CALYPSO Advanced Navigation 2019

CALYPSO Software

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Navigation Selections

Navigation within the feature strategy window

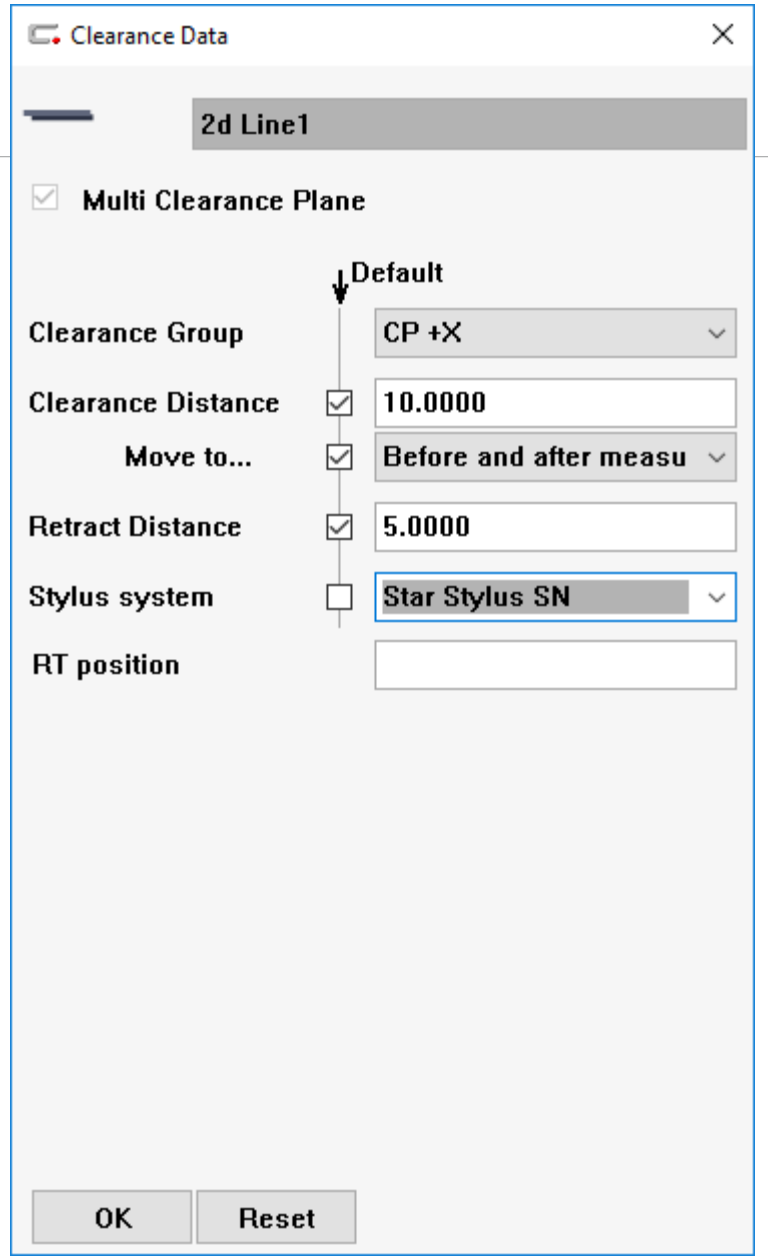
CALYPSO Advanced Navigation
Basic Navigation – Clearance Data

Usual Navigation:

- ✓ Clearance Planes - Choose to approach the part from one of the six sides of the safety cube.

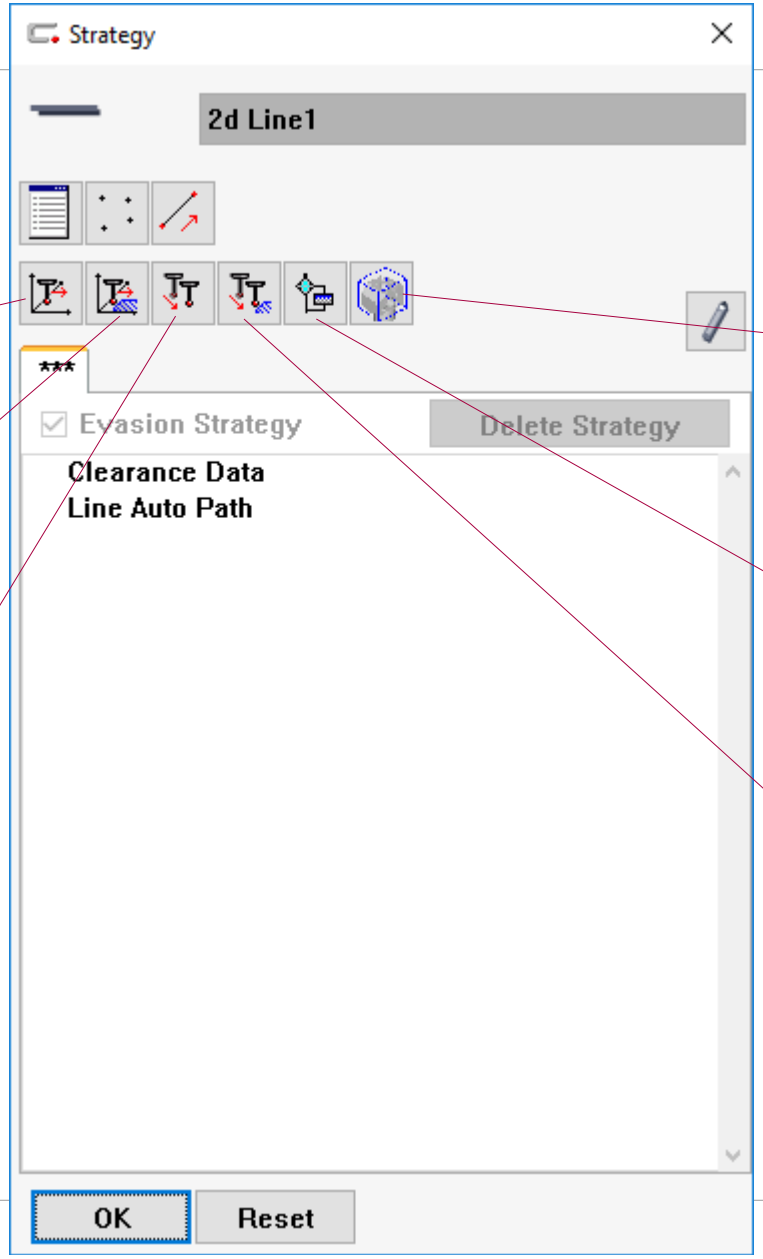
- ✓ Clearance Distance -10mm default distance normal to the feature.

- ✓ Retract Distance - 5mm default distance opposite of the probing direction.



CALYPSO Advanced Navigation

Feature Strategy



CMM Position Point

Probing Point

CMM Step (Without Probing)

Clearance Data

Programmable Stop

CMM Step (With Probing)

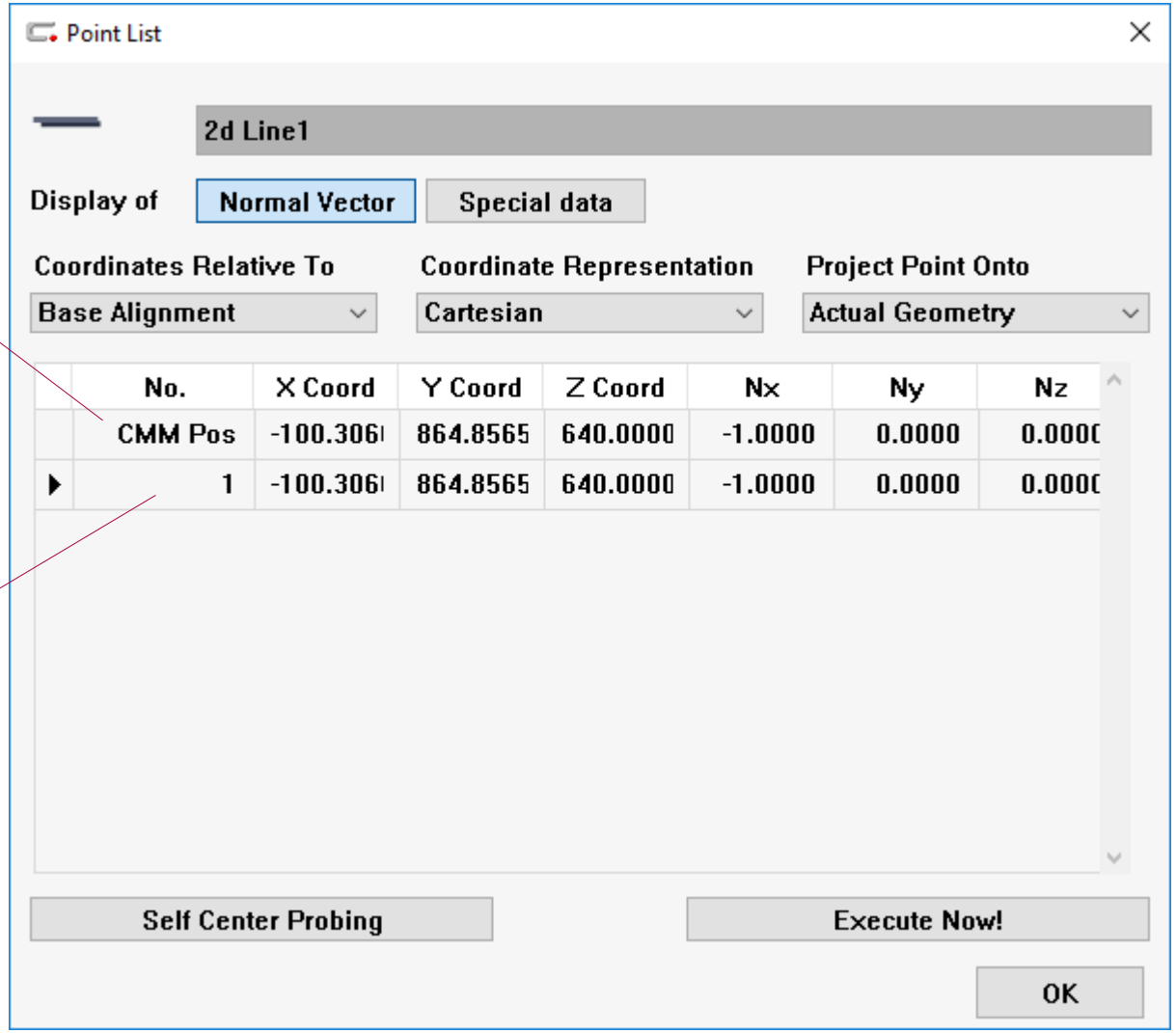
CALYPSO Advanced Navigation
Navigation Points

CMM Positioning Points :

- ✓ This position point option has the CMM travel directly to a desired location in reference to the base alignment. A list of positioning points can be used to effectively navigate to and from features that are difficult to measure.

Probing Point :

- ✓ This is an actual physical probing that fills in one point of data for a feature.



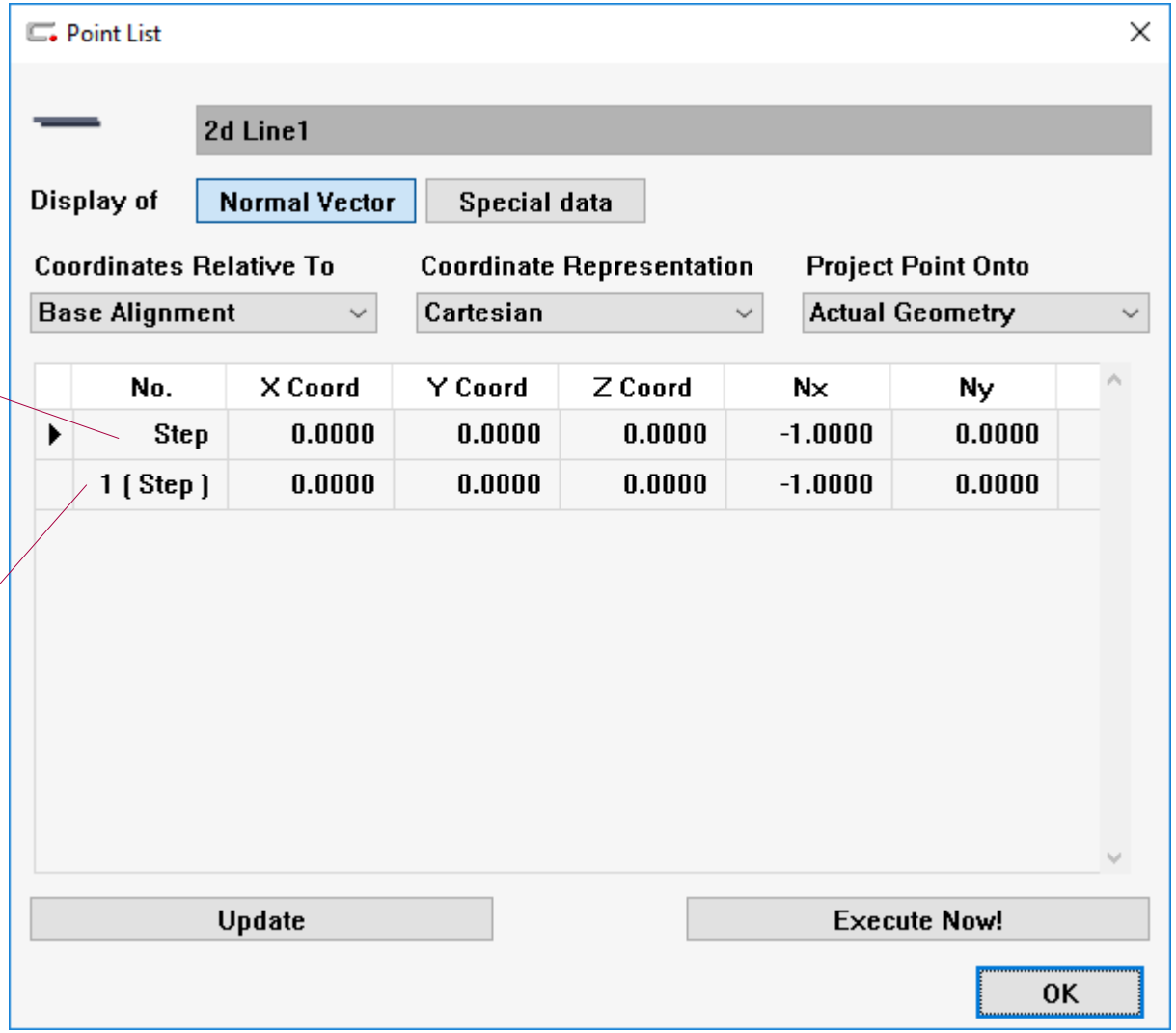
CALYPSO Advanced Navigation
Navigation Points

Step Without Probing :

- ✓ A step movement has the CMM travel relative to the current position of the active stylus. So, each step point will be an offset from the current position in the X, Y, and Z direction. Step without probing is not intended to make contact with the part.

Step With Probing :

- ✓ This is the same offset movement from the current active stylus position as the 'Step without Probing'. However, this navigation method **DOES** intended to make contact with the part. This option exists because on occasion the navigation to get to a feature is so restricted that a stylus must come in contact with the part, and that is when this navigation option should be used.

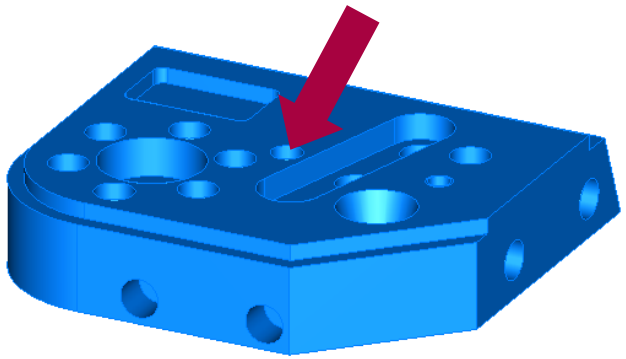


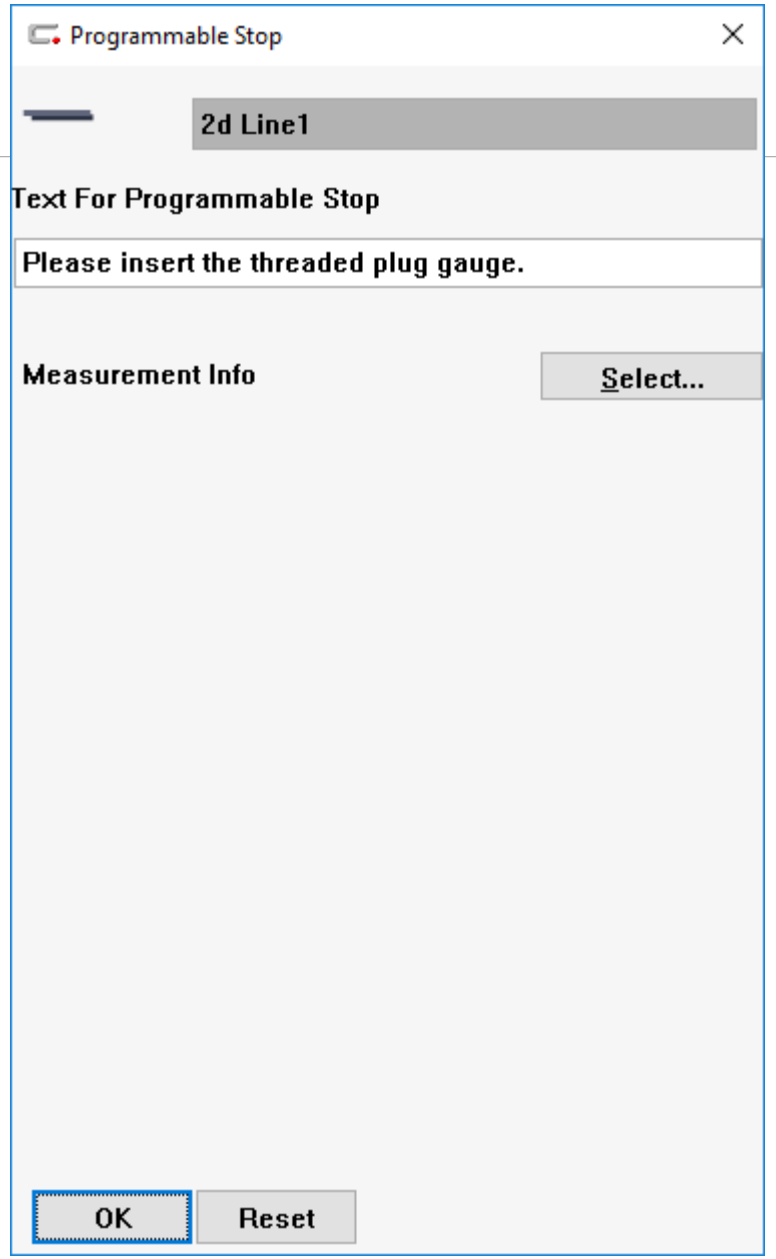
CALYPSO Advanced Navigation
Programmable Stop

Programmable Stop:

- ✓ When programming a part use this function to temporarily pause a run, give instructions to the operator, and then when finished have the operator click OK to continue the run.

