EasyCmm
Universal CMM server
Any Software for Any CMM

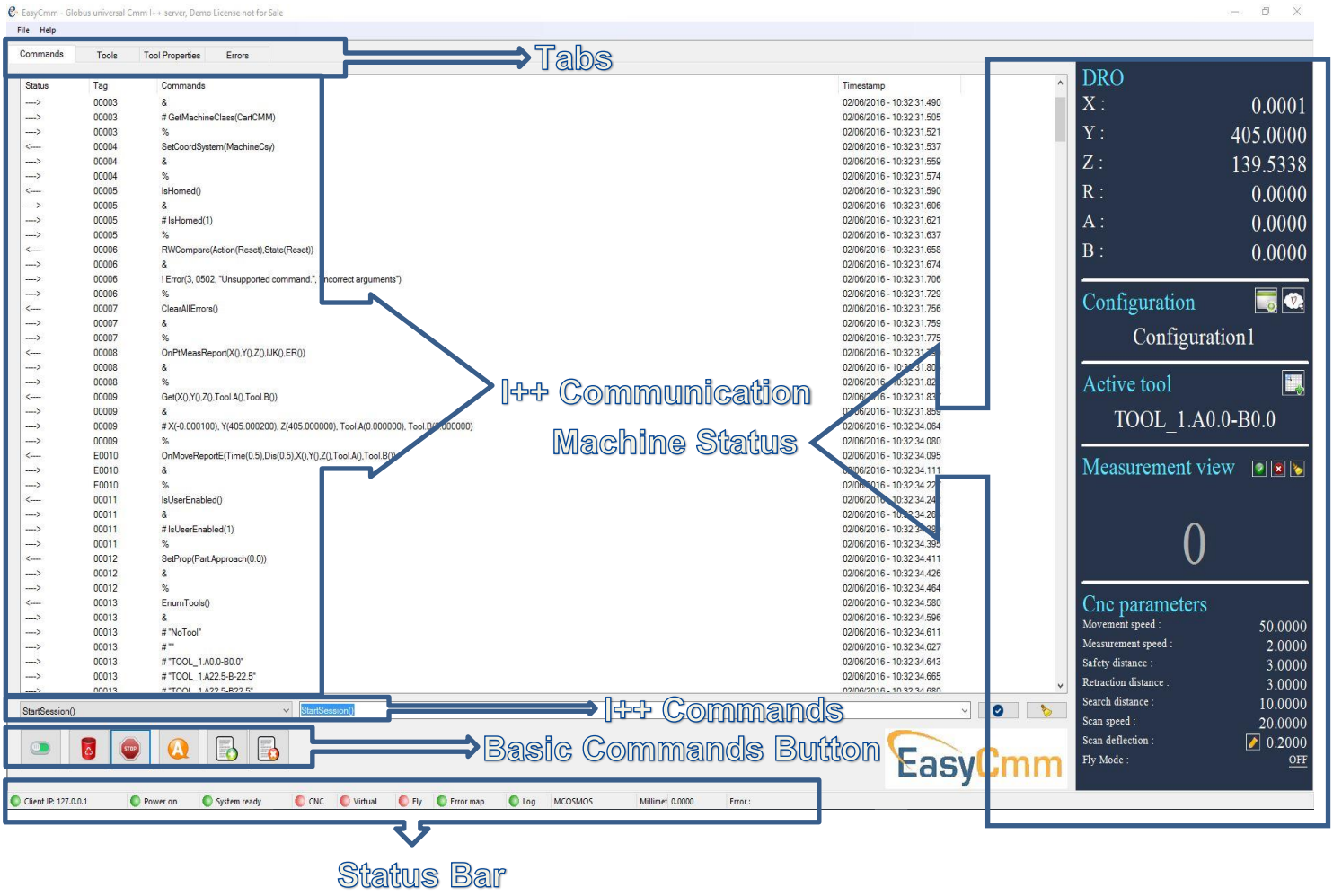
User Manual

Universal CMM Server

6/5/2016

1. GUI

1.1. Main screen



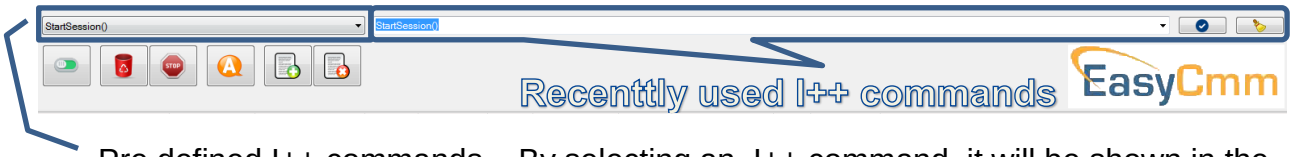
1.1.1. Tabs

1.1.1.1. Command

Status	Tag	Commands	Timestamp
<----	00001	StartSession()	10/01/2016 - 14:21:14.035
---->	00001	&	10/01/2016 - 14:21:14.038
---->	00001	%	10/01/2016 - 14:21:16.264
<----	00002	GetDMEVersion()	10/01/2016 - 14:21:16.270
---->	00002	&	10/01/2016 - 14:21:16.279
---->	00002	# DMEVersion("1.7")	10/01/2016 - 14:21:16.307
---->	00002	%	10/01/2016 - 14:21:16.312
<----	00003	GetMachineClass()	10/01/2016 - 14:21:16.322
---->	00003	&	10/01/2016 - 14:21:16.326
---->	00003	# GetMachineClass(CartCMM)	10/01/2016 - 14:21:16.340
---->	00003	%	10/01/2016 - 14:21:16.343
<----	00004	SetCoordSystem(MachineCsy)	10/01/2016 - 14:21:16.354
---->	00004	&	10/01/2016 - 14:21:16.357
---->	00004	%	10/01/2016 - 14:21:16.374

The Command tab shows the communication commands between the server (EasyCmm) and the client.

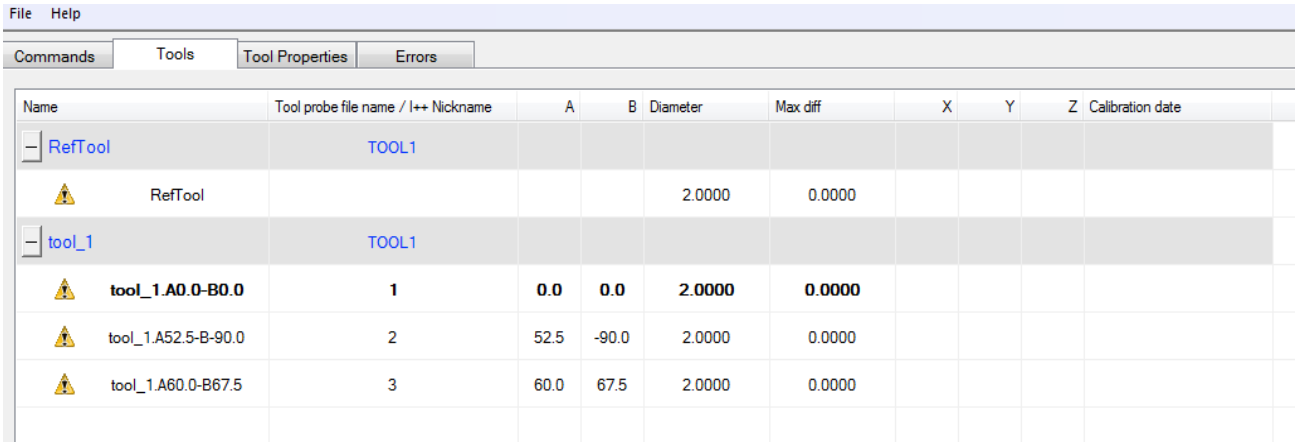
- Status :
  - <-- Incoming command (Usually from client)
  - --> Outgoing reply from server (&, #, %, !)
- Tag :
  - 00001 – A command tag incoming from client
  - E0001 – An Error tag or An Event tag
  - C0001 – A command triggered by the server
- Commands :
  - & - Server receives the command
  - # - Server returns data (if necessary) to client
  - % - Server sends command complete
  - ! – Indicates an error
- Timestamp : Current date & time of the line



- Pre defined I++ commands – By selecting an I++ command, it will be shown in the recently used I++ command combo box. There, the user can type manually additional parameters.

- Connect / Disconnect - StartSession method initiates the connection between client and server
- Clear All Errors - Enable the server to recover from an error
- Abort E - Abort all pending transactions and if possible the current one
- CNC – Automatic / Manual mode
- Save Log – Saves current commands log to a file
- Clear Log – Clears current commands log

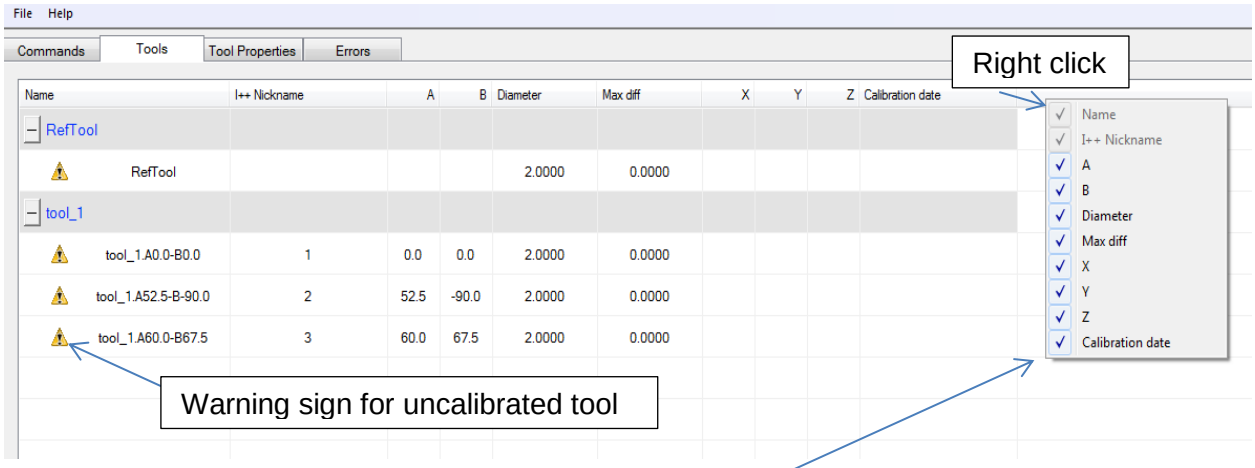
1.1.1.2. Tools



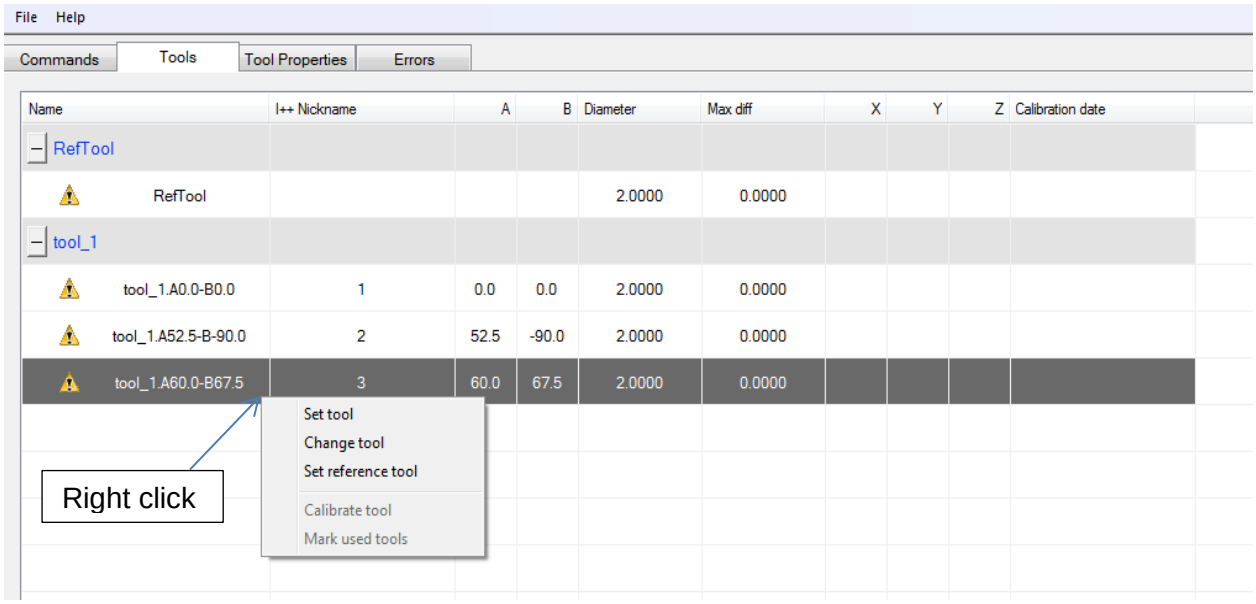
Tools tab shows the active configuration tools.
The orientations are grouped for each tool.
The user can set his own RefTool.

RefTool - Supports all standard tool properties. Is used by many servers for basic geometric referencing of the tools to the machine.
F.I. defining position of qualification - artifact, multiple columns referencing.

- Name – Tool's I++ name
- I++ Nickname – Tool's nickname. User input a name that is used by the client.
- A, B – Tool's orientation in 'A' & 'B' angles.
- Max Diff – the quality of the measurement or probe system
- Diameter – The effective diameter of the probe. If two values are shown, the first represents the value for touch signal and the second represents the value for scanning.
- Calibration Date – Date & Time of the Tools last calibration.
- Tool Probe File Name – (Only for PCDmis client) – The PCDmis tool's file name. When PCDmis loads, it asks which tool is in use. The user must choose from the tools file names.
  In case the user changes a tool on the I++ server and this tool file name is set, it notifies the PCDmis with this information, so when the PCDmis loads, it will show the last tool used (from Server) as a default.



