Visvesvaraya National Institute of Technology, Nagpur

V. R. Jamdar Siemens Center of Excellence

Industry 4.0 and Digitalization

SIEMENS
3D Engineering

Visvesvaraya National Institute of Technology
Ground Floor and 5th Floor, New Academic Building, South Ambazari Road, Nagpur, Maharashtra - 440010 (India)

About
V.R. Jamdar Siemens Center of Excellence

The V. R. Jamdar Siemens CoE, established in 2020 at Visvesvaraya National Institute of Technology, Nagpur, operates with a primary focus on creating a robust technical education eco-system through it's experience in industrial products and services.

The Center houses 11 sophisticated laboratories which provide opportunities for promising innovations. The entire gamut of Industry 4.0 and digitalization is served by the CNC Lab, Smart Factory Lab, Robotics Lab, Product Design & Validation Lab, Test and Optimization Lab, Advanced Manufacturing Lab, IOT Lab, Mechatronics Lab, Automation Lab, Process Instrumentation Lab and Reverse Engineering Lab.

This multi-faceted unique center offers skill development courses, internships, Research and Development assistance and industrial consultancy services across various sectors.

3D Engineering

Certified Platinum Partner of Siemens Digital Industries Software. Offering technology software sales and services support for:
- PLM Software Solutions
- Digital Manufacturing
- Simulations Solution
- 3D Printing
- Virtual Reality

Leading Siemens partner in setting up Siemens CoE with India's top academic engineering institutes.

3D Engineering

To bridge the gap between industry and academia, 3D Engineering and Siemens has set up V.R.Jamdar Siemens Centre of excellence. The CoE focuses on empowering students with practical knowledge to enhance their skills and make them more ready to take on their roles in the industry when they are employed.

Ajay Deshkar, Director,
3D Engineering, Operations partner of CoE

Institute of National Importance offering Bachelors, Masters and Doctoral programs in engineering as well as basic science.

VNIT

"I am glad to share that VNIT Nagpur is setting up Siemens Centre of Excellence in Industry 4.0 and Digitalization. It is a multidisciplinary, industrial collaboration that focuses on developing "Skill Excellence" for Academia and Industry. This CoE is envisioned as a link that aligns industry requirements with technical education to make industry-ready engineering graduates."

Prof. Pramod M. Padole, Director, VNIT

SIEMENS

An integrated technology company with presence in 4 sectors.
- Energy
- Healthcare
- Industry
- Infrastructure & Cities

Global market & technology leader in its areas of Operation.

SIEMENS

The Siemens Centre of excellence at VNIT is envisaged to provide Industry Grade Siemens Tools and Platform for Learning, R & D, Skilling and Reskilling for students, faculties, start-ups, and professionals across multiple industries.

Sanjay Rohilla, Head-Governance,
Academics-India, Siemens Industry Software

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The Objectives
of V. R. Jamdar Siemens CoE

Typically, small and medium scale industries face the challenges of large Investment in time, effort & money to train new engineering recruits. It takes anywhere between 6-18 months before recruits become productive, which affects competitiveness of companies.

In view of these aspects, V. R. Jamdar Siemens CoE at VNIT has taken following initiatives.

CoE Initiatives

- Impart state-of-the-art industry-oriented training to bridge the gap between trainees skillsets and industry needs.
- Enable institutions to improve the quality of technical education.
- Provide state of the art tools to match industry standards.
- Train students in Industry Skills

Learning Roadmap

Industry 4.0

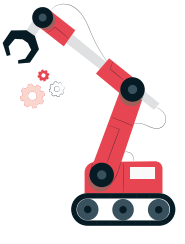
- Shop Floor Design
- Plant Optimization
- Process Design
- Process Optimization
- Quality Management
- Internet of Things (IoT)
- Smart Factory Automation

Mechatronics & Automation

- Fluid Mechanics
- Electrical Circuits
- PLC
- SCADA
- DCS
- Mechatronics: Design, Operation & Troubleshooting

Robotics

- Introduction
- Material Handling
- MIG Welding
- Spot Welding
- Assembly
- Machine Tending
- Painting
- Inspection



CNC

- Introduction
- Programming
- Operation
- Commissioning
- Application
- Maintenance
- Troubleshooting

