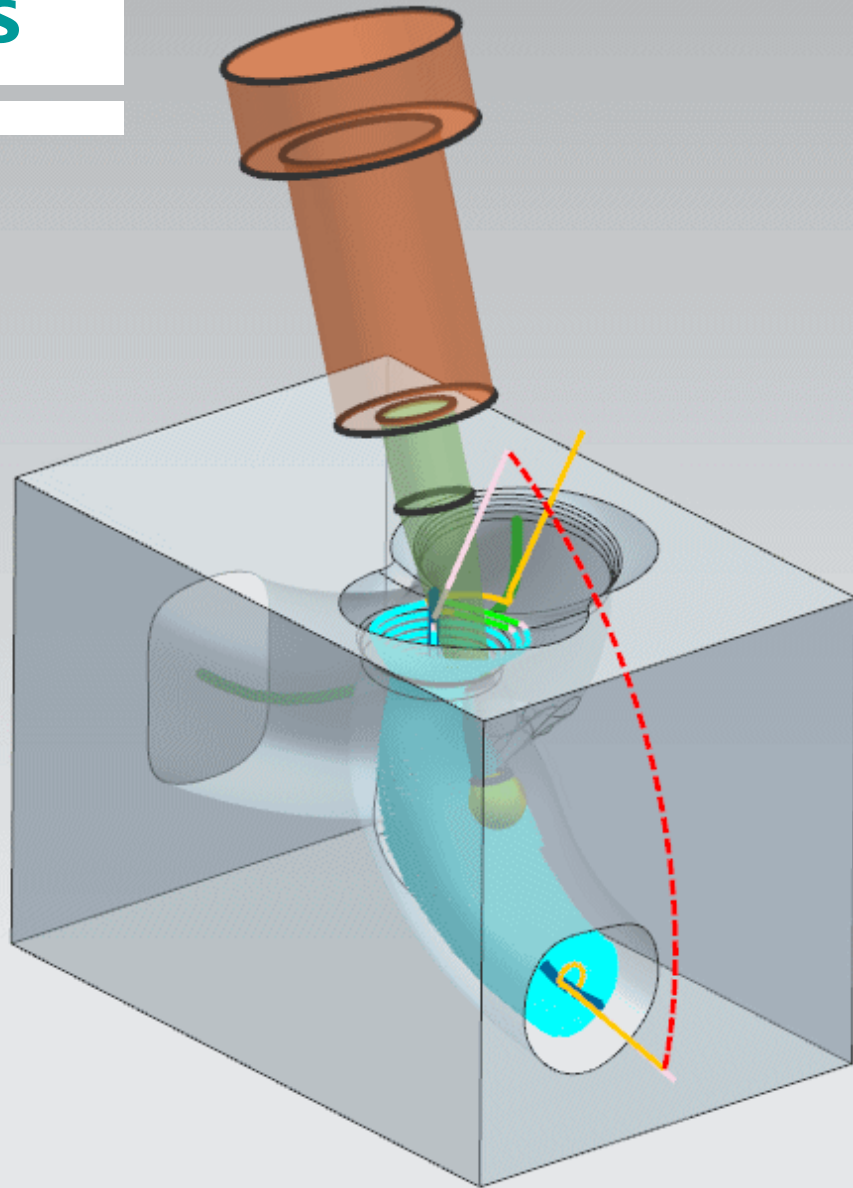


SIEMENS



Siemens PLM Software

NX CAM 11.0.1: Machining Tubes and Ports

Creating operations designed specifically to finish complex interior surfaces commonly found in manifolds and cylinder heads.

Answers for industry.