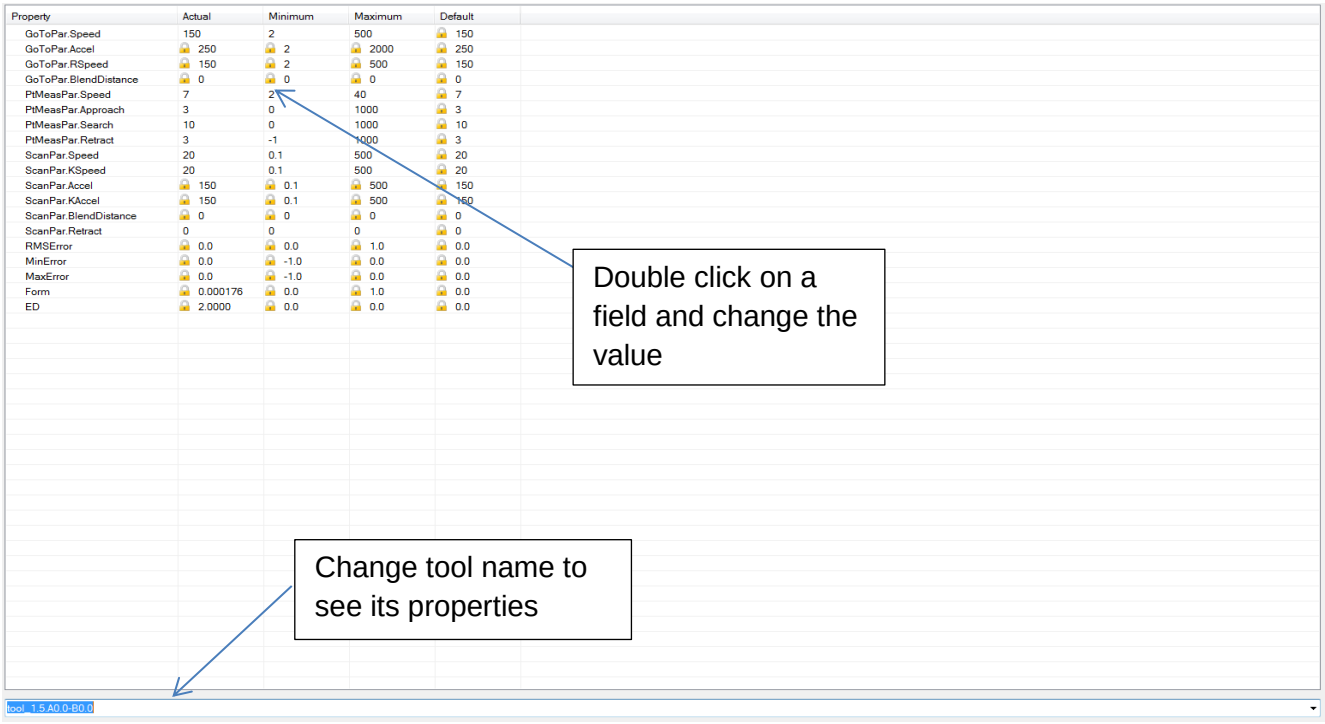
User can choose the fields to see in tool's table.



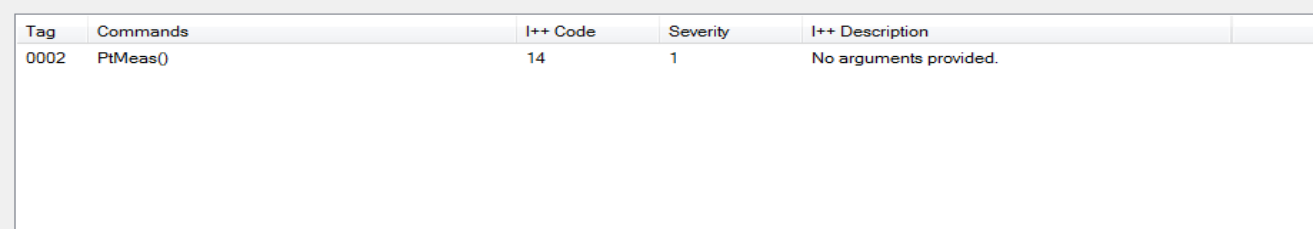
- Set Tool – Sets the active tool.
- Change Tool - Change the tool by Probe Changer or manually
- Calibrate Tool - Requalify Active Tool
- Locate Sphere – Relocate a predefined sphere with active tool.
- Marked used Probes - (Only for PCDmis client) This button will mark all PCDmis part program used probes. It is simulating the mark used button of PCDmis as it is disabled in case that PCDmis works as an I++ client. (User must set the communication path as shown in 2.3.1.2).

1.1.1.3. Tool Properties

Tool Properties tab shows the properties per each tool. The user can change (in some of the parameters) the minimum, maximum and actual value.



1.1.1.4. Errors tab



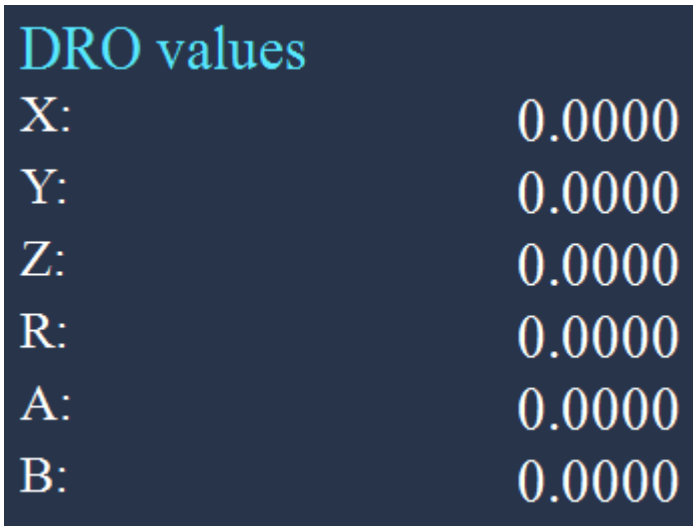
Tag	Commands	I++ Code	Severity	I++ Description
0002	PtMeas()	14	1	No arguments provided.

- Tag – I++ unique tag id.
- Commands – I++ command
- I++ Code – I++ predefined error code (as defined on DME specification).
- Severity – Default error severity classification
  0: Info
  1: Warning, level 0 and 1 doesn't interfere with pending commands
  2: Error, client should be able to repair the error
  3: Error, user interaction necessary
  9: Fatal server error
  Only errors with classification higher or equal 2 require ClearAllErrors().
- I++ Description - I++ error description.

1.1.2. Right pane

1.1.2.1. DRO

The DRO shows current X, Y, Z coordinates (and R if a rotary table is activated) and probe orientation (A, B angles).



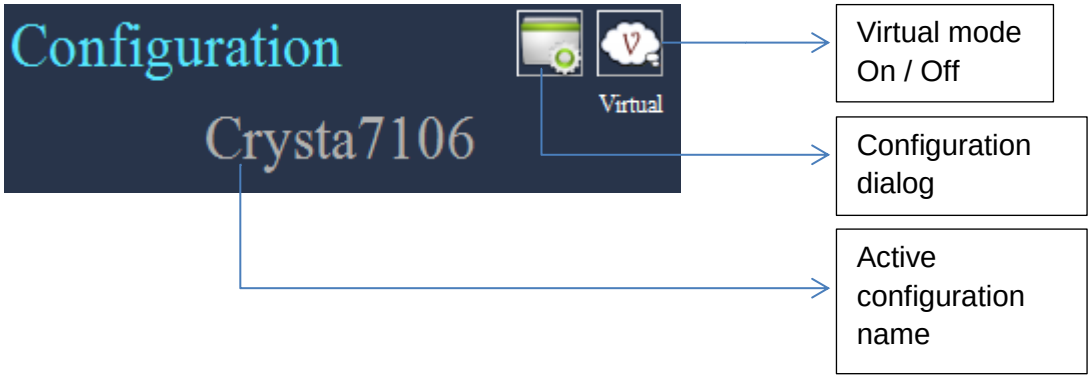
1.1.2.2. Configuration

The Configuration section shows the active configuration name.

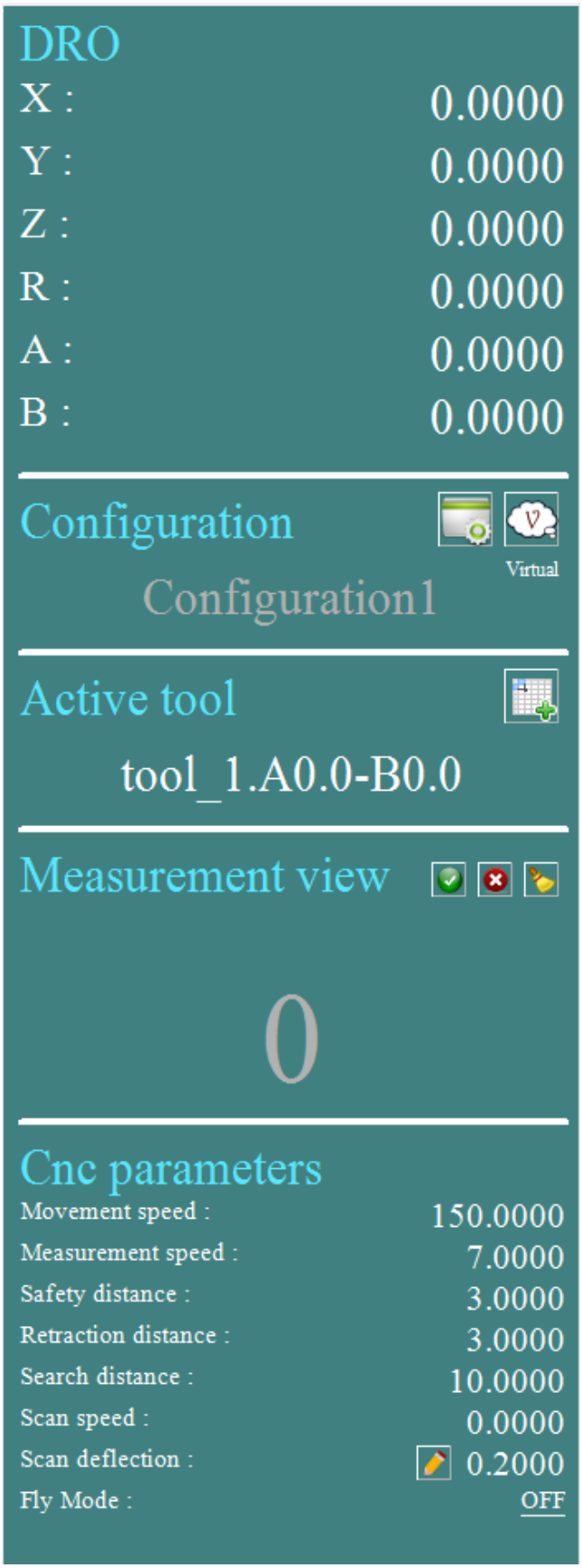
User can choose to connect online or offline (virtual mode).

User can change, create, delete and edit any configuration.

User can change, create, delete and edit any configuration items & settings.



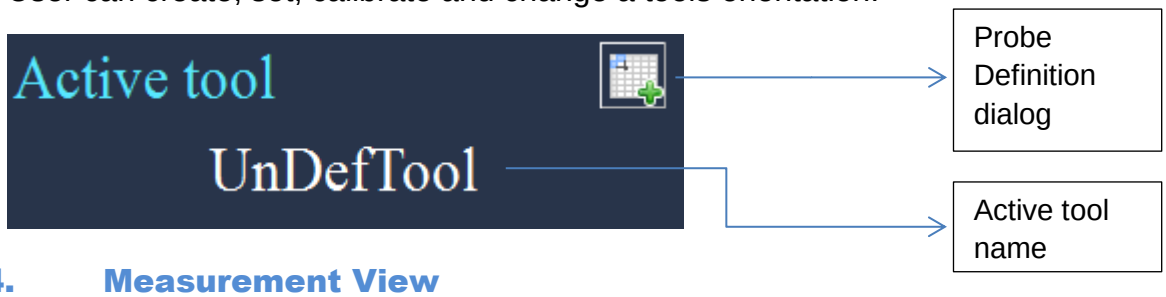
When **Virtual** mode is on, the Right pane will have different color and the virtual on will be indicated on the status bar.



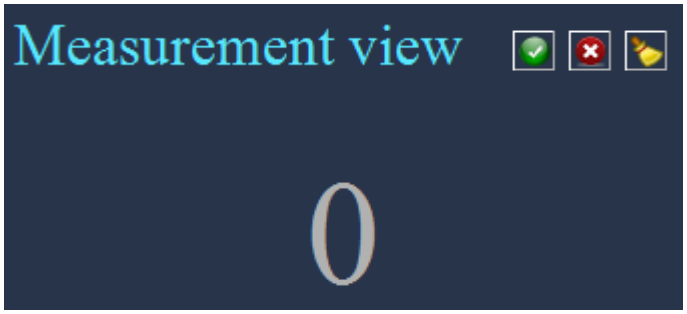
1.1.2.3. Active Tool

The Active tool section shows the active tool name.

User can create, set, calibrate and change a tools orientation.



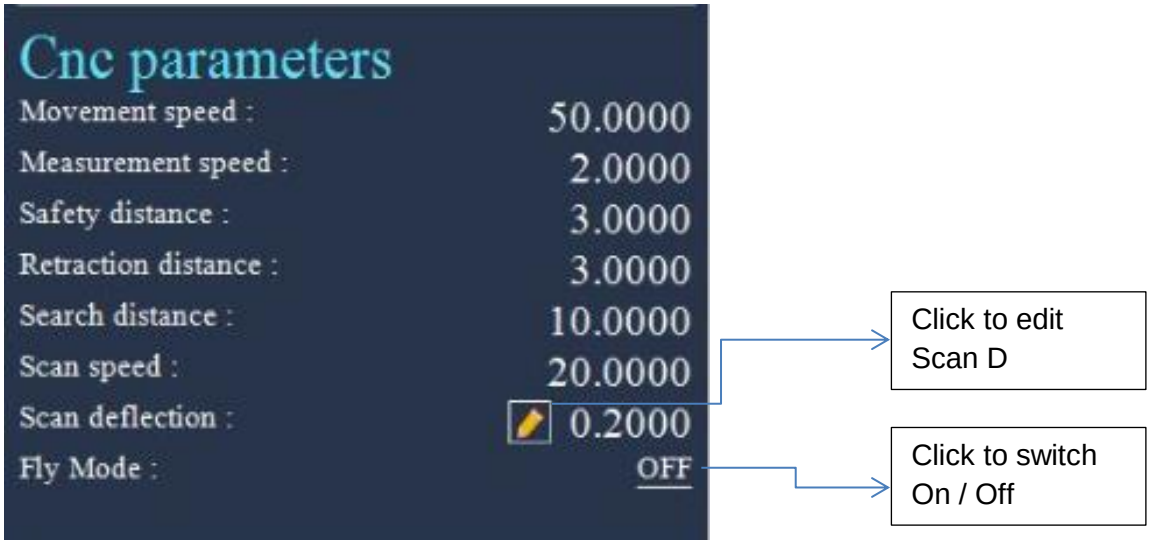
1.1.2.4. Measurement View



- Done - Signals an operation should be finished
- Delete - delete a function call or a measured point
- Clear counter

1.1.2.5. CNC parameters

The CNC parameters shows the active tool automatic modes basic activated parameter values that the controller uses when driving the machine on GOTO, PTMEAS or SCAN command.