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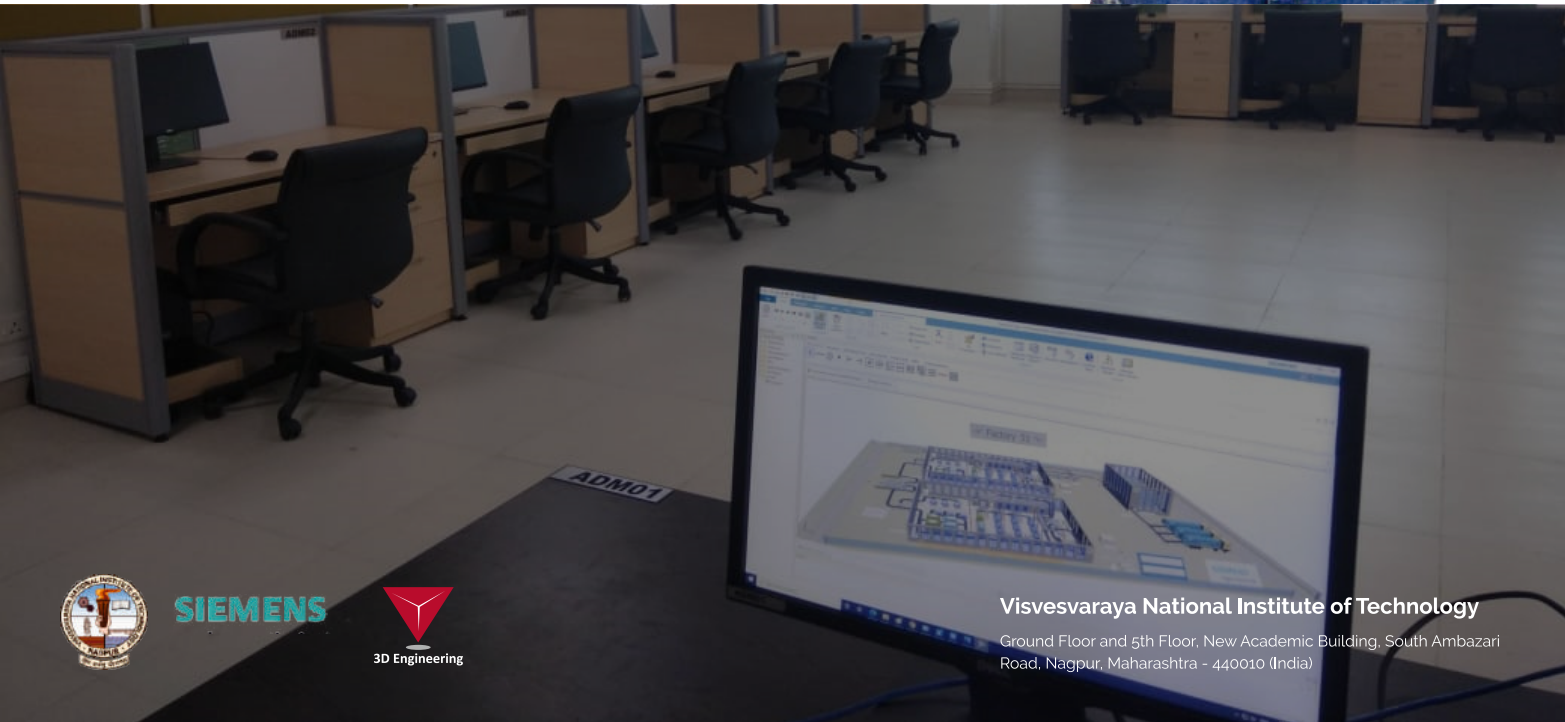
Deliverables
of Centre of Excellence

- Impart technical skills and value based education to engineering (or technical) trainees from academia and industry, to enable them to face the demands of the industry through industry oriented training with contemporary learning methodologies.

- Support academicians who are looking forward to taking advantage of the global market and research in contemporary technologies.

- Benefit researchers in developing single word solutions to industry-related problems.

- Provide a platform for consultancy in various technological areas such as Mechanical, Instrumentation, Electrical, Electronics and Communication, Automobile & Bio-medical Engineering.



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Courses for Students
offered by V. R. Jamdar Siemens CoE

Skill Development Certificate

Duration : 8 Hours, 16 Hours, 20 Hours

Eligibility : ITI / Diploma / BE / ME

Skill Development Certificate

Duration : 22 Hours, 32 Hours, 40 Hours

Eligibility : BE / ME

Diploma

Duration : 100 Hours

Eligibility : Diploma

PG Diploma

Duration : 300 Hours

Eligibility : BE / ME

Advanced PG Diploma

Duration : 600 Hours

Eligibility : BE / ME

Internship

Duration : 4-5 weeks / 3 months / 6 months

Eligibility : Skill Development Certificate Course

Courses for Industry Professionals
offered by V. R. Jamdar Siemens CoE

Globalization, Digitalization, the Internet of Things, Robotics, Smart factories, and Industry 4.0 are the new business models that are rapidly changing our way of working, living, and learning.
V. R. Jamdar Siemens Center of Excellence at Visvesvaraya National Institute of Technology, Nagpur offers professional training under the mentioned domain to develop Industry Professionals skillset and command the latest technology. It'd be wise to learn from experienced professionals concerning ways in which one can boost efficiency in the workplace.
In this regard, we are conducting the following 100 Hrs. duration Certificate course in various technologies related to Industry 4.0 for Industry Professionals:
1- Digital Manufacturing using Siemens Tecnomatix
2- Industrial Automation with IIoT
3- Product Design Validation & Simulation using Siemens NX and Simcenter 3D
4- Robotics, CNC and Its Programming

Course Features: -

- 35 Hours of Training sessions
- 65 Hours of Practice
- (Online Training via Google meet, Remote access to Software via any desk)
- Flexible Schedules
- Free demo on request
- Post-Training Support
- One-on-one doubt clearing
- Certification from Siemens, 3D Engineering and VNIT Nagpur
- Real-time project use cases

Benefits of taking this course:

- o Carefully crafted absolute beginner-friendly course
- o Expert-led coaching sessions at your convenience
- o Guided practical sessions by handholding during the execution
- o PLM career guidance from an expert

Note: Customized Courses for various duration/Mode for various domains are also offered.

