DEPARTMENT OF MECHANICAL ENGINEERING

CAD/CAM LAB

Lab Introduction: The objective is to develop of designs of various mechanical components using both 2D and 3D software, and manufacture the required part. The lab is available to graduate the students in the fields of Computer Aided Designing and Computer Aided Manufacturing. At Under graduation level aid is given for the students to model the complete part. The basic knowledge can be used for successful accomplishment of project works. At post graduation level, the students can make use of advanced modules in the design software for their research work.

For the designed part student generates NC program with different CAM software packages, simulates the program for validation and manufactures parts with CNC machines. The CNC machines available in the laboratory can be utilized for advanced manufacturing research.

CEO & COs:
The objective of CAD/CAM Lab is to design, assemble and manufacture engineering components using computer aided tools.

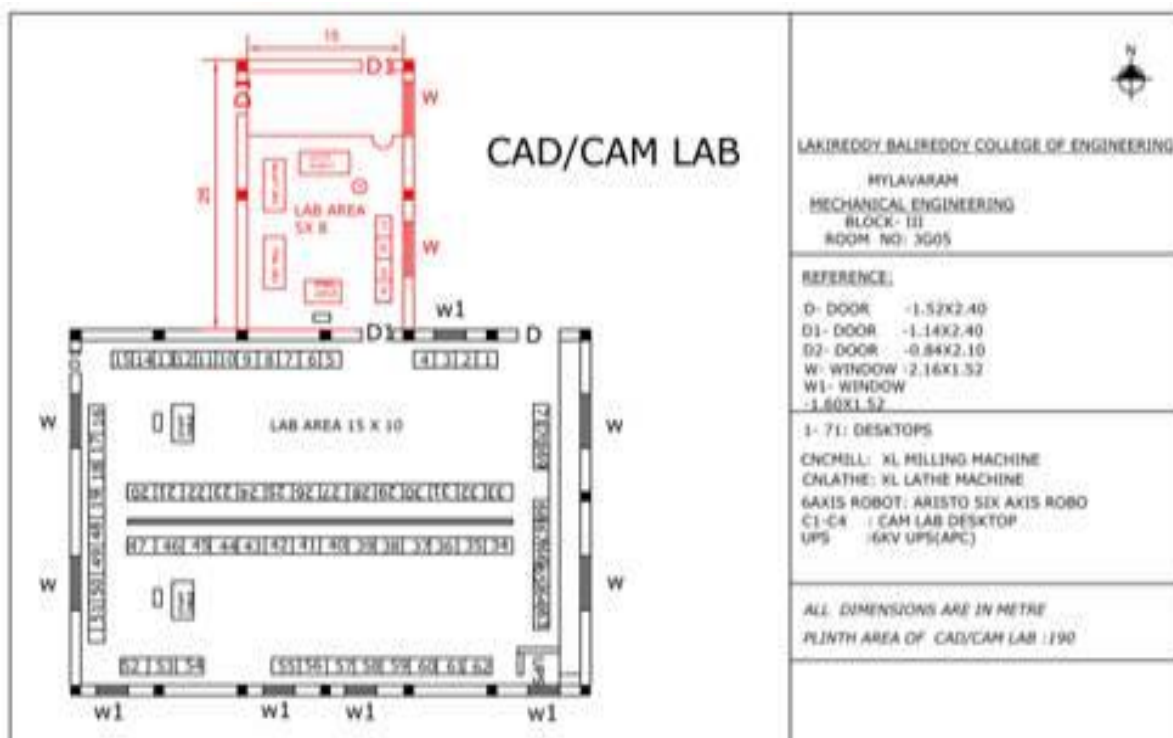After the completion of the course, students should be able to
CO 1: Design and assemble of the parts using geometric modelling.
CO 2: Perform kinematic and interference analysis.
CO3: Apply FEA principles in designing of components.
CO4: Develop NC code for different part profiles and perform machining on CNC Machines.

