial settings step in the program window
- Double-click Turn off continuous fire mode...

The text changes to **Turn on continuous fire mode...** Continuous Fire mode will now be turned on when the program is run.

Program Step

When the state of Continuous Fire is changed from the Live Video window or the VED toolbar, a separate Continuous Fire step is recorded in the program. The state of this step can be changed.

Program		×
Status Cx Tol	Action	Data 🔺
	Program Properties	
÷	Initial settings	
	Turn on continuous fire mode	
	Save part 6	

Change the state of a Continuous Fire program step

To turn Continuous Fire off in an existing program step:

Double-click on Turn on continuous fire mode...

Turn off continuous fire node... is displayed in the Program window and the program will now turn Continuous Fire off at this step in the program.

To turn Continuous Fire on in an existing program step:

> Double-click on a **Turn off continuous fire mode...** step

Turn on continuous fire node... is displayed in the Program window and the program will now turn Continuous Fire on at this step in the program.

Measure Shortcuts

Keyboard shortcuts for starting Ellipse, Torus, Profile, and Profile3D measurements are now available. The shortcuts are listed in the Measure menu.

In addition to the new measure shortcuts, the Rectangle menu item has been moved to a more appropriate location in the Measure menu.

Ellipse Shortcut

To start an Ellipse measurement:

Press Ctrl+E on the keyboard

Torus Shortcut

To start a Torus measurement:

Press Ctrl+T on the keyboard

Profile Shortcut

To start a Profile measurement:

Press Ctrl+F2 on the keyboard

Profile3D Shortcut

To start a Profile3D measurement:

Press Ctrl+F12 on the keyboard

leasure	Datum	Probe	Tools	Win
Mea	sure Magi	c	F	2
Poin	t		F	-3
Line.			F	-4
Arc			F	5
Circl	e		F	6
Ellips	se		Ctrl+	E
Slot.			F	7
Blob			F	-8
Rect	angle		F1	2
Dista	ince		F	9
Angl	le		F1	1
Plan	e		Ctrl+F	-3
Cylin	nder		Ctrl+F	-4
Sphe	ere		Ctrl+F	-5
Cone	e		Ctrl+F	6
Toru	IS		Ctrl+	Т
Profi	ile		Ctrl+F	-2
Profi	ile 3D		Ctrl+F1	2
Mag	netic Plan	ie	Ctrl+F	7
Part	View		Ctrl+F	-9
Resu	lts		Ctrl+F1	1

Measure menu

N

Axial Runout Tolerance Check for Plane Feature

Axial runout tolerance can be applied to a Plane feature that is perpendicular to a reference axis, e.g. plane to cylinder.

- To apply axial runout tolerance:
- Measure a cylinder to be used as a reference in the tolerance
- Measure the plane to apply the axial runout tolerance to
- ▶ Select the **Plane** feature in the **Features** template
- Select Tools>Tolerance>Axial Runout
- Enter tolerance parameters
- Click ok

Tolerance results are displayed.

Tools Windows Help			
Tolerance •	Perpendicularity		
Explode Data Cloud	Flatness		
Filter Adjust Contrast and Brightness Goto Worm Goto Worm Stop	Coplanarity Axial Runout	Axial Runout Tolerance Entry	1
Goto → Joystick → Motors Off Release Probe Deactivate Touch Probe Capture Image Ctrl+F8		Runout OK Tol. Zone Distance 0.030 1 Cancel Reference Feature Cylinder 1	Axial Runout Tolerance Results
Programming Customize Options CNC Language		Named Tolerances	0.03000 0.02296 P Edit Reference Feature Cylinder 1
	1		

Select

Tools>Tolerance>Axial Runout

Enter tolerance parameters and click OK

Tolerance results are displayed

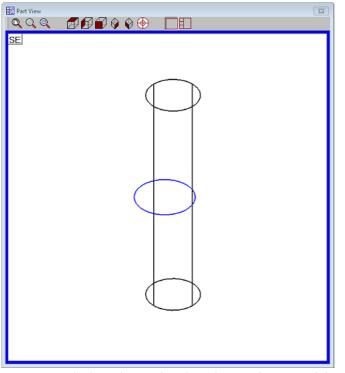
Performing a runout tolerance on a circle using a cylinder as a reference

Performing a runout tolerance on a circle requires a reference feature such as another circle or cylinder.

To use a cylinder as a reference feature:

Measure a cylinder to be used as the reference feature for the runout tolerance and then measure the circle to be toleranced.

Features					× 1
Features Program					
I Tol Name	X		Y Z		
O Cylinder 4	X	14.5000 Y	-3.2000 Z	0.0000	
O Circle 2	Х	14.4910 Y	-3.2879 Z	0.0162	



Measure a cylinder to be used as the reference feature and then measure the circle

▶ Right-click on the Results window

Select Tolerance>Runout...

		_	
<	Least Square Best Fit Circle		
	Min Superscribed Circle		
	Max Inscribed Circle		
	Least Radial Distance Circle		
	Point		
	Line		
	Arc		
	Sphere		
	Plane		
	Change Name		
	Add Probed Points		
	Tolerance		Bi-Directional
	DDE Output		True Position
	Delete Selection		MMC LMC
	Feature Properties		Runout
	Format •		Circularity Concentricity
			ISO

Right-click and select **Tolerance>Runout...**

- ▶ Enter the Tol. Zone
- Select the cylinder to use as the reference feature from the Reference Feature drop-down list
- Enter a name into the Named Tolerances field if desired
- Click **OK** in the Runout Tolerance Entry window to accept the values entered

Runout Tolerance Entry	×
Runout Tol. Zone	ОК
0.25	Cancel
Reference Feature	Delete
Named Tolerances	
Save Delete	

Enter Runout Tolerance Entry information and click OK

Click **OK** in the Runout Tolerance Results window to save changes and close the window

Or

Click Edit... to go back to the entry window

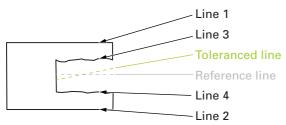
Runout Tolerance Results	×
Runout Tol. Zone Actual	ОК
0.2500 0.1767 P	Edit
Reference Feature	

Click OK or Edit...

Symmetry Tolerance

A symmetry tolerance can be applied to Line and Plane features that are symmetrical to a reference feature.

Symmetry Tolerance Applied to a Line



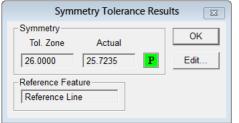
To apply the symmetry tolerance to a line:

- Measure four lines, two lines on opposite sides that are considered to be master edges and two lines from edges that are to be symmetrically toleranced. Lines 1 and 2 are measured from master edges while lines 3 and 4 are measured from the edges to be symmetrically toleranced.
- Construct a reference line from lines 1 and 2
- Construct the line to be tolerance for symmetry from lines 3 and 4
- Select the resultant line from the construction using lines 3 and 4

2		Features							
I	Tol	Name	Datum	▲					
/		Line 1							
/		Line 2							
/		Line 3							
/		Line 4							
/		Reference Line							
/		Toleranced Line							

Apply symmetry tolerance with the constructed line from lines 1 and 2 as the reference feature

Feature Properties]	Symmetry Tolerance Entry
Cut Copy Delete Selection		Symmetry OK Tol. Zone Cancel
Select All	-	Reference Feature Delete
Change Feature		Named Tolerances
Tolerance •	Bi-Directional	
Print Selection	True Position Straightness	Save Delete
Template Properties New Template Open Template Save Templates Save Template As	Parallelism Perpendicularity Angle Symmetry	
Charts 🕨		

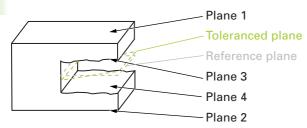


I To	l Name	Datum	
/	Line 1		
/	Line 2		
/	Line 3		
/	Line 4		
/	Reference Line		
Z 😰	Toleranced Line		



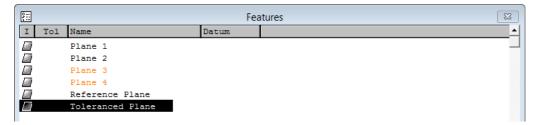
The actual tolerance is calculated by doubling the maximum distance between the endpoints of the constructed tolerance line from the endpoints of the constructed reference line.

Symmetry Tolerance Applied to a Plane



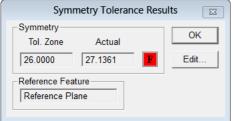
To apply the symmetry tolerance to a plane:

- Measure four planes, two planes on opposite sides that are considered to be master surfaces and two planes from surfaces that are to be symmetrically toleranced (see drawing above). Planes 1 and 2 are measured from master surfaces while planes 3 and 4 are measured from the surfaces to be symmetrically toleranced.
- Construct a reference plane from planes 1 and 2
- Construct the plane to be toleranced for symmetry from planes 3 and 4
- Select the resultant plane from the construction using planes 3 and 4



Apply symmetry tolerance with the constructed plane from planes 1 and 2 as the reference feature

Feature Properties	Symmetry Tolerance Entry	83
Cut Copy Delete Selection	Symmetry Tol. Zone 26	OK Cancel
Select All	Reference Feature	Delete
Change Feature	Named Tolerances	
Tolerance	Bi-Directional	
Print Selection	True Position Straightness Delete	
Template Properties New Template Open Template Save Templates	Parallelism Perpendicularity Angle Symmetry	
Save Template As Charts	ISO	



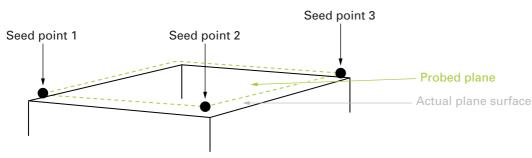
20	_	Fea	tures
I Tol	Name	Datum	
	Plane 1		
	Plane 2		
	Plane 3		
	Plane 4		
	Reference Plane		
🖉 🚯 🗐	Toleranced Plane		



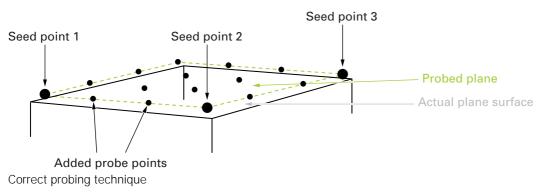
The actual tolerance is calculated by doubling the maximum distance between the endpoints of the constructed tolerance plane from the endpoints of the constructed reference plane.

Plane Probing Technique

A plane can be measured by probing three seed points for the data cloud. The IK 5000 fitting algorithm uses these three points as the first three corners of the plane.

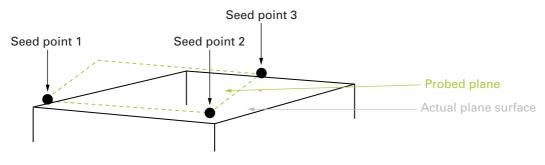


It is important to probe the three seed points on the corner surfaces of the actual plane if the **Add Probe Points** function is used to add more points to the data cloud of the plane measurement.

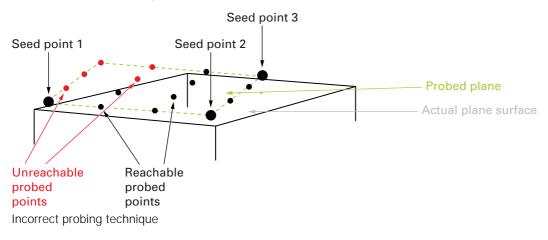


1.1 Operation

In some cases it may be necessary to probe the seed points in a different order and location. For example, probing the seed points where the first two are located at the immediate corners facing the operator while the third point is probed on the middle point of the opposite edge.



The resulting plane cannot be used with the **Add Probe Points** function because it will fail due to some points being located outside the actual surface. The system will miss target points as they will be located outside the actual plane and cannot be reached.



Exporting 3D CAD Model Features in STEP File Format

IK 5000 supports exporting features to the STEP file format.

To export features to the STEP file format:

- Open a reporting template (e.g. Feature List template, Reports template, etc)
- Measure a feature or features to export

	E Features								
Featu	Features Program Report								
I	Tol	Name		Datum	▲				
•		Point 1			_				
0		Circle 2							
1		Line 3							
0 0		Slot 4							
Θ		Cylinder 5							
0		Sphere 6							
C		Arc 7							
↔		Distance 8							
		Cone 9							
		Plane 10							

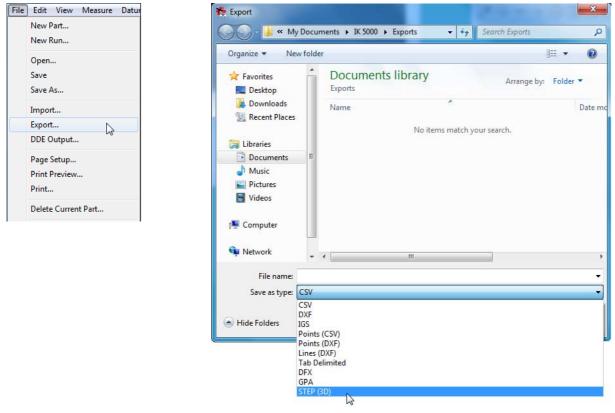
Open a reporting template

Select the features to be exported

Features 🛛									
Features Prog	Features Program Report								
I Tol	Name	Datum	▲						
•	Point 1								
0	Circle 2								
/	Line 3								
0 0 0	Slot 4								
Θ	Cylinder 5								
•	Sphere 6								
C	Arc 7								
\leftrightarrow	Distance 8								
4	Cone 9								
	Plane 10								

Select the features to be exported

- Click File>Export...
- Select STEP (3D) from the Save as type drop-down list



Click File>Export...

