HYTECH DIDACTIC

ROBOTICS

Handling Robot

Redefining Precision in Industrial & Educational Automation

www.hytechdidactic.com

Smart Handling for Smarter Learning & Production

The Handling RoboCell is a fully integrated robotic automation system designed for a broad range of industrial applications and educational training setups. Constructed with a sturdy aluminum extrusion frame, it supports key operations such as material handling, assembly, inspection, and sorting. The system features smart, modular components for tasks like tool changing, vision-based part assembly, RFID-based tracking, weight classification, and color sorting. With integrated robotics, vision systems, sensor technologies, and PLC control, the RoboCell offers high flexibility, precision, and real-time responsiveness—ideal for Industry 4.0 environments and modern manufacturing workflows.

Hytech Robotic Training Cell

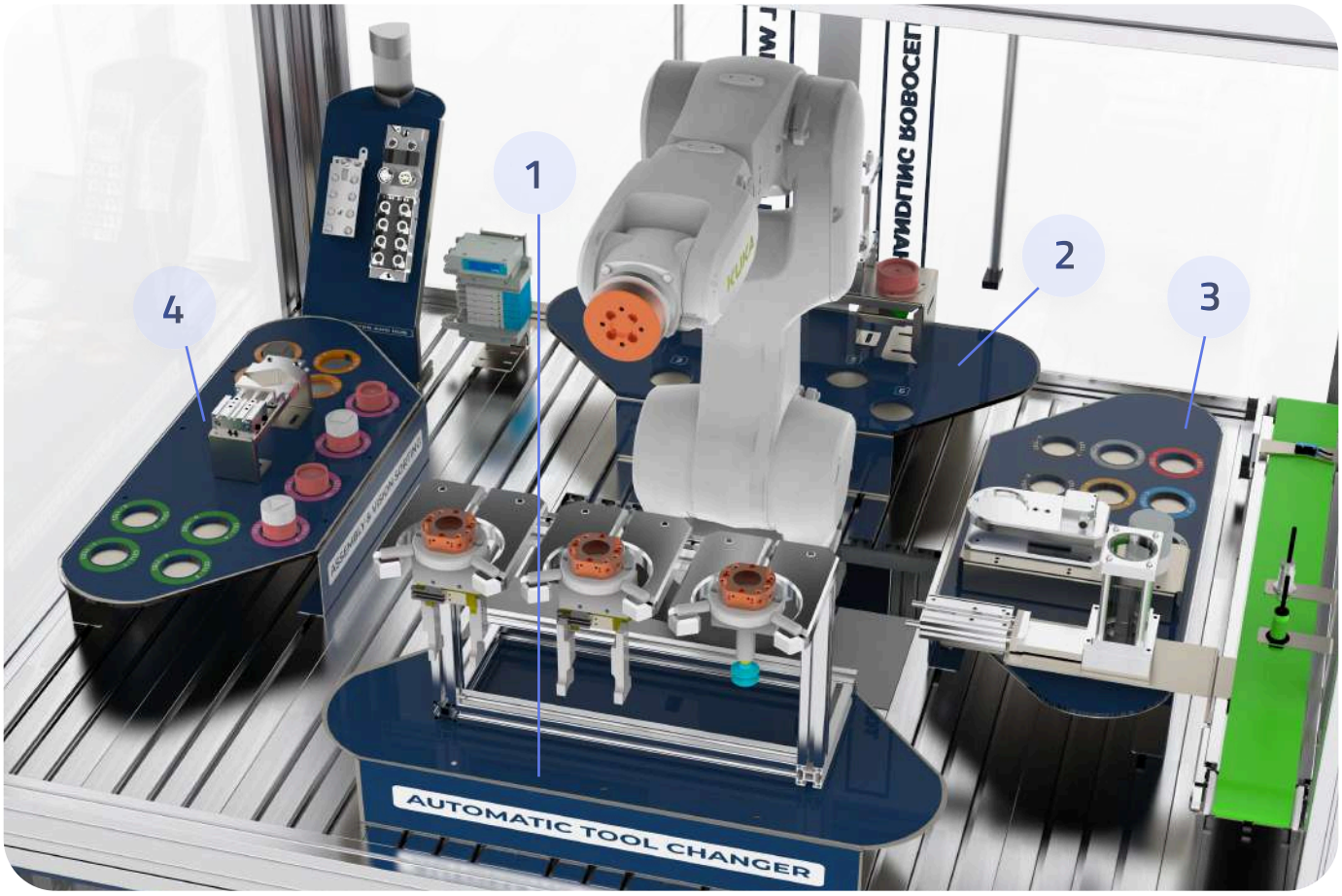
The Hytech Robotic Training Cell is an advanced educational platform designed to deliver hands-on industrial training in robotics and automation.

The Hytech Robotic Training Cell is a comprehensive solution for modern robotics and automation training. Its robust design, seamless integration, and advanced features prepare trainees for real-world challenges in industrial automation and smart manufacturing.

Key Features of the Hytech Robotic Training Cell

1. Seamless Integration
2. Industrial-Grade Components
3. Dynamic Digital Twin Software
4. Offline Programming Tool
5. Robust and Flexible Hardware
6. Centralized Control System
7. Pre-Installed Workstation

Core Components That Drive Performance



1. Robot Tool Changer Table:

Tool changers play a critical role in enhancing the versatility and efficiency of robotic systems across various industries. They allow robots to perform multiple tasks without manual intervention by enabling quick and seamless changes between different tools or end-effectors.

2. RFID Based Sorting Table:

Radio Frequency Identification (RFID) technology is a vital component in modern robotics, enhancing efficiency, automation, and precision in various industrial and commercial applications. RFID systems use electromagnetic fields to identify and track objects, and when integrated with robotics, they bring significant advantages.