- ✓ A selected file can be opened, such as an image, when a programmable stop is reached.





Navigation Options

Navigation functions within the Plan > Navigation dropdown menu

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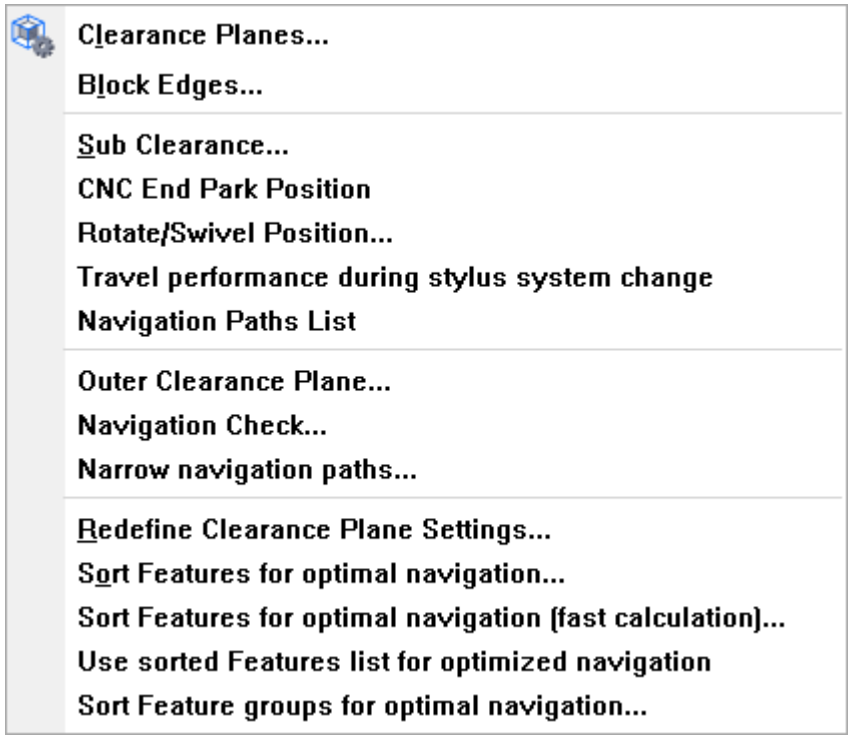
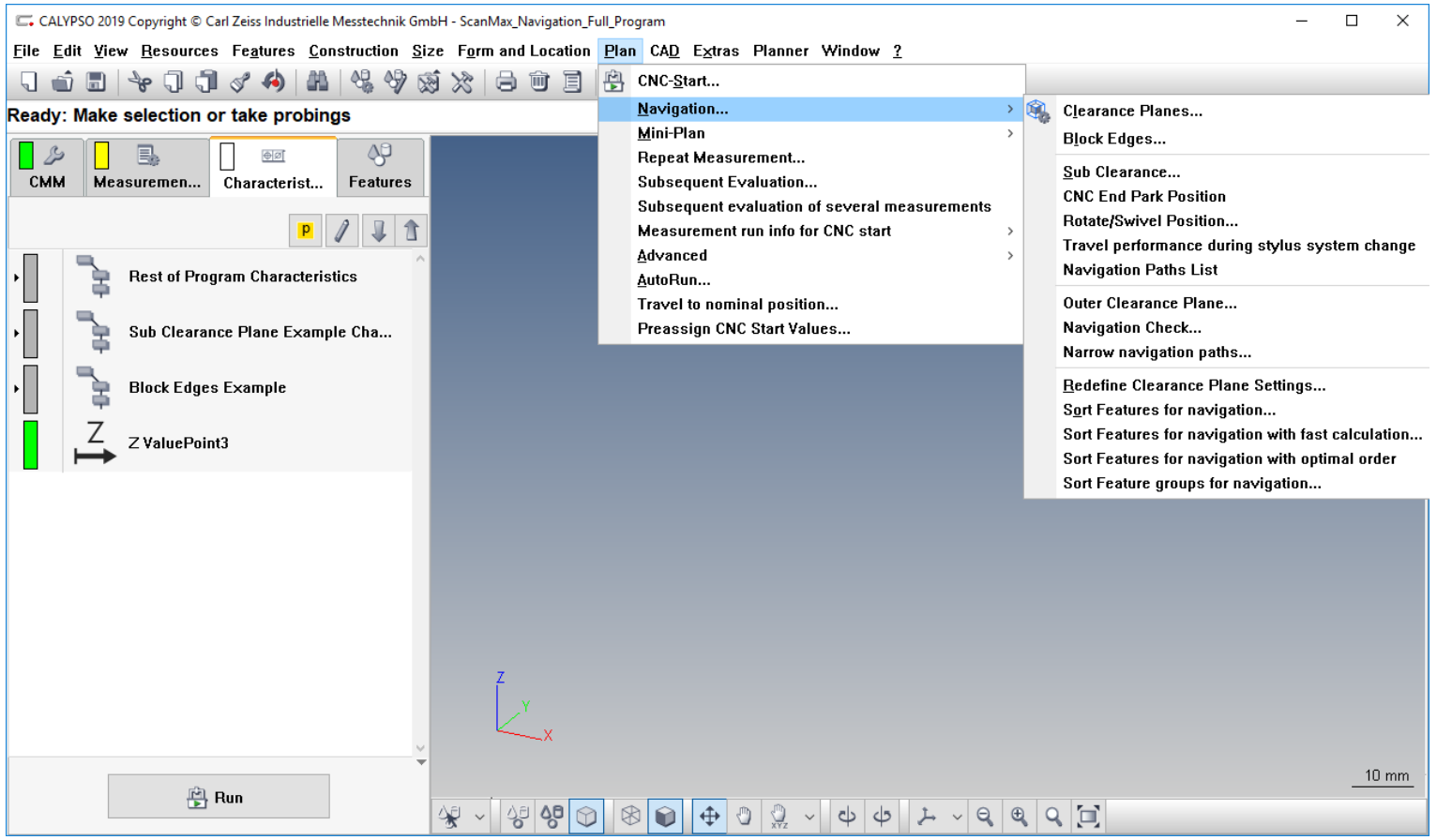
CALYPSO Advanced Navigation
Where Are These Functions Located?

Plan > Navigation

✓ Many of the advanced navigation tools are located at this location in CALYPSO.





CALYPSO Advanced Navigation
Clearance Planes

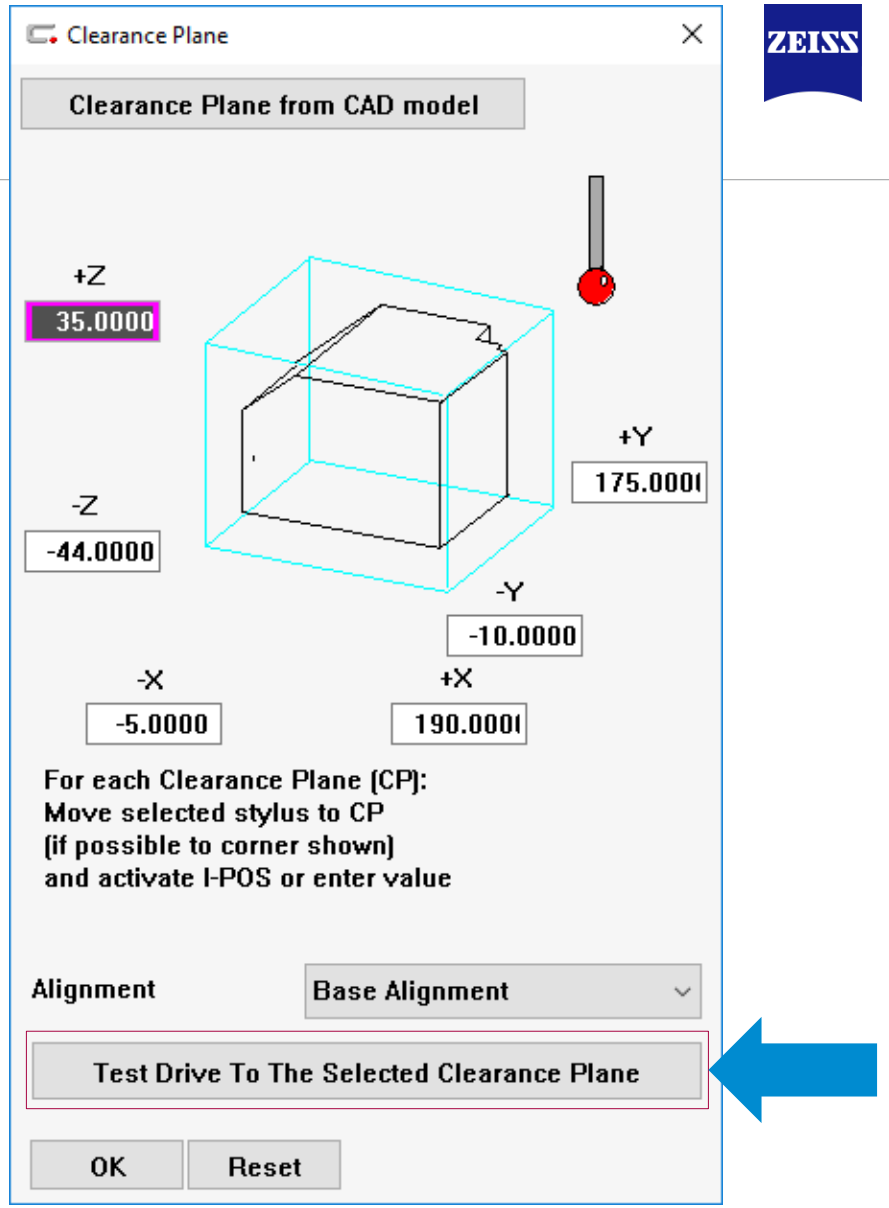
Clearance Planes :

- ✓ This option defines a box for safe travel around a part in a program. In between measuring different features, the sensor will remain outside of the defined Clearance Planes. In order to prevent collisions, be sure the entire part and all fixtures are contained within the safety cube.

Example:

Use the ‘Test Drive To The Selected Clearance Plane’ button to visually check if the part and all fixtures are contained within the Clearance Planes.

Click to highlight one of the six different planes, and then use the button.

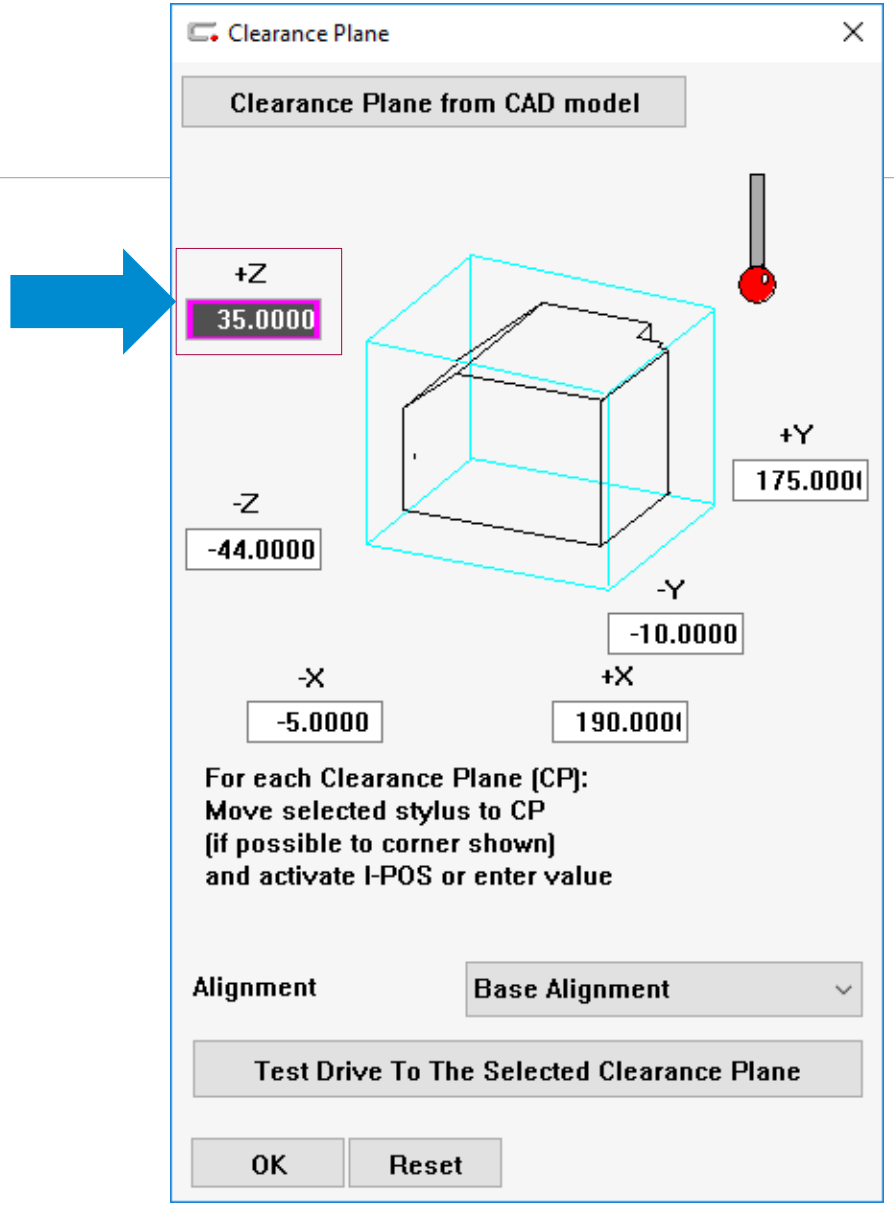


CALYPSO Advanced Navigation
Clearance Planes

Clearance Planes :

- ✓ This is the same menu as the option under the Measurement tab. Also note that by default the displayed values are from the base alignment.

- ✓ Use the button on the top of the right joystick to enter an actual coordinate value from the CMM into the window.