Select STEP (3D)

Enter a name in the File name field

Click Save

🛟 Export		×
🕢 🗸 📕 « My Docur	ments 🕨 IK 5000 🕨 Exports	✓ 4 Search Exports
Organize 👻 New folde	er	!≡ ▼ 🔞
★ Favorites ■ Desktop	Documents library Exports	Arrange by: Folder 🔻
Downloads	Name	A Date mo
and the contracts	No item	ns match your search.
Cibraries		
■ Documents ■ Music		
Pictures		
Videos		
🖳 Computer		
🗣 Network 👻	٠ III	4
File name: STEP_	Export	•
Save as type: STEP ((3D)	•
) Hide Folders		Save Cancel

Enter a File name and click Save

The features will be saved to file in STEP file format.

Open Database Connectivity (ODBC) Data Export

The IK 5000 can export data to applications, like Microsoft Excel, using Open Database Connectivity (ODBC).

To send data to a target application:

- Create a database in the target application (in the case of Excel, create a file)
- Configure the database as a data source using the operating system's ODBC Data Source administration

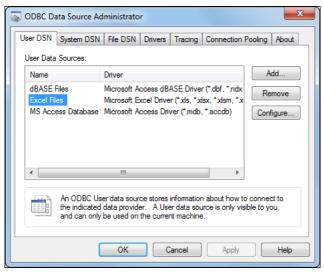


Refer to the PC's operating system instructions for how to configure an ODBC data source. An example is provided below.

Microsoft Windows 7 database configuration example

- Open the Windows Control Panel from the Start menu
- Select Administrative Tools
- Select the Data Sources shortcut

The ODBC Data Source Administrator window opens.



ODBC Data Source Administrator

Select the Excel Files Data Source

If the Excel Files Data Source does not exist, click the **Add** button and add it from the installed ODBC drivers.

Click Configure

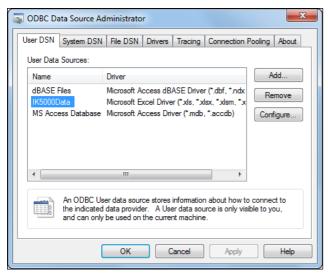
The ODBC Microsoft Excel Setup window opens.

ODBC Microsoft Exc	el Setup	? X						
Data Source Name:	IK5000Data	ОК						
Description:	Export data to Excel	Cancel						
Database	Database							
Version: Exc	el 12.0 🔹	Help						
Workbook: C:\\	K 5000\Export\ODBC_Export xlsx							
	Select Workbook							
Use Current Dir	ectory	Options>>						

ODBC Microsoft Excel Setup window

- Enter the Data Source Name and Description into the text fields
- Click the Select Workbook button and select the workbook to be used for the database
- Click OK to save the data source configuration

The Data Source is configured and the name is updated in the ODBC Data Source Administrator.



ODBC Data Source Administrator

- Close the ODBC Data Source Administrator window
- Close the Excel file if it is open

Select Tools>Options... from the IK 5000 menu bar

The Options window opens.

Select the General tab

Select the Prompt for ODBC Export checkbox

Tolerance Explode Data Cloud	•	Locks Measure Part View Point Filtration Programming	0
Explode Data Cloud		Runs SLEC Sounds Square Supervisor	Car
Focus		VED	
Filter			Inch
Adjust Contrast and Brightness		User settings	
Goto Worm		Save on exit	
Goto Worm Stop			
		COM #: 1 Communication Communi	
Goto	•	C Hard stop	
Joystick	•	Delimiter: 10 None	
Motors Off		Send on new feature Set now	
Release Probe		Include labels	
Deactivate Touch Probe		Start Datum Magic on a probe hit if there are no alignments	
Capture Image	Ctrl+F8	☑ Display the coefficients in the results window in a wide format	
capture image	carro	☐ Open the last Part when the IK 5000 opens	
Programming	•	Enable tracking of recent user activity	
Customize		Enable simple zeroing of the current DRO position	
Options		✓ Prompt for ODBC Export	
CNC		Startup Projection Plane Auto	
Language	•	Varn on change of magnification	

Select Tools>Options...

Select the General tab and the Pronpt for ODBC Export checkbox

1.1 Operation

To send data to a target Microsoft Excel file:

Select features or records from the available data templates

	tures	Concession of the local distance of the loca	2.455			
I To	1 Name	Datum	X	Y	Z	
/	Line 1		-15.5007	-19.6019	0.0000	
0	Circle 2		31.4306	10.8686	0.0000	

Select features or records

Select File>Export...

A prompt will request confirmation to export data to an ODBC data source.

Click Yes

File	Edit View M	leasure [Datum													
	New Part New Run															
	Open Save Save As			IK 5000											×	
	Import			0	Do	o you w	want to	o expo	ort to a	an ODE	BC data	a sourc	e?		Yes	
	Export DDE Output														No	
Solo	oct FilosFyr	ort		Click Ye	es											_

Select File>Export...

CIICK Yes

The Data Connection Information prompt appears.

- Enter the DSN (Data Source Name), User Name and Password for the data source
- ▶ Enter the Table Name that the data will be exported to
- Click OK

Database Conne	ection Information	X
DSN	IK5000Data	ОК
User Name		Cancel
Password		
Table Name	SheetA	

Enter the Database Connection Information and click OK



The target database file must be closed before performing an ODBC data export from the IK 5000.



If using DDE OUTPUT, the target database file has to be open before performing a DDE output from the IK 5000.

1.1 Operation



Setup

2.1 Setup

Updating the IK 5000 Software

The update should be performed according to the following procedure:

- Make a backup of the IK 5000 system settings
- Uninstall the installed IK 5000 software
- Install the new IK 5000 software version
- Restore the IK 5000 system settings

Backup System Settings

Make a backup of the IK 5000 system settings (via menu: Help>Backup Settings...)

Uninstall Old Software Version

Uninstall the installed IK 5000 software with the tools provided by the operating system (control panel)

Install New Software Version

Install the new software version 3.0.x

Restore System Settings

Restore the IK 5000 system settings (via menu: Help>Restore Settings...)

If an option that requires a license key is enabled the current license key remains valid. A new license key is not required.

Support Information

IK 5000 technical support may be obtained by contacting HEIDENHAIN or the Original Equipment Manufacturer (OEM).

To access support contact information:

Click Help>Support

A customer support information PDF file will open.



Files and Folders

IK 5000 files and folders locations are distributed throughout Windows operating system folder locations in accordance with the operating system's files and folders location guidelines.

The files and folders are distributed as follows:

- IK 5000 files are located in the HEIDENHAIN\IK 5000 folder which is in the **Program Files** OS folder
- IK 5000 application is located in HEIDENHAIN folder in the Start menu
- Configuration files are stored in IK 5000 folder in **Program Data** OS folder
- User settings files are saved to the IK 5000 folder in **Local User** OS folder
- User document files are saved to the IK 5000 folder in the **Documents** OS folder



Some file types that were supported in previous versions are no longer used. File type .met is no longer supported. Files of this type have been removed from the system.

Use Current Reference Frame

Program Properties	×
Fixturing General Palletize	ок
Run program this many times	Cancel
I Use current reference frame	
I ⊂ Empty feature list before running	
I Use probe teach values as recorded	
Do not report any errors during program running	
Prevent program from being modified by anyone but supervisor	
Close the part when done running	
Prompt user for part scaling	
On measurement failure goto label	
Randomly measure this percent of guide features	

Program Properties window

The **Use machine reference** option in the **Program Properties** dialog has been renamed to **Use current reference frame**. When an existing program is loaded into IK 5000 SW v3.0.0 or higher, the **Use current reference frame** option will take on the opposite state of the **Use machine reference** option.

The reference frame that is in place when a program is first recorded is now stored within the program. If **Use current reference frame** is unchecked, the program will use this stored reference frame as its initial reference frame when the program is executed.

If **Use current reference frame** is checked, the program will use the current part reference frame when the program is executed.

To change the current part reference frame:

▶ Select a different part reference frame from the status bar

The default state of **Use current reference frame** is unchecked. If a part reference frame has been created before the program is first recorded **Use current reference frame** will be automatically checked.

Programs written prior to SW v2.96.0 do not include the reference frame that was in place when the program was first recorded. If **Use current reference frame** is unchecked the program will use the machine reference frame as the initial reference frame when the program is executed.

If **Use machine reference** was previously used the same behavior can be obtained with **Use current reference frame**.

To obtain the same behavior:

- Select the machine reference frame prior to recording the program
- Uncheck Use current reference frame in the Program Properties dialog prior to executing the program

or

- Check Use current reference frame
- ▶ Select the machine reference frame prior to executing the program

Camera Parameters

The IK 5000 supports the configuration of camera and image quality parameters through DirectShow interfaces. The configurable parameters are limited to those provided by the camera driver support for DirectShow. The IK 5000 cannot modify a parameter that the camera driver does not allow to be modified.

Example configurable parameters are gamma, brightness, contrast and color saturation. Brightness and contrast settings are saved when the IK 5000 is shut down and restored on the next start up.

To access digital camera parameters:

- ▶ Right-click in the **Video** window
- Select Video Properties

A video properties window will open displaying the available camera parameters that can be edited.

Color Settings Image Parameters	Device	Mis hage Processin	- , I	Input/Outp Trigger/Flas
Gamma				1.00
	1.0		2.2	
Brightness (Blacklevel Comp.)	0			0 ÷
Contrast (Gain)	 0		100	10 ÷ Auto
Auto parameter				
Scene selection			~	
Anti flicker mode	Í		-	
Photometry	í		-	
Auto backlight o	, ompensation	7	_	
Auto contrast correction	J		0,00	* *
mage parameter —				
Sharpness	0		100	0 ×
Saturation	 0		100	
		Defa	ault	

Example video properties window

Dry Fire Probe
New VED Probe VED Probes
Focus Teach Ved Edge Filter Goto Worm Goto Worm Stop
Capture Image Clipboard Image
Auto Finish Show Features
Cal X Cal Y Other ►
Video Properties
Video Zoom 🔹 🕨 🕨

Right click in the Video window and select Video Properties

Specify Video Probe Parameters

Use the **VED** screen in video edge detection systems to specify video probe measurements parameters.

To display the VED screen:

Click Tools>Options...>VED

Digital video probe and measurement parameters will be displayed for your system.

New options:

Camera: Select the camera to use for VED (previously unnamed)

Image format: Select the image color format

Options	×
Buttons Display Encoders Files General Locks Measure NLEC Part View Point Filtration Probes Programming Runs SLEC Sounds Square Supervisor VED Image: Supervisor Image: Supervisor	OK Cancel Inch/MM
Realign probes in High Accuracy mode Always do an Advanced Teach Scale video charts to magnification Number of Pattern Tool search rings 0 Search ring overlap (pixels) 10 X pixel size at 1x magnification 0.03937 Allow crosshair probe to rotate Allow video charts to rotate Allow video charts to be moved with the mouse Make video charts move with the part Image Type C NTSC Y/C C PAL Y/C C Hi Res Color © NTSC C PAL Camera Image Format RGB24	
Animate VED tools every (milliseconds) 200 Max distance from edges of Field Of View that Worm Tool will scan (pixels) 15 Prompt for the pattern file name during a Pattern Tool teach Enable FOV Spherical Correction Enable FOV NLEC Second monitor resolution is 800 x 600 Include tools and points in archived images Auto enter timeout (secs) 2 Auto enter distance 0.00020 Saturation Threshold (0 is off) 255 Minimum Pattern Score (0 to 99) 80 Spotter Image Format RGB24	

VED screen example

Spotter Camera Options

The digital camera selected as the spotter camera and the format for the spotter camera can be set from the $\ensuremath{\textit{VED}}$ setup tab.