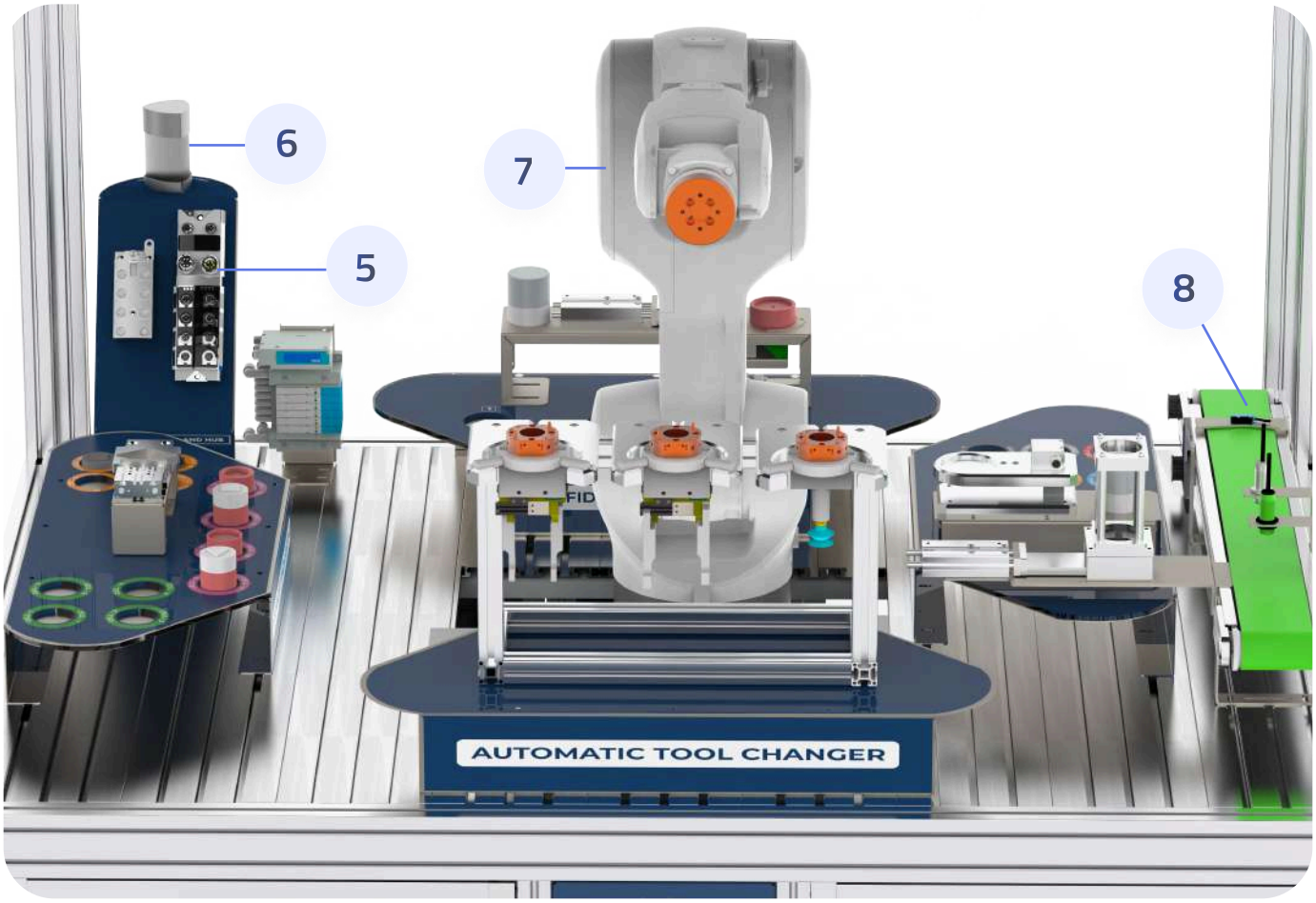
3. Colour Based and Weight based Sorting Table:

Color sensors play a critical role in enhancing the functionality and versatility of robots. By enabling robots to detect and differentiate colors, these sensors expand the scope of applications in industries ranging from manufacturing to healthcare.
Weight sensing, which is achieved through load cell, is a crucial technology in robotics. It enables robots to detect, measure, and respond to weight variations, enhancing their efficiency, safety, and functionality across diverse applications.

4. Vision Sensing Table:

Vision sensing, or robotic vision, enables robots to perceive and interpret visual information from their environment. This capability is realized through Profinet-based industrial vision systems and advanced image processing algorithms, establishing vision sensing as a cornerstone of modern robotics.

Core Components That Drive Performance



5. IO/Link Master:

An I/O-Link Master serves as the interface between a programmable logic controller (PLC) and I/O-Link-enabled devices such as sensors, actuators, and modules. It plays a pivotal role in modern robotics and automation by ensuring efficient communication, seamless integration, and enhanced functionality.

6. Smart Light:

I/O-Link-enabled smart lights serve as advanced signalling devices in robotics and automation systems, providing real-time visual feedback, enhanced communication, and increased operational efficiency. Their integration with robots and PLCs makes them an indispensable tool for monitoring and managing industrial processes.