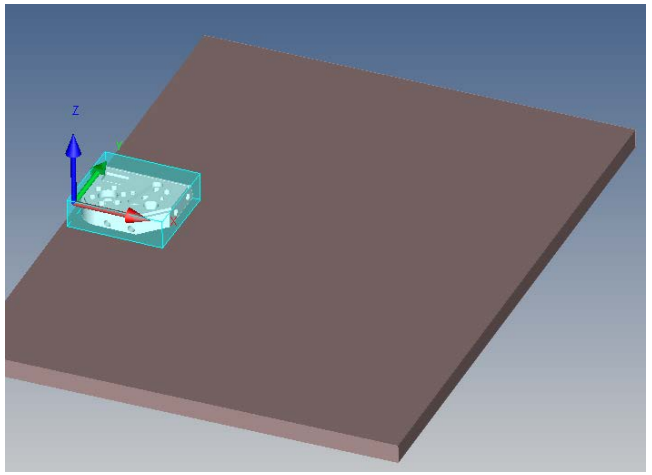
CALYPSO Advanced Navigation
Block Edges

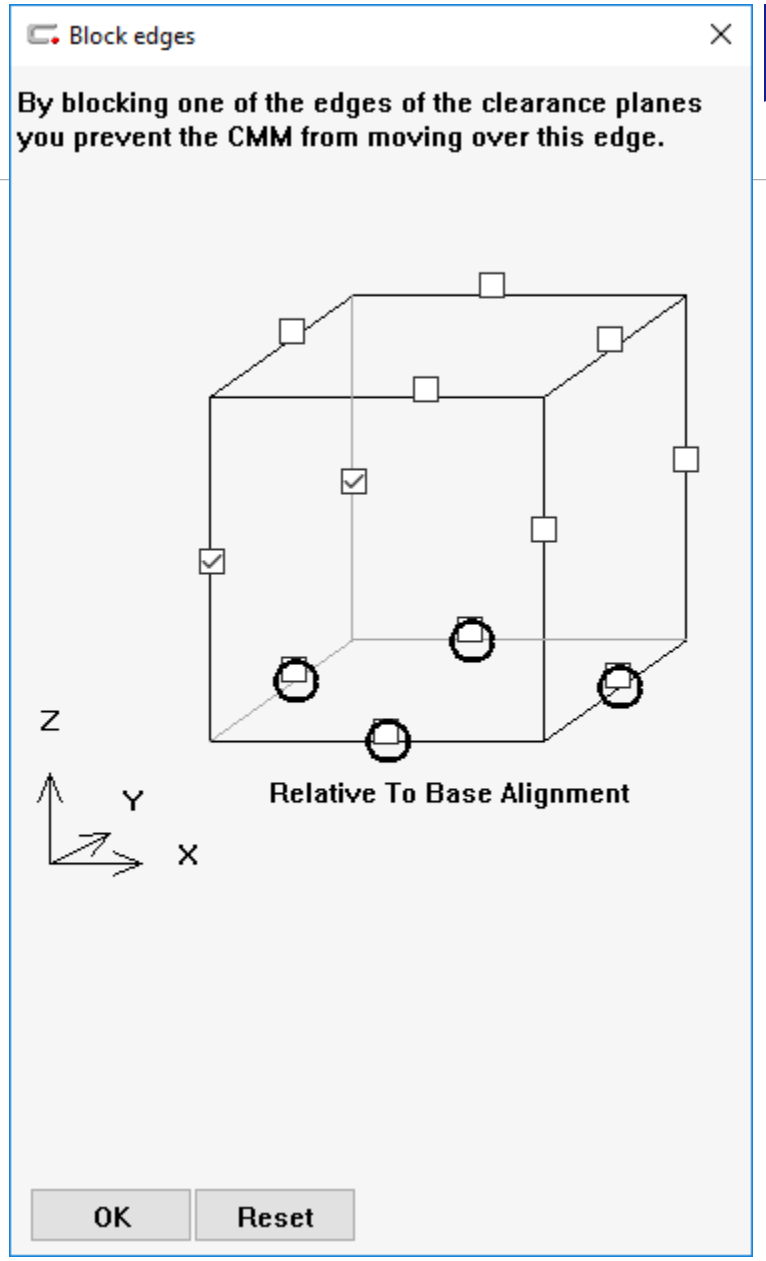
Block Edges :

- ✓ This option lets the user decide what edges of the part can be crossed over safely when traveling outside of the Clearance Planes. This function is most useful when avoiding fixtures outside of the safety cube, and when the part is close to the limits of the CMM.

Example:

Use blocked edges to avoid objects not inside of the clearance plane box (safety cube).

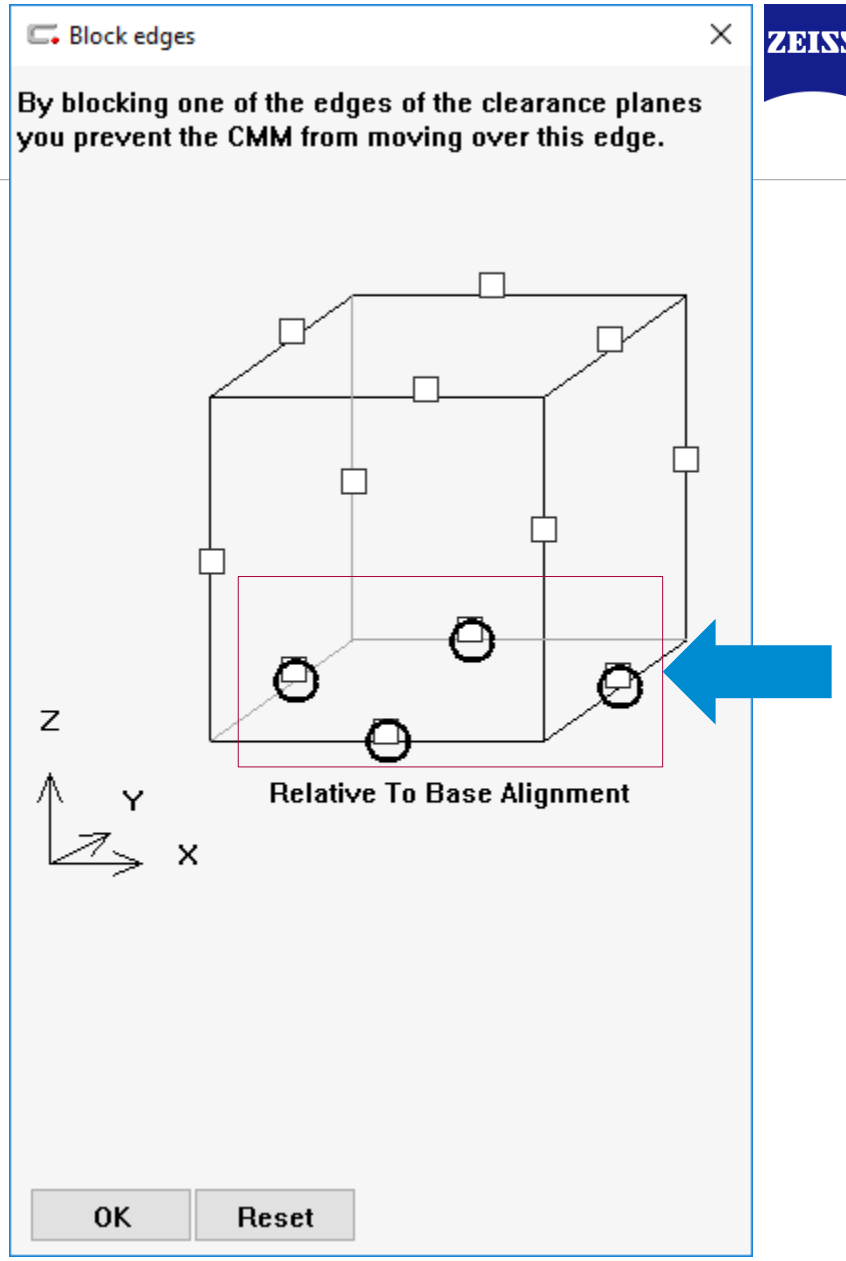




CALYPSO Advanced Navigation
Block Edges

Block Edges :

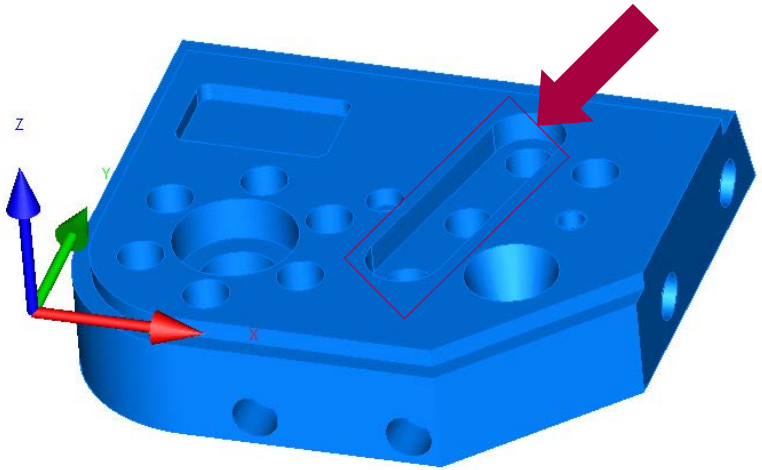
- ✓ Notice how the four edges underneath a part are circled. A circled blocked edge means that it is always checked. Attempting to travel under a part will most likely result in a serious collision, and CALYPSO blocks those movements.

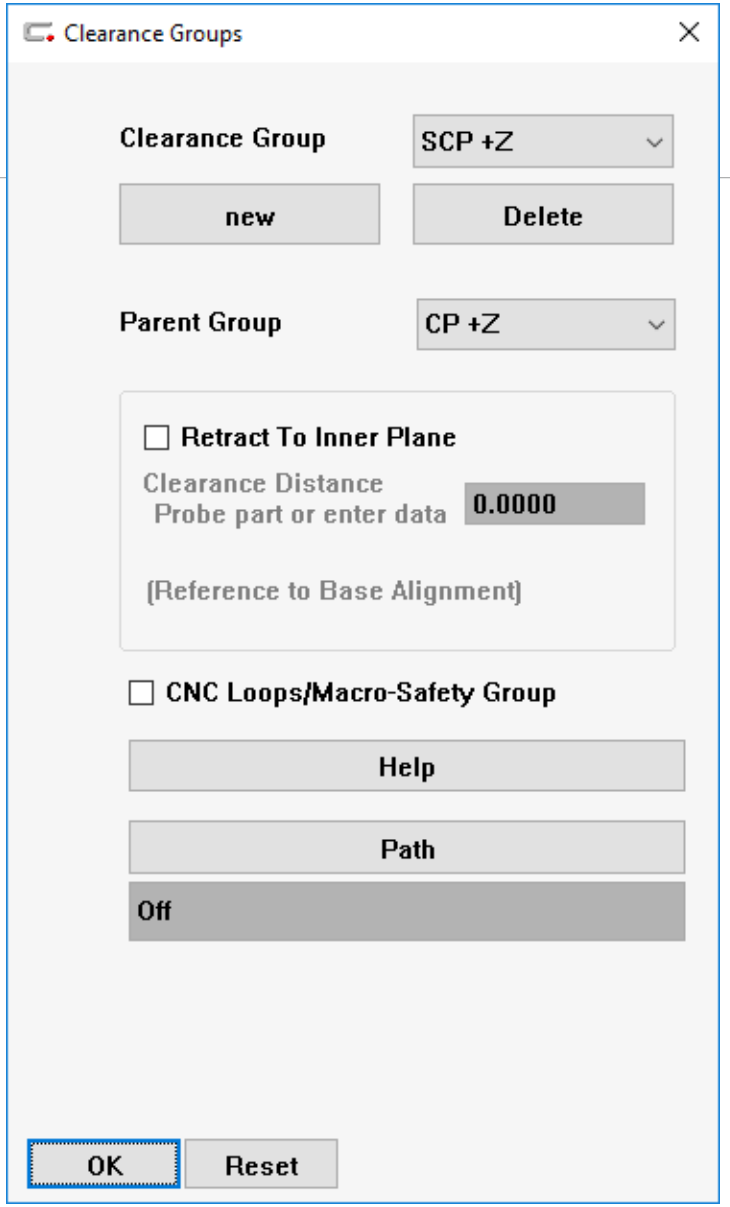


CALYPSO Advanced Navigation
Sub Clearance Groups

Sub Clearance :

- ✓ This function allows the user to set up custom clearance planes to reduce unnecessarily long travel paths between features. One of the most common applications is for sets of features that are nested close together inside of a large part.

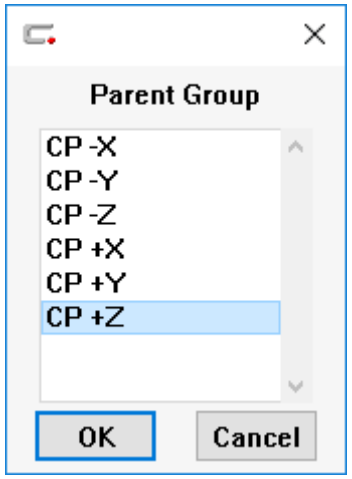


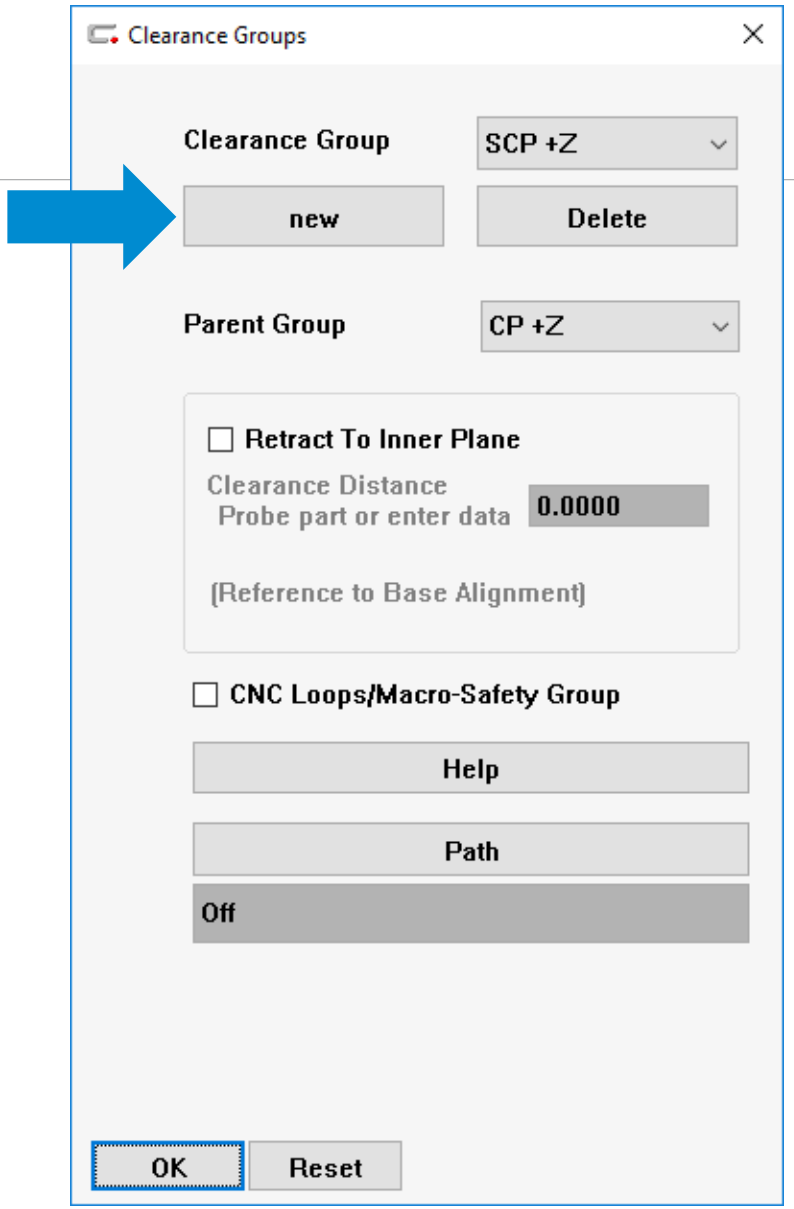


CALYPSO Advanced Navigation
Sub Clearance Groups

Sub Clearance :

- ✓ The first step is to click the ‘New’ button and enter in a relevant name.
- ✓ The second step is to choose a parent group, which should be in the same direction as the new desired sub clearance plane.



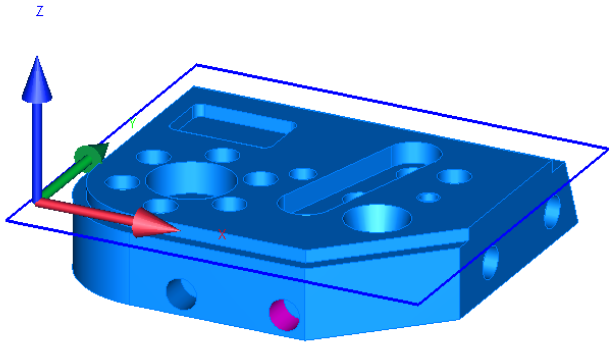


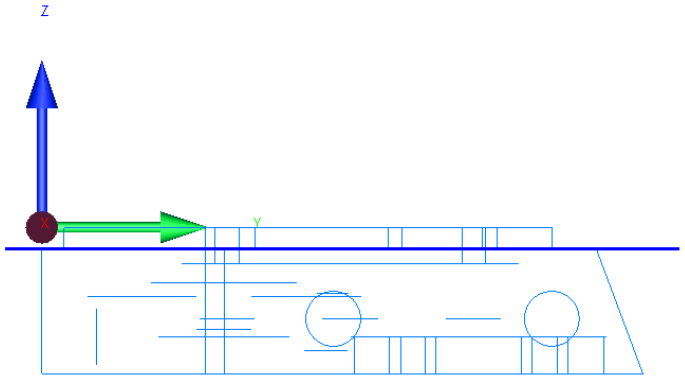
CALYPSO Advanced Navigation
Sub Clearance Groups

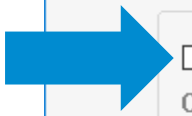
Sub Clearance :

- ✓ The third step is to check the ‘Retract To Inner Plane’ box. This allows the user to input a distance from the alignment zero (top plane in this case), which will be used by the new sub clearance plane.

- ✓ Once a sub clearance plane is created, click OK and then reopen the sub clearance plane window to get a preview.





