ADVANCED CENTRE OF EXCELLENCE

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April 9, 2025

Proposal for Advanced Centre of Excellence (CoE)

This proposal outlines the establishment of an **Advanced Centre of Excellence focused on Industry 4.0, Automation, Additive & EV Manufacturing** aiming to bridge the gap between academia and industry, fostering innovation and preparing professionals for the evolving job market.

Strategic Collaboration

By leveraging strategic partnerships and cutting-edge technology, the CoE will enhance research capabilities and provide valuable learning experiences for students, ultimately positioning the university as a leader in deep-tech education.

KEY STAKEHOLDERS & RESPONSIBILITIES

01

University

Provides infrastructure, engages faculty, and collaborates on research initiatives with Industry.

02

AMS-India

Offers industry expertise, infrastructure supply and installations, support for projects.

Robotics
Process Automation
AI & Machine Learning
IoT & Sensors
Additive Manufacturing
EV Manufacturing

03

Industry Partners

Contributes funding, provides internships, and engages in live projects.

04

Students & Researchers

Involved in research, contributions and the execution of projects.

CORE COMPONENTS OF COE

Research Focus

Innovate in key areas like human-robot collaboration and autonation.

Infrastructure & Hardware

Focus on advanced robotics and IoT technologies for research.

Software Tools

Utilize leading programming tools for robotics and AI applications.

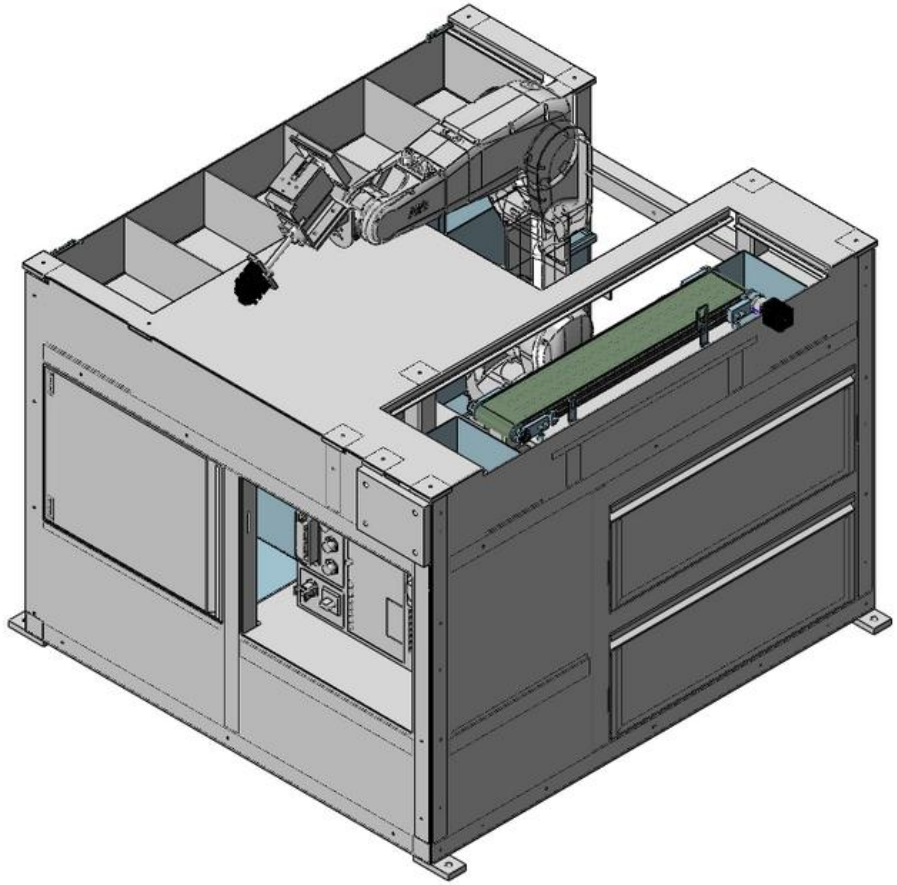
1. INDUSTRY 4.0

Establishment of the Centre of Excellence with Industry-Grade solutions in Automation, Robotics, AIML and Industry 4.0 through Collaborative Effort involving Institution-ABB and AMS-India

AI & ML LEARNING KIT

AMS-India

Empower Minds, Shape Futures: Unleash the Power of AI & ML with Our Revolutionary Educational kit!