About NX CAM

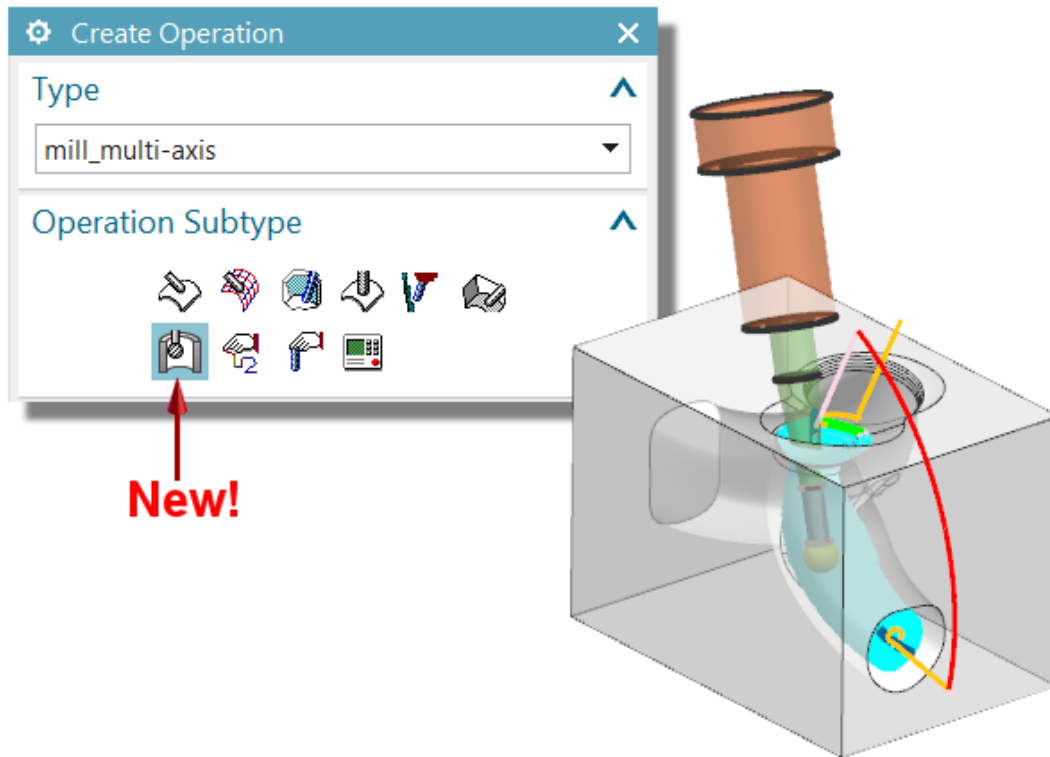
NX™ CAM software has helped many of the world's leading manufacturers and job shops produce better parts faster. You can also achieve similar benefits by making use of the unique advantages NX CAM offers.

This is one of many hands-on demonstrations designed to introduce you to the powerful capabilities in NX CAM 11.0.1. In order to run this demonstration, you will need access to NX CAM 11.0.1.

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

Hands-on Demonstration: Machining Tubes and Ports

You can now create Tube Machining operations to finish complex interior surfaces typically found in manifolds and cylinder head ports.



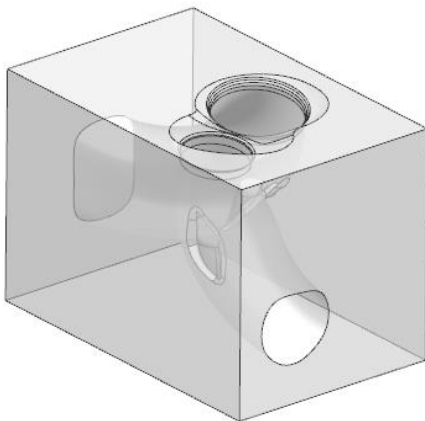
Prerequisites:

1. You will need access to **NX CAM 11.0.1** in order to run this demonstration.
2. If you haven't done so already, download and unzip **machining_tubes_and_ports.7z**.

Demo:

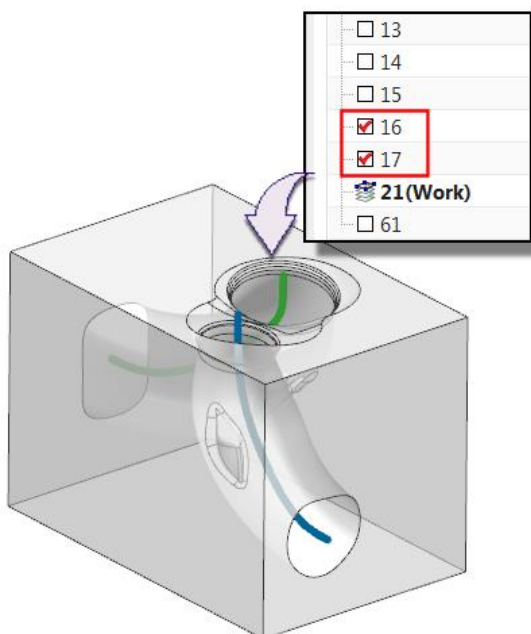
1. Open **ports.prt** in NX.

