



**CENTRE OF EXCELLENCE IN MANUFACTURING NATIONAL
INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

Product Design and Validation Lab

NX – Essentials for NX Designers

Duration: 40 Hours

PREREQUISITES	Nil
WHO SHOULD ATTEND	Students, Engineers, drafters, checkers and managers who need to manage and use NX
PROVIDED COURSE MATERIALS	Student guide and Activity material

NX part files 4 Hours

Introduction to Teamcenter Integration for NX - Introduction to NX - New file overview - Layers - Show and Hide - Working with the Teamcenter Navigator - Working with folders in NX - Create a new folder for your part files - Activities: NX part files - Create new - Part data organization in Teamcenter Integration for NX - Open file overview.

The NX user interface 12 Hours

Customize and display toolbars - Command Finder - Dialog boxes and the Dialog Rail - Roles - Save toolbar configuration between activities: User interface - Toolbars and Roles - Using the mouse - Selecting - Deselect - Preview - Selection bar - Selection bar Snap Point - QuickPick - Activities: User Interface - Views - Summary - User interface.

Sketching: Sketch overview - Sketch curves - Sketch curve functions - Types of constraints - Sketch dimensions - Convert To/From Reference - Activities: Create constraints. **Datum features:** Datum Plane - Create an inferred datum plane with an offset - Create a datum plane midway between planar faces - Create a datum plane at an angle - Create a datum plane through three points - Activities: Datum features – Relative - Datum Axis - Datum CSYS - Activities: Datum features - cylindrical faces - Summary: Datum features. **Swept features:** Types of swept features - Internal and external sketches – Extrude - Combining bodies using Boolean commands - Body type - Revolve - Sweep along Guide - Create a simple sweep along guide feature - Activities: Swept features - Summary: Swept features. **Hole features:** Hole overview - Hole overview - Hole dialog box - Hole position and direction options - Hole form and dimension options - Create a General Hole feature - Activities: Hole features - Summary: Hole features. **Edge operations:** Edge Blend overview - Activities: Edge operations - blends - Chamfer overview - Create a Chamfer - Chamfer options - Activities: Edge operations – chamfers.

Introduction to Assemblies	8 Hours
<p>Assembly - Subassembly - Component objects - Component Part Files - Assembly Load Options group - Load states - Scope group - Reference Sets - Saved Load Options - Activities: Assemblies - assembly load options and the Assembly Navigator - Select components - Assembly Navigator display commands - Activities: Assemblies - more navigator options - Part revisions and saving assemblies /Save / Save Work Part Only.</p> <p>Adding and constraining components: General assembly concepts - Bottom-up assembly modeling - Activities: Adding components - create assembly - Move Component /Move Component options - Assembly Constraints - Show Degrees of Freedom - Activities: Adding and constraining components - constrain.</p>	
Introduction to Drafting	8 Hours
<p>Drafting application overview - The 3D drafting process in NX - The Drafting interface - Master model concept /Master geometry /Create a new master model drawing - Sheet /12 Create a new drawing sheet / Open a drawing sheet/ Edit a drawing sheet - Delete a drawing sheet -drawing display to monochrome - Activities: Drafting - Create drawings - Change drawing display to - Drafting View Style and View Preferences - The View Creation Wizard-Base View/Projection views - Edit the style of an existing view - Drag views on a drawing - views on a drawing - Activities: Drafting - add views - Dimensions - Activities: Drafting – dimensions - Activities: Drafting - Notes and labels.</p>	
Additional projects	8 Hours
<p>Custom Roles - Primitive solids - Block – Cylinder - Features with predefined shapes: Boss - Slot - Pocket - Pad – Groove - Positioning Methods/Edit Positioning.</p>	



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NX CAD Intermediate

Duration: 40 Hours

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INTERMEDIATE NX DESIGN AND ASSEMBLIES 16 Hours

Pattern sketch curves- Offset sketch curves- Create a basic free form shape- Create expressions with measurements- Copy/paste a feature- Create reference sets- Create draft- Use Synchronous Modelling- Create a variable blend- Create component patterns- Apply top down assembly modelling- Design “in context”- Use the WAVE geometry linker- Create interpart references- Define remembered assembly constraints- Define a revision identifier- Understand component replacement methods- Manage assembly arrangements

Synchronous Modelling and Parametric Design 8 Hours

Central Engineering Framework – Scope of the Products – Range – Licensing – Installation – operating systems – Virtualization - **TIA PORTAL:** Portal view and Project view – Settings – Project tree – Task card – Inspector window – Saving Projects – Libraries – Project Migration – Help functions

DRAFTING 16 Hour

Create and maintain drawing sheets and views.- Create and manage derived views, such as section and detail views, and their view boundaries.- Create view dependent geometry.- Create and edit symbols, dimensions and annotations.- Apply unique display methods to views in assembly drawings.- Generate an assembly parts list.



