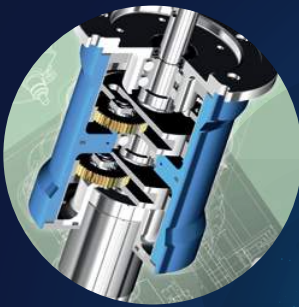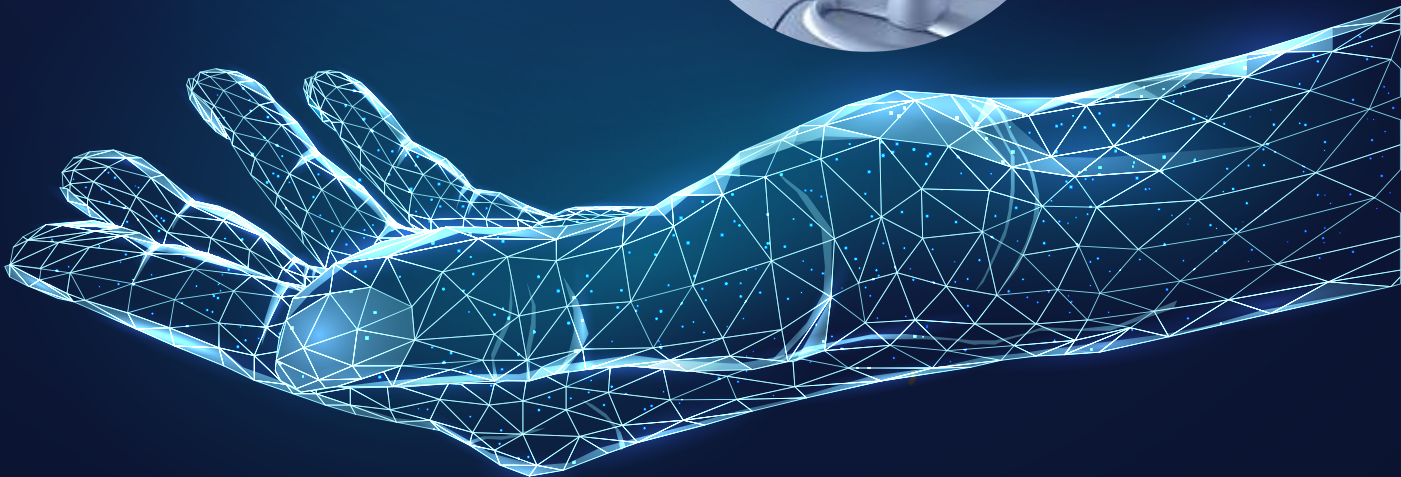**SIEMENS**

Expert Partner

Digital Industries Software

Centre of Excellence
for
Digital Manufacturing and Automation

About NITW

National Institute of Technology, Warangal (An Institute of National Importance, Ministry of Education, Govt. of India), formerly known as Regional Engineering College, was established in 1959. Pandit Jawaharlal Nehru laid the foundation stone for this institute on October 10, 1959, it is the first in the chain of 31 NITs (formerly known as RECs) in the country. The Institute is well known for its dedicated faculty, staff and the state-of-the art infrastructure and laboratory facilities conducive to a healthy academic environment. The Institute is constantly striving to achieve higher levels of technical excellence. Evolving a socially relevant and yet internationally acceptable curriculum, implementing innovative and effective teaching methodologies and focusing on the wholesome development of the students are our concerns. It has nearly 320 teaching staff and 500 administrative and supporting staff apart from outsource personnel. It is a self- contained residential campus located in a beautiful wooded land of about 248 acres.

Centre of Excellence for Digital Manufacturing and Automation (A Joint Initiative of NIT Warangal and SIEMENS) is a core point for the National Institute of Technology, Warangal, Telangana (An Institute of National Importance) in its aims of building facilities to develop technology-driven solutions with the aid of cutting-edge software and robust hardware in the Design and Manufacturing Industries. The facility is dedicated to perform these solutions driven engagements for both Industry and academia. The infrastructure available at centre can take up real-time projects in the fields of design and manufacturing for industrial, service and may other sectors. Additionally, there is an opportunity for consultancy and research activities which are benefited by latest hardware and software deployed at the centre. The centre team not only includes experienced professionals with practical exposure of dealing with industrial processes and troubleshoot but also supported by highly experienced academia fraternity of NIT Warangal to add value to the deliverable. CoE is committed to the growth of a technology - driven society with a focus on uplifting both regional and national perspectives.

