

Siemens PLM Software

NX CAM 9.0.2: Control Drilling Depth

Drilling as deeply as it is safe to do so by controlling bottom stock and tool contact point.

About NX CAM

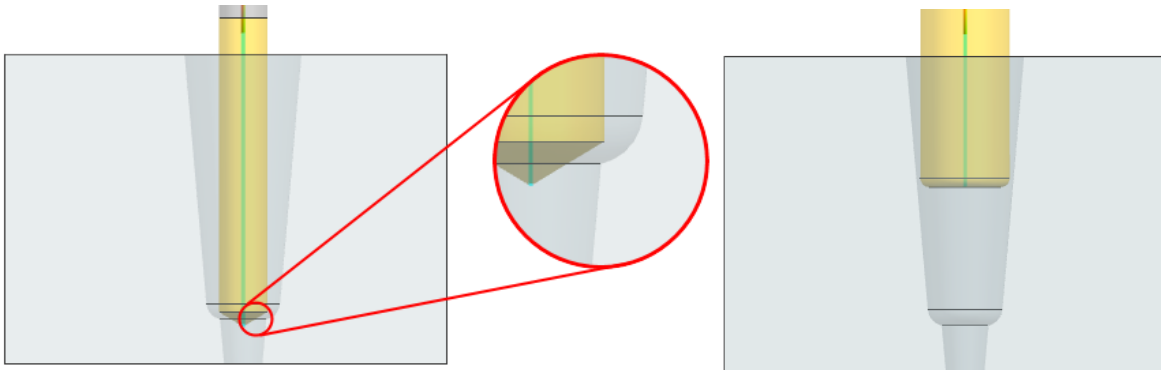
NX™ CAM software has helped many of the world's leading manufacturers and job shops produce better parts faster. You can also achieve similar benefits by making use of the unique advantages NX CAM offers.

This is one of many hands-on demonstrations designed to introduce you to the powerful capabilities in NX CAM 9.0.2. In order to run this demonstration, you will need access to NX CAM 9.0.2.

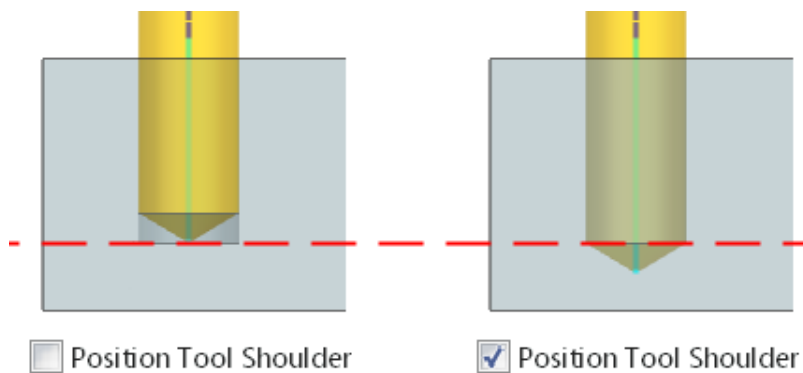
Visit the [NX Manufacturing Forum](#) to learn more, ask questions, and share comments about NX CAM.

Hands-on Demonstration: Control Drilling Depth

In the new drilling operation you can now use Model Depth to be applied to tapered or non-cylindrical holes. By specifying Model Depth as the machining area and by specifying a Bottom Stock, the operation will drill only as deep into the taper as it is safe to do so without gouging the part.



You can specify whether to use the tool tip or tool shoulder as the contact point when drilling blind holes. This is useful when you wish to completely remove material from a hole with a flat bottom or a bottom that does not match the tool tip when cutting into the part geometry with the tool tip is permissible or desired.



Do you have a question?

