TTRC Project Guide

Handbook for Student Projects

TTRC
19/09/14

1. The Importance of Final Year Projects - An Introduction

Your final year project is one of the most important aspects of your engineering degree. An Engineers Profession can be defined as that in which Knowledge of Mathematical, Computational and Natural Science gained be study and experience is integrated and customised with wisdom and thought to develop the best information and implementation of the same to the benefit of any common mass"

Engineering is first and foremost the application of knowledge. However, the application must be carried out with *judgement*, to ensure that the resultant system is *effective* and *efficient*, and that it is of *benefit* (which raises the issue of the ethical responsibilities of engineers – a topic for another day). The final year project is one of the primary mechanisms used by the College/Universities to provide you with an opportunity to gain experience in the practical, effective, efficient, and beneficial application of what you have been studying for the past several years. Naturally, you will continue to gain engineering experience after you graduate but the final year project will be your first exposure to the full rigour of engineering practice. It is essential that you learn from this exposure and practise all of the engineering methodologies involved. It is particularly important that you learn not just to apply what you know, but to apply it with judgement, with the ability to assess what you are doing and to be critical of it.

The importance of the Final Year Projects being explained above, it becomes truly surprising the engineers to buy and duplicate academic projects which are in fact readily available in the market.

There is another reason why your final year project is so important: it will inevitably be used as a discriminator to decide how good an engineering student you are. If you end up with a result in your degree examinations which is on the borderline between one grade and another, the examiners will look at how you performed in your project and then they will make a decision as to which grade you should be assigned.

To conclude on the introduction it is advisable for an Engineer to think that the project is a passport to the engineering profession – your formal studies are your ticket but without your passport, you can't travel.

2. Choosing Your Project

Given that you are going to spend a lot of time working on your project, it is essential that you pick a project which you like and which you are capable of doing. Note that these are not necessarily the same things: just because you like a particular project doesn't mean you are qualified to do it. You may not have taken all of the requisite courses or it may be a more theoretically-aligned project whereas you might be a more practically-oriented engineering student (or vice versa). Think long and hard before making your final choice. At the very least, you should take the following steps in assessing and choosing an appropriate topic.

Find out what are your options

Try to get a list of projects from your teachers or colleagues which has industrial relevance, try to figure out clearly the descriptions of each project and identify the one which really interests you. Read them again and again until you are clear in the following:

- The concepts involved
- The engineering content
- The industrial relevance
- Tools/Software which would support the project in its execution phase
- The Methodology involved
- The competence involved

Think about proposing your own project. Using the descriptions you have read as a guideline, write your own proposal. Note, however, that the feasibility and suitability of your proposal will have to be assessed before it can be added to your list. Submit your proposal to the Project Coordinator who will have it reviewed by an appropriate member of staff.

Go and talk to the supervisors (*i.e.* the member of staff who proposed the project or the person nominated by the project coordinator in the case of your own proposal).

3. Planning, Executing, and Managing Your Project

Most students have no idea how to begin their project. This is understandable: it is the first time they will have had to tackle a large amount of work that is probably poorly defined (the project descriptions provided by lecturers are rarely complete!) To get started, it helps to know the key activities that result in a successful project. They are:

1) Problem identification and its relevance to the industry
2) Problem modelling with respect to Engineering Principles
3) Fixing the appropriate Engineering Methodology and Validation of the same
4) Solving the problem with proven justified Methodology derived above
5) Results and validation with Engineering Justification
6) Practically validating the results with supporting documents or test results
7) Documentation
8) Project management

The first two points mentioned above are explained here, for the detailed explanation of the remaining points please send in your request to hr@aaplttrc.com

Problem identification and its relevance to the industry

Problem Identification involves a lot of background work in the general area of the problem. Normally it calls for the use of prior experience, typically experience you may not yet have. It requires an ability to look at a domain (e.g. telecommunications or engine control) and to identify the issue that needs to be addressed and the problem to be solved (*e.g.* elimination of noise or cross-talk on a communication channel, or engine control for temperature-dependent fuel efficiency). It also required an understanding of the theoretical issues by which we can model the problem.