Vision

To be a globally recognized and leading centre for skill development, training and translational research for empowering indigenous manufacturing.

Mission

• To empower the Indian youth with industry relevant skills in manufacturing technologies through education and training, securing rewarding employment opportunities.
• To develop capabilities and building capacity for indigenous manufacturing in collaboration with industry, academia, and government agencies.
• To provide access to state-of the art machinery and software tools for innovative design and developing new manufacturing technologies.

CoE Labs

01. Product Design & Validation Lab
02. Advanced Manufacturing Lab
03. Additive Manufacturing Lab
04. Mechatronics Lab
05. Internet of Things (IoT) Lab
06. CNC Machines Lab
07. Robotics Lab
08. Process Instrumentation Lab
09. CNC Controller Lab
10. Test & Optimization Lab
11. Automation Lab
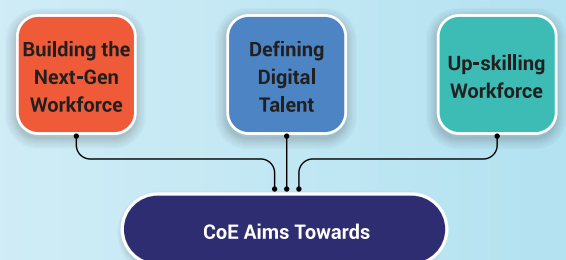12. Electrical and Energy Studies Lab
13. Smart Factory Lab

Centre of Excellence acts as
- Industry projects R&D centre
- Training, Mentoring & Incubation centre
- Knowledge Centre
- Hub for Industry Interaction

Key Features

▶ All labs are based on latest Products, Technology and Configurations.
▶ Project based learning.
▶ Development of projects and conducting research on real-time industrial problems.
▶ Opportunity to simulate and practice real world problems.
▶ Develop skills to meets industry needs and realities.
▶ Inculcate research based skills in the learner.
▶ Advantage of apps and solutions that solve real problems.
▶ Connect with a thriving community of developers and solution partners.

Infrastructure

▶ Spacious, Pollution Free 248 Acres Lush Green Campus.
▶ Air Conditioned Classrooms, Monitored & Secure Campus.
▶ Highly Qualified, Professional & Experienced Staff.
▶ Industry grade Infrastructure and Amenities.
▶ Well-equipped, IT-enabled classrooms with multimedia projectors & Interactive Screen.
▶ Structured & Well-Planned Curriculum.
▶ Research Based Experiential Learning.
▶ Counselling Facilities.
▶ Engaging Learning and Classroom Environment.

Building the Next-Gen Workforce
Defining Digital Talent
Up-skilling Workforce
CoE Aims Towards

01 PRODUCT DESIGN & VALIDATION LAB

Siemens NX software is a flexible and powerful integrated solution to deliver quality products at faster pace with greater efficiency. It offers the next generation design solutions enabling us to realize the value of the digital twins. Design and Validation lab offers customized consulting and market specific solutions aiming to develop highly skilled work force ready for placement in the field of product design and development.
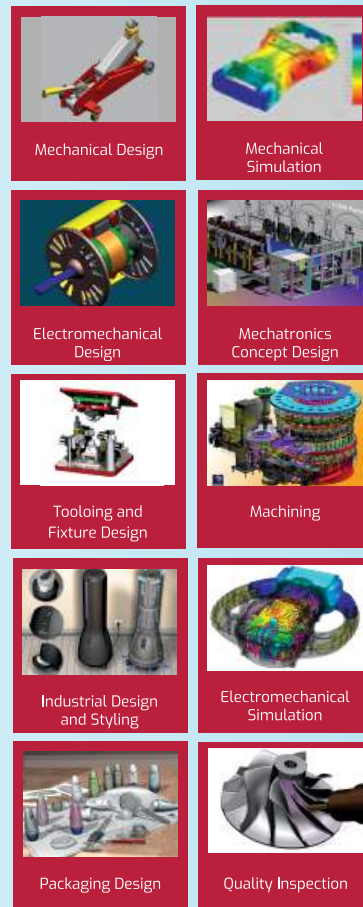
Key Functionality

