

## VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR

**Type of online course: Certificate**

**Course title: Certificate course on Digital Manufacturing using Siemens Tecnomatix**

**Offered by:** V. R. Jamdar Siemens Center of Excellence, VNIT Nagpur (Interdisciplinary Board)

**Eligibility:** Diploma/ B.Tech (Any branch) (2<sup>nd</sup> Year Completed), M.Tech (Electrical, Electronics, Mechanical, and related branches) (First Semester Completed). Bonafide students of VNIT Nagpur are not eligible.

**Proposed Maximum Duration:** 3 months

**Total contact hours:** 100 (Lecture: 0+ Tutorial: 16 + Practical: 84)

**Mode of course delivery:** Hybrid

### Course Objectives:

1. Introduce students to the concept of digital manufacturing and its role in modern industrial processes.
2. Teach students how to develop and optimize manufacturing processes using simulation tools.
3. Provide hands-on experience with Siemens Tecnomatix software through various simulation projects and exercises.
4. Help students develop the skills to effectively communicate with various stakeholders, such as engineers, operators, and managers, regarding digital manufacturing projects.
5. Teach students how to apply digital manufacturing concepts and techniques to real-world manufacturing problems.

### Course structure (per week equivalent):

Sr. No.	Courses (Titles)	L	T	P	Cr
1	Process and Plant Simulation	0	1	6	4
	Total	0	1	6	4

**Course fee: Rs. 20,000+ 18% GST**

### Course Contents:

Sr. No.	Topics	Hours	
		Tutorial	Practical
1	Process and Plant Simulation		
1.1	Tecnomatix Process simulate : Identify basic concepts for Process Simulate (on eMS) Standalone, Identify Process Simulate basics, Identify basic tools in Process Simulate environment (part 1), Identify basic tools in Process Simulate environment (part 2), Identify the placement commands, Use kinematics to create operations	2	4
1.2	Tecnomatix Process simulate : Detect collisions, Create snapshots, markups, notes, and pictures, Create sections and define cables, Import component geometry, Model geometry in	2	8

	Process Simulate, Define basic kinematics in Process Simulate, Define basic kinematic cranks and robotic tools		
1.3	Tecnomatix Process simulate Define basic robot kinematics, Define advanced kinematics, rails, gantries, and positioners, Define advanced kinematic functions, compound equipment, and motion parameter files, Define part-in-tool robot spot welding paths Adjust welds in spot welding paths, Define part-on-robot spot welding paths Search for spot weld guns and use servo guns, Define robotic drilling and riveting paths	2	12
1.4	Tecnomatix Process simulate: Define robotic material handling paths, Define robotic arc welding continuous feature paths, Define robotic paint continuous feature paths, Define other robotic continuous feature paths, Test robot reach and set basic robotic path attributes, Add via locations to avoid collisions	2	12
1.5	Tecnomatix Process simulate: Identify other path modification and creation tools, Identify location attributes for multiple robot interlocking, Create swept volumes, interference zones, and events, Examine other robotic path modification tools and techniques (part 1), Examine other robotic path modification tools and techniques (part 2)	2	12
1.6	Tecnomatix Plant simulate : Basic Plant Simulation interface, Object-oriented modeling strategies, Basics of material flow objects, Hierarchy and inheritance, Navigation and structure of the 3D Window, Modeling buffers, assembly lines, roads, Kanban, and failures Resource objects (i.e. workers, shift calendars, foot paths, etc.) Basic conveying systems (length-oriented objects), Other objects (i.e. Information objects, User Interface object, mobile units)	2	12
1.7	Tecnomatix Plant simulate : Sankey, bottleneck analyzer, and experiment manager basics, Creating videos and printing the scene, Techniques for creating frame backgrounds in 3D, Customizing object logic (Method creation), Methods for 3D, data collection, and evaluation, Methods for interfaces (read and write to Excel and text files)	2	12
1.8	Tecnomatix Human Simulation: Identify the human model and human simulation options, Create basic human operation, Create human operations using Task Simulation Builder (TSB), Create human operations using other automatic posture tools (part 1), Create human operations using other automatic posture tools (part 2)	1	6
1.9	Tecnomatix Human Simulation: Create and view ergonomic reports (part 1), Create and view ergonomic reports (part 2), Assign a duration to human operations, Examine features related to body and hand motion capture, Identify other Process Simulate human tools	1	6
<b>Total Hours</b>		<b>16</b>	<b>84</b>

### Course Outcomes:

1. Gain knowledge about the use of 3D modeling software and how to create digital models of manufacturing equipment and systems.
2. Learn to develop and optimize manufacturing processes using simulation tools.

3. Understand the role of data analytics in digital manufacturing and how to use it to improve production efficiency and quality control.
4. Gain hands-on experience with Siemens Tecnomatix software through various simulation projects and exercises.
5. Be able to apply digital manufacturing concepts and techniques to real-world manufacturing problems.

**Attendance requirement:** 100 % mandatory, 25% relaxation may be given by course coordinator

**Course Evaluation plan:** Mid-term (30%) + End Term(30%) + Teacher's Assessment (40% which includes mini project)

**Course Coordinator(s)(Name and Sign):**

Dr. Ravindra Keskar

(Professor Incharge, Advanced Manufacturing Lab of VRJSCOE)

Dr. D. A. Jolhe

(Professor Incharge, Advanced Manufacturing Lab of VRJSCOE)

**Lab Coordinator(s)(Name and sign):**

Trainers for Advanced Manufacturing Lab of VRJSCOE Lab and Center Manager

**Course Execution Coordinator (Name and Sign):**

Prof. Shital S. Chiddarwar

Center Head

V R Jamdar Siemens CoE