So, the first thing you need to do in your project is become an expert in the problem at hand: a *problem-domain* expert. At the same time, you also need to know how to handle the tools that will enable you to solve the problem. These might include the operating system, the programming language, the application programming interface (API) definitions, System CAD Modelling tools, Problem simulating tools like Ansys Products or any other similar FEM Packages, Flow simulation packages etc. That is, you also need to become a *solution-domain* expert. The only way to become an expert in both the problem domain and the solution domain is to learn as much as possible about the area and to learn it as quickly and efficiently as possible.

Many people come unstuck at this first step and they launch themselves into a frenzy of unstructured research, reading much but learning little. Here are some tips to avoid this happening. Collect any papers, articles, book chapters you can on the area and make a copy for your own personal archive.

Make sure you keep a full citation index, *i.e.,* you must record exactly where every article you copy, comes from. Typically, you need to record the title of the article, the authors, the name of the magazine/journal/book, the volume and number of the journal or magazine, and the page numbers. If it's a chapter in a book and the author of the chapter is different from the editor of the book, you need to record both sets of names.

Not all the articles you collect will be equally relevant or important. Consequently, it's not efficient to give each of them the same attention. But it's not easy to know how relevant it is until you read it. So how do you proceed? To solve this dilemma, you should know that there are three levels of reading:

Shallow Reading: you just read the article quickly to get an impression of the general idea. Read it twice. This should take a half-an-hour to an hour. Moderate Reading: Read the article in detail and understand all of the main concepts; this will probably require you to read it several times and take a couple of hours to assimilate.

Deep Reading: Here you make an in-depth study of the article. This may take you several hours or even a couple of days. After many careful readings, you should know as much about the topic as the author. The way to proceed with your 'reading in' is to Shallow read everything and write a 5-line summary of the article. If you think the article is directly relevant to your project, label it, and put it on a list of articles to be read at the next level, i.e. Moderate Reading.

Moderate Reading: Read all the labelled articles and write a 1-page summary.
If the article is going to be used directly in the project, e.g. as a basis for a hardware design or a software algorithm, then you need to add it to your list of articles to be read at the next level, i.e. Deep Reading.
Read all the Deep-Read articles and write extensive notes on them.
Note that the 'reading in' phase of the project can last quite a long time (there's a lot of reading *and writing* to be done) and it can overlap partially with some of the other early tasks, such as requirement elicitation, the topic of the next section.
Finally, it is very important that you realize that, in order to fully understand anything that you read, you must write it up in your own words. If you can't express or speak about a given idea, then you haven't truly understood it in any useful way. This is so important that it's worth saying a third time:

Writing is an Essential Part of Understanding:
This is why, in all of the above guidelines, you see recommendations to write things down.

Problem modelling with respect to Engineering Principles

Once you know the requirements, and are an expert in the problem domain, you can abstract the problem from the problem space and model it computationally: this means we can identify the theoretical tools we need to solve the problem. Examples include statistical analysis for the elimination of noise on the communication channel, characterization of the relationship between fuel consumption and engineer cylinder temperature for the engine control; the extraction of facial features from images, and the statistical classification techniques used to match these feature with faces in a database. In general if the problem we have is on Engineering design, the pre-required Knowledge pool of the candidate would be on to

a. the approach to the design problems
b. invention and analysis
c. decision making, criteria and constraints
d. strategies for synthesis and decisions
e. fault and failure analysis
f. failure predictions and failure modes
g. Structural integrity etc.

This could be further explained as explained below:

- The design process – specifying problems and generating solutions
- Making decisions – decision-making strategies, cost benefit analysis, economic and human factors
- Fault / failure analysis

Introduction to Engineering Graphical Communication:

- Sketching
- Orthographic (multiview), layout, assembly and detailed drawings
- Dimensioning

Introduction to Structural Integrity in Engineering Design:

- Structural integrity and the nature of failure
- Structural distillation – decomposition of structural systems into elementary engineering components
- Estimation, units and calculation
- Failure predictors and factors of safety
- Fatigue – What is fatigue? Time-varying stresses, fatigue strength, design against failure. S-N diagram, A-M diagram. Shafts as an example of fatigue-based structural integrity design

4. Project Documentation

We noted earlier that writing is an essential part of understanding. We note it again here but in a different sense. In this case, writing is essential in order for others to understand what you have done. There are two reasons why you want others to understand your work:

1. So that you can be given credit for it (your final mark depends on it);
2. So that others can carry on your work and develop or maintain your system.