AI & ML LEARNING KIT SPECIFICATIONS

Robot	Model: ABB-IRB 1200 | Handling Capacity: 5 Kg Reach: 0.9 m | DOF: 6 | Weight: 54 Kg Power Consumption: 0.45 kW
Vision System	Model: HIK Vision | System Hardware: 1.3 MP Camera Lens: 150 x 120 mm FOV | Light: 140 x 140 mm FOV
Soft Robotic Grippers	Types: Mini (Max Load: 10 gm) | Light (Max Load: 270 gm) Medium (Max Load: 540 gm) | Heavy (Max Load: 600 gm)
Load Station	Dimension: 30 x 25 cm | Payload: 5 Kg
Conveyor	Distance: 600 mm | Speed: 120 mm/sec | Payload: 500 gm Dimension: 700 x 215 x 60 mm | Net weight: 4.2 kg
Segregation Bins & Inspection Bins	Dimension: 296 x 225 x 140 mm | Material: Sheet Metal
AI & ML Software	ABB Robot Studio & Deep Learning Software
Vacuum/Pressure Pump	Model: iPCU2-SMN | Output Pressure: -90 to 300 Kpa Lifetime: 50 Million Times | Working Noise: 50 db Air source: 0.45 - 0.80 MPa, dry, clean | Stable Flow: 200 L/min Size: 208 x 134 x 141 mm
Integrated Cell	Dimension: 1 m x 1 m

AMS-India

Industrial sensor monitoring and Data management

Simple IOT Kits

DIGITAL KIT

- High-precision digital signal processing
- Binary state monitoring
- Rapid data transmission

IDEAL FOR

- Robotic Handling and Quality Control
- Sorting, Packaging, and Safety
- Assembly Line Monitoring and Safety
- Elevator Door Positioning and Safety
- Guided Vehicle Navigation & Object Avoidance

ANALOG KIT

- Continuous signal measurement
- Wide range of input types
- Precise analog value tracking

IDEAL FOR

- Oil Pump Monitoring in Oil & Gas Industry
- HVAC Compressor Protection
- Power Plant Turbine Lubrication Monitoring
- Hydraulic System Monitoring in Marine
- Industrial System Monitoring in Manufacturing

PRODUCTIVITY KIT

- Production line performance tracking
- Efficiency & Downtime measurement
- Shift wise data analysis

IDEAL FOR

- Manufacturing Performance Monitoring
- Tracking Productivity & Identifying Bottlenecks
- Energy Efficiency and Cost Reduction
- Downtime Analysis and Maintenance Planning
- Production Scheduling & Capacity Planning

PLC KIT

- Industrial automation monitoring
- Complex logic interpretation
- Machine control interface

IDEAL FOR

- Multi-Machine Control System
- Batch Mixing System
- Solar Power Plant Monitoring and Control
- Vehicle Cleaning and Drying
- Test Bench Automation

METROLOGY KIT

- Precise measurement tracking
- Quality control integration
- Dimensional analysis support

IDEAL FOR

- Part Quality Control and Inspection
- Automated Part Sorting and Rejection
- Precision in Aerospace & Automotive
- In-Process Measurement for CNC Machining
- Precision in Electronics Manufacturing

