The CAD/CAM Centre of PSG College of Technology has the state-of-art hardware, software and human resources with extensive teaching and industrial expertise. Various consultancy services in the area of design and analysis of engineering components, design of patterns and core boxes, plastic molds and dies are carried out at the center. Using CAD/CAM software tools the centre delivers solutions for the most complex and demanding projects, with a broad range of cost effective design solutions. Hands-on-training course is offered to students and practicing engineers in software, so as to make them proficient.

Courses offered

- CAM simulation, CNC programming and Hands-on training in 3-axis VMC
- Diploma in CAD/CAM/CAE (CREO)
- Diploma in CAD/CAM/CAE (CATIA)
- Short Term Course on CREO
- Short Term Course on CATIA
- Design and Drafting using NX
- Short Term Course on CAM Simulation (Master CAM)
- Reverse Engineering using MicroScribe and Rhinoceros
- Hands-on Training in Coordinate Measuring Machine (CMM) and Dimensional Metrology
- Analysis using HyperMesh and RADIOSS
- Finite Element Analysis using ANSYS

For Queries:

Dr. M. R. Pratheesh Kumar,
Assistant Professor (S.G)
Mr. V. Babuji,
Project Engineer
CAD/CAM Centre
Y-Block (3rd Floor)
PSG College of Technology
Coimbatore – 641004.

0422 – 4344147, Extn.: 4507 & 4471

PSG Centre for Non-formal and Continuing Education
A Block (A103)
PSG College of Technology
Coimbatore – 641 004.

0422 – 4344136 & 4344147
cnce@mail.psgtech.ac.in
Hands-on training

- Machine specification and familiarization with different parts of CNC VMC LV45
- Machine control panel options FANUC oi-MD
- Operating modes in CNC – Jog, MDI, Auto etc.,
- Work and Tool set up in CNC VMC
- Parameters in Tool offset page
- Wear offset register
- Programming incorporating cutter radius compensation
- Programming incorporating Sub-program
- Canned cycles program
- Executing CAM program in VMC

Facilities

The participants will be given hands-on practice in 3-axis CNC Vertical Machining centre with FANUC controller.

CAM Software – NX / MasterCam / Creo

OTHER COURSES CONDUCTED

(Full Time and Part Time)

- Diploma in CAD/CAM/CAE (CREO)
- Diploma in CAD/CAM/CAE (CATIA)
- Short Term Course on CREO
- Short Term Course on CATIA
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- Short Term Course on CAM Simulation (Master CAM)
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- Finite Element Analysis using ANSYS

CAM Simulation, CNC Programming and Hands-on Training in 3-Axis VMC

This course is designed for the students of Engineering and Polytechnic Colleges, manufacturing engineers and CNC machine operators.

Each participant will be given individual system for practical sessions in CAM.

Faculty members well experienced in teaching and consultancy will handle the lectures and practical sessions.

After completing this course student can use the software efficiently for product design and development.

Duration | 144 hrs/ level | Full Time | 9.00am to 4.30pm | Part Time | 4.30pm to 7.30pm
---|---|---|---|---|---

CAM Simulation, CNC Programming and Hands-on Training in 3-Axis VMC
### COURSE CONTENT

#### CAD Basics
- Introduction to CAD
- Parametric modeling
- Introduction to Pro-Engineer/Creo
- Create a basic model
- Sketching, Dimensioning and Constraints
- Extrude and Revolve
- Sweep and Blend
- Datum features
  - Plane
  - Axis
  - Point
- Fillet and Chamfer
- Editing the model
- Hole
- Draft
- Copying methods
  - Mirror
  - Move
  - Rotate
  - Transform
- Patterns
  - Dimension
  - Axis
  - Fill
  - Direction
- Rib and Pipe
- Shell and X-Section
- Reorder and Reroute
- Cosmetic features and layers
- Exporting the file formats

#### CAM Simulation
- Introduction to Pro/Manufacturing
- Design-model and work piece
- Manufacturing model
- Import part model
- Creation work piece
  - Automatic
  - New Work piece
- Operation setup
- Machine tool setup
  - Milling
  - Turning
- Machine zero using Csys
- Retract definition
- Design of fixtures
- Work coordinate system
- Tool selection
- Manufacturing parameters
- Cut parameters
- Manufacturing geometry
- Types of NC sequences
  - Volume milling
  - Profile milling
  - Pocketing
  - Surface milling
  - Face milling
  - Local milling
  - Pencil tracing
  - Hole making
  - Threading
- Pro/NC Check using VERICUT
- NC code generation
- CL data concept
- NC post processing
- Output NC program data