It is extremely important that you document your work at every stage of your project.
We saw already that documentation is essential in the initial reading-in, requirements, and specification phases but it is equally important in the design, implementation, test, and maintenance phases.

The best way to organize your writing is to keep a log book of all work in progress. You should go out and buy a nice hard-cover notebook and write everything you do on the project into this log book every day. Every thought and observation you have on your project should go into this book, along with notes of meetings with your supervisor, results, theoretical developments, calculations, everything. This log book will become an invaluable source of material when you come to write up your project in the final report.

However, don't wait until the end of the project to begin the process of formal documentation. At the end of each phase of the project (or at the end of each task) you should write up a formal report on that phase. These reports will, in turn, become an excellent basis for your final report.

Finally, there is one other form of documentation which you will have to create during your project. This is the project presentation. Since the final report and the project presentations are so important, we will devote all of the section 4 to these topics.
You can use MS Products for project documentation with a clear understanding of the MS Word and MS Excel tools.

A Typical Project Specification Report

Title Page

- Specific Title of the Project (e.g. "Design and Analysis of a Composite Shaft for Engine Transmission")
- General Title (i.e. "Project Specification")
- Degree (e.g. B.Eng. in Mechanical Engineering)
- Author (name and student identification number)
- Institution (i.e. Technology Training & Research Centre)

- Supervisor
- Date

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Section 1. Introduction

1. Brief summary of the problem being addressed.
2. Overview on the relevance of the problem (where is it going to be used?)
3. Overview of the technical area, i.e. background technical and theoretical context.
4. Summary of functionality (what is it going to do?)
5. Overview of the report: what material will you be covering and how is it arranged?

Section 2. Methodology adopted

1. Required system solution methods
2. Validation of the method employed with references suggestions on improvement
3. List of criteria that define a successful project: expected outcomes, required system behaviour, and especially performance metrics.

Section 3. Theoretical Foundations: The Engineering Model

1. Introduction
2. Details of theoretical model
3. Mathematical/computational model
4. Discrete or other approximations
5. Limitations and assumptions
6. Possible algorithm options reference to the tools employed

Section 4. Solution execution and Project Management

Section 5. Task Analysis and Schedule of Activities

1. Task decomposition
2. Project schedule
3. Task specification: for each task, identify goals, inputs, outputs, estimated effort and duration, and task dependencies.

Section 6. Results, conclusions and discussions

Section 7. Project Management

1. Meetings with supervisor
2. Major risks and contingency plans
3. Principal learning outcomes

References

Appendices

Interim Progress Report

The Interim Report should focus primarily on presenting the progress that has been made in achieving the initial goals. It takes the project specification report as its baseline. Any amendments to the project specification should be highlighted and discussed in full. Similarly, any deviation from the schedule should be identified and all amendments to the schedule should be addressed: explaining the need for the change, the nature of the change, and any knock-on effects. The interim report should provide a complete summary of all project outcomes to date. These include project management documents, system analysis documents, theoretical development, system design, implementation, and early results.

The following is an outline of a typical Interim Report.

1. Goals of the Project

   Give a short summary of the main objectives of the project and the expected results.
2. Synopsis of the Problem Specification
3. Overview of Task Specifications and Project Schedule

   List the primary tasks and sub-tasks required to carry out the project and an overview of the project schedule, giving the timings (start date, duration, and amount of effort) of each task.
4. Review of Tasks

   Provide a comprehensive review of the status of each task and sub-task, setting out at least:
   - The status (not started, on-going, complete, behind schedule, ahead of schedule …);
   - Problems encountered and identified solutions;
   - Anticipated problems and possible solutions;
   - Impact on the project schedule.
5. Summary of Changes to the Specification
6. Interim Results

   If possible, provide examples of any interim results you have achieved.
7. Short Term Plans

   Identify the next steps you will take in the project.