Options	X
Buttons Display Encoders Files General Locks Measure NLEC Part View Point Filtration Probes Programming Runs SLEC Sounds Square Supervisor VED Image: Supervisor Image: Supervisor	OK
Image Type Supervisor VLD Image Type C PAL Y/C C PAL Image Type Image Type Image Type	Inch/MM
Image Format RGB24 Animate VED tools every (milliseconds) 200 Max distance from edges of Field Of View that Worm Tool will scan (pixels) 15	
□ Prompt for the pattern file name during a Pattern Tool teach	
Enable FOV Spherical Correction Enable FOV NLEC Second monitor resolution is 800 x 600 Include tools and points in archived images	
Auto enter timeout (secs) 2	
Auto enter distance 0.00020 Saturation Threshold (0 is off) 255 Minimum Pattern Score (0 to 99) 80 Spotter Image Format RGB24	
User settable	

Spotter camera options

2.1 Setup

Supported image formats:

- UYVY
- RGB24
- RGB32
- To access Spotter camera options:
- Select Tools>Options...
- Select the VED tab
- Select a digital camera from the **Spotter** drop down menu
- Select an image format from the Image Format drop down menu
- ► Click **OK**

Scale Factor for Open Loop Joystick Control (Optional)

A CNC system can be operated in either **Closed Loop** or **Open Loop** joystick control mode. This can cause a system to move with different velocities when a user switches from one mode to the other. To make the velocity comparable, a user can apply a scaling factor to the joystick parameters when in open loop control mode. The Scale factor ranges from 0.01 to 1.00. This is a unit-less value. The default value is 0.5.

Verify the system is set to Open Loop joystick control mode:

- Click Tools>CNC...
- Enter the Password
- Click the General tab
- Select the Set joystick control to Open Loop mode checkbox if not already selected

NC							
	Motion Mouse	SAC	Korad	Software Fence	Supervisor	ОК	
	X Axis	Y Axis	Z Axis	Shutdown			
	Auto Home	Auto Requal	Digital Positioner	General	Joystick	Cancel	
Set joystick control to Open Loop mode							
Use external amplifier for Open Loop control Inch/MM							
Disable following errors during startup							

Set joystick control to Open Loop mode

Click OK

2.1 Setup

Set Scale factor:

- ► Click **TOOLS>CNC...**
- Enter the Password
- Click the Joystick tab
- Enter the desired scaling factor into the Scale factor field

CNC					
Motion Mo Z Axis Auto Home Configuration Enable Dead band % View calibra	Au	Software Fo ito Requal	1	Supervisor X Axis Y Axis OK Positioner General Joystick Current values X 0000000 Y 0000000 Z 0000000	
Preferences Reverse Apply Jerk Normal Fine Expo % Scale factor	□ X □ X 100 30 1 0.5	□ Y □ Y [100 [30 [1	☐ Z ☐ Z]100]30]1	Teach	

Enter the desired scaling factor

- Click Apply
- Click OK

Shutdown

The Shutdown function applies to CNC enabled systems only. During system shutdown the probe returns to a position defined in machine coordinates regardless of probe type. The position may be specified using X, Y and Z coordinates or by choosing the current probe location.

Auto Home) tuto Do ovol		and Connect) In antinh	1
	Auto Requal	Digital Position		Joystick	, ОК
Motion Mouse	SAC	Korad	Software Fence	Supervisor	
X Axis	Y Axis	Z Axis	Shutdown		Cancel
✓ Enabled					Apply Inch/MIV
X 0.00000 Y 0.00000	Use Current Positi	on			
Z 0.00000					

Shutdown settings window

To specify the probe position at shutdown:

- ▶ Select Tools>CNC...
- Enter the Supervisor password into the Password field
- Select the Shutdown tab
- Select the **Enabled** checkbox
- Enter the X, Y and Z coordinates or click **Use Current Location**
- Click OK

Debounce Parameters

Y and Z axis debounce count values for the digital positioner use their own axis value. Previously they used the X axis value.

CNC Motion Mouse SAC Software Fence Korad Supervisor OK X Axis Y Axis Z Axis Shutdown Cancel Digital Positioner Auto Home Auto Regual General Joystick Current values Configuration Apply X 0 Enable $\square X \lor Y \lor Z$ Inch/MM Y 0 -Share With Z 0 Preferences Reverse ΓY ΓZ Normal 100 100 100 30 30 30 Fine Accel % 10 10 10 Debounce (cnts) 10 10 10

Digital Positioner settings window

To specify debounce count values:

- Select Tools>CNC...
- Enter the Supervisor password into the Password field
- Select the Digital Positioner tab
- Enter values into the **Debounce** (cnts) fields
- Click OK

Software Fences

A software fence is used to limit axial movement in a CNC system.

The IK 5000 has three software fence options:

- Machine Fence
- User Fence 1
- User Fence 2

A machine fence is a software fence established to prevent collisions at the end of an axis.

A user fence is a software fence established to limit axial travel, usually in relationship to part geometry.



If a user fence and a machine fence are active at the same time the more restrictive fence defines the limits on an axis

A software fence may be established in two ways:

- Manually
- Using the Teach function

Manually Creating a Software Fence

To manually create a software fence:

- ▶ Select Tools>CNC...
- Select the Supervisor tab
- Enter the Supervisor Password
- Press the Enter key on the keyboard

Tools Windows Help	CNC
Tolerance Explode Data Cloud	Z Axis Shutdown OK Auto Home Auto Regual Digital Positioner General Joystick
Focus Filter Adjust Contrast and Brightness Goto Worm Goto Worm Stop Goto Joystick Motors Off Release Probe Deactivate Touch Probe Capture Image Ctrl+F8 Programming Programming Customize Options CNC Language	Auto Hequai Digital Positioner General Joystick Motion Mouse Software Fence Supervisor X Axis Y Axis Password
Soloot Teolar CNC	Colorithe Summinger tables of the Supervisor Description and proce Finter on the Keylog

Select Tools>CNC...

Select the ${\it Supervisor}$ tab, enter the Supervisor ${\it Password}$ and press ${\it Enter}$ on the keyboard

- Select the Software Fence tab
- Enter maximum coordinates in the Max field for each desired axis
- ▶ Enter minimum coordinates in the **Mn** field for each desired axis
- Select the Enable checkbox next to an axis to enable the software fence for that axis. If the Enable checkbox for an axis is not checked, the software fence is not applied to that axis.

		Auto Requal	Digital Positioner		Joys	
Motion N	Nouse Sot	ftware Fence	Supervisor	X Axis	Y Axis	s Cance
Machine	Fence					Apply
Enable	X	∀	▼ Z			Inch/W
Max	100.0000	120.0000	50.0000			
Min	-50.0000	-30.0000	-10.0000			
User Fer	nce 1					
Enable	▼ X	γ	I▼ Z			
Max	75.0000	110.0000	60.0000			
Min	-45.0000	-15.0000	-10.0000			
User Fer	nce 2					
Enable	X	γ	I▼ Z			
Max	50.0000	130.0000	40.0000			
Min	10.0000	20.0000	-25.0000			
Teach						

Select the Software Fence tab, enter coordinates and enable axes

Click Apply to apply the changes

or

Click **OK** to apply the changes and exit the **CNC** window

Using the Teach Function to Create a Software Fence

To create a software fence using the Teach function:

- ▶ Select Tools>CNC...
- Select the Supervisor tab
- Enter the Supervisor Password
- Press the Enter key on the keyboard

Tools Windows Help	CNC	
Tolerance	Z Axis Shutdown Auto Home Auto Requal Digital Positioner General Joystick	ОК
Focus	Motion Mouse Software Fence Supervisor X Axis Y Axis	Cancel
Filter	~ Password	Apply
Adjust Contrast and Brightness	*****	
Goto Worm	E Kan atilana wil anara is with	Inch/MM
Goto Worm Stop	✓ Keep privileges until program is exited	
Goto +	Change Password	
Joystick +		
Motors Off		
Release Probe		
Deactivate Touch Probe		
Capture Image Ctrl+F8		
Programming •		
Customize		
Options		
CNC		
Language >		
		·

Select Tools>CNC...

Select the **Supervisor** tab, enter the Supervisor **Password** and press **Enter** on the keyboard

Select the Software Fence tab

Click the Teach button

	Axis Home /	Shutdown	Digital Positioner	General) Joystick	ОК
Auto Motion N		Auto Requal ware Fence		X Axis	Y Axis	Cancel
Machine						Apply
Enable	□ X	ΓY	□ Z			Inch/MN
Max	0.0000	0.0000	0.0000			
Min	0.0000	0.0000	0.0000			
User Fe	nce 1					
Enable	□ X	ΓY	ΓZ			
Max	0.0000	0.0000	0.0000			
Min	0.0000	0.0000	0.0000			
User Fe	nce 2					
Enable	□ X	ΓY	□ Z			
Max	0.0000	0.0000	0.0000			
Min	0.0000	0.0000	0.0000			
Teach						

Select the Software Fence tab and click the Teach button

2.1 Setup

The Software Fence Teach dialog window opens.

- Click a radio button to select the desired software fence to teach
- Click Next
- Check the box next to the axis or axes to teach
- Any single axis or combination of axes may be selected.
 - Click Next

Software Fence Teach	
Select which fence to teach:	Software Fence Teach
 Machine Fence User Fence 1 	Select which axes to teach:
C User Fence 2	Z V Y V X V
Cancel < Back Next > Finish	Cancel < Back Next Finish

Click a radio button to select the desired Check the box next to the axis or axes software fence to teach and click **Next**

to teach and click Next

- ▶ Move each axis to the desired limit of travel for the selected axes. In general, position the axes at the point that is to mark the beginning of positive travel.
- Click Next
- Move each axis in the safe direction
- Click Next

Machine Fence Teach							
Move the machine to the desired limit of travel for the selected axes							
Cancel	< Back N	ext > Fi	nish				
		he					

Move each axis to the desired limit of travel and click **Next**

Machine Fence Teach	
Move the machine	in the safe direction for the selected axes and then press next.
Cancel	< Back Next > Finish

Move each axis in the safe direction and click Next

Move each axis to the desired limit of travel in the opposite direction. This should be the furthest distance away for each axis to travel from the point taught in the previous two steps.

Click Finish

The system fills in the minimum and maximum values.

Move the machine to the other desired limit of travel for the selected Cancel < Back Next >	Machine Fence Teach			X
Cancel < Back Next > Finish	Move the machine	to the other desire	ed limit of travel for t	the selected
	Cancel	< Back	Next >	Finish

Machin	e Fence		
Enable	X V	V V	₹ Z
Max	94.8210	110.9105	80.1505
Min	-10.0050	-5.0015	-15.0010

Move each axis to the desired limit of travel in the opposite direction and click **Finish**

The system fills in the minimum and maximum values.

Select the Enable checkbox next to an axis to enable the software fence for that axis. If the Enable checkbox for an axis is not checked, the software fence is not applied to that axis.

	ZAxis	Shutdown Auto Requal	Digital Positio	ner]	General	Joystick		OK
Motion I		ftware Fence	Supervisor		X Axis	Y Axis	пH	Cancel
Machine	e Fence							Apply
Enable	▼ X	γ	∠					Inch/MM
Max	94.8210	110.9105	80.1505					Inch/iviivi
Min	-10.0050	-5.0015	-15.0010					
User Fe	nce 1							
Enable	□х	ΓY	ΓZ					
Max	0.0000	0.0000	0.0000					
Min	0.0000	0.0000	0.0000					
User Fe	nce 2							
Enable	Σ	ΓY	Σ					
Max	0.0000	0.0000	0.0000					
Min	0.0000	0.0000	0.0000					
Teach								

Enable axes

Click **OK** to apply the changes and exit the **CNC** window



If a user fence and the machine fence are active at the same time the more restrictive fence defines the limits on an axis

Joystick Button Assignment

Joystick buttons can be assigned to toggle the user fence state or to activate a user fence.

Option	Description
Toggle User Fence	Toggles the user fence state between Fence Off, User Fence 1 and User Fence 2 when the assigned button is pressed.
Activate User Fence 1	Activates User Fence 1 settings when the assigned button is pressed.
Activate User Fence 2	Activates User Fence 2 settings when the assigned button is pressed.

To assign a user fence option to a button:

Click Tools>Options...

[]

- Select the **Supervisor** tab
- Enter the supervisor Password

ools Windows Help	Options	
Tolerance	• VED]]]	
Filter	Buttons Display Encoders Files General	
Adjust Contrast and Brightness	Locks Measure 3D Error Comp Part View Point Filtration) Ca
Goto Worm	Probes Programming Runs Sounds Supervisor	
Goto Worm Stop	Password	Inc
Goto		
Joystick		
Motors Off	Keep privileges until program is exited	
Capture Image Ctrl+	Change Password	
Programming	•	
Customize		
Options		
CNC		
Language	>	

Click Tools>Options...