#### CNC Programming
- Introduction to CNC machines
- ISO classification of work material groups
- ISO Tool codification
- Tool materials and coatings
- Axis nomenclature for milling machines
- Machine datum & work datum
- Co-ordinate systems
- Basics of Programming for machining center
- Fanuc Programming structure
- Concept of cutter radius compensation
- Concept of Sub-program
- Fanuc Programming cycles- drilling and tapping
- Rigid tapping
- Factors affecting selection of milling tools
- Tool catalogue usage
- Basics of tool holders
- Calculation of power requirements
ANALYSIS USING ANSYS /HYPER WORKS (50 Hours)

- Introduction to FEA
- Importance of FEA
- Introduction to ANSYS
- Various types of analysis
- Pre Processing
  - Elements and nodes
  - Real constants
  - Modeling and boolean operations
  - Meshing and quality checking
- Solution
  - Load definitions
  - Displacement & DOF
  - Types of loads
  - Solving
- Post Processing
  - Plot results
  - Animation of results
  - Report generation

ADVANCED CNC PROGRAMMING AND OPERATIONS (130 Hours)

- Introduction to CNC machines
- Constructional features of CNC machine
- Types of programming and codes
- Types of datum
- Manual part programming
- Canned cycles
- Control systems
- Tools, cutters and inserts
- Hands-on training in 3-Axis VMC
- Maintenance of CNC machines
- Introduction to rapid prototyping
- Introduction to reverse engineering

<table>
<thead>
<tr>
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- Each participant is given individual system for practical sessions
- Expert faculty members, well experienced in the areas of teaching and consultancy works, will handle the lectures and practical sessions
- After completing this course student can use the software efficiently for product design and development

OTHER COURSES CONDUCTED

- CAM simulation, CNC programming and Hands-on training in 3-axis VMC
- Diploma in CAD/CAM/CAE (CATIA)
- Short Term Course on CREO
- Short Term Course on CATIA
- Design and Drafting using NX
- Short Term Course on CAM Simulation (Master CAM)
- Reverse Engineering using MicroScribe and Rhinoceros
- Hands-on Training in Coordinate Measuring Machine (CMM) and Dimensional Metrology
- Analysis using HyperMesh and RADIOSS
- Finite Element Analysis using ANSYS

Diploma in CAD/CAM/CAE Using CREO

CAD/CAM Centre
PSG COLLEGE OF TECHNOLOGY
Coimbatore-641004

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PSG College of Technology
Coimbatore – 641004
Phone: 0422 – 4344136, 4344147
Extn: 4471,4507
E-Mail: cnce@mail.psgtech.ac.in
**COURSE CONTENT**

**BASIC MODELING (LEVEL-I)**
- Introduction to CAD
- Parametric modeling
- Introduction to Pro-Engineer/Creo
- Create a basic model
- Sketching, Dimensioning and Constraints
- Extrude and Revolve
- Sweep and Blend
- Datum features
  - Plane
  - Axis
  - Point
- Fillet and chamfer
- Editing the model
- Hole
- Draft
  - Copying methods
    - Mirror
    - Move
    - Rotate
    - Transform
- Patterns
  - Dimension
  - Axis
  - Fill
  - Direction
- Rib and Pipe
- Shell and X-section
- Reorder and Reroute
- Cosmetic features and Layers
- Exporting file formats
- Projects

**ADVANCE MODELING AND SURFACE DESIGN (LEVEL-II)**
- Introduction to surface modeling
- Customization of user interface
- Datum curves and Csys
- Variable section sweep
- Swept blend
- Helical sweep
- Section to surface
- Surface to surface
- Tweak features
  - Offset
  - Fill
  - Thicken
  - Project and Wrap
- Toroidal blend
- Spinal blend
- Family table creation
- Mirror and Move
- Trimming and Extending surfaces
- Reverse engineering surface model
- Thicken and Solidify
- Introduction to Pro-Sheet metal
- Projects

**ASSEMBLY AND DRAFTING (LEVEL-III)**
- Top Down/bottom up assembly
- Mating condition
  - Mate & mate offset
  - Align & align offset
  - Insert & orient
  - Tangent and other constraints
- Layers in assemblies
- Sub assembly concepts