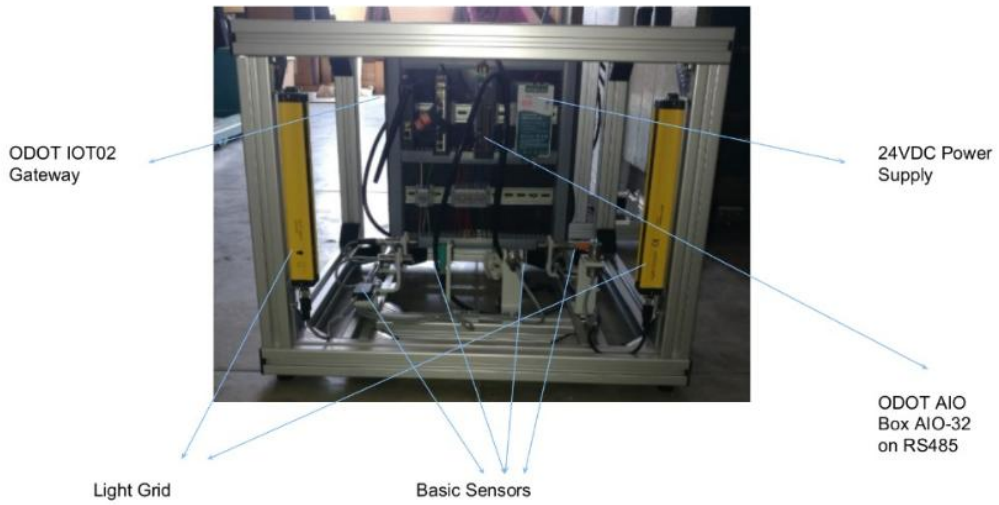
MTCM

Machine tool condition monitoring EDGE module is a cost-effective solution for Condition Monitoring of Machine tools.

MTCM EDGE module consists of 3 Sub Modules

- Energy Monitoring and Analysis Module – EMAM
- Vibration Monitoring Module (Non-IEPC) – VMM
- Temperature Monitoring Module –- TM

DIGITAL KIT



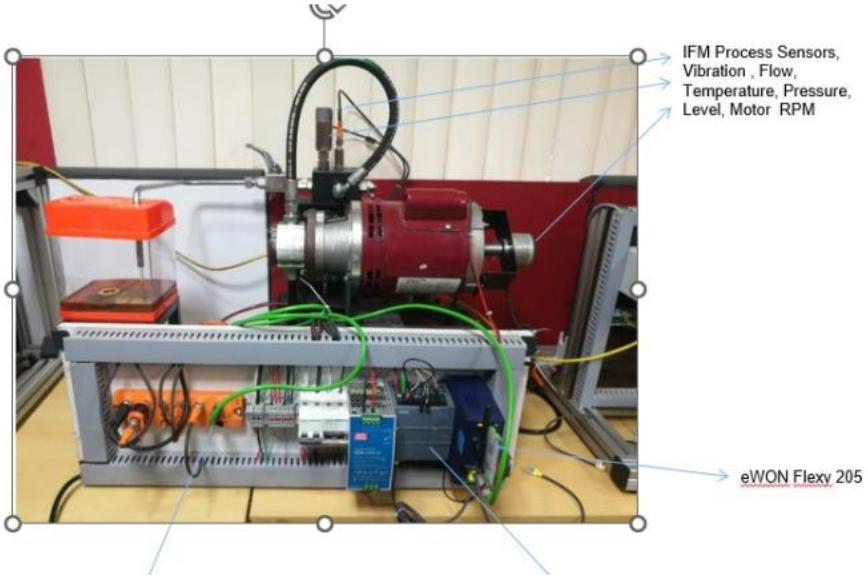
Introduction

Digital Kit is an Ethernet-based integrated sensor and control system. ODOT Control is merged with DI signals from the Inductive Sensor, Thru-Beam Sensor, Retroreflective Sensor, Diffuse Sensor, Background Suppression Sensor, Capacitive Sensor, and Light Curtain Sensor. ODOT Gateway and the Modbus TCP Protocol are both used for data transmission via Ethernet.

Purpose

- Digital Kit are useful for Training and Testing
- Web and mobile-based visualization of sensor data

ANALOG KIT



Introduction

Analog Kit is an Ethernet-based integrated sensor and control system. AIO Controller is merged with DI and AI signals from the Vibration Sensor, Level Sensor and Temperature Sensor . Ewon Flex Gateway and the Modbus TCP Protocol are both used for data transmission via Ethernet.