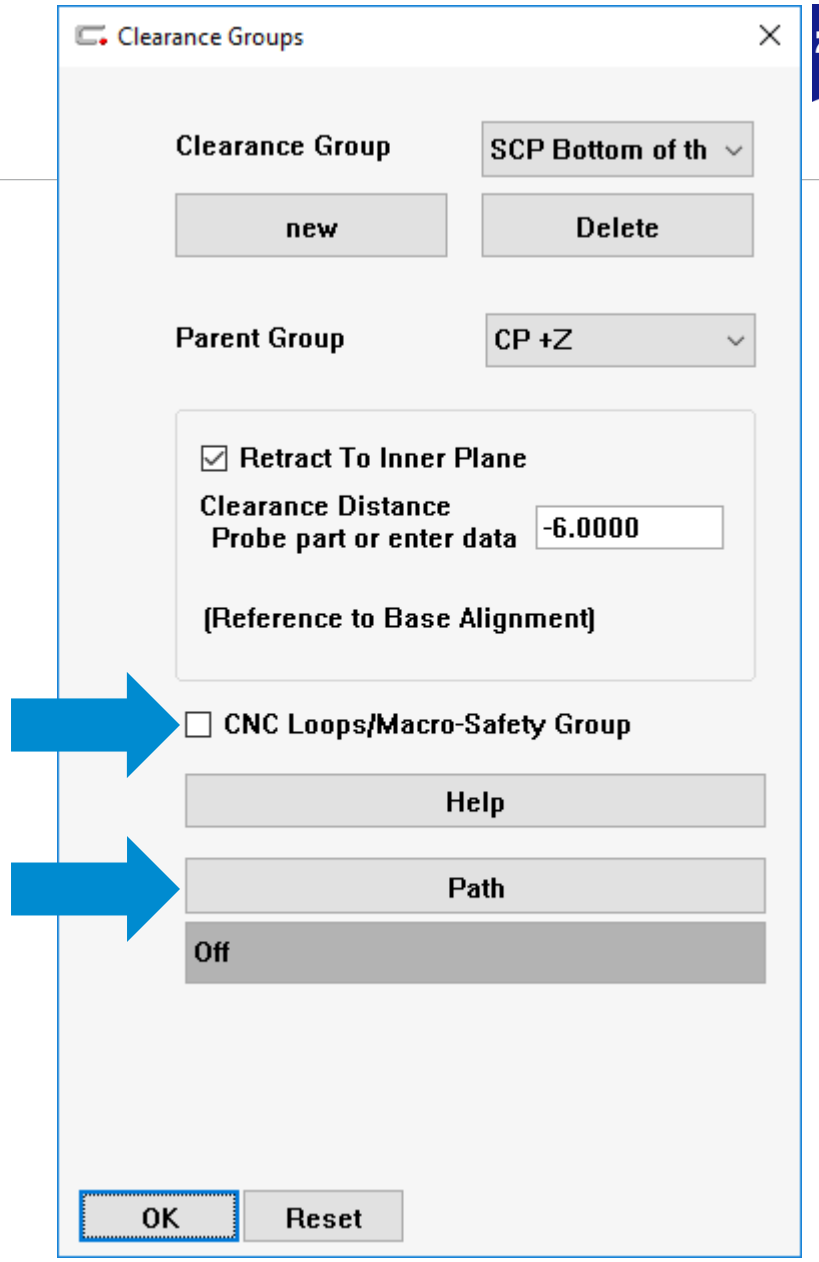


CALYPSO Advanced Navigation
Sub Clearance Groups

Sub Clearance :

- ✓ Use the ‘CNC Loops/Macro-Safety Group’ check box when dealing with complicated loops or macros. This will help ensure that the selected sub clearance planes will be utilized.

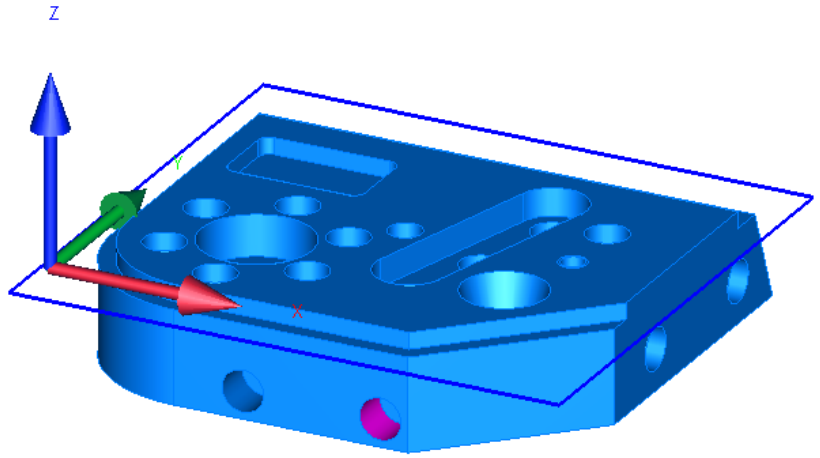
- ✓ If a unique set of movements is needed to get to a group of features a ‘Path’ can be set up here as well. This will be similar to building a movement path with CMM position points.

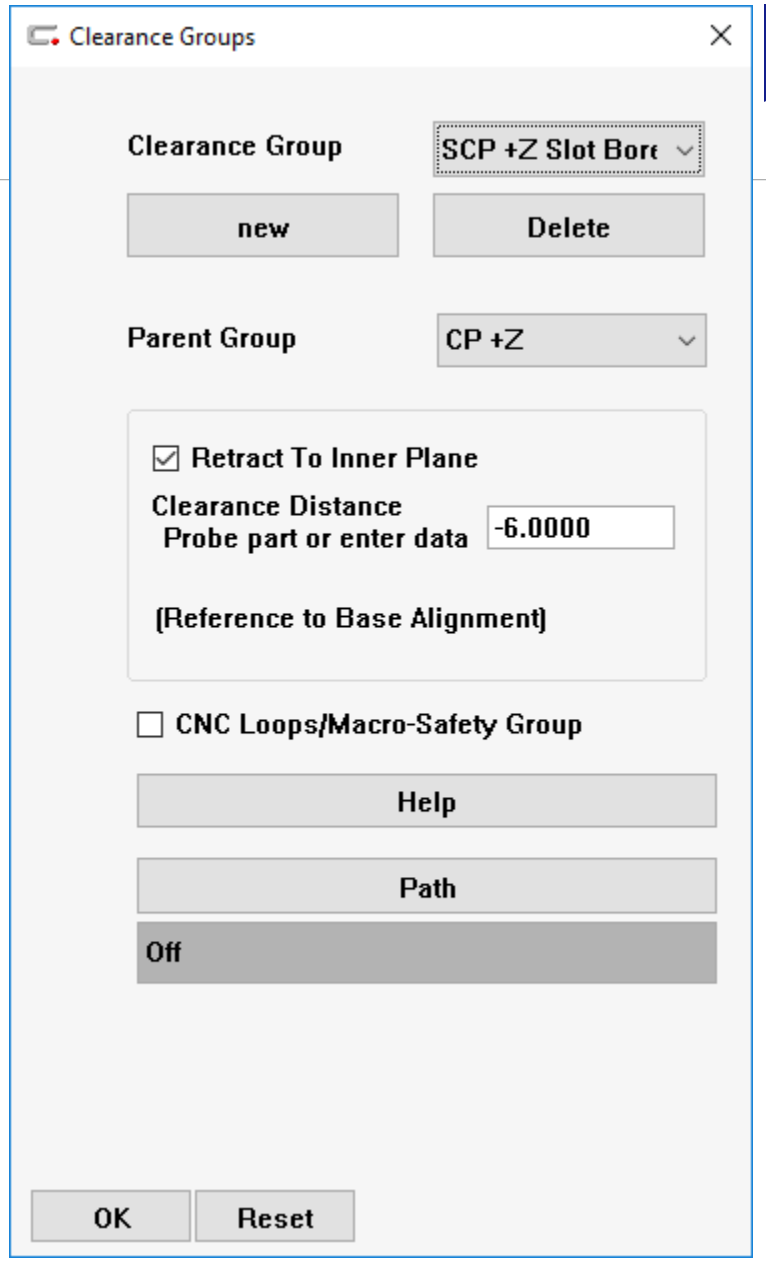


CALYPSO Advanced Navigation
Sub Clearance Groups

Example:

For this situation, a sub clearance plane will be used to reduce the travel paths between a set of bores at the bottom of a slot. Traveling completely back to the safety cube between bores is an extra movement that can be eliminated.

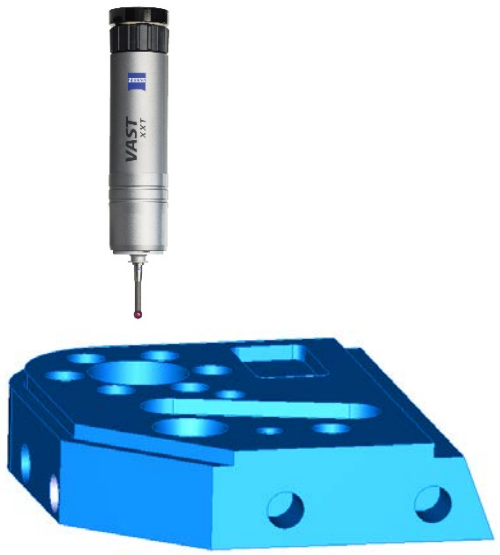


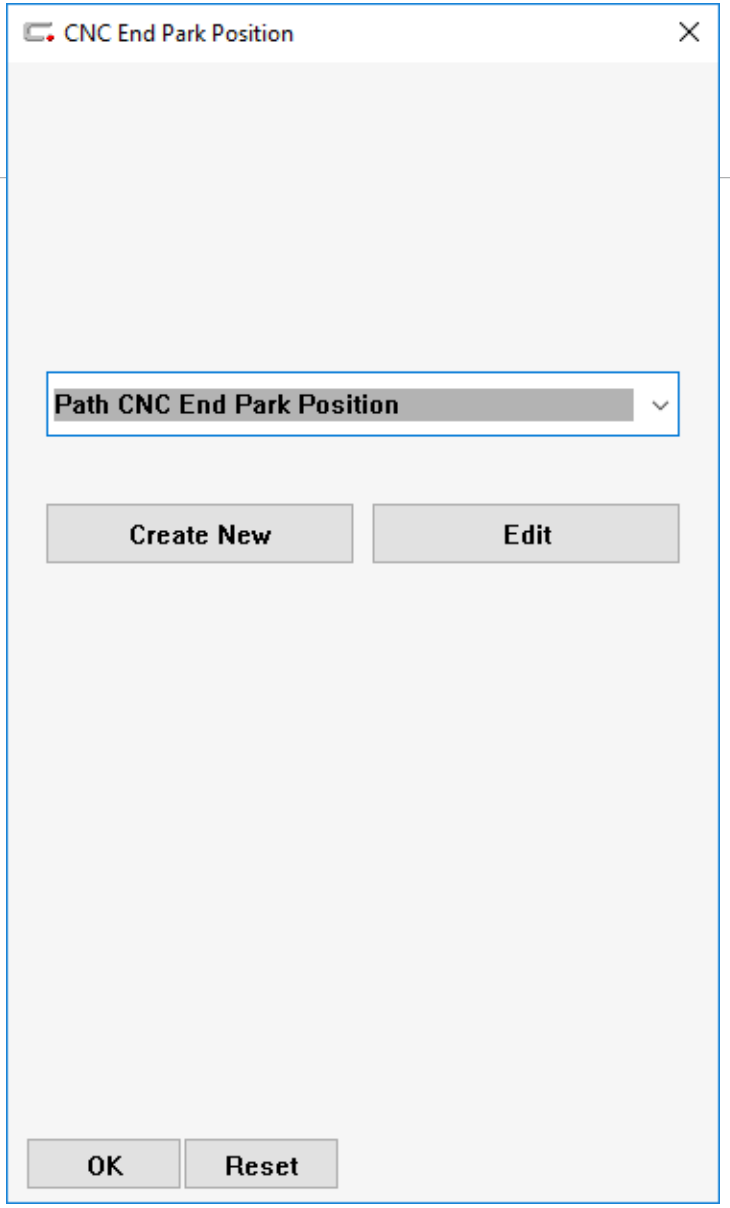


CALYPSO Advanced Navigation
CNC End Park Position

CNC End Park Position :

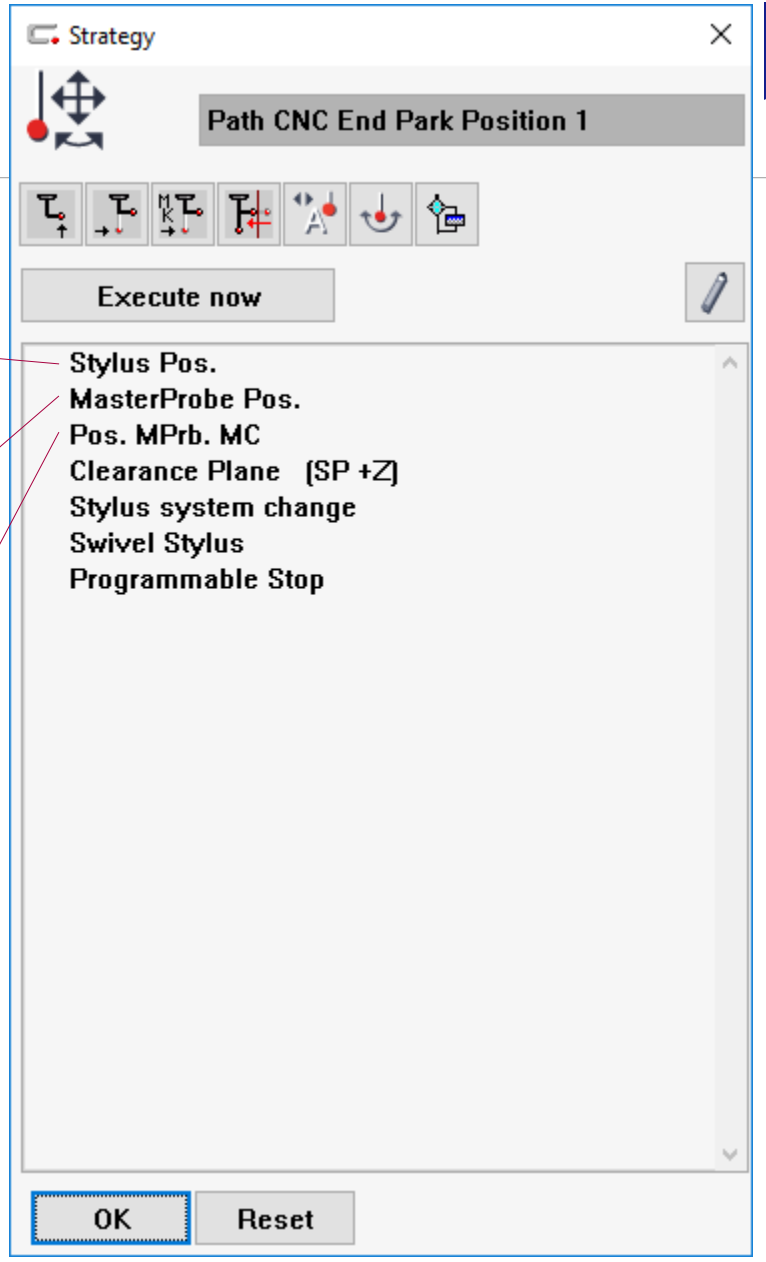
- ✓ An end park position defines a movement or set of actions for the CMM to follow after a run is completed.





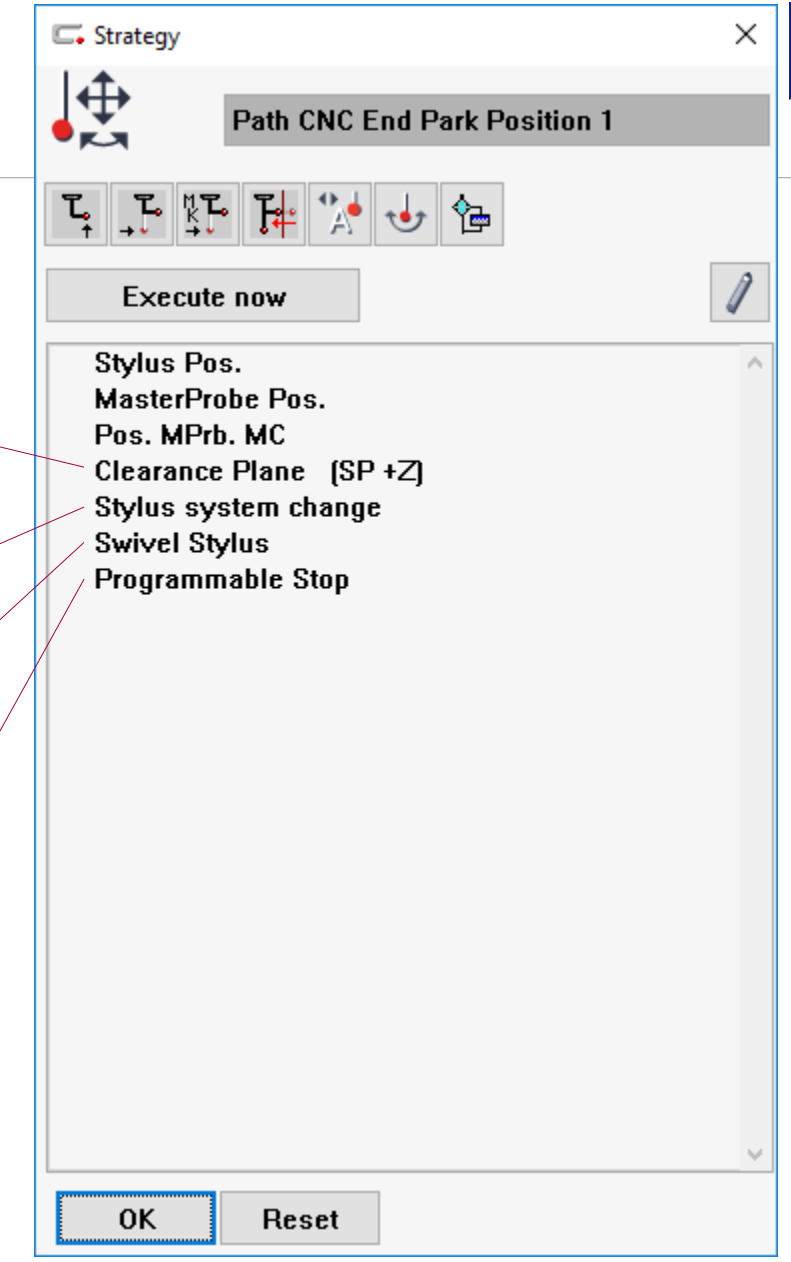
CALYPSO Advanced Navigation
CNC End Park Position

- ✓ Stylus Position: This sets a coordinate location that the CMM will go to in reference to the base alignment.
- ✓ MasterProbe Position: For this option a coordinate is also set in space that tells the CMM where to travel as if the MaterProbe were the active stylus system on the sensor. The base alignment is referenced here.
- ✓ Position Master Probe in Machine Coordinate: This is the same MasterProbe coordinate position as mentioned above, but instead the machine coordinate system is referenced. Be careful since these points do not move with the base alignment.