**MANUFACTURING AND NC SIMULATION (LEVEL-IV):**
- Exploded views
- Patterns
- X-Section of an assembly
- Creating a drawing
- Adding views and projections
- Sectioning
  - Partial
  - Broken
  - Full section
  - Detailed view
- Assembly drawings
- Table creation
- Text and symbols
- Bill of materials
- BOM balloons creations
- Format set up
- Dimensioning
- Redefining views
- Drawing output
- Projects
- Introduction to Pro/manufacturing
- Design-model and work piece
- Manufacturing model
- Design of fixtures
- Tool definitions
- Manufacturing parameters
- Cut Parameters
- Manufacturing geometry
- Types of NC sequences
- Pro/NC check using VERICUT
- NC Code generation
- CL Data concept
- NC Post processing
- Output NC program data
Introduction to FEA
Importance of FEA
Introduction to ANSYS
Various types of analysis
Pre processing
  • Elements and Nodes
  • Real constants
  • Modeling & Boolean operations
  • Meshing and quality checking
Solution
  • Load definitions
  • Displacement & DOF
  • Types of loads
  • Solving
Post processing
  • Plot results
  • Animation of results
  • Report generation

ADVANCED CNC PROGRAMMING AND OPERATIONS (130 Hours)

Introduction to CNC machines
Construcational features of CNC machine
Types of programming and codes
Types of datum
Manual part programming
Canned cycles
Control systems
Tools, cutters and inserts
Hands-on training in 3-Axis VMC
Maintenance of CNC machines
Introduction to rapid prototyping
Introduction to reverse engineering

Duration | 50 hrs/level | Full Time | 9.00am to 4.30pm | Part Time | 4.30pm to 7.30pm
--- | --- | --- | --- | --- | ---

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➢ After completing this course student can use the software efficiently for product design and development

OTHER COURSES CONDUCTED

(Full Time and Part Time)

➢ CAM simulation, CNC programming and Hands-on training in 3-axis VMC
➢ Diploma in CAD/CAM/CAE (CREO)
➢ Short Term Course on CREO
➢ Short Term Course on CATIA
➢ Design and Drafting using NX
➢ Short Term Course on CAM Simulation (Master CAM)
➢ Reverse Engineering using MicroScribe and Rhinoceros
➢ Hands-on Training in Coordinate Measuring Machine (CMM) and Dimensional Metrology
➢ Analysis using HyperMesh and RADIOSS
➢ Finite Element Analysis using ANSYS

Diploma in CAD/CAM/CAE Using CATIA

PSG COLLEGE OF TECHNOLOGY
Coimbatore-641004

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Phone: 0422 – 4344136, 4344147, Extn: 4471,4507
E-Mail: cnce@mail.psgtech.ac.in
**COURSE CONTENT**

**PART DESIGN (LEVEL-I)**
- Introduction to CAD
- Parametric Model
- Introduction to CATIA
- Creation of Basic modeling
- Sketching, Dimensioning and Constraints
- Pad, Pocket, Shaft, Groove, Hole, Threaded hole, Rib, Slot, Stiffener, Loft and Multi Section Solid
- Datum Features
  - Plane
  - Axis
  - Point
- Fillet, Chamfer and Draft
- Shell, Thickness and Thread/Tap
- Editing the model
- Copying methods
  - Mirror
  - Symmetry
  - Rotation
  - Translation
- Patterns
  - Rectangular
  - Circular
  - User Pattern
- Split And thick surface
- Close surface and sew surface
- Entering the advanced part design
- Associating bodies And tools
- Measuring And multi document
- Power copy And reusing existing design
- Projects

**GENERATIVE SHAPE DESIGN (LEVEL-II)**
- Introduction to generative shape design
- Creation of Point, Line, Plane, Circle, Spiral Helix, Spine, Combined Curves, Reflect Lines and Intersections
- Extruded Surfaces, Revolution Surfaces, Offset Surfaces, Swept Surfaces, Fill Surfaces and Blend Surfaces
- Edit Definitions, quick edition, replace elements, creating elements in external bodies and deactivate elements
- Display parents and children
- Managing open bodies
- Duplicating open bodies
- Hiding/Showing open bodies
- Creating a curve from its equation
- Patterning
- Managing power copies
- Using hybrid parts
- Reusing existing design
- Working with the generative shape design Workbench

**ASSEMBLY AND DRAFTING (LEVEL-III)**
- Introduction to assembly
- Assembly constrains
- Analysis of assembly
- Moving components
- Using assembly tools
- Creating annotations
- Measuring and clash
- Sectioning and measuring distances
- Reconnecting a replaced representation
- Reconnecting constrains