Note: If the part is not translucent as shown below, choose **Menu→Preference→Visualization**, click the **Visual** tab, and select the **Translucency** check box.



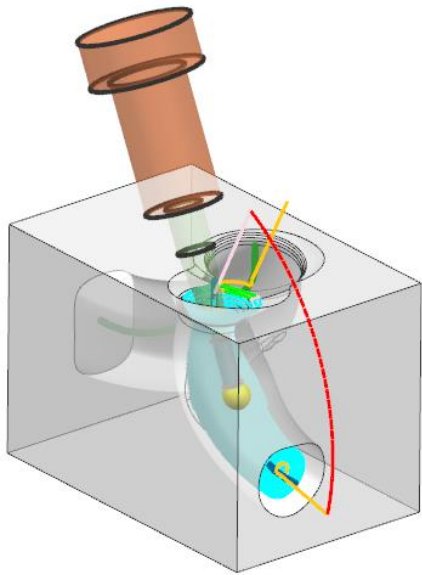
You will first display the central curves of the ports. These curves are required to create the Tube Finishing operations.

2. Select **Menu→Format→Layer Settings**.
3. Select the layer **16** and layer **17** check boxes to display the center curves for each port.



4. Click **Close** in the **Layer Settings** dialog box.

You will begin by machining the small port.



5. Click **Create Operation** .

6. Select **mill_multi-axis** from the **Type** list.

7. Select **Tube Finishing** .

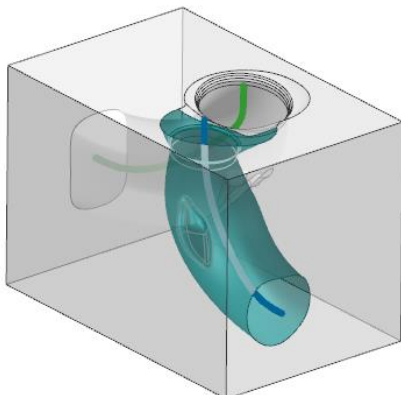
8. Specify the following:

Program:	PROGRAM
Tool:	SPHERICAL_D20
Geometry:	FINISH_SMALL_PORT
Method:	MILL_FINISH

Tube Finishing operations may use ball mill or spherical mill tools.

9. Click **OK**.

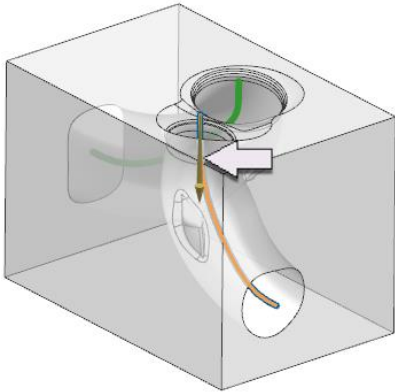
10. Click **Display**  next to **Specify Cut Area**.



The end of the central curve you select determines the start point of the tool path.