VNIT
Nagpur

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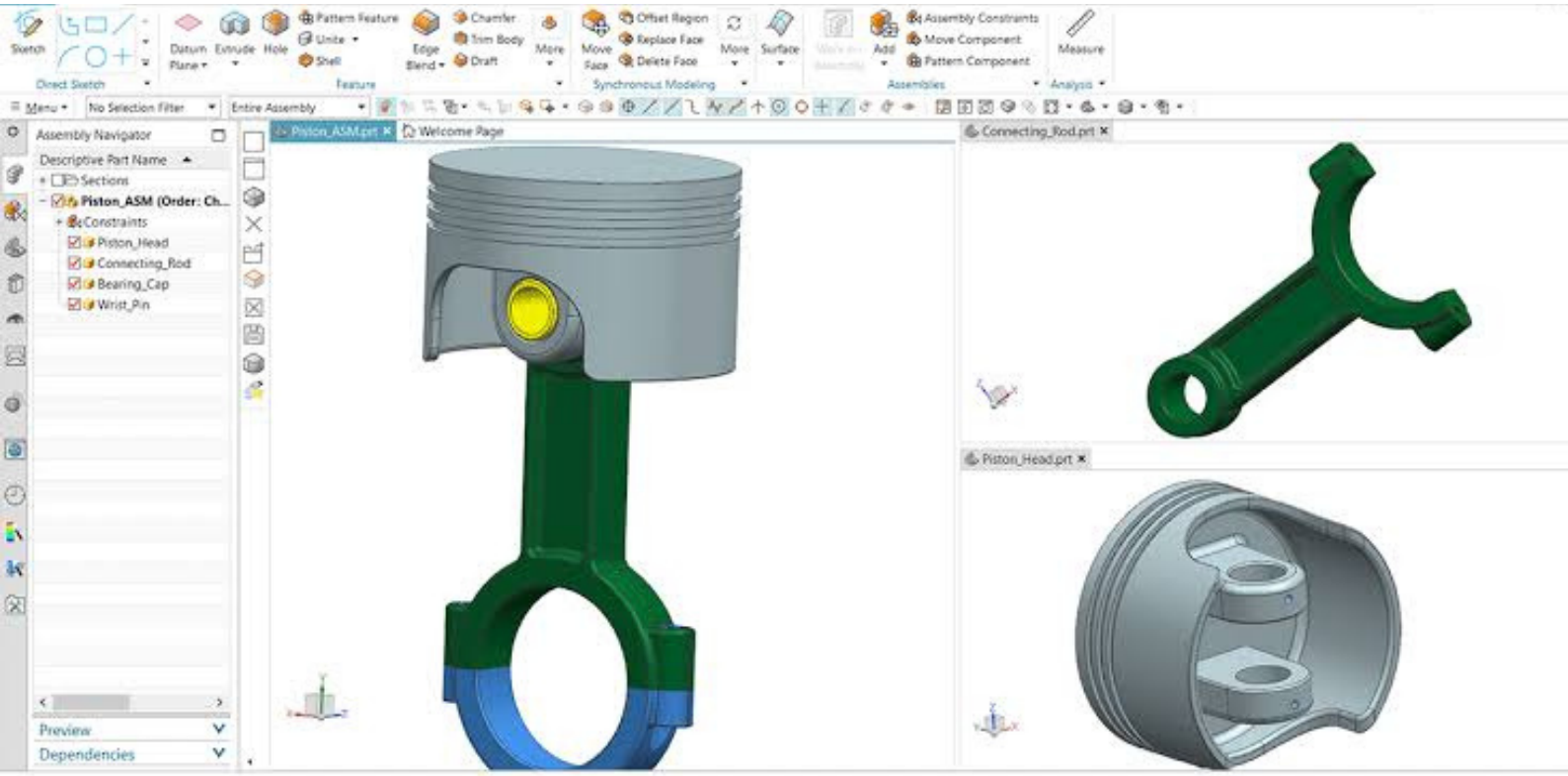

Product Design, Validation and Simulation

Participants will learn how to design a product, starting from part modeling and assembly design, utilizing CAM and validating it with simulation Tool (Simcenter 3D). They will also learn the process of drafting the product to be sent to the manufacturing plant.

Course content:

- Sketcher
- Part modeling
- Assembly design
- Drafting
- FEA Analysis
- Reverse Engineering
- Sheet metal
- Milling Multi axis operation
- Machine simulation
- Post process
- Structural Analysis
- Thermal Analysis

Duration:- 100 Hrs.

Complete practical and industrial approach with Siemens softwares.

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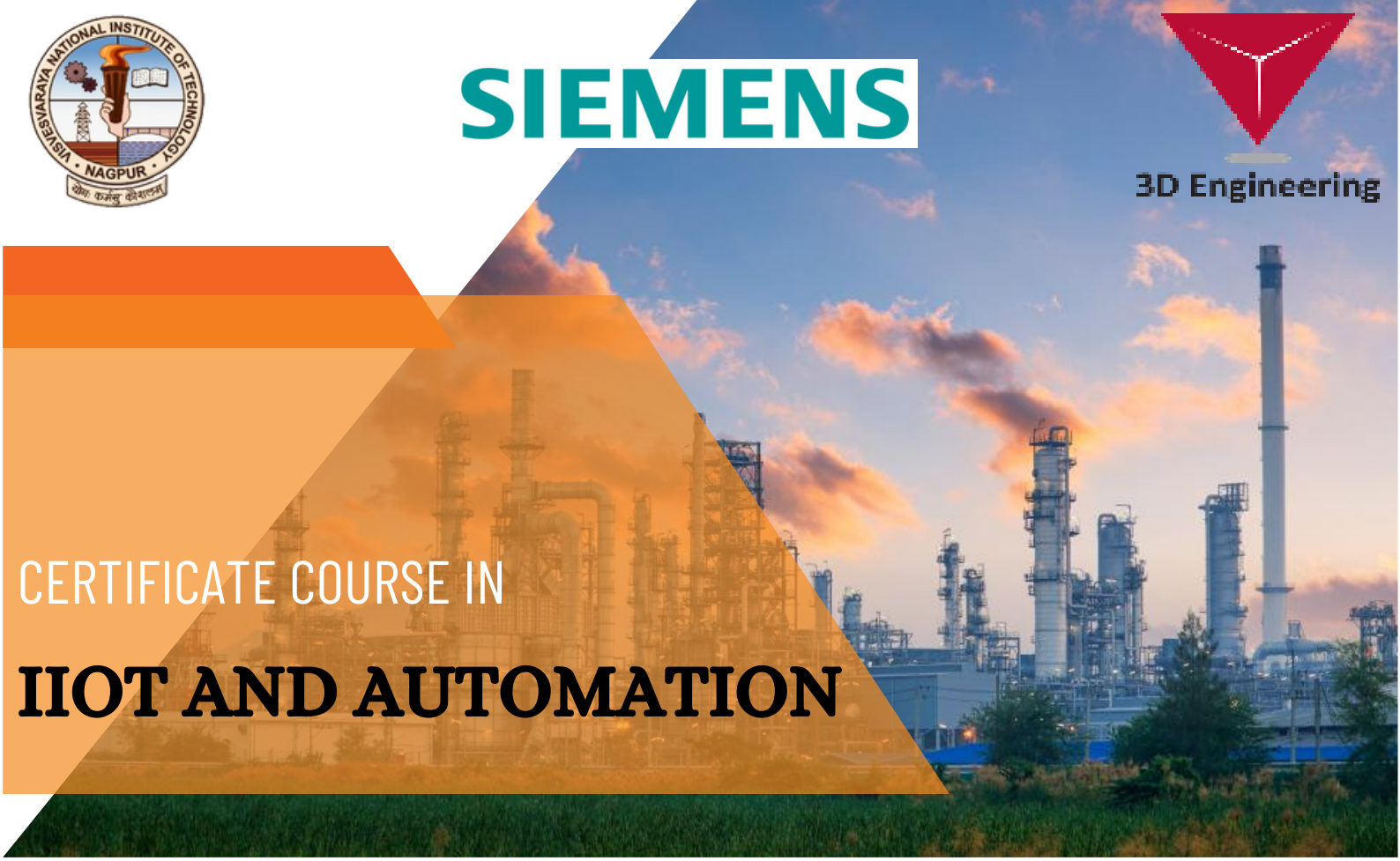


