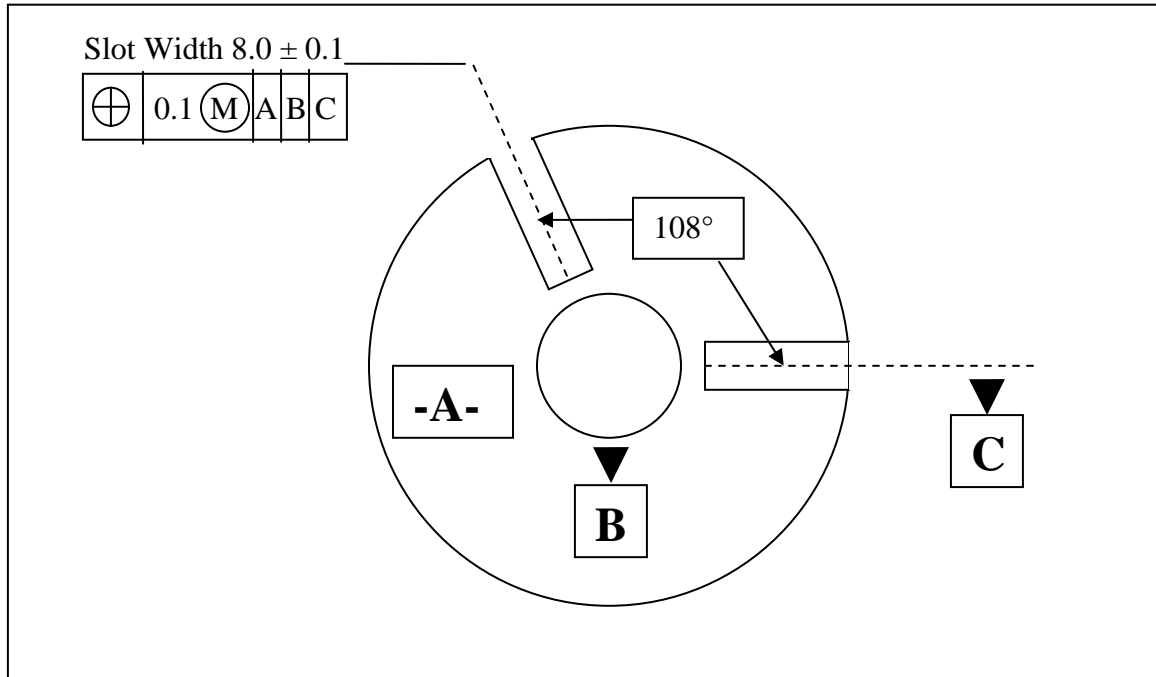


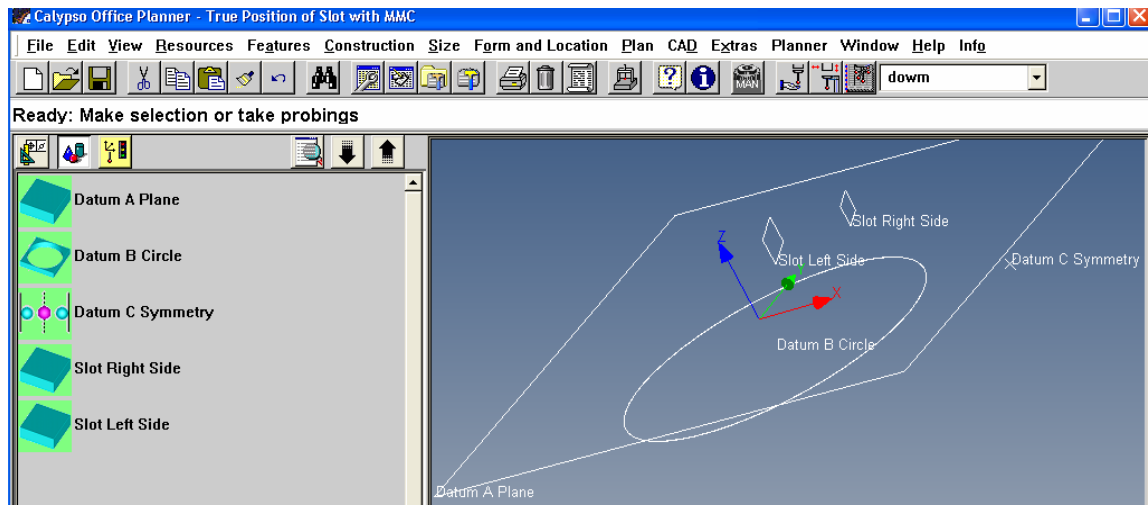
# How to Evaluate True Position of a Slot with MMC In Calypso