- Move Speed - Speed when the CMM moves between the measurement points.
- Measure Speed – Speed when the CMM is moving to probe the part.

- Safety Distance - The distance between the theoretical probe point on the surface of the piece and the point where the CMM changes from movement speed to measurement speed.
- Retract distance - Defines the distance that the probe retracts from the workpiece after each probe hit.
- Search Distance - The maximal distance the CMM will move in measurement speed in order to probe a point.
- Scan Speed – Used when the CMM is scanning.
- Scan Deflection - The measuring probe deflects when scanning a work piece during measurement. The deflection will not go beyond the limits of the defined value.

1.1.3. Status Bar

The Status bar shows in real time the relevant status of some important parameters.

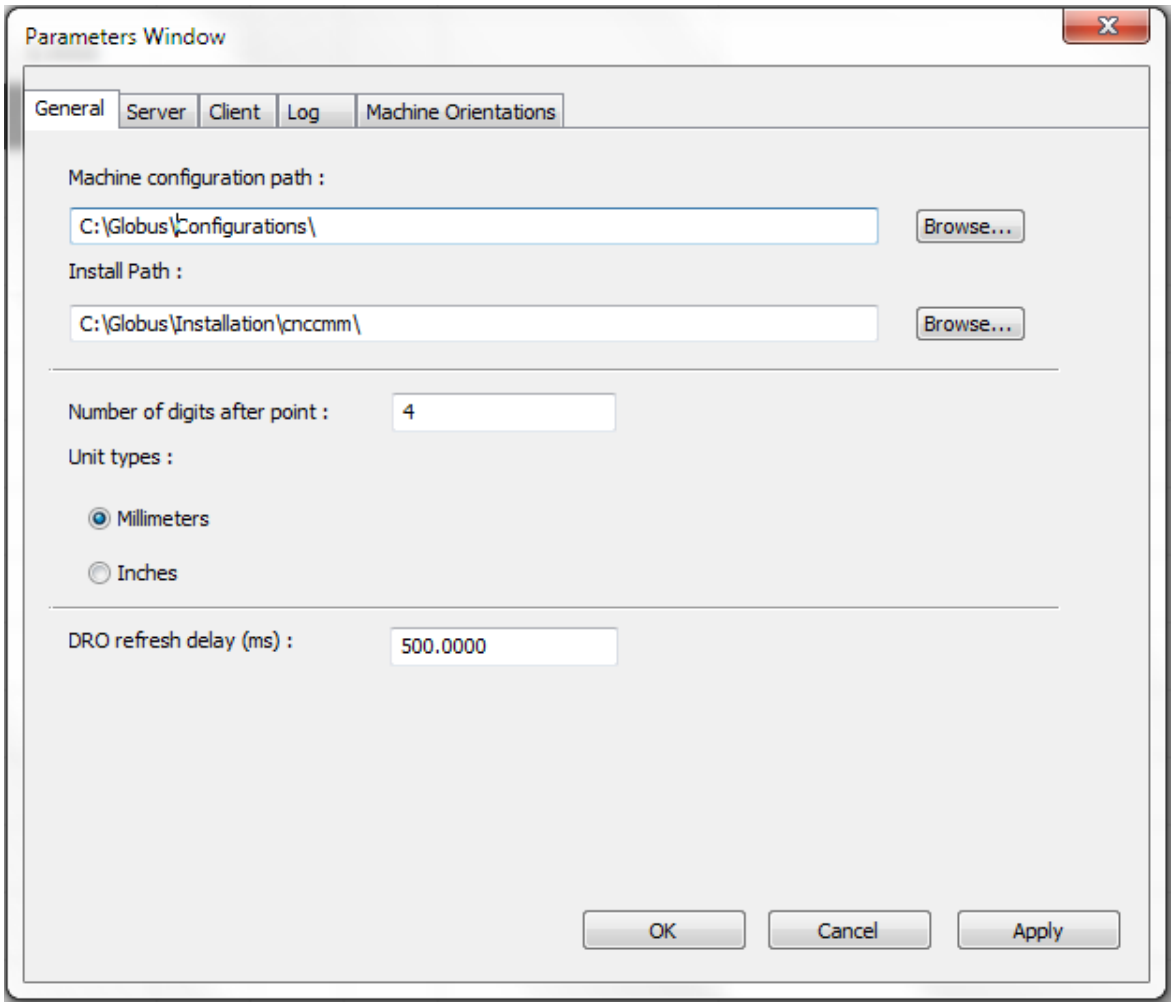
- Client IP – IP address of the computer which runs the client software.
- Power On – Shows connectivity with the controller.
  - On (Green) – Server is connected to the controller.
  - Off (Red) – Server is disconnected from the controller.
- System Ready – Shows the status of the server while executing commands.
  - Green light – Server is ready for next operation.
  - Red light – Server is busy with uncomplete command (a command didn't come to its end and no 'complete' reply was issued).
- CNC – Shows whether the controller is in CNC (automatic) mode or Manual mode.
  - Green light – CNC (automatic) mode.
  - Red light – Manual mode.
- Virtual – Shows weather the server is in virtual (Offline) mode or not.
  - Green light – Virtual (Offline) mode.
  - Red light – CMM connection mode.
- Fly – Shows if fly mode is On / Off.
- Error Map – Shows if an error map is activated and the controller uses this map while sending the coordinates.
  - Green light – Error map is used.
  - Red light – Error map is not used.
- Client software name – Shows the used client software as defined on parameters tab.
- Millimeters / inches – Shows the active units.
- Decimals – Shows the active decimal format.
- Error – Shows the last error description.

2. Parameters

2.1. UM

UM – Universal Machine – The layer that handles all communications between I++ server and the drivers (which communicate with controllers).

It is also handles all configurations, i.e. machines, controllers, tools, spheres, tool changers etc.



2.1.1. Machine Configuration Path

The path used for all configurations folders. When clicking the configuration button, the dialog will show all configurations under this path.

2.1.2. Install Path

The path used for all components database, i.e. heads, modules, probes, tool changers, etc.

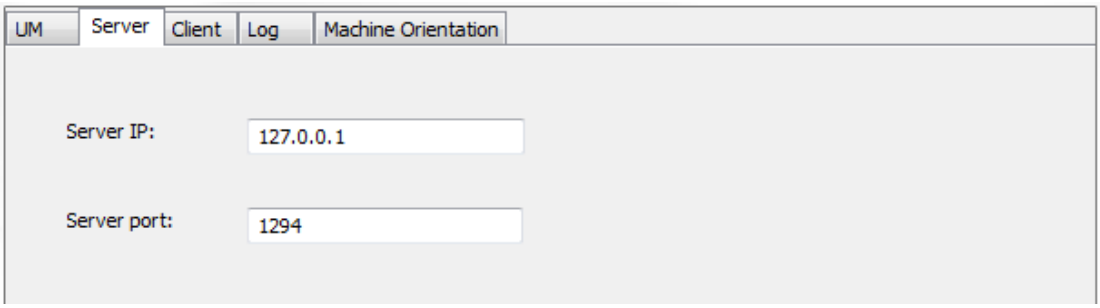
2.1.3. Number of Digits after Point

Number of decimal places for all numeric values.
Unit Types: mm / inch – The unit type for all numeric values.

2.1.4. DRO Frequency

The value is sent to the controller when 'OnMoveReportE' command is issued, sets the DRO time interval that the controller sends to the server and the server to the client.

2.2. Server



2.2.1. Server IP & Port

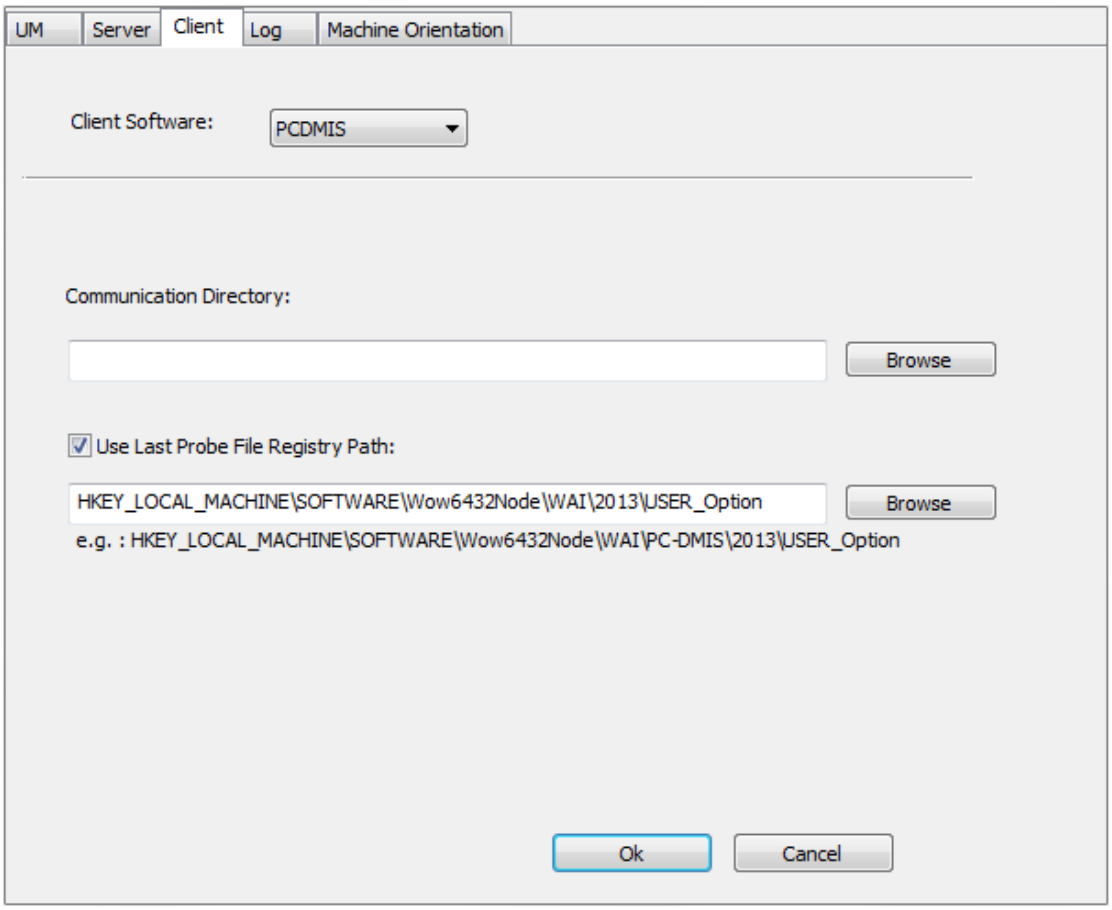
IP address of the computer which runs the I++ server.

The port used for I++ communication.

2.3. Client

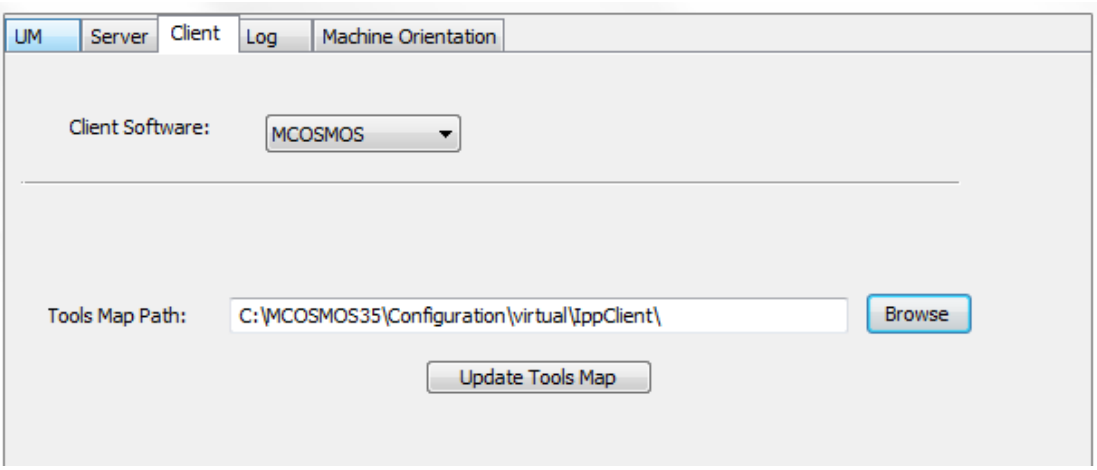
Client section is used to define which I++ client is used. Some relevant parameters per each client can be defined.

2.3.1. PCDmis parameters

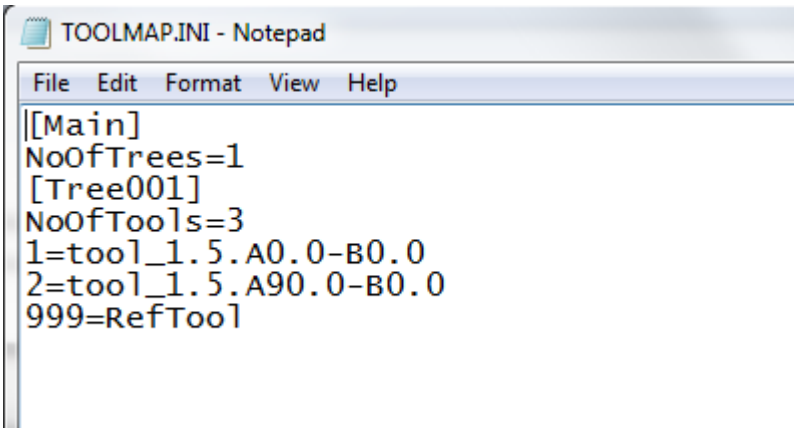


- Communication Directory –
  This directory is used when the user wants to use the 'Mark Used' button and simulate the 'Mark Used' functionality in PCDmis (which is disabled when used as I++ client).
  It is the location folder where PCDmis will creates the part program used probe orientation file (after running a VB script from the part program). When the server finds this file and the 'Mark Used' button is pressed, all used probes will be marked, so they can be calibrated automatically with the calibrate tool button .
- Use Last Probe File Registry Path – The server will update PCDmis with the last used tool, so when PCDmis loads it will know if a tool change was executed in the server. This operation will be executed only when PCDmis is not running and the registry path is correct.
  User must enter the registry path for the last used probe (filename).