CALYPSO Advanced Navigation
CNC End Park Position

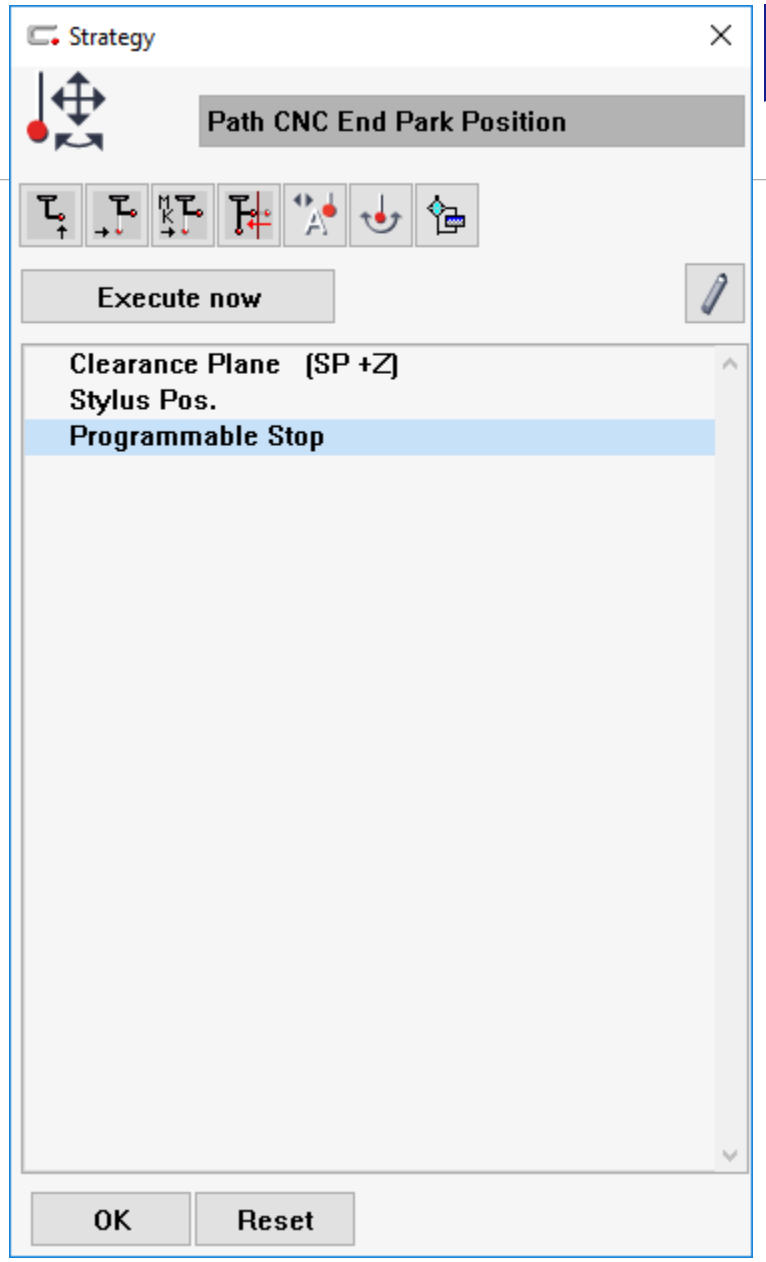
- ✓ Clearance Plane: Here a Clearance Plane is selected along with an additional offset distance (For example +Z and +100mm offset).
- ✓ Stylus System Change: This option allows the user to change out the stylus system on the sensor.
- ✓ Swivel Stylus: With the RDS or Vast XTR sensors a rotation can be selected as well.
- ✓ Programmable Stop: When this item is added to the end park position list, the run will pause and a window will open with custom text. Once the user clicks OK, the run will continue.



CALYPSO Advanced Navigation
CNC End Park Position

Example 1 :

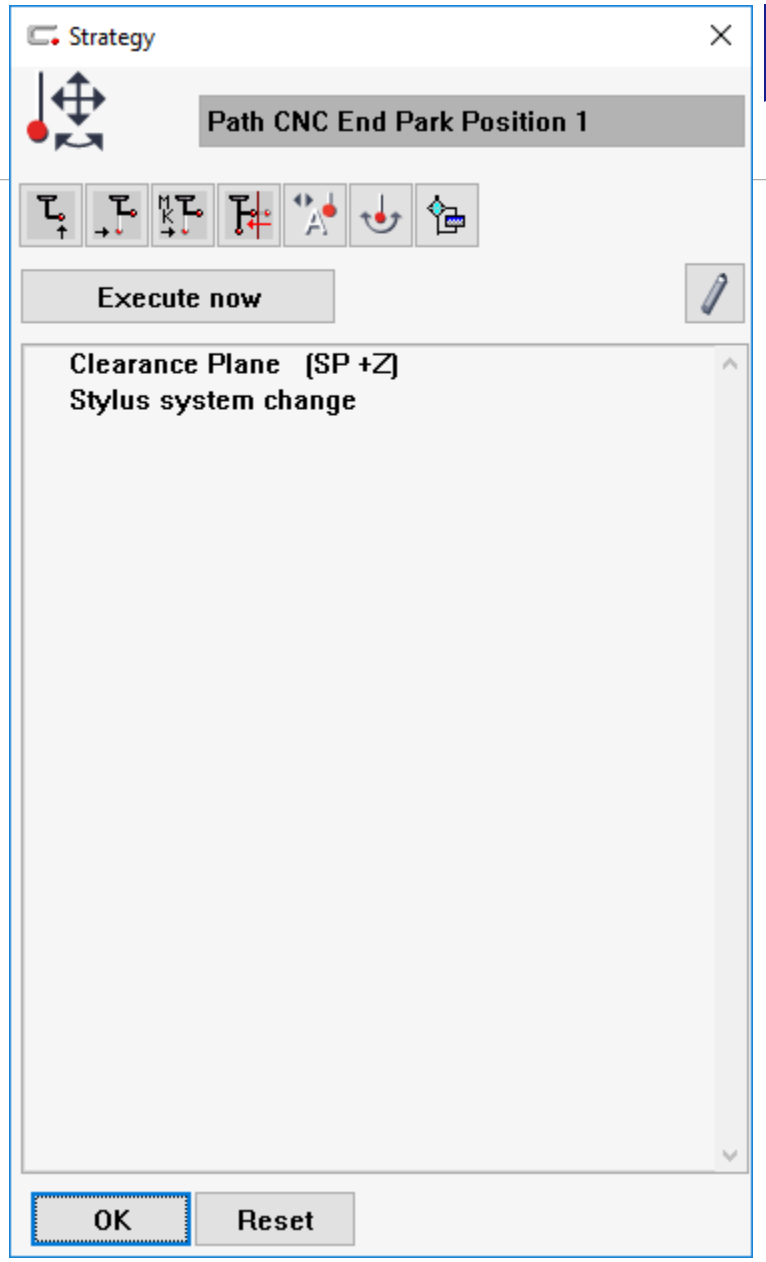
For this situation the stylus system and probe are moved out of the way so that the part can be quickly unloaded from the CMM. The user must then click OK to finish the run.



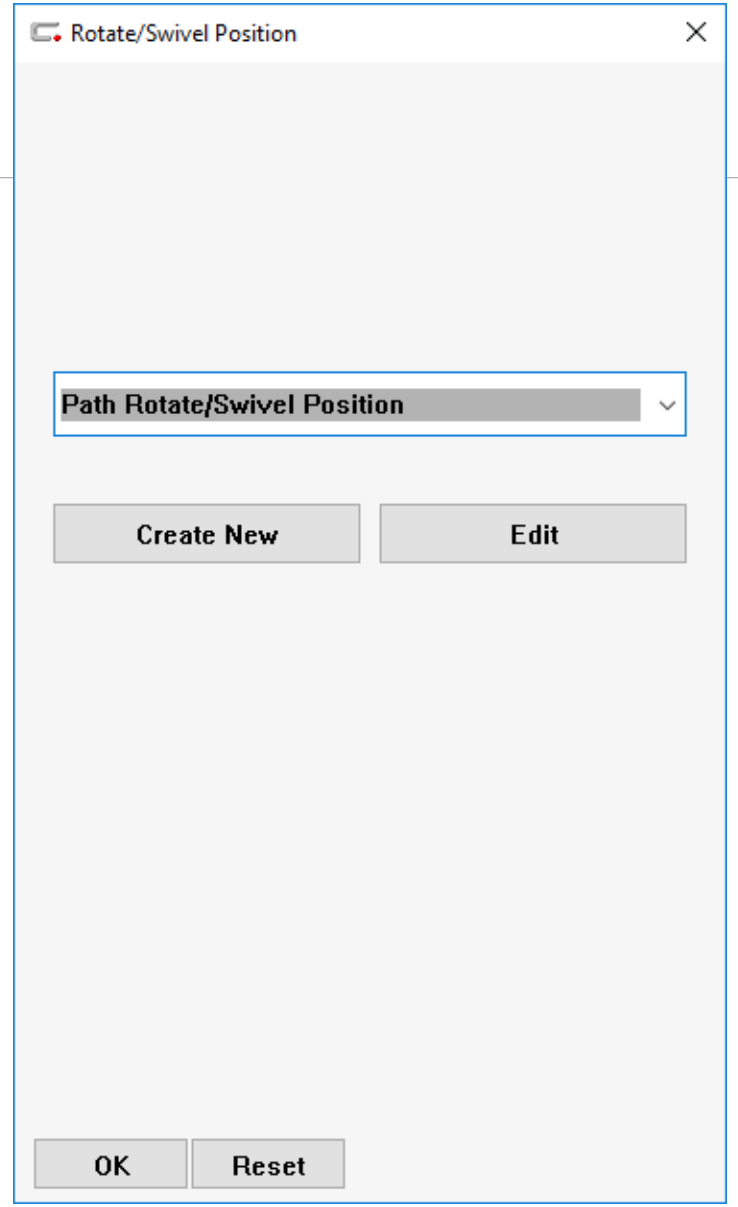
CALYPSO Advanced Navigation
CNC End Park Position

Example 2 :

Stylus system changes can also be set up after a run is complete so that when the next program starts the operator will not have to switch out the stylus system.

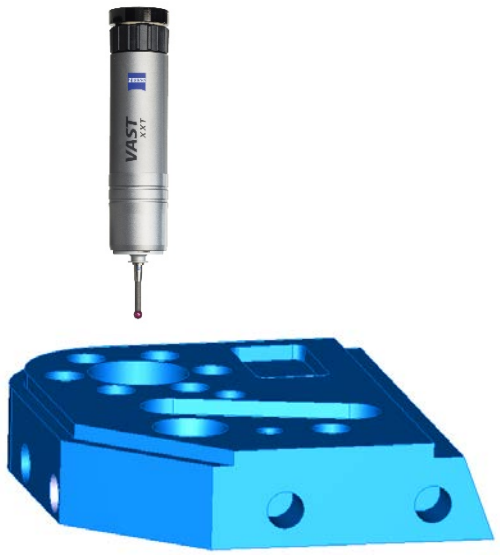


CALYPSO Advanced Navigation
Rotate / Swivel Position



Rotate / Swivel Position :

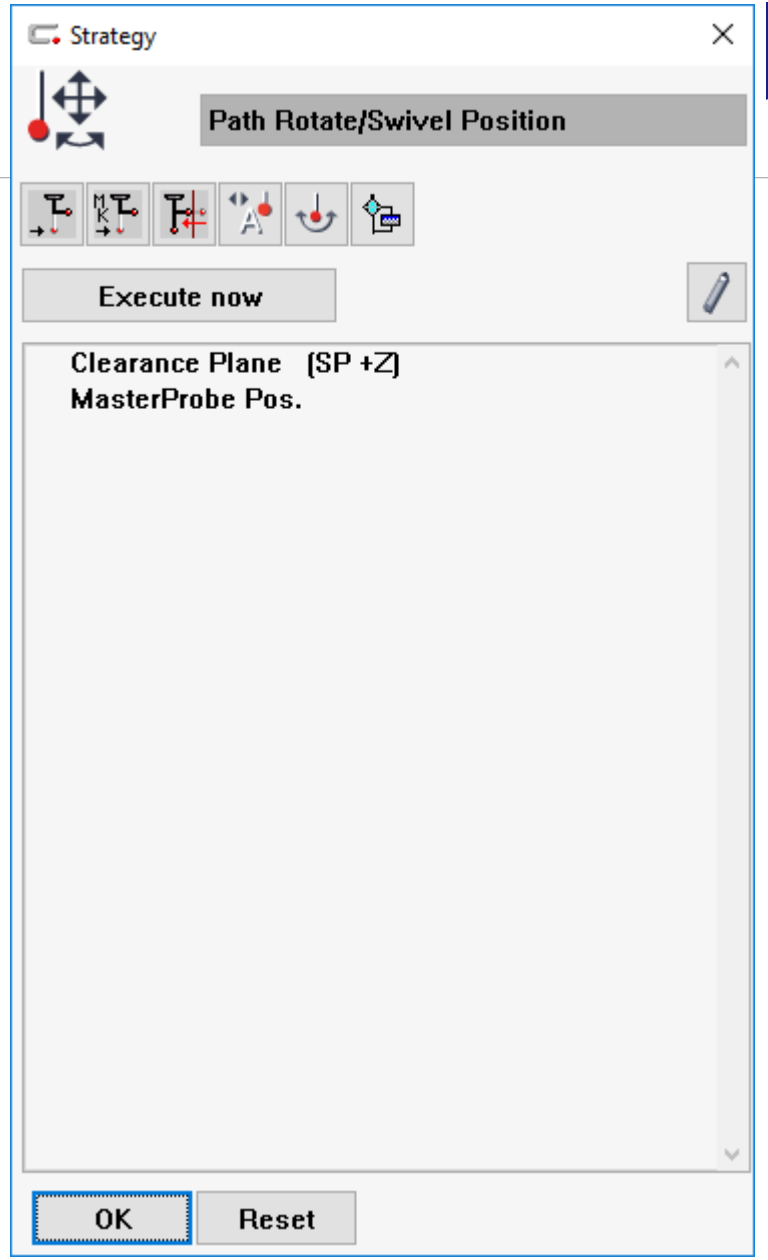
✓ This option sets a consistent path or location during the run where the CMM will first travel to before rotating the sensor. This is important if there are obstacles on the CMM that are not inside of the clearance planes.



CALYPSO Advanced Navigation
Rotate / Swivel Position

Example:

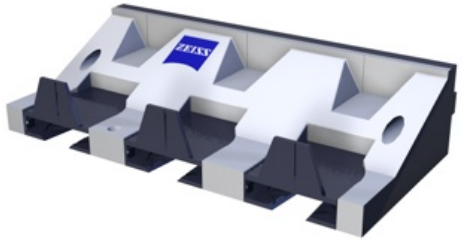
Set up a location above a part where all of the swivel positions in a program will take place. Please note, this may make the measurement plan take longer.

