



Verisurf Feature AlignTM_{REV R1}

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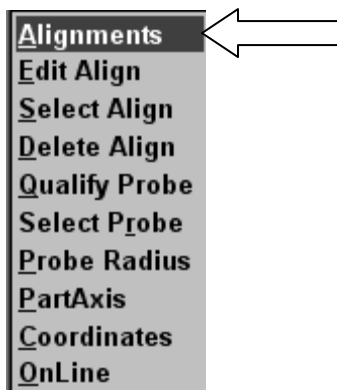
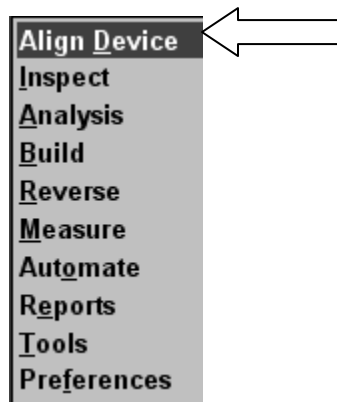
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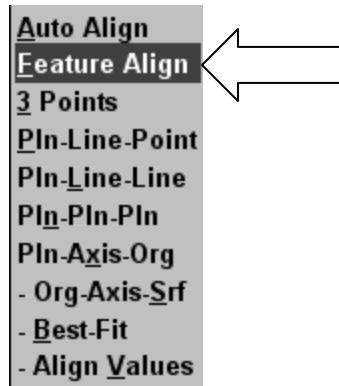
About Verisurf Feature Align

The Verisurf Feature Align product is a new device to quickly and accurately align a part up to blueprint dimensions. It is extremely flexible and can utilize a full array of elements to align a part to drawing requirements. Feature align is the recommended alignment method if there is no Cad model associated with the part. To use feature align the operator can measure all the datum features and then bring up Feature Align to enable the newly created graphic features to be aligned per the blueprint. After an alignment has been accomplished the inspection of the part can be completed.

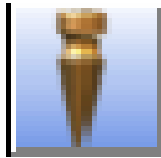
To access feature align you can use any 1 of 3 methods:

Using the **menu bar**.





Or the **toolbar icon** shown below of a plumb bob



Or the **F12 key**

Using any of these 3 methods will bring up the Feature alignment menu.

Feature Align Menu Screen

The example shown below shows the Feature Align tool aligning Z+ to a primary Plane 1, clocking X+ to a secondary Line 1 and origin aligning on tertiary point Origin Circle. The Menu screen is broken up into 4 sections and 2 buttons:

- Alignment Name
- Primary Plane setup area
- Secondary Axis setup area
- Tertiary Point setup area
- Part Axis and Align Device buttons

The screenshot shows the 'Datum Feature Alignment' dialog box. It has a title bar with a close button. The 'Name' field is set to 'FeatureAlign 1'. The 'Primary Plane' section has three dropdown menus, with 'Plane 1' selected in the first. Below these are radio buttons for X+, X-, Y+, Y-, Z+ (selected), and Z-. The 'Secondary Axis' section has two dropdown menus, with 'Line 1' selected in the first. Below these are radio buttons for X+ (selected), X-, Y+, Y-, Z+, and Z-. An 'Angle' field is set to '0' with a unit dropdown set to 'xy'. The 'Tertiary Point' section has a 'Set Origin' label and an 'Offset' label. The 'Set Origin' label is above three rows of dropdown menus: 'Set X' (Origin Circle), 'Set Y' (Origin Circle), and 'Set Z' (Plane 1). The 'Offset' label is above three rows of text boxes: '0', '0', and '0'. To the right of the 'Offset' label is a unit dropdown set to 'xyz'. At the bottom are two buttons: 'Part Axis' and 'Align Device'.

Datum Feature Alignment	
Name = FeatureAlign 1	
Primary Plane	Secondary Axis
Plane 1	Line 1
	Angle 0 xy
<input type="radio"/> X+ <input type="radio"/> X- <input type="radio"/> Y+ <input type="radio"/> Y- <input checked="" type="radio"/> Z+ <input type="radio"/> Z-	<input checked="" type="radio"/> X+ <input type="radio"/> X- <input type="radio"/> Y+ <input type="radio"/> Y- <input type="radio"/> Z+ <input type="radio"/> Z-
XY Plane	Direction
Tertiary Point	
Set Origin Offset xyz	
Set X Origin Circle	0 X
Set Y Origin Circle	0 Y
Set Z Plane 1	0 Z
Part Axis	Align Device

