

Definition of “Probe.dat”

The “probe.dat” file is the file that controls the graphical and numerical representation of the probe system for Pc-dmis. If a probe or probe system is desired to be used within Pc-dmis then it must first be defined in the “probe.dat” file. There is a specific format for defining a probe or probe system and the rules of this format must be strictly followed. The format and rules of the format are described below along with a list of the commands and their definitions.

Commands:

ITEM:
begintip
endtip
ribcount
line
sphere
cutsphere
cylinder
cone
ring
comment
hotspot
opticalcenter
connect
autojoint
manualjoint
face
solid
cadgeom

The format of each of the commands are as follows (all lowercase):

ITEM:TIP2BY20MM M2 The first set of characters following the colon is the name that will appear in the “PROBE UTILITIES” dialog box when the operator is looking to construct a probe setup. The second set of characters “M2” define the type of thread or connection type this item has.

begintip This just states the start of a tip definition.

endtip This just states that a tip definition is finished.

ribcount N Where "N" is the number of lines seen in a circular feature. "N" can be anything from 2 to 1000.

line x1 y1 z1 x2 y2 z2 Where x1,y1,z1 is the starting point and x2,y2,z2 is the ending point.

sphere x y z d Where x,y, & z are the center location of the sphere and d is the diameter.

cutsphere x y z i j k d t b Where x, y, z, and d are the same as sphere, i, j, k is the vector perpendicular to the sphere top and bottom, and t, b define the location of the top and bottom as follows:
Top = (x,y,z) + t * (i,j,k)
Bottom = (x,y,z) - b * (i,j,k)"

cylinder x1 y1 z1 x2 y2 z2 d Where x1, y1, z1 are location of the top of the cylinder and x2, y2, z2 are the location bottom and d is the diameter.

cone x1 y1 z1 d1 x2 y2 z2 d2 Where x1, y1, z1 are location of the top of the cone and x2, y2, z2 are the location bottom and d1 is the diameter at the top and d2 is the diameter at the bottom.

ring x1 y1 z1 i1 j1 k1 d1 d2 Where x1, y1, z1 are the center location of a ring and the i1, j1, k1 are the vector of the ring with respect to the current coordinate system of the probe definition. d1 is the diameter of the outside of the ring and d2 is the diameter of the inside of the ring.

comment text A "comment" is just a way for the person editing "probe.dat" to place a comment to themselves as to what they are doing. The

“text” which follows the “comment” is not acted upon by the probe system.

hotspot x1 y1 z1 i1 j1 k1 d1 t1 type

Where x1, y1, z1 are the center location of the center of the probe tip, i1, j1, k1 are the vector of the probe tip, usually 001, d1 is the diameter of the tip, t1 is the thickness of the tip (for disk probe), and type is the type of probe (ball, shank, disk, etc.).

opticalcenter x1 y1 z1 i1 j1 k1 sch=1 minf maxf optics_type min_na max_na mag type

opticalcenter x1 y1 z1 i1 j1 k1 sch=2 ot magsteps fov1 fov2...fovmagsteps, na1, na2,...namagsteps, auxlensmag type

Where x1, y1, z1 are the center location of the center of the probe tip, i1, j1, k1 are the vector of the probe tip, usually 001, sch is the schema number for the optical center data, ot is the optics_type(1:encoder infinite zoom, 2 is fixed optics, 3:nonencoder zoom, 4:encoder discrete zoom, 5 is turret microscope, 6 is DCC turret microscope), magsteps is the count of fov and numeric aperture values, fov give the X fov size for each mag step or min and max if infinite zoom, na is the numeric aperture for each mag step or those corresponding to the min and max fov size if infinite zoom, auxlensmag is the magnification of any attached auxillary lens, and type is the type of probe (ball, shank, disk, camera, etc.).

connect x1 y1 z1 I1 j1 k1 take Where x1,y1,z1 are the location of a connection point on the probe system, I1, j1, k1 is the vector of the connection based on its orientation to the current coordinate system of the probe system being defined and always points toward the center, and take is the type of thread or connection type that the connect point will take.

autojoint x1 y1 z1 I1 j1 k1 ina inc sa ea label

Where x1, y1, z1 are the location of the joint with respect to the current coordinate system, i1, j1, k1 are the vector of the joint based on the current coordinate system pointing back towards the startup location, ina is the default initial angle of this joint, inc is the increments of this joint, sa is the starting angle of this joint, ea is the ending angle of this joint, and label is the name of the joint that will appear in the "PROBE UTILITIES" dialog box.

manualjoint x1 y1 z1 I1 j1 k1 ina inc sa ea label

Where x1, y1, z1 are the location of the joint with respect to the current coordinate system, I1, j1, k1 are the vector of the joint based on the current coordinate system pointing back towards the startup location, ina is the default initial angle of this joint, inc is the increments of this joint, sa is the starting angle of this joint, ea is the ending angle of this joint, and label is the name of the joint that will appear in the "PROBE UTILITIES" dialog box.

face N x1 y1 z1 ... xN yN zN N is the number of corner points on the given face and x1, y1, z1 through xN, yN, zN are coordinates of each corner point of the face.

solid N "solid" is used in conjunction with the "face" command to indicate the number "N" of "face" commands which follow to which shading should be applied. If "solid" is not defined, the faces will only appear as wireframes.

cadgeom X Y Z II IJ IK JI JJ JK KI KJ KK Level FileName

X Y Z = The coordinate transformation to move the origin of the CAD file to the start point of the drawing for the probe file.