5. Giving a Project Presentation

During the course of your project, you will be required to give presentations:

You have learned much about presentation skills during your time in the College and it wouldn't be appropriate to attempt to review everything you have been taught already. However, a few pointers may help you give a professional and impressive presentation.

- Don't depend too much on Power point slides: your speech is the presentation and the slides support you (not the other way around).
- Take your time: pause frequently. Sometimes, the best thing to say is nothing.
  Short one-second rests create dramatic impact and also give your audience time to assimilate what you've said. Of course, you also have to maintain continuity and flow; otherwise people forget what you are talking about. It's a question of balance.
- Use a microphone (and practice using it before your presentation).
- Arrive early and make sure you know where all the equipment is. Know how to use it.
- Look at the audience, not at your slides.
- Project your voice (but don't shout).
- Smile: enjoy giving your presentation.
- Be confident: you've done some great work – here is your opportunity to get credit for it.
- The people in the audience are on your side (though sometimes they disguise it well!) They want you to succeed. If they ask you a question you don't understand, say so and ask their help. Ask them to explain, and ask nicely. If you still don't understand, don't bluff. Admit your ignorance and suggest ways of how you will overcome that lack of knowledge.
- Nobody knows everything; but that's no excuse for not trying to know everything.
  A knowledgeable person knows enough to do his job well, a wise person knows that he doesn't know everything, and an intelligent person knows how to find out what he doesn't know. Be knowledgeable, wise, and intelligent: be an engineer.

6. A Sample Project Reporting Details Facilitated at TTRC

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7. Project Research Facilitated at Technology Training & Research Centre

TTRC Department of Materials Engineering and Finite Element Analysis

1. Finite Element Analysis and Simulation Orthogonal Cutting Process.

Associate: Sreejith N, M-Tech, Cochin University of Science and Technology.

- Explicit Dynamic Analysis is carried out to observe the stress distribution on Cutting tool, Pre-processing, solving and post processing done using ANSYS-LSDYNA.

2. Soil - Structure Interaction Studies Of Offshore Wind Farm Structure with Conventional and Reinforced Soil Foundation Using FEA Methods

Associate: Miss. Anooja Joseph, M. Tech Cochin University of Science and Technology

- Intend to study the response of the conventional offshore foundation using ANSYS FEA, to predict the enhancement in the strength of the foundation with reinforced soils and to analyse the dynamic response of the structure by consecutive waves hitting the structure.

3. Finite Element Analysis of Folded Plates to observe the comparative study on Classical Method and Numerical Method.

Associate: Tibu Chacko, M-Tech, MA College of Engineering.

- Static structural Analysis is done to observe the mid span deflection, force distribution on the folded plate structure. Pre-processing, solving and Post-processing done using ANSYS APDL.

4. Static Structural Analysis of Steel Fibre Reinforced Concrete Deep Beam with and without Opening.

Associate: Nerin. K. Antony, M-Tech, MA College of Engineering.

- Static Structural Analysis is carried out to observe the mid-span deflection with varying distance between the load span areas. The Pre-processing, solving and Post-processing is done using ANSYS APDL.

5. Finite Element Analysis and Modelling of Flat slab and Grid Slab Structure.

Associate: Muhammed Yoosaf K T, M-Tech, MA College of Engineering.

- Static Structural Analysis is carried out to observe the deflection in the mid-section area of the Flat slab and Grid slab structure, loads distribution in the critical region of both slabs. Pre-processing

6. Finite Element Analysis and Modelling of RC Beam Strengthened with FRP Laminates.

Associate: Martina Paulose, M-Tech, Cochin University of Science and Technology.

- Transient Structural Analysis is carried out to observe the deformation of the reinforced structure, reinforced structure with FRP laminates .Pre-processing, solving and post-processing is done by using ANSYS APDL.

7. Finite Element Analysis and Modelling of Cylindrical Shell Structure.

Associate: Ashique Jose, M-Tech, MA College of Engineering.