▶ Design Concept, complete parametric model
▶ Design Interoperability
▶ Design Validation
▶ Design for Manufacturing
▶ Design Simulation for Performance Validation
▶ Industrial Design & Styling
▶ Mechatronics Concept Design
▶ Simulation Driven Design
▶ Template Based Design
▶ Detail drafting sheets for manufacturing of product

Major Facilities

▶ NX (Academic Core+CAD, CAE+CAM)
▶ Femap with NX Nastran
▶ Syncrofit for NX
▶ Fibersim for NX
▶ Mastertrim for NX
▶ Solid Edge University Edition

Certification Courses

1. NX CAD Design & Assembly
2. Moulded & Cast Part Design
3. Design in Context of an Assembly
4. Digital Product Modeler
5. Mechatronics System Modeler
6. Manufacturing Process Simulation Engineer
7. Automotive components Modeler
8. Model Based Definition using PMI
9. Advanced Modeling
10. Documenting with Drafting
11. Sheet Metal Design
12. CAD Surface Modelling Processes

Mechanical Design	Mechanical Simulation
Electromechanical Design	Mechatronics Concept Design
Tooloing and Fixture Design	Machining
Industrial Design and Styling	Electromechanical Simulation
Packaging Design	Quality Inspection

02 ADVANCED MANUFACTURING LAB

This lab will helps to digitalize manufacturing and the process of transforming innovative ideas and raw materials into real products. Through the software available in this lab synchronization between product engineering, manufacturing engineering, production, and service operations can be achieved to maximize production efficiency.

Key Functionality

▶ Hands-on learning on virtual industrial process and robot handling in manufacturing
▶ Facilitates collaboration for a holistic view of product and process design
▶ Forum to create, operate and evaluate plant process simulations for efficient process
▶ Navigate Digital Twins of Production facilities
▶ Commission Automation Systems Virtually
▶ Perform Human-centred Design and Planning
▶ Design for Maintenance, Line balancing, and Ergonomics
▶ Offline Program Robotics & Automation
▶ Assembly Simulation for Virtual Process Verification
▶ Optimize Production Logistics & Material Flow
▶ Configure Layout of Digital Factory
▶ Analyze Production Systems with 3D Statistical Simulation

Major Facilities

▶ Tecnomatix Manufacturing (Process & Plant Simulation)
▶ NX (CAD+CAE+CAM)
▶ Teamcenter
▶ Opcenter APS
▶ Preactor

Certification Courses

1. Teamcenter
2. 4th Generation Design for Teamcenter
3. Teamcenter Data Model Administration
4. Teamcenter Application Administration
5. Simulation Process Management
6. Tecnomatix Process & Plant Simulation
7. Robotic Simulation
8. Digital Manufacturing Process Planner
9. Plant Layout Designer
10. Plant Robot Simulation Engineer
11. Product Life Cycle Manager

03 ADDITIVE MANUFACTURING LAB

Additive Manufacturing (AM) is the process of applying 3D-printing to industrial production that allows materials to be created without joints and with minimal post-processing. AM technology enables OEMs to create new products rapidly with minimal waste and lower material costs, produce consolidate assemblies into single parts without tooling, reduce the inventory costs significantly. AM technology seen as future in wide and diverse sectors like Aerospace, Automotive, Medical Implants, Shipping, Lifestyle etc.

Key Functionality

This lab provides necessary capabilities, from design to print to post-print validation, in a single integrated system. It can not only prototype, but also manufacture groundbreaking products.

▶ Rapid Prototyping
▶ Print on Demand
▶ Strong and Lightweight Parts
▶ Fast Design and Production
▶ Minimizing Waste
▶ Ease of Access

Major Facilities

▶ 3D Systems Projet MJP 2500 Plus
▶ Post processing- MJP Easy Clean System
▶ Software- 3D Sprint

Certification Courses

1. Technologies as per ASTM
2. Rapid Prototyping
3. Design for Additive Manufacturing (DfAM)
4. 3D Printing Expert

04   MECHATRONICS LAB

Mechatronics is the fundamental building block for pioneering initiatives in multiple engineering disciplines, which are major enablers of Industry 4.0. This lab provides a platform to foster knowledge and working experience of synergistic integration of diverse engineering disciplines amongst the individuals so as to equip them with industry ready skills.