CERTIFICATE COURSE IN

IIOT AND AUTOMATION

Let`s See What We Learn?

- Automation in Industry.
- Siemens Controllers PLC
- Introduction to PLC
- Configuration of PLC
- Bit Logic & Logic Gates
- Application Development
- Timer Counter & Compare Operation
- Scaling of analog Sensor
- Controlling of Process from Remote Location using HMI & SCADA.
- Introduction to IoT
- Arduino, Tinker CAD, Node MCU
- Study of NANO Box Datasheet
- Configuration of NANO Box (Gateway)
- Study of Connectivity Datasheet
- Introduction to Asset Manager/Insights/Mind connect IoT Extension
- Introduction to HMI & SCADA
- Configuration of HMI & SCADA
- Screen Design & Screen Engineering
- Application Development
- Alarm/Trend/Recipe & Security

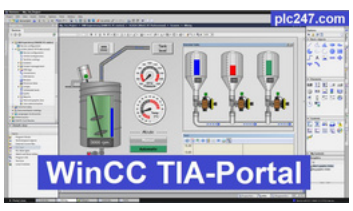
Software

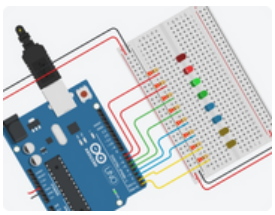
- Totally Integrated Automation Portal
- Mindsphere, Tinker CAD, Node-Red.
- Arduino IDE.

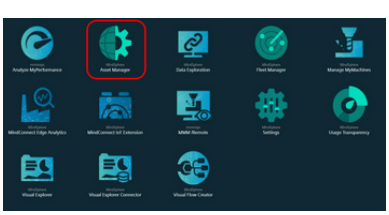
Hardware

- PLC S7-1200/1500
- Human Machine Interface HMI TP/KTP 700
- WinCC Professional SCADA
- Simatic IPC 227E (Nano Box)

Course Gallery







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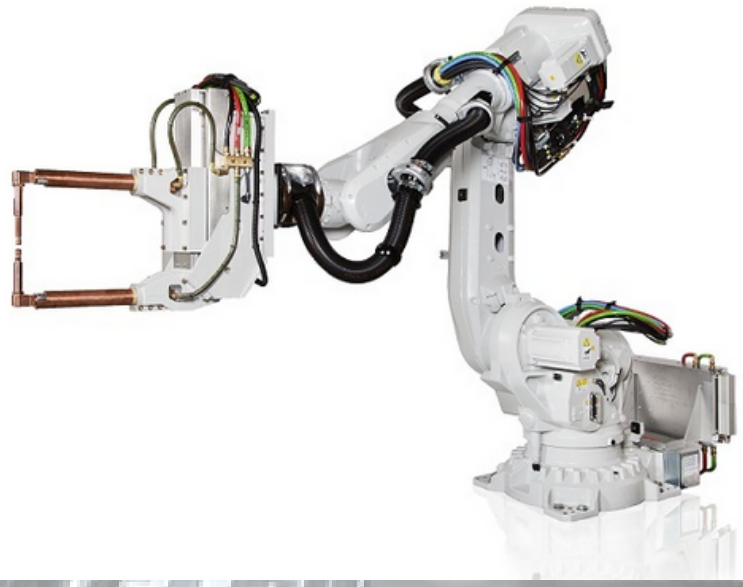
Certificate course on Industrial Robotics and CNC Programming

Participants will gain hands-on experience in operating industrial robots and CNC machines, including setting up workpieces, running programs, and troubleshooting common errors



Content

Duration: 100 Hrs

- Component of ARC welding Robot
- Rapid Programming for ARC welding
- Components of Spot welding
- KUKA robot, AR6900 Robot programming
- Programming in RobotStudio
- 3 Axis Milling
- CNC Lathe Machine
- Siemens Controller 828D & 840D
- NX CAM & Post builder
- Cutting parameters & non-cutting moves
- Multi Axis operation & Machining Simulation

The Participants of all ability levels in real-world scenarios utilizing CNC and Robotic concepts to problem solve through hands-on activity

Academic
Project Guidance

Faculty Development Program (FDP)

The Program will provide excellent opportunity for skill upgradation of faculty members in Mechanical, Electrical, Electronics, Communication, Instrumentation, Industrial Engineering.

Courses Offered : Basic NX Design and Simulation, Digital Manufacturing and Industrial Robotics, CNC Programming and Machining, Industrial Automation.

Trainees can utilize SIEMENS CoE laboratories for their academic projects in various domains like CAD, CAE, Prototyping, CNC machines, Automation and Robotics and guidance can be given by the domain experts.

Summer Internship Program (SIP)

To upgrade skills to international standards through Industry Oriented Training with SIEMENS learning methodologies and to make participant industry ready upon completion of the course.

The Program will provide excellent opportunity for Trainees of Mechanical, Electrical, Electronics, Communication, Instrumentation, Industrial Engineering.