Lab Layout:

Equipment details in CAD/ CAM Laboratory:

S.No	Name of the equipment	Date of purchase	No. of Available	Total cost in Rs
1	CNC Lathe machine (Modal XL Turn) Accessorise for CNC Lathe Machine	22-01-2003	01	6,20,000/-
2	CNC Milling Machine (Model Xl mill) Accessorise for Model Xl mill	22-01-2003	01	7,20,000/-
3	LENOVO DESKTOP Intel (R) Core i3-4150 CPU @3.50GHz,RAM: 4GB, 500 GB Hard Disk MONITOR LENOVO 18.5" LED	25-3-2015	30	8,59,500/-
4	Intel Core- I3, 2GB Ram, HP202	18-02-2014	45-1 = 44	13,09,500/-
5	ESPIRIT Cam Software (05 users)	22-02-2003	05	1,75,000/-
6	Auto Desk Inventor Series	28-07-2003	4 Users (Expired)	1,87,000/-
7	CATIA (V5R9,5users) Software	28-07-2003	5 Users (Expired)	2,14,000/-
8	ANSYS advanced Multi physics Version 8.0	04-12-03	05 users	3,75,000/-
9	CADIAN MECHANICAL (V2004,15 Users Bundle) Software	07-03-2005	15 Users	1,50,000/-
10	IRON CAD (V7,250 Users Bundle) Software	08-03-2005	250 Users	1,00,000/-
11	Vacuum Cleaner	23-08-2004	01	6,390/-
12	Printer HP Leser jet	3-10-2005	01	9,086/-
13	6 Axis Articulated Robot (Aristo Model)	19-04-2013	01	6,01,688/-
14	Writing Board	8-12-2010	01	4,200/-
15	LCD Projector Ceiling Mount	02-12-2010	01	1450/-
16	ANSYS Academic Teaching industry version of 12.1	17-12-2010	05 users	2,10,000/-
17	24 port Switches	28-12-2010	05	16,585/-
18	Dell Core 2 Duo Proc, 2GB RAM, 320GB HDD	14-09-2010	02	49,000/-
19	Dell Core 2 Duo Proc, 2GB RAM, 320GB HDD	14-09-2010	03	73,500/-
20	CatiaV5 Academic R24 Discover Package	11-03-2015	10 Users	2,73,435/-
21	ANSYS18.1	31-12-2016	110 Users	7,20,000/-
22	Flash Forge Guider II (3D PRINTER)	03-03-2021	01	1,58,710/-
23	DDR 3 DESKTOP RAM 4GB	20-03-2021	120	2,31,000/-

24	6KVA UPS SYSTEM WITH STAND	19-08-2021	1	1,53,890.90/-
25	Mother Board with CPU Fan (Zebronics)	08-10-2021	20	90,000/-
			Total Amount	70,98,934.90