Key Functionality

▶ Advanced mechatronics modular systems is specially compiled with Siemens S7 1200 PLC.
▶ Hands-on Experience learning on working and programming of mechatronics modular systems.
▶ Troubleshooting using different strategies (SFC, LSD, DSD etc.) and with interpretation of process circuit diagrams and datasheets.

Major Facilities

This lab comprises of MAPS 6S (Modular Automation Production System with 6 stations specially compiled with Siemens PLC :

▶ PLC S7-1200
▶ TIA Portal Software V16 – Ladder Diagram (Programming Language)
▶ PROFINET – Communication Protocols

Certification Courses

1. Mechatronics
2. Mechatronics System Developer
3. Mechatronics Maintenance Technician

05 INTERNET OF THINGS (IoT) LAB

The Internet of things describes physical objects that are embedded with sensors, processing ability, software, and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks.

Key Functionality

▶ Manufacturing Performance Management
▶ Smart Energy & Traffic Management and Machine Assistant
▶ Connect assets and upload data to the cloud
▶ Collect, monitor, and analyze data in real-time
▶ Gain insights that improve efficiency and profitability
▶ Develop apps that increase the business value of your data
▶ Make use of an open environment for development and operations
▶ Profit from ready-to-use APIs and cloud services
▶ Take advantage of client's preferred cloud infrastructure: AWS, Azure
▶ Condition Monitoring and Asset Management
▶ CNC Process Improvement and Preventive Maintenance
▶ Cloud Industrial Supervision
▶ Manufacturing Performance Management
▶ Smart Energy & Traffic Management and Machine Assistant

Major Facilities

▶ SIEMENS MindConnect Nano
▶ SIEMENS Insights Hub (MindSphere- Cloud software)
▶ Raspberry Pi, Arduino, NodeMCU, Beaglebone Black
▶ Texas Instruments – Launchpad, Development Board, Booster packs

Certification Courses

1. IIoT Concepts
2. IIoT Development Platform
3. Application Development
4. IoT Professional
5. IoT Designer
6. IoT Associate

06 CNC MACHINES LAB

5-Axis Simultaneous operation VMC is one of its kind state-of-the-art machining centre available at CoE . It can be used for machining of parts with complex geometries, and profiles and having intricate manufacturing process sequence. The trainees will be trained to operate industry-grade machines and develop complex parts for biomedical, automobile and other industries.

Key Functionality

▶ CNC Programming & Machining (Tool path creation)
▶ Practical exposure on the industrial CNC Milling Machines
▶ NX CAM Programming & Simulation

Major Facilities

▶ SIEMENS SinuTrain: Simulation for CNC Programming & Machining
▶ MTAB Max Mill Plus + CNC Vertical Machining Centre with SIEMENS 828D Controller

Certification Courses

1. CNC Milling NC Programming (G&M Codes)
2. CNC Milling operating & Machining
3. CNC 5-axis Milling programming & machining

07 ROBOTICS LAB

The industrial robot and emerging Robots - the key player in Industry 4.0 are fast creating a niche for their integration in all verticals of industry and human life. The aim is to prepare skilled manpower ready for placement in the manufacturing and automation industry with enhanced employability.

Key Functionality

▶ Hands-on Experience learning on the working and testing of Industrial Robots
▶ Design strategy and programming of the robots to perform different tasks
▶ Design simulate & offline program operations utilizing robotics & automation
▶ Using 3D robotic work cell design, simulation and offline programming Ability to assemble and dissemble of robots
▶ Develop projects on real-life industrial problems
▶ Engineer and optimize robotic and automated production systems Navig Plan, Simulate, Optimize Robotic paths
▶ Program Robots and Automation offline Virtual Commissioning