Alignment Name

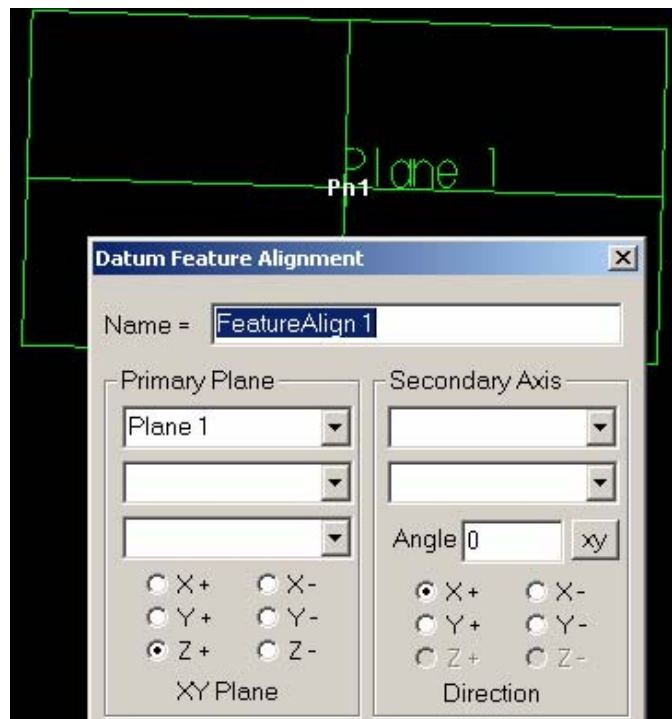


Each time a new alignment is created a new name is associated to represent that alignment. The operator can designate any unique name they desire to the alignment. Verisurf defaults to FeatureAlign1 and will increment the number with each successive alignment.

Primary Plane Setup Area

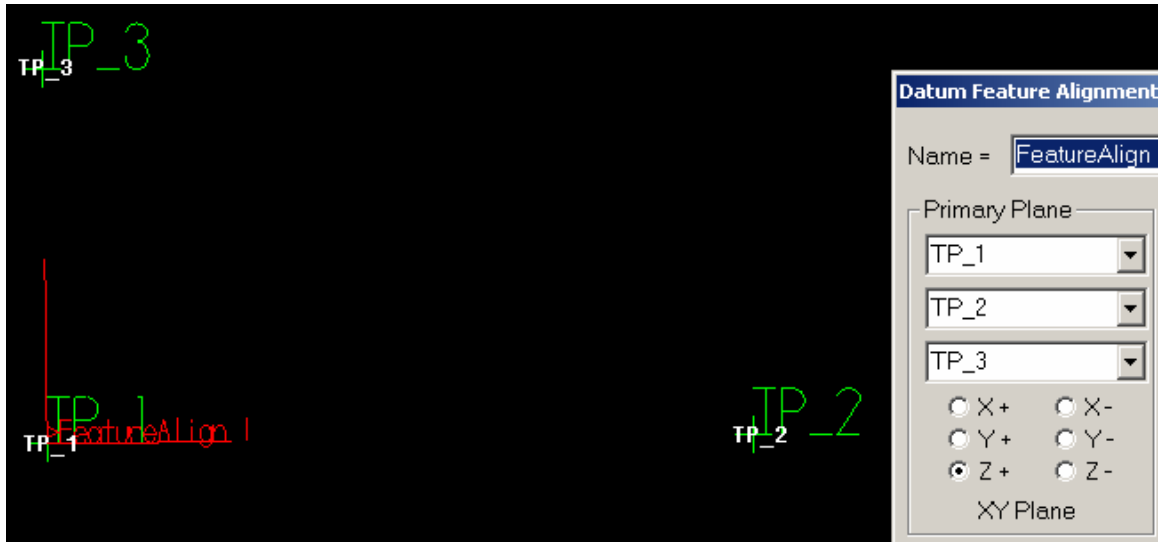
The Primary plane setup area is comprised of three dropdown boxes and six toggle windows. A primary plane is not necessarily a plane. It is the setting of the initial direction of the item being inspected. This is usually the datum –A- plane but it may also be a cylindrical element, 3 datum targets or perhaps 2 diameters on opposite ends of a camshaft.

The basic setup of using a plane to Align the Primary Plane in the Z+ direction is show in the following illustration.