Purpose

- Analog Kit are useful for Training and Testing
- Web and mobile-based visualization of sensor data

PLC KIT

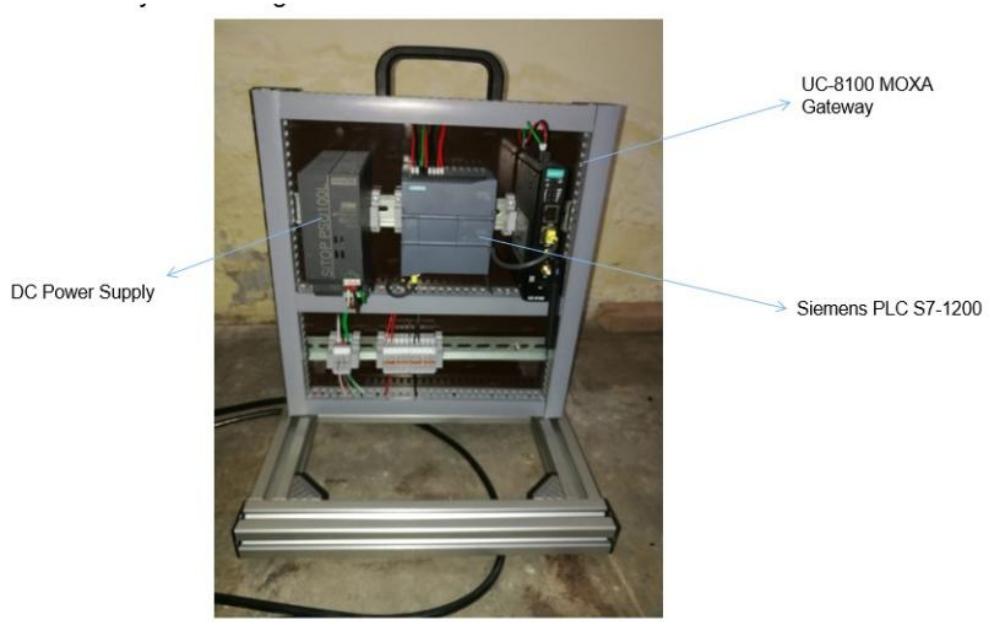
Introduction

PLC Kit is an Ethernet-based integrated sensor and control system. Simens Delta, Allen Bradley PLC Controller is merged with DI and AI signals from the Push Button, Indicators . OPCUA Gateway and the Modbus TCP Protocol are both used for data transmission via Ethernet.

Purpose

- PLC Kit are useful for Training and Testing
- Web and mobile-based visualization of sensor data

PRODUCTIVITY KIT



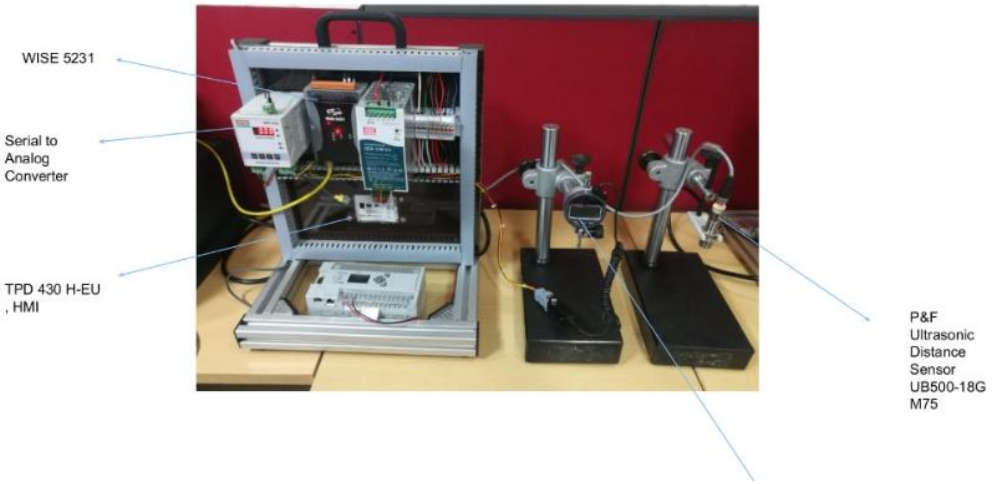
Introduction

Productivity Kit is an Ethernet-based integrated sensor and control system. Simens PLC Controller is merged with DI and DO signals from the Pushbutton and Indicators. Moxa Gateway and the Modbus TCP Protocol are both used for data transmission via Ethernet.

