**Net-Inspect support for PC-DMIS CMM results**

# Disclaimer

“PC-DMIS” is a trademark of Hexagon Metrology. The term “PC-DMIS” is used throughout this document to identify that particular metrology software.

# Overview

Submitting an automatically parsing a CMM report file saves you from having to manually re-enter, or copy and paste data from the report file. To automatically parse a CMM results file it must first be machine readable, and it must be in a predictable and consistent format.

This document describes the requirements for a successful parsing of a PC-DMIS generated CMM results report.

# Allowed formats

PC-DMIS generates CMM results in two formats: one graphics based, and the other text-based.

The graphics based report, although very attractive and informative, consists of a series of rendered bitmaps which cannot be directly parsed. THIS REPORT FORMAT IS NOT SUPPORTED by the loader.

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Instead you must use the text mode report either as an ASCII text file (.TXT extension, no color) :



DIM ITEM 48 X & Y @ZERO= LOCATION OF CYLINDER CYL2 UNITS=IN
AX NOMINAL +TOL -TOL MEAS DEV OUTTOL
X 0.00000 0.00500 0.00500 0.00016 0.00016 0.00000 ----#----
Y 0.00000 0.00500 0.00500 0.00009 0.00009 0.00000 ----#----
D 1.48000 0.00200 0.00200 1.47842 -0.00158 0.00000 #--------

or as a Rich Text Format file (.RTF extension, with color):



DIM 40= TRUE POSITION OF CIRCLE CIRC\_43 UNITS=MM

AX NOMINAL +TOL -TOL BONUS MEAS DEV OUTTOL

Y 66.030 66.739 0.709

Z 2.730 0.739 -1.991

DF 7.800 0.100 0.100 6.957 -0.843 0.743 <-------

TP RFS 0.500 0.000 4.228 3.728 ------->

It is permissible for an RTF text mode report to have a graphical header, either the default header, or a custom company header.

This YouTube video shows you how to switch between the two formats:

<https://youtu.be/DAXm6th7fjw?list=PLnazUmDXfFRr_UEVjMvq1f0UrUEsRvFt->

# Supported records

The parser reads the report and determines the meaning of each number in much the same way as a human reader. The column header (AX, NOMINAL, +TOL, -TOL, etc.) in conjunction with the AX column identifier (X, Y, Z, TP, etc.) and with knowledge of the tolerance or geometric element type in the record header (DIM 40=…) together assigns meaning to each number.

The PC-DMIS loader currently supports the combinations of AX row identifiers and geometry/tolerance types shown in the table below. If the results file you are submitting contains information not covered in the table below, the parser will need to be adjusted to handle the new or different markers.

|  |  |  |  |
| --- | --- | --- | --- |
| **Feature type** | **AX identifier** | **Geometry/tolerance type** | **Comments** |
| X coordinate | X | = LOCATION OF= POSITION OF= TRUE POSITION OF |  |
| Y coordinate | Y | = LOCATION OF= POSITION OF= TRUE POSITION OF |  |
| Z coordinate | Z | = LOCATION OF= POSITION OF= TRUE POSITION OF |  |
| R coordinate | PR | = POSITION OF= TRUE POSITION OF | XY plane assumed |
| A coordinate | PA | = POSITION OF= TRUE POSITION OF | XY plane assumed |
| Diameter | D | = LOCATION OF | D supersedes DF if both present  |
| Diameter | DF | = POSITION OF= TRUE POSITION OF | D supersedes DF if both present  |
| Radius | R | = LOCATION OF |  |
| Length | L | = LOCATION OF |  |
| Length | LF | = POSITION OF= TRUE POSITION OF |  |
| Width | D | = LOCATION OF\*= LOCATION OF SLOT | \* only if L also present, otherwise interpreted as diameter |
| Width | WF | = POSITION OF= TRUE POSITION OF |  |
| Angle | A | = LOCATION OF |  |
| Angle between | A | ANGLE FROMANGLE (TRUE) FROMANGLE (COMPLEMENT) FROM | For both 2D and 3D |
| Distance between | M | DISTANCE FROM | For both 2D and 3D |
| Vector (profile) | T | = LOCATION OF |  |
| Profile | M | = PROFILE OF SURFACE OF= SURFACE PROFILE OF= PROFILE OF LINE OF= LINE PROFILE OF\* | \* anticipated but not yet observed |
| Position | TP | = POSITION OF= TRUE POSITION OF |  |
| Flatness | M | = FLATNESS OF |  |
| Straightness | M | = STRAIGHTNESS OF |  |
| Circularity | M | = ROUNDNESS OF= CIRCULARITY OF |  |
| Cylindricity | M | = CYLINDRICITY OF |  |
| Parallelism | M | = PARALLELISM OF= PARALLELISM FROM\* | \* anticipated but not yet observed |
| Perpendicularity | M | = PERPENDICULARITY OF= PERPENDICULARITY FROM\* | \* anticipated but not yet observed |
| Concentricity | M | = CONCENTRICITY OF= CONCENTRICITY FROM |  |
| Angularity | M | = ANGULARITY TO= ANGULARITY FROM |  |
| Circular runout | M |  RUNOUT OF RUNOUT FROM\* | \* anticipated but not yet observed |
| Total runout | M | Included above |  |
| Symmetry | M | = SYMMETRY OF\*= SYMMETRY FROM\* | \* anticipated but not yet observed |