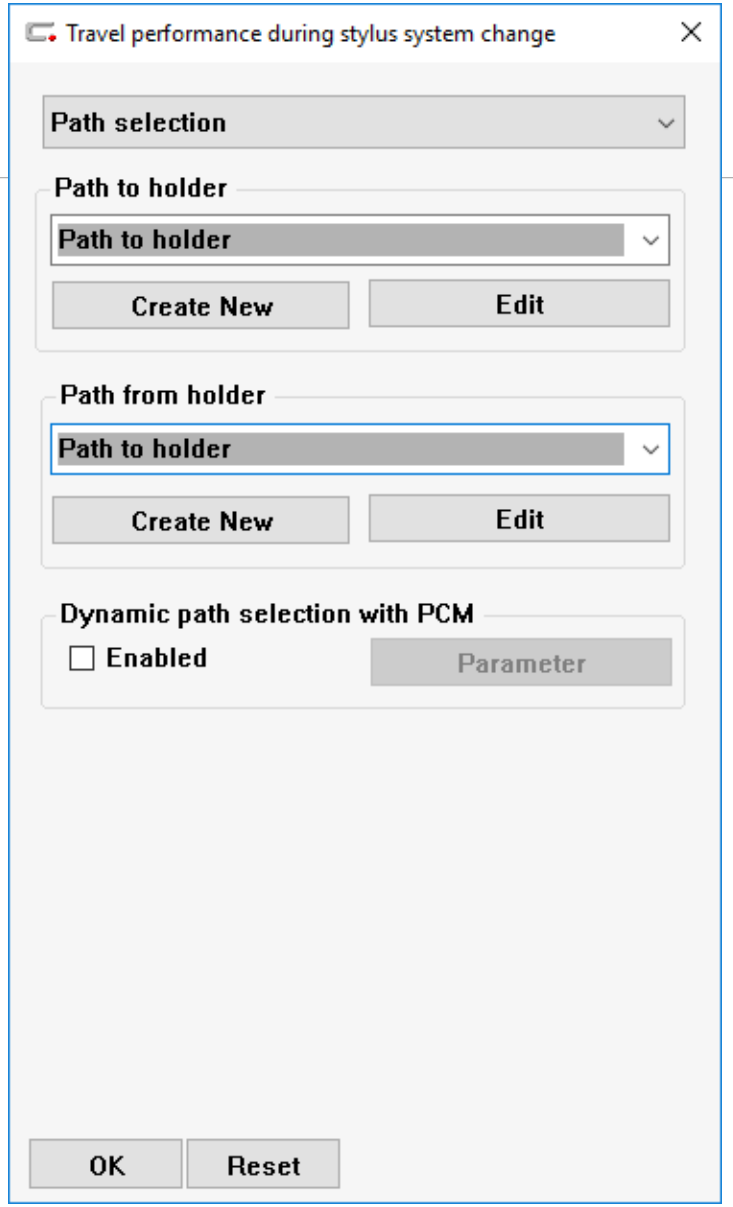


CALYPSO Advanced Navigation
Travel Performance During Stylus System Change

Travel Performance during stylus system change :

- ✓ This option allows the user to create a custom pathway to access the stylus system holders. This is important if the part or fixture are complicated, if the workpiece fills most of the machine volume, or if the stylus system holders are close to the clearance planes. This resource allows stylus system changes even in complicated situations.

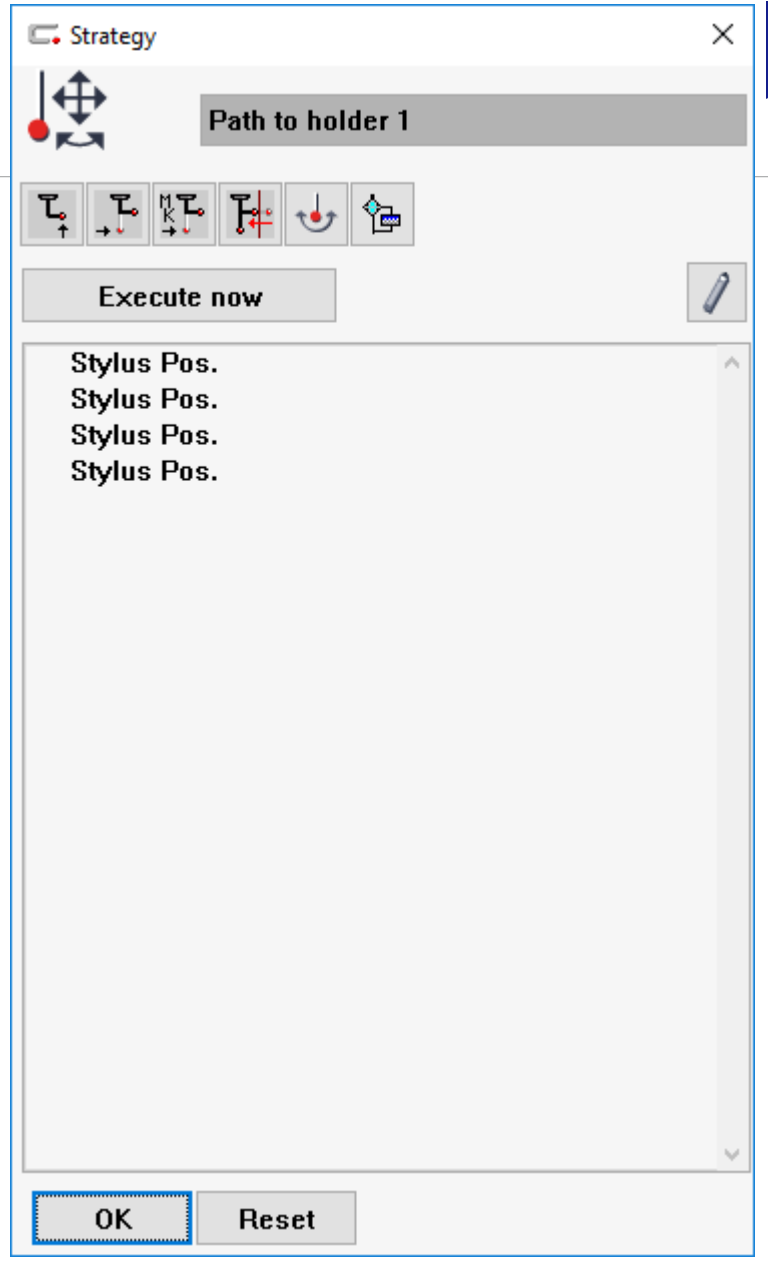




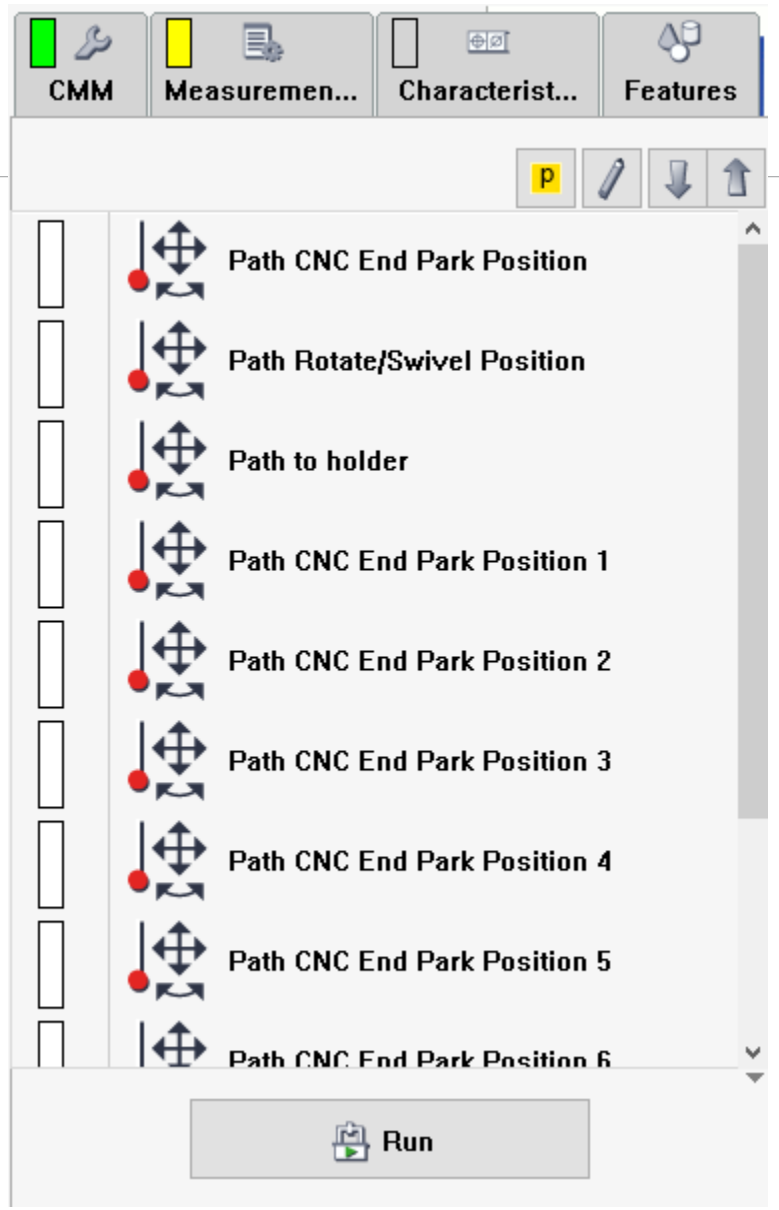
CALYPSO Advanced Navigation
Travel Performance During Stylus System Change

Example:

A path is set up in this example to simulate the programmer needing to keep close to the edges of the CMM during stylus system changes. This could be for a large or complicated part.



CALYPSO Advanced Navigation
Navigations Path List



Navigations Path List :

- ✓ This option shows a list of the already created navigation functions.
  The user can then look through, edit, and delete any of these custom navigation moves.

- ✓ The list will show up in the programming tab, and will closed once a new tab is selected.

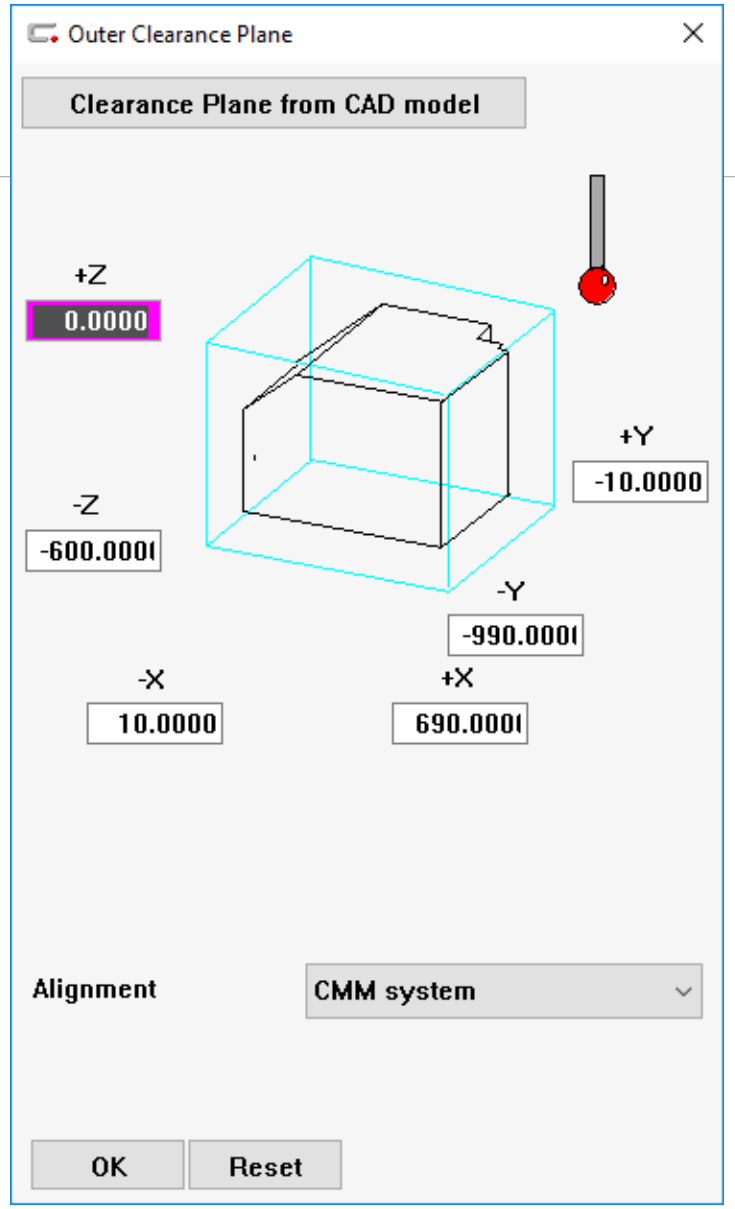
- ✓ Right click to rename the various navigation elements.

CALYPSO Advanced Navigation
Outer Clerance Planes

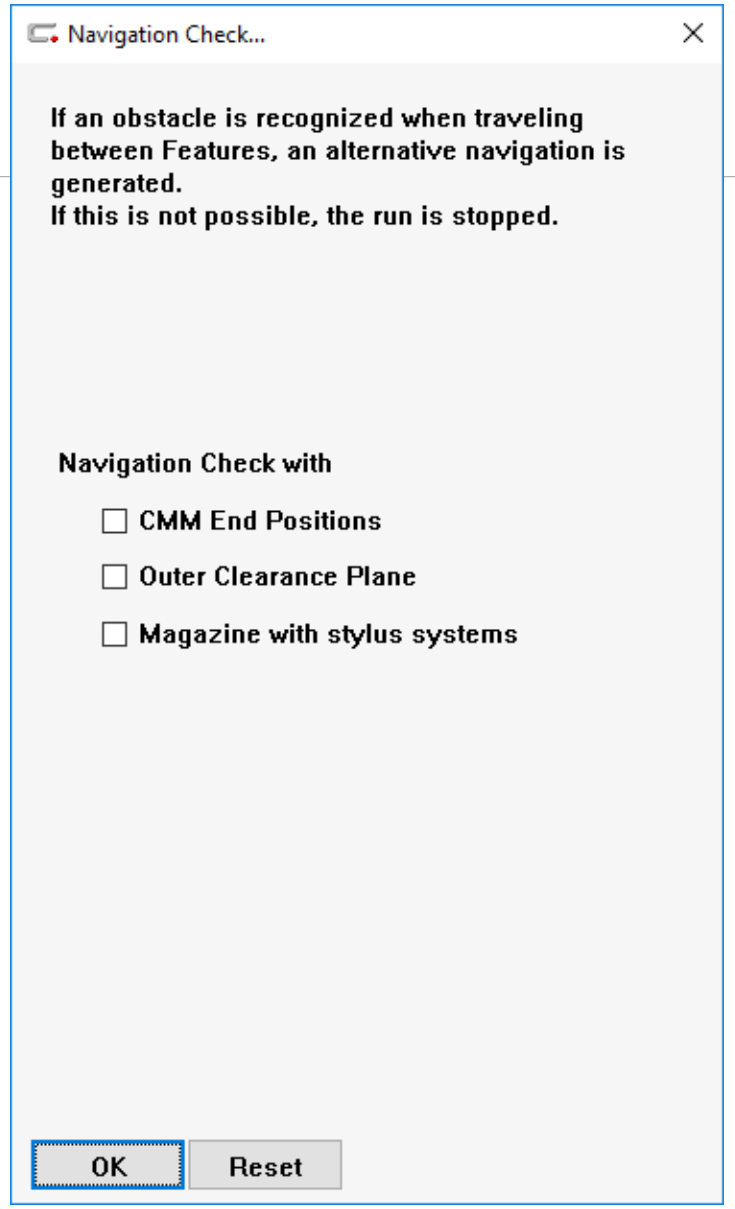
Outer Clearance Planes:

- ✓ This function controls the size of the outer limits of the CMM. Notice that there is about 10mm clearance from the CMM limit in most directions.

- ✓ A user can adjust the outer clearance planes to get a small amount of additional travel space for parts that fill up most of the machine volume.



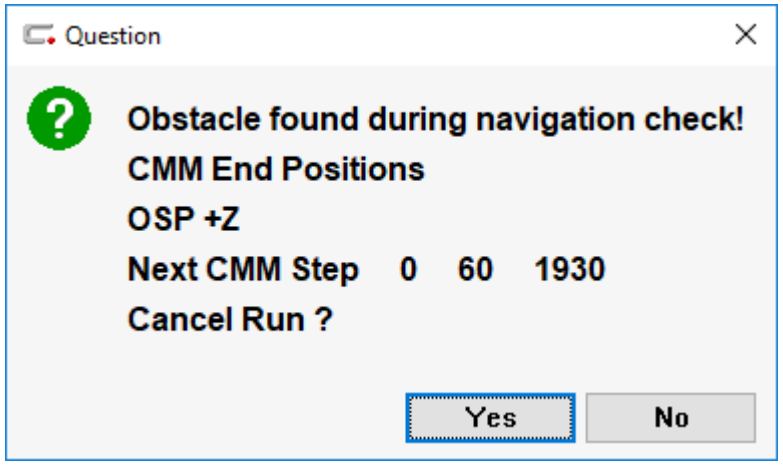
CALYPSO Advanced Navigation
Navigation Check



Navigation Check:

- ✓ Before the CNC run begins, the software scans to find if the sensor will move outside of the machine limit during the inspection plan. If there is an instance where the sensor will leave the machine volume an error message will appear.