7. Industrial Robot:

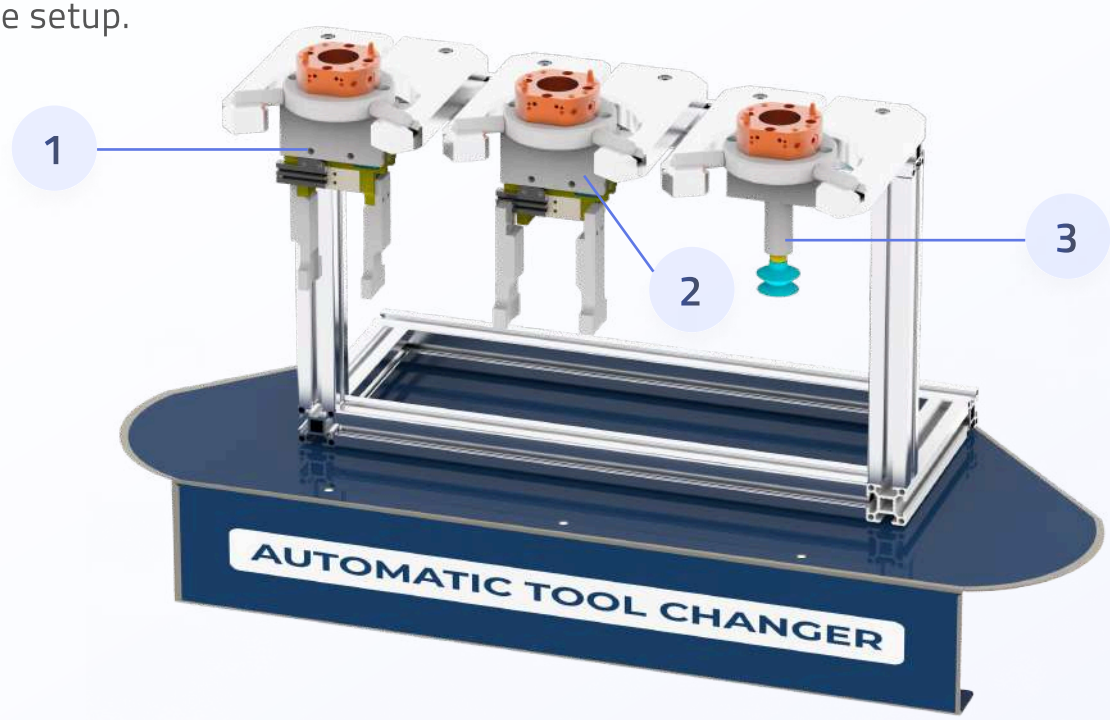
Training on industrial robots that are actively used in the automation industry provides learners with a competitive edge by equipping them with the skills and knowledge required to operate and integrate these systems effectively. This hands-on experience is essential for bridging the gap between academic learning and industry demands, fostering career readiness and innovation

8. Conveyor with Auto Feeder:

A conveyor system equipped with an auto feeder is a critical component in robotics training, simulating real-world industrial automation processes. It provides trainees with practical exposure to material handling, process automation, and system integration, enabling them to develop essential skills for modern manufacturing and logistics environments.

Table 1 – Automatic Tool Changer

Facilitates real-time tool switching to adapt to various handling tasks such as gripping, assembling, or transferring parts—enabling a multi-functional robot in a single setup.



1. Robotic Tool 1	Schunk or Equivalent Electrical Gripper
	Stroke per Jaw: 12mm
	Max Gripping Force: 63N
	Max Opening Force: 85N
	Functionally Integrated with Robot
2. Robotic Tool 2	Schunk or Equivalent Electrical Gripper
	Stroke per Jaw: 12mm
	Max Gripping Force: 63N
	Max Opening Force: 85N
	Functionally Integrated with Robot
3. Robotic Vacuum Gripper	Vacuum Gripper with 50mm Pick up Bellow
	Vacuum Generator

Table 1 features a modular tool station equipped with multiple robotic tools designed for various operations and functions. Based on the required task, the robot autonomously selects the appropriate tool and executes precise pick-and-place operations with high efficiency and flexibility.

Table 2 – Assembly & Vision Sorting

Features a smart vision system to identify object shapes and orientations, enabling precision part assembly and intelligent decision-making based on user-defined requirements.

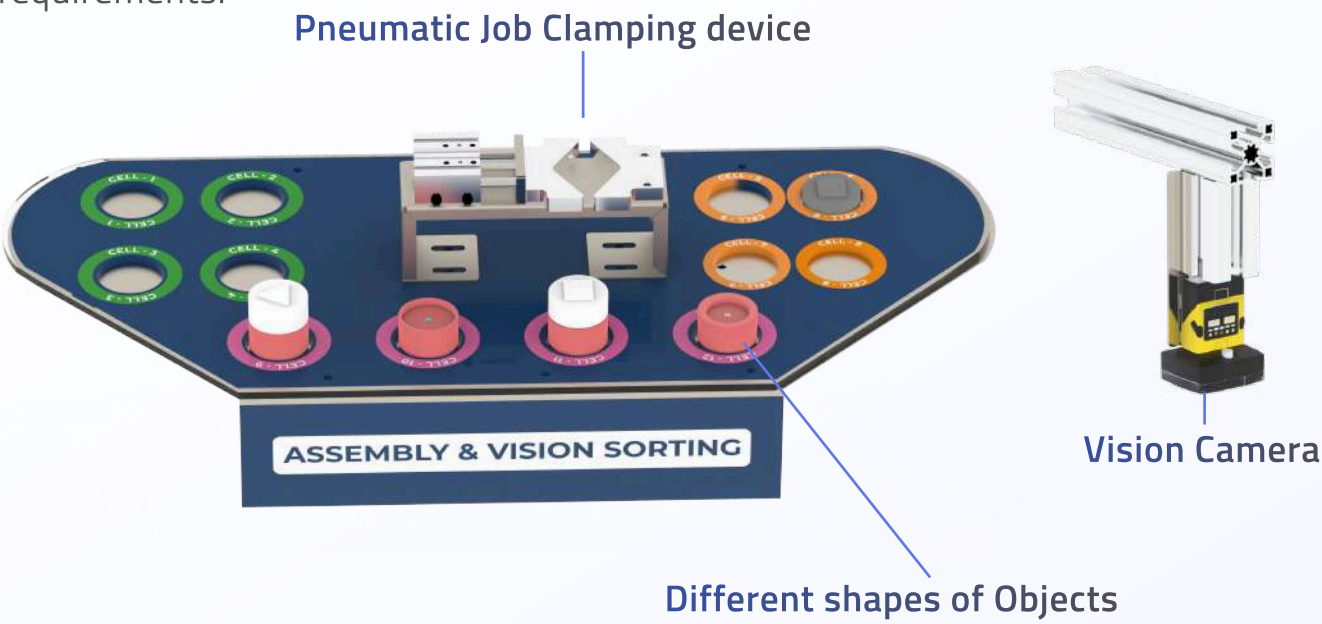


Table 2 - Vision Based Sorting And Assembly	Vision Camers (Cognex) with Profinet Communication
	Pneumatic Guided Cylinder for Workpiece Clamping
	Workpieces in Different shapes (Qty: 06)
	Pallet for workpieces
Guided Cylinder	Guided Cylinders Qty: 01 with minimum stroke of 50mm
	Magnetic Reed Switches (Qty: 02) for guided cylinders