# Handled variances

As a proprietary format, the PC-DMIS text mode results format is not required to conform to any published standard and can change without notice. Variances from the regular form can cause parsing errors and the loader is adapted as they are encountered. Some of the known variances can be seen in the table above, e.g., the use of “TO” and “FROM”, and the various wordings associated with PROFILE and POSITION. Here are some other observed variances from the regular form which are already handled by the PC-DMIS results loader:

1. Concentricity: a version of PC-DMIS produces concentricity output with a missing space: “=CONCENTRICITY” rather than “= CONCENTRICITY”
2. DIM missing: a version of PC-DMIS produces records with the DIM prefix missing, e.g. this:
 FCFLOC1 = POSITION OF CYL2 FIT TO DATUMS=ON DEV PERPEN CENTERLINE=ON …
instead of this:
 DIM FCFLOC1 = POSITION OF CYL2 FIT TO DATUMS=ON DEV PERPEN CENTERLINE=ON …

(PC-DMIS has two tolerance types: legacy tolerances, and the newer feature control frame (FCF) tolerance. Therefore it is possible that the intent was that the marker “FCF” was to be used much like the marker “DIM”, i.e. separated from the record name by a space like this:
 FCF LOC1 = POSITION OF CYL2 FIT TO DATUMS=ON DEV PERPEN CENTERLINE=ON …
the loader will support this change should it appear in a future PC-DMIS version.)
3. Text boxes: a version of PC-DMIS used an RTF text formatter that enclosed small chunks of report text each in its own text box resulting in large file sizes (typically 40-50 times larger than the equivalent RTF file not using text boxes).

For example, instead of just having the text

 AX NOMINAL

The A, X, N, OMINAL and each space between appear in its own text box:

\par\pard\pvpg\phpg\posx168\posy375\charscalex100\expndtw0 \ql\fs24\cf1\f1\fs16\cf3 A {\shp{\\*\shpinst\shpbxpage\shpbypage\shpwr3\shpfblwtxt1{\sp{\sn shapeType}{\sv 1}}{\sp{\sn fBehindDocument}{\sv 1}}\shpleft264 \shptop374 \shpright365 \shpbottom557
{\sp{\sn fillColor}{\sv 16777215}}{\sp{\sn lineWidth}{\sv 0}}{\sp{\sn fLine}{\sv 0}}{\sp{\sn fFilled}{\sv 1}}}}