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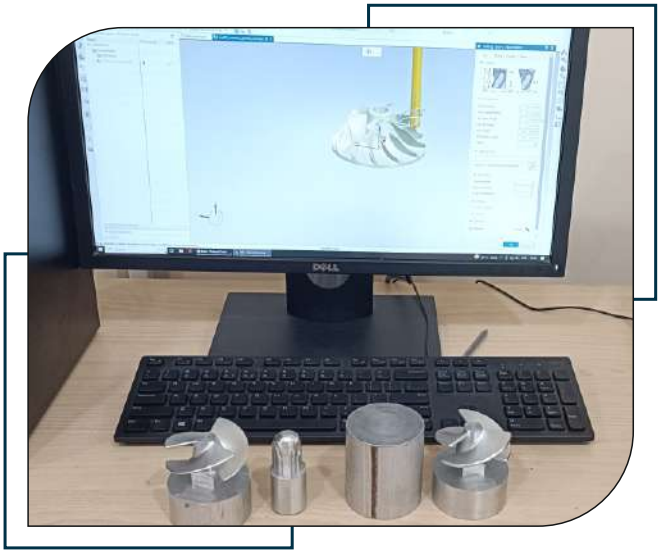
CNC Lab

5 Axis Simultaneous operation vertical machining centre (VMC) is one of it's kind state-of-the-art machine tool available at Siemens COE . It is used for machining of parts that have complex geometries, profiles and intricate manufacturing process sequences.

The Trainees will be trained to operate industry-grade machines and develop complex parts for bio-medical, automobile and other industries.



Major Equipment:

- Simultaneous 5 Axis Vertical Machine Centre (VMC).
- Horizontal Turning Machine: MTAB's MAXTURN PLUS
- Vertical Milling Machine: MTAB MAXMILL PLUS

Modules Offered:

- CNC Introduction Milling: Workholding Devices, Tooling, Machine Construction, Machining Process
- CNC Introduction Turning: Machine Construction, Machining Process, Workholding Devices, Tooling
- CNC Operation Milling: Basics
- CNC Operation Milling: Siemens
- CNC Operation Turning: Basics
- CNC Operation Turning: Siemens
- CNC Commissioning Milling: Siemens
- CNC Commissioning Turning: Siemens

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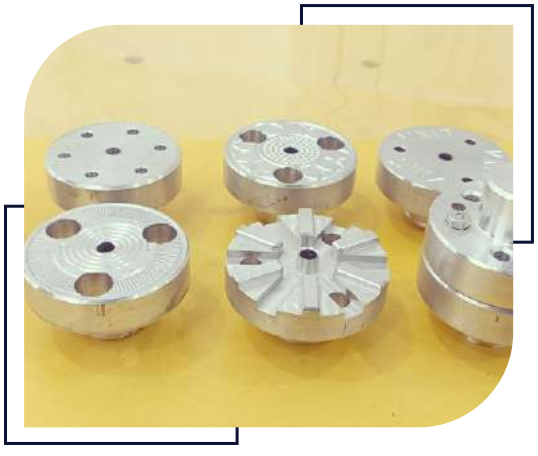
Smart Factory Lab

Smart Factory is a framework for automated control and management of manufacturing processes in a factory using Industry 4.0 and Internet of Things technologies. The purpose of the Smart Factory Lab is primarily to introduce the concept of Computer Integrated Manufacturing (CIM).

Smart Factory Lab provides candidates with many challenging hands-on experiences such as manufacturing design and control. It is a state-of-the-art laboratory consisting of various equipment for -

(i) material processing - computer numerically controlled (CNC) machining centers (mill and lathe),
(ii) material handling - KUKA Collaborative robots,
(iii) material transportation - automated guided vehicle (AGV) conveyor system,
(iv) material inspection - vision based system.
(v) materials storage - automated storage and retrieval system (AS/RS)
(vi) process control - CIM controller, IoT



Major Equipment and Software:

- Maxmill CNC (Milling)
- Maxturn CNC (Turning)
- AGV (Automated guided vehicle)
- MTAB Robot (Machine Tending)
- KUKA Collaborative Robot
- Machine Vision System
- ASRS (Automated Storage and Retrieval System)
- CIM Controller
- IoT

Modules Offered:

- Industry 4.0 Concept
- Factory Automation
- IoT

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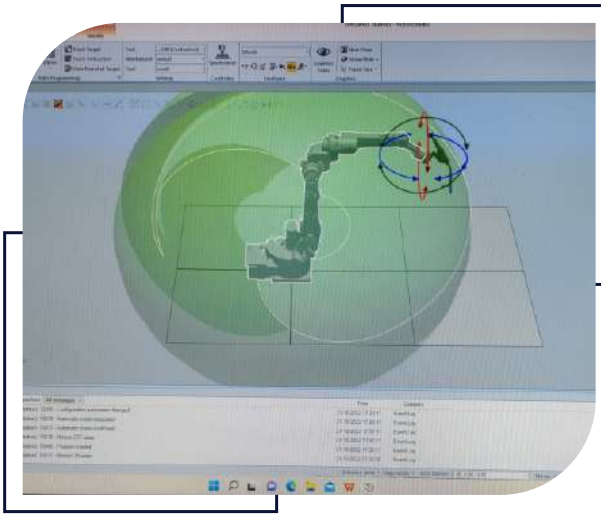
Robotics Lab

Robots play an important role in the manufacturing industry, ensuring that the quality of the product is not compromised and the production volumes are met. The spot welding and arc welding robotic cells with Robot Studio software from ABB will enable Trainees to understand kinematics, trajectory planning and motion planning of robots for specific welding task.