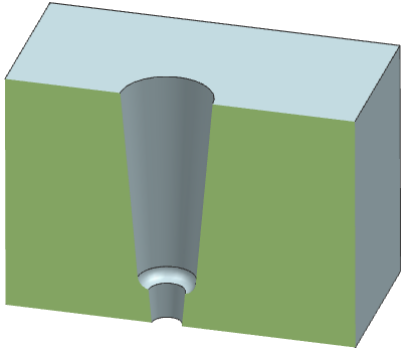
Post your questions or comments at the bottom of [this Tech Tip article in the NX Manufacturing Forum](#).

Prerequisites:

1. You will need access to **NX CAM 9.0.2** in order to run this demonstration.
2. If you haven't done so already, download and unzip **Control Drilling Depth.7z**. You will find the .7z file attached directly to [this Tech Tip article in the NX Manufacturing Forum](#).

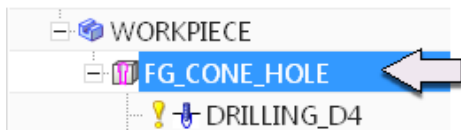
Demo:

1. Open **drilling_depth_1.prt** in NX.

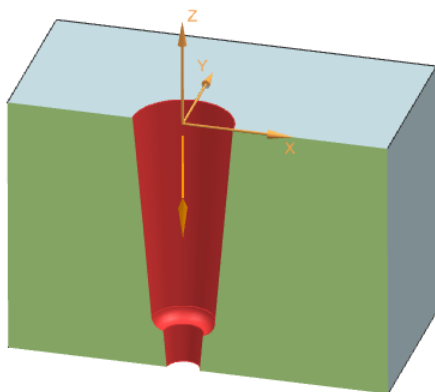


You will examine operations that drill a tapered hole. The goal is to remove as much material as possible by using drilling tools before finishing the hole geometry with milling or tapered tools.

2. In the Geometry View of the Operation Navigator, click **FG_CONE_HOLE**.



The geometry group consists of a multi-stepped hole with tapered walls and a radius. Prior to these enhancements, model depth calculations for such holes were not always correct and it was very difficult to define the cut depth manually.



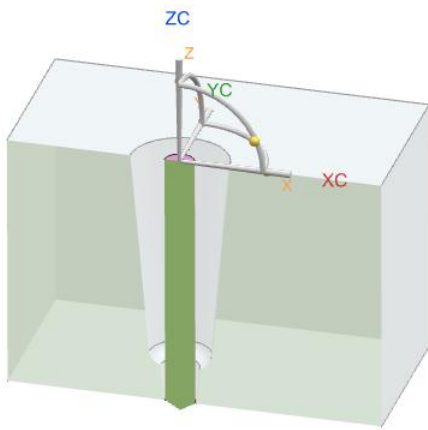
3. Double-click **DRILLING_D4** to edit the operation.

4. Select **Specify Feature Geometry** .

Machining Area is set to MODEL_DEPTH. This is a new option that allows you create drilling operations using conical geometry or any geometry where you want the shape and diameter of the tool to determine the cutting depth.



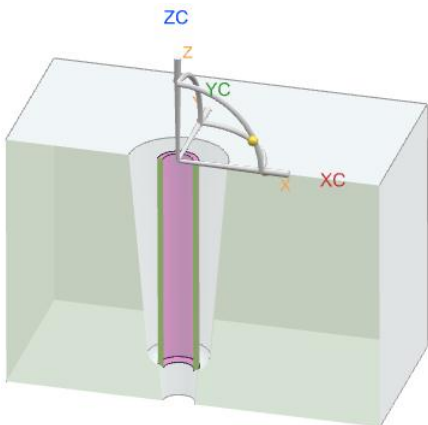
Notice that this operation drills a through hole because the tool fits all the way through the hole in the part.



5. Click **Cancel** in the Feature Geometry dialog box.
6. Click **Cancel** in the Drilling dialog box to exit the operation.
7. Double-click **DRILLING_D5.5** to edit the operation.