Select the Supervisor tab and enter the supervisor Password

Select the Buttons tab

Locks	Measure	3D Error Co	omp F	^p art View	Point Filtration	OK
Probes	Programming	g Runs) S	ounds	Supervisor	
VED]			l		Cance
Buttons	Display	Encoders	File	s	General	Inch/M
External button as	signments					——
Button 1	No Assigni	ment	•	level ba	ased	
Button 2	No Assigni	ment	•	level ba	ased	
Button 3	No Assigni	ment	-	level ba	ased	
Narrow footswitch	button No Assigni	ment	-	level ba	ased	

Select the Buttons tab

Select Toggle User Fence, Activate User Fence 1 or Activate User Fence 2 from the drop-down list of the desired

		С		

Locks	Measure 3D Er	ror Comp 📄	Part View	Point Filtration	OK
Probes P	rogramming 📔 Ru	ns	Sounds	Supervisor	
VED]	Cancel
Buttons Di	splay Encode	rs F	les	General	Inch/MI
External button assignme	nts				
Button 1	Toggle User Fence	-	🗌 🗆 level base	ed	
Button 2	Pause Prg Run Prg	*	level base	ed	
Button 3	Edge / Crosshair Damp TP200		🗆 level base	ed	
Narrow footswitch button	Toggle User Fence Activate User Fence 1	E E	Ievel base	ed	
Wide footswitch button	Activate User Fence 2	-	🗌 🗌 level base	ed	

Select Toggle User Fence

Click **OK** to apply the changes and exit the **Options** window

User Fence Status Display

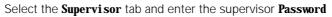
The user fence state can be displayed and toggled in the status bar.

To show or hide the user fence status bar item:

- Click Tools>Customize...
- Select the **Supervisor** tab
- Enter the supervisor Password

Тоо	·		Customize	×
	Tolerance	•		
	Explode Data Cloud		Toolbars	ОК
	Focus			Cancel
	Filter		Password	
	Adjust Contrast and Brightness			Apply
	Goto Worm		✓ Keep privileges until program is exited	
	Goto Worm Stop			
	Goto	•	Change Password	
	Joystick	•		
	Motors Off			
	Release Probe			
	Deactivate Touch Probe			
	Capture Image	Ctrl+F8		
	Programming	•		
	Customize			
	Options			
	CNC			
	Language	•		

Click Tools>Customize...



- Select the **Statusbar** tab
- Scroll to the User fence option and select it
- Click Show to display the User fence status or Hi de to remove the User fence status item from the status bar

Customize	-		X
Toolbars Colors Errors		 Statusbar St	upervisor
□ Layer □ Probe Family □ Camera □ Probe Info □ Projection Plane □ Reference Frame □ DMS/DD □ SLEC ⊠ Auto Enter ⊠ Program □ Tool Status □ FOV Size □ True Magnification □ Pixel Size □ Fine Position State □ Joystick State □ Temperature Comp. □ User fence	Shqv Hide		Apply
I User settable			

Select the Statusbar tab, select User fence and click Show or Hide

Click Apply to apply the changes

or

▶ Click **OK** to apply the changes and exit the **CNC** window

The status bar will be updated.

Toggling the User Fence State

The user fence can be toggled between **Fence Off**, **User Fence 1** and **User Fence 2** when displayed in the status bar.

To toggle the user fence state:

Click the user fence state in the status bar

The state will toggle to the next user fence option.

User fence

Cartesian MM Auto Enter Off No Program Fence Off
--

Click the user fence state in the status bar to toggle the status.

Touch Probe Requalification and Starting Point

Touch probe auto requalification can be set to **Use circular moves** and to begin the requalification measurements at the top of the sphere and not along the diameter.



Deselecting this option allows the automatic requalification to be executed by linear movements, minimizing stage vibrations for systems with large measuring stages.

CNC					
Motion Mouse	SAC	Korad	Software Fence	Supervisor	ОК
X Axis	Y Axis	Z Axis	Shutdown]	
Auto Home Au	uto Requal 📄	Digital Positioner	General	Joystick	Cancel
Maximum qualification					Apply
Maximum points per sl					Inch/MM
Amount of qualification s X offset 0.00000 Y offset 0.00000 Z offset 0.00000 Ø Begin measurement a Ø Use circular moves			0.19685		

Auto Requal settings window

To select 'Auto Requal' parameters:

- ▶ Select Tools>CNC...
- Enter the Supervisor password into the Password field
- Select the Auto Requal tab
- Select the Begin measurement at top of sphere and Use circular moves checkboxes
- Click OK

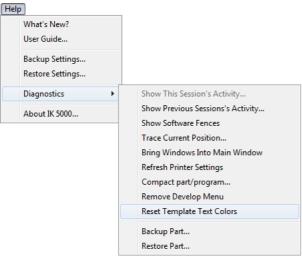
Reset Template Text Colors

It is possible to set the text color of a template to the same color as the background. When this happens the text is not readable.

The **Reset Template Text Colors** option makes it simple to revert the text colors for all open templates back to the default color. The default text color for all templates is black.

To reset template text colors:

Select Help>Diagnostics>Reset Template Text Colors. A prompt appears requesting verification to reset the text colors.



Select Help>Diagnostics>Reset Template Text Colors

Click Yes



Click Yes

Default Fixtures Files Location

A default location for Fixtures files can be selected. The IK 5000 uses this location to save and load reference frames.

The default location is the Fixtures subfolder of the IK 5000 folder located in the user's system documents folder.

To change the Fixtures file location:

- Select Tools>Options...
- Select the Files tab
- Browse or enter a new **Fixtures** file location

Lock		LEC Part Vie		OK
Probes			Sounds	Cance
Square Buttons	Supervisor VED	I	General	Ounce
Duttons	Display Encoder	s riles	General	Inch/M
Default file loo	ations			
Backups	Backups	Browse		
Coefficients	Coefficients	Browse		
Exports	Exports	Browse		
Imports	Imports	Browse		
Overlays	Overlays	Browse		
Parts	Parts	Browse		
Templates	Templates	Browse		
Workspaces	Workspaces	Browse		
Patterns	Patterns	Browse		

Browse or enter a new Fixtures file location

Disabling measurements when homing is not completed

Measurements can be disabled when machine zero homing is not completed.

To disable measurements when homing is not complete:

Click Tools>Options...

Γool	ls Windows Help	
	Tolerance	+
	Explode Data Cloud	
	Filter	
	Adjust Contrast and Brightness	
	Goto Worm	
	Goto Worm Stop	
	Goto	+
	Joystick	+
	Motors Off	
	Release Probe	
	Deactivate Touch Probe	
	Optimet Settings	
	Capture Image	Ctrl+F8
	Programming	×
	Customize	
	Options	
	CNC	

Click Tools>Options...

Select the General tab

Check Disable measurements if homing is not completed

Locks	Measure	NLEC	Part View	Point Filtration	OK
Probes	Programming	Runs	SLEC	Sounds	
Square	Supervisor	VED] _]]	Cance
Buttons	Display	Encoders	Files	General	Inch/M
User settings					
Save now					
Save on exit					
<u> </u>					
Serial output	Machine C Pofe	e zero rence marks			
COM #: 1	C Hard				
Delimiter: 10	Non				
Send on new featu		-			
✓ Include labels	ure Set r	10W			
Include labels					
Start Datum Magic	on a probe hit if there	are no alignment	s		
Display the coefficie	ents in the results win	dow in a wide for	mat		
Open the last Part v	when the IK 5000 ope	ns			
Enable tracking of re	ecent user activity				
Enable simple zeroi	ng of the current DRC) position			
Prompt for ODBC E	xport				
		-			
Startup Projection Plan	e Auto	-			
Warn on change of it	magnification				
	sion in Reports				

Click Tools>Options...and check Disable measurements if homing is not completed

Click **OK** to save changes and exit the Options window

External Amplifier Open Loop Control (Optional)

IK 5000 Open Loop joystick control provides the ability to toggle between two joystick speeds when Speed Toggle is assigned to a joystick button. External amplifier Open Loop joystick control provides the ability to toggle between three speeds. The ability to toggle between three speeds provides increased control over the velocity of movements.

When **Set joystick to Open Loop node** and **Use external amplifier for Open Loop control** are enabled, Open Loop functionality is controlled by the HEIDENHAIN amplifier connected to the IK 5000 system. **Use external amplifier for Open Loop control** is disabled by default.

чс							
Joystick	Motion Mouse	Probe Rack Settings	Software Fence	OK			
Supervisor	X Axis	Y Axis	Z Axis				
Shutdown				Cancel			
Auto Home	Auto Requal	Digital Positioner	General	Apply			
Set joystick control	Set joystick control to Open Loop mode						
✓ Use external amplif	ier for Open Loop control						
Disable following errors during startup							
🔲 Inhibit amplifier whe	en stopped						

CNC window General settings tab

To enable external amplifier Open Loop control:

- ► Select Tools>CNC...
- Select the General tab
- Select the Set joystick to Open Loop mode and Use external amplifier for Open Loop control checkboxes
- Click OK

Warning on CNC movement

A pop-up warning can be enabled that warns you when the system is about to make a CNC movement.

To enable the CNC movement warning:

Click Tools>CNC...

Tools Windows Help	
Tolerance	+
Explode Data Cloud	
Filter	
Adjust Contrast and Brightness	
Goto Worm	
Goto Worm Stop	
Goto	×
Joystick	×
Motors Off	
Release Probe	
Deactivate Touch Probe	
Optimet Settings	
Capture Image	Ctrl+F8
Programming	۱.
Customize	
Options	
CNC	

Click Tools>CNC...

Select the **General** tab

Check Warn user on CNC movement

Joystick	Motion Mouse	Probe Rack Setting	s Software Fence	: Oł			
Supervisor	X Axis	Y Axis	Z Axis				
Shutdown	Ì]]		Can			
Auto Home	Auto Requal	Digital Positioner	General	Арр			
Set joystick control to	Open Loop mode			Inch/I			
Use external amplifier	for Open Loop control						
□ Disable following errors during startup							
□ Inhibit amplifier when stopped							
Amplifier inhibit level is high							
Zero stepper motor ou	tput in continuation zone						
☑ Inhibit moves during startup							
Allow open loop after application exit							

Check Warn user on CNC movement

2.1 Setup

A pop-up warning will now appear when the CNC is going to make a movement.



CNC movement pop-up warning

The warning can be restricted to the first CNC movement in a program.

To restrict the warning to the first movement:

Check In programs only

Joystick	Motion Mouse	Probe Rack Settings	Software Fence	OK		
Supervisor	X Axis	Y Axis	Z Axis			
Shutdown]		Cancel		
Auto Home	Auto Requal	Digital Positioner	General	Apply		
Set joystick control to Open Loop mode Use external amplifier for Open Loop control						
Disable following errors during startup						
Inhibit amplifier when stopped						
I Amplifier inhibit level is high						
Zero stepper motor out	put in continuation zone					
Inhibit moves during st	artup					
C Allow open loop after application exit						
Warn user on CNC mo	vement					
In programs only						

Check In programs only

The warning will now only appear on the first movement of a program.



Pop-up warning on first CNC movement

Click **OK** button to save the changes and exit the Options window

Joystick Button Assignment

2.1 Setup

Speed Toggle must be assigned to a joystick button in order use joystick speed control. The HEIDENHAIN QUADRA-STEP setup software is used to assign joystick button functions in the HEIDENHAIN amplifier. QUADRA-STEP setup software and the QUADRA-STEP setup guide can be downloaded from *www.heidenhain.de.*

The IK 5000 and external amplifier both sense joystick button presses. When Speed Toggle is assigned to a joystick button in the external amplifier, the same button must be set to **No Assignment** in the IK 5000 Options settings.

Opti	ons								X
	Locks	1	Measure	NLEC) 1	Part View	Point Filtrat	ion	ок
	Probes	Pr	ogramming	Runs	1	SLEC	Sounds		
	Square	Su	pervisor	VED	1				Cancel
	Buttons	Di	splay	Encoders	File	es 🗎	General		Inch/MM
,	External button ass	ignmei	nts						
	Button 1		No Assignm	nent	7	Ievel	based		
	Button 2		No Assignm	nent	-	Ievel	based		
	Button 3		No Assignm	ient	•	Ievel	based		
	Narrow footswitch b	utton	No Assignm	ient	-	Ievel	based		

Options window Buttons tab

To set a IK 5000 joystick button assignment:

- Click Tools>Options
- Select the Buttons tab
- Click the drop-down arrow for the joystick button Speed Toggle was assigned to in the external amplifier
- Select No Assignment
- Click OK

RS-232 COM port allocations

The IK 5000 uses RS-232 for data transfer and to communicate with custom devices. Serial communication ports (COM ports) are configured to enable this communication.

Several COM ports can be available in a computer system and can be used for data transfer and communication. The ports are typically numbered COM 1, COM 2, etc...

The IK 5000 can use any COM port to communicate with an attached serial device and the port to use with each device can be configured.

In some cases it is necessary to assign a specific serial port to be used for a certain device. In these cases the COM port is set to a specific number and cannot be changed.

The COM port can be changed for the following functions and devices:

- Sending feature data
- Sending general RS-232 strings

Sending Feature Data

To configure the COM port for sending feature data:

- Select Tools>Options...
- ▶ Select the General tab
- ▶ Enter the desired COM port in the COM# field

COM 1 is the default setting.