- Static Structural Analysis is carried out for the cylindrical shell structure to observe the pressure distribution over the surfaces .Pre-processing, solving and post-processing is done using ANSYS APDL.

8. Finite Element Analysis to observe a performance –based approach for evaluating fire resistance of Pre-Stressed concrete double T-beam.

Associate: Rohini G Nair, M-Tech, Cochin University of Science and Technology.

- Transient Thermal Analysis, Transient Structural Analysis and coupled analysis is carried to observe the thermal effect on the strand (pre-stressed reinforced).Pre-processing, solving and post-processing is done using ANSYS APDL.

9. Finite Element Analysis observes Axial and Flexural Performance of Square RC Columns Wrapped with CFRP under Eccentric Loading.

Associate: Safna M S, M-Tech, Cochin University of Science and Technology.

- Linear and Non-linear Static Structural Analysis is carried to observe compression pressure distribution on the surfaces of the square RC Column structure wrapped with CFRP .Pre-processing ,solving and post-processing is done using ANSYS APDL.

10. Finite Element Analysis and Modelling is carried to observe the effect of cooling fluid in the Engine Cavitation considering Piston- Cylinder Assembly forces.

Associates: Basil George, Paulcy Issac, Gokul P R, Jojo Thomas, Josy Jose, B-Tech (Mech), Ilahia College of Engineering.

- Static, Acoustic (Fluid Coupled), Thermal and Harmonic Analysis is carried out to observe the effect of cooling and pressure distribution in the engine cavitation considering Piston-Cylinder Assembly.

11. Finite Element Analysis is carried out to observe the study of Biomimetic Applied for Design Optimization of Cylindrical Shell Structure.

Associate: Remya P M, M-Tech, Cochin University of Science and Technology.

- Static Structural Analysis Macro has been written using ANSYS log file, Design Optimization has been done to get coordinate of shell structure. Pre-processing, solving and post-processing is done using ANSYS APDL.

12. Finite Element Analysis of Flange Joint.

Associates: Bivin Thomas, Jabin M, Benjamin, Jerin Jose, Jerome J P, B-Tech, Amal Jyoti College of Engineering.

- Static Structural Analysis is carried out to observe the deformation and stress occurs due to pressure distribution in flange joint. Pre-processing, solving and post-processing is done using ANSYS WORKBENCH.

13. Finite Element Analysis is carried out to observe The Seismic Analysis - Earth quake effect on the storage tank.

Associates: Parvathy Krishnakumar, Anumodh A.S, Shaharban Shaful, Ejas P J, M-Tech, Cochin University of Science and Technology.

- Modal, Transient Analysis is carried out to observe the earth quake effect on the storage tank at bottom section .Pre-processing, Solving and Post-processing is done using ANSYS APDL.

14. Finite Element Analysis of Aircraft Wing Structure and Design Validation.

Associates: Blesson Raju, Nadheer A, Anujith M, Alexander Achankunju, B-Tech (Aero) Mount Zion College of Engineering.

- Static Structural Analysis of Trainer Aircraft Wing Structure is carried out to validate the Design Structure .Hand calculation; Modelling is done using CATIA, Pre-processing, solving and post-processing is done using ANSYS WORKBENCH.

15. Finite Element Analysis of Aircraft with GPS & INS/ILS Technology.

Associates: Jacky Joseph, Abdul Majeed, Tito Antony, Vibi John, Ajay Shankar, B-Tech (Aero), Jawaharlal College of Engineering.

- Fabrication, Modelling and installation of GPS, INS/ILS Technology is done, Static structural Analysis of Engine Mount is carried to validate the design structure of the aircraft. Modelling is done using CATIA, Pre-processing, solving and Post-processing is done using ANSYS WORKBENCH.

16. Finite Element Analysis and Modelling of 5 Seater Short Range Passenger Aircraft.

Associates: Arshath Ayoob, Arya Sanil, Vishnu S Nair, B-Tech (Aero), Mount Zion College of Engineering.

- Hand calculation of Aircraft Design parameters, Modelling and Static Structural Analysis of Fuselage and Wing Structure assembly is carried out to validate the Design structure of the Aircraft. Pre-processing, solving and post-processing is done using ANSYS WORKBENCH.

17. Finite Element Analysis, Modelling and Design Optimization of Snake Boat.

Associate: Devdas P, M-Tech, Cochin University of Science and Technology.

- Modelling of Snake boat Structure is done using CATIA, Static and Modal analysis is carried out to validate and optimized the design structure of the Snake Boat. Pre-processing, solving and post-processing is done using ANSYS WORKBENCH.

18. Finite Element Analysis and Modelling of Micro turbine Compressor.

Associate: Manikandan H, M-TECH, KMEA College of Engineering.

- Modelling is done using CATIA, Static and Modal Analysis is carried out using three different materials to observe the structure deformation and stress distribution while rotating at different Velocities. Pre-processing, solving and post-processing are done using ANSYS WORKBENCH.

19. Finite Element Analysis, Modelling and Design Optimization Billet Size for minimum Forging Load.

Associate: Arun KS, M-Tech, St. Joseph College-PALA

- Static Structural Analysis followed by the design optimization is carried out to obtain the minimum forging load for Billet Size. Pre-processing, solving and post- processing is done using ANSYS APDL.

20. Numerical Investigation On Optimum Layout Of Submarine Pipe Laying

Associate: Arun Kumar K K, M Tech, Cochin University of Science and Technology

- To establish a scheme of numerical simulation to determine the hydrodynamic properties for various layouts of submarine pipes and to suggest an optimum layout for minimum hydrodynamic forces.

21. Finite Element Analysis of RF MEMS Switch.

Associates: Minni J Kappen, Therasa Tomy, B-Tech-Electrical, Rajagiri College of Engineering.

- Thermal-structural coupled analysis is carried out to observe the deformation in the mid span section of RF MEMS Switch.Pre-processing, solving and post-processing is done using ANSYS APDL.

22. Finite Element Analysis of Ceiling Fan Shank Structure.

Associates: Agin Jose, Geo Antony, Krishnadas, Cherian, B-Tech, Amal Jyothi College of Engineering.

- Static Structural analysis is carried out to observe the deformation and pressure distribution over the ceiling fan shank structure. Pre-processing, solving and post-processing is done using ANSYS WORKBENCH.

23. Finite Element Analysis is carried out to observe the flexural behaviour of Reinforced and Pre-stressed Concrete Beams.

Associate: Zaroof Mohammed, M-Tech, NITK, Surathkal.

- Static Structural is carried out to observe the crack initiation and failure of whole structure at 16000 lbs.Pre-processing, solving and post-processing is done using ANSYS APDL.

24. Finite Element Analysis and Modelling of Aircraft Searcher Mak-ll (UAV)

Associate: Lt. Nitin Manocha, M. tech, CUSAT.

- Hand calculation of Searcher Mak-ll UAV, Modelling is done using CATIA Static structural Analysis is carried out to valid the design structure of UAV. Pre-processing, solving and post-processing is done using ANSYS WORKBENCH/APDL.

25. Analysis of Crack growth in Rubber

Associate: Shiva Prasada B, Santhosh K. R, Sriharsha. R, B.E

- A fracture analysis, combination of stress analysis and fracture mechanics to observe the crack initiation and propagation in the Rubber.

26. Finite element analysis of pressure vessel manifold

Associate: Umesh Naik. R, Kishan Kumar Rai, B.E

- A Thermal and Structural analysis of the pressure vessel manifold using finite element method to determine the structural and thermal properties of the pressure vessel manifold and to determine the safe limits.

27. Thermal & Structural analysis of Pressure vessels

Associate: Simon Mathews, Nibu Sam Chacko, Vikas Bangera B.E

- Thermal-Structural coupled field analysis of pressure vessel to get the stress distribution and validate it using ASME Code Section VIII Div 1.

28. Thermal and Structural analysis of heat Exchanger Shell

Associate: Appu C. Kurian, M.Tech,

- Thermal Analysis of heat exchanger Shell to get the temperature plots and Thermal-Structural coupled field analysis of shell to get the stress distribution then validate it using ASME Code Section VIII.

TTRC Department of Computational Fluid Dynamics

1. CFD optimization of rear diffuser in a Sedan to minimize drag

Associate: Kurian Jory, M.Tech CAD/CAM, Vellore Institute of Technology.

- CFD analysis on sedan class car was done with various under body rear diffuser configuration to understand the variation in flow pattern and drag force. The diffuser dimension was varied in lengthwise and angle wise and drag variation was studied. This data can be used for further optimization of car diffusers.

2. CFD optimization of Heat sink.

Associate: Jestin K, Abey Rajan, Justin Sunny, Midhun V.M, Deepak Johny, B.tech mechanical, Ilahia College of Engineering

- CFD simulation of heat sink was to attain optimal configuration of base plate thickness, fin frequency, and to select efficient base plate material.

3. CFD simulation of cross flow heat exchanger.

Associate: Shanulraj, Kunjunni M, Sanjay N.S -B.tech Mechanical, Toch -Cochin

- CFD simulation of cross flow heat exchanger was done to measure the performance and to find out the resulting outlet temperature of hot and cold fluid. The hot fluid was air and the cold fluid was water

4. Pressure distribution study using CFD and stress analysis in FEA on the ceiling fan shank

Associate: Agin Jose, Geo Antony, Krishnadas, Cherian, B.tech mechanical, Amal Jyothi College of Engineering

- CFD simulation of ceiling fan was done to find the pressure acting on fan blades to apply the details in stress analysis.

5. Parametric modelling of ram air channel using CFD.

Associate: Bibin Joseph, Midhun Menon, Jayasanker N, Grace Sarah Gabriel B.tech Aeronautical, Mount Zion College of Engineering

- Ram air channel of fighter aircraft was parametrically modelled using CFD which can be used for optimization of ram air channel components at minimum drag and pressure loss.

6. Wing structure analysis of searcher mark-II UAV

Associate: Lt. Nitin Manocha, Naval Institute Aeronautical Technology M.Tech, CUSAT

- CFD simulation wing was done at different angle of attack to find the pressure force action on the wing and the variation of drag and lift forces. This result was used to do the structural analysis.

7. Nose cone design

Associate: Heigurujam Don Singh

- For different nose cone model the fluid flow is studied and it is observed in which model the shock wave is mild and velocity profile is uniform.

8. Pressure recovery optimization of Centrifugal Compressor using Advanced CFD tools

Associate: Pothuri. Venkateshwara Rao

- The pressure recovery of the centrifugal compressor studied, by varying the angle of the diffuser and the most suitable angle for the desired outcome was studied.

9. Gas Turbine silencer (industrial) design optimization

Associate: Shahid Nadeem, M.Tech

- Avoiding the turbulence created inside the silencer to reduce the vibration and failure, by guiding the flow.

10. Design of different inlets for fully developed flow in axial duct fan

Associate: MD. Aslam

- Different types of inlet with varied properties are designed for the fully developed flow in the axial duct fan

11. Fluid flow analysis of piezoelectric valve less micro pump

Associate: Mohan Das A N, B.E

- A Study on the Fluid flow analysis was done for the piezoelectric valve les micro pump was done to evaluate the best possible mode.

12. Anti-icing system of aircraft wing

Associate: Jagannath Reddy, M.tech

- Analysis of heat transfer from piccolo tubes to the wing surface, which maintains a temperature on the surface to prevent icing.

13. Estimation of aerodynamic characteristics aircraft using CFD Simulation

Associate: M.D.Zameer, M.tech

- Simulation carried out in fluent for a fuselage to find out lift and drag values at various angle of attack.

14. Drag prediction around aircraft wing

Associate: Som Dutt.M.Patil, M.Tech.

- Simulation carried out in fluent for an aero foil (2d) & wing (3d) to find out lift and drag values at various angle of attack.

15. Analysis of flow performance through annular curved diffusing duct using CFD

Associate: Ashok.M, M.Tech

- Simulation of fluid flow inside the annular curved diffuser duct without hub, with hub and with hub of varying cross section and finding the pressure recovery and pressure loss.