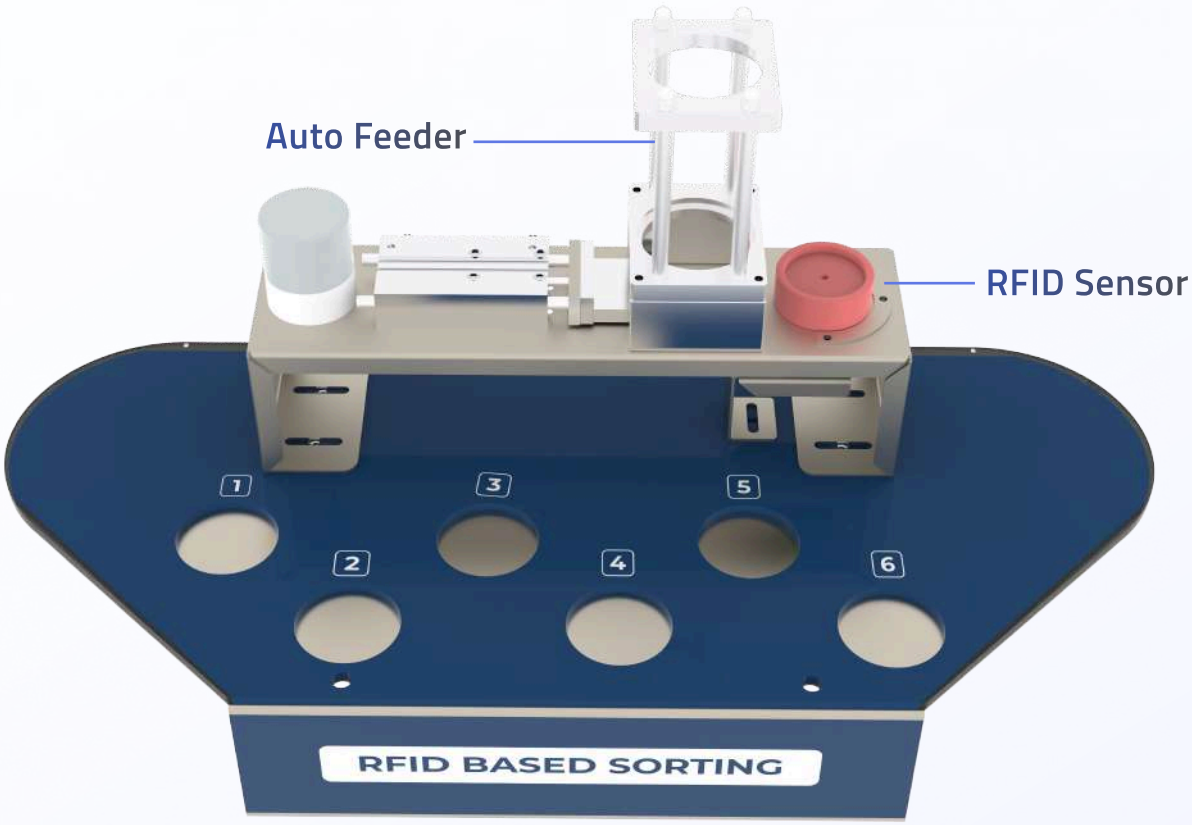
To initiate the vision inspection and assembly process, the robot at Table 1 automatically picking up Tool 1 and retrieving the bottom component (female part) from the storage cell. This part is accurately placed onto a pneumatic vice, which securely holds it in position for precise alignment.

Next, the robot picks up the top component (male part) from the designated cell and places it over the bottom part. The bottom component is embedded with magnets to ensure reliable attachment to the top part, creating a stable assembly.

Once assembled, a vision sensor performs real-time inspection and shape identification based on predefined user requirements. Upon successful verification, the robot picks up the assembled unit and places it in the designated output location, completing the intelligent assembly sequence.

Table 3 – RFID-Based Sorting

Allows the system to write and read data from RFID tags, making it ideal for traceability, and customized sorting applications.