**MANUFACTURING AND NC SIMULATION (LEVEL-IV):**
- Flexible Sub-Assemblies
- Creating a drafting
- Exporting and importing files
- Sheets and views
- View modification
- Generating dimensions
- Tweak features
- Dress up features
- Properties
- Interoperability
- Saving and printing a document
- Projects

- Introduction to manufacturing
- Part operations, manufacturing programs, machining process,
- Simulation and program output design changes
- Generating NC data
- Prismatic operations
  - Pocketing
  - Facing
  - Profile
  - Countering operations
  - Point to point
  - Curve following operations
- Drilling, hole finishing, boring, threading, chamfering, T-sloting, circular milling
- Create a sweep roughing and roughing operation
- Pencil & reworking operation
- Area to machine, area to rework, offset area
- Introduction to turning
- Projects
Introduction to Creo/Manufacturing
Design-model and work piece
Manufacturing model
Import part model
Creation work piece
  - Automatic
  - New Work piece
Operation Setup
Machine Tool Setup
  - Milling
  - Turning
Machine zero using Csys
Retract definition
Design of fixtures
Tool definitions
Cut parameters
Types of NC sequences
  - Volume milling
  - Profile milling
  - Pocketing
  - Surface milling
  - Face milling
  - Local milling
  - Pencil tracing
  - Hole making
  - Threading
Creo/NC Check using VERICUT
NC Code Generation
CL data concept
Ncl file creation
Ncl file creation for combined operations
NC post processing
Output NC program data

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OTHER COURSES CONDUCTED
(Full Time and Part Time)
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Phone: 0422 – 4344136, 4344147,
Extn: 4471, 4507
E-Mail: cnce@mail.psgtech.ac.in
COURSE CONTENT

BASIC MODELING (LEVEL-I)

- Introduction to CAD
- Parametric modeling
- Introduction to Creo
- Create a Basic Model
- Sketching, Dimensioning and Constraints
- Extrude and Revolve
- Sweep and Blend
- Datum Features
  - Plane
  - Axis
  - Point
- Fillet and Chamfer
- Editing the Model
- Hole
- Draft
- Copying Methods
  - Mirror
  - Move
  - Rotate
  - Transform
- Patterns
  - Dimension
  - Axis
  - Fill
  - Direction
- Rib and Pipe
- Shell and X-Section
- Reorder and Reroute
- Cosmetic Features and Layers
- Exporting file formats

ADVANCED MODELING

- Introduction to surface modeling
- Customization of user interface
- Datum curves and Csyc
- Variable section sweep
- Swept blend
- Helical sweep
- Section to surface
- Surface to surface
- Tweak features
  - Offset
  - Fill
  - Thicken
  - Project & Wrap
- Toroidal blend
- Spinal blend
- Family table creation
- Mirror and move
- Trimming and extending surfaces
- Reverse engineering surface model
- Thicken and Solidify option

SURFACE

- Introduction to surface modeling
- Using datum curves
- Fill surfaces
- Trim & extend surfaces
- Blend tools
- Merging surfaces
- Advanced surface options
- Projecting curves to surfaces
- Introduction to sheet metal design
- Reverse engineering modeling concept

ADVANCE MODELING AND SURFACE DESIGN (LEVEL-II)

ASSEMBLY AND DRAFTING (LEVEL-III)

ASSEMBLY

- Top Down/Bottom Up Assembly concepts
- Mating conditions
  - Mate & Mate offset
  - Align & Align offset
  - Insert & Orient
  - Tangent and other constraints
- Layers in assemblies
- Sub assembly concepts
- Exploded views
- Mirror parts
- Patterns
- X-Section of an assembly

DRAFTING

- Creation of drawing
- Drawing and page setup
- Adding views and projections
- Sketching
- Sectioning
  - Partial
  - Broken
  - Full section
  - Detailed view
- Assembly drawings
- Creation of table
- Text and symbols
- Bill of Materials
- Creation of BOM balloons
- Format set up
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- Redefining views
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- Projects
MANUFACTURING AND NC SIMULATION (LEVEL-IV):