Tools Windows Help Develop	Options	
Tolerance	Locks Measure NLEC Part View	Point Filtration
Filter Adjust Contrast and Brightness	Probes Programming Runs SLEC Square Supervisor VED Buttons Display Encoders Files	Sounds
Goto Worm Goto Worm Stop	User settings	
Goto Joystick	Save on exit	
Motors Off Release Probe	COM #: 1 Communication Communi	
Deactivate Touch Probe Capture Image Ctrl+F8	Delimiter: 10 C None	
Programming	□ Send on new feature Set now	
Options	 Start Datum Magic on a probe hit if there are no alignments Display the coefficients in the results window in a wide format 	
Select Tools>Options	□ Open the last Part when the IK 5000 opens Enter the COM #	

Click OK

Other serial port parameters are set to 9600 baud, 8 data bits, 1 stop bits and 0 parity.

2.1 Setup

Sending General RS-232 Strings

To configure the settings for sending general RS-232 strings:

- Select Tools>Options...
- Select the **Supervisor** tab
- Enter "RS232" in the Password field

To	ols Windows Help Develop		Options				
	Tolerance Explode Data Cloud	•	Buttons) Display	Encoders	Files	General
	Filter Adjust Contrast and Brightness		Locks Probes Square	Measure Programming Supervisor	NLEC Runs VED	Part View SLEC	Point Filtration Sounds
	Goto Worm Goto Worm Stop		Password				
 Image: A start of the start of	Goto Joystick Motors Off Release Probe Deactivate Touch Probe	•	Change Passwor	s until program is exited			
	Capture Image Programming	Ctrl+F8 ▶					
	Customize Options CNC						

Select Tools>Options...

Select the **Supervisor** tab and enter "RS232" in the Password field

The RS232 Setup window appears.

▶ Enter the desired COM port in the **Port number** field

COM 1 is the default setting.

ſ	RS232 Setup			×
	COM Settings]	ОК
	Port number (1 - 4)			Cancel
	<u>B</u> aud (9600, 38400, etc)	38400		Calicer
	<u>D</u> ata bits (7, 8)	8		
	<u>S</u> top bits (0 - 2)	1		
	P <u>a</u> rity (0 - 2)	1		
	Format of received strings			1
	ASCII codes <u>b</u> efore string			
	ASCII codes <u>a</u> fter string			
l				

Enter the COM port in the Port number field

Click OK

RS-232 Connections

The IK 5000 can communicate with certain RS-232 capable devices. Sending and receiving data between the IK 5000 and an RS-232 compatible device requires the baud, data bits, stop bits, and parity communications parameters match on both the IK 5000 and the device. The IK 5000 COM port must be set to the port where the device is connected.

The RS-232 cable type used to connect the IK 5000 to the device may vary depending on the device's serial port design. Some devices use a straight-through cable (no cross-overs) while others require a cable with cross-overs. Connecting computer-as-a-device requires a cable with cross-overs. The Serial Port setting on the computer set as the sending/receiving device must be set to match the settings on the IK 5000 serial port in the Windows OS Control Panel.

Printer Selection

The IK 5000 uses the Windows operating system default printer. If the Windows default printer is changed after the IK 5000 has been run, the IK 5000 printer settings need to be updated.

To update the printer settings:

Click File>Page Setup...

The Page Setup window opens.

Make any desired changes in the Page Setup window

Click OK

The changes are updated and the Page Setup window closes

	Page Setup
File Edit View Measure Datur	Proved Standard Net Proved Standard Net Proved Standard Standard Net Proved Standard Standard Net Proved Stand
New Part	Can despendent Canada and a second and a sec
New Run	2 Comparison of Association Registry & Names and Association 1 Comparison Registry Registry & Association of Association of Association Registry Registry & Association of Association of Association of Association Registry Registry & Association of Association of Association of Association Registry Registry & Association of Association of Association of Association Registry Registry & Association of Association of Association of Association Registry Registry & Association of Association of Association of Association Registry Registry & Association of Association of Association of Association Registry Registry & Association of Association of Association of Association Registry Registry & Association of Association of Association of Association Registry Registry & Association of Association of Association of Association Registry Registry & Association of Association of Association of Association Registry Registry & Association of Association of Association of Association of Association Registry Registry & Association of Associat
Open	1 A source of the second secon
Save	Paper
Save As	
Import	Size:
Export	Source: Automatically Select
DDE Output	Orientation — Margins (millimeters)
Page Setup	
Print Preview	Portrait Left: 4.23 Right: 4.23
Print	C Landscape Top: 4.23 Bottom: 4.23
Delete Current Part	OK Cancel
Exit	
Click File>Page Setup	Make any desired changes in the Page Setur

Make any desired changes in the Page Setup window

Displaying the Software Version on Reports

The IK 5000 software version can be displayed in a report header.

To display the software version:

Click Tools>Options...

Tools Windows	Help	
Tolerance		+
Explode Data	Cloud	
Focus		
Customize		
Options	and the second s	
CNC	13	
Language		×

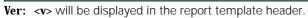
Click Tools>Options...

- ▶ Select the General tab
- Check Show Software Version in Reports

Select the General tab and check Show Software Version in Reports

Ver: v> will be displayed when the report template header is opened.

Report report header							
	ΙK	5000	F€	eature	Print	out	
Date: <d> Job: <?1></d>				<v> <n></n></v>		e: <t> ator:</t>	<u></u>
# 🛆 I T Fea	ture	Position/	Dim.	Size	Orientation	Form/Dim.	Special
							-
•							•



Displaying System Units On Reports

Report headers can display the current system linear units. This option can be activated by enabling **Show report header** for new report templates. For existing templates, the option must be activated manually.

To enable **Show report header** manually in a report template:

Click Windows>Open Template...

Select a report template from the list and click the **Open** button

ly Documents ► IK 5000 ► Templates	✓ 4 Search Templates
	≣≕ ▼ 🗔 🔞
Documents library	Arrange by: Folder 💌
Templates	, , , , , , , , , , , , , , , , , , ,
Name	Date modified Type
AllTol.5ft	2/13/2017 11:29 AM 5FT File
Eurotol.5ft	2/10/2017 4:19 PM 5FT File
PointDetails.5ft	2/10/2017 4:19 PM 5FT File
CartLim.5ft	2/10/2017 4:19 PM 5FT File
CartPIMi.5ft	2/10/2017 4:19 PM 5FT File
TruePos.5ft	2/10/2017 4:19 PM 5FT File
Report.5ft	2/10/2017 4:19 PM 5FT File
Runs.5ft	2/10/2017 4:19 PM 5FT File
Features.5ft	2/10/2017 4:19 PM 5FT File
Program.5ft	2/10/2017 4:19 PM 5FT File
	•
	✓ Feature Templates ✓
	Open Cancel
	Templates Name AllTol.5ft Eurotol.5ft CartLim.5ft CartLim.5ft CartPIMi.5ft Report.5ft Report.5ft Resources.5ft Program.5ft Program.5ft

Click **Windows>Open** Template...

Select a report template from the list and click the **Open** button

- 2.1 Setup
- ▶ Right-click on the report template and select **Template Properties**
- Select Show report header in the Sections group and click OK

Feature Properties			
Cut Copy Delete Selection		Template Properties Display Filters Misc	
Select All Change Feature Tolerance	+	Display Grid I → Horizontal lines □ Snap to grid I → Vertical lines Grid size	OK Cancel
Print Selection		Sections Set Text Color Font Name Courier New	
Template Properties New Template Open Template Save Templates Save Template As	6	□ Show report footer □ Show page header □ Show page footer Show page footer Set Line Color C MS Serif C Arial C Times New Roman	
Charts	×		

Right-click on the report template and select **Template Properties**



The report template now shows the header with **Unit:** <**unit**> displayed.

Features Program	Report						
report header	IK	5000	Feature	e Prin	tout		
Date: <d> Job: <?1> Unit: <uni< td=""><td>.t></td><td>Pa</td><td>rt: <n></n></td><td></td><td>e: <t> rator: <</t></td><td>:u></td><td></td></uni<></d>	.t>	Pa	rt: <n></n>		e: <t> rator: <</t>	:u>	
# _ I T Fea	ture	Position/	Dim. Size	Orientation	Form/Dim.	Special	

The report template now shows the header with **Unit:** <unit> displayed.

Configuring an Indexible Probe System

Configuring a system with an indexible contact probe head is done by turning on the **Indexible Probe Head** option and enabling the **Probe Selector**.

To configure the indexible system:

Click Tools>Options...

Select the Probes tab and enable the installed Indexible probe type

Op	x
	Programming Runs SLEC Sounds Square Supervisor VED I I Buttons Display Encoders Files General
Tools Windows Help Tolerance Explode Data Cloud Focus Filter Adjust Contrast and Brightness Goto Worm Goto Worm Stop Goto Joystick Motors Off Release Probe Deactivate Touch Probe Capture Image Programming Customize Options Options Q.	Locks Measure Part View Point Filtration Probes Qualification data

Click Tools>Options...



Click OK

The $\ensuremath{\textbf{Probe}}$ $\ensuremath{\textbf{Selector}}$ window allows you to teach different probe angles.

To enable the probe selector window:

Probe Tools Windows Help

Probe Compensation

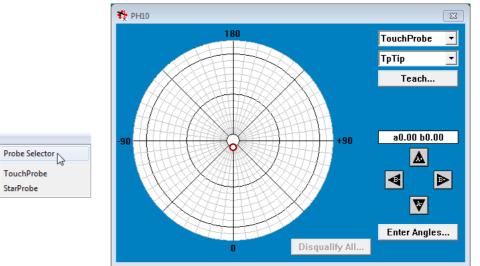
Contact Probes

Teach Ved Edge... Probe Library...

✓ Ved Probes

Click Probe>Contact Probes>Probe Selector

Stretch the probe selector window in order to access all of the controls if neccessary





| None ►

| None)

| Cardinal >

Click Probe>Contact Probes>Probe Selector

Stretch the probe selector window in order to access all of the controls if neccessary



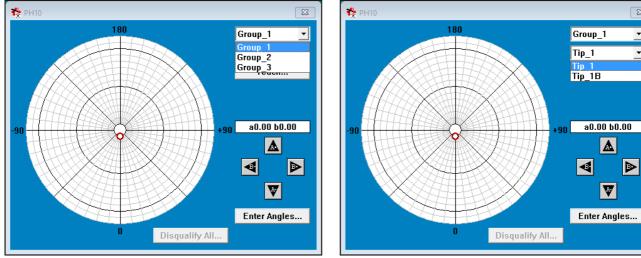
Adding probe groups and their probe tips is done in the probe library. Refer to the operating instructions for adding probe groups and tips.

Teaching (Calibrating) a Probe Tip Angle Position for CNC Systems with an Indexible Probe

The following example assumes that valid data has been entered into the Tools>CNC... Auto-Requal tab and that groups and tips have been added in the Probe Library.

To teach an angle position for an indexible position:

- Select a group from the group drop-down list
- Select a probe tip from the probe tip drop-down list



Select a group

Select a probe tip

▶ Set the tip to the straight-down position (A0.00-B0.00, this is the reference position) by clicking on that position on the cobweb of the Probe Selector window (example A0.00-B0.00) or by repeatedly clicking on the A+- and B+- buttons

The system will automatically switch to this probe indexible position if the indexible probe head is motorized. Otherwise the system will prompt you to manually switch to this probe indexible position.

23

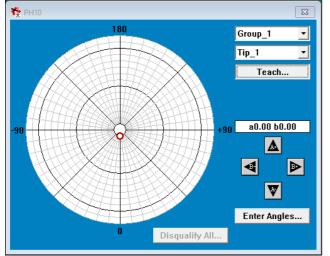
•

•

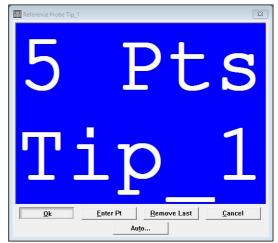
▲

⋒

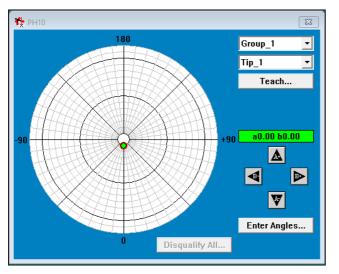
- Manually teach this indexible position by probing a qualification sphere
- ► Once done probing the qualification sphere, click the **OK** button to complete the teach process



Click the position on the cobweb (example A0.00-B0.00) or repeatedly click on the A_{+-} and B_{+-} buttons



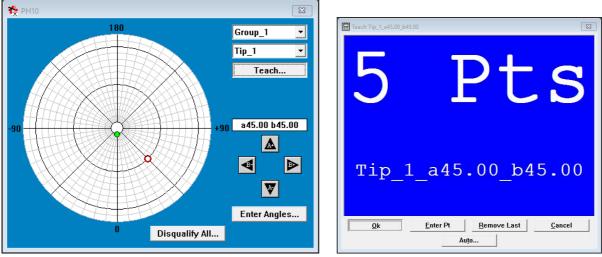
Click the **OK** button to complete the teach process



If the Stack length for the selected group is equal to zero, the system will calculate it and automatically add it. If you manually add a value that is greater than zero, the system will use that value.