2.4. MCosmos parameters

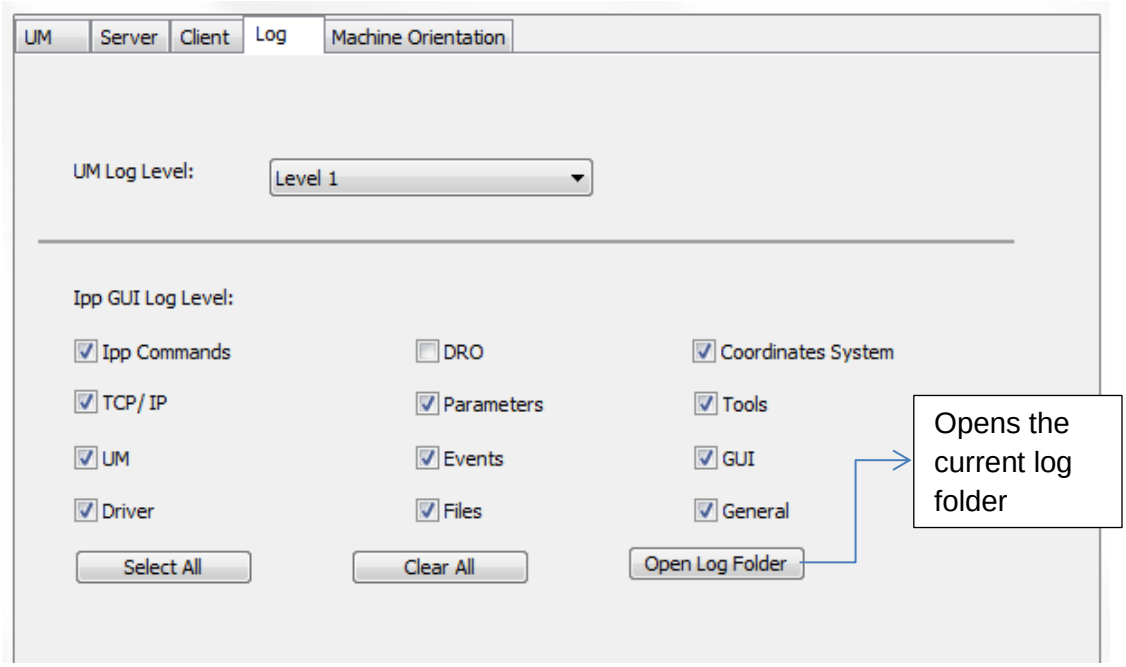


- Tools Map Path – This path is used when the user wants to have the tools tree structure in MCosmos. When pressing 'Update Tools Map' button it will organize the 'ToolMap.Ini' file in a tree structure order, so MCosmos will have the change tree functionality and the user will see in the 'Probe Data Management' only the current tool orientations.



2.5. Log

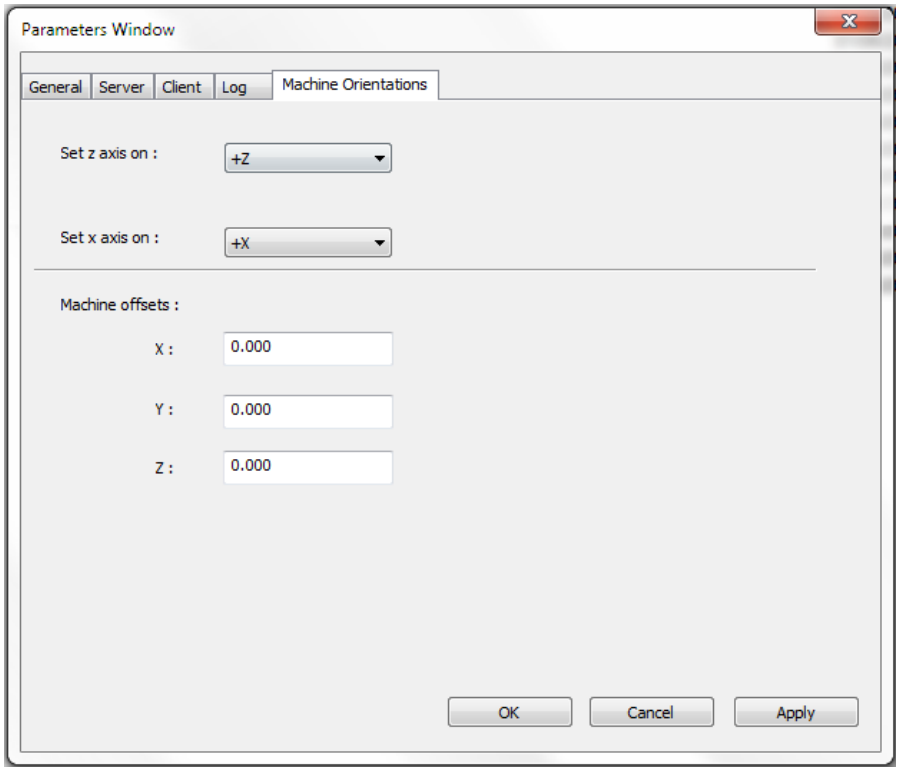
In this section the user can pick the UM log level and the I++ GUI log level.



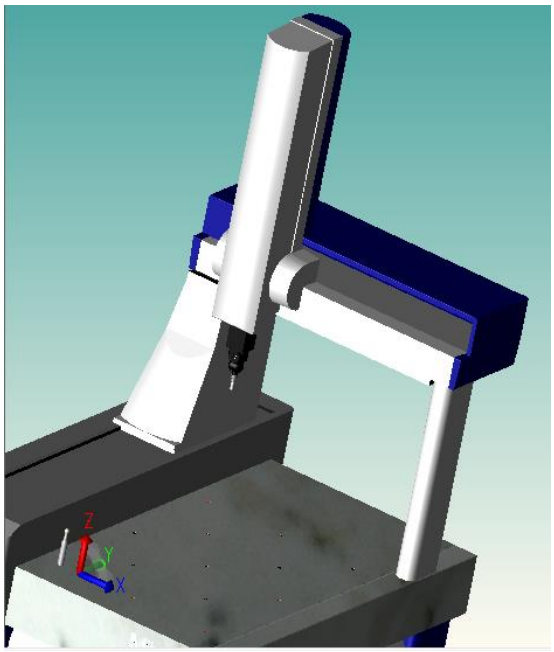
- UM Log Level – Universal machine (and drivers) log level. From Level 1 (the less detailed) to Level 4 (the most detailed).
- I++ GUI Log Level – The user can select any source to log out to the log file.

2.6. Machine Orientation

In This section the user can define the machine orientation i.e. the coordinate system orientation representing the machine coordinate system and machine offsets.

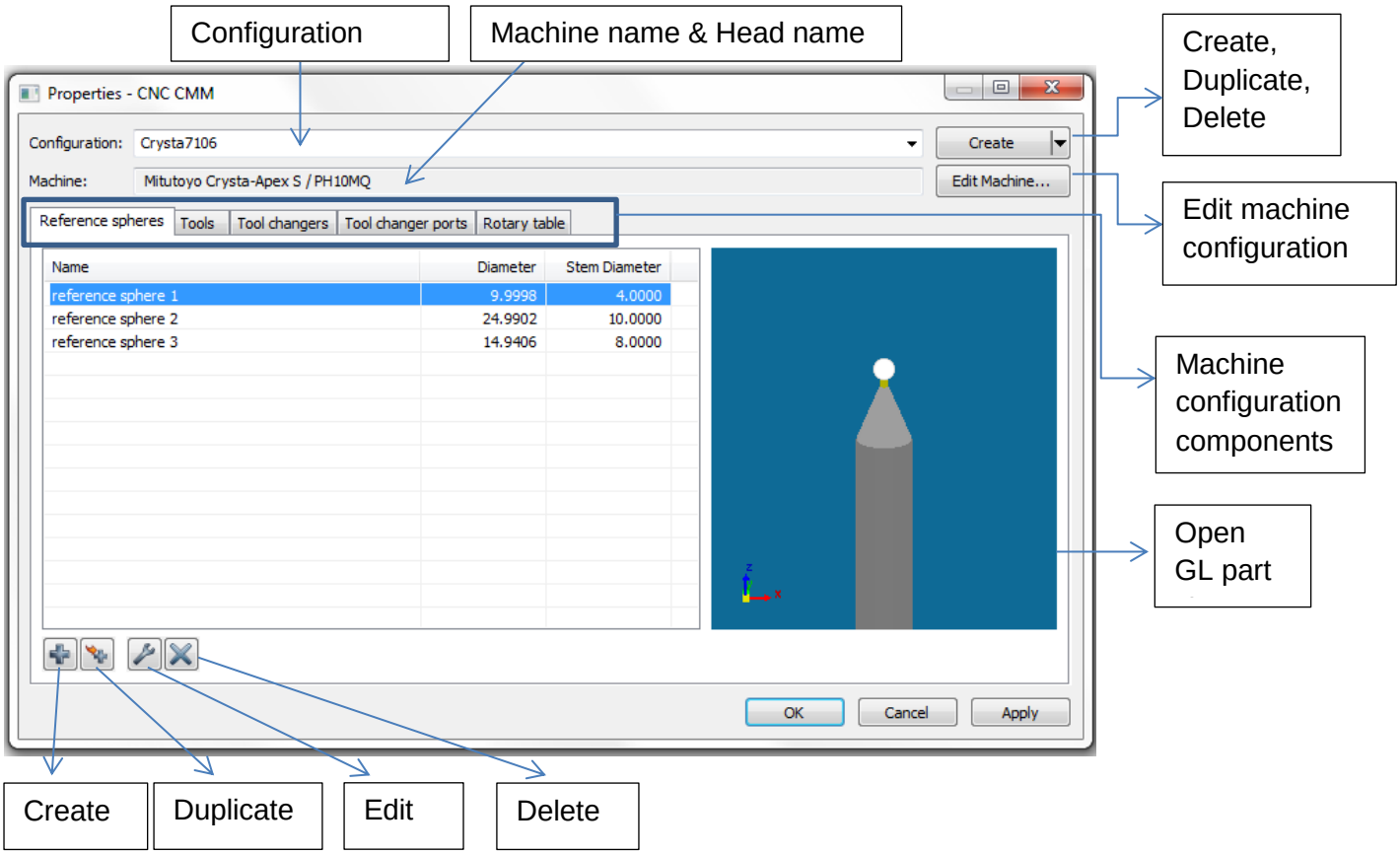


For example, in the defined case above, the orientation when facing towards the front of the machine will look like this:

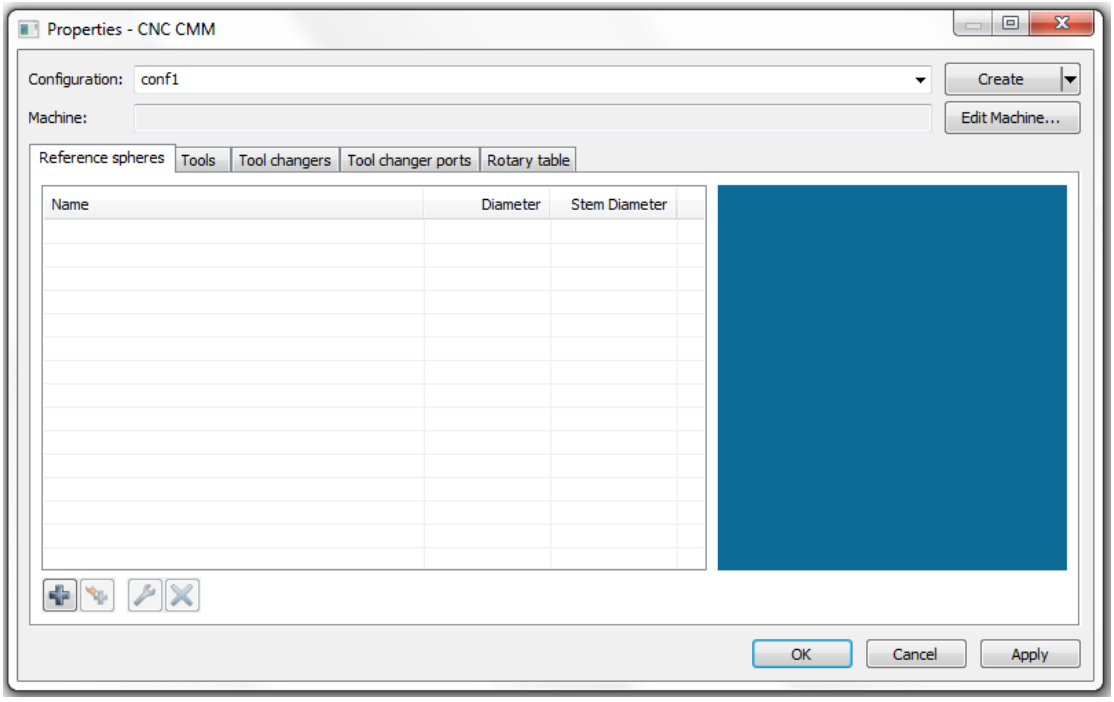


3. Set Configuration

In this dialog the user can create, duplicate, delete and edit a CMM configuration.



3.1. Create Configuration



To create new configuration, click on the create/duplicate/delete option box.

The dialog will reopen and the server will be disconnected (if connected).

The user can name the configuration in the configuration text box.

The new configuration will be activated.

3.2. Create Duplicate Configuration

To create a duplicate configuration, choose this option from the create/duplicate/delete combo box.

The current configuration will be duplicated to a new one with a different name.

The new configuration will be activated.

3.3. Delete Configuration

To delete a configuration, choose this option from the create/duplicate/delete combo box.

The current configuration will be deleted and the next configuration, if exists, will be activated. If no configuration exists, a new one will be created.

3.4. Change Configuration

To Change the active configuration (machine), choose a different one from the configuration combo box.