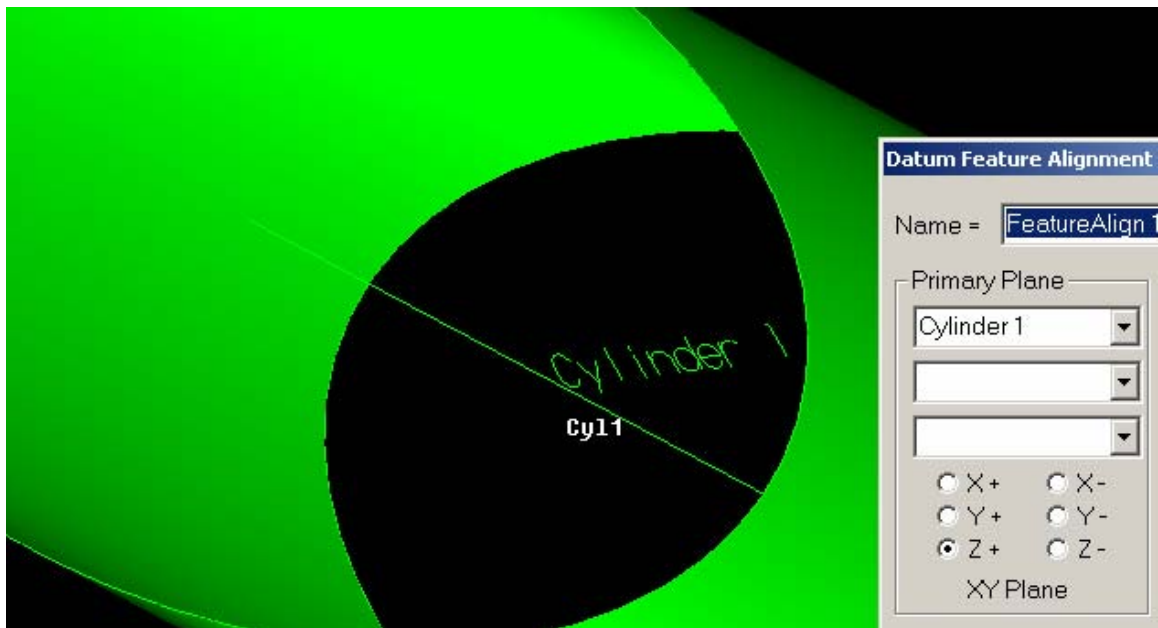


The primary plane setup area can utilize an array of combinations of entities to establish the primary plane. Normally datum –A- will be the primary plane.

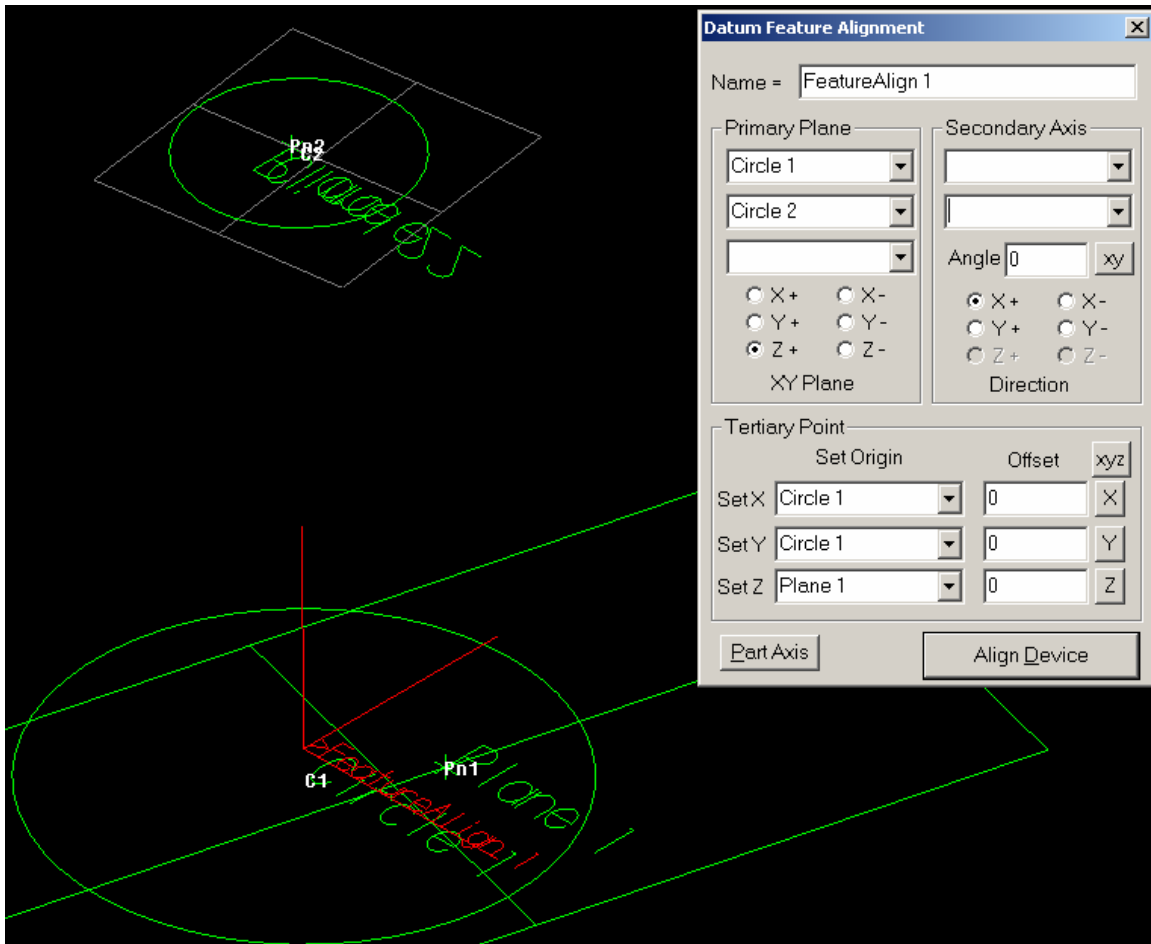
In this example 3 points are used to establish the primary plane in the Z+ orientation.



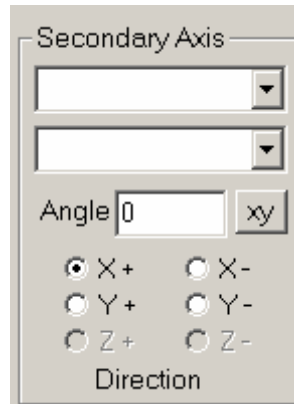
In this example a cylinder is used for the primary plane.



In this example 2 different sized circles are used for the primary plane. An actual application of this situation may be an item such as a camshaft or crankshaft.



Secondary Axis Setup area



Secondary Axis

Two empty dropdown menus for feature selection.