Purpose

- Productivity Kit are useful for Training and Testing
- Web and mobile-based visualization of sensor data

METROLOGY KIT



Introduction

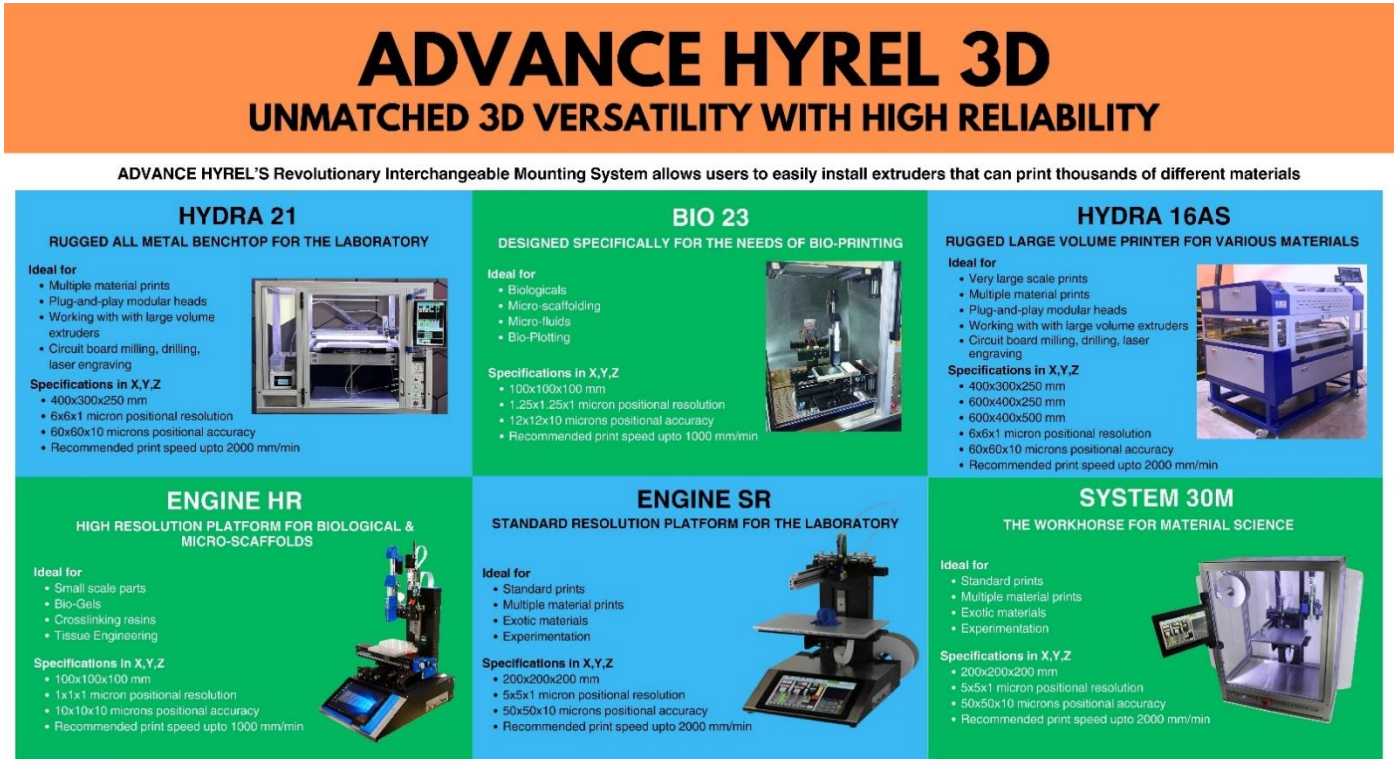
Metrology Kit is an Ethernet-based integrated sensor and control system. ICP Das Control is merged with DI and AI signals from the Pushbutton, Ultrasonic Sensor and Dial Indicator. ICP DAS Gateway and the Modbus TCP Protocol are both used for data transmission via Ethernet.