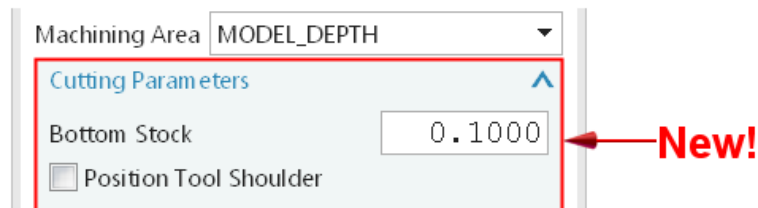
8. Select **Specify Feature Geometry** .

This operation drills to a blind depth because the tool does not fit all the way through the hole.



MODEL_DEPTH drills to the depth where the tool contacts the part or to a specified distance above the part contact point. The displayed volume also indicates that a prior operation already removed material in the center of the hole (hollow).

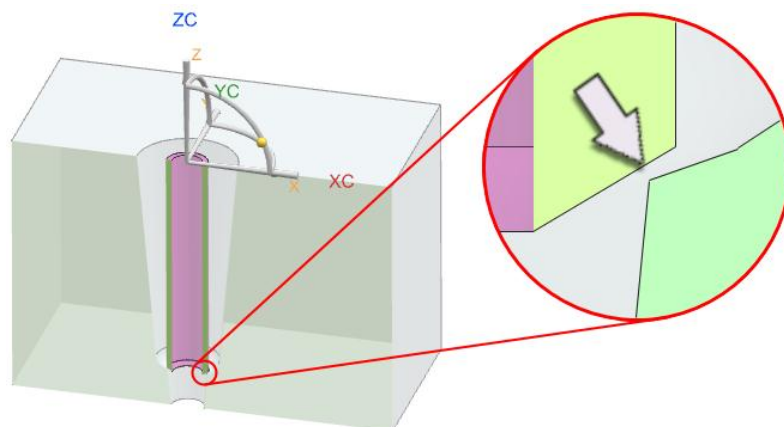
The Cutting Parameters options apply only to operations that drill to a blind depth. These options are new.



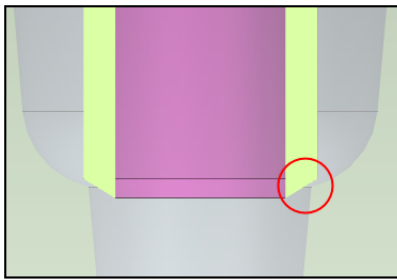
Note: If the Cutting Parameters options do not appear in the dialog box, be sure Feature Geometry (More) has been selected from the Dialog Options list.



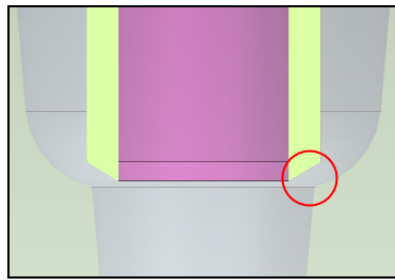
Positive Bottom Stock is used to prevent the tool from contacting the part geometry. This distance is measured along the tool axis. It is also possible to define negative stock to drill deeper than the modeled depth.



9. Type **0.5000** in the **Bottom Stock** dialog box and press the Enter key.
Notice the distance between the in-process feature and the part increases.



Bottom Stock = 0.1000

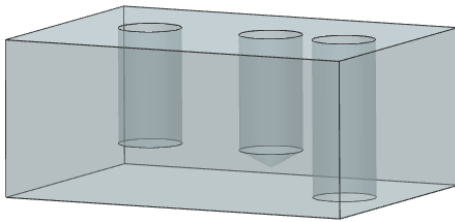


Bottom Stock = 0.5000

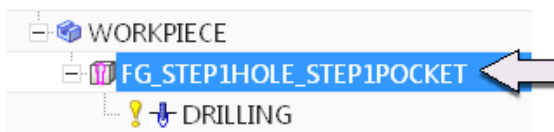
10. Click **Cancel** in the Feature Geometry dialog box.
11. Click **Cancel** in the Drilling dialog box to exit the operation.
12. Close the part without saving.