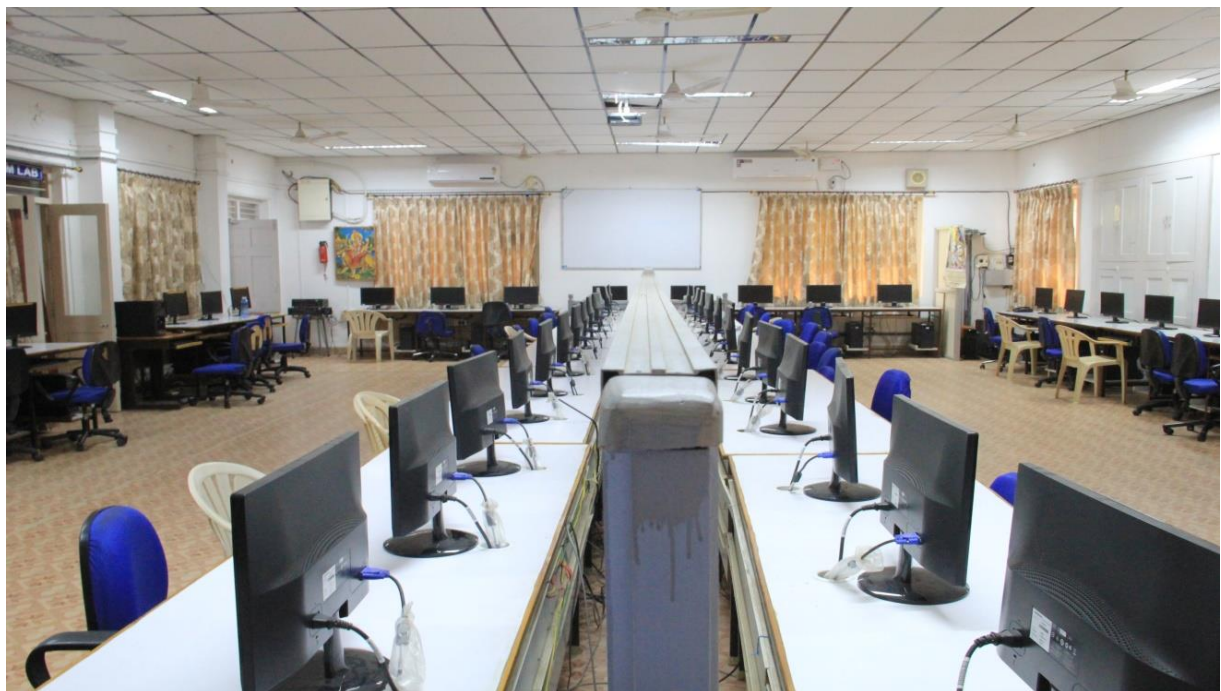**CAD/CAM LAB:**

Fig.1 CAD/CAM LAB

Fig.2 CAD/CAM LAB overview

CAD/CAM Labboratory is embeded with Computer-aided design(CAD), computer-aided manufacturing (CAM), and computer-aided engineering (CAE) software. These technologies used for design and development of various stages in product cycle.

Fig.3 XL TURN CNC MACHINE

Specifications XL TURN:

SPECIFICATIONS	UNITS	XLTURN
Chuck Size	mm	100
Maximum turning diameter	mm	32
Maximum turning length	mm	120
Bed		Slant bed 45deg
No. of axis		2
Swing over bed	mm	150
Swing over crosslide	mm	50
Distance between centers from Spindle face	mm	210
Positioning of axis	mm	0.015
Repeatability of axis	mm	20.008
Spindle nose taper	type	Az3/ MT3
Hole through spindle	mm	20
Spindle speed range	rpm	150-3000
Spindle motor		4.2 amps 3000 rpm
Spindle motor capacity	HP	1
Number of stations	nos	8
Tool cross section	mm	12x12
Boring bar size	mm	16
X- axis Travel	mm	80
Z- axis travel	mm	180
Ball screw (X - axis)	dia& pitch	12mm & 2.5mm
Ball screw (Z - axis)	dia& pitch	16mm &Smm
Rapid rate X / Z	m/min	1.2m/min
Feed rate	mm/min	0-1000

Axis Motor (X and Z axis)		Stepper motors
Axis Motor Torque	Ncm	80
Slides		Hardened & ground with turcite B
Tailstock base stroke	mm	150
Quill stroke	mm	40
Quill diameter	mm	26
Tailstock taper		MT2
Control		PC Based 2 Axis continuous path
Main supply		230V, Single Phase, 50 Hz
L x W x H (w/o work bench)	mm	880 x 575 x 615
Weight (w/o work bench)	kg	150
Lubrication		Centralised Lubrication System