Purpose

- Metrology Kit are useful for Training and Testing
- Web and mobile-based visualization of sensor data

2. ADDITIVE MANUFACTURING

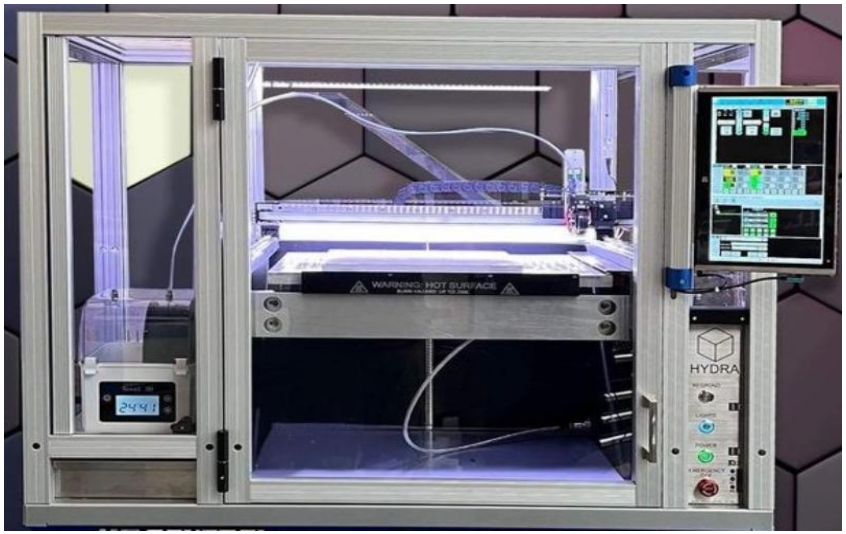
Enabling industry-relevance consultancy, advanced AM research and enabling new product development by Faculty and Students



SCOPE OF SUPPLY

Advance Hydra 21 with Extruders for Industrial Plastics	One Unit
ABB IRB 1090 with Bulk Feeder for Ceramic Printing	One Unit
Furnace with Extruders for Metal Printing	One Unit

ADVANCE HYREL 21: RUGGED ALL METAL BENCHTOP FOR THE LABORATORY



Ideal for:

- **Multiple material prints**
- **Plug-and-play modular heads**
- **Working with with large volume extruders**
- **Circuit board milling, drilling, laser engraving**

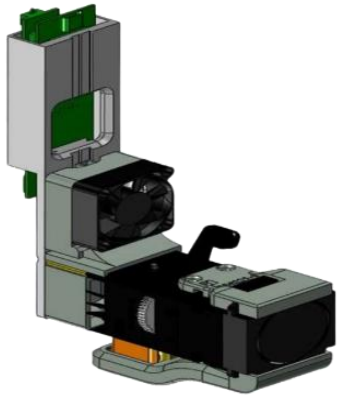
Specifications in X,Y,Z:

- **400x300x250 mm**
- **6x6x1 micron positional resolution**
- **60x60x10 microns positional accuracy**
- **Recommended print speed upto 2000 mm/min**

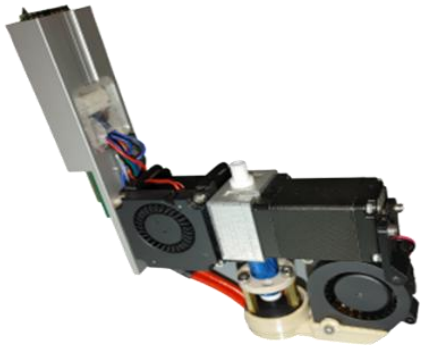
ADVANCE HYDRA 21 - MATERIALS THAT CAN BE PRINTED		
Industrial Plastics	**Flexible Plastics**	**High Temperature Plastics**
Using XHT-250 Extruder	Using MK2-250 Extruder	Using XHT-450 Extruder
ABS	BendLay, Flex 45	PC
PLA	MoldLay	PEEK
Nylon, HIPS	EcoFlex PLA,	Ultem
PET	PlastInk_Rubber	
PP	T-Glase	
Laybrick, T-Glase	Ninjaflex	