- Introduction to manufacturing
- Part operations, manufacturing programs, machining process,
- Simulation and program output design changes
- Generating NC data
- Prismatic operations
  - Pocketing
  - Facing
  - Profile
  - Countering operations
  - Point to point
  - Curve following operations
- Axial machining operations
- Drilling, tapping
- Hole finishing
- Boring, threading
- Chamfering, T-slottting
- Circular milling
- Create a sweep roughing and roughing operation
- Sweeping and Z level machining
- Contour-Driven Machining
- Profile contouring and Spiral milling
- Facing operations
- Pencil & reworking operation
- Area to machine, area to rework, offset area and group of offset areas
- Groove milling operation
- Introduction to turning
- Projects

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Design, Drafting, Assembly and Manufacturing Using

CATIA

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<td>Moving components</td>
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<td>Sketching, Dimensioning and Constraints</td>
<td>Offset surfaces, Swept surfaces</td>
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<td>Pad, Pocket, Shaft, Groove, Hole, Threaded hole, Rib, Slot, Stiffener, Loft and Multi Section Solid</td>
<td>Fill surfaces and Blend surfaces</td>
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<td>Datum Features</td>
<td>Join geometry, split geometry, trim geometry</td>
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<tr>
<td>• Plane</td>
<td>Creation of boundary curves</td>
<td>Sectioning</td>
</tr>
<tr>
<td>• Axis</td>
<td>Fillet, corners</td>
<td>Measuring minimum distances</td>
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<td>• Point</td>
<td>Transformation</td>
<td>Reconnecting a replaced representation</td>
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<tr>
<td>Fillet, Chamfer and Draft</td>
<td>Extrapolate a surface, Extrapolate a curve, invert geometry orientation</td>
<td>Reconnecting constrains</td>
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<tr>
<td>Shell, Thickness and Thread/Tap</td>
<td>Edit definitions, quick edition</td>
<td>Designing in assembly context</td>
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<tr>
<td>Editing the model</td>
<td>Replace elements, creating elements in external bodies and deactivate elements</td>
<td>Assembly features</td>
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<td>Copying methods</td>
<td>Display parents and children</td>
<td>Assembly symmetry</td>
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<tr>
<td>• Mirror</td>
<td>Define an axis-system</td>
<td>Flexible Sub-Assemblies</td>
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<td>• Symmetry</td>
<td>Inserts elements, groups</td>
<td>Reusing a part design pattern</td>
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<tr>
<td>• Rotation</td>
<td>Check connections between curves</td>
<td>Managing part and assembly templates</td>
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<tr>
<td>• Translation</td>
<td>Managing open bodies</td>
<td>Scenes</td>
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<td>Patterns</td>
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<td>Reusing existing design</td>
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<td>Working with the generative shape design</td>
<td>Tweak features</td>
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<td>Workbench</td>
<td>Dress up features</td>
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**UNIGRAPHICS NX - BASIC LEVEL**

**PART DESIGN**
- Introduction to CAD & NX
- Preferences - Sketch, modeling preferences
- Layers
- Sketching, Dimensioning and constraints
- Form Feature
- Reference Features
- Special Feature
- Primitives
- Feature Operation
- Boolean Operations
- Edit Feature & Model Navigator
- Projects.

**DRAFTING**
- Adding and editing views
- View Dependant Edit, Preferences
- GD&T
- Weld Symbols
- Projects

**PRE-REQUISITE**
- A degree in Mechanical/ Production
  /Automobile /Aeronautical Engineering
- Students of the above branches of Engineering

**OTHER COURSES CONDUCTED** (Full Time and Part Time)
- CAM simulation, CNC programming and Hands-on training in 3-axis VMC
- Diploma in CAD/CAM/CAE (CREO)
- Diploma in CAD/CAM/CAE (CATIA)
- Short Term Course on CREO
- Short Term Course on CATIA
- Design and Drafting using NX
- Reverse Engineering using MicroScribe and Rhinoceros
- Hands-on Training in Coordinate Measuring Machine (CMM) and Dimensional Metrology
- Analysis using HyperMesh and RADIOSS
- Finite Element Analysis using ANSYS

**CAD/CAM CENTRE**
**PSG COLLEGE OF TECHNOLOGY**
Coimbatore-641004

For further information contact:
PSG Centre for Non-formal and Continuing Education/CAD/CAM Centre
A Block (A 103)/Y-Block (3rd Floor)
PSG College of Technology
Coimbatore – 641004
Phone: 0422 – 4344136, 4344147,
Extn: 4471,4507
E-Mail: cnce@mail.psgtech.ac.in
VMC OPERATIONS
- Contour Milling
- Face Milling
- Drilling
- 2D high speed machining
- Pocketing
- Engraving
- Circle paths