11. Click **Specify Central Curve** .

12. Select the upper end of the central curve in the small port.

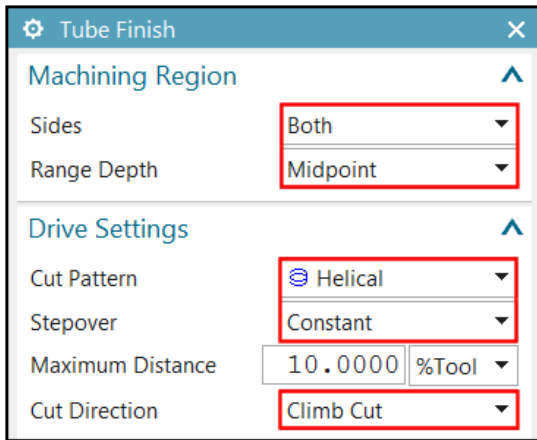


13. Click **OK**.

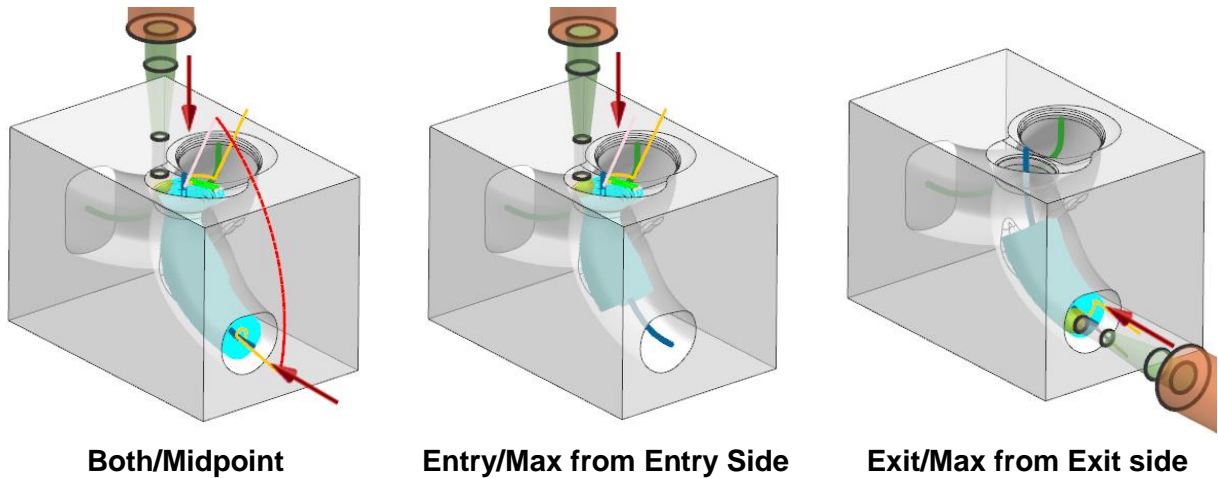
Because of its complex shape and depth, the port must be finished by machining half of it from one end and the other half from the other end.

14. In the Drive Method section of the dialog box, click **Tube Finish** .

The Machining Region and Drive Settings parameters are set by default to the most frequently used options.



When Sides is set to Both, the tool path cuts to the specified range depth from each end of the port. When set to Entry or Exit, the tool path will cut to the specified range depth from one end or the other.




15. Type **2.0000 mm** in the **Maximum Distance** list.
16. Click **OK**.

17. Click **Cutting Parameters** .

18. Select the **Containment** tab.

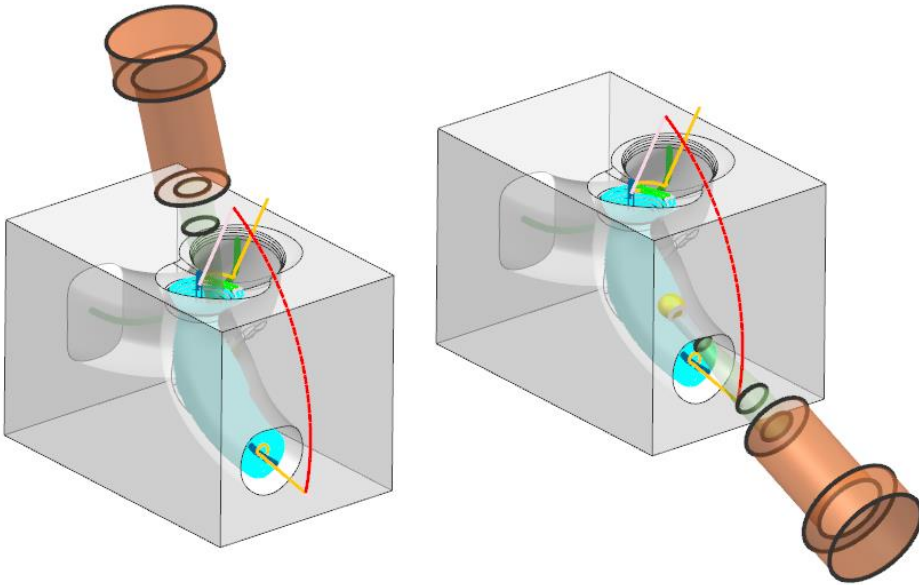
19. Specify the following Clearance values.