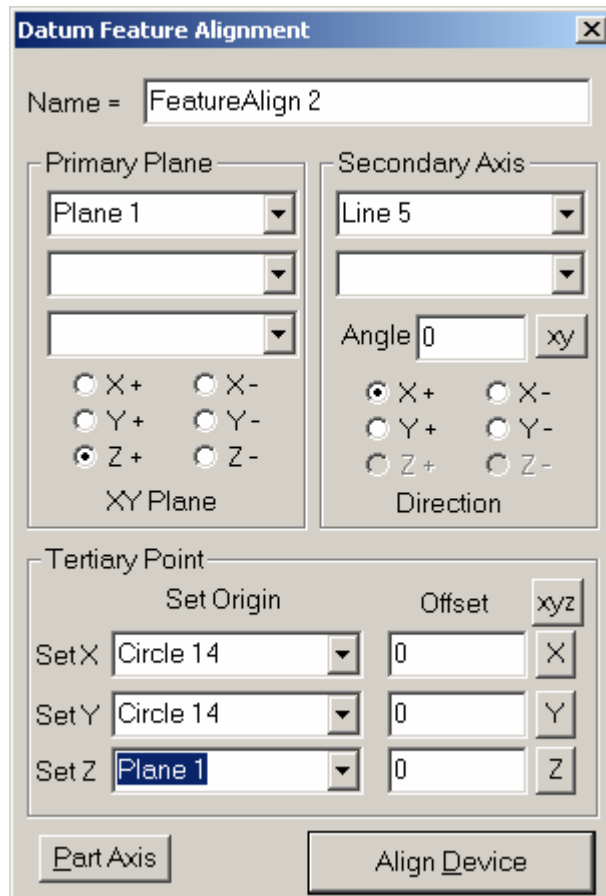
Angle

Direction:

☒ X+ ☐ X-
☐ Y+ ☐ Y-
☐ Z+ ☐ Z-

The secondary axis setup area is comprised of two drop down windows, an angle input box, an xy button and six toggle windows for direction. Whereas the primary sets the initial orientation the secondary axis usually sets up the clocking or rotational alignment. This is accomplished by selecting previously measured features from the dropdown boxes and specifying the direction the elements are oriented.

A basic example of the secondary alignment might be a line on the edge of a part. Here Line 5 is being used to clock the part in the screenshot in the X+ orientation.



Datum Feature Alignment

Name =

Primary Plane

Direction:

☐ X+ ☐ X-
☐ Y+ ☐ Y-
☒ Z+ ☐ Z-

XY Plane

Secondary Axis

Angle

Direction:

