3.0 Project Description

In the modern-day world, we are all accustomed to travelling in the aircraft since it is the safest and the most efficient mode of transportation. Our project is based on the Internal Combustion Engine of the Aircraft dealing with specific concepts related to mechanism, combustion, efficiency and noise. These factors constitute the working of an engine. The entire research is based on the engineering principles governing the system to find ways to improve the working and efficiency of the machine, reduce waste emissions, improve aerodynamics and deal with the adverse effects which may occur in the future. This section highlights the principles that will be used to answer the research questions outlined in the table below.

Table 1: Role of each team member in the project

Group member Name	**Subtopic**	**Research Questions**	**Engineering Principle**	**Role of Principle**
Reuben Ghosh	Mechanical Operation	How does mechanical operation work in internal combustion engine of an aircraft?	*Propeller*	The role of the propeller is to provide *thrust* to the engine to facilitate the flow of the aircraft in air. Essentially, a gas or a fluid is accelerated through the engine and the reaction produces a force on the engine [6].
		How does crank *mechanism* in an internal combustion engine work?	*Torque*	The role of torque is to explain the fact that how the gas force acting on the *piston* is to be converted to the *crankshaft* depending on the crank position to turn the propellers and make the aircraft move [7].

Alexandre Dinh	Combustion	What is combustion and what are its *products*?	Chemical Reaction	A combustion reaction is a chemical reaction between fuel and oxygen which produces a small explosion [8].
		Which pollutants are produced and does an engine reduce their emissions?	Catalytic Converters	Catalytic converters filter out a good part of the toxic particles before the gas is released through the exhaust pipe [9].
Abdul Rehman	Efficiency	How to improve the fuel efficiency?	*Thermodynamics*	Through Thermodynamics, engine produces *work* and *power*. Also, engine parts are rotated in an *Otto Cycle* that improves the fuel efficiency [10].
		What are the factors affecting the efficiency of an internal combustion engine?	Conservation of energy	The role of conservation of energy is when the energy gets converted from one form to another in an internal combustion engine during the take off and landing of an aircraft; some energy loses while in this process [5].
Bomi Garuba	Noise	What are the ways to reduce noise pollution by ICE?	Frequency	One of the most efficient ways to reduce the operation of the landing gears and the high lift device (flaps and slats), which are deployed during takeoff and landing as their current mode of operation unsteadies the aircraft frame tremendously and thus gives off noise pollution[11].
		What is the sonic boom phenomenon and its effects of the aircraft pilot and passengers (if its a commercial aircraft)	*Pressure*	When an aircraft passes through the air it creates a series of pressure waves front of the aircraft that eventually merge into one single shockwave

				traveling at the speed of light, that is a sonic boom [11].

4.0 Project Timeline

Project timeline and deliverables can be found in Appendix A of this document

5.0 Team Contract

Team contract can be found in Appendix B of this document

6.0 Conclusion (On your own)

Glossary Terms (no section number for glossary and also do reference for glossary terms).

Appendix A

Table 2: Project Deliverables

Major Project Deliverables	Due Date	Stages in completing those deliverables
Presentation of preliminary findings	October 16, 2018	- Conduct personal research on subtopics - Check-up meeting to prepare presentation (rehearsal) and gather the information to write the handout
Preliminary Report	October 30, 2018	- Group meeting to prepare for in-class write-up
Report of individual findings	November 13, 2018	-Research on individual subtopics and extracting data for presentation.
Presentation of team findings	November 20, 2018	- Create PowerPoint presentation - Create common document
Report of team findings	December 04, 2018	-Writing an abstract -Combining team report and conclusion
Letter of Transmittal	December 05, 2018	-Providing a brief introduction of the document that mainly explains the purpose of the project

Table 3: Team Meeting Schedule

Team Meeting Date	Team Meeting Focus
September 17, 2018	Meeting Peer mentor and proposing our individual second research questions and Engineering principles linked to them
September 25, 2018	Working on presentation and rehearsing it. Figuring out what individuals could add to their research and work on referencing in IEEE format Abdul Rehman recorded team meeting minutes
September 28, 2018	Giving the team members a brief introduction about their topic Reuben Gosh recorded team meeting minutes
October 5, 2018	Visiting the Elsie MacGill Learning Centre or Writing Tutorial Services to get the project proposal review and receive feedback
October 14, 2018	Presenting your preliminary findings to your team and rehearsing the presentation Alexandre Dinh will be recording team meeting minutes
November 18, 2018	Working on final presentation and rehearsing it in a team The rest of team members are supposed to give feedbacks Garuba Bomi will be recording team meeting minutes
November 30, 2018	Make a full report that include both team and individual components

Appendix B

Team 3 Contract

Team 3 Group Members:

Reuben Gosh, Alexandre Dinh, Abdul Rehman, and Bomi Garuba

Team Goal:

- The team's main goal for this project is the development of written and oral communication skills.
- It will also be very important to finish the project within the set deadline and avoid procrastination.

- The combination of our different talents and interests will be key to our success. An essential team goal is to finish the project before it is due and not to wait until the last minute to actually begin working.
- The key should be to learn from this term project and use the developed concepts in the future.
- Focus on each team member individual talents that can greatly help on the project.
- Motivate one another and treat each other professionally and generate more and better ideas as a team.
- Develop our team quirk: One for all and all for one.

Role of team leader:

- Improvising on organizational and management skills.
- Develop a strategy that will help the team to reach its goal.
- Making sure that everyone in the group is following the instructions and meeting the team deadline.
- Monitor the participation of each team member.
- Make sure that everything is handed in on time.
- Post due date reminders.
- Maintain an interactive environment.
- Work on establishing common ground since the project is based on team work.

Active participation & behaviour that encourages active participation:

- Encourage each other to arrive on time for the team meeting.

- Work collaboratively and help each other.
- Keep in touch through messaging and video conference.

Attendance expectations:

- Timely and regular attendance of every team meeting which is scheduled between September 17th, 2018, September 25th, 28, September 28th, 2018, October 5th, 2018, October 14th, 2018, November 18th, 2018, and November 30th, 2018.
- If a team member