CNC LATHE (2-Axis)
- Introduction to Computer numerical Control Machines
- Axis nomenclature
- Work Datum setting & Tool Offset
- Stock selection
- Turn profile, tool path graphics simulation
- Selection of cutting parameters
- Tool Holders & Insert Selection
- Facing
- Turning

CNC LATHE OPERATIONS
- Drilling
- Boring
- ID & OD Threading
- ID & OD Grooving

CAD Basics
- Introduction to CAD / CAM Software
- 2D Sketching
- Modify X Form features
- Basic Modeling
  - Protrusion
  - Revolve
- Basic programming using G & M codes and canned Cycles
- Co-ordinate System Creation
- Stock selection
- Cutting Tool Selection
- Cutting Parameters Selection

<table>
<thead>
<tr>
<th>Duration</th>
<th>30 hrs/level</th>
<th>Full Time 9.00am to 4.30pm</th>
<th>Part Time 4.30pm to 7.30pm</th>
</tr>
</thead>
</table>

- The course is designed for design engineers, manufacturing engineers, draftsman and students of engineering and polytechnic Colleges
- The participants will be given course materials to help them for practice
- Faculty members experienced in the areas of teaching and consultancy works, will handle the lectures and practical sessions
- Each participant will be given individual computers for CAM practice

OTHER COURSES CONDUCTED
(Full Time and Part Time)
- CAM simulation, CNC programming and Hands-on training in 3-axis VMC
- Diploma in CAD/CAM/CAE (CREO)
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Mastercam

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E-Mail: cnce@mail.psgtech.ac.in
Aesthetic design has much power to determine the success of automotive and Fast Moving Consumer Goods (FMCGs). In today's competitive global market, designers are under pressure to come up with, innovative designs that address form function and fit.

Rhinoceros is a NURBS based software that gives complete solution for the innovative design of components used in automotive, marine, aeronautical, jewels, medical and Fast Moving Consumer Goods (FMCGs) industries. It is a design solution used by all major manufacturers around the world. It provides a comprehensive suite of tools for the entire shape definition process, from concept sketches and 3D Digitized Data through Class-A-surfacing.

Rhinoceros accelerates the design process with specialized tools for concept design, reverse engineering, model evaluation, real time visualization, production modeling and CAD integration.

MicroScribe MX is a measurement system, capable of inspecting and reverse engineering 3D objects with six degrees of freedom and up to 0.1mm accuracy.

Prerequisite
Interest in aesthetic design and sketching.
Knowledge in engineering:
Expected level is that of BE degree in mechanical/production/automobile engineering.

OBJECTIVE
To train engineers with latest tools and softwares on styling and digitizing for innovative and creative generation of concepts for product development using MicroScribe and Rhinoceros

Other Courses Conducted (Part time and Full time)
- CAM simulation, CNC programming and Hands-on training in 3-axis VMC
- Diploma in CAD/CAM/CAE (CREO)
- Diploma in CAD/CAM/CAE (CATIA)
- Short Term Course on CREO
- Short Term Course on CATIA
- Design and Drafting using NX
- Short Term Course on CAM Simulation (Master CAM)
- Hands-on Training in Coordinate Measuring Machine (CMM) and Dimensional Metrology
- Analysis using HyperMesh and RADIOSS
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Reverse Engineering Using MicroScribe and Rhinoceros

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**COURSE CONTENT**

**Level – 1**

**Introduction**
- Class-A-surface and conceptual design
- NURBS and Bezier
- Parametric and Non-parametric
- Methods to creating surface
- Surface, Polysurfaces and freeform surface
- Types of continuity to create curves and surface

**Sketching and 2D/3D concept Development**
- Integration with Corel Painter
- Canvas image creation
- Conceptual sketch practice
- Importing the canvas image to Rhino

**2D/3D concept Development**
- 2D Planes in 3D space

**Modeling**
- Grid size control
- Modeling aids
- View and constructions
- Co-ordinates
- Object snap
- Types of Points and curves
- Types of Surface creation
- Solid creation tools
- Convert surface into solids
- Mesh tools
  - Type of Polygon mesh
  - Types of polygon primitives
- Booleans
- Transform type

- Edit tools
  - Curves edit tools
  - Surface edit tools
  - Visibility
- Layers
- Groups
- Blocks