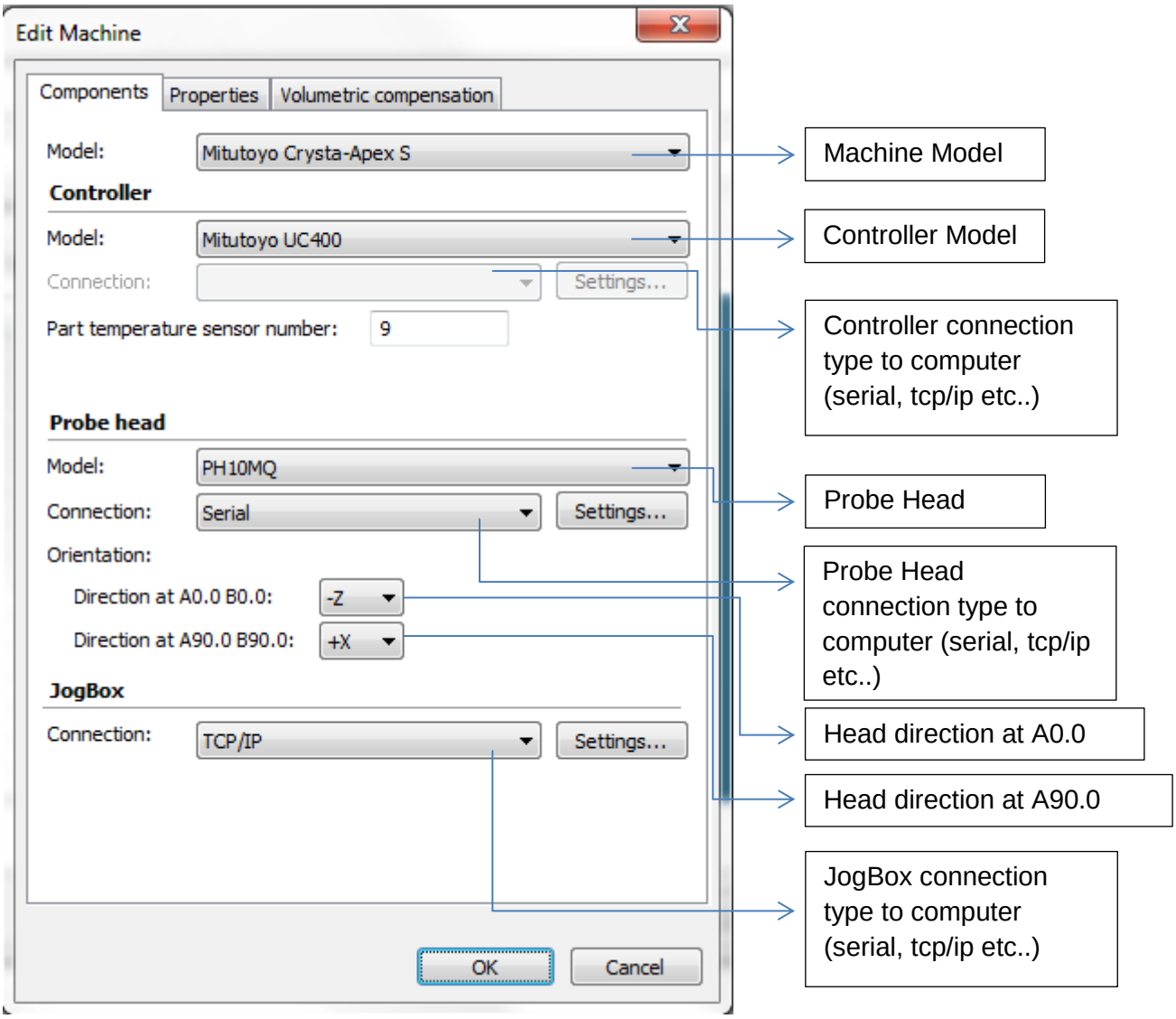
The dialog will reopen and the selected configuration will be activated.

3.5. Edit Machine

To edit the selected configuration press the 'Edit Machine' button.

3.5.1. Components

Set the components of the selected configuration.

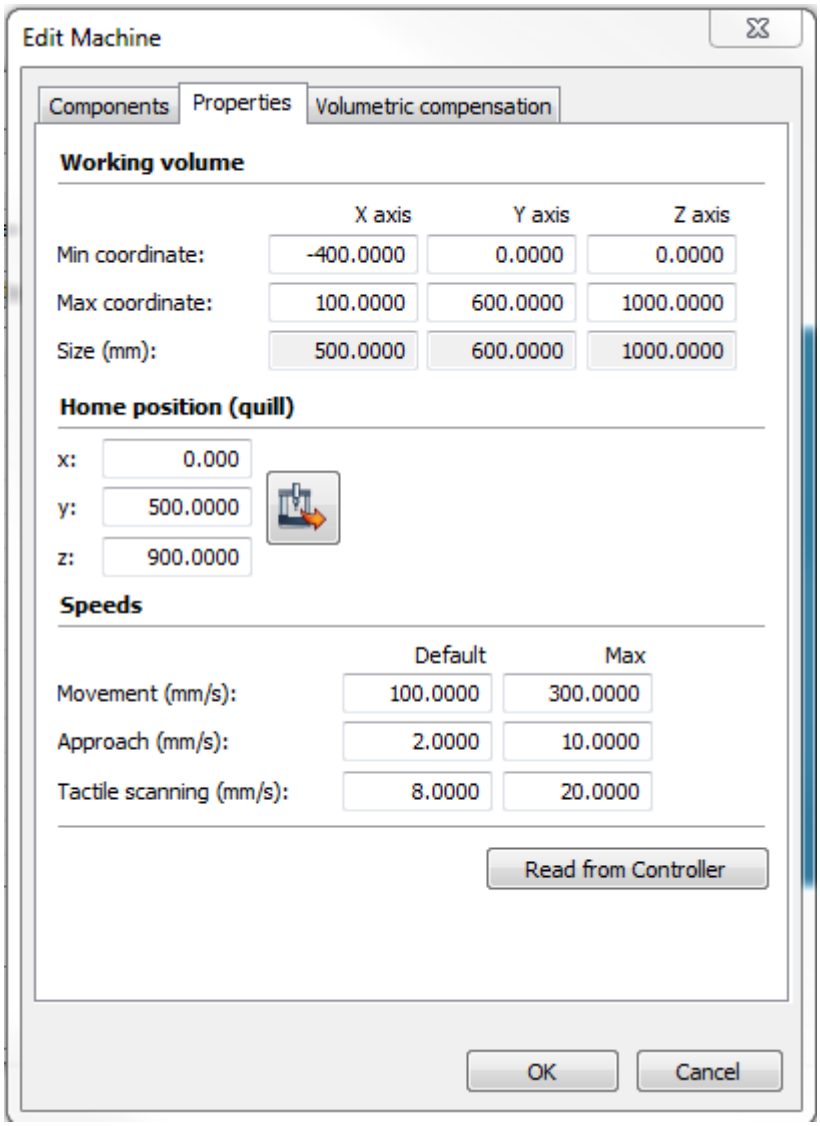


Machines with temperature compensation have sensors that sample the temperature. These sensors are indexed.

Part temperature sensor number - The sensor that samples the part temperature.

3.5.2. Properties

Set size and basic default speeds of the machine.



Working Volume:

Min Coordinate – Minimum coordinate value of each axis.

Max Coordinate – Maximum coordinate value of each axis.

Size – Absolute working volume size.

Home Position – Coordinate system of the "software" home position (as opposed to initialization home position).

 - Read coordinates from machine – Reads the current X, Y, Z position from machine and fill in the fields, respectively.

Movement Speed – Set default and maximum speed used when the CMM moves between the measurement points.

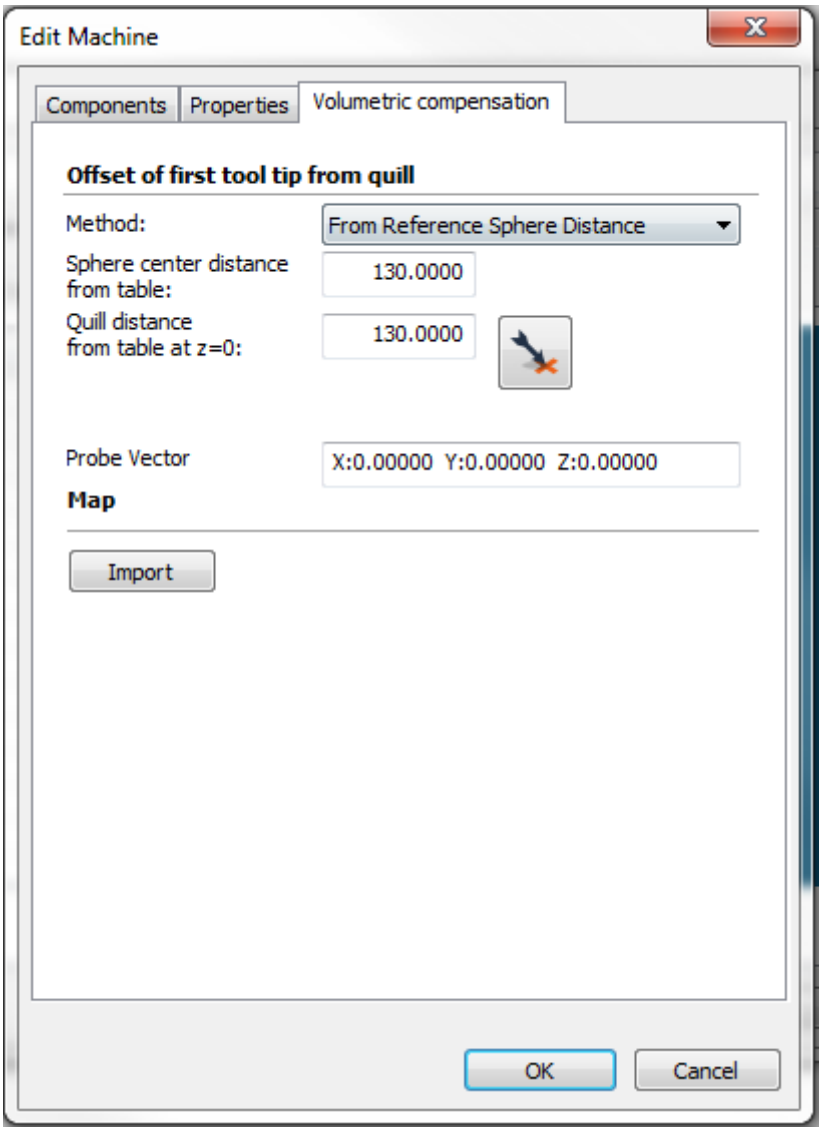
Approach Speed – Set default and maximum speed used when the CMM is moving to probe the part (also known as measurement speed).

Tactile Scanning Speed – Set default and maximum speed used when the CMM is scanning.

Read From Controller – The server will try to read as much as possible the above parameters and set them automatically as defined in the controller. (Not supported by all controllers).

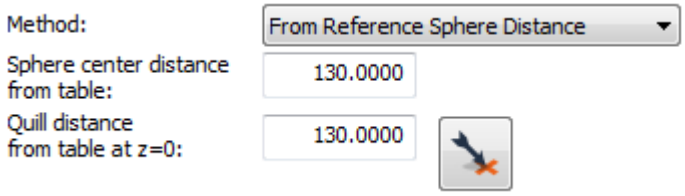
3.5.3. Volume Compensation:

In order to execute compensation at the actual measurement place, the server must know the offset from Z-spindle to stylus tip. This value is known as Probe Vector.



There are three methods to define the offset of first tool tip from quill:

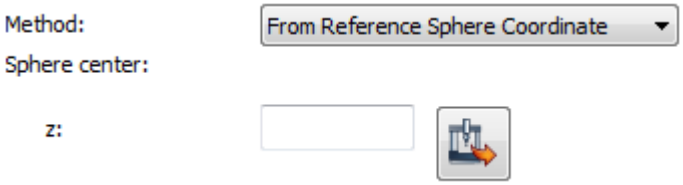
- From Reference Sphere Distance



Sphere center distance from table – Defined from the table to the center of the masterball.

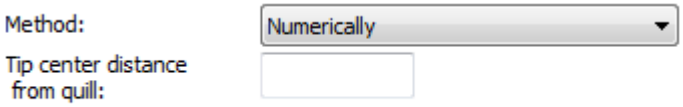
Quill distance from table at z=0 - To set this distance, you must move the Z-spindle to Z = 0. Normally, you have to remove your probe system to determine this distance.

- From Reference Sphere Coordinate



Set the 'Z' coordinate of the reference sphere center.

- Numerically

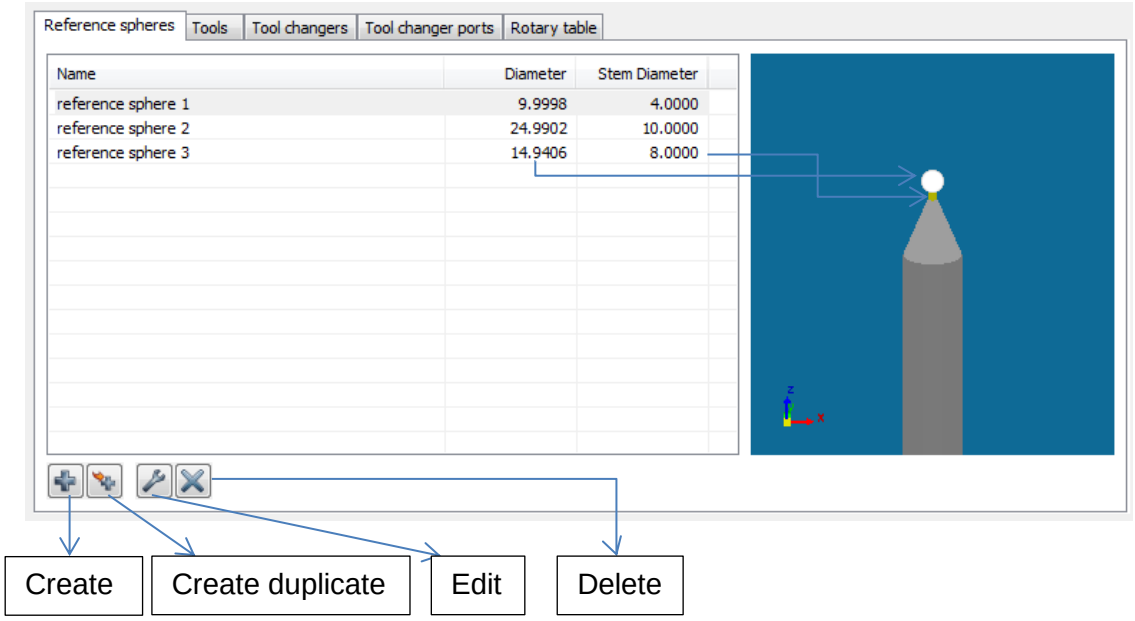


- Tip center distance from quill – Set the stylus tip center distance from quill.