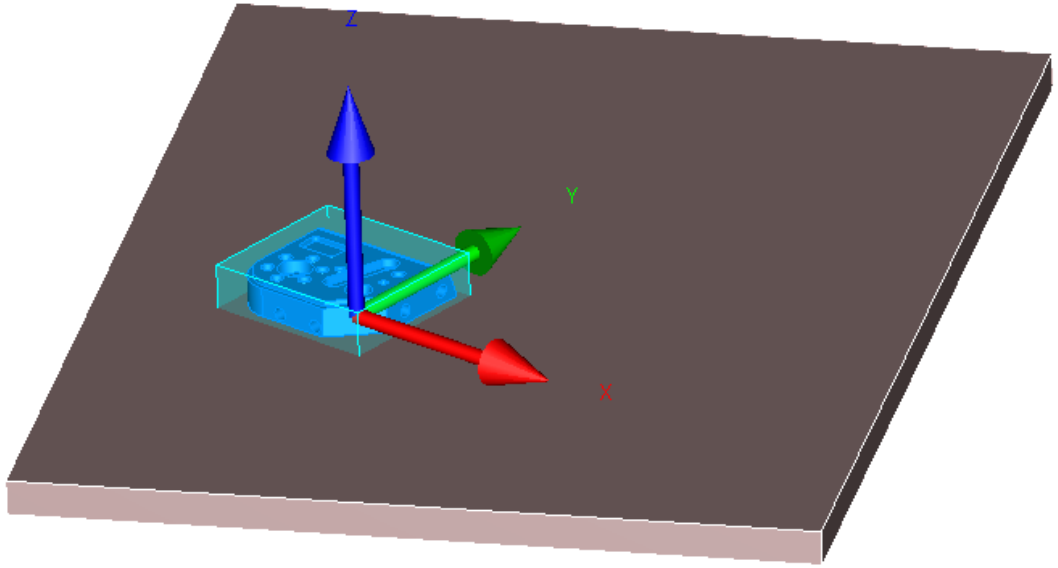
- ✓ This check can done for the CMM End Positions, Outer Clearance Planes, and the Magazine with stylus systems (stylus rack).



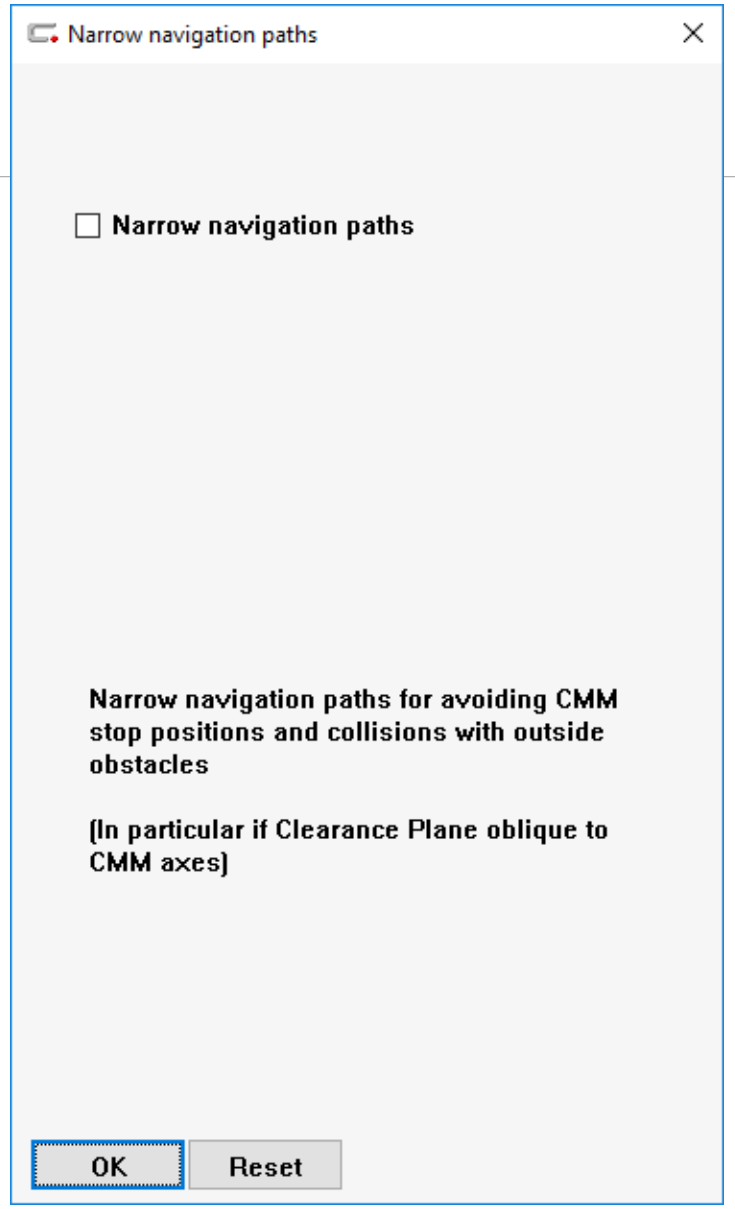
CALYPSO Advanced Navigation
Narrow Navigation Paths

Narrow Navigation Paths:

- ✓ When a part coordinate system does not align with the CMM coordinate system the travel paths are lengthened. This is because the travel movements of the CMM still follow along the directions of the machine coordinate system.



CALYPSO Advanced Navigation
Narrow Navigation Paths



Narrow Navigation Paths:

- ✓ This tool shortens the navigation paths around a part that is skewed on the CMM (at an angle offset from the X, Y, or Z axis). The navigation paths are shortened since the CMM is no longer forced to travel along the CMM axis directions.

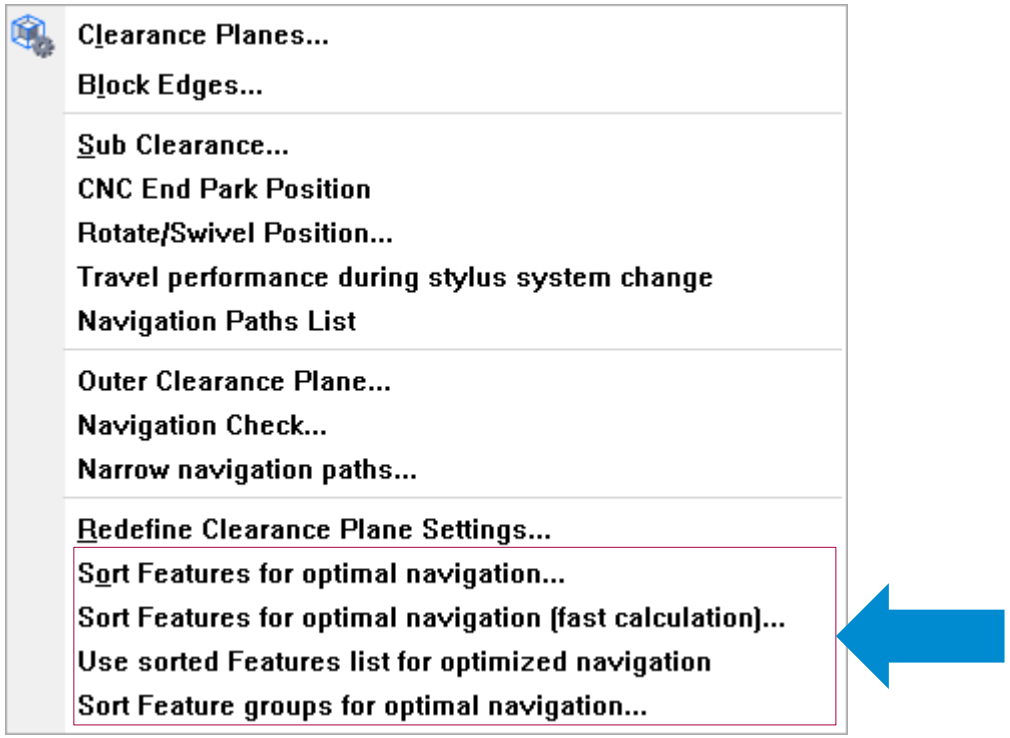
- ✓ The best way to see if this will help save time in a program is to activate the setting, and then check the overall run time.

CALYPSO Advanced Navigation
Sorting the Feature List

Sort Features for optimal navigation with fast calculation:

- ✓ The purpose of this function is to automatically calculate the optimal features list in order to reduce run time.

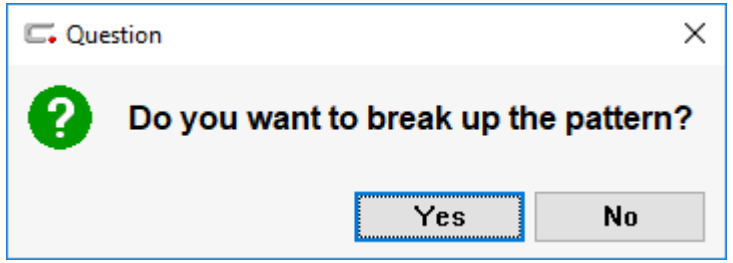
- ✓ CALYPSO will attempt to figure out what the best run order would be for a measurement plan. This may take a while to calculate, and CALYPSO will not physically re-order the program during this process.

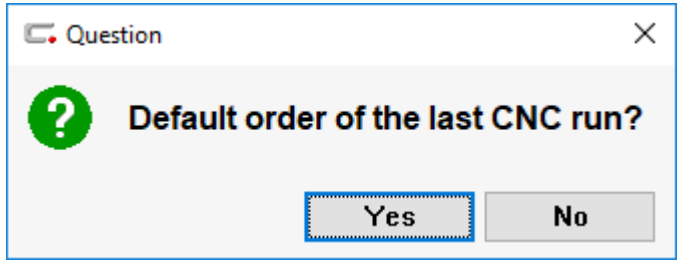


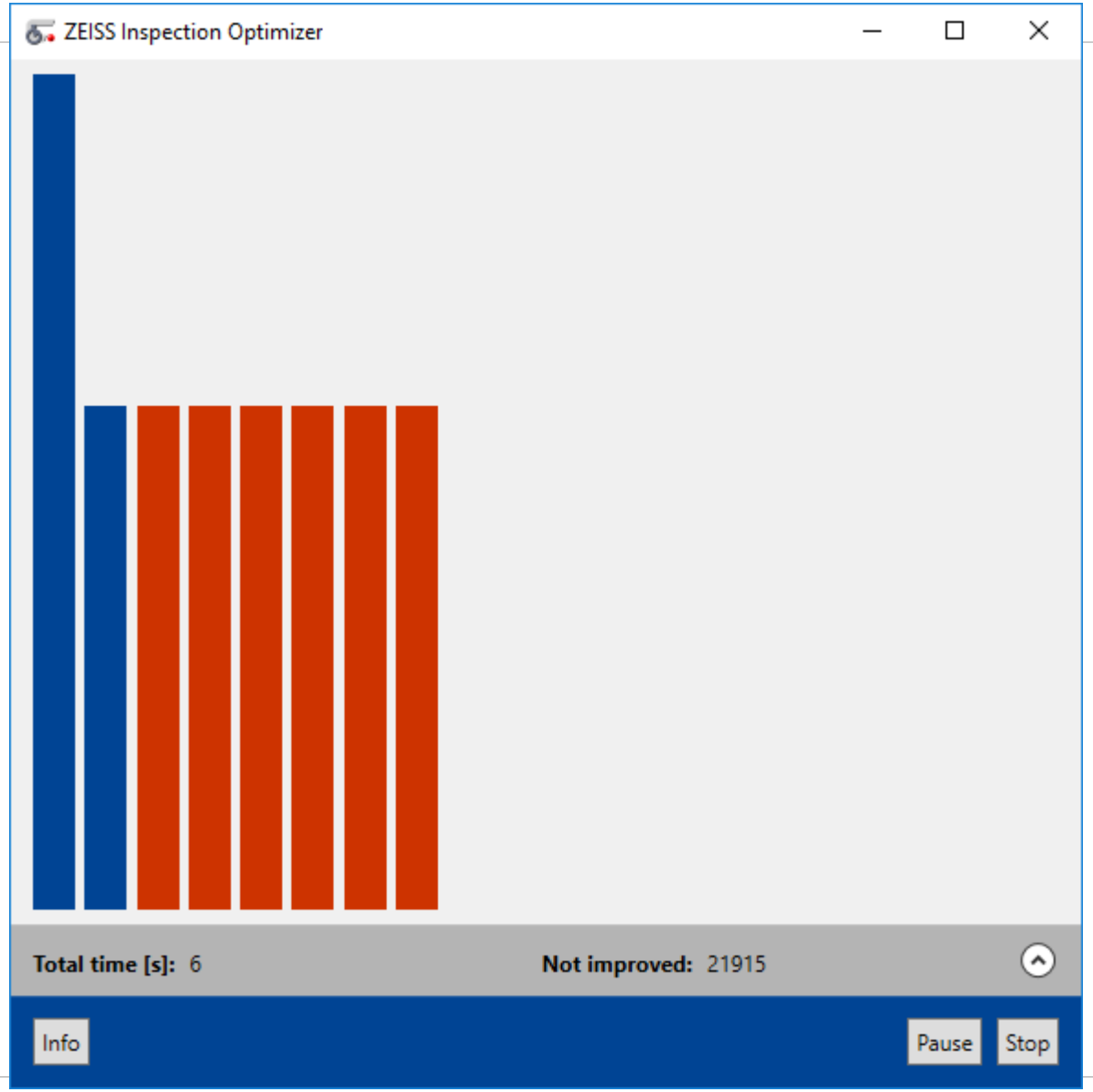
CALYPSO Advanced Navigation
Sorting the Feature List

Sort Features for optimal navigation:

- ✓ Be sure to run the program through at least once before using this tool. The user will have to decide to break up patterns or not. Then the ZEISS Inspection Optimizer window will adjust and simulate the run order of a program, and when red bars begin to appear the process is finished.





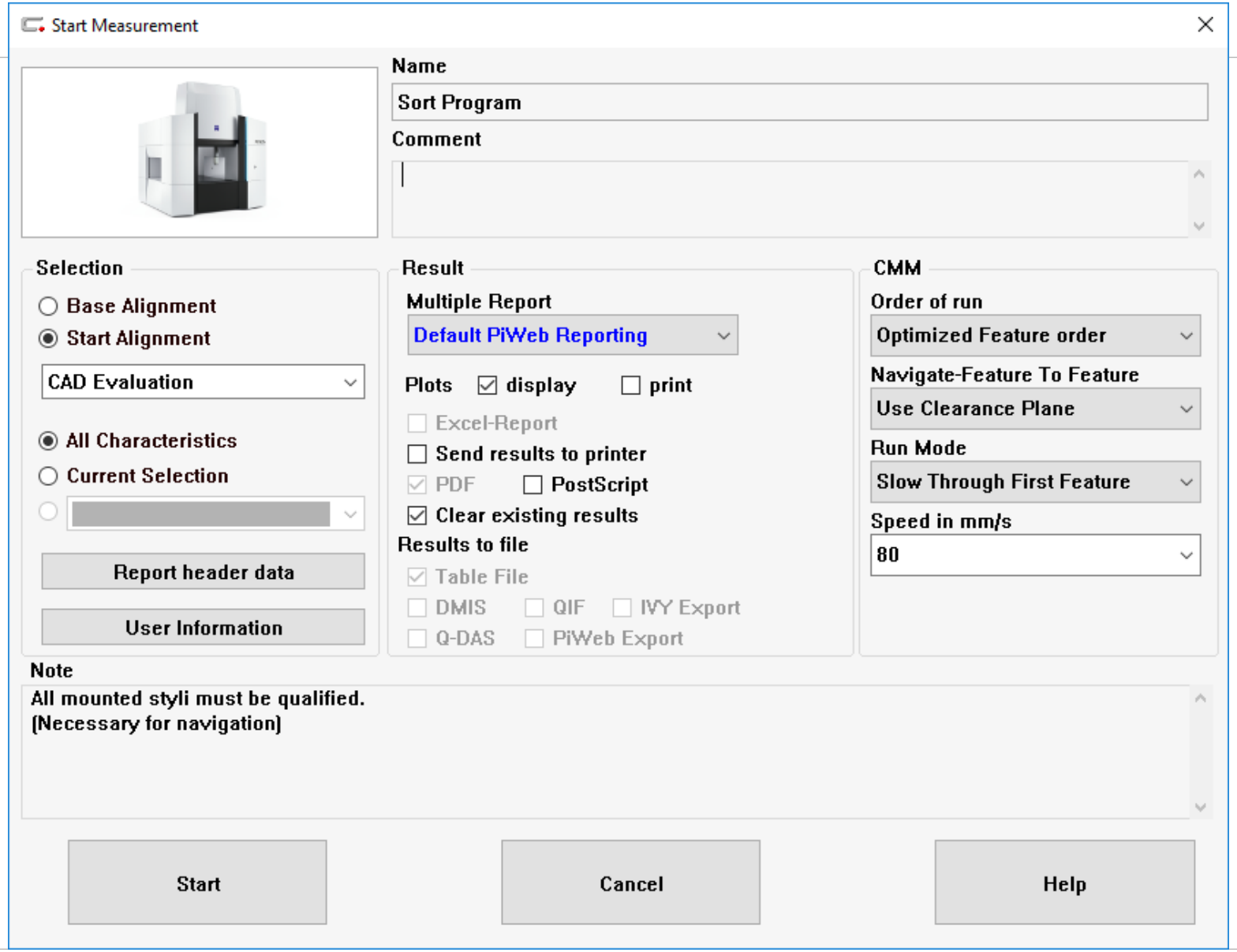


CALYPSO Advanced Navigation
Sorting the Feature List

Sorting Features for Navigation:

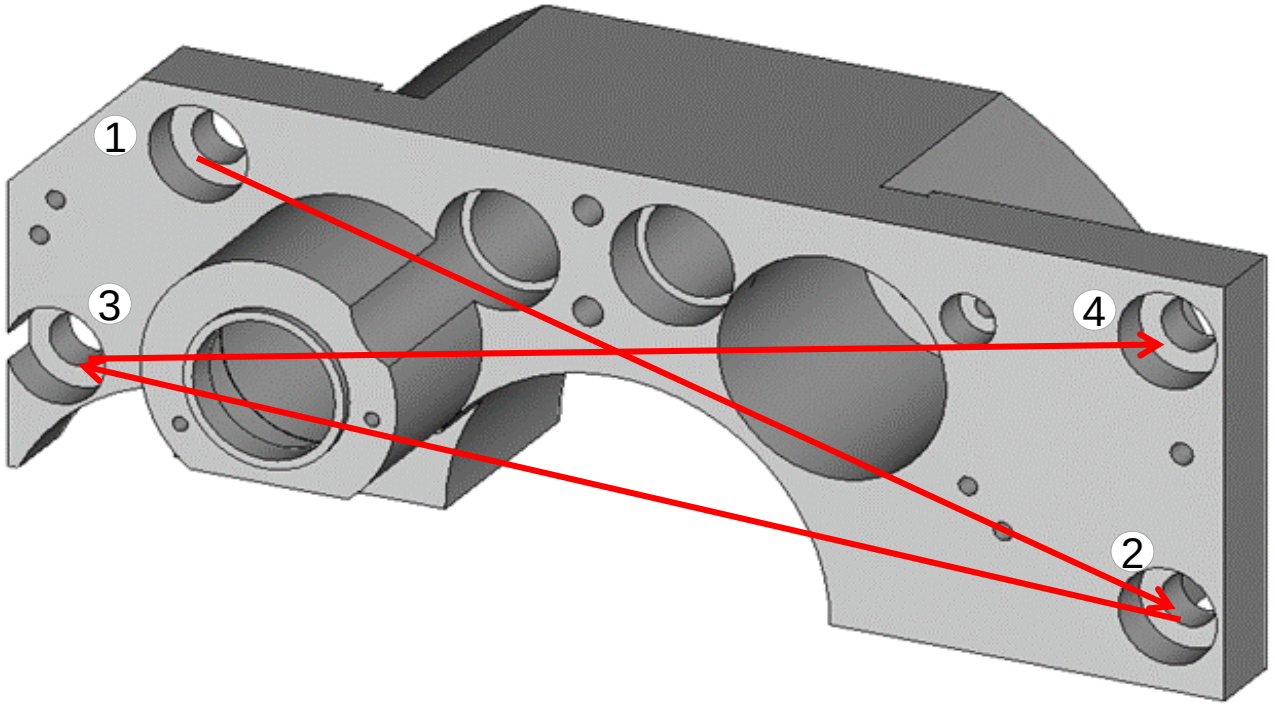
- ✓ Select OK to save the optimized feature order as a file.