PLASTICS: EXTRUDERS & ACCESSORIES

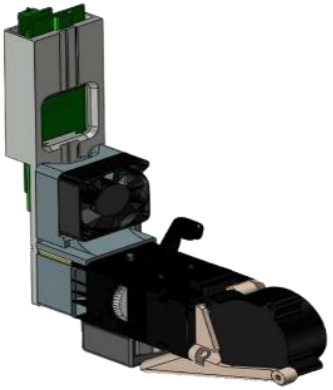
XHT-250



MK2-250



XHT-450



USB Microscope

LA5-808

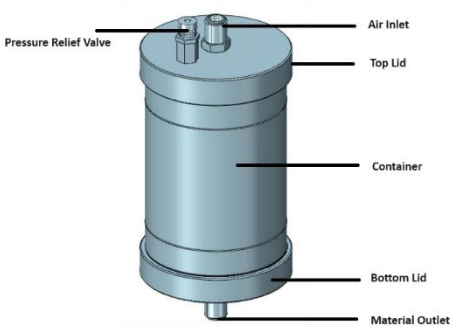
ABB IRB 1090 ROBOT WITH BULK FEEDER

Key Features

- **High Capacity**: With a 1-litre capacity, the bulk feeder reduces downtime and increases productivity
- **Pneumatic Operation**: Utilizes pneumatic force to ensure a smooth and controlled material feed, enhancing the precision and quality of prints
- **Versatile Compatibility**: Supports a wide range of customized materials like bio gels, hydro gels, clay paste, ceramic paste and other special pastes
- **Easy Installation and Use**: Designed for straightforward setup and operation, allowing users to integrate it seamlessly with their existing 3D printing setups
- **Durable Construction**: Made from high-quality materials to withstand the rigors of continuous use, ensuring long-term reliability and performance

CERAMIC/METAL PRINTING ACCESSORIES

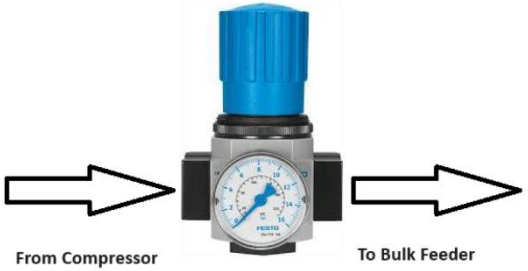
Bulk Feeder



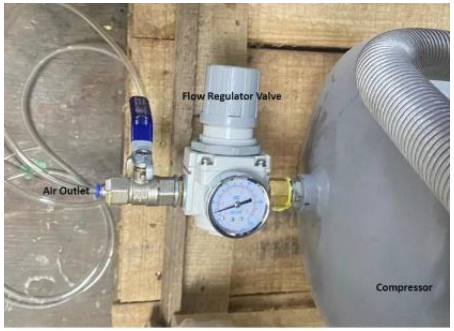
Compressor

Pneumatic Actuator

Pressure Regulator



Air Supply Valve



Filament Heater

High Temperature Box Furnace

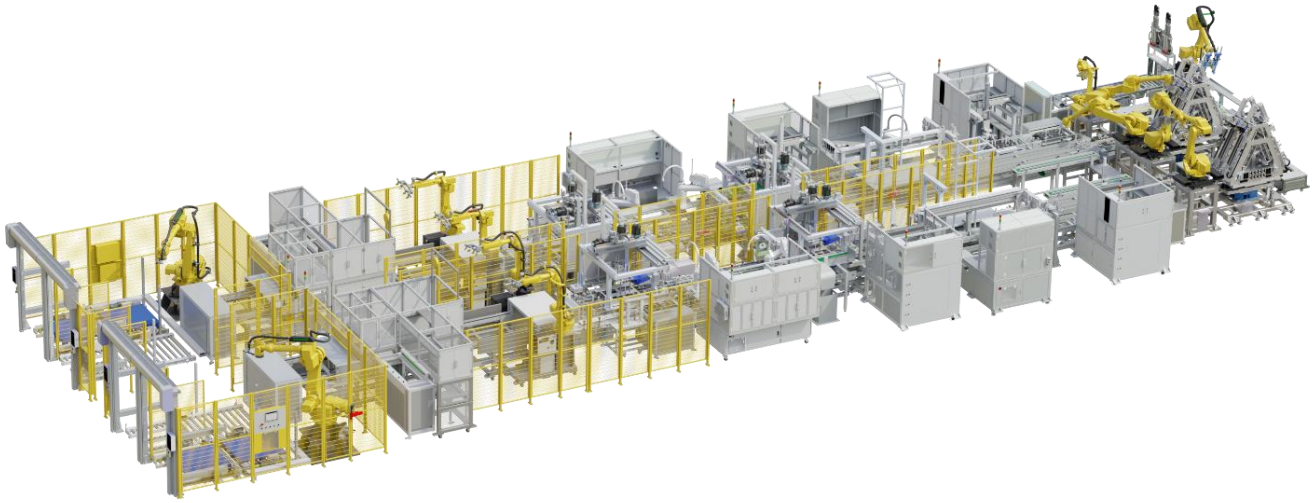
3. ELECTRIC VEHICLE

Centre of Excellence will have three laboratories viz.