**Advanced Surface creation tools**
- Draping over existing objects.
- Unroll a developable surface.
- Orient
- Curve from two views
- Set points
- Cap planner holes
- Refine surface shape
- Hiightfiled from image

**Analysis**
- Measure
- Curvature and surface direction
- Point Analysis
- Types of Surface Analysis
- Types of Curves Analysis
- Edge Tools
- Mass properties
- Bounding Box
- Diagnostics
- Direction

**Annotation**
- Annotate
- Dimensions

**Shade & Render**

**Level – 2**

**Reverse Engineering using MicroScribe with Rhinoceros**
- Use of MUS for reverse engineering
- Measurements
- Curve creation
- Surface creation
- Set the curves and surface X, Y, and Z directions
- Model creations
- Scanning
- Import and Export of the scan points and cloud data to other softwares for CAD

**Data Exchange with CAD packages**

**Visualizing the product in Virtual Reality environment**

<table>
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<th>Duration</th>
<th>75 hrs</th>
<th>Full time</th>
<th>9.00am to 4.30pm</th>
<th>Part time</th>
<th>4.30pm to 7.30pm</th>
</tr>
</thead>
</table>

- Each participant is given individual system for practical sessions
- Expert faculty members, well experienced in the area of teaching and consultancy works, will handle the lectures and practical sessions
The College

PSG College of Technology, a premier institution for engineering education in India, started in 1951 has developed into a centre for advanced studies and research in several areas of engineering, technology, applied sciences and management. The college is autonomous since 1978 and is certified by ISO 9001:2008. The laboratories, workshops and library of the college are all well equipped with modern facilities.

Metrology Laboratory

The metrology laboratory in the Department of Production Engineering has been set up with the aim of catering to the needs of researchers and industry. With this aim laboratory is being upgraded with the state of the art equipment continuously.

Instruments Available

- Co-ordinate measuring machine (CMM)
- Electronic height master
- Auto collimator
- Optical profile projector
- Tool maker's microscope
- Electrical, pneumatic & electro pneumatic Comparators
- Surface roughness tester
- Dial gauge tester
- Michelson interferometer
- Monochromatic light source
- Gear composite error testing machine
- Gauge blocks, angle gauges and other basic measuring instruments

Coordinate Measuring Machine (CMM)

Mass Production and precision manufacturing demands measuring instruments with capability to provide measurements which are precise and compatible with CAD platforms. This requires the power of software which is not inbuilt in most of the conventional instruments. Coordinate Measuring Machine (CMM) is one measuring machine incorporated with software which can measure the dimension of intricate shapes and features fulfilling the GD&T requirements of industry. Industries in manufacturing sector have already started using CMMs in large number. Use of CMM for the above purpose requires a complete knowledge on the operation of CMM, selection of right probe for a particular application, GD&T features and CAD packages. This course is conducted to provide hands-on training to the students of mechanical engineering/manufacturing engineering, faculty members and practising engineers from industry on dimensional metrology, CAD and coordinate metrology.

<table>
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<th>Duration</th>
<th>Full Time</th>
<th>4 weeks</th>
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<tbody>
<tr>
<td></td>
<td>Part Time</td>
<td>5 Weeks</td>
<td>4.30pm to 7.30pm</td>
</tr>
</tbody>
</table>

CAD/CAM Centre
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Extn: 4471, 4507
E-Mail: cnce@mail.psgtech.ac.in
**Course Coverage**

**Dimensional metrology**
- Calibration of measuring instruments and evaluation of measurement uncertainty
- Evaluation of repeatability & reproducibility
- Surface roughness evaluation
- Form measurement
- Dimensional measurement using electronic height master
- Basics of GD&T, limits, fits & tolerance

**CAD modeling**
- Solid modeling
- Import/Export of CAD models
- Reverse engineering techniques
- Advanced features for reverse engineering

**Coordinate metrology**
- Introduction to CMM & its specifications
- Introduction to MCOSMOS v4.1
- Co-ordinate System
- Modes of operation
- Probe data management/Calibration
- Plane selection & creation of datum
- Basic measurements
- Manual / Automatic programming
- 2D comparison
- Report generation
- Contour profile measurement
- Import/Export of CAD models
- Automatic path generation
- Nominal to actual comparison
- Hands on tutorials in CMM

Make the participants familiar with the use of surface roughness measuring instrument.
Perform form measurements using basic measuring instruments.
Train the participants to use electronic height master to measure various dimensions.
Provide training in solid modeling using CREO 3.0.
Create awareness among manufacturing engineers on the latest developments in coordinate metrology and highlight the features and applications of CMMs.
To enable the student calibrate the probe.
Enable the participants to operate CNC CMM and use its software for dimensional measurement, form measurement, comparison of nominal and actual dimension and to do reverse engineering from the cloud points obtained using CMM.