- ✓ Then choose the new option from the ‘Order of run’ dropdown.



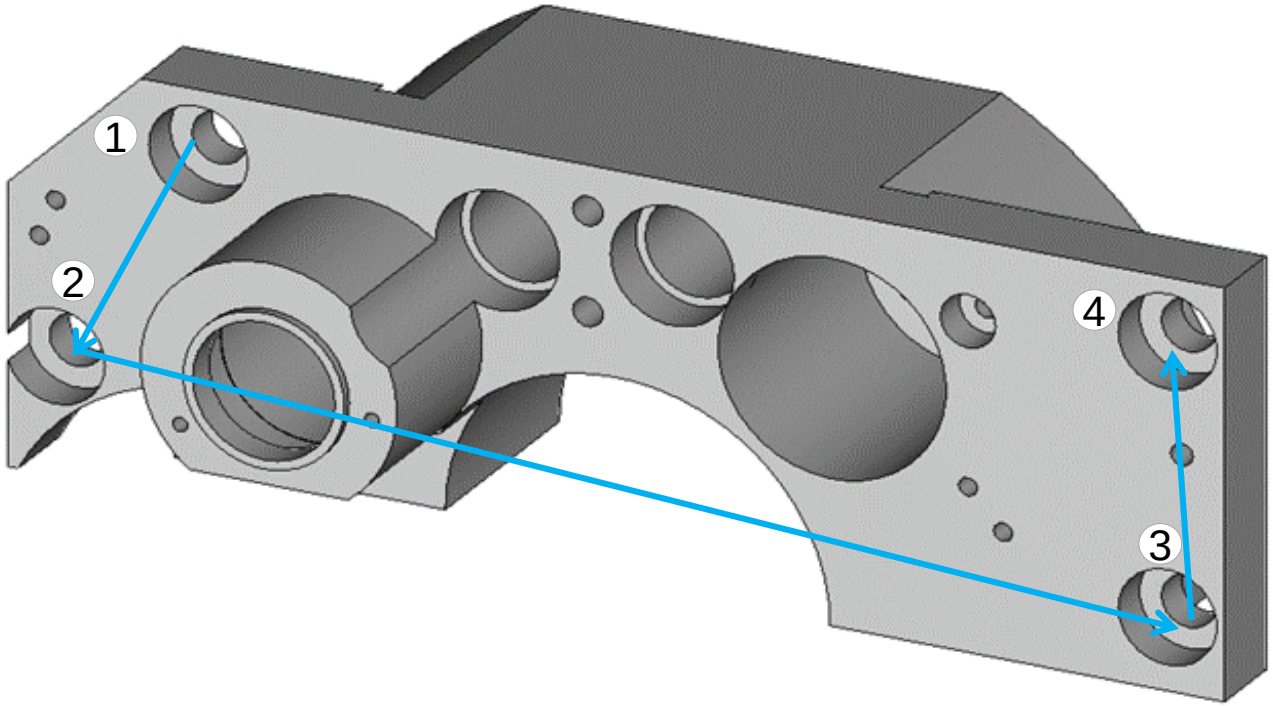
CALYPSO Advanced Navigation
Sorting the Feature List

Sorting Features for Navigation: Before



CALYPSO Advanced Navigation
Sorting the Feature List

Sorting Features for Navigation: After



Navigation Troubleshooting

Here are a few examples of real navigation issues

CALYPSO Advanced Navigation
Missing the Feature with Small Slots

Problem:

- ✓ With small slots the CALYPSO program seems to be missing the feature.

CALYPSO Advanced Navigation
Missing the Feature with Small Slots

Problem:

✓ With small slots the CALYPSO program seems to be missing the feature.

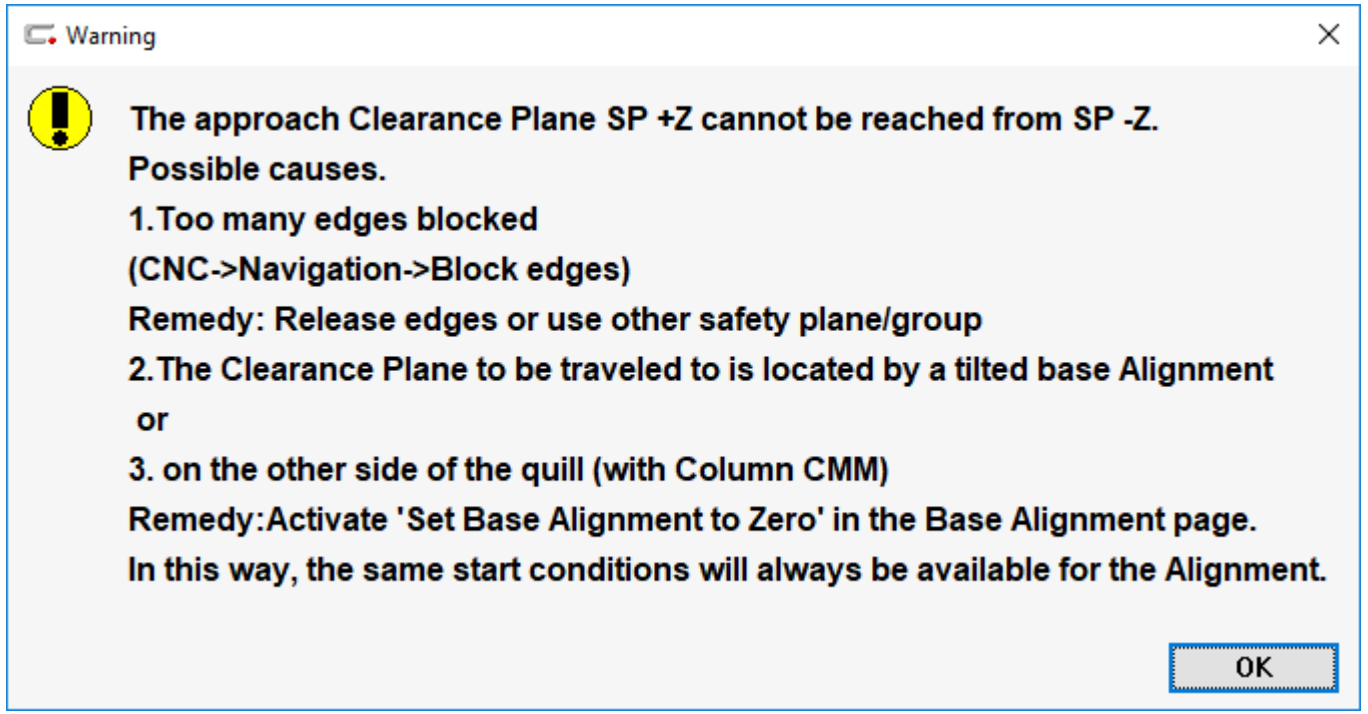
Solution:

Reduce both the Clearance Distance and the Retract Distance. Small circles automatically choose the center of a hole when navigating, but slots do not. The user will need to manually adjust the various navigation moves to reach very small slots, keyways, and more.

CALYPSO Advanced Navigation
Missing the Feature with Small Slots

Problem:

- ✓ After setting up the base alignment a measurement plan keeps coming up with a ‘blocked edges’ message when traveling over the top of the part.



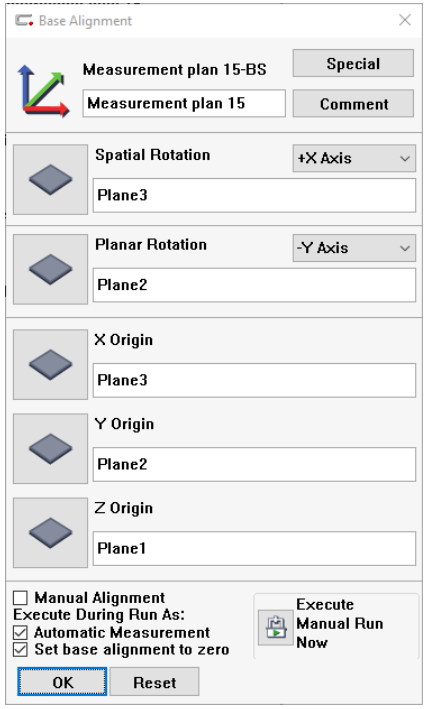
CALYPSO Advanced Navigation
Missing the Feature with Small Slots

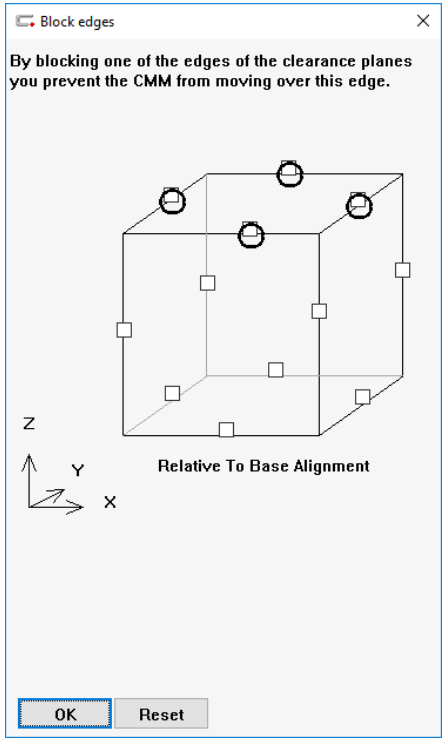
Problem:

- ✓ After setting up the base alignment a measurement plan keeps coming up with a ‘blocked edges’ message when traveling over the top of the part.

Solution:

If the base alignment is used to flip a part upside down then the blocked edges will not stay on the bottom of the part. So, instead use the CAD transformation tools to flip a part completely over or on its side, and not the base alignment.



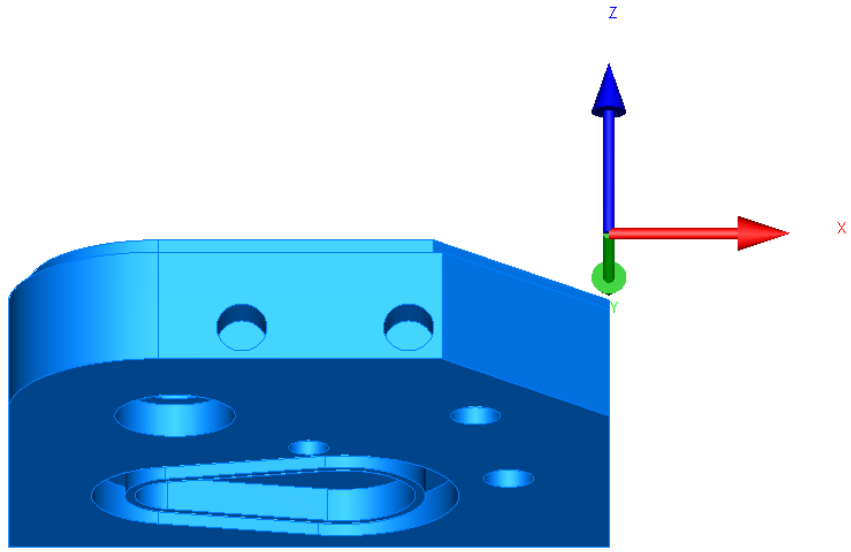


CALYPSO Advanced Navigation
Missing the Feature with Small Slots

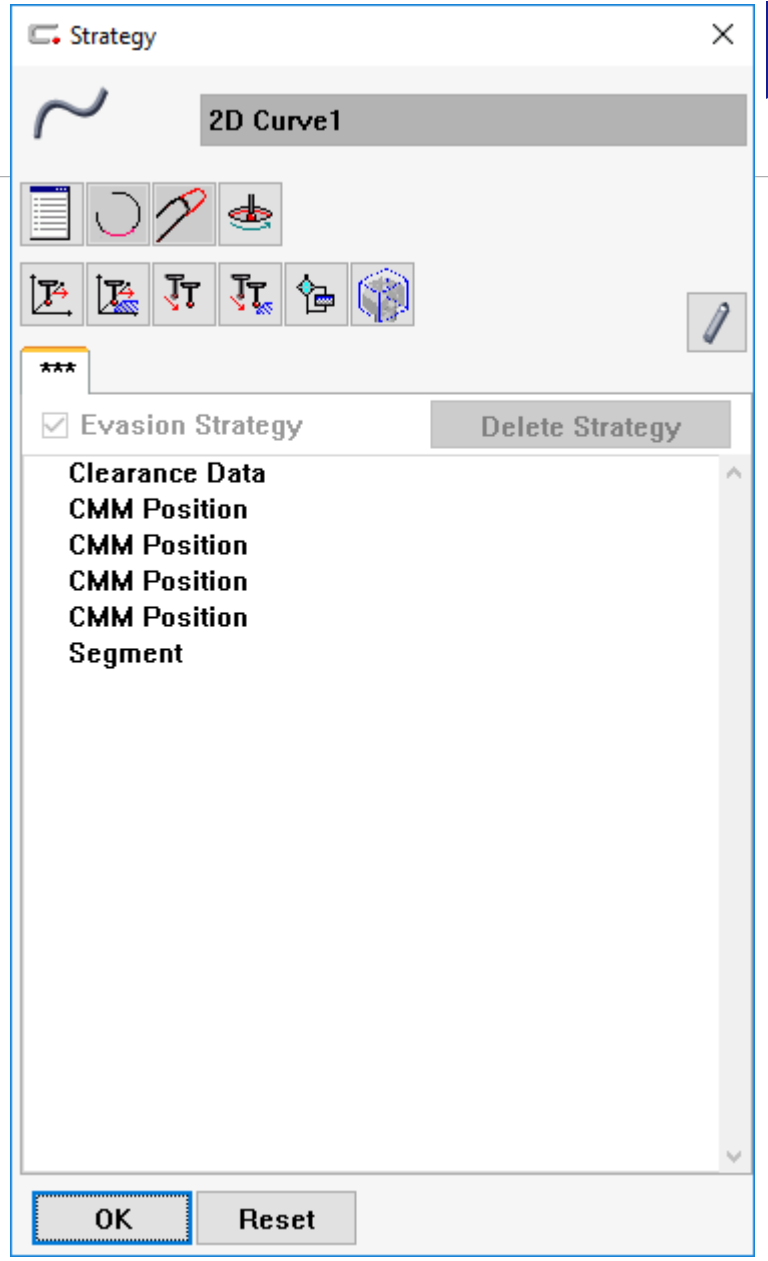
Problem:

- ✓ A user is trying to measure a Curve on the underside of a part.

  Unfortunately none of the regular clearance plane options are able to reach this feature.



CALYPSO Advanced Navigation
Missing the Feature with Small Slots



Problem:

- ✓ A user is trying to measure a Curve on the underside of a part. Unfortunately none of the regular clearance plane options are able to reach this feature.

Solution:

The best solution in this case might be to set up CMM positioning points (referencing the base alignment) in order to reach the Curve feature.

Questions and Helpful Information

Ask whatever proramming questions you have


ZEISS