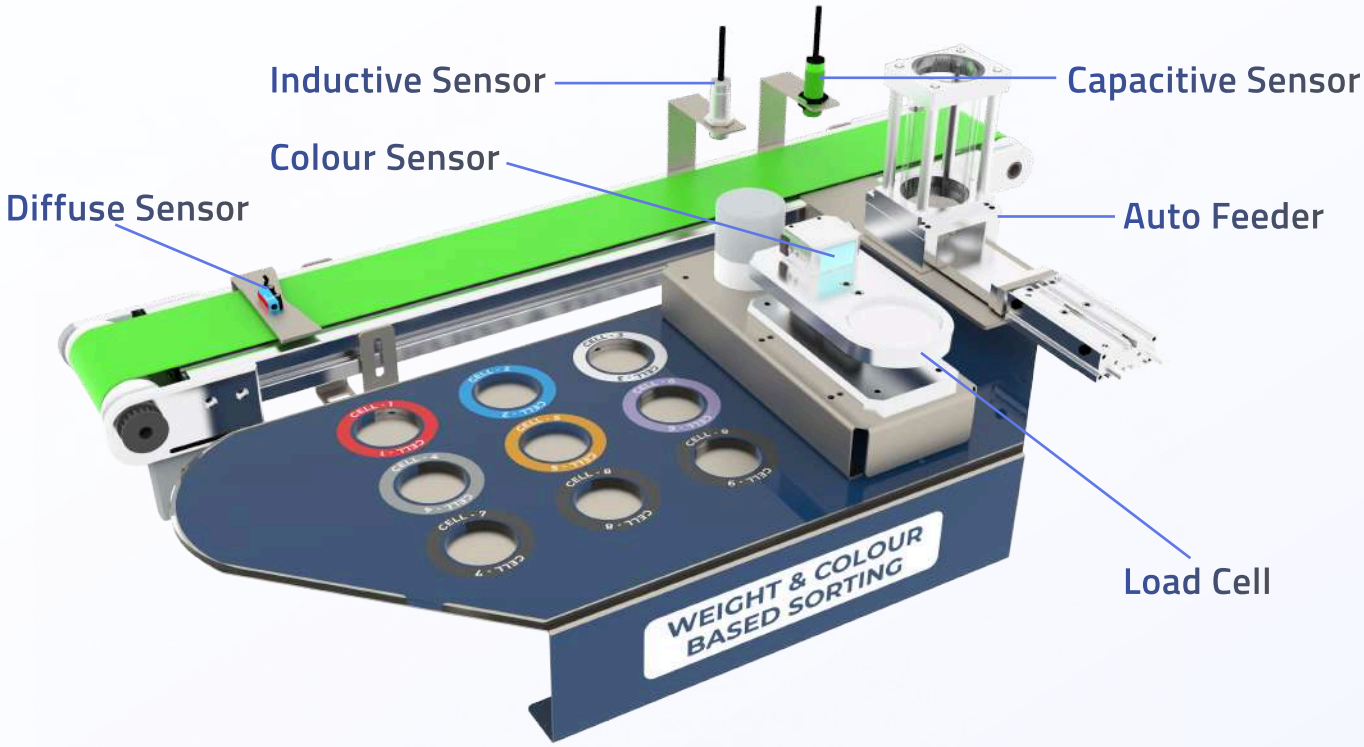


RFID Based Sorting	I/O Link based RFID Reader and Writer
	RFID Tags (8 Qty)
	Workpieces with mounting arrangement for RFID Tags (Qty: 08)
	Pallet for workpieces
Pneumatically Actuated Auto Feeder	Guided Cylinders Qty: 01 with minimum stroke of 50mm
	Magnetic Reed Switches (Qty: 02) for guided cylinders

Table 3 is equipped with RFID technology and fully integrated with a PLC system, enabling seamless read/write operations on RFID tags. This intelligent integration ensures reliable traceability, accurate product identification, and customized sorting based on real-time, programmable logic-driven decisions.

Table 4 – Weight & Color-Based Sorting

Equipped with sensors for weight detection and color identification, this table enables precise material classification and transfer based on dual-parameter logic.



Conveyor With Pneumatically Actuated Auto Feeder	Conveyor with DC Geared Motor and Pneumatically actuated Auto Feeder
	Minimum travel length: 500mm
	Minimum width: 70mm
	Guided Cylinders Qty: 01 with minimum stroke of 75mm
	Magnetic Reed Switches (Qty: 02) for guided cylinders
Load Based Sorting And Colour Based Sorting	I/O Link based Colour sensor
	Load Cell with Analog output and digital set point
	Workpieces in 3 different colours for colour-based sorting (Qty: 06)
	Workpieces in three different weights for load-based sorting (Qty: 06)
	Pallet for workpieces

The Color Sensing Module features a dedicated detection pallet that enables the robot to identify and sort jobs from the conveyor based on color. Integrated with the robotic cell and PLC, the sensor can detect up to three colors—Blue, Black, and Red—each triggering a unique output signal for automated, real-time sorting. This enhances operational efficiency and supports product differentiation.

Technical Specifications:

Structure

Structure made in Aluminium Extrusions

Outer Dimensions of 1700 x 1300 x 1900 (Ht)

4 Castor Wheels with Brakes and anti-vibration mounts

Complete transparent enclosure with 4 doors and door latching switches

Horizontal worksurface made in Aluminium extrusions

Robot / Cobot Pedestal made in Mild Steel with mounting arrangements

Robot Controller arrangement with electrical control panel for Robot Operations. Transparent door with door latching switch for Robot Controller

Robot

KUKA / FANUC / Mitsubishi ROBOT with Teach Pendant

Minimum Payload: 7 KG

Minimum Reach: 700mm

Pneumatic Gripper (Parallel) with minimum 7 KG Payload Capacity and minimum opening of 20mm

Technical Specifications:

Digital Twin Integration	Provision of complete setup in STP format for offline programming
	Complete integration with Siemens Tecnomatix and Visual Components for Offline Robot Programming
Central Control Unit	Separate Structure made in Aluminium Extrusions with top surface of 720mm x 100mm. Top surface made partially in Aluminium extrusions and partially in MDF
	4 Castor Wheels with Brakes and anti-vibration mounts
	Complete Electrical panel with PLC
	Transparent doors on front side with door latching switch
	Aluminium extrusion based mounting arrangement for LED TV, LED Monitor and HMI
	Siemens S7 1200 / Mitsubishi FX 5 PLC
	Siemens MTP 700 HMI / Mitsubishi GT 2110 HMI
	Siemens TIA License (Latest Version - Perpetual)
	IIOT - Siemens Industrial Edge (Optional)
	I/O Link Master with minimum 8 Ports
	I/O Link based Smart Light
	HMI Mounting unit with push buttons for Cycle Start, Cycle Reset, Emergency Stop
	Workstation (Intel i5) with 21-inch monitor preconfigured with the system / High Performance Laptop preconfigured with the system
	Wireless Keyboard and Mouse
Pneumatics	5/2 Way double acting Solenoid valve
	FRL Unit
	Pneumatic Pressure Switch
	Compressor with minimum capacity of 43 Litre

Hytech Robotic Training Cells: Central Control With PLC – HMI And IIOT

1. Centralized Control with PLC and HMI Integration

- The robotic training cells feature a separate Central Control Unit comprising a PLC (Programmable Logic Controller) and HMI (Human-Machine Interface).
- Robots are seamlessly integrated with the PLC and HMI, enabling trainees to operate complete robotic cycles within an industrial automation context.
- This setup provides comprehensive exposure to industrial robotic architecture and hands-on experience with state-of-the-art robotics.

2. Customization and Experimentation

- Users can design and implement various PLC programs and develop custom HMI screens for controlling robot operations.
- Trainees can experiment with diverse industrial automation components, such as:
  - RFID Reader/Writer: For tracking and automation applications.
  - Color Sensors: For detecting and responding to color variations in automated workflows.
- These components are integrated with the robot via the PLC-HMI framework, providing real-world automation scenarios.