\par\pard\pvpg\phpg\posx264\posy375\charscalex100\expndtw0 \ql\fs24\cf1\f1\fs16\cf3 X
\shp{\\*\shpinst\shpbxpage\shpbypage\shpwr3\shpfblwtxt1{\sp{\sn shapeType}{\sv 1}}{\sp{\sn fBehindDocument}{\sv 1}}\shpleft365 \shptop374 \shpright466 \shpbottom557
{\sp{\sn fillColor}{\sv 16777215}}{\sp{\sn lineWidth}{\sv 0}}{\sp{\sn fLine}{\sv 0}}{\sp{\sn fFilled}{\sv 1}}}}
 {\shp{\\*\shpinst\shpbxpage\shpbypage\shpwr3\shpfblwtxt1{\sp{\sn shapeType}{\sv 1}}{\sp{\sn
BehindDocument}{\sv 1}}\shpleft461 \shptop374 \shpright562 \shpbottom557
{\sp{\sn fillColor}{\sv 16777215}}{\sp{\sn lineWidth}{\sv 0}}{\sp{\sn fLine}{\sv 0}}{\sp{\sn fFilled}{\sv 1}}}}
 {\shp{\\*\shpinst\shpbxpage\shpbypage\shpwr3\shpfblwtxt1{\sp{\sn shapeType}{\sv 1}}{\sp{\sn fBehindDocument}{\sv 1}}\shpleft557 \shptop374 \shpright658 \shpbottom557
{\sp{\sn fillColor}{\sv 16777215}}{\sp{\sn lineWidth}{\sv 0}}{\sp{\sn fLine}{\sv 0}}{\sp{\sn fFilled}{\sv 1}}}}
 {\shp{\\*\shpinst\shpbxpage\shpbypage\shpwr3\shpfblwtxt1{\sp{\sn shapeType}{\sv 1}}{\sp{\sn fBehindDocument}{\sv 1}}\shpleft658 \shptop374 \shpright758 \shpbottom557
{\sp{\sn fillColor}{\sv 16777215}}{\sp{\sn lineWidth}{\sv 0}}{\sp{\sn fLine}{\sv 0}}{\sp{\sn fFilled}{\sv 1}}}}
 {\shp{\\*\shpinst\shpbxpage\shpbypage\shpwr3\shpfblwtxt1{\sp{\sn shapeType}{\sv 1}}{\sp{\sn fBehindDocument}{\sv 1}}\shpleft754 \shptop374 \shpright854 \shpbottom557
{\sp{\sn fillColor}{\sv 16777215}}{\sp{\sn lineWidth}{\sv 0}}{\sp{\sn fLine}{\sv 0}}{\sp{\sn fFilled}{\sv 1}}}}

\par\pard\pvpg\phpg\posx754\posy375\charscalex100\expndtw0 \ql\fs24\cf1\f1\fs16\cf3 N {\shp{\\*\shpinst\shpbxpage\shpbypage\shpwr3\shpfblwtxt1{\sp{\sn shapeType}{\sv 1}}{\sp{\sn fBehindDocument}{\sv 1}}\shpleft854 \shptop374 \shpright955 \shpbottom557
{\sp{\sn fillColor}{\sv 16777215}}{\sp{\sn lineWidth}{\sv 0}}{\sp{\sn fLine}{\sv 0}}{\sp{\sn fFilled}{\sv 1}}}}

\par\pard\pvpg\phpg\posx854\posy375\charscalex100\expndtw0 \ql\fs24\cf1\f1\fs16\cf3 OMINAL {\shp{\\*\shpinst\shpbxpage\shpbypage\shpwr3\shpfblwtxt1{\sp{\sn shapeType}{\sv 1}}{\sp{\sn fBehindDocument}{\sv 1}}\shpleft950 \shptop374 \shpright1051 \shpbottom557

This version of PC-DMIS was very short lived so you are unlikely to encounter it. If you do, the loader does strip out all the text box wrappers to create an intermediate file format which can be parsed. Nevertheless it is recommended that you change to a different version of PC-DMIS not exporting this format.

# Net-Inspect requirements

Net-Inspect requires certain information to be present in the CMM results file. The order of the columns in the CMM report is not important but some of the columns in the table below are required depending on the feature type:

|  |  |  |
| --- | --- | --- |
| **Column header** | **Description of data** | **Comments** |
| AX | The axis identifier | Required for all dimensions and geometric tolerances  |
| NOMINAL | The nominal value for the feature | Required for all dimensions. Not needed for geometric tolerances where the nominal can be taken to be zero |
| MEAS | The measured, actual value of the feature | Required for all dimensions and most geometric tolerances except position and profile |
| DEV | The deviation of the actual value from nominal | Required in the case of position and profile, measured is taken from this column |
| DEVANG | The deviation angle for position | Not required |
| +TOL | Upper tolerance or tolerance zone | Required for all dimensions and geometric tolerances |
| -TOL | Lower tolerance | Required for all dimensions and for profile geometric tolerances |
| BONUS | Bonus from MMC or LMC | Not required |
| MIN | Most negative deviation | Not required |
| MAX | Most positive deviation | Not required |
| OUTTOL | Out of tolerance amount | Required for all dimensions and geometric tolerances, a value of zero indicates an in-tolerance condition and a non-zero value indicates an out-of-tolerance condition |

Some examples of column sets and orderings are:

AX MEAS NOMINAL +TOL -TOL DEV OUTTOL

AX MEAS NOMINAL +TOL -TOL BONUS DEV DEVANG OUTTOL

AX NOMINAL MEAS +TOL -TOL DEV OUTTOL

AX NOMINAL +TOL -TOL BONUS MEAS DEV OUTTOL

AX NOMINAL +TOL -TOL MEAS MAX MIN DEV OUTTOL

AX MAX MIN +TOL -TOL DEV OUTTOL

The last example is suitable only for position or profile because the MEAS column is not present.