Once qualified, the position indicator will turn green.

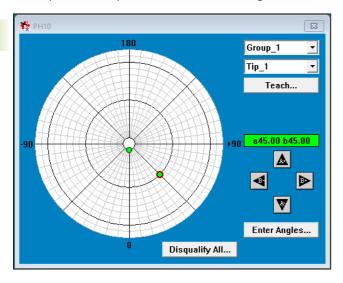
- Select an indexible position by clicking on that position on the cobweb of the Probe Selector window (example A45.00-B45.00), or by repeatedly clicking on the A+- and B+- buttons If the indexible probe head is motorized, the system will automatically switch to this probe indexible position (Otherwise, the system will prompt you to manually switch to this probe indexible position).
- ▶ Teach this position by probing the qualification sphere that was used to qualify the reference position You can probe it manually or automatically. Automatic probing is done by clicking the **Auto...** button in the gualification window.
- ▶ Once done probing the qualification sphere manually, click the **OK** button to complete the teach process If done automatically, the system will complete the teach process automatically.



Click the position on the cobweb (example A45.00-B45.00) or Click the **OK** button to complete the teach process repeatedly click on the A+- and B+- buttons

2.1 Setup

Once qualified, the position indicator will turn green.

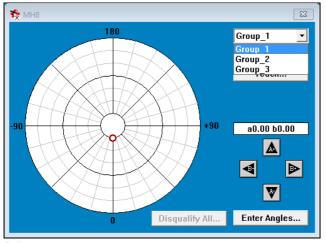


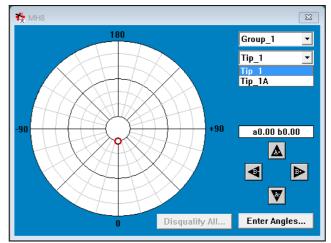
- The group Stack length can be reset by going to the Probe Library and entering a value of zero for that group. The next time the reference position for the reference tip of that group is qualified manually, a new Stack length will be calculated and automatically added.
- The system will not automatically change a group's Stack length if you manually enter a value that is greater than zero.
- The qualification sphere position for automatically probing can be set to a new location by moving the qualification sphere to the new location and then manually re-teaching the reference position of the reference tip of the reference group.
- The reference position can be re-qualified using automatic qualification sphere probing if the group Stack length is non-zero.
- Non-reference group's Stack length will be calculated and added in automatically once a group has been crosscalibrated with the reference group.

Teaching (Calibrating) a Probe Tip Angle Position for a Non-CNC System With an Indexible Probe

To teach an angle position for an indexible position:

- Select a group from the group drop-down list
- Select a probe tip from the probe tip drop-down list





Select a group

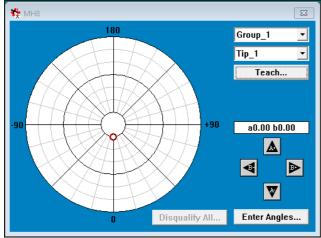
Select a tip

► Set the tip to the straight-down position (A0.00-B0.00, this is the reference position) by clicking on that position on the cobweb of the **Probe Selector** window (example A0.00-B0.00), or by repeatedly clicking on the **A+**- and **B+**- buttons.

The system will prompt you to manually switch to this probe indexible position.

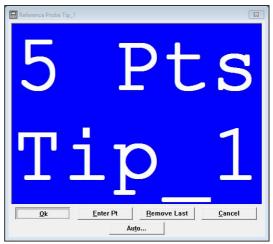
▶ Teach this indexible position by probing a qualification sphere

▶ Once done probing the qualification sphere, click the **OK** button to complete the teach process

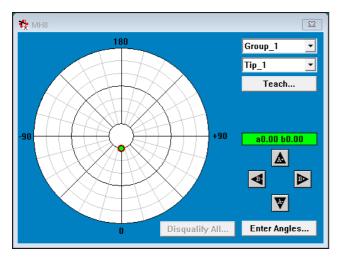


Click the position on the cobweb (example A0.00-B0.00) or repeatedly click on the $A\!\!+\!\!-$ and $B\!\!+\!\!-$ buttons

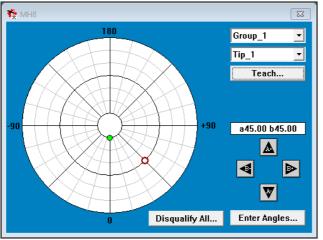
Once qualified, the position indicator will turn green.

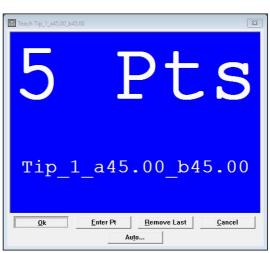


Click the **OK** button to complete the teach process

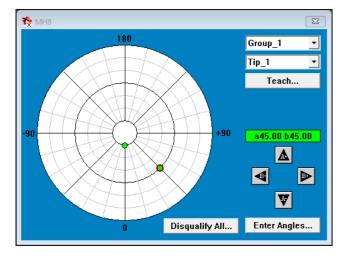


- Select an indexible position by clicking on that position on the cobweb of the **Probe Selector** window (example A45.00-B45.00), or by repeatedly clicking on the A+- and B+- buttons The system will prompt you to manually switch to this probe indexible position.
- Teach this indexible position by probing the qualification sphere that was used to qualify the reference position
- Once done probing the qualification sphere, click the **OK** button to complete the teach process





Click the position on the cobweb (example A45.00-B45.00) or Click the **OK** button to complete the teach process repeatedly click on the **A**+- and **B**+- buttons



Once qualified, the position indicator will turn green.

Setting the Circle Fit Algorithm during Auto Programming

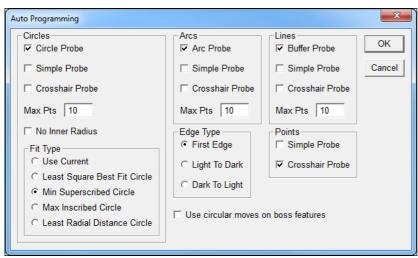
A circle fit algorithm can be set during auto programming to be used when a program is played back.

- To set the fit algorithm:
- Select the features to be auto programmed from the feature list
- Click Tools >Programming>Auto Program.

	Tools Windows Help		
	roleidhee	•	
	Explode Data Cloud		
	Filter		
	Adjust Contrast and Brightness		
	Goto Worm		
E Features	Goto Worm Stop		
Features Program Report	Goto	•	
I Tol Name Datum	Joystick	•	
O Circle 1	Motors Off		
O Circle 2			
O Circle 3	Capture Image Ctrl+F8		
Arc 4	Programming	• 🗸	Pause Mode
<pre>/ Line 5 / Arc 6</pre>			Record/Edit Mode
Line 7	Customize		Set Current Step
Line 8	Options		
Line 9	CNC		Auto Program
Line 10	Language	,	Optimize Steps
		1	CNC Mode Steps
			Editing Steps
			Flow Control Steps
•			Programming Wizards
			Special Steps +

Select the features to be auto programmed from the feature Click **Tools** >**Programming**>**Auto Program.** list

Select the desired fit type under the Circles group, Fit Type subgroup



Select the desired fit type under the Circles group, Fit Type subgroup

Click OK

Notice that the circles are measured using the selected fit type after playing back the program.

		ОК
Flavor:	Run:	Cancel
e: Layer:	,	
Filtered		
Sigma factor:	Quantization:	
2	0.00012	
	e: Layer: Default Layer ▼ Point Filtration Filtered Sigma factor:	

Configuring a Laser Pointer

A laser pointer can be connected to the IK 5000 to be used as an input.

Click Tools>Options...

Q
Ę
Se
~
3

Т

00	ls Windows Help	
	Tolerance	+
	Explode Data Cloud	
	Filter	
	Adjust Contrast and Brightness	
	Goto Worm	
	Goto Worm Stop	
	Goto	•
	Joystick	•
	Motors Off	
	Release Probe	
	Deactivate Touch Probe	
	Optimet Settings	
	Capture Image	Ctrl+F8
	Programming	×
	Customize	
	Options	
	CNC	

Click Tools>Options...

Select the Supervisor tab and enter "Options" in the password field

Buttons	Display	Encoders	Files	General	OK
Locks	Measure	Part View	Point Filtration	Probes	
Programming	Runs	SLEC	Sounds	Square	Canc
Supervisor	VED				Inch/N
Password					Inch/r

🗖 Keep privileges un	itil program is exited				

Select the Supervisor tab and enter "Options" in the password field



The **CNC** option or the **CcLight** option must be selected for the **LaserPointer** option to be selectable.

Enable the **LaserPointer** option

actory Options					
- Environment			Probes-		ОК
✓ DisplayZ	C XYManualZCNC	Temperature	VED	SAC	
🗆 DisplayQ	XYCNCZManual	Profile	🗆 StandAloneCrosshair	🗆 Korad	Cance
	🗖 Rotary	🗖 Profile3D	□ OE	Crosshair	
Full3D	SeperateJoystickSetup	ProbeRetract	ContactProbes	C XRAY	
PolarSystem	MultipleRefFrames	🗖 ProbeRack	SpotterCamera		
RsfUsb			Lighting	Error Correction	
⊢Video Edge Det	ection		🗆 Light 🗖 Deva	□ NLEC	
AutoFocus	DX9Camera	✓ LaserPointer	🗆 CcLight 🗖 Proto	3DErrorComp	
FOV	🗌 Hamamatsu	ShapeCal			
Zoom	🗖 Camera Trigger	LensSystem	- Emulation	Laser	
Turret			Emulated	Coptimet C	Keyence
L TOITEC			VedEmulated	Nikon	

Enable the LaserPointer option

Click OK

The laser pointer can be enabled or disabled with a button mapped to a toolbar.

To add the enable/disable **LaserPointer** button to a toolbar:

Click Tools>Customize...

- Select the Supervisor tab and enter the supervisor password in the Password field

Too	ls Windows Help		Customize	X
	Tolerance Explode Data Cloud	•		ОК
	Focus Filter Adjust Contrast and Brightness Goto Worm Goto Worm Stop		Colors Errors Help Misc Statusbar Supervisor Password ******* ******* Keep privileges until program is exited	Cancel Apply
✓	Goto Joystick Motors Off Release Probe	•	Change Password	
	Deactivate Touch Probe Capture Image	Ctrl+F8		
	Programming Customize			

Click Tools>Customize...

Select the Supervisor tab and enter the supervisor password in the Password field

- Select the Tool bars tab
- Select a toolbar in the Toolbars column
- Select LaserPointer in the All Possible Buttons column
- Click <- Copy to copy the button to the selected toolbar

Customize			×
Toolbars ☐ Display buttons	Errors Help without raised borders o be docked with other windo Buttons In Toolbar Laser Pointer	Misc Statusbar Supervisor Ws All Possible Buttons Button Spacer 1 Button Spacer 2 Button Spacer 3 Button Spacer 4 Button Spacer 5 Laser Pointer Fill Color Line Color Line Weight Transparent/Solid Make Font Sigger Make Font Smaller Norm/Bold	OK Cancel Apply
Probe .	 Remove Map Part Map Workspace ✓ User settable 	Vew Text	

Click <- Copy to copy the button to the selected toolbar

Click OK

toggled. Cus...

already displayed

LaserPointer LaserPointer Off On



Cus...

The Laser Pointer uses the first lamp enable line output; connector N, pin 3, Lamp en 1.

Display the toolbar that the LaserPointer was mapped to, if it is not

Notice the button in the Off state and On state when the button is

The first lamp enable line is not available for use with light control while the LaserPointer option is active.

Refer to the installation instructions for the lamp enable connector pin assignments.

Waiting for an External Input Line Program Step

A program can be recorded with a step to wait for an external input line. The input line can be high (1) or low (0).

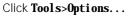


The CNC software option is required in order to use the **Wait For Input Line** feature.