3. Industrial IoT (IIoT) Integration

- Siemens Industrial Edge technology is incorporated to offer advanced IIoT capabilities.
- Trainees gain essential skills in data collection, analysis, and remote monitoring —key aspects of modern industrial environments.

4. Industrial IoT (IIoT) Integration

- All required software licenses for PLC, HMI, and Industrial Edge are pre-installed and fully operational.
- The workstation included with the setup ensures a seamless and efficient training experience.

Importance Of PLC – HMI Integration With Robot:

1. Seamless System Control

PLCs manage inputs/outputs, while HMIs provide a user-friendly interface, ensuring smooth communication and integration with equipment like conveyors and sensors.

2. Enhanced Monitoring & Diagnostics

HMIs display real-time PLC data, helping operators monitor performance, identify faults, and take quick corrective actions.

3. Flexibility & Programming

PLC-HMI integration simplifies robot programming and allows quick parameter adjustments through HMI touchscreens.

4. Industrial Relevance

Used widely in automation, PLC-HMI-robot setups prepare trainees for real-world applications like pick-and-place, welding, and packaging.

5. Centralized Control

One HMI can manage multiple PLCs and robots, enabling centralized control of complex systems like inspection or tracking.

6. User-Friendly Interaction

HMIs simplify system use for beginners with GUI-based control, reducing the learning curve.

7. IIoT & Industry 4.0 Integration

Supports real-time analytics, remote monitoring, and prepares trainees for modern tech like predictive maintenance.

8. Safety & Reliability

Safety features like alarms and interlocks are managed through HMI for efficient emergency handling and operator protection.

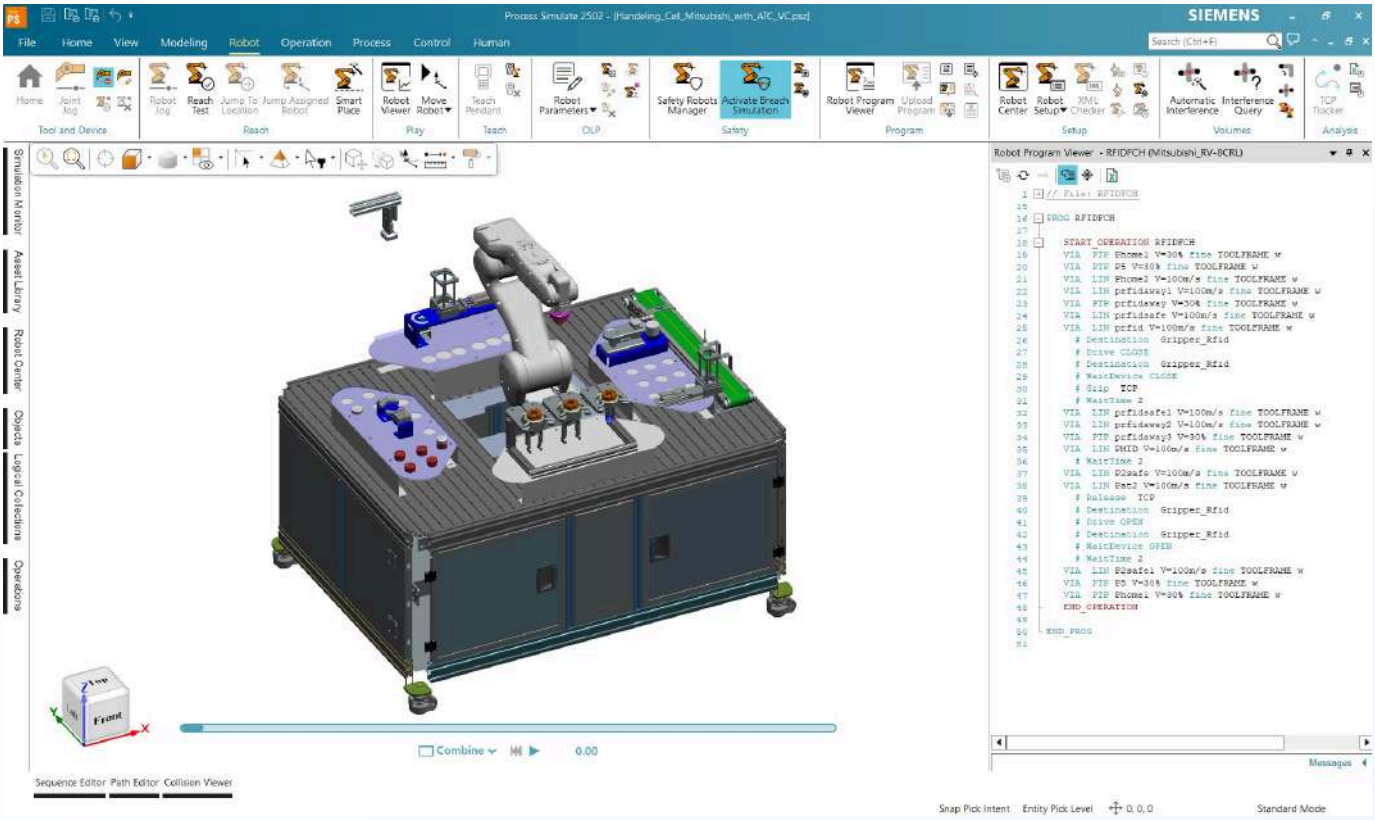
9. Simplified Maintenance

Visual cues from HMIs help schedule preventive maintenance and reduce downtime.

10. Better Problem-Solving

The integration builds diagnostic and troubleshooting skills using live system feedback and logic-based analysis.

Digital Twin Integration In Hytech Robotic Training Cells



Digital Twin technology is a critical innovation in modern robotics training systems, offering a virtual replica of real-world systems to enhance learning and operational efficiency. Hytech robotic training cells leverage this technology to provide a comprehensive, state-of-the-art training experience.

