Iterative alignment
1) You need to know WHAT the datums are that you have to use for alignment. Use CTRL-F to open the AUTO FEATURES window
2) Select the type of feature you are going to use (vector, surface, circle, etc.) and pick that feature from the model
3) Create the feature, BUT DO NOT MEASURE IT!
4) Continue until you have all the features you need for your alignment, remember, ALL circular feature types NEED a minimum of 3 surface sample hits (circles, cylinders, cones, slots)
5) Print out the graphics screen for a reference of where the points need to be measured
6) Mark all the features and execute them, measure them as close to where they need to be as you can. OPTIONAL, do this here or at STEP 13
7) Go into the alignment and then into ITERATIVE alignment
8) Select the (minimum of) 3 'level' features
9) Select the (minimum of) 2 'rotate' features
10) Select the (minimum of) 1 'origin' feature
11) Set the tolerance to high values, I use 10mm radius and 1mm fixture
12) OK out of the iterative window and the alignment window
13) Mark all the features an execute the program, and measure the features as close to where they go as you can, this is the second place you can do this, but if you didn't do it as step 6, DO IT NOW!
14) You are now aligned
15) Turn on DCC mode and repeat steps 1 to 10, making the program executable, meaning it will run without crashing. HOWEVER, for the tolerances, at this point, I use 0.5 for radius and 0.05 for fixture. ALSO, mark the MEASURE ALL ALWAYS box in the iterative window
16) Now, program the checks of the part

Alignment producer:
COLLECTING THERORETICAL AND MEASURED DATA

1. From the "Auto Features" toolbar, select the "Vector Point" icon.

2. On the Vector Point screen, be sure to have the "Misc." selected to "Nominals". Using the mouse, select a point from the CAD model on the top surface. Make sure you have "Surface mode" selected. Pc-dmis will pierce the CAD model and insert the values for this measurement.

3. Once the point has been selected, verify all of the calculated values, paying close attention to the Normal Vector. This vector for the top surface should be logical in relation to the CAD coordinate system.

4. Name the feature PT1. With the “Measure” box unchecked select “Create”. The CMM will now create the theoretical code for that point.

5. Repeat steps 2-4 to create the remaining points as follows:

· PT2 and PT3 on the top surface. (A total of 3 points)
· PT4 and PT5 on a surface that’s ~75° to 90° from the top.
· PT6 on a surface ~75° to 90° to PT4, PT5 and the top.

6. Once the 6 points have been created theoretically, its time to collect the measured data for these points.

7. Mark All.

8. Say Yes to “Ok to mark manual alignment features”.

9. Execute the program. Follow the instructions to measure all 6 points. Once the execution is complete, the measured data has been collected in order to proceed to the Iterative Alignment.

CREATING THE MANUAL ITERATIVE ALIGNMENT

1. From the “Insert” menu select Alignment\New. From the alignment screen select “Iterative”.

2. Select the points from this screen as follows:

· PT1, PT2 and PT3 as the Level (set drop down menu to default).
· PT4 and PT5 as Rotate.
· PT6 as the Origin.

(Click “Select” after each, Level, Rotate, and Origin)

3. Select “Meas All Once”. Verify that the “Point Target Radius” is set to approximately 5mm, (this means you should to take your hits within 10mm diameter of where you clicked on the CAD). Set your “Fixture Tolerance” to ~0.05mm (this is basically the best fit tolerance for the iterative alignment, if you get an iterative alignment error then try bumping the fixture tolerance up in 0.01mm increments). Select OK. Set the jog box to run SLOWLY. Say YES to the message “Measure all iter features now”. The CMM will prompt you to position the probe above the first point. Keep in mind that the machine is still in manual mode. Continue to follow the prompts through the rest of the points.

4. Once the last feature has been measured, the Alignment screen will appear. Select OK. Watchingthe probereadoutwindow, notice that the origin is off the table (Car Position). Also notice that the axes are following the CAD model, not the machine axes.

DCC ALIGNMENT:

COLLECTING MEASURED DATA

RULES:

1. Insert an operator comment “Prepare for DCC Operation”. Then from the toolbar turn on the DCC mode.

2. Due to the fact that the CAD origin is off the table, move points will be the most efficient way to establish clearance above and around the part for free state. If you are programming using a fixture then a good way to establish clearance is to add a “Move Distance” to your auto features, this can be found under the “Advanced” button in the “Auto Features” dialog box. This distance can be set to your liking 10mm to 500mm> depending on if you are trying to clear a clamp or whatever. When the CMM goes to measure one of the features it will start at the distance you set (say 500mm) above the feature, keep in mind that the probe will follow the approach vector and will start and finish at the distance you enter along the approach vector, so this is best used with an I,J,K in your machines Z direction.
The use of clearance planes can also achieve the same result; moving from one point to another without hitting the piece being inspected.

3. It is now time to collect the measured data for the DCC iterative alignment.

4. Since you have the part locked-in relatively close with the manual iterative alignment you can now program the DCC alignment using auto features with the “Measure” box checked. Don’t forget your “Move Points” or “Move Distances” and make sure your “Normal Vectors” are in logical relation to the CAD coordinate system.

Before hitting “Create” set the jog box to slow to avoid a crash

The six point iterative is good for the manual alignment because it makes it faster to do your initial part set-up and it is not important to use datum features. All you are worried about, for the manual alignment is getting the CAD model locked-in relatively close so the DCC iterative can run through hitting the datums, precisely snapping the CAD to the part. The DCC Iterative Alignment is where the CAD model gets accurately locked-in to the part/fixture.

If you programming a part in the free-state, then you will want to use your primary DATUM features for your alignment. Typically you will Take 3 points on datum –A-, measure a circle for datum –B- and a circle or a slot for datum –C-, typical but not always the case (important* if you have to use a slot then you will want to construct a point or circle at the slot to use in the iterative).

If your are programming using a fixture then you will want to use the circle method iterative, for both the manual and DCC alignments. You will most likely use either three circles (cylindrical inserts), three spheres (tooling balls) or two circles and a point (two cylindrical inserts). You will want to enter the XYZ locations of the tooling balls/cylinder inserts in the auto features box for auto circle/auto sphere location. This information will be stamped on the fixture.

CREATING THE DCC ITERATIVE ALIGNMENT

1. After you have your measured data for the DCC iterative alignment, follow the steps above from CREATING THE MANUAL ITERATIVE ALIGNMENT the only difference is you will check the “Measure All Always” box for the DCC alignment and you may be using features other than just points.

2. Once the last feature has been measured, pc-dmis will evaluate the measured points and decide if it needs to re-measure the points and “Iterate” the alignment. Most likely it will and will run through the alignment a second time.