Clearance 			
Tool Holder	2.0000	mm	▼
Tool Shank	0.5000	mm	▼
Tool Neck	0.1000	mm	▼
Tilt Clearance Angle	0.1000		

20. Click **OK**.

21. Click **Generate** .

22. Click **Verify**  and **Play** .



23. Click **OK** to complete the tool path visualization.

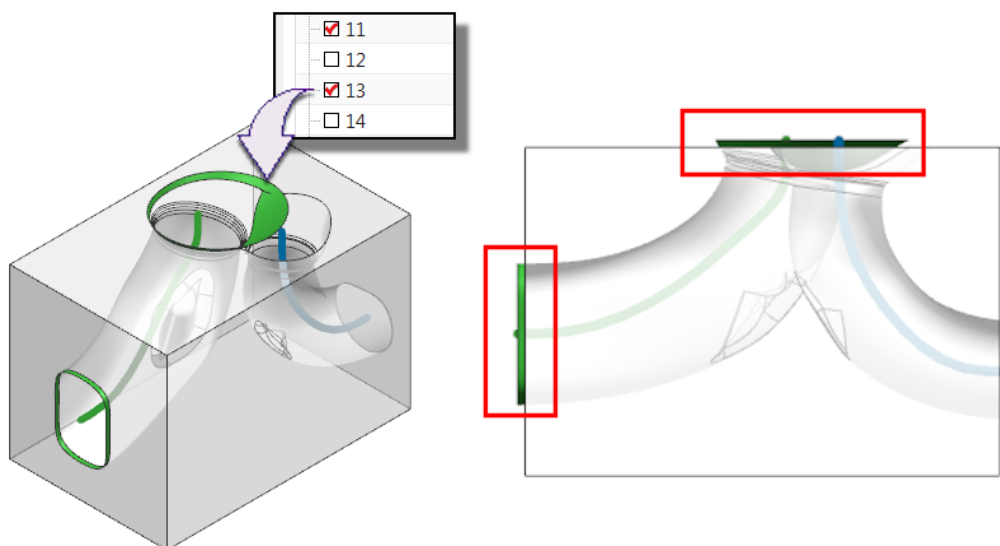
24. Click **OK** to complete the operation.

You can specify cut area surfaces that do not belong to the part geometry. This is useful when you wish extend tool paths beyond the port.

25. Change the view to **Isometric**.

26. Select **Menu**→**Format**→**Layer Settings**.

27. Select the layer **13** check box to display the extension surfaces for the large port.



28. Click **Close** in the **Layer Settings** dialog box.

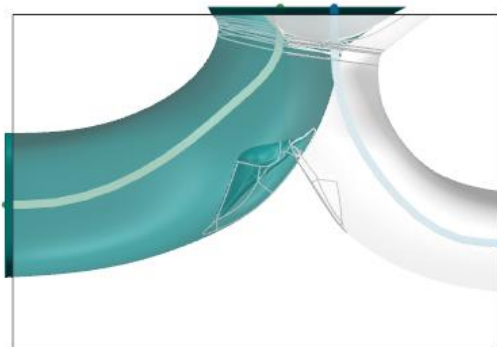
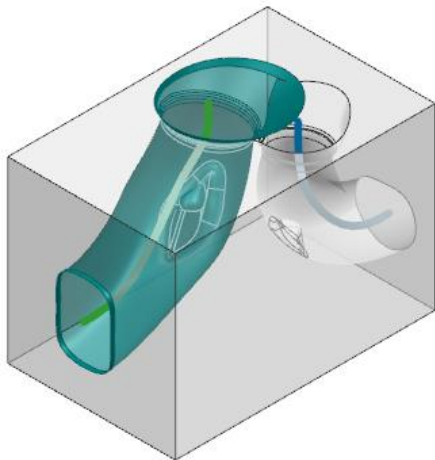
29. Click **Create Operation** .

30. Specify the following:

Program: PROGRAM
Tool: SPHERICAL_D20
Geometry: FINISH_LARGE_PORT
Method: MILL_FINISH

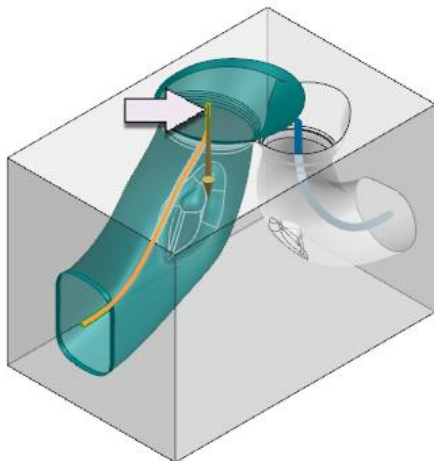
31. Click **OK**.