Importance Of Digital Twin Technology

- **Enhanced Learning Experience:**

Digital Twin technology allows trainees to visualize and interact with robotic systems in a virtual environment, bridging the gap between theoretical knowledge and practical application.

- **Risk-Free Experimentation:**

Trainees can design, simulate, and test robotic programs in the digital twin environment without risking damage to physical equipment.

- **Improved Operational Efficiency:**

By simulating and optimizing operations virtually, users can streamline workflows and reduce setup time on actual equipment.

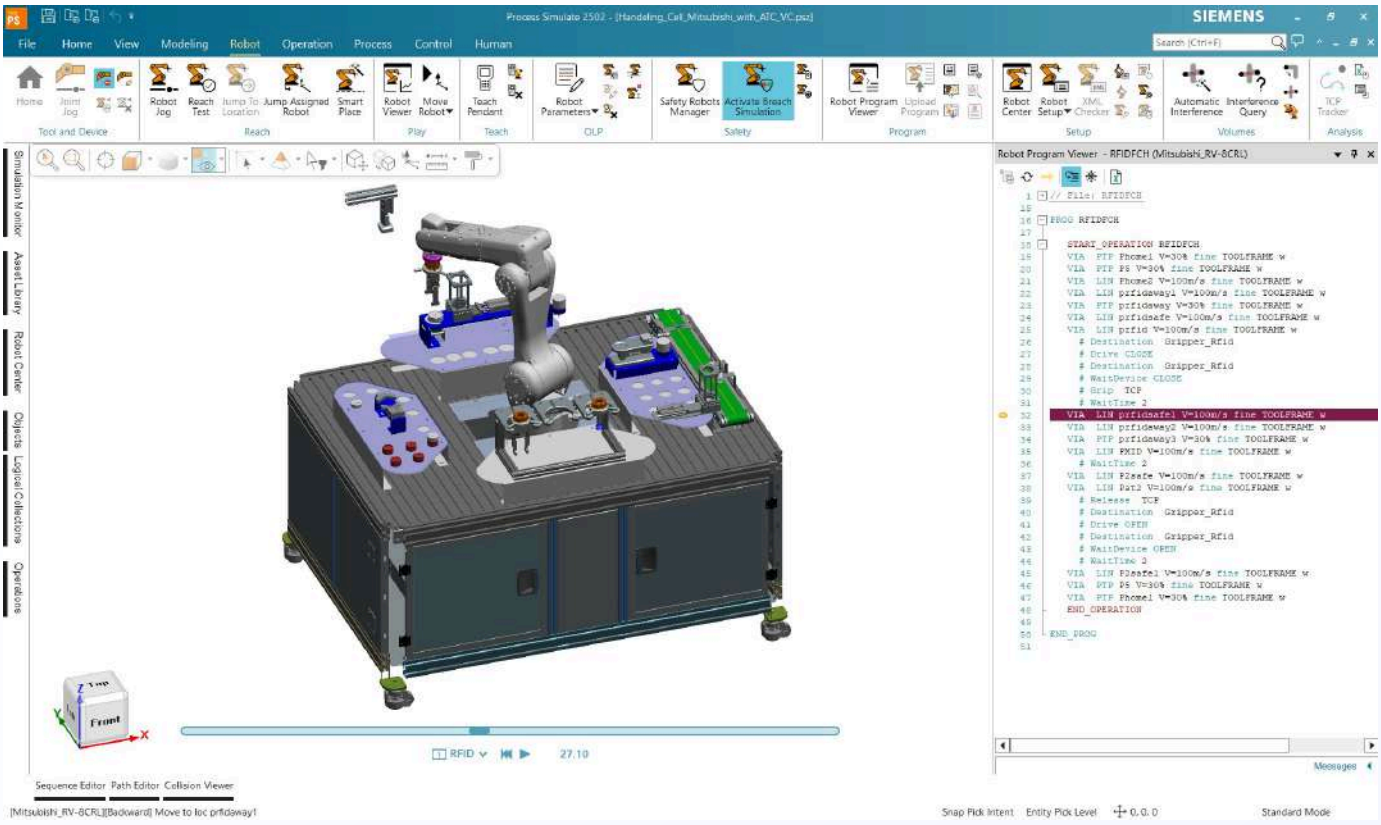
- **Real-Time Performance Analysis:**

Digital Twin enables real-time data analysis, helping trainees understand system performance and make informed decisions.

- **Alignment With Industry 4.0:**

The integration of digital twin technology aligns training methodologies with the latest industrial standards and practices.

Digital Twin Integration In Hytech Robotic Training Cells



Key Features In Hytech Training Cells

1. Seamless Integration With Digital Twin Software

- The training setup is fully compatible with advanced platforms such as Visual Components and Siemens Tecnomatix, offering cutting-edge simulation capabilities.

2. 3D Setup And Comprehensive Resources

- A complete 3D model setup is provided, ensuring trainees have all the tools to replicate real-world environments virtually.
- Software includes tools for creating programs tailored to the specific make and model of the robot.

3. Simulation And Post-Processor Capabilities

- Trainees can simulate their programs in the digital twin software to validate functionality.
- A dedicated post-processor ensures smooth translation of simulated operations into executable programs for the robot.

4. Dynamic Communication And Real-Time Execution

- The system supports real-time, dynamic communication between the digital twin software and the physical robot.
- Programs developed virtually can be directly executed on the robot, allowing seamless transitions from virtual to physical environments.

Key Features of the Advanced Handling Robot System

Hytech's Handling Robot is a complete automation training and deployment platform. Designed for educational labs and Industry 4.0 setups, it combines intelligent sorting, real-time control, and plug-and-play hardware into a compact system — giving learners and engineers hands-on experience in smart manufacturing.