To record this step into a program:

	•
•	

Tools Windows Help	
Tolerance	۱.
Explode Data Cloud	
Filter	
Adjust Contrast and Brightness	
Goto Worm	
Goto Worm Stop	
Goto	+
Joystick	•
Motors Off	
Release Probe	
Deactivate Touch Probe	
Optimet Settings	
Capture Image	Ctrl+F8
Programming	•
Customize	
Options	
CNC	



Enter the supervisor password in the Password field

ons					×
Buttons	Display	Encoders	Files	General	ОК
Locks	Measure	Part View	Point Filtration	Probes	
Programming	Runs	SLEC	Sounds	Square	Cancel
Supervisor	VED			1	Inch/MM
Password ↓ ****** ✓ ✓ Keep privileges un	til program is exited				
Change Password					

Enter the supervisor password in the Password field

Select the Buttons tab

Assign an external button input by selecting Use In Programfrom the drop-down menu and checking the level based checkbox

Button	Conn	ector	Pin	Assignment
Button 1	B ¹⁾	²⁾	15	Button 1 TTL in
Button 2	B ¹⁾	l ²⁾	6	Button 2 TTL in
Button 3	B ¹⁾	l ²⁾	24	Button 3 TTL in
Narrow footswitch button	A ¹⁾	H ²⁾	30	Foot switch 1
Wide footswitch button	A ¹⁾	H ²⁾	15	Footswitch 2

¹⁾ IK 5000 QUADRA-CHEK Installation Instructions (ID 1035034-9x)

²⁾ IK 5000 QUADRA-CHEK Installation Instructions (ID 1108935-9x)

Locks	Measure	Part View	Poi	nt Filtrati	on	Probes	OK
Programming	Runs	SLEC) S	ounds) :	Square	
Supervisor	VED]	1				Cance
Buttons	Display	Encoders	File	es	Gen	eral]	Inch/M
External button assign	ments						
Button 1	Use In Prog	ram	-	level	based		
Button 2	No Assignm	ent	•	Ievel	based		
Button 3	No Assignm	ent	•	level	based		
Narrow footswitch butte	on No Assignm	ent	•	🗆 level	based		
Wide footswitch button	No Assignm	ent	•	level	based		

Select the **Buttons** tab, select **Use In Program** and check **level based**

▶ While recording a program, right-click in the program template window and select CNC Mode Steps>Wait For Input Line

 Image: A start of the start of	Cut Copy Copy And Mirror Paste Paste Special Delete Selection Select All Select None Select All Similar Steps Pause Mode Record/Edit Mode		
	CNC Mode Steps	+	Set Full CNC Mode Set Manual Mode
	Editing Steps		Set Power Assist Mode
	Flow Control Steps		Set Power Assist Mode
	Programming Wizards		Focus Lock Off
	Special Steps	•	Focus Lock On
	Template Properties		Set Output Line
	DDE Output		Wait For Input Line
	DDL Output		trait i or inpat ente

Right-click in the program template window and select CNC Mode Steps>Wait For Input Line

A new program step **Wait for input line <button> at a state** is added to the program.



When playing back the program, the program will wait until the state of **<button>** changes when the program step **Wait for input line <button> at a state** is encountered. A CNC option is required for this program step to be available.

Features	Pro	gram	Runs AllTol		
Status	Сх	Tol	Action	Data	
			Program Properties		
E	Ŧ		Initial settings		
	\rightarrow		Wait for input line "Button 1" at	a state	

A new program step Wait for input line <button> at a state is added to the program.

Creating and Using Global Variables

A program variable can be set to be used in multiple programs. It can be set to be edited every time the program is run, only the first time the program is run, or only once.

To set program variable options:

- Record a program
- Right-click in the Program template and select Special Steps>Set Variable... to add a program variable

S Program Runs AllTo Cx Tol Action		Data		
	Properties	•		
	al settings			
		Comment DDE Delay Display Part View Map		
	Cut	New Run Of Data		
	Сору	Play Sound		
	Copy And Mirror	Program Image		
	Paste	Record Part View Display		
	Paste Special Delete Selection	Run DOS/Windows Program Run Part		
	Select All	Set Variable		
	Select None	User Message		
	Select All Similar Steps			
	Pause Mode	File Steps RS232 Steps		
	✓ Record/Edit Mode			
	CNC Mode Steps	Max Speed On		
	Editing Steps	Max Speed Off		
	Flow Control Steps	Start Timer		
	Programming Wizards	StopTimer		
	Special Steps 🕨	Demo Stage		
	Template Properties			
	DDE Output			
	Print Selection			

- Enter the variable Label, Formula, and Prompt
- Select the **Result Type** and **Constant Type**
- Check the Remember this variable across Runs and Parts (make it permanent) or Prompt on first run or both options to set the desired option for the variable

Program Variable		×
Label Gobal_Val		ОК
Formula	Fields >	Cancel
	Functions >	Analyze
	Operators >	
	Other >	
Result type Inch/mm Constants are Fixed	•	
Prompt: Enter variable value		
\square Remember this variable across Runs and Parts (make	e it permanent)	
Prompt on first run		

Select the options for the variable

Cross-calibrating Probe Families, Groups/Cameras, and Tips/Magnifications

The IK 5000 can cross-calibrate between probe families (in a multisensor system), different groups/cameras in a probe family, and various probe tips/magnifications within a group/camera.

Any probe family (in a multi-sensor system), group/camera (in a probe family), or probe tip/magnification (in a group/camera) can be assigned to be the reference.

A multi-sensor system with Video Edge Detection (VED) and Contact Probe family of probes is an example. The system may be configured with one camera (Camera_1) for VED with two magnifications (Mag_1 and Mag_2), and two groups (Group_1 and Group_2) for Contact Probe with two probe tips each (Tip1_G1, Tip2_G1, Tip1_G2, Tip2_G2). Each level is automatically assigned a reference. This can be changed by going to the probe library and selecting a different item to be the reference.

Example: Change the Reference of a Probe Tip from Tip1_g1 to Tip2_g1

To change the reference of a probe tip:

Click Probe>Probe Library...

Select Contact Probe on the left side and double-click on Group_1 to show probe tips Tip1_G1 and Tip2_G1

Prob	e Tools Windows	Help
	Contact Probes	None ►
	Probe Compensation	Cardinal 🕨
<	Ved Probes	Circle 🕨
	Teach Ved Edge	
	Probe Library	
	Magnifications	Mag_4 ▶
	Probe Path Data	

Probe Library				
Probes	Name	Date	Who	New
ted Ued	Tip1_G1			
ContactProbes	Tip2_G1			Delete
Group_1				
Group_2				Set Current
				Disqualify
				ок 📋

Click Probe>Probe Library...

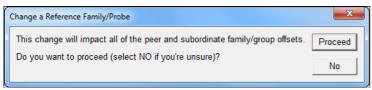
Select **Contact Probe** on the left side and double-click on **Group_1** to show probe tips Tip1_G1 and Tip2_G1

Select the Size/Ofs tab of Tip2_G1 and check This is the reference probe for all probes within this group

Probe Library				
Probes	Name	Date	Who	New
⊡. ContactProbes	Tip1_G1 Tip2_G1	-	-	Delete
Group_1				Set Current
				Disqualify
				ОК
Properties Size/Ofs G Tip diameter: 0.000 Offset	eneral 10 Teach			
This is the reference	e probe for all pr	obes within this	group	

Select the ${\bf Size/Ofs}$ tab and check ${\bf This}\ {\bf is}\ {\bf the}\ {\bf reference}\ {\bf probe}\ {\bf for}\ {\bf all}\ {\bf probes}\ {\bf within}\ {\bf this}\ {\bf group}$

Click **Proceed** in the Change a Reference Family/Probe window



Click Proceed

▶ Click **OK** in the Probe Library window to save the changes and exit the window

2.1 Setup

Example: Set the Contact Probes to be the Reference Family

To cross-calibrate between probe families:

- Click Probe>Probe Library... The Probe Library window opens.
- Select Probes on the left and then select ContactProbes on the right
- Check Reference (other probe families are calibrated relative to this one)

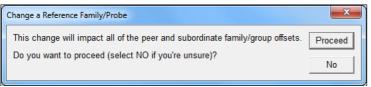


At every level of the probe hierarchy, there must be a reference item. There must be a reference family, reference group/camera, and reference probe tip/ magnification.

		P	robe Library					
		P	Probes	Name Ved ContactProbes	Date	Who		New Delete Set Current Disqualify OK
Prot	De Tools Windows Help Contact Probes None > Probe Compensation Cardinal > Ved Probes Circle > Teach Ved Edge Probe Library		Properties Offset Family name: Conta Offset X 0.0000 Y 0.0000 Z 0.0000 C Reference (other prot	ctProbes Teach	ibrated relative to	this one)		
	Magnifications Mag_4 ► Probe Path Data							
Clic	k Probe>Probe Library	Se	elect Probes , then Con	tactProbes	and check Re	ference (otl	ier pro	be families

Select Probes, then ContactProbes and check Reference (other probe families are calibrated relative to this one)

Click Proceed in the Change a Reference Family/Probe window



Click Proceed

- > Select Probes on the left side and then select Ved on the right side
- Select the **Offset** tab and Click **Teach**

Probe Library				
Probes	Name Ved ContactProbes	Date	Who	New Delete Set Current Disqualify OK
Properties Offset Family name: Ved Offset X 0.0000 Y 0.0000 Z 0.0000	Teach	librated relative to	this one)	
User settable				

Select Probes, then Ved, Select the Offset tab and click Teach...

- ► Follow the prompts until the cross-calibration is completed. If the cross-calibration is successful, the system will insert values (most likely non-zero values) in the XYZ offset group box.
- Click **OK** in the Probe Library window to save the changes and exit

Master User Profile

Creating the Master User Profile

A supervisor can create an IK 5000 master user profile that can be loaded for different Windows OS users. When this master user profile is loaded, it gives the IK 5000 a uniform look as designed when the profile was saved.

The profile is saved to the IK 5000 folder located in the ProgramData system folder.

To create the master user profile:

Click Tools>Options.	
----------------------	--

Too	ls Windows Help	
	Tolerance	۲
	Explode Data Cloud	
	Focus	_
	Customize	
	Options	
	CNC	
	Language	۲

Click Tools>Options...

- Select the Supervisor tab and enter the supervisor password in the Password field
- Check Keep privileges until program is exited
- Click **OK** to save the changes and exit the **Options** window

Options						×
	VED uttons icks ies	 Display Measure Programming	Encoders 3D Error Comp Runs	Files Part View Sounds	 General Point Filtration Supervisor	OK Cancel
		: until program is exit	ed			Inch/MM

Select the **Supervisor** tab, enter the supervisor password, check **Keep privileges until program is exited**, and click **OK**

Click Help>Master User Profile...>Save

A pop-up message is displayed indicating that a Master User Profile was saved.

Click **OK** to close the message window

Help What's New? User Guide			
Backup Settings Restore Settings			
Master User Profile	Save		
Diagnostics +	Load	IK 5000	x
Support About IK 5000		The Master User Profile was successfully saved.	

Click Help>Master User Profile...>Save Click OK

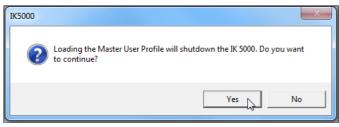
Loading the Master User Profile

To load the Master User Profile:

Click Help>Master User Profile...>Load

A pop-up message is displayed indicating that loading the Master User Profile will shutdown the program.

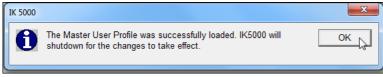
Click Yes



Click Yes

A pop-up message is displayed indicating that the Master User Profile was loaded successfully and the program will shutdown for the changes to take effect.

Click OK



Click **OK**

Enabling Load Master User Profile at Startup

The Master User Profile can be loaded on startup for situations when a supervisor wants the user to always have the same profile at startup.

To enable Load master user profile at startup:

Click Tools>Options...

Tools	Windows Help	
	Tolerance	+
1	Explode Data Cloud	
	Focus	_
	Customize	
	Options	
	CNC	
	Language	+

Click Tools>Options...

Select the **Supervisor** tab and enter the supervisor password in the **Password** field

Options						X
VEI	· , I) Encoders) Files] General		ок
Locks	Measure	3D Error Comp	Part View	Point Filtration	ηΠ	Cancel
Probes	Programming	Runs	Sounds	Supervisor		Inch/MM
Password						
✓ Keep privil	eges until program is ex	tited				
Change Pass	sword					

Select the Supervisor tab and enter the supervisor password

Select the Locks tab

Check Load master user profile at startup

ptions					X	
Runs VED] SLEC) Sounds	Square	Supervisor	ОК	
Buttons	Display	Encoders	Files	General	Cancel	
Locks	Measure	Part View	Point Filtration	Programming	Inch/MM	
Lock the position	s and sizes of the m	ain windows				
Lock all programs	so they cannot be r	modified (and new o	nes cannot be recorde	d)		
Lock all template	s so they cannot be	modified				
Lock the fields in	the Results window	so they cannot be r	nodified			
Lock the status b	ar so that it is "read	only"				
Lock the DRO to		,				
Lock switching to						
Activate "Run Only" mode						
✓ Allow overwriting an existing part if not in supervisor mode						
Prevent superviso	•					
	-					
Prevent user setti		-				
Prevent Live Vide		9				
Require password						
Load master user	profile at startup					

Select the Locks tab and check Load master user profile at startup

Click **OK** to save the changes and exit the **Options** window

Setting Focus Offset

For example, you may want to do this when a camera has an inbuilt delay in the posting of image frames. The target focal point will be off because of the delay. The distance that the focal point is off can be corrected by applying a focus offset.

An offset can be set for each magnification of each camera in the system.

To set a Focus Offset value:

Determine the offset value that needs to be applied to the acquired focus point for a magnification

Click Probe>Probe Library...

