# Adding a comment to display MMC used in a True Position Calculation

Requirement: PCM (optional software from Zeiss)

### **Objective:**

When you report True Position with MMC Calypso adds the MMC allowance to the blueprint tolerance automatically. If you would like to report the blueprint tolerance and the MMC used in your true position characteristic separately follow these steps.

### Method:

When MMC is allowed on the blueprint you may add the deviation of a diameter the amount it exceeds its smallest size.

Below is a simple example

Blueprint callout for the Bearing Bracket Diameter 3.875 +/- 0.001 Blueprint True Position of 0.006

| Dia at | Allowable | TP        |
|--------|-----------|-----------|
| MMC    | MMC       | Tolerance |
| 3.874  | 0.000     | 0.006     |
| 3.875  | 0.001     | 0.007     |
| 3.876  | 0.002     | 0.008     |

### Note: If the diameter is undersized and is below 3.874 there is no allowable MMC

Create the following. Your diameter characteristic, the true position, and a Result Element

- 📕 🛛 🖱 Diameter\_Bearing Bracket Dia
  - ➡ True Pos Bearing Bracket ...
- 🐨 💞 MMC for TP of Bearing Dia

Step 1: Create a Result Element Presetting Parameter

We will make this out so it will not show up on the printout.

Now right click and choose Parameter.

In the presetting type the following

1

| 😅 Settings   |                           |
|--|---------------------------|
| Presettings  |                           |
|  | Font size                 |
| i=getActual("Bearing Bracket Dia").diameter                              |                           |
| if i<(getNominal("Bearing Bracket Dia").diameter-0.001) then             | — A                       |
| Var1=0.0000  |                           |
| endif  |                           |
|  | _                         |
| if i>(getNominal("Bearing Bracket Dia").diameter-0.001) then             |                           |
| Var1=getActual("Bearing Bracket Dia").diameter-(getNominal("Bearing Brac | ket Dia").diameter-0.001) |
| endif  |                           |
|  |                           |

### Α

First we will determine if we have any allowable MMC. This will test if the actual hole size is below the minimum hole size. We already have a clue with the diameter characteristic being red, it could be undersize or oversize, both being outside the allowable tolerance.

| =getActual("Bearing Bracket Dia").diameter Substitute with the name of your Diameter Characteristic  |                   |  |  |  |
|--|-------------------|--|--|--|
| if i<(getNominal("Bearing Bracket Dia").diameter-0.001) then<br>Var1=0.0000<br>endif   |                   | This next line takes the result of the line above<br>and names it i<br>If i is less than the result of the nominal minus<br>the lower tolerance<br>Then          |  |  |
| В  |                   | Var1 = 0.000 (no allowable MMC)  |  |  |
| if i>(getNominal("Bearing Bracket Dia").diameter-0<br>Var1=getActual("Bearing Bracket Dia").diameter-<br>(getNominal("Bearing Bracket Dia").diameter-0.00<br>endif | 0.001) then<br>1) | This next line takes the result of the first line<br>above and names it i<br>If i is greater than the result of the nominal<br>minus the lower tolerance<br>Then |  |  |

Var1 = the actual of the diameter and subtracts the nominal of the diameter at lower limit

The result is your MMC

### Step 2: Finish with the Result Element

| C. Result Element                 | x             |  |  |  |
|-----------------------------------|---------------|--|--|--|
| MMC for TP of Bearing Dia Comment |               |  |  |  |
| Fine                              | ✓             |  |  |  |
| Nominal                           | 0.0000        |  |  |  |
| ISO286                            |               |  |  |  |
| Upper Tol.                        | ✓ None        |  |  |  |
| Lower Tol.                        | ✓ None        |  |  |  |
| Dimension                         | Number        |  |  |  |
| • Lengui • Angle                  | <b>Number</b> |  |  |  |
| 💿 Calculate Formula               |               |  |  |  |
| Formula                           |               |  |  |  |
|                                   |               |  |  |  |
| Result Input                      |               |  |  |  |
| Dialog Text                       |               |  |  |  |
|                                   |               |  |  |  |
|                                   |               |  |  |  |
| <                                 | >             |  |  |  |
|                                   |               |  |  |  |
| Actual 0.0000                     |               |  |  |  |
| OK Reset                          |               |  |  |  |

No need to tolerance this result. It is masked and we just need the actual result.