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NX Sheet Metal

Duration: 16Hours

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NX Sheet Metal 16 Hours

Learning about sheet metal preferences- Creating sheet metal parts using base features, bends, and flanges- Closing corners, creating cut outs and deform features- Creating advanced sheet metal features- Creating aerospace sheet metal features- Flattening sheet metal parts- Working with non-sheet metal parts imported from other CAD systems



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NX CAE Beginner

Duration: 64 Hours

PREREQUISITES	Essentials for NX Designers
WHO SHOULD ATTEND	Students, Engineers, drafters, checkers and managers who need to manage and use NX
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Advance Simulation Process 16 Hours

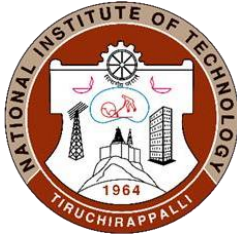
Introduction to Advanced Simulation- Simulation Navigator- Selecting entities- Managing CAE analysis data- Meshing and mesh quality- Setting boundary conditions- Boundary condition types and techniques- Solving- Post-processing- Geometry idealization, repair, and abstraction- Synchronous Modelling- Mesh collectors- Materials and physical – properties- Model quality- Reports

Motion Simulation 16 Hours

Combine rigid bodies (links), joints, and motion drivers to create a mechanism and set it into motion- Manage multiple motion simulations- Apply forces, torques, springs, dampers, bushings, and contact in a motion simulation- Query a motion simulation for information and edit both model and simulation features.- Apply packaging options to generate feedback in the form of marker and component tracing, critical measurements, and interference checking- Use spreadsheets and graphing to both animate and analyse a motion simulation- Use advanced solutions to simulate component flexibility, transfer loads for a finite element analysis, and control an electric motor

Advance Simulation Processes and Solutions 32 Hours

Introduction to Advanced Simulation- Managing CAE analysis data- Selecting entities- Preparing a model for analysis- Meshing and mesh quality- Boundary condition- Post-processing and reports- Materials and physical properties- Linear and nonlinear static analysis- Modal, thermal, and buckling analysis- Response simulation- Contact and gluing- Symmetry- Finite element modelling with assemblies- Optimization- Adaptive meshing- Super elements- Flexible body analysis- Acoustic analysis- Multi physics- Import and export of model data- Templates



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NX CAE Intermediate		Duration: 40 Hours
PREREQUISITES	Advanced Simulation Processes and Simulation	
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FLOW SIMULATION		8 Hours
Overview of NX Flow- Fluid volume creation and meshing- Meshing and material properties- Flow initial conditions and boundary conditions- Flow solution options and solving- Post-processing specific for NX Flow- Flow mapping		
RESPONSE SIMULATION		16 Hours
Theory of single and multi-degree of freedom systems- Function creation and manipulation- Random vibration analysis- Transient vibration analysis- Response spectra analysis- Base excitation methods- Shock and drop analysis		
THERMAL AND FLOW ANALYSIS		16 Hours
Introduction to Advanced Simulation- Managing CAE analysis data- Selecting entities- Preparing a model for analysis- Meshing and mesh quality- Boundary condition- Post-processing and reports- Materials and physical properties- Linear and nonlinear static analysis- Modal, thermal, and buckling analysis- Response simulation- Contact and gluing- Symmetry- Finite element modelling with assemblies- Optimization- Adaptive meshing- Super elements- Flexible body analysis- Acoustic analysis- Multi physics- Import and export of model data- Templates		



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NX CAM Beginner

Duration: 32 Hours

PREREQUISITES	Essentials for NX Designers
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CAM MANUFACTURING FUNDAMENTALS 16 Hours

Introduction and Overview- Part analysis for manufacturing- User Interface- Operation Navigator- Machine Coordinate System- Tooling Visualization/Verification- Post Processing/Shop Documentation- Planar/Cavity Milling- Drilling- Fixed Contour Area Milling- Face Milling- Text Engraving

CAM POST BUILDING TECHNIQUES 8 Hours

NX Post – postprocessor- Building a postprocessor with the post builder- Units-only sub posts- Post Builder for wire EDM applications- Post Builder for 4-axis and 5-axis mills . Post Builder for lathe applications- Create mill-turn postprocessors- Tcl Basics for Post Builder- Custom commands- User-defined events and user-defined cycles- Post processing with a Siemens controller- Create a macro with Post Builder- A Guide to best practices of building a postprocessor

CAM TURNING MANUFACTURING PROCESS 8 Hours

Defining part and blank geometry- Retrieving and creating tools- Facing operations- Tool Path Verification- Common options- Centreline operations- Roughing operations – OD- Roughing operations – ID- Finish operations OD and ID- Grooving- Teach mode- Threading operations- Using Multiple Spindles- Mill-turn- Merging lathes- Vertical turret lathe



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CAM FIXED-AXIS AND MULTI-AXIS MILLING

32 Hours

Overview- Plunge Milling- Z-Level Milling- High-speed Machining- Fixed-axis Contour Milling- Introduction to 4 and 5-axis Machining- 5-axis Z-Level- Sequential Mill basics Sequential Mill advanced- Variable axis Contour Milling- Profiling walls with a variable tool axis- Non Cutting Moves- Wave Geometry Linker in Manufacturing- Turbomachinery Milling- Refixturing and the In Process Work piece- Hole Milling and Thread Milling- Generic Motion and Probing operations