II -> KK = Sets of 3 transformation matrices to rotate the CAD csy to the probe csy. If no changes are required, the nominal values would be

cadgeom X Y Z 1 0 0 0 1 0 0 0 1 Level FileName

Level = The CAD level number as assigned from within PC-DMIS. If no CAD level exists or if there are multiple levels, you may need to create a new level inside PC-DMIS.

FileName = A .draw file which is nothing more than a renamed .cad file.

Important note: When importing the IGES/STEP/etc. file, there is a registry entry in the OPTION section that needs to be changed.

ConvertToFacetedFaces = 1

This is normally 0 and should only be set to 1 when importing a file that will be used to create a DRAW file.

Format of the probe or probe system ITEM:

Each new probe configuration added to the file “probe.dat” must begin with the command “ITEM:” that contains both a distinct naming description and a connection identifier that specifies the type of object it can be connected too. The available connection identifiers are listed below. For a probe tip only the second line of the probe configuration must be a “begintip” command, and the very last line a “endtip” command.

To define a probe configuration you must work with a **Top Down** approach. This means that your initial starting point is $x=0$, $y=0$, $z=0$ and everything is drawn from that point down, which means that all z values should have a negative value. Also for most items the 0 0 0 location is the center of that item therefore there could be both positive and negative numbers in both the X and Y directions. Positive X always moves from left to right initially, and Positive Y always moves from front to back as if you were looking **FROM** the positive Z direction.

The only two commands that define a active configuration are “hotspot” for tips and “connect” for all others. One of these two must be present in any configuration, but never are both present at the same time. “hotspot” defines the center location of any portion of a configuration that can be used to actually touch a part for measurement purposes. While “connect” defines any location that

another item can be added to the current item. Each connection must include a Connection Identifier to define the type of item it can take.

The two commands that can change the coordinates system of the probe configuration are “autojoint” and “manualjoint”. Special care should be taken when using these two commands, because when they are used the origin of the configuration is transferred to the center of the Joint as defined by the command. Also the axes of the coordinate system are changes on by the first “joint” command,. What was the Negative Z direction now becomes the Positive X direction and What was the Positive X direction now becomes the Positive Z direction, Y remains the same. These commands are usually used in pairs. For example: one command will control the B rotation of a PH9 while a second will control the A rotation of a PH9 also the first command of the pair always control the B rotation and the second Always controls the A rotation.

Connection Identifiers:

M2	specifies that it can connect a M2 threaded device.
M3	specifies that it can connect a M3 threaded device.
M4	specifies that it can connect a M4 threaded device.
M5	specifies that it can connect a M5 threaded device.
M8	specifies that it can connect a M8 threaded device.
QC	specifies that it can connect a Quick Connect device.
ARM	specifies that it connects directly into the machine arm.
OPT	specifies that it can connect to a Renishaw Optical lense that works with the VP2 and VP1 optical probes.
DEA	specifies that it connects with the DEA old style Probe head including their rotary head.
LEITZ1	specifies that it can connect a Leitz M5 threaded device.
LEITZ1ANALOG	specifies that it can connect a Leitz M5 threaded device on an analog probe head.
FIXEDOPTICS	
ZOOMOPTICS	
TESAOVP	
TKJ	specifies that it is a Tesa Kinematic Joint.

Examples:

Tip:

ITEM:TIP1.5BY11MM M2
begintip
ribcount 10

cylinder 0 0 0 0 0 -3 3
cone 0 0 -3 3 0 0 -7 0.65
cylinder 0 0 -7 0 0 -11 0.65
color 255 0 0
sphere 0 0 -11 1.5
hotspot 0 0 -11 0 0 1 1.5 1.5 ball
endtip

Probe Head:

ITEM:PROBEPH9A ARM

color 0 0 0

comment THE FOLLOWING 12 LINES CREATE THE BOX OF THE PH9

line -30 -30 0 30 -30 0

line 30 -30 0 30 30 0

line 30 30 0 -30 30 0

line -30 30 0 -30 -30 0

line -30 -30 0 -30 -30 -60

line -30 -30 -60 30 -30 -60

line 30 -30 -60 30 30 -60

line 30 30 -60 -30 30 -60

line -30 30 -60 -30 -30 -60

line 30 -30 0 30 -30 -60

line 30 30 0 30 30 -60

line -30 30 0 -30 30 -60

comment THE FOLLOWING CREATE THE LED

ring 0 -30 -30 0 1 0 20 4

ribcount 10

color 255 0 0

sphere 0 -30 -30 4

comment THE FOLLOWING STARTS THE ROTATING SPHERE

autojoint 0 0 -77 0 0 1 0 7.5 -180 180 b angle

color 0 0 0

ribcount 10

sphere 0 0 0 50

autojoint 0 0 0 -1 0 0 0 7.5 0 105 a angle

ribcount 10

color 0 0 0

cylinder -22 0 0 -38 0 0 25

connect -38 0 0 1 0 0 QC