Right click on the Formula bar and select Formula. Type in Var1

### Step 3: True Position Characteristic

| C. True Position                            | ×             |   |
|---|---------------|---|
| True Pos_Bearing Bracket Dia                | ient          |   |
|   |               |   |
| Shape Of Zone Tolerance                     |               |   |
| Diametral YZ 🚽 0.0060                       |               |   |
| Nominal Position                            |               |   |
| 0.0000 × -0.0000 Y 0.0000                   | Z             |   |
| Feature (MMC)                               |               |   |
| Bearing Bracket Dia                         |               |   |
|   | C. Name/Comme | nt 🕞 🗖 💻 🔀  |
| Clear Datum Referer 🕶 Datum Ref. Frame Spec | Identifier    | True Pos_Bearing Bracket Dia to Armature REF ONLY |
| Primary Datum                               | Comment       | Base Tolerance is 0.006                           |
| End of Part                                 |               |   |
| Secondary Datum (RFS)                       |               |   |
| Armature Bore Dia                           |               |   |
| Tertiary Datum                              |               | OK Cancel Help                                    |
| Symmetry Point X                            |               |   |

Be sure to add the MMC on the feature. Click on Comment

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Add this to your formula

## "Base Tolerance is 0.006" +cr()+"Allowable MMC Bonus is " +formatL( getActual("MMC for TP of Bearing Dia").actual,0,4)

The base or blueprint tolerance is 0.006 plus add a cr() or carriage return, starts a new line. Start the new line with MMC Bonus is

Now the format line justifies the new line to the left hence formatL

Here you will get the actual of the Result element. Make sure you type in the name of your result element correctly. This will get the Var1 of our conditional statement. Next is the amount of decimal places to be displayed.

Here is the report. In this example the diameter was undersized and therefore no MMC is allowable.

|          | Tru | True Pos_Bearing Bracket Dia to Armature REF ONLY            |        |        |        |         |
|----------|-----|--|--------|--------|--------|---------|
| $\Theta$ |     | 0.0057   | 0.0000 | 0.0060 | 0.0060 | 0.0057  |
|          | Y   | 0.0000   | 0.0000 |        |        | 0.0000  |
|          | ZBA | -0.0029<br>ase Tolerance is 0.006<br>Ilowable MMC Bonus is 0 | 0.0000 |        |        | -0.0029 |

Here is an example of a diameter that has a 3.199 +/-0.003 diameter callout.

| 🚍 Settings   |
|--|
| Presettings  |
| All 😽 🗍 🗐 🖗 🔤 🖑 🗐 🛛 🗛  |
| i=getActual("Stator Bore Dia").diameter  |
| if i<(getNominal("Stator Bore Dia").diameter-0.003) then   |
| Var2=0.0000  |
| endif  |
| if i>(getNominal("Stator Bore Dia").diameter-0.003) then<br>Var2=getActual("Stator Bore Dia").diameter-(getNominal("Stator Bore Dia").diameter-0.003)<br>endif |

The actual is 3.1996 minus the diameter at low limit (3.196) = 0.0036

|              | True Pos_Stator Bore Dia  | a Nr.7 -S-                          |        |        |                            |
|--------------|---|-------------------------------------|--------|--------|----------------------------|
| <del>\</del> | 0.0027<br>Y 0.0005<br>Z -1.5607<br>Base Tolerance is 0.008<br>Allowable MMC Bonus is 0. | 0.0000<br>0.0000<br>-1.5620<br>0038 | 0.0060 | 0.0096 | 0.0027<br>0.0005<br>0.0013 |

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### Copy to Additional True Position Callouts

Make sure if you copy this to other true positions that you:

- 1) Change the lower limit tolerance in the parameters for the diameter per the blueprint
- 2) Change the Var names from Var1 to Var2, Var3, etc. so you won't overwrite the previous variable.