Major Equipment & Hardware:

- Spot Welding Robot ABB IRB 6700
- MIG Welding Robot ABB IRB 1520ID

Major Software:

- ABB Robot studio

Modules Offered:

- Introduction to Industrial Robotics
- Robot Programming: MIG Welding Application
- Robot Programming: Spot Welding Application

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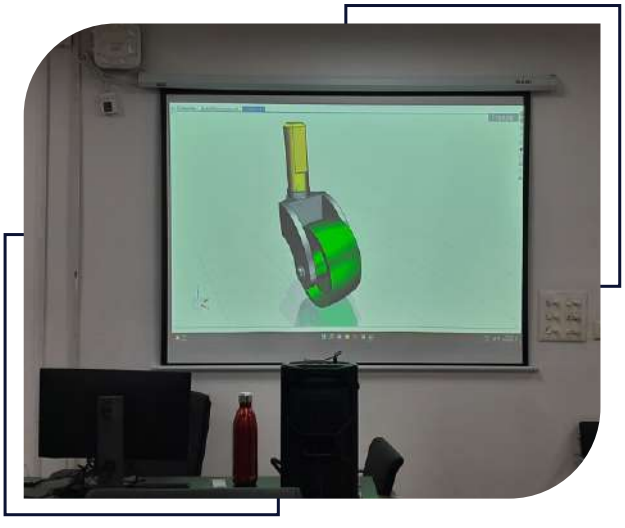
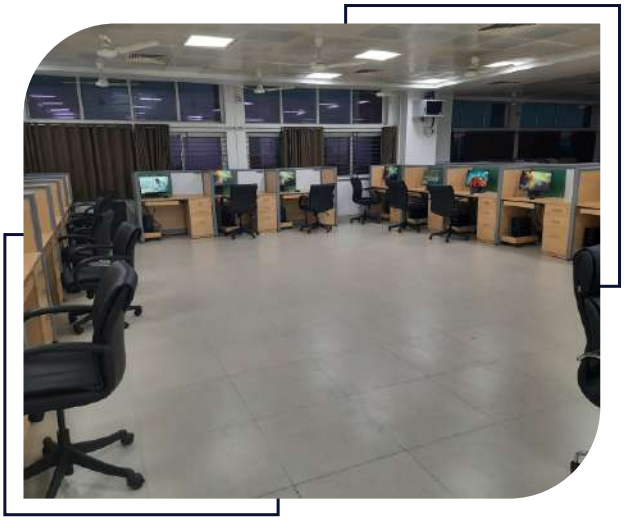
Product Design and Validation Lab

Based on technology from Siemens, this Lab focuses on Product Digitization. The facilities in the Lab provide the most powerful, flexible and innovative product development solutions in the industry through NX software. Each aspect of product development, from concept design through engineering and manufacturing solutions development and validation is supported.

The NX for Design has multiple tools to benefit the user in 2D & 3D CAD Modelling, Design Interoperability, Mechanical - Electrical/Electronic Design, Design Validation, Design for Manufacturing, Molded Part Validation & Injection Molding Simulation, Industrial Design & Styling, Reverse Engineering, Mechatronic Concept Design, P&ID Design, 3D Electrical Wiring and Harness Design, Aero Structures Design, Automotive Design, Marine Design Solutions and many more.





Modules Offered:

- Teamcenter
- Essentials for NX Designer
- NX Basic Design
- NX Synchronous Modeling Fundamentals
- NX Synchronous Modeling Parametric Design
- NX Drafting Essentials
- NX Sheet Metal
- NX Nastran Advanced Nonlinear
- Motion Simulation
- Advance Simulation Process
- Advance Simulation Processes and Solutions
- Thermal and Flow Analysis
- CAM Manufacturing Fundamentals
- CAM Turning Manufacturing Process
- CAM Fixed And Multi-axis Milling

Major Software:

- Siemens NX (CAD & CAM)
- FeMAP with NX Nastran
- Solid Edge
- Teamcenter
- Fibersim
- Mastertrim
- Syncrofit

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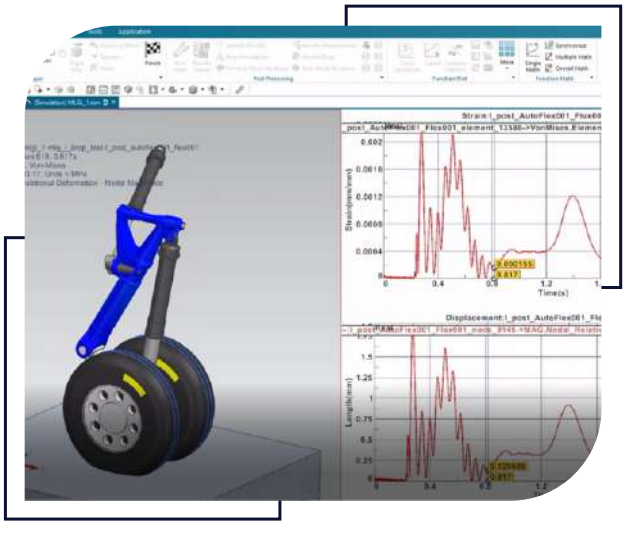
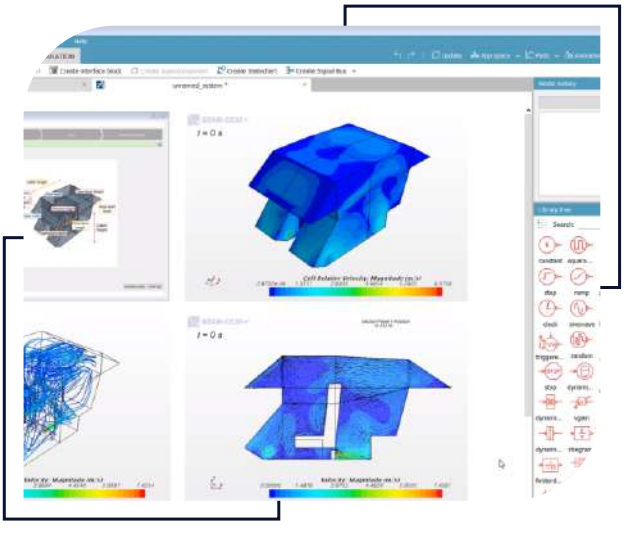
Test and Optimization Lab

The Test and Optimization Lab addresses complex engineering challenges that keep the balance between technological design options and functional performance. From testing and mechanical simulation to model-based systems engineering, it enables engineers to understand the functional performance engineering of mechatronic systems. It can solve issues related to noise ,vibration and harshness (NVH), acoustics, durability, dynamics, performance, fuel economy and controls development.