Error Map

User can import the error map file of a machine.

3.6. Reference Spheres

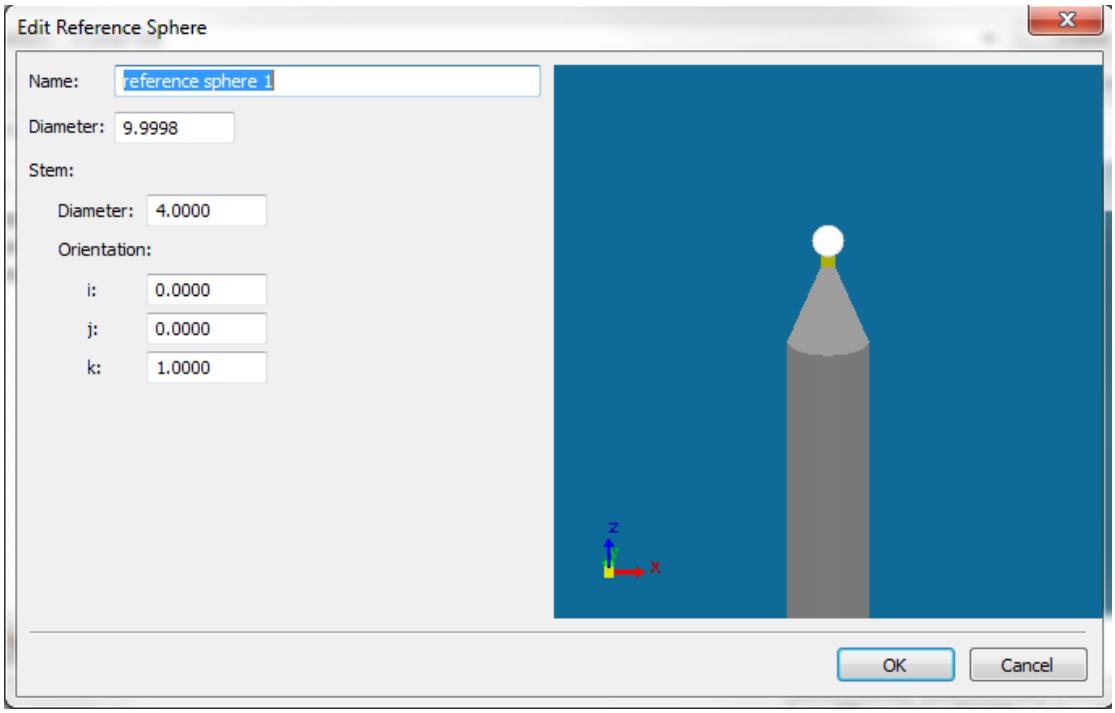


Create – Create a new sphere.

Create duplicate – Create a duplication of selected sphere and rename it.

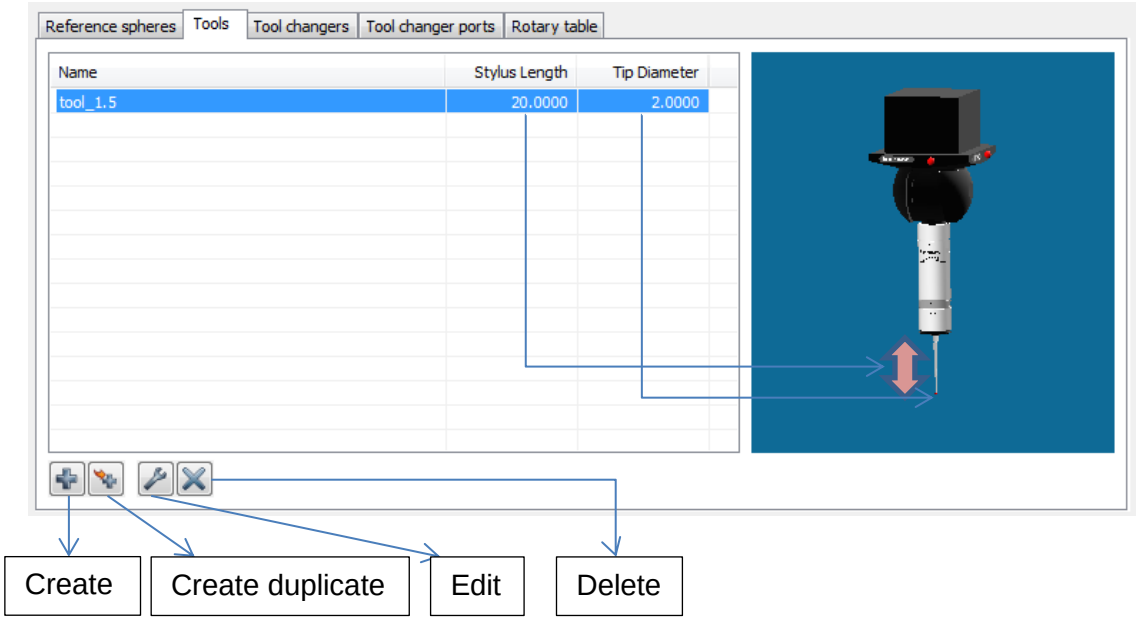
Delete – Delete selected sphere configuration.

Edit – Edit configuration of selected sphere

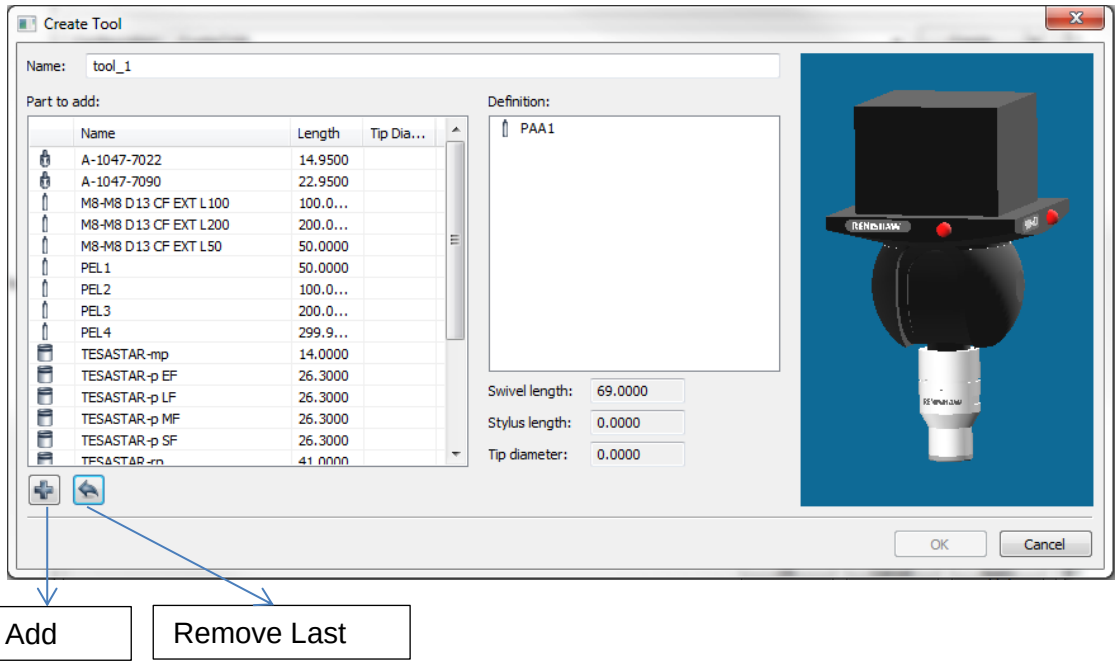


Orientation – Sphere orientation while calibrating.

3.7. Tools



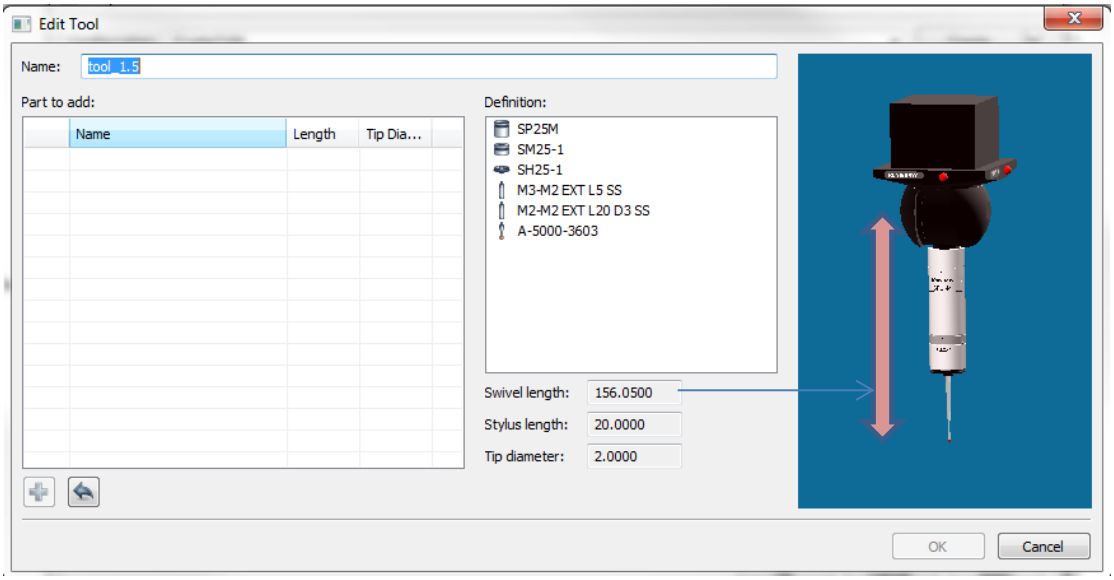
Create – Create a new tool.



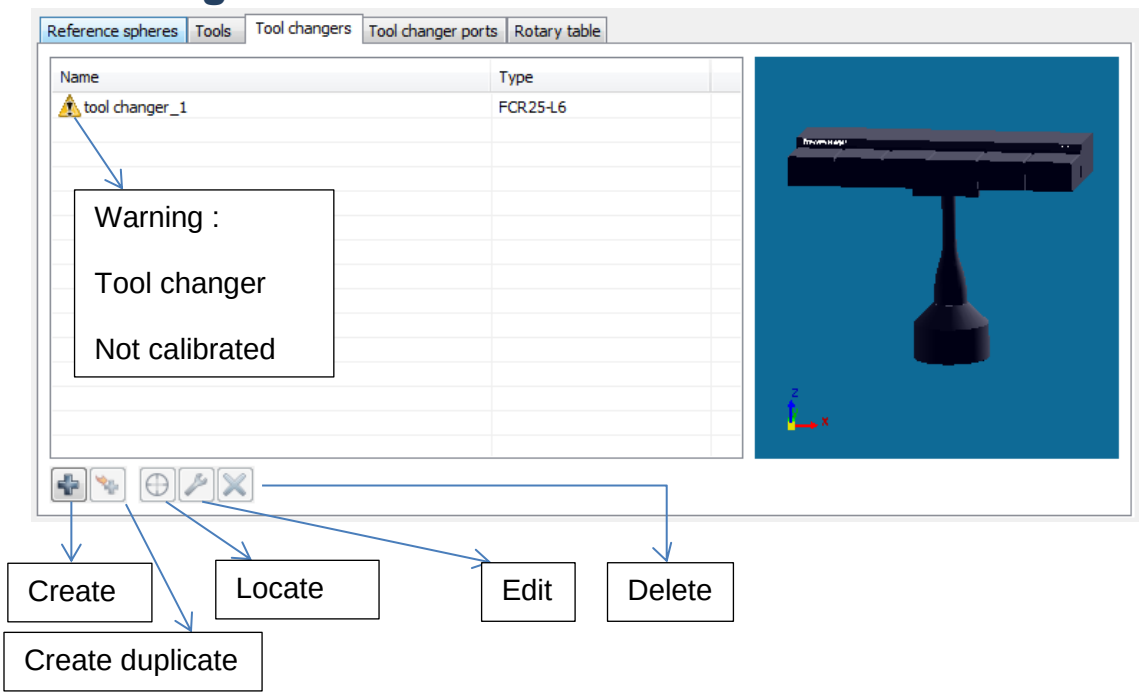
Add Part – Add the selected part to assembled tool.

Remove Last Part – Remove the last part from assembled tool.