☒ X+ ☐ X-
☐ Y+ ☐ Y-
☐ Z+ ☐ Z-

Direction

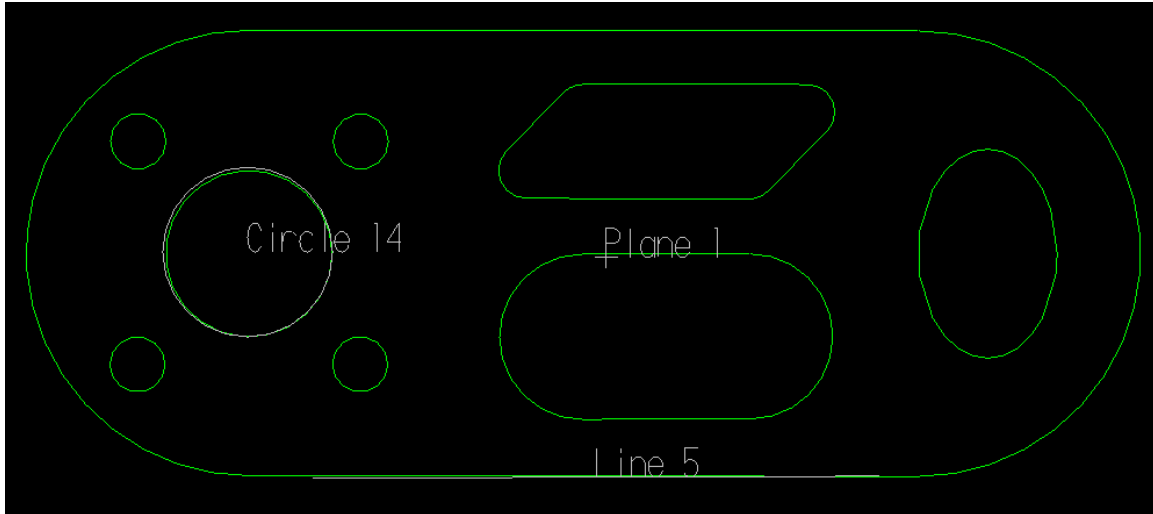
Tertiary Point

Set Origin Offset

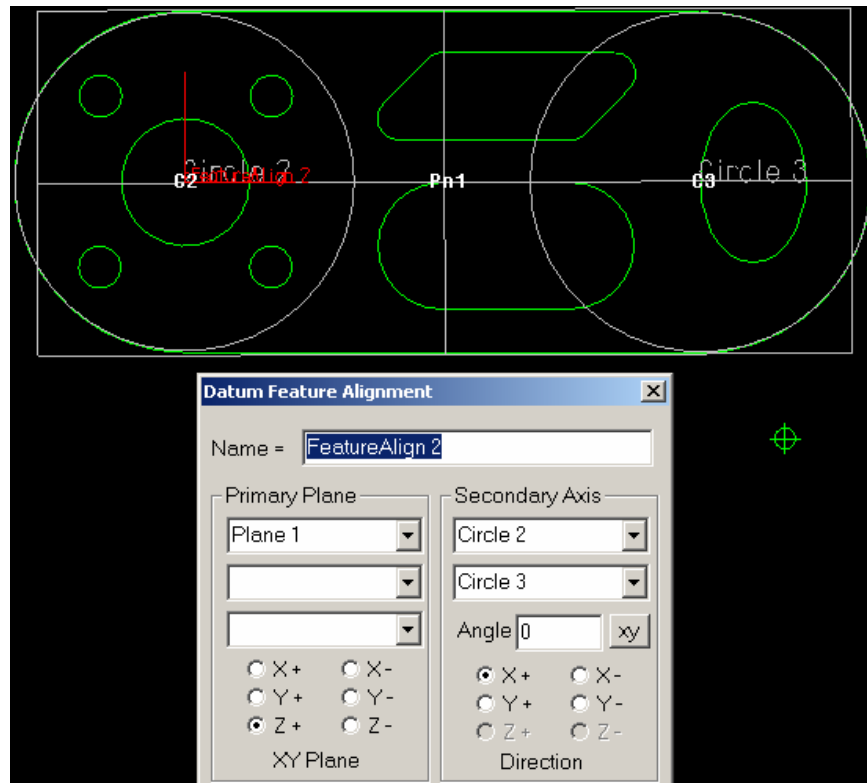
Set X

Set Y

Set Z

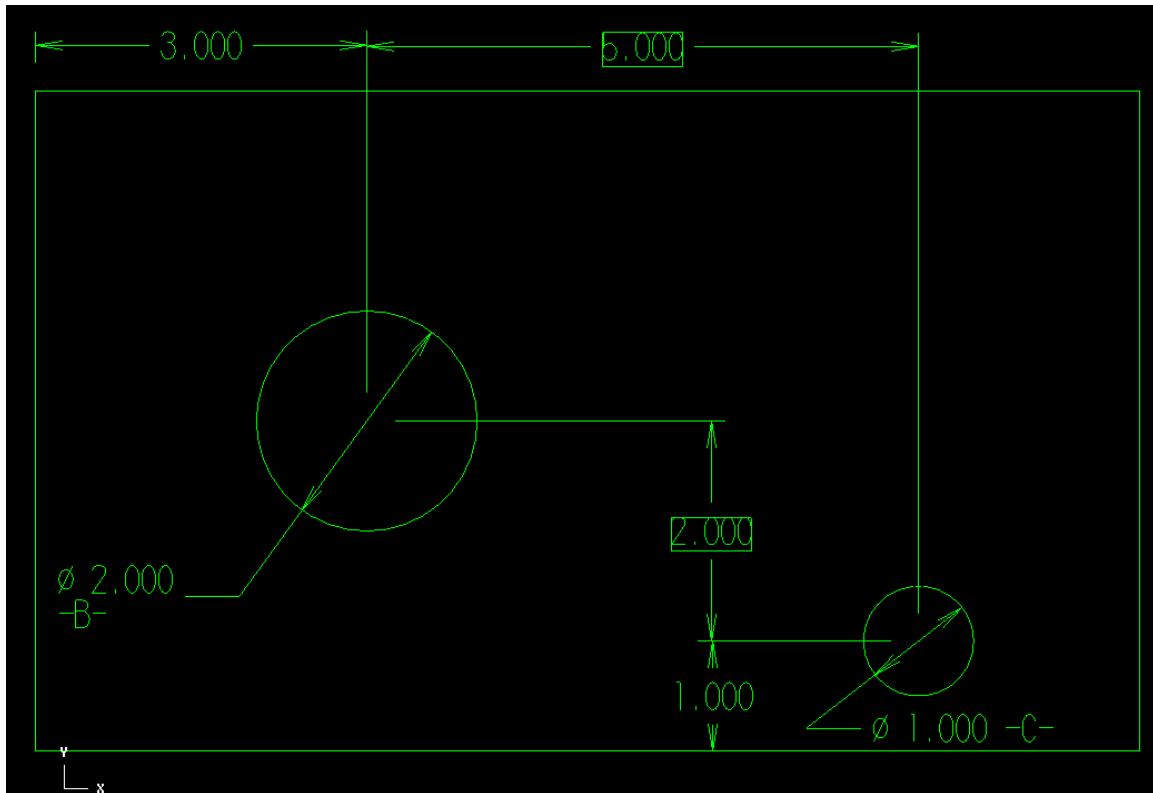


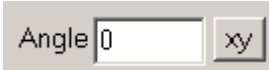
The example below uses 2 features to define a secondary axis. The X+ direction is defined by the Circle 2 on the left side of the drawing and Circle 3 feature on the right. The vector from C2 to C3 gives the direction and with the X+ toggle selected the direction X+ will be towards the right side.