The system simulation, 3D CAE and testing facility helps trainees and industry to predict performance across all critical attributes before and during the entire product lifecycle. By combining physics-based simulations with insights gained from data analytics, Simcenter helps Trainees & industry to optimize their design and deliver innovations faster.





Major Equipment & Software:

- Simcenter 3D
- Simcenter Amesim
- LMS Test Lab Academic Bundle
- Imagine.Lab
- Virtual Lab

Major Equipment & Hardware:

- Impulse hammer
- Miniature shaker kit
- ICP Force sensor
- Motor assembly
- Airplane scaled model
- Vacuum cleaner
- Lasertech kit

Modules Offered:

- Simcenter Testlab: Structures & Rotating Machineries, Data Acquisition System
- Simcenter Amesim:
  Thermal Fluid System Simulation,
  Hydraulic System Simulation,
  Transmission System Simulation

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Advanced Manufacturing Lab

This Lab facilitates factory layout design and optimization through Tecnomatix software. Digital Twins Navigation, Virtual Commissioning of Automated Systems, Plant Simulation & Throughput Optimization, Human-Centered Design and Planning, Ergonomics & Human Performance, Offline Robotic Programming and automation, Press Line Design & Simulation, Impact of Dimensional variation, Work Instruction Delivery, Manufacturing Process Planning, Assembly Simulation for Virtual Process Verification Production Logistics & Material Flow, Material Flow Optimization, Factory and Line Design are some of the modules available in the software.

Major Equipment & Software:

- Tecnomatix - Plant Simulation
- Tecnomatix - Process Simulate
- Tecnomatix - Robcad
- Tecnomatix - Jack

Modules Offered:

- Plant Simulation
- Process Simulate Basic (Robotics)
- Process Simulate basic (Human)
- Robcad
- Jack Human Simulation
- Teamcenter

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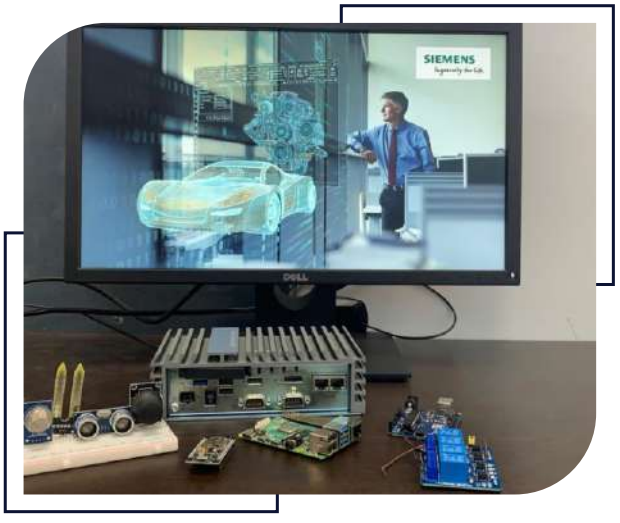
IOT Lab

The Internet of Things, or IOT, is emerging as the next technology mega-trend, with repercussions across the business spectrum. By connecting to the Internet, billions of everyday devices, ranging from fitness bracelets to industrial equipment, the IOT merges the physical and online worlds.
This opens opening up a host of new opportunities and challenges for companies, governments and consumers.



Equipment & Software:

- NanoBox, Raspberry Pi
- Mindsphere Portal

Modules Offered:

Basics of IOT:

- Introduction to Raspberry Pi & Node Red
- Mindsphere Platform Introduction
- Mindsphere App Development Basic
- Mindsphere App Development Advanced

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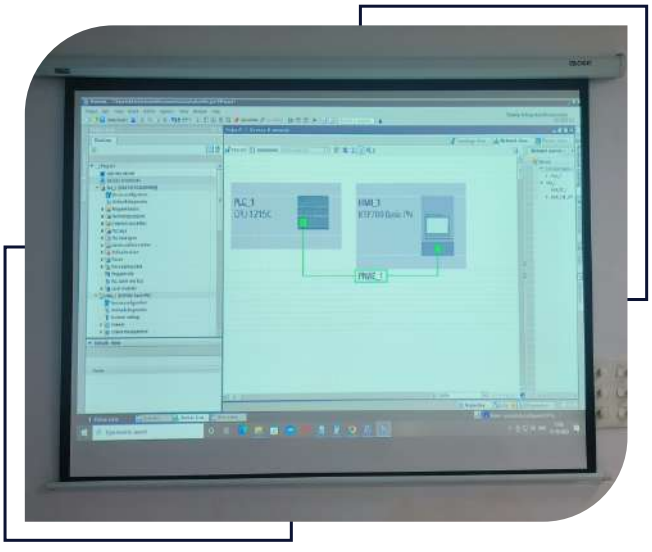
Automation Lab

Automation is the creation and application of technologies to produce and deliver goods and services with minimal human intervention. Implementation of automation technologies, techniques and processes help to improve the efficiency, reliability, and/or speed of many tasks that were previously performed by humans. The Automation Lab allows the Trainees to understand the requirement and functioning of Programmable Logic Controllers (PLCs). This is the first step toward Internet of Things (IOT). Here the Trainees learn how to program Industrial PLCs, work with Industrial Human Machine Interface (HMI), Industrial SCADA (Supervisory Control & Distributed Acquisition) and PLC networking using PROFIBUS and PROFINET standards.



Equipment & Software:

- SIMATIC S7
- TIA Portal V15.1
- S7-1500 PLC with TP 700 COMFORT HMI
- S7-1200 PLC with KTP 700 BASIC HMI
- SCADA

Modules Offered:

- Industrial Controller. (Programmable Logic Controller)
- HMI & Networking. (Human Machine Interface)
- Industrial SCADA. (Supervisory Control And Data Acquisition System)

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Process Instrumentation Lab

The Process Instrumentation Lab enables Trainees to work on Advanced Automation using Distributed Control Systems (DCS) and understanding the working of the following equipments in a plant. Temperature, Flow Level Pressure Sensors/Measurements & communication. SIMATIC PCS 7 improves scalability, availability, and security in process automation. It prepares the facility for the future by increasing security, proactive lifecycle management, and inventive plant engineering.