Edit – Edit tool configuration



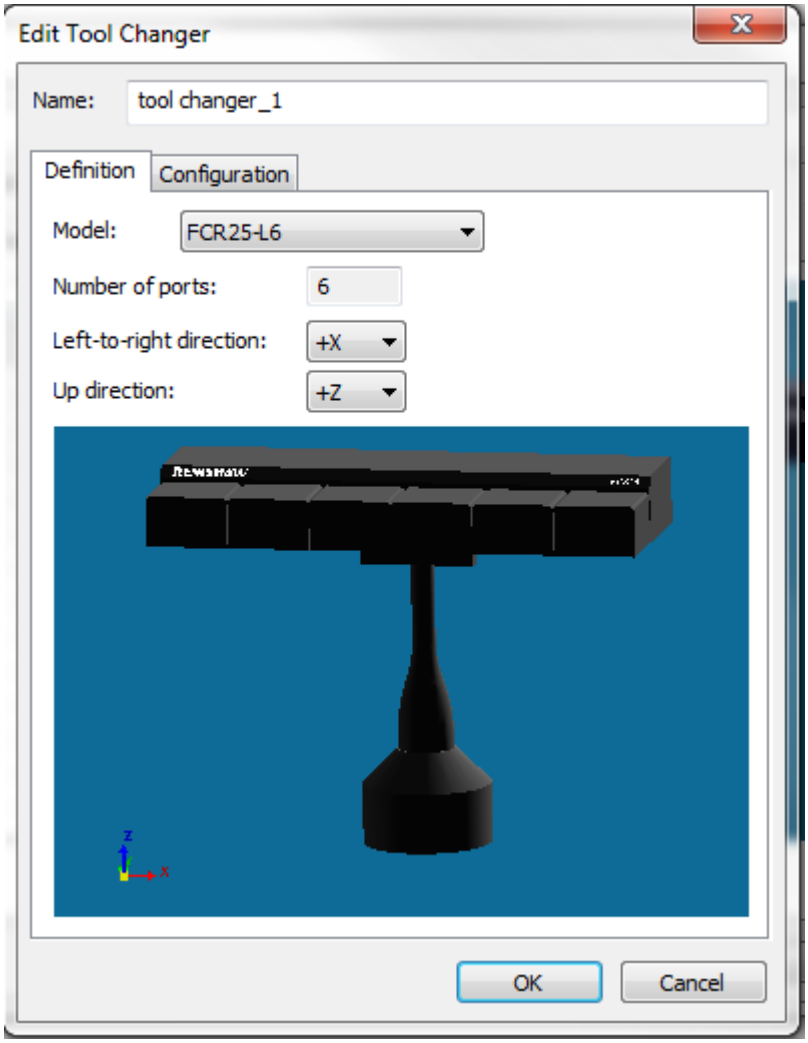
3.8. Tool Changers



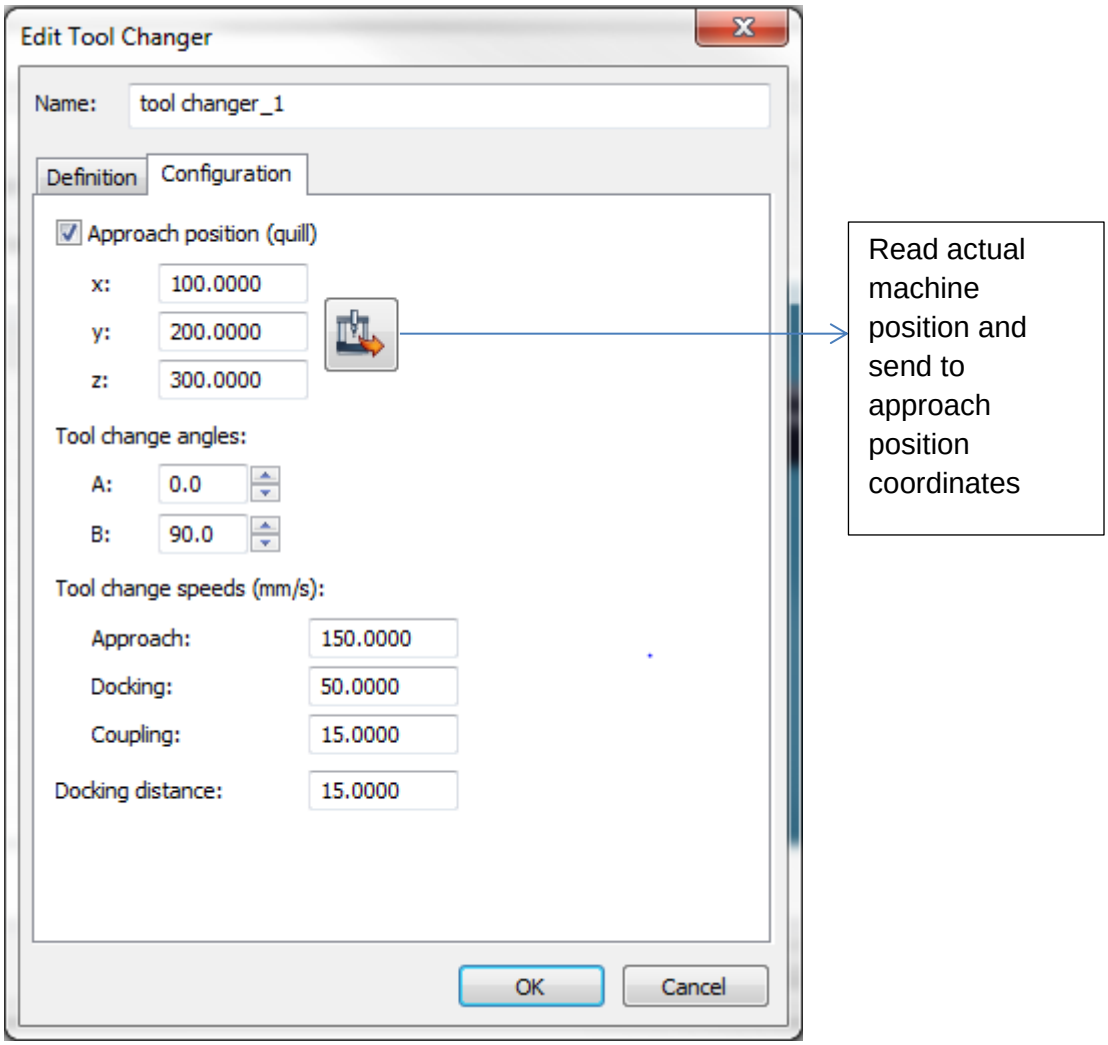
- Edit – Edit a selected tool changer

- Definition

Set the tool changer model, number of ports and orientation on the machine.



- Configuration



Approach Position – An intermediate position for the probe before entering the tool changer.

Tool Change Angles – Tool orientation angles 'A' and 'B' when entering the ports.

Tool Change Speeds:

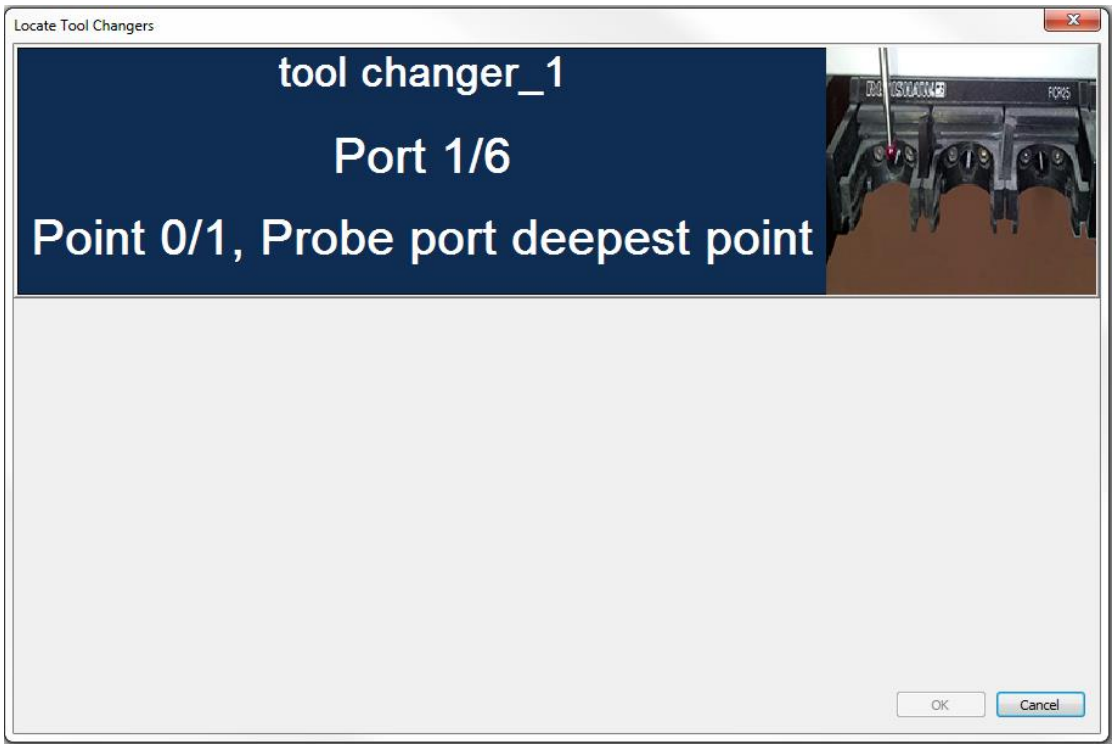
Approach – Speed while moving around the tool changer with a tool attached.

Docking – Docking speed (in and out from a port).

Coupling – Used while moving when no tool attached (after undocking and before docking).

Docking distance – A distance from a port, which sets the limit between, approach speed and docking speed.

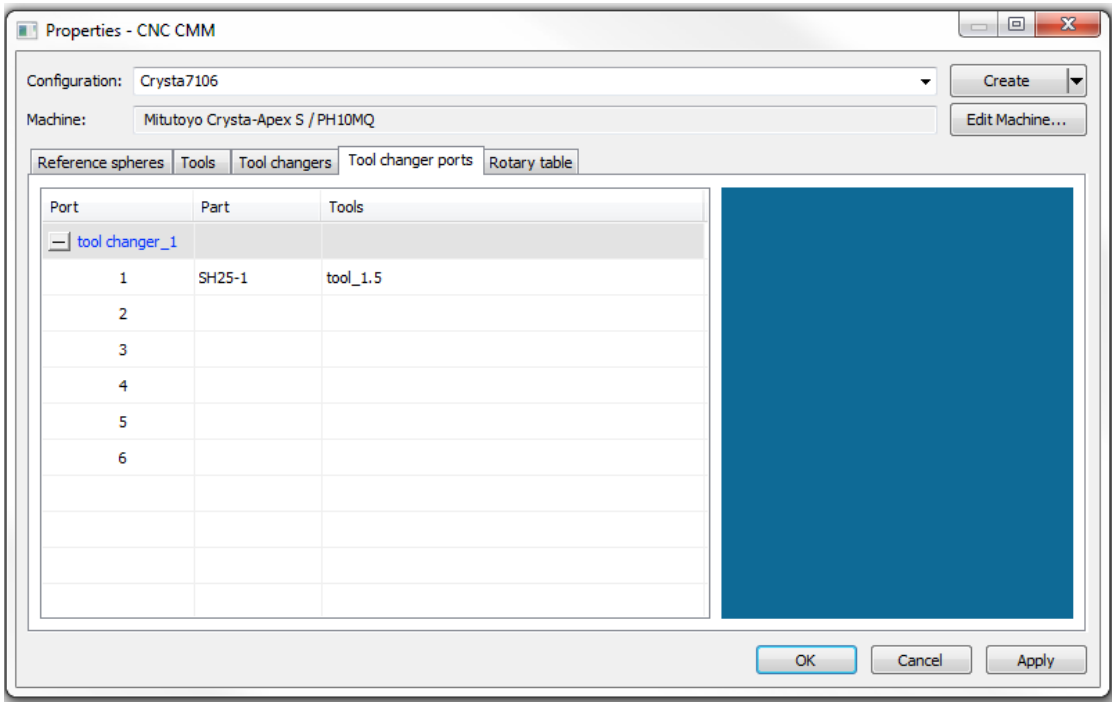
Locate Tool Changer



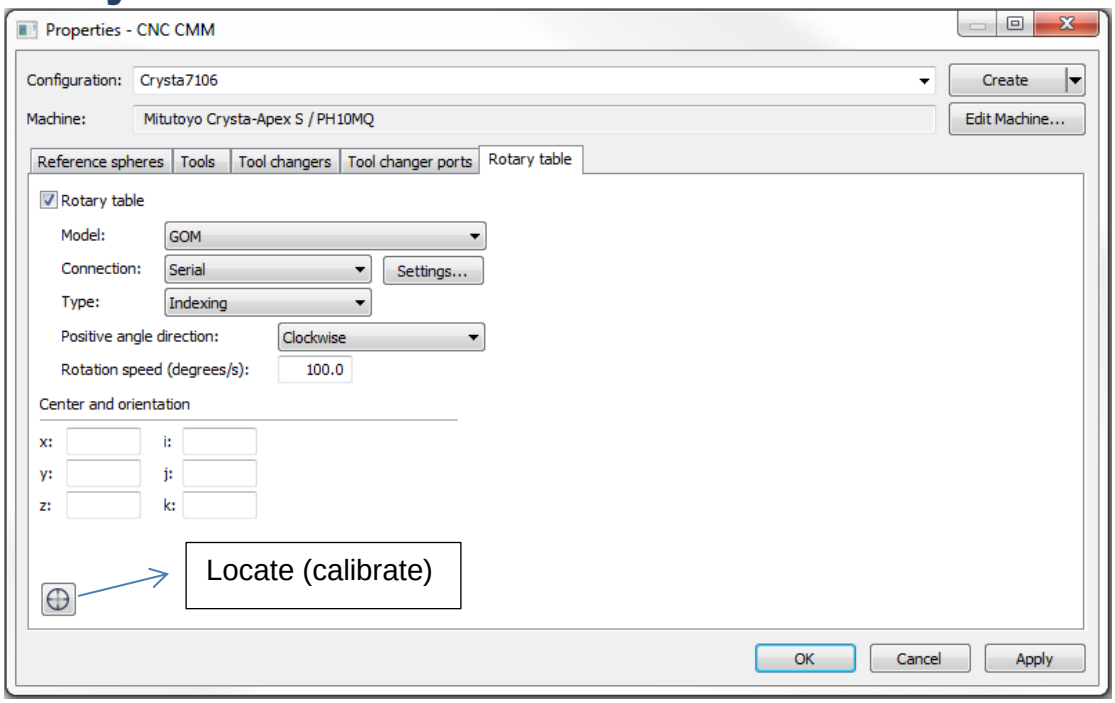
To calibrate a tool changer, please follow instructions on Locate Tool Changer dialog.

3.9. Tool Changer Ports

Set the tools and their components on the ports of the tool changer.



3.10. Rotary Table



Model – Set the model of the rotary table.

Connection – Set the connection type to the computer (i.e. serial, tcpip etc..)

Type – Set the rotary table type (i.e. Indexing or Continuous).

Indexing – Rotary table has fixed number of angles (rotation positions) and each angle should be calibrated to be used.

Continuous – User can rotate to any angle (rotation position). In this case calibration will take place just once.

Positive angle direction – Set the direction (clockwise / counter clockwise) for positive angle.