32. Click **Display**  next to **Specify Cut Area**.




33. Click **Specify Central Curve** .

34. Select the upper end of the central curve in the large port.



35. Click **OK**.

36. In the Drive Method section of the dialog box, click **Tube Finish** .

37. Type **2.0000 mm** in the **Maximum Distance** list.

38. Click **OK**.

39. Click **Cutting Parameters** .

40. Select the **Containment** tab.

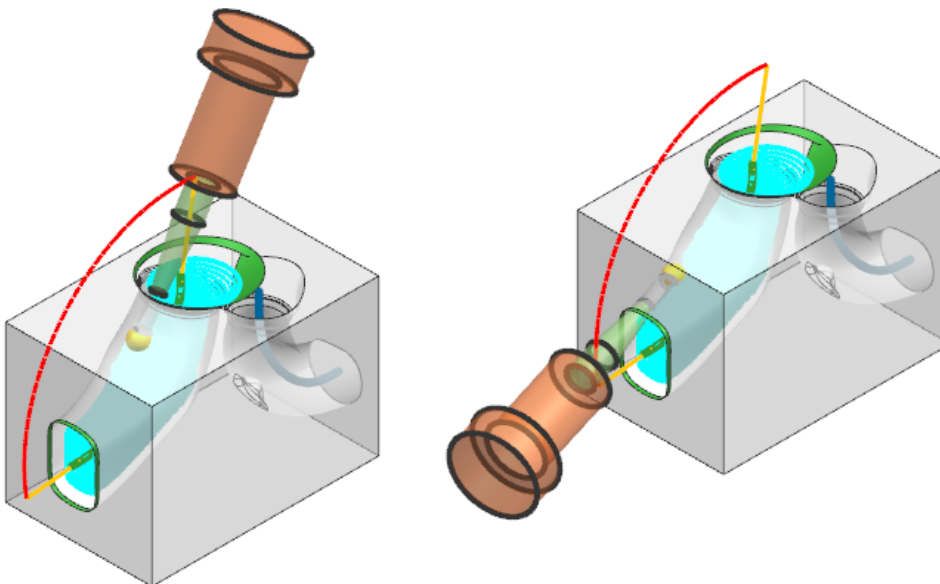
41. Specify the following Clearance values.

Clearance		
Tool Holder	2.0000	mm
Tool Shank	0.5000	mm
Tool Neck	0.1000	mm
Tilt Clearance Angle	0.1000	

42. Click **OK**.

43. Click **Generate** .

44. Click **Verify**  and **Play** .



45. Click **OK** to complete the tool path visualization.

46. Click **OK** to complete the operation.

47. Continue practicing.

48. When you are finished, close the part without saving.

Siemens Industry Software

Headquarters

Granite Park One
5800 Granite Parkway
Suite 600
Plano, TX 75024
USA
+1 972 987 3000

Americas

Granite Park One
5800 Granite Parkway
Suite 600
Plano, TX 75024
USA
+1 314 264 8499

Europe

Stephenson House
Sir William Siemens Square
Frimley, Camberley
Surrey, GU16 8QD
+44 (0) 1276 413200

Asia-Pacific

Suites 4301-4302, 43/F
AIA Kowloon Tower, Landmark East
100 How Ming Street
Kwun Tong, Kowloon
Hong Kong
+852 2230 3308

About Siemens PLM Software

Siemens PLM Software, a business unit of the Siemens Industry Automation Division, is a leading global provider of product lifecycle management (PLM) software and services with seven million licensed seats and more than 71,000 customers worldwide. Headquartered in Plano, Texas, Siemens PLM Software works collaboratively with companies to deliver open solutions that help them turn more ideas into successful products. For more information on Siemens PLM Software products and services, visit www.siemens.com/plm.

© 2016 Siemens Product Lifecycle Management Software Inc. Siemens and the Siemens logo are registered trademarks of Siemens AG. D-Cubed, Femap, Geolus, GO PLM, I-deas, Insight, JT, NX, Parasolid, Solid Edge, Teamcenter, Tecnomatix and Velocity Series are trademarks or registered trademarks of Siemens Product Lifecycle Management Software Inc. or its subsidiaries in the United States and in other countries. All other logos, trademarks, registered trademarks or service marks used herein are the property of their respective holders.