Center of Excellence In Computer Aided Product Development & Automation

15. Centre of Excellence Lab

The Centre of Excellence Lab, sponsored by industry partners, is a state-of-the-art facility designed to bridge the gap between academia and industry. Equipped with 41 high-performance ACER desktop computers and advanced software like Solidworks 3D, CFD, AutoCAD, and MATLAB, it offers students real-world tools for design and simulation. The lab features cutting-edge equipment, including CNC Milling machines, 3D printers, pneumatic kits, and an ARISTO 6-axis robotic arm. With industry-grade resources such as NI's data acquisition systems and PLC microcontrollers, this lab fosters innovation, hands-on learning, and prepares students for the challenges of modern engineering.

Equipment

16. Desktops for CAD & CAD CAE Lab

The Centre of Excellence lab is splitted into three sections namely
  a. CAD Section
  b. CAD / CAE Section
  c. Automation, CAM & 3D Printing Section

The CAD & CAD / CAE sections are equipped with a total 41 Hi-Tech desktops.

The Automation, CAM & 3D Printing sections consist of Pneumatic Kit, CNC Milling machine and 3D Printer.

Desktop Specifications:
- **Make**: ACER
- **Model**: VERITON M-200 H610
- **Operating System**: Windows 11 Home 64 Bit
- **Processor**: Intel Core i5-12400, 12th Generation (2.50 GHz)
- **RAM**: 16GB (2X8GB) DDR4
- **Storage**: 512 GB SSD
- **Monitor**: Acer 21.5" LED Monitor
- **Mouse**: Acer USB Optical Mouse
- **Keyboard**: Acer USB
- **Quantity**: 40 Nos.

17. CNC Machine

The Pimento CNC Mill is designed for precision machining of materials such as HSS, HCS, and titanium alloys, making it ideal for various applications in manufacturing and prototyping. Its advanced Mach 3 controller and robust specifications ensure high accuracy and efficient operation.

Make: Control Technics
Model No.: Pimento CNC Mill
Controller:

- Standalone Controller: Mach 3, PC Based

Specifications:

- Rapid Speed: 1000 mm/min
- Max. Spindle Speed: 8000 rpm
- Spindle Power: 2.2 kW
- Max. Tool Size: BT 30 (Dia - 25 mm)
- Accuracy: 0.01 mm
- Working Area: 400 x 300 x 250 mm

|	
	● Weight of the Machine: 750 kg ● Machinability: HSS, HCS & Ti alloy

18. NATIONAL INSTRUMENTS (NI) DATA ACQUISITION & VIRTUAL INSTRUMENTATION HARDWARE & LABVIEW SOFTWARE
	This system integrates hardware and software solutions for data acquisition and virtual instrumentation. The setup includes a compact chassis, various data acquisition modules for different measurements, and advanced sensors for vibration, sound, and force analysis. LabVIEW software is used for virtual instrumentation, supporting measurement and analysis tasks.
	
	Specifications:
	Hardware:
	
	● **CDAQ-9174 Compact Chassis**
	● 04 Slot-USB for Data Acquisition Modules
	
	Data Acquisition Modules:
	
	● Temperature, Current, Voltage, Strain, Vibration, Fluid, Load, Universal
	
	Sensors:
	
	● **Vibration Sensors**:
	  ○ Accelerometer
	  ○ Frequency Range: 5 to 10 kHz
	● **Impact Hammer**:
	  ○ Maximum Force: 1000 N
	  ○ Frequency Range: 5 kHz
	● **Sound Sensors**:
	  ○ GRAS Array Microphone
	  ○ Frequency Range: 10 Hz - 20 kHz
	  ○ Dynamic Range: 32 dBA - 135 dB
	
	Software:
	
	● NI LabVIEW for Virtual Instrumentation & Vibration Measurement & Analysis
	● 05 Users - NI LABVIEW Academic Site License

19. 3D Printer

The Flashforge Dreamer 3D Printer (Model: Ender-3 S1) is a versatile and efficient printer with dual extruders, designed for detailed 3D printing. It offers a build volume suited for a variety of projects and supports multiple file types and connectivity options.

Specifications:

- **Make**: FLASHFORGE DREAMER
- **Model No.**: ENDER-3 S1
- **Build Volume**: 230L x 150W x 140H mm
- **Layer Resolution**: 100 – 150 microns
- **Filament Diameter**: 1.75 mm (0.069 inch)
- **Nozzle Diameter**: 0.4 mm (0.015 inch)
- **Software & Firmware**: FLASHPOINT
- **File Types Supported**: STL, OBJ
- **Operating System**: Windows 7, Mac OS X
- **Connectivity**: Wi-Fi, USB, SD Card
- **Extruder Quantity**: Two
- **Product Dimensions**: 467 x 381 x 320 mm
- **Gross Weight**: 17 kg
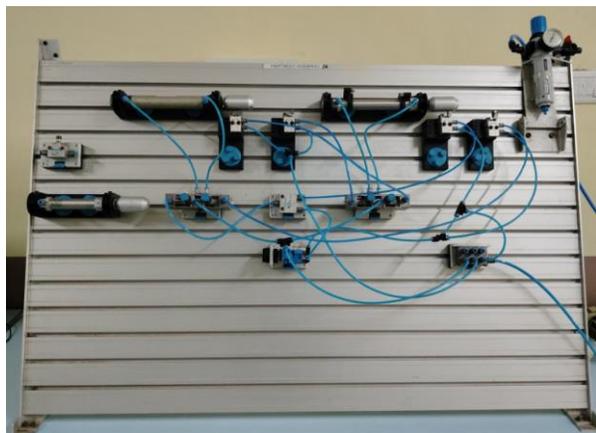
20. PNEUMATIC , ELECTRO-PNEUMATIC KIT

This experimental set up is used to design pneumatic, electro-pneumatic systems using sensors.

- Make: FESTO
- Working Medium: Compressed air
- Working pressure: 6 bar
- Maximum Working Pressure: 8-10 bar

21. ARISTO 6 Axis Robotic Arm	This Robotic arm is used for development of program for pick and place operation. ● Number of Axis: 6 ● Payload Capacity: 2.5 kg ● Weight: Approx. 35 kg ● Motors: DC Servo Motors ● Power supply: 230 V AC, 50/60 Hz, 15A

List of Experiments

Finite Element Analysis Lab

● Any two problems using bar element
● Any two problems using truss element
● Any two problems using CST element
● Any two problems using axisymmetric element
● Any one problem of free vibration analysis using bar
● Any one problem on steady state heat conduction
● Any one problem for analysis of beams

CNC & 3D Printing Lab

● Write & verify part programming & part fabrication on CNC turning trainer for step turning, facing, taper turning & threading operations
● Write & verify part programming & part fabrication on CNC milling trainer for contouring, drilling, facing & pocketing operations
● Tool-path generation by translation of part geometry from computer aided design (CAD) to computer aided manufacturing (CAM) systems
● Post processing of code generated via CAM system
● Development of physical 3D mechanical structure using any one of the rapid prototyping processes

- Segmentation in Slicer's Segment Editor module for the purpose of 3D printing (3D Slicer open source) (Application: Any Bone part as per available Dicom files)
- Creation of 3D model from 2D images using any image processing software and printing it. (3D Slicer open source) (Application: Any body organ like Heart, Gallbladder etc. as per available Dicom files)
- Case Study: Usability of rapid tooling integrated investment casting process, with their advantages and limitations in any one of emerging areas of dentistry, jewelry, surgical implants, turbine blades, etc.