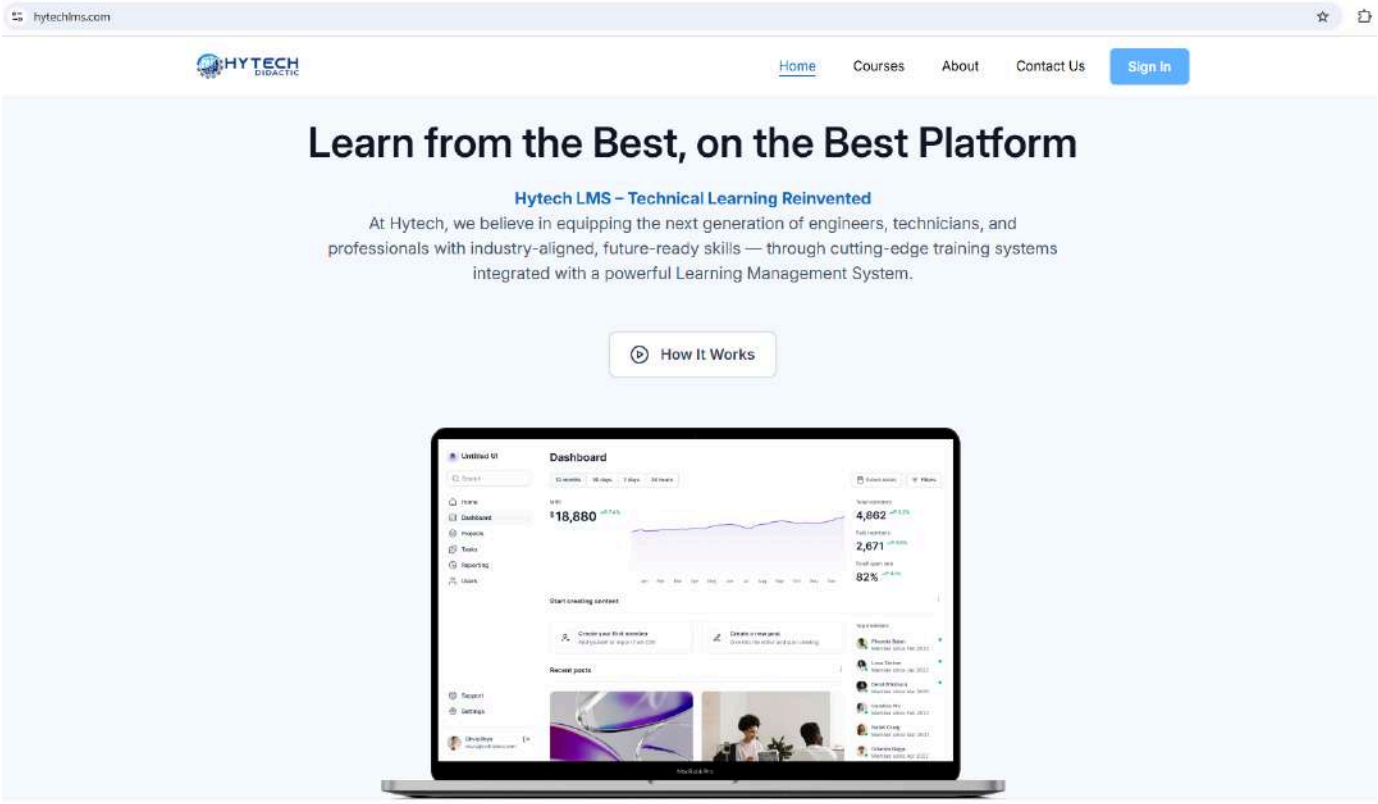
- 6-Axis Industrial Robot with multi-tool handling
- Tool changer station for flexible operations
- PLC (Siemens/Mitsubishi) with remote HMI & IIoT
- Integrated with Digital Twin with offline programming
- Industry 4.0 / IIoT applications
- IO-Link sensor integration for advanced diagnostics
- Color and weight-based sorting modules
- Vision system for shape-based inspection
- RFID-enabled traceability and sorting
- Smart pneumatic fixtures with magnetic locking
- Modular conveyor with auto-load capability
- Visual alerts via lamp
- Durable, compact aluminium frame design

Robotics Technology Training with Hytech Robotics Training Cells (Learning Management System)

Robotics technology is an advanced and continuously evolving field. Training of trainers plays a pivotal role in equipping them to impart effective training to students. Hytech Robotics training cells come equipped with a comprehensive Learning Management System (LMS) designed to enhance the learning experience.

Key Features Of The Hytech LMS:

- **Step-By-Step Guidance:** Trainers receive a structured, step-by-step guide to understand various robotic technologies.
- **Up-To-Date Training Content:** Courses within the LMS are continually upgraded to align with the latest advancements in robotics technology.
- **Customizable Content:** Trainers can create their own training modules, conduct examinations, and issue certifications directly through the LMS.
- **Support For Management:** The LMS is an invaluable tool for addressing trainer attrition and ensuring consistent training and handholding for trainers.



Contact us today for a free demonstration of the Hytech LMS and explore how it can transform robotics training at your institution.

Robocell Handling Courses in the LMS:

3 Days	**Basic Operations of Robot**	**24 Hours**
	Introduction to Robot	8 Hours
	Introduction to Robot Teach Pendant	8 Hours
	Robot Teaching and Programming	8 Hours
3 Days	**Robot and PLC Integration**	**24 Hours**
	Operate Robot from PLC	8 Hours
	Integrate I/O Link sensors with PLC	8 Hours
	I/O Link Sensor Teaching and PLC integrated Operations	8 Hours
1 Day	**Vision Camera Operations**	**8 Hours**
	Teaching and Operation of Vision System	4 Hours
	Robot Operations with Vision Integration	4 Hours
3 Days	**HMI Integration**	**24 Hours**
	Basics of HMI Design	8 Hours
	Robot Operation with HMI Integration	8 Hours
	Digital Twin	8 Hours
3 Days	**Basics of Digital Twin**	**24 Hours**
	Offline Programming from Digital Twin	8 Hours
	Robot Program generation from Digital Twin	8 Hours
	Actual Robot operation from Digital Twin Software	8 Hours
1 Day	**IIOT / Industry 4.0**	**24 Hours**
	Introduction to Industry 4.0	8 Hours
	Dashboard Design	8 Hours
	Integration of various parameters with IIOT Dashboard	4 Hours
	IIOT Based data collection and monitoring	4 Hours

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Thank You!

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