Fig.4 XL MILL CNC MACHINE

Fig. 5 MTABARISTO ROBOT with 6AXIS

SPECIFICATIONS	UNITS	XL MILL
Travels		
X axis	mm	225
Y axis	mm	150
Z axis	mm	115
Distance between table top and spindle nose	mm	70 - 185
Table		
Table size	mm	360 x 132
Spindle		
Spindle motor capacity	HP	0.5
Programmable spindle speed	rpm	150 - 4000
Spindle nose taper	-	BT 30
Accuracy		
Positioning accuracy	mm	0.010
Repeatability	mm	±0.005
Feed rate		
Rapid traverse X x Y x Z axis	m/min	1.2
Programmable Feed Rate X x Y x Z axis	mm/min	0 - 1200
ATC unit		
Tool storage capacity	Pcs	6
Max tool length	mm	40
Max tool dia	mm	16
Slides		
Slides		Hardened ground guide ways
Ball Screws X , Y and Z axis	Dia & Pitch	16mm & 5mm
CNC		
Control system		PC based 3 Axis continuous path
Lubrication		
Lubrication system		Centralised Lubrication System
Power source		
Main supply		230V, Single Phase, 50 Hz
Machine dimensions		
Height x Length x Depth (W/o work bench)	mm	1000 x 575 x 650
Machine weight (w/o work bench)	kg	170
Training Material		
Manuals: Construction Manual, Programming Manual, Operation Manual, Maintenance Manual		
Work Book: Teachers Workbook, Students Work Book		
Simulation software: CNC Train Simulation Software		
Optional Accessories		
CAM software, Offline programming software, Auto door, Hydro Pneumatic Vice, Work bench, 3 Axis Loading & Unloading arm, 6 Station ATC, Stabilizer, Air Compressor.		
Features		
Compatible / Upgradable		FMS & CIM System

Performance Features:	Metric		SAE Units	
Payload	kg	2.5	lbs	5.5
TipSpeed	m/sec	0.2	ft/sec	0.67
Repeatability	mm	+/ -0.3	in	0.01
Resolution	degrees	0.1	degrees	0.1
Mechanical:				
Configuration		VerticalArticulatedFive-barlinkage		VerticalArticulatedFive-barlinkage
No.ofAxes		6(3 axes waist-shoulder-elbowmanipulatorwith3 axes Roll-Pitch-Rollsphericalwrist)		6(3 axes waist-shoulder-elbow manipulator with 3axesRoll-Pitch-Rollsphericalwrist)
HorizontalReach	mm	170-640	in	6.8-25.6
VerticalReach	mm	420	in	16.8
Link1	mm	300	in	11.8
Link2	mm	400	in	15.75
JointActuators		DCServogearedmotors		DCServogearedmotors
Transmission		Joint1:SpurgearTrain		Joint1:SpurgearTrain
		Joint2&3:Ballscrew		Joint2&3:Ballscrew
		Joint4,5&6:BeltDrive		Joint4,5&6:BeltDrive
GravityCompensation		100%(Non-backdrivableballscrew)		100%(Non-backdrivableballscrew)
PositionFeedback		OpticalEncoder(HP2phase 500ppr)		OpticalEncoder(HP2phase500ppr)
Gripper		Pneumatic (20deg angularopening= approx. 40mm).OPTION:VacuumGripper		Pneumatic (20deg angularopening= approx. 40mm).OPTION:VacuumGripper
Waist	degrees	340	degrees	340
Shoulder	degrees	45	degrees	45
Elbow	degrees	60*dependentonAxis2	degrees	60*dependentonAxis2

Laboratory Utilization:

S. No	Laboratory Name	Branch(s)
1	Computer Programming Lab	B.Tech I Semester (Mechanical Engg.)
2	CAEG LAB	B.Tech II Semester (Mechanical Engg.)
3	CAEG LAB	B.Tech II Semester (ASE)
4	CAMD Lab	B.Tech IV Semester (Mechanical Engg.)
5	CAD/CAM Lab	B.Tech VII Semester (Mechanical Engg.)
6	ACMA LAB	B.Tech VII Semester (ASE)
7	ADP LAB	B.Tech VII Semester (ASE)

Lab In-charge:

Faculty in-charge: A. Nageswara Rao

Sr.Technician: P.Guna Sunadara Reddy

Lab Assistant: Ch. Sankar Rao