Major Equipment & Software:

- SIMATIC PCS 7 Training Kits
- Process Transmitters Racks
- HART Cable, Pro bus Cable, **Profinet** Cable

Modules Offered:

- Automation Application:
- Instrumentation
- Sensors
- Basic of DCS

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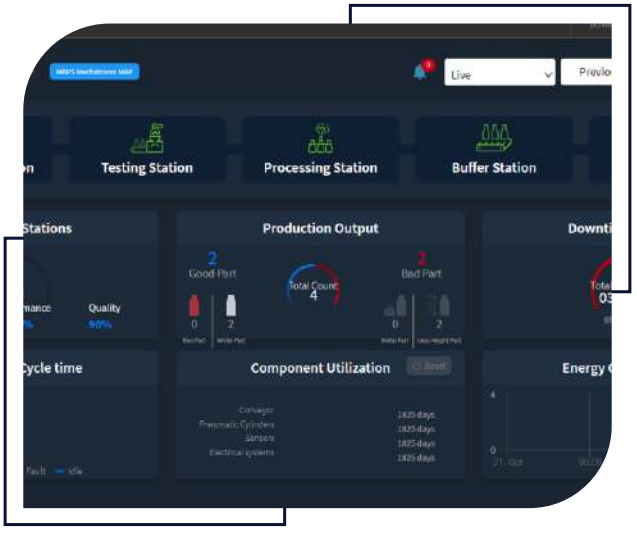
Mechatronics Lab

Mechatronics integrates multiple disciplines such as mechanical, electronics, control, instrumentation and programming, that enables operators, technicians, supervisors, managers and designers to design, optimize, operate and maintain real world automation processes that comprise of these technologies. The Mechatronics Lab, based on technology from Siemens, brings together four departments of engineering, namely Mechanical, Electrical, Electronics & Communication, and Computer Science. This allows Trainees to work on a mini factory setup and on areas such as Pneumatic s & Hydraulics, Sensors, Communication Protocol, PLC programming, PLC Networking using PROFIBUS and PROFINET standards.



Major Equipment & Software:

- Machines:
- Modular Automation Production System (MAPS 6S2)
- SIMATIC S7-1200 PLC with KTP 700 Basic.
- Accessories: - Silent Compressor, Toolkit
- TIA Portal V16

Modules Offered:

- Introduction: General, Mechatronics System
- Operation: General, Mechatronics System
- Application: Fluid Power, Pneumatics, Electropneumatics
- Programming: General, Mechatronics System
- Troubleshooting: General, Mechatronics System

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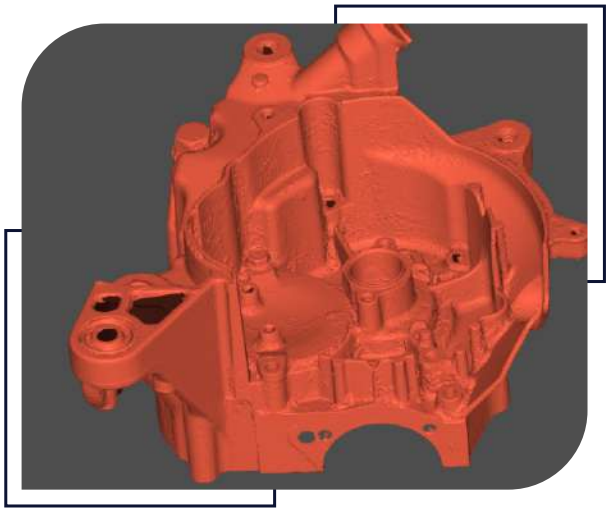
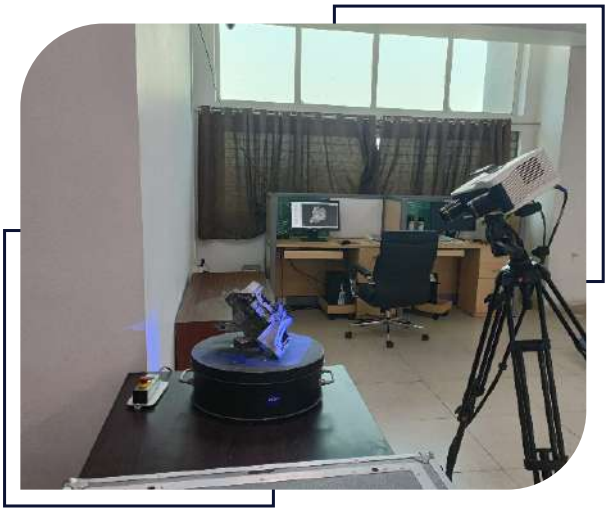
Reverse Engineering Lab

Reverse engineering, typically referred to as back engineering, is a method of extracting design knowledge from software, machinery, aircraft, architectural structures, and other items. Reverse engineering frequently entails dismantling individual components of bigger items. Reverse engineering is used to figure out how a part was created so you can replicate it. When obtaining a replacement part from an original equipment manufacturer (OEM) is not an option, companies frequently adopt this method. Real world objects, industrial components, and other items are scanned in 3D and imported into a digital pipeline at Reverse Engineering Lab. The virtual models obtained are used for creating CAD models, rapid prototyping, and 3D inspection.





Modules Offered:

- Reverse Engineering & 3D Scanning-Foundation
- 3D Scanning & 3D Inspection-Advanced

Software:

- Colin3D Software
- GOM Inspect 2019 Software

Hardware:

- Zeiss Make COMET L3D 5M 3D Scanner with automatic object positioning system (COMET Rotary).

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V. R. Jamdar Siemens Center of Excellence

Industry 4.0 and Digitalization

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3D Engineering

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Location Map