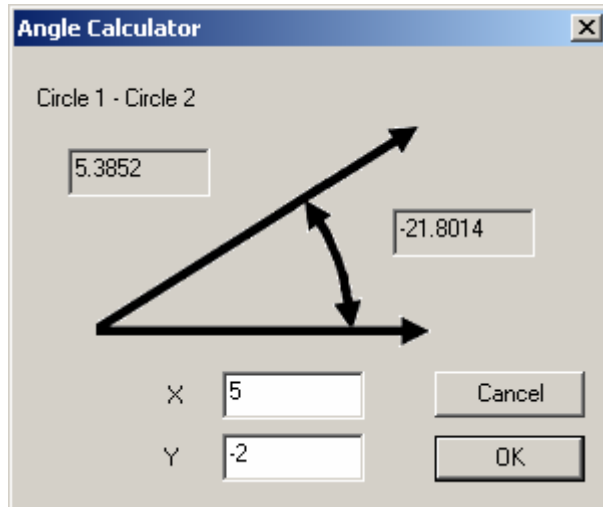


Secondary Datum Offset

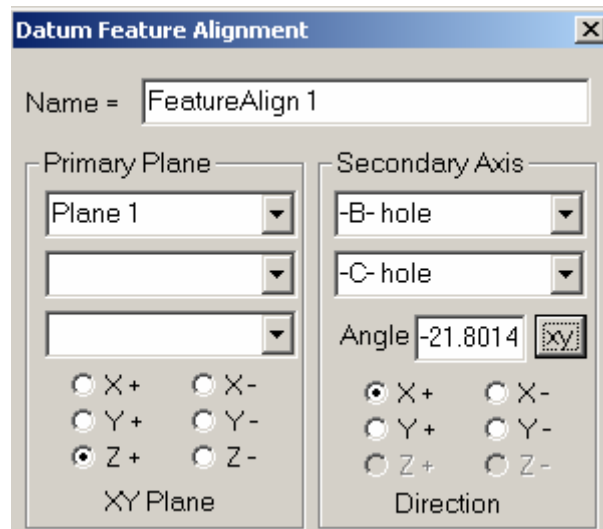
In this next example we will use an offset feature. The 1.000 diameter –C-hole located at X5.000 and Y-2.000 will be used to define our secondary axis direction. Our centerline will be the 2.000 diameter –B-.



Pressing the XY button  takes us to an angle calculation screen where we input the circles coordinates as show below. Here we enter the coordinates 5 and -2.



This calculates the angle to be -21.8014. As shown below this will orient the -C- hole which is offset from -B-.



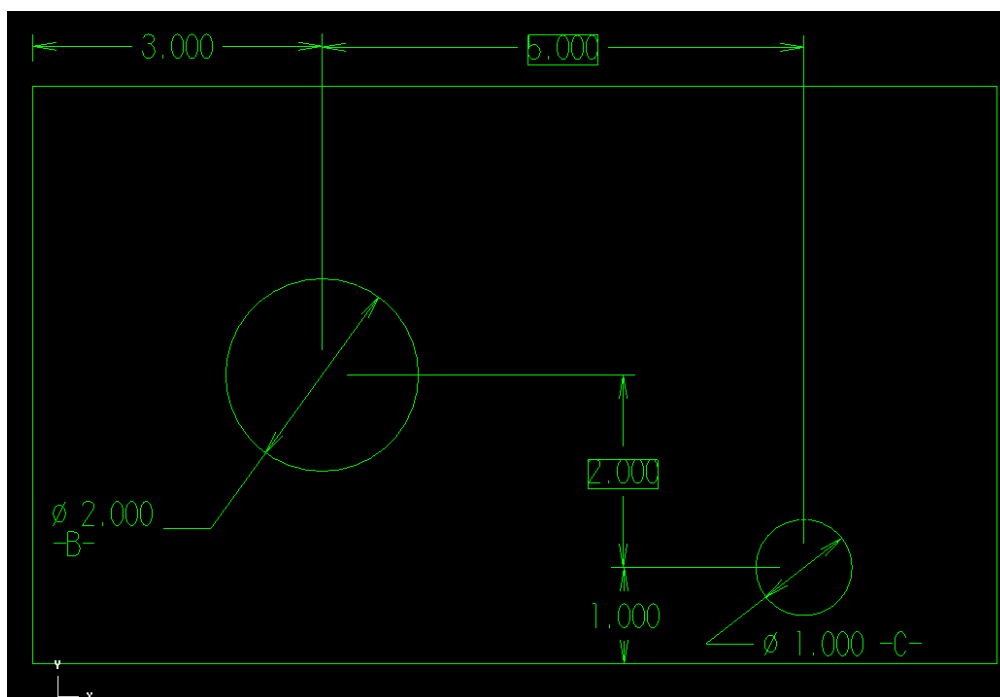
Tertiary Point Setup Area

The tertiary point setup area is comprised of three feature entry boxes for X,Y and Z, three offset entry boxes and 4 buttons that can be used to calculate offset values from the model.