## Metadata tags

Metadata tags are specially formatted comments in the PC-DMIS results file used for traceability information. Metadata tags take the form <identifier=data>. The table below shows allowed tags.

|  |  |  |
| --- | --- | --- |
| **Information to be captured** | **Uniform file template tag** | **Examples** |
|  |  |  |
| feature number | <##> or <## ##>, etc. | <6> <6.1 6.2> <7 8> |
| time/date stamp start | <starttime=YYYY-MM-DDTHH:MM:SS> | <starttime=2016-02-17T09:45:17> |
| time/date stamp end | <endtime=YYYY-MM-DDTHH:MM:SS> | <endtime=2016-02-17T09:48:44> |
| serial number | <serialnumber=####> | <serialnumber=1234567> |
| part number | <partnumber=####> | <partnumber=PN4321> |
| part revision | <partrevision=####> | <partrevision=rev 2.1> |
| measurement device name | <measdevice=####> | <measdevice=CMM 231> |
| inspection program name | <progname=####> | <progname=PN4321\_FAI.DMI> |
| inspector/operator name | <operator=####> | <operator=John Smith> |
| run number | <runnumber=####> | <runnumber=3> |
| lot size | <lotsize=####> | <lotsize=30> |
| part name | <partname=####> | <partname=left spoiler lever> |
| part description | <partdesc=####> | < partdesc=aluminum lever 12 inches> |
| setup date | <setupdate=YYYY-MM-DD> | < setupdate=2016-01-12> |

## Feature numbers

Feature numbers are a special type of metadata.

A feature number is typically the numeric balloon number attached to a tolerance call-out as shown in Figure 1.

Figure 1:

This balloon number can be indicated in a CMM results file using the uniform file template tag:

<6>

DIM 40= TRUE POSITION OF CIRCLE CIRC\_43 UNITS=MM

AX NOMINAL +TOL -TOL BONUS MEAS DEV OUTTOL

Y 66.030 66.739 0.709

Z 2.730 0.739 -1.991

DF 10.000 0.400 0.400 9.157 -0.843 0.743 <-------

TP MMC 1.000 0.000 4.228 3.228 ------->

Because there are two tolerances applied to circle CIRC\_43 the feature number applied to the diameter tolerance will be 6, and the feature number applied to the true position will be 6.01.

If different balloon numbers are applied to each line of a tolerance call-out as in Figures 2 and 3 then the feature number tag must contain the balloon numbers, separated by spaces, in the order they are to be applied to the tolerances.

Figure 2:



Figure 3:

The callout in Figure 2 would use the feature number tag <6.1 6.2>, and the callout in Figure 3 would use the feature number tag <6 7>.

## Feature descriptions

Feature descriptions collect the information in the record header along with the feature type to produce a (hopefully) unique feature description. This example

<6>

DIM 40A LEFT= TRUE POSITION OF CIRCLE CIRC\_43 UNITS=MM

AX NOMINAL +TOL -TOL BONUS MEAS DEV OUTTOL

Y 66.030 66.739 0.709

Z 2.730 0.739 -1.991

DF 10.000 0.400 0.400 9.157 -0.843 0.743 <-------

TP MMC 1.000 0.000 4.228 3.228 ------->

Results in these feature descriptions:

CIRC\_43 diameter 6 (40A LEFT)

CIRC\_43 position 6 (40A LEFT)

Here is the same example highlighted to show data source and destination:

<6>

DIM 40A LEFT= TRUE POSITION OF CIRCLE CIRC\_43 UNITS=MM

AX NOMINAL +TOL -TOL BONUS MEAS DEV OUTTOL

Y 66.030 66.739 0.709

Z 2.730 0.739 -1.991

DF 10.000 0.400 0.400 9.157 -0.843 0.743 <-------

TP MMC 1.000 0.000 4.228 3.228 ------->

CIRC\_43 diameter 6 (40A LEFT)

CIRC\_43 position 6 (40A LEFT)

And again the same sample with shaped balloons to show data source and destination:

