**K.I.T.'s College of Engineering**

**Department of Production Engineering**

**Report of Tata Technologies' Distance Ready Engineer Program**

**Objectives:** To enhance technical skills of engineering graduates to improve their employability and reduce the time and resource spent by companies on re-training graduate engineers. To achieve this MoU has been signed between TATA TECHNOLOGIES and our institute.

**About the Program:** It is well known fact that India produces a few lakh qualified engineers annually, industry routinely faces an acute shortage of competent engineers who are employable or industry-ready to immediately deliver on engineering services projects after graduating out of colleges. The course is designed especially to train young engineers, in a classroom way, but will involve a practical approach. These ready engineers are easily picked up by the industry.

The department conducts Distance Ready Engineer in association of TATA Technologies for students appearing in Third Year. The purpose of the Ready Engineer programme is to bridge the engineering industry talent gap by educating and mentoring aspiring young engineers. The aim is to be a catalyst in reducing the academia-industry gap and ensure that the future engineers are ready for the industry. Supported by Tata Technologies' online learning platform, iGET IT®, the faculty members of the department give 80 hours of classroom training related to the core mechanical modules like CATIA, Styling and Product Design, Bonnet Design and Development, CAE, Formability, Die Design and Fixture Design to selected and exemplary students. This course is conducted addition to regular curriculum after college hours. This course helps students gain additional knowledge in the area of automotive design thus building confidence which helps them facing campus-offcampus interviews. K.I.T.'s COE is acting as a nodal college with other 5 satellite colleges working under it.

160 Students were enrolled for the program for academic year 2016-17. The final examination for these students was conducted on 20th April 2017. Final results will be announced shortly by TATA TECHNOLOGIES.

The students enrolled for the program undergo training in following domains:

1. CATIA:
    1. SKETCHER WORKBENCH (In detail)

**A) PROFILE** Toolbar

1) PROFILE

2) RECTANGLE: Rectangle, Oriented Rectangle, Parallelogram, Elongated hole, Cylindrical Elongated Hole, Keyhole profile, Hexagon, Centered Rectangle, Centered Parallelogram

3) CIRCLE: Circle, Three Point Circle, Circle with coordinated, Tri Tangent circle, Three point arc, Three point arc with limits, arc.

4) SPLINE

5) ELLIPSE, PARABOLA

6) LINE: Line, Infinite Line, Bi-Tangent line, Bisecting Line, Normal Line

7) AXIS

8) POINTS

**B)SKETCH TOOLS** Toolbar

**C) OPERATION** Toolbar:

**1)** Corner: Trim All Elements, Trim First Element, No trim, Standard Line trim, Construction Line trim etc.

**2)** CHAMFER: Trim All Elements, Trim First Element, No trim, Standard Line trim, Construction Line trim etc.

**3)** RELIMITATION toolbar: Trim, Break, Quick trim, close, compliment

**4)** TRANSFORMATION toolbar: Mirror, Symmetry, Translate, rotate, scale, offset

**5)** 3D GEOMETRY: Project 3D elements, Intersect 3D elements, Project 3D silhouette Edges

**D) CONSTRAINT** TOOLBAR

1) CONSTRAINT DEFINITION: Distance, Length, Angle, Radius,Diameter, Semimajor Axis, Semiminor Axis, Symmetry, Midpoint, Fix, Coincidence, Concentricity, Tangency, Parallelogram, Perpendicular, Horizontal, Vertical.

2) CONSTRAINT: Dimensioning

3) ANIMATE CONSTRAINT

E) **VIEW Toolbar**

F) **MEASURE Toolbar**

2) PART DESIGN WORKBENCH

**A)SKETCH BASED FEATURES** toolbar

**1)** PAD toolbar:

**i)** FIRST LIMIT: Dimension, Upto Next, Upto Last, Upto plane, Upto Surface, Thick, Reverse Side, Reverse Direction, Mirrored Extent, Normal to Profile, Thin Pad

**ii)** SECOND LIMIT: Dimension, Upto Next, Upto Last, Upto plane, Upto Surface, Thick, Reverse Side, Reverse Direction, Mirrored Extent, Normal to Profile, Thin Pad

2) MULTI PAD

3) POCKET

i) FIRST LIMIT: Dimension, Upto Next, Upto Last, Upto plane, Upto Surface, Thick, Reverse Side, Reverse Direction, Mirrored Extent, Normal to Profile, Thin Pad

ii) SECOND LIMIT: Dimension, Upto Next, Upto Last, Upto plane, Upto Surface, Thick, Reverse Side, Reverse Direction, Mirrored Extent, Normal to Profile, Thin Pad

4) MULTI POCKET

5) REVOLVE: First Angle, Second Angle, Thick Profile, Thin Shaft

6) GROOVE: First Angle, Second Angle, Thick Profile, Thin Shaft

7) HOLE:

i) EXTENSION: Blind, Upto next, Upto Last, Upto surface.

ii) TYPE: Simple, Counterbored, Countersunk, Counterdrilled.

iii) THREADS

iv) POSITIONING OF SKETCH, DIRECTION etc.

8) RIB: Profile, Centre Curve, Profile Control, Merge Rib End, Thick Profile, Thin Rib, Neutral Fibers, Merge Ends.

9) SLOT: Profile, Centre Curve, Profile Control, Merge Rib End, Thick Profile, Thin Rib, Neutral Fibers, Merge Ends.

10) STIFNER

11) SOLID COMBINE

12) MULTISECTIONS SOLID: Guid, Spine, Coupling, Relimitation.

13) REMOVED MULTISECTIONS SOLID: Guid, Spine, Coupling, Relimitation.

**B) DRESSUP FEATURES TOOLBAR**

**1)**EDGE FILLET: Edge Fillet, Variable Radius Fillet, Tritangent Fillet.

**2)** CHAMFER

**3)** DRAFT ANGLE

**4)** SHELL

**5)** THICK

**C)TRANSFORMATION FEATURE**

**1)**TRANSLATION, ROTATION, SYMMETRY, MIRROR

**2)** RECTANGULAR PATTERN, CIRCULAR PATTERN, SCALING

D) **REFERENCE ELEMENT EXTENDED**

1) POINT: Point type: Coordinate, On curve, On plane , On surface

2) LINE: Line type: Point-Point, Point- Direction, Angle-normal, Tangent

3) PLANE: Plane Type: offset, angle, normal, three points, two lines, point and line etc.

4) MEASURE: Material And Physical Properties, Apply Material

3) DRAFTING WORKBENCH(In Detail)

1. INSER SHEET, PROPERTIES
2. ADD BASE VIEW
3. PROJECTED VIEW
4. AUXYLLARY VIEW
5. SECTION VIEW
6. REVOLE SECTION VIEW
7. BROKEN VIEW
8. DIMENSIONING
9. ANNOTATION
10. BALLONS

4) ASSEMBLY WORKBENCH (IN DETAIL)

1. BOTTOM UP & TOP DOWN APPROACH
2. INSERT COMPONENT
3. APPLY CONSTRAINTS
4. EXPLODED VIEW
5. MOVE TOOLBAR

5) SURFACING WORKBENCH (BASIC)

1) SURFACES:

- Extrude,
- Revolve,
- Sphere,
- Cylinder,
- Offset,
- Sweep,
- Fill,
- Multisection Surface,
- Blend.

2) OPERATIONS:

- Join,
- Split,
- Boundary,

- Translate

3) WIREFRAME:

2. Styling and Product Design: Introduction to Design, What is "Good Design"?, Good Design, Examples of All Time, What is Industrial Design?, Where Industrial Design is used?, Typical Product Life Cycle, Automotive Design Process (Design Process for production release), Design Studio Process or Product Conceptualization process, Case Study, What are CAS Surfaces or Digital Clay Models?, Why CAS Surfaces?, What are Class A Surfaces?, Role of Class A Surface Engineer, Requirements for a Surface to fulfil "Class A Surface" Standards, Why Class A?, Case Studies for Class A Surfaces, Step by Step Process for Bonnet, Class A Surface Creation

3. Bonnet Design and Development:
   a) Overview of BIW, List the panels of the BIW substructures,
   b) What is Bonnet, purpose, function & types,
   c) Design Consideration of Bonnet,
   d) Regulation and Norms for Bonnet: 1. External Projections, 2. Pedestrian Impact, 3. Forward Field of Vision,
   e) Input required for hood design,
   f) Consideration of product design,
   g) Steps to detail hood design,
   h) CAE Tests,
   i) Panel Detail design, Hood Latch System, Designing of Hood Hinges, Hood Indoor & outdoor testing,
   j) Body Assembly process, Prototypes & production release.

4. CAE Considerations:
   a) Introduction About CAD, CAM & CAE, FEA: Definition, Various Domains – NVH, Dura, Crash, Occupant Safety, CFD, Implicit vs. Explicit Solvers, Degrees of Freedom, Stiffness matrix, What is a Pre-Post and Solver, Types of Solvers,
   b) Durability: Oil Canning on Hood, Why Oil-Canning?, Scope of Work, Loading, Boundary conditions, Results & Conclusion,
   c) NVH: Constrained Modal Analysis on Hood, Why Constrained Modal Analysis?, Scope of Work, Loading, Boundary Conditions, Results & Conclusion,

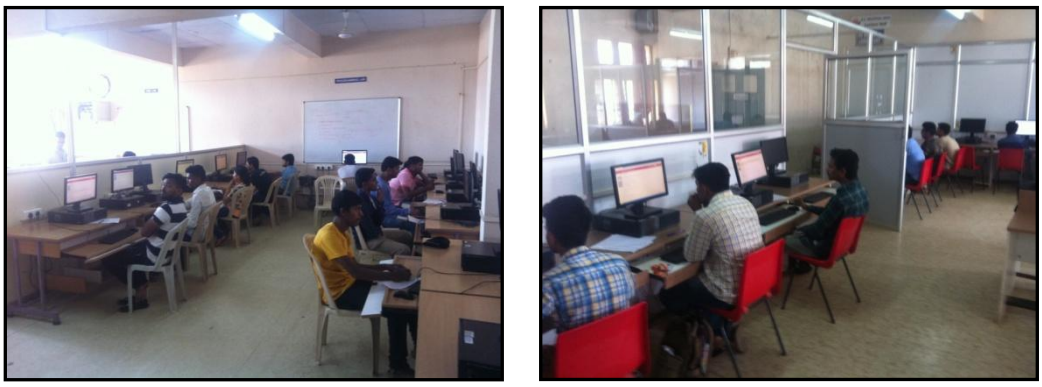
d) Crash: About Vehicle Crashworthiness, About Energy Management, What Happens During Crashes, Newtonian Laws, Work Energy Principles, Conservation Of Momentum, Importance Of Seatbelts,
e) Biomechanics: Head Injury, Coup & Counter-Coup,
f) Head Impact Analysis on Hood: Why Head Impact?, Scope of Work,Loading, Boundary Conditions, Results & Conclusion.
g) Failure Criteria: mportance of Failure Criteria, Von Mises Stress

5. Formability Analysis:
   a. Module Overview, Module- Sheet Metal Formability Study,
   b. SE(simultaneous Engg), feasibility study, Various stages in sheet metal part manufacturing, Auto body and its parts Constituents of Automobile, sheet metal Sheet metal processes
   c. Types of draw dies Draw model development in CAD software Various terms used with draw model development Considerations for draw development
   d. Forming simulations, Various Material properties, Forming Limit Curve (FLD), Pre processing, Post Processing
6. Die Design: Sheet metal operation processes, Hydroformng, Basic sheet metal operations, Draw Die, Hemming, Press, Elements of die design, types of dies.
7. Fixture Design:
   a) Types of joints, Welding's, joints and its process,
   b) Advantages and disadvantages over Riveted joints
   c) Body Coordinates, 3-2-1 principle , Need of Fixture, Type of Fixture
   d) Use of product GD&T in Fixture design.
   e) Type of Fixtures and Design Typical Operations in Sheet metal Fixture (Manual/Pneumatic/Hydraulic Fixture)
   f) Typical Unit Design for Sheet metal parts (Rest/Clamp/location/Slide/Dump units/base)
   g) Types of Fixture (Spot welding/Arc welding/Inspection Fixture/Gauges)

Following is the list of faculty members who conduct above mentioned domains.

| S.N. | Name of the Faculty | Domains |
|---|---|---|
| 1 | Prof. S.M.Pise | CAE Considerations |
| 2 | Prof. S. B. Sangale (SPOC) | CATIA, Styling and product Design, Bonnet Design and Development |
| 3 | Prof. A. S. Takalkar | CAE Considerations, Formability Study |
| 4 | Prof. V.D.Kamble | Die Design, Fixture Design |

Currently 103 students are enrolled for the program had undergone training for 3 domains. The remaining modules will be finished by the month of December 2017.



(a) (b)

Fig. 1 Students appearing for training from department of, (a) Production, (b) Mechanical

TATA TECHNOLOGIES has deputed our faculties to train the faculties of 6 Engineering institutes affiliated to VTU, Belgaum. This training was conducted on 24th and 25th Jan, 2017 at SDM Dharwad.

Fig. 2 Training conducted by PG faculty at SDM College of Engineering and Technology

**Mr. A. S. Takalkar**

**Co-ordinator**

**TTL-DRE Program**

**Mr. S B Sangale**

**SPOC**

**TTL-DRE Program**