a) Electric Vehicle Lab,

b) Engineering Simulation lab and

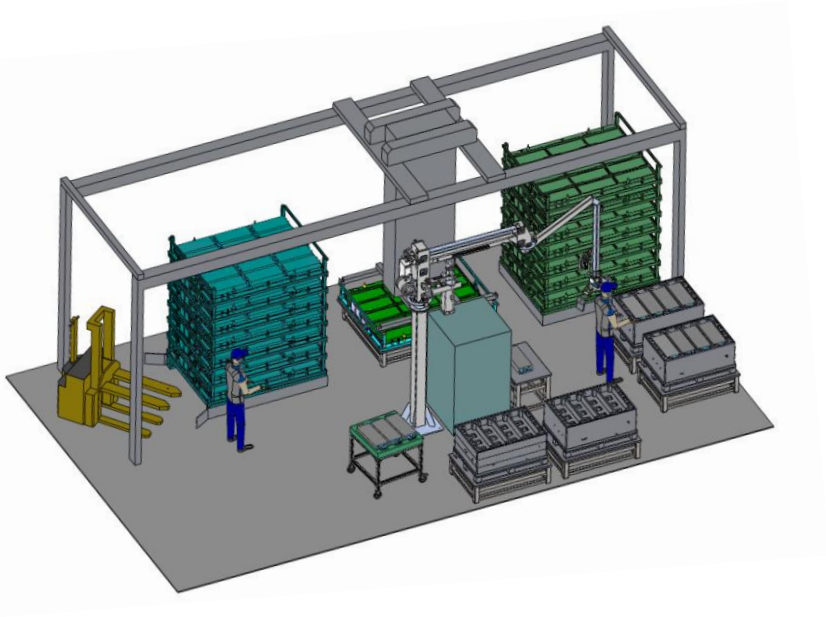
c) Training Materials for EV lab



ELECTRIC VEHICLE LAB

1. Battery Charge and Discharge Test System
2. Data Acquisition and Logging system
3. Environment Test Chamber for battery testing
4. Thermocouple/ RTD for Temperature Measurement
5. Battery Tester for Internal Resistance Testing
6. Electric Vehicle BLDC Motor Training System
7. BLDC (Brushless) Inner Rotor brushless DC motor coupled with DC shunt motor to study the load characteristics and study of drive parameters
8. Battery Characteristics Training System
9. PMDC Motor Training System
10. Power and Transmission System Study Models for EV Application
11. PMSM Motor Coupled with DC Generator Test Bench Setup
12. Switched Reluctance Motor Coupled with Eddy Current Dynamometer Test Bench Setup
13. PWM Charge Controller Training System:
14. Sectioned Electric Vehicle Two-Wheeler Chassis
15. Sectioned Electric Vehicle Four-Wheeler Chassis
16. Battery Resistance Spot Welding Machine
17. DC /AC Clamp Meter
18. Non-contact type Tacho meter
19. Two Wheeler Chassis Dynamometer to simulate road resistance for EV in Single Charge
20. Wind Tunnel for scaled automotive model testing

ENGINEERING SIMULATION LAB



1. Computing Workstations/ PC for EV Design and Simulation
2. Multi-Body Dynamics analysis Research Software Bundle for EV
3. Power train/ Gearbox Design Research Software Package
4. 1D+3D Thermal Modelling, BMS Modeling, Electric Motor Modeling Research Software
5. Multi-physics CAE Research Software with Battery Modeling and Analysis

AMS-India is working with many top-class Institutions in Robotics, Automation & Additive Manufacturing

Faculty & students from these institutions have received patents and published several papers in high impact journals and SCI publications

Thank You

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