Major Facilities

▶ KUKA Spot Welding Cell
▶ KUKA MIG Welding Cell

Certification Courses

1. Industrial Robot Programming
2. Robot Welding Programmer
3. Spot and MIG Welding Robot programmer

08 PROCESS INSTRUMENTATION LAB

Process Instrumentation is comprised of the sensors and various instruments to monitor & maintain process control equipments for improved production, product consistency, quality management and work- place safety in manufacturing and processing facilities. The major focus of the lab is on the application of electronics and associated technology to instrumentation, industrial automation, process control systems and commonly used sensors.
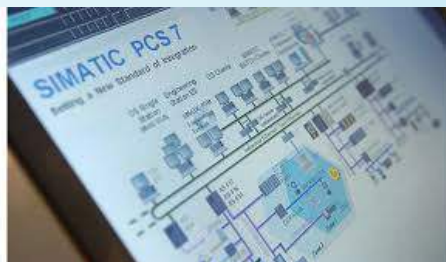
Key Functionality

▶ Imparts skills & knowledge on complete Process Automation & Process Instrumentation in all types of Process Industries
▶ Provides knowledge on Distributed Control Systems & Configuration, Measuring Technologies for Pressure, Temperature, Level & Flow and Valve Positioning etc
▶ Hands-on experience of different processes instruments and their measurements

Major Facilities

▶ PCS7 V 9.0 for Engineering Station (ES), Operator Station (OS), Automation Station (AS) configuration and programming
▶ SIMATIC PCS 7 training kit & Process Transmitters Racks with Pressure Transmitters, Temperature Transmitter, Level Transmitter (RADAR, Ultrasonic & Capacitive), Flow Transmitters (Electro-magnetic, Coriolis Mass flow, Ultra- sonic) & Electro-pneumatic Valve Positioner

Certification Courses

1. PCS 7 & Hardware
2. Process Instrumentation basic with PDM
3. PCS 7 with Advanced Process Library (APL)
4. PCS 7 and WinCC SCADA Engineer
5. Integration of Automation station with PI

09   CNC CONTROLLER LAB

CNC Machine and CNC Controllers play key role in the manufacturing industries to deliver quality products and parts in compliance with the customer demand and industry standards.

Key Functionality

SINUMERIK CNC Controllers offer the suitable automation solution for all machine designs - for job shop, contract manufacturing and large series production.

▶ Practical exposure on the industrial CNC Machines and CNC Controller
▶ Design of machining and programming strategies to produce quality products
▶ Formulate standard CNC programming cycles and optimization
▶ Integration of CAM technology

Major Facilities

▶ 808D Turning Kit
▶ 808D Milling Kit
▶ 840DSL Kit
▶ Sinutrain (840DSL)

Certification Courses

1. Turning Programming - Sinumerik 808D
2. Milling Programming - Sinumerik 808D
3. Turning Programming - Sinumerik 840DSL
4. Milling Programming - Sinumerik 840DSL
5. NX CAM

6. NX CAM - Turning Operations
7. NX CAM – Advanced
8. CNC Programmer (MILLING)
9. CNC Programmer (LATHE)
10. CNC Operator (MILLING)

10 TEST & OPTIMIZATION LAB

Computer Aided Engineering is an integral part of mechanical system analysis being extensively used in the analysis and design of complex life systems ranging from simple linear static problem to highly complex non-linear transient dynamic problems. This lab provides multi-physics simulation platform having result-oriented features for achieving desired accuracy specifications and reduce the need for physical prototypes in the design process.

Key Functionality

- Finite Element Analysis (FEA)
- Computational Fluid Dynamics (CFD)
- Thermal Analysis
- Internal Combustion Engine System Simulation
- Model Based Systems Engineering
- Marine Propulsion System Simulation
- Virtual Integrated Aircraft Simulation
- Optimization and Design of Experiments

Major Facilities

Software
- Simcenter 3D, STAR-CCM,Simcenter Amesim , NX Nastran & Test Lab

Hardware
- Simcenter SCADAS XS
- Simcenter SCADAS
- PCB 356A02 Triaxial, accelerometer
- PCB 378B02 1/2" free-field prepol microphone
- TMS ICP LaserTach Kit
- TMS Miniature shaker kit
- PCB 208C02 Multi-purpose, ICP® force sensor.