The Position Tool Shoulder toggle determines whether the tool tip or tool shoulder is used as the part contact point at the bottom of a blind hole.

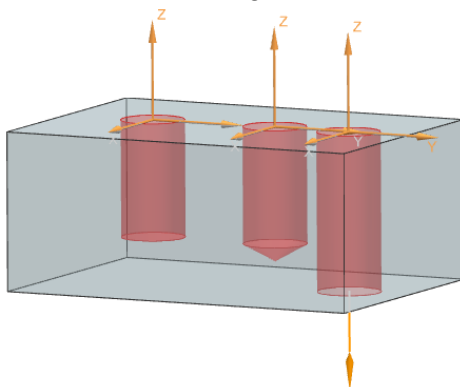
13. Open **drilling_depth_2.prt** in NX.




14. In the Geometry View of the Operation Navigator, click **FG_STEP1HOLE_STEP1POCKET**.

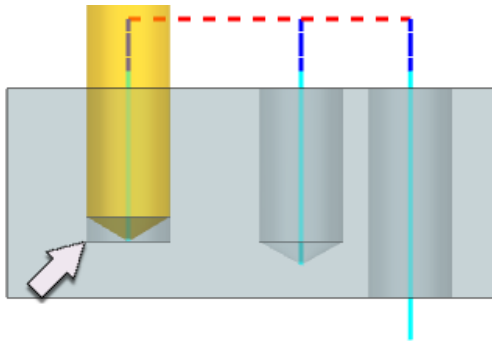


The geometry group consists of a blind hole with a flat bottom, a blind hole with a tapered bottom, and a through hole.



15. In the background of the graphics window, right-click and choose **Orient View→Right**.
16. Double-click **DRILLING** to edit the operation.
17. Click **Verify**.
18. Select the **Replay** tab.
19. Click **Step**  several times and observe how the tool drills each hole.

Notice that material remains in the hole with the flat bottom.



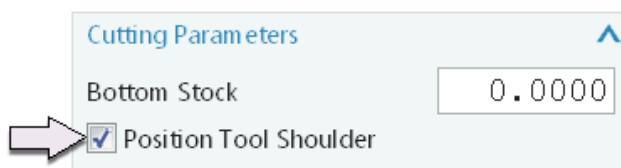
This occurs because the tool tip is currently used as the contact point.

20. Click **OK** in the Tool Path Visualization dialog box.

21. Select **Specify Feature Geometry** .

Machining Area is set to `FACES_CYLINDER_1`. This option is used because the holes consist of a single cylinder. In this case there would be no difference in using the `MODEL_DEPTH` option. For cylindrical multi-stepped holes, multiple cylinder options would be made available, each one representing the cylinder you want to machine.

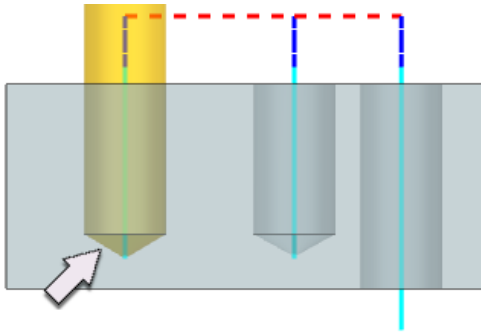
22. Select the **Position Tool Shoulder** check box.



This will cause the shoulder of the tool to contact the bottom of the flat hole, removing the remaining material, but also cutting into the part. This option does not affect the through hole and the blind hole with a tapered bottom because the tool is already positioned to the shoulder after reaching the overall depth.

23. Click **OK**.
24. Click **Generate**.
25. Click **Verify**.

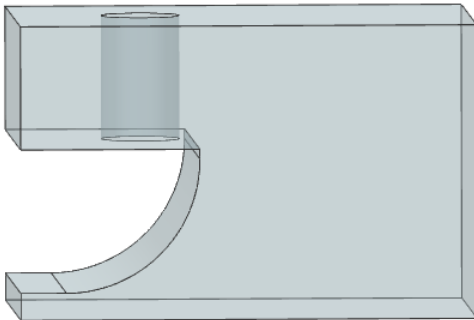
26. Click **Step** several times and observe how the tool drills each hole.
Notice that the tool cuts into the flat bottom until the shoulder reaches the bottom of the hole.