The screenshot shows the 'Datum Feature Alignment' dialog box. It has a title bar with a close button. The 'Name' field is set to 'FeatureAlign 1'. The 'Primary Plane' section has three dropdown menus, with the first set to 'Plane 1'. Below these are radio buttons for 'X+', 'X-', 'Y+', 'Y-', 'Z+', and 'Z-', with 'Z+' selected. The 'Secondary Axis' section has two dropdown menus, both set to '-B- hole' and '-C- hole' respectively. Below these are radio buttons for 'X+', 'X-', 'Y+', 'Y-', 'Z+', and 'Z-', with 'X+' selected. An 'Angle' field is set to '-21.8014' with a 'xy' button next to it. The 'Tertiary Point' section has a 'Set Origin' label and an 'Offset' label. Below 'Set Origin' are three dropdown menus for 'Set X', 'Set Y', and 'Set Z', all set to '-B- hole', 'Plane 1', and 'Plane 1' respectively. Below 'Offset' are three input fields, all set to '0', with 'xyz', 'X', 'Y', and 'Z' buttons next to them. At the bottom are two buttons: 'Part Axis' and 'Align Device'.

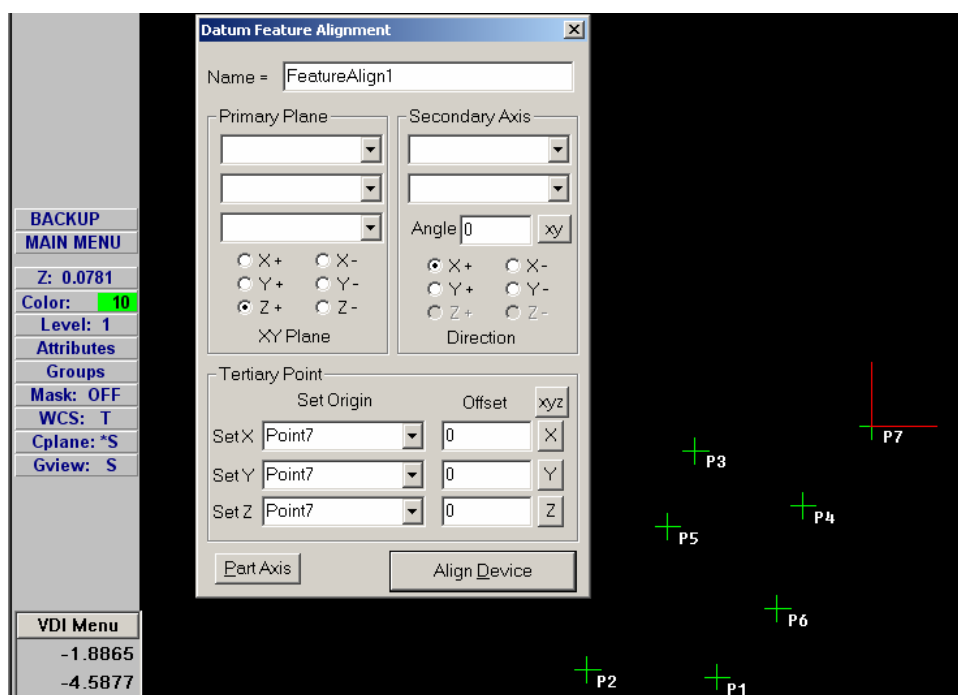
Datum Feature Alignment	
Name = FeatureAlign 1	
Primary Plane	Secondary Axis
Plane 1	-B- hole
	-C- hole
	Angle -21.8014 xy
<input type="radio"/> X+ <input type="radio"/> X- <input type="radio"/> Y+ <input type="radio"/> Y- <input checked="" type="radio"/> Z+ <input type="radio"/> Z- XY Plane	<input checked="" type="radio"/> X+ <input type="radio"/> X- <input type="radio"/> Y+ <input type="radio"/> Y- <input type="radio"/> Z+ <input type="radio"/> Z- Direction
Tertiary Point	
Set Origin Offset xyz	
Set X -B- hole	0 X
Set Y -B- hole	0 Y
Set Z Plane 1	0 Z
Part Axis Align Device	

Using the drawing from the prior example we have used -B- hole to set the X and Y datums and Plane 1 to set the Z.



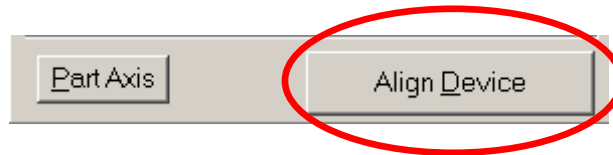
The tertiary setup area can also be used to automatically locate the highpoint of a group of points. This is useful if your measuring device is gravity aligned and you need to zero on the highpoint. Verisurf will sort the group or scan of points and input the highest point in the tertiary datum input fields.

In the following example we have seven points randomly placed in a side view. After the points are selected we choose F12 to access the Feature Alignment screen and note that the highpoint Point 7 is placed in all the tertiary datum fields.