Certification Courses

1. CFD analysis fundamentals of Simcenter STAR CCM
2. CFD analysis Multiphase flows in Simcenter STAR CCM
3. CFD Analysis Advanced topics in Simcenter STARCCM
4. Simcenter 3D Pre & Post
5. System Modeling using Simcenter
6. Testing Solutions using Simcenter Testlab
7. Simcenter 3D Thermal Multiphysics
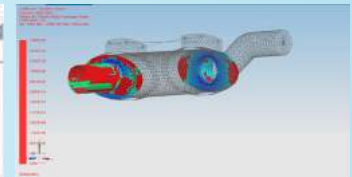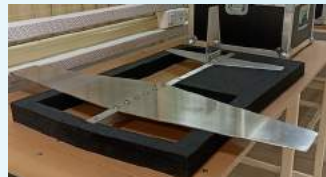
11 AUTOMATION LAB

Industrial controllers have become the integral part of digital manufacturing, automated & interconnected production and providing flexibility to achieve complete factory automation. This lab offers hands-on training on SIMATIC S7 technology/ products and developing industry ready professionals/ solution providers.

Key Functionality

▶ Hands-on Experience learning on Siemens factory automation products
▶ Identifying the components of PLC, develop programmes and enhance the skills on hardware programming and servicing
▶ Interface HMI and SCADA with PLC control system via PROFINET

Major Facilities

▶ S7 1200 PLC, S7 1500 PLC
▶ HMI KTP-700, HMI TP-700
▶ SCADA – Simatic WINCC Professional (PC System)
▶ TIA Portal V16 – Ladder Diagram (Programming Language)
▶ PROFINET- Communication Protocols

Certification Courses

1. PLC (Programmable Logic Controller)
2. SCADA (Supervisory Control and Data Acquisition)
3. HMI (Human Machine Interface)

12 ELECTRICAL AND ENERGY STUDIES LAB

Energy efficient electrical systems have always been the priority for industries across the verticals. The knowledge on high performance equipment's, high standard protective instruments and the best industry practices for energy conservation contribute significantly to facility management and facility engineering. This lab offers the opportunity to make in-depth study of the Industrial equipment's and explore energy efficient strategies that can be deployed in the industries to deliver customized consulting and market specific solutions.

Key Functionality

▶ Hands-on Experience learning on industrial AC-DC drives, industrial switchgear, parameterization, motor maintenance/servicing
▶ Ability to create diagnostic & troubleshooting strategies
▶ System that automatically processes the electrical energy consumption and visualizes it in real time

Major Facilities

▶ DC Drive Training Equipment with SINAMICS DC Master 6RA80
▶ AC Drive Training Equipment with SINAMICS G120
▶ LV-Switchgear Training Equipment setup
▶ SIMOCODE (Intelligent Motor Management System)
▶ PAC Meter-Energy Meters
▶ Energy Saving Training Equipment

Certification Courses

1. Induction motors
2. AC/DC Drives
3. LVSG (Low Voltage Switch Gear) – 1
4. LVSG (Low Voltage Switch Gear) – 2

SINAMIC G-120 TRG KIT

SINAMIC DC TRG KIT

13 SMART FACTORY LAB

The aim is to enhance the efficiency, reduce cost, and improve overall productivity in manufacturing operations. This lab offers an opportunity to get in-depth training on automation of industrial equipment such as CNC machines, various industrial controllers and emerging industrial robots etc for smart manufacturing.

Key Functionality

▶ Hands on Experience with Industrial Machineries.
▶ Communication of different Industrial Equipment integrated on it.
▶ Product Development in Real Time with cutting edge manufacturing technologies.

Major Facilities

▶ CNC Turning Machine (2 Axis)
▶ CNC Milling Machine (3 Axis)
▶ DIR Articulated Robot + RTU (Robot Transfer Unit) – (6+1 Axis)
▶ SCARA Robot (4 Axis) with DRA Studio
▶ Siemens S7-1200,S7-1500 PLC with TIA Portal V17
▶ AGV (Automated Guided Vehicle) with AGV Studio
▶ KTP Basic HMI Device
▶ Manual Tapping
▶ Vision & RFID Inspection Station

Certification Courses

1. Smart Factory Implementation: Technologies & Best Practices.

WHO SHOULD ENROLL?

- Teachers of technical Institutes
- Industry Professionals
- Engineering Graduates (B.E/B.Tech/M.E/M.Tech)
- Diploma and ITI Graduates
- PhD/ Research Scholars
- Research/ Project Associates
- Technology Evangelists & Aspirants

Technology & Execution Partners

Expert Partner
Digital Industries Software

SIEMENS

3D Engineering

National Institute of Technology, Warangal, Telangana

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