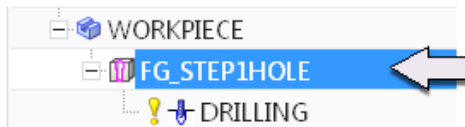
27. Click **OK** in the Tool Path Visualization dialog box.
28. Click **OK** in the Drilling dialog box to complete the operation edit.
29. Close the part without saving.

MODEL_DEPTH can also be used in cases where part geometry potentially obstructs the end of a through hole tool path.

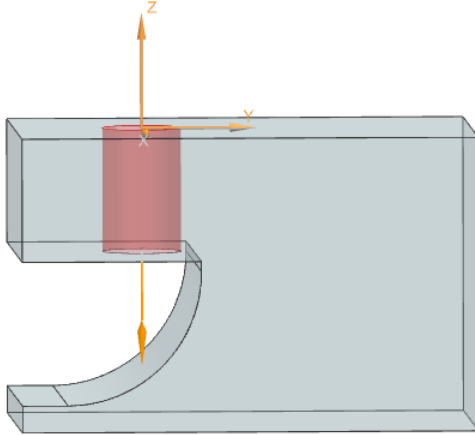
30. Open **drilling_depth_3.prt** in NX.



31. In the Geometry View of the Operation Navigator, click **FG_STEP1HOLE**.



The geometry group consists of a through hole.

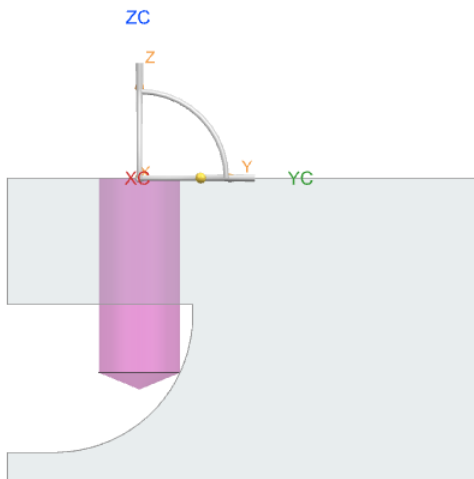


32. In the background of the graphics window, right-click and choose **Orient View→Right**.

33. Double-click **DRILLING** to edit the operation.

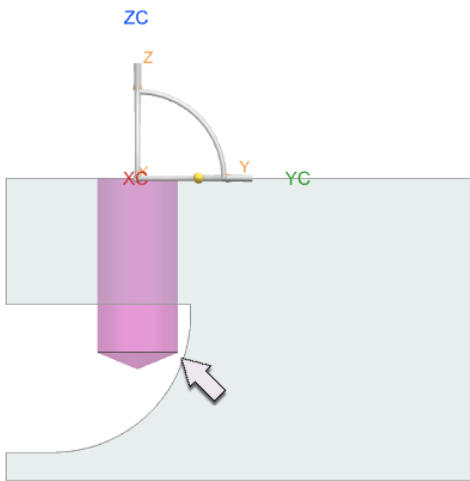
34. Select **Specify Feature Geometry** .

Machining Area is set to MODEL_DEPTH. This option allows the tool to continue drilling until it contacts the part, thereby removing as much material as possible before machining out the scalloped area in a separate operation.



To avoid contacting the part, you should add stock.

35. Type **2.0000** in the **Bottom Stock** box and press the Enter key.
This reduces the drill depth by a distance measured along the tool axis.



36. Click **OK**.
37. Click **Generate**.
38. Click **OK** in the Drilling dialog box to complete the operation edit.
39. Close the part without saving.

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