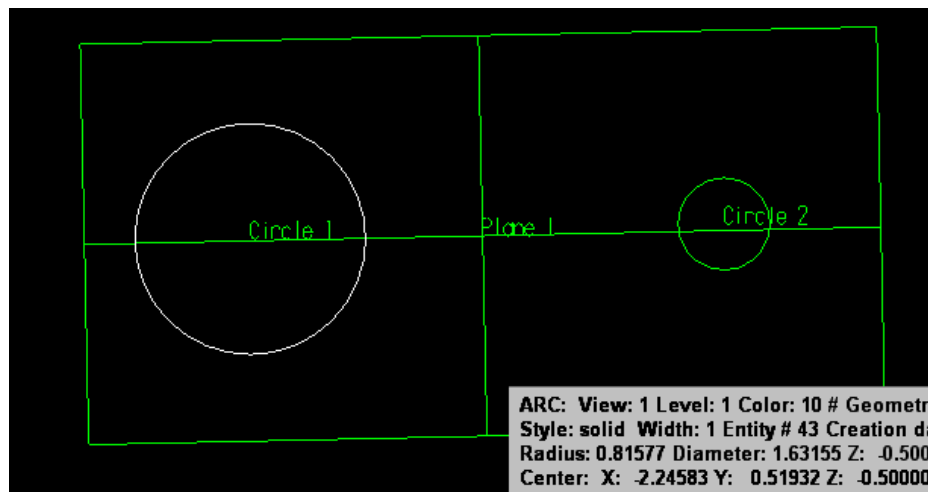


Align Device Button

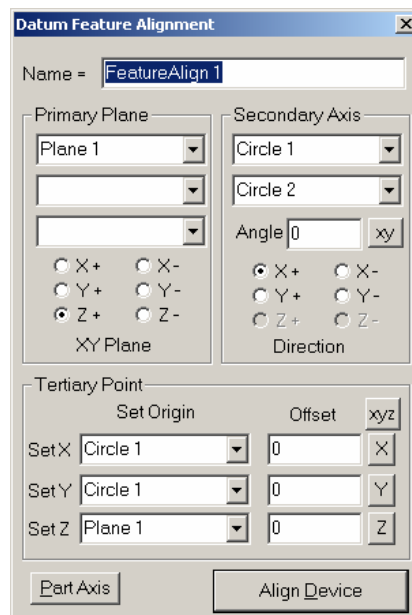
The Align device button will move all the measured geometry created in the display to the new coordinates and zero the part.



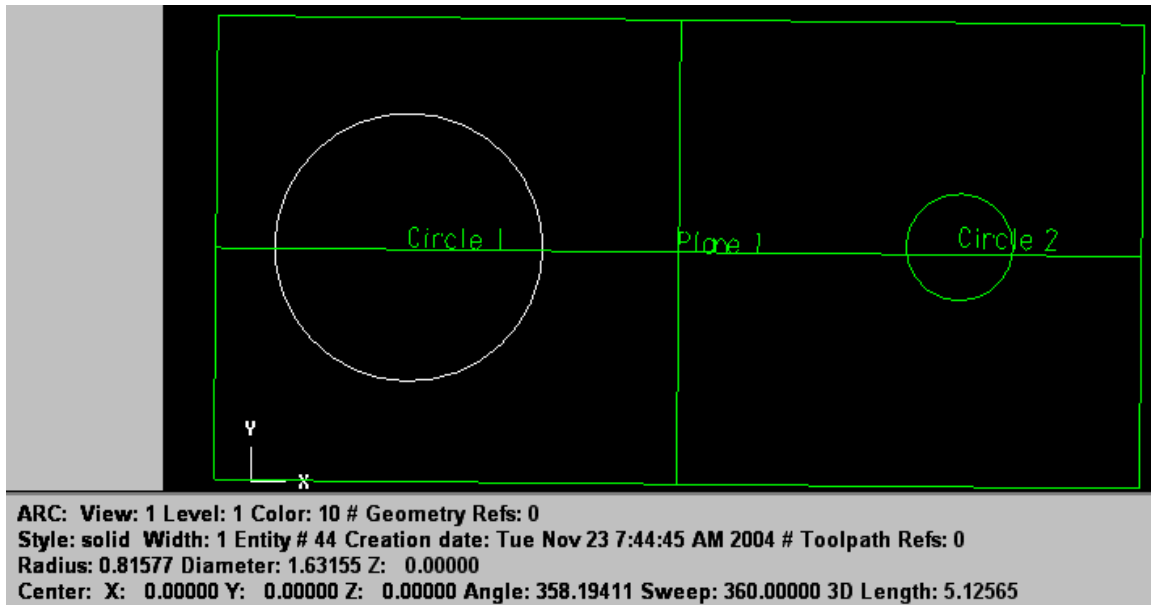
In this example we have measured 3 features. Plane 1, Circle 1 and Circle 2. Analyzing Circle 1 prior to align device shows that it is at X:-2.2458 and Y: .5193. These are the machine coordinates.



We do a feature alignment using Circle 1 as origin and Circle 2 as secondary.

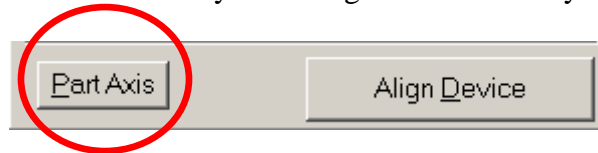


Now when we analyze Circle 1 we see it is at 0,0,0 coordinates. The measuring device has now been aligned.



Part Axis Button

The Part Axis button, when pressed, will place a named coordinate system where you have designated. You will then be prompted if you want to accept the alignment. At this point you can view the model to verify if the alignment is where you actually want it.



The new Part Axis will be named with the default name FeatureAlign1 unless changed by the operator. As shown in the illustration on the next page the new Part Axis is named and is on the centerline of Circle 1 or -B- hole.