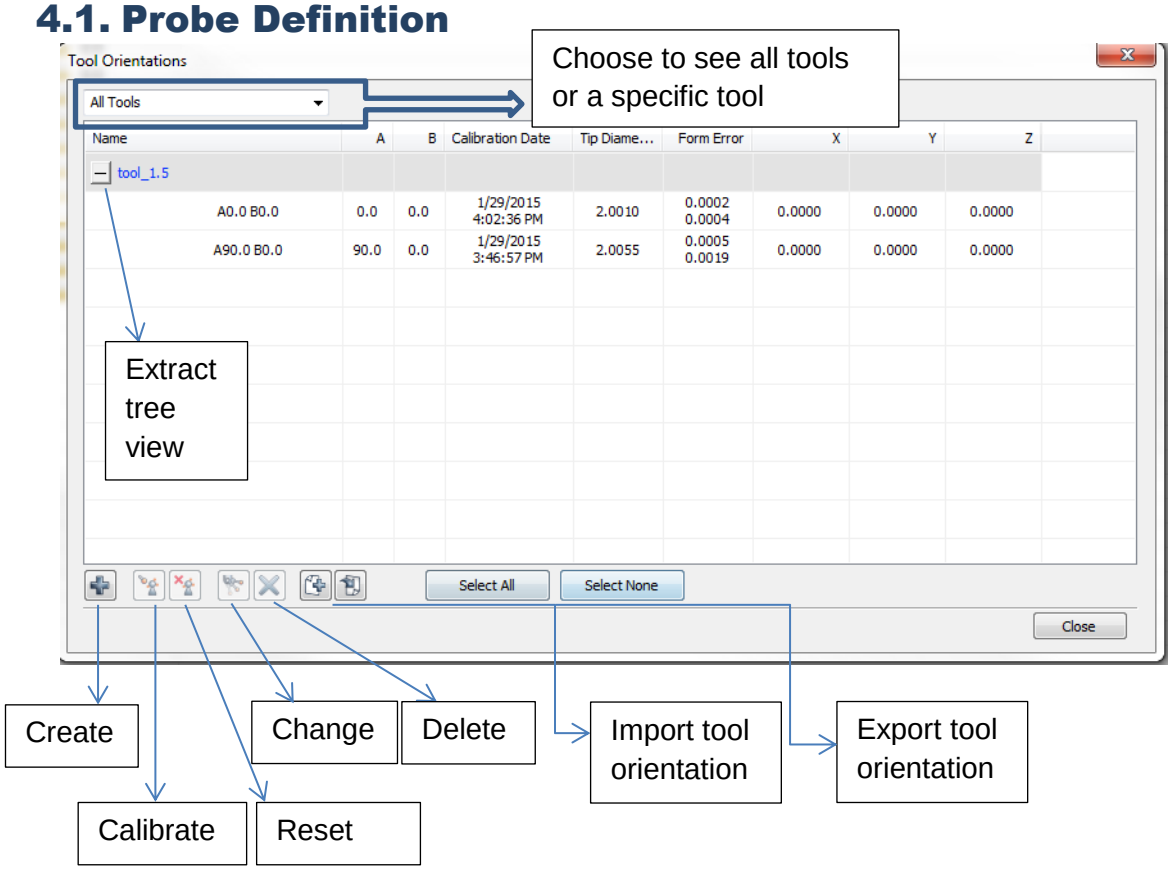
Rotation Speed – Set the rotation speed (degrees/second).

Center and orientation – Shows the rotary table center and orientation on the machine.

Locate – To calibrate the selected Rotary table please follow the instruction from the dialogs.

4. Set Tools

4.1. Probe Definition



Name – Tool orientation name (sorted by Groups, i.e. Tools).

A – 'A' angle.

B – 'B' angle

Calibration Date – Tool orientation's last calibration date.

Tip Diameter – If not calibrated, tip diameter will show nominal value. If calibrated, tip diameter will show effective diameter (calculated diameter out of the calibration).

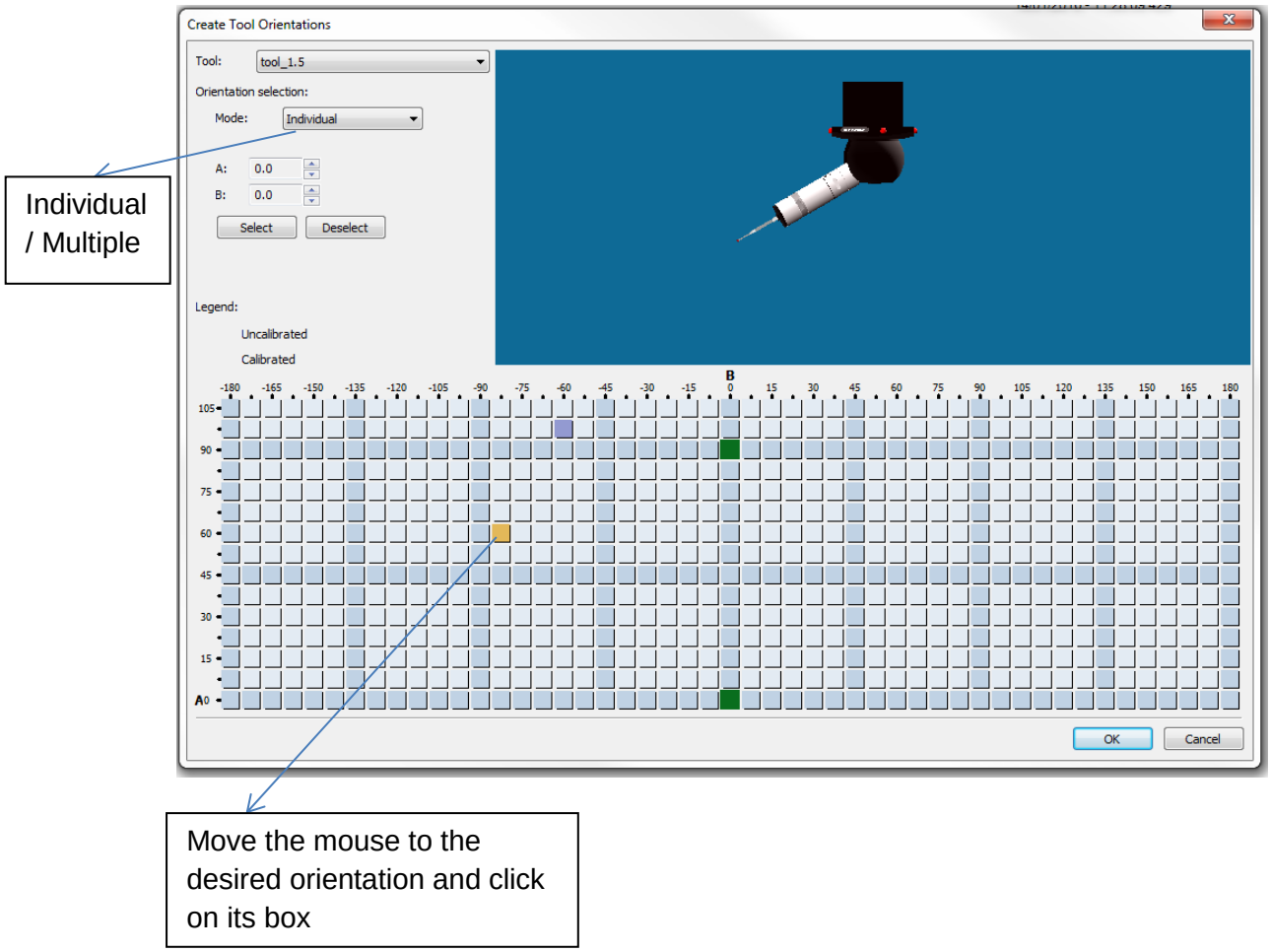
Form Error – Form difference of the sphere.

X, Y, Z – Offsets of orientation to the reference tool.

- When scanning probes are calibrated the user receives two different probe diameters and form errors,
  - One for touch measurement and the other for scanning measurement.
  - The values of the scanning probe are always the lower ones. Only the offset of the touching measurement is used.
  - For the probe radius compensation of scanning commands, the diameter of the scanning probe is always used.

4.2. Create

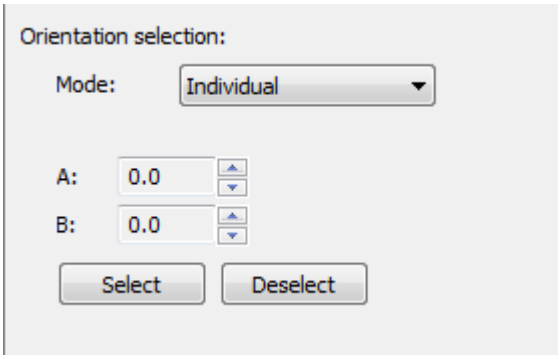
Create new orientations of selected tool.



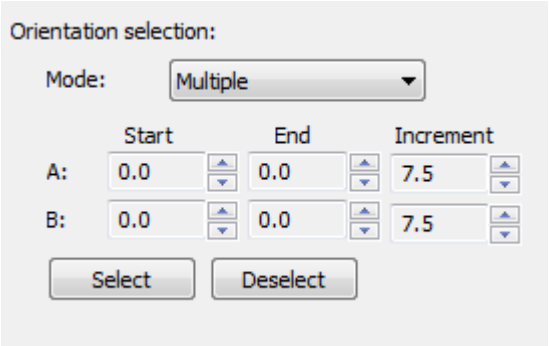
Calibrated orientation will be shown in green color.

Orientation selection:

Individual - By selecting the desired orientation box or selecting manually angle 'A' & 'B'.



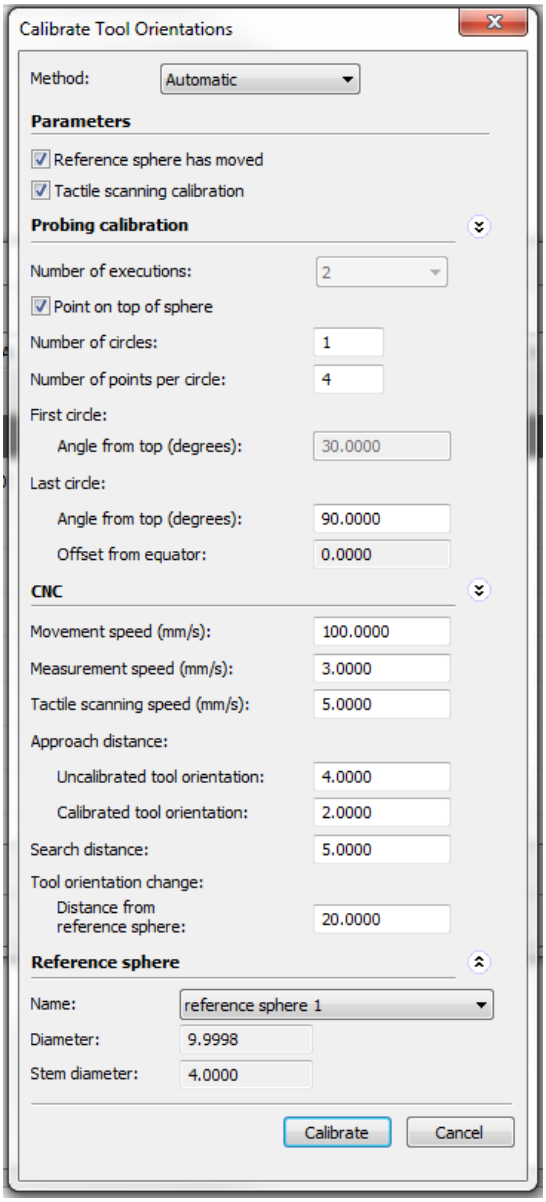
Multiple – By selecting start angle, end angle and step angle.



4.3. Calibration

There are two methods for calibration: Automatic and Manual

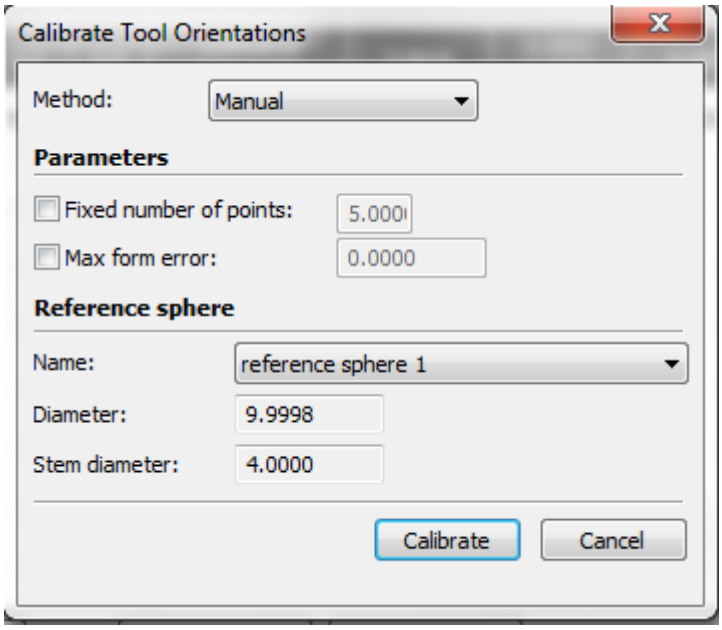
- Automatic



- Reference sphere has moved – To start calibrating the machine needs to know the masterball position.
  If it is already predefined (by calibration that was done before or a 'Locate Sphere' routine), the user can uncheck this checkbox and the machine will move automatically above the center of the masterball.
- Tactile scanning calibration - Check this option if a scanning probe is attached and you want to have the scanning routine while calibrating. In this case, calibration data for diameter, form and date will have two results, one is tactile result and the second is scanning result.
- Number of executions – Set number of executions.

- Point on top of sphere – Check this option if you want the machine to probe the first point on the center top of the sphere. Calibration is performed between the top of sphere and lower circle arc.
  If this option is unchecked, calibration is performed in the last circle arc (If number of circles set to 1) or between the first circle angle and last circle angle (If number of circles set to at least 2).
- Number of circles – Set the number of circles.
- Number of points per circle – Set the number of points per circle.
- First circle – Angle from top – Set the angle from top of sphere for the first circle (will be enabled only in if at least 2 circles are set in 'Number of circle' field.
- Last circle – Angle from top - Set the angle from top of sphere for the last circle (usually performed on equator).
  - 'Z offset' is calculated automatically out of last circle angle. It is the distance (in mm) from the equator (It is usually used when probe diameter is small and there is a shank risk while calibrating).
- CNC parameters – Set the speeds, approach and search distances for the calibration routine.
- Distance from reference sphere - This distance is where the probe change will take place.
- Reference sphere – Select the reference sphere for calibration routine.

- Manual



- Fixed number of points – Check this option if you want to enter a fixed number of points to take on the masterball. If it is checked, enter the number of points.
- Max form error – Check this option if you want the calibration to be accepted if it does not exceed the form error value that you set.
- Reference sphere - Select the reference sphere for calibration routine.

4.4. Reset calibration

Resets all actual calibration data (diameter, form error, date, offsets) of the selected tool.

4.5. Change

If no tool is set (after connect or after a collision), this button will set the selected tool.
If there is an active tool set, this button will change to the selected tool.

4.6. Delete

Delete the selected tool.

4.7. Import tool orientations

User can import a saved tool orientation table from a file.

4.8. Export tool orientations

User can export the existing tool orientation table to a file.

5. Prepare Client Software As An I++ Client

See attached documentations:

- MCOSMOS setup for I++.doc
- PC-DMIS as I++ Client_V1.3.pdf

6. Shortcuts

CTRL+L – Opens log folder.

7. License Options

License options show the activated licensed modules of the software.