**Key take aways**

At the end of the course the participants will be able to
- Apply and interpret the concepts like limits, fits, tolerance and GD&T representation in manufacturing related documents.
- Calibrate the measuring instruments and evaluate measurement uncertainty as per standard procedure and handle sophisticated measuring instruments like various types of comparators, electronic height master, auto collimator, profile projector, Tool maker’s microscope, monochromatic light source and Michelson interferometer.
- Model solids/any component, import and export CAD models, use advanced features in surface modeling and reverse engineering of objects.
- Calibrate probe, operate CNC-CMM, perform various types of measurements, compare the actual and nominal dimensions and generate reports for the measurements made.

**OTHER COURSES CONDUCTED**

(Full Time and Part Time)
- CAM simulation, CNC programming and Hands-on training in 3-axis VMC
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- Short Term Course on CREO
- Short Term Course on CATIA
- Design and Drafting using NX
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- Reverse Engineering using MicroScribe and Rhinoceros
- Analysis using HyperMesh and RADIOSS
- Finite Element Analysis using ANSYS
In product design initially sketches and surface models are made in softwares like Creo, Pro-E, NX, CATIA, Alias, Rhino. Later, these conceptual models are to be converted to the CAD models for design and manufacturing activities. HypeMesh/Radioss are two powerful softwares that can analyze the behavior of the product/part in several environments and simulate the deformation/heat flow, Sloshing etc. HyperMesh can mesh the CAD models in a flexible way to improve the computational efficiency and hence productivity. This course will be useful for designers who are interested in optimizing a given design.

PRE-REQUISITE

- A degree in Mechanical/Production/Automobile/Aeronautical Engineering
- Students of the above branches of Engineering

OTHER COURSES CONDUCTED (Full Time and Part Time)

- CAM simulation, CNC programming and Hands-on training in 3-axis VMC
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OVERVIEW

The course is designed for Engineers working in industries and students of engineering and polytechnic colleges
- Each participant is given individual system for practical sessions
- Expert faculty members, well experienced in the areas of teaching and consultancy works, will handle the lectures and practical sessions
- After completing this course student will be able to use Radioss software efficiently for Analysing simple and complicated parts
COURSE CONTENT

PRE-PROCESS/MODELING THE STRUCTURE

FINITE ELEMENT ANALYSIS BASICS
- Introduction/Importance to FEA
- Types of elements and nodes
- Introduction to HyperMesh

GEOMETRY OF MODEL DEVELOPMENT
- Importing and repairing of CAD Geometry
- Generating a mid plane from solid geometry
- Simplifying a geometry
- Creating and editing a line data
- Creating a surface from elements
- Creating and editing a solid geometry

MESHING

1D Elements
- Creating 1-D Elements
- Connecting with 1-D

2D Elements
- AutoMeshing
- Meshing without Surfaces
- 2-D Mesh in Curved
- QI Mesh Creation
- Batch Meshing

3D Elements
- Tetra meshing
- Creating a Hex-Penta Mesh using Surfaces
- Creating a Hexahedral Mesh using the Solid Map Function
- Tetra Meshing CFD

ANALYSIS/SOLVER

QUALITY CHECKING
- Checking and Editing Mesh
- Measuring and Improving 2-D Quality using Quality Index
- Penetration

MORPHING
- Freehand Morphing
- Map to Geometry
- Morph Volume
- Domains and Handles

OPTISTRUCT ANALYSIS SETUP
- Formatting Models for Analysis
- Setting up Loading Conditions
- Obtaining and Assigning Beam Cross-Section Properties using HyperBeam
- Working with Loads on Geometry

OPTISTRUCT ANALYSIS
- Advanced Finite Element Analysis
- Multi Body Dynamic Analysis

RADIOSS (Crash Solver) analysis setup in HyperMesh

Crash Solver (RADIOSS)
- Dynamic Analysis
- History

POST-PROCESSING

VIEWING THE RESULT IN HYPERVIEW
- Animation
- Visibility and view controls
- Result data analysis
- Working with model
- Annotation

ASSEMBLY
- Creating Connectors