## Example:



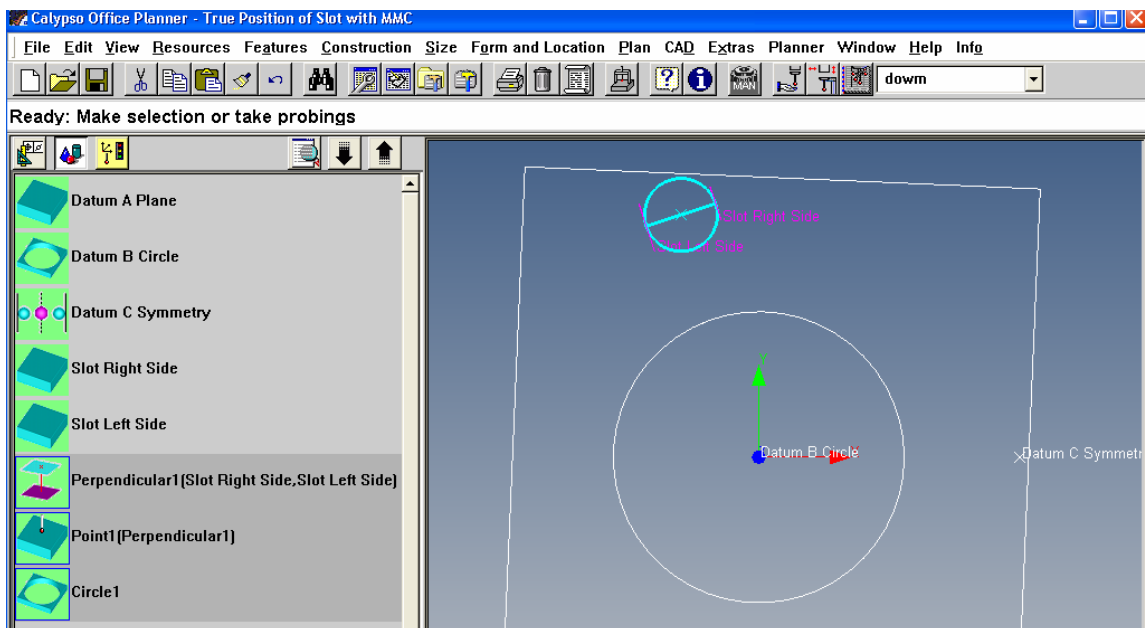
## Measure:

- Top Plane (Datum A)
- Center Circle (Datum B)
- Symmetry Point in Left Slot (Datum C)
- Left side of slot to evaluate as a line or plane
- Right side of slot to evaluate as a line or plane



## Create Constructions:

- CONSTRUCTION>PERPENDICULAR between Left and Right side of slot.
- FEATURES>POINT. Open the point and choose NOMINAL DEFINITION>RECALL. Select the Perpendicular from above.
- FEATURES>CIRCLE. Open the circle and choose NOMINAL DEFINITION>THEORETICAL FEATURE.
  - In the X ACTUAL field of the circle, right click and choose formula. Enter the formula **getActual("Point1").x** assuming the constructed point is named "Point1".
  - In the Y ACTUAL field, right click and choose formula. Enter the formula **getActual("Point1").y** assuming the constructed point is named "Point1".
  - In the Z ACTUAL field, right click and choose formula. Enter the formula **getActual("Point1").z** assuming the constructed point is named "Point1".
  - In the Diameter ACTUAL field, right click and choose formula. Enter the formula **getActual("Perpendicular1").len** assuming the constructed perpendicular is called "Perpendicular1".
  - Enter appropriate NOMINALS for the slot center. Note that the nominals do not need to be perfect – the true position nominals will take care of that.



## Create Characteristic:

- FORM AND LOCATION>TRUE POSITION
- Enter the Theoretical Circle as the Feature. Enter the top plane, center circle, and slot symmetry into the window as the Datums.
- Click the SPECIAL BUTTON in the True Position window and Rotate about the Z axis the basic dimension angle of 108°.
- In the True Position window, change the SHAPE OF ZONE to ONLY Y.
- Edit Y basic dimension to Zero if it is not Zero already.
- Change RFS to MMC in the dropdown for the Circle Feature and ensure the characteristic nominals and tolerances are correct for the Circle diameter.
- Enter your True Position tolerance from the Print.

The image shows a screenshot of the 'True Position' dialog box in a CAD software. The dialog is titled 'True Position' and has a close button (X) in the top right corner. It contains several sections:

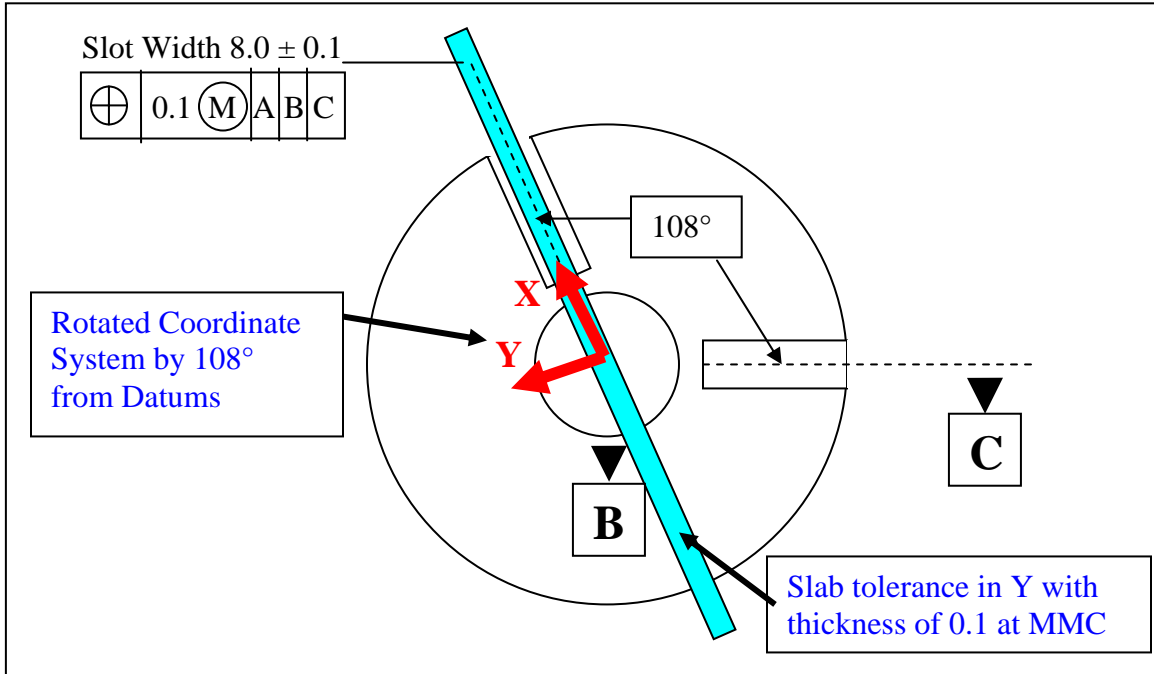
- Feature Selection:** A button with a circle and crosshair icon is selected. The text 'True Position Slot with MMC' is displayed, along with a 'Comment' button.
- Tolerance Type:** Radio buttons for 'Position Tolerance' (selected) and 'Best fit of bore pattern'.
- Shape Of Zone:** A dropdown menu set to 'Only Y'. A text box next to it contains '0.1000'. A 'Tolerance' label is to the right.
- Nominal Position:** Three input fields for X, Y, and Z, all containing '0.0000'. The Y field is circled in red.
- Feature:** A button with a circle icon is selected. The text 'Circle1' is displayed. A dropdown menu next to it is set to '[MMC]' and is circled in red.
- Datum Reference:** A dropdown menu set to 'Clear Datum Reference'. A 'Datum Referenc' label is next to it. A 'Special' button is circled in red.
- Datum Selection:** Three sections for 'Primary Datum', 'Secondary Datum', and 'Tertiary Datum'.
  - Primary Datum: 'Datum A Plane' (with a plane icon).
  - Secondary Datum: 'Datum B Circle' (with a circle icon) and a dropdown menu set to '[RFS]'.
  - Tertiary Datum: 'Datum C Symmetry' (with a symmetry icon).
- Actual:** An input field containing '0.1659'.
- Buttons:** 'OK' and 'Reset' buttons at the bottom.

Annotations and callouts:

- A box on the left says: 'Change the Zone shape from "Diametral" to "Only Y" to match the True Position Callout.' An arrow points to the 'Only Y' dropdown.
- A box on the right says: 'Click MMC on here and Click the Diameter button to enter the Nominal and Tolerances so MMC bonus can be calculated.' An arrow points to the '[MMC]' dropdown.
- A box on the left says: 'Make sure this Value is Zero.' An arrow points to the Y nominal position field.
- A box on the right says: 'Enter your Basic Rotation angle here. This rotates the coordinate system created by the datums so the slot is "lined up" with one axis. Evaluation with a "slab" shaped zone in Y is now possible.' An arrow points to the 'Special' button. Below this box is a smaller screenshot of the 'Special Functions' dialog, showing 'Rotate Around Z-Axis (108.0000)' and buttons for 'Offset', 'Rotate by an a', and 'Rotate by dista'.

**Understand Report:**

- Below is what is a graphic describing what is set up in the True Position Characteristic.



- Below is the Calypso Custom Printout with Additional Position Result turned on.

**ZEISS Calypso**

Measurement Plan  
True Position of Slot with MMC

Drawing No.  
\* drawingno \*

Operator  
Master

Date  
September 25, 2006

Time  
1:04:52 pm

CMM  
C32Bit

Order  
\* order \*

Incremental Part Number  
8

	Actual	Nominal	Upper Tol.	Lower Tol.	Deviation
True Position Slot with MMC					---
Y	0.1655 -0.0828	0.0000 0.0000	0.1000	0.1728	0.1655 -0.0828
Width of Slot	7.9728	8.0000	0.1000	-0.1000	--

- This Report indicates that the Slot is in Tolerance, but shifted to the “right” by 0.0828mm in the rotated coordinate system. Notice that the tolerance WITH BONUS, 0.1728mm, is shown in the “Lower Tol.” Column.