Select Ved, the desired camera, and the desired magnification

Probes 	New Delete
	Set Current Disqualify OK
Probe Tools Windows Help Offset Resolution Auto Focus Mag Offset Teach Y 0.0000 Z Ved Probes Circle + Teach Ved Edge Circle +	
Probe Library Magnifications Probe Path Data Click Probe>Probe Library Select Ved, the desired camera, and the desired magnific	

Select the Auto Focus tab and enter the offset value in the Focus Offset field

Probe Library					
Probes ⊡- Ved	Name Mag. 1	Date	Who		New
Camera_1	Mag_1 Mag_2	_	-		Delete
ContactProbes					Set Current
					Disqualify
					ОК
Properties		. – ľ			
Offset Re:	solution	Auto Focus	Mag	- 1	
Search Distance: 0	.0000				
Focus Offset: 2	.5				
Max two passes					
Enable final check					

- Select the Auto Focus tab and enter the offset value
- Click **OK** in the Probe Library window to save the changes and exit

Loading an NLEC (Non-Linear Error Compensation) file

NLEC information is stored in a file in the system configuration folder.



An NLEC file must be created by an IK 5000 system or structured in the same format as an IK 5000 NLEC file.

To load an NLEC file:

- Replace the NLEC.txt file in the system configuration folder with the new NLEC file. The new file must be named NLEC.txt.
- Click Tools>Options...

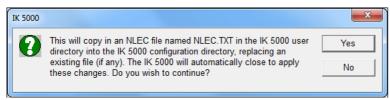
Tools Win	dows Help	
Tolerar	nce	+
Explode	e Data Cloud	
Filter		
Adjust	Contrast and Brightness	
Goto W	Vorm	
Goto W	Vorm Stop	
Goto		+
Joystic	k	+
Motors	s Off	
Release	e Probe	
Deactiv	vate Touch Probe	
Optime	et Settings	
Captur	re Image	Ctrl+F8
Program	mming	۲
Custon	nize	
Option	15	
CNC	*0	
Click Too	ls>Options	

- ▶ Select the NLEC tab
- ▶ Verify that the NLEC Enabled check-box is checked
- Click Load...

tions					
Probes	Programming	g Runs	SLEC	Sounds	OK
Square	Supervisor	VED			1
Buttons	Display	Encoders	Files	General	Cancel
Locks	Measure	NLEC	Part View	Point Filtration	Inch/MN
NLEC Enabled Serial Number Comment]		

Click Load...

Click Yes in the prompt to confirm loading



Click Yes

- Browse to the system configuration folder and select the new NLEC.txt file
- Click **OK** to save the changes and exit the Options window

2D Profile Maximum Form Error

When a 2D profile feature has been measured, applying a tolerance can result in a failure if outlier data points are present.

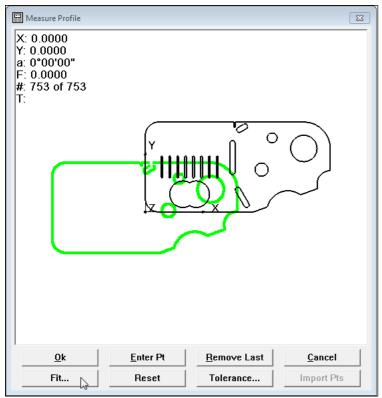
The Maximum Form Error function can be used to filter outlier data points from tolerance test consideration.

To use Maximum Form Error and filter outlier data points:

Start measuring a 2D profile feature

While in the Measure Profile screen:

Click **Fit**...



Click Fit...

2.1 Setup

Enter the maximum allowed form error that will be acceptable for data points to be included in the tolerance pass/fail test in the Maximum Form Error field

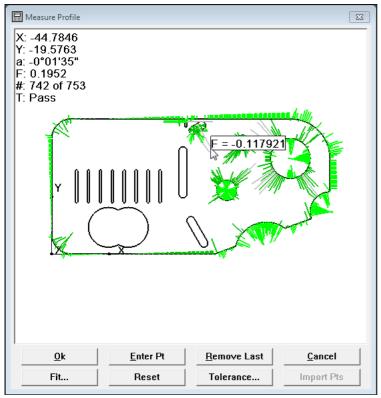
Any data point that is greater in absolute value than the maximum form error value will be filtered from the overall set of points used in the fit of the profile.

- Enable/disable applicable fit options Allow X, Allow Y, Allow Z, and Allow A.
- Click **OK** in the **Fit Settings** window to save the changes, exit the dialog, and perform a fit calculation. Notice the results data on the upper left corner (if display data is enabled).

Fit Settings		×
Maximum Form Error 0.1		OK Cancel
🔽 Allow X 🔽 Allow Y	🗖 Allow Z	🔽 Allow A

Enter the Maximum Form Error and click OK

Complete the 2D profile measurement



Complete the measurement

Editing VED Tools in a Program

VED tools can be edited to change the size, number of scans, scan direction and edge type.

For tools with two sides—inner and outer or left and right—the size of each side can be changed independently using the Inner and Outer size change parameters.

For probes like the circle tool, the Inner size change applies to the inner circle and the Outer size change applies to the outer circle.

For probes like the buffer tool, the Inner size change affects the start of scan side and the Outer size change affects the end of scan side.



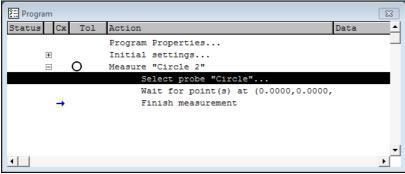
The Inner size change cannot be applied if the change is going to make the inner side larger than the outer side.

The Outer size change cannot be applied if the change is going to make the outer side smaller than the inner side.

Example: Recording a program with features measured using the circle VED tool

To edit VED tools in a program:

- ▶ Start recording a program using the VED circle tool
- ▶ Highlight the Select probe "Circle"... step in the program



Highlight the Select probe "Circle"...

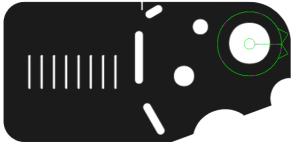
- Right-click in the program window and select Editing Steps>Edit Selected Steps...
- Enter the size percentage for the selected edge tool in the Inner and Outer fields
- Make any other neccessary changes to the parameters in the Edit Probe Steps window

Cut Copy Copy And Mirror Paste Paste Special Delete Selection Select All Select All Select All Similar Steps Pause Mode Record/Edit Mode		
CNC Mode Steps Editing Steps	Edit Selected Steps	X
Flow Control Steps Programming Wizards Special Steps	Expand/Collapse Selected Steps Single Step Single Step	Close Apply
Template Properties DDE Output Print Selection	Enable Selected Steps Outer 100 Disable Selected Steps Edge Type Load Steps C Dark To Light To Dark C First Edge	

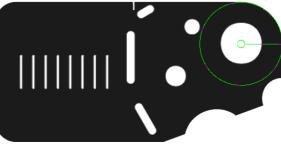
Right-click on the program template and select **Editing Steps>Edit Selected Steps...**

Enter the Inner and Outer size percentage

Click Apply to save the changes and then click Close to exit. Note the changes on the tool—before and after.



Note the changes on the tool-before.



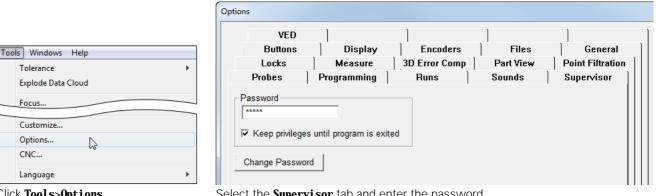
Note the changes on the tool-after.

Changing the Size of Continuous Fire Function Stake Marks

The Continuous Fire VED function uses stake marks to show where an edge has been found. The size of the stake marks can be set from 1-30 pixels.

To change the stake mark size:

- Click Tools>Options...
- Select the Supervisor tab and enter the supervisor password in the Password field



Click Tools>Options...

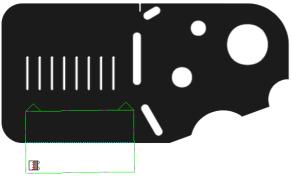
Select the Supervisor tab and enter the password

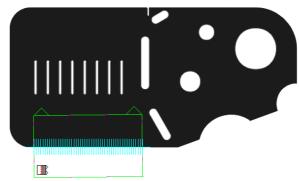
- Select the VED tab
- > Enter the desired pixel size in the Continuous fire stake marks size field. The value needs to be set from 1–30 pixels

Options					×
Buttons	Display	Encoders	Files	General	ОК
Locks	Measure	3D Error Comp	Part View	Point Filtration	
Probes	Programming	Runs	Sounds	Supervisor	Cancel
VED])]]]	Inch/MM
I Realign probes in Hi □ Always do an Advan	• •				
Scale video charts t	o magnification				
Number of Pattern Tool	search rings 0				
Search ring overlap (pi>	(els) 10				
Auto enter timeout (set	-3/ 12	Auto enter distan	ce 0.0051		
Continuous fire stake n	narks size 15				
Saturation Threshold (0	is off) 255				
Minimum Pattern Score	e (0 to 99) 80				
User settable					

Select the VED tab and enter the Continuous fire stake marks size

► Click **OK** to save the changes and exit the Options window. Note the changes on the tool—before and after





Note the changes on the tool-before.

Note the changes on the tool-after.

Enabling User Access to Settings

Most IK 5000 configuration settings are set by the OEM or a supervisor. A supervisor can allow the User to access **User settable** settings if the option is available for that parameter. The **VedProbes** in the **Probe Library** are an example of a **User settable** parameter.

To enable **User settable** settings:

Check the User settable checkbox

	Name	Date	Who	· ·	New
🖻 Ved	Average	7/8/15	us4116		
camera_1	Blob	7/8/15	us4116		Delete
VedProbes	Buffer	7/8/15	us4116		
ContactProbes	Capture	7/8/15	us4116		Set Current Disqualify
	Circle	7/8/15	us4116		
	Crosshair	7/8/15	us4116	E	
	ActiveCrosshair	7/8/15	us4116		Disquality
	Farthest	7/8/15	us4116		OK
	Height	7/8/15	us4116		
	Nearest	7/8/15	us4116		

Check the **User settable** checkbox

2.1 Setup

Numerics

Α

С

Camera parameters
145 Continuous probe firing 78 Copy and paste special 31 Creating and using global variables 164
Cross-calibrating probe 166

D

Debounce parameters	114
disable measurements when homin	g is
not completed	130
Disc pattern auto probe	. 16
Displaying system units on reports	
143	
Displaying the software version on	
reports	141

Ε

Editing VED tools 180)
Error whiskers display magnification	
60	
Explode data cloud 73	3

F

Files and folders locations	104
Fixtures files location	129
Focus Offset	174

G

Grid pattern auto probe	15
Grids	18
_	
1	

ISO tolerance 74

Κ

Keyboard shortcuts Ellipse 81 Measure 81 Profile 81 Profile3D 81 Torus 81 Keyence laser 71

L

loading an NLEC file	176
----------------------	-----

Μ

Manual VED height point
measurement67
Master user profile 170
Measure
Rectangle 44
measuring maximum inscribed tangent
circles 41
measuring minimum superscribed tan-
gent circles 41

0

ODBC data export 95
Open Loop control
External amplifier 132
Joystick button assignment 136
Joystick control 111
Optimet laser 70

Ρ

Palletizing multiple parts36Part scaling13Plane auto probe15Plane probing90Polar grids22Printer selection140Profile import points39Profile3D
Automatic fit analysis56Data shifts51Fit analysis55Fit analysis reset59Measurement process48Measurement screen functions46,47
Measurements

R

Random placement 24, 26
Reference steps 24
Reset template text colors 128
RS-232 COM port allocations 137
RS-232 connections 140
runout tolerance on a circle using a cyl-
inder as a reference

S

0	
Scale factor	111
Setting the circle fit algorithm durin	g
auto programming	154
Shutdown	113
Six point alignment	. 58
Software fences	115
Spotter camera options	109
STEP file export	. 92
Support information	103
Symmetry tolerance	. 86
System requirements	3

т

Teaching a probe tip	o angle	e pos	sition	
CNC systems	with	an	index	kible
probe				147
Non-CNC system	ns wit	h an	index	kible
probe				151
Touch probe				
Requalification a	ind sta	arting	g poin	t
127				

U

Updating software	102
Use current reference frame	105
User access to settings	183

VED tools	
Rotating and positioning using	part
reference frame	. 74
Video probe parameters	108

W

Waiting for an external input line pr	0-
gram step	161
warning on CNC movement	

Index

Index

HEIDENHAIN

DR. JOHANNES HEIDENHAIN GmbH

Dr.-Johannes-Heidenhain-Straße 5 **83301 Traunreut, Germany** [™] +49 (8669) 31-0 [™] +49 (8669) 5061 e-mail: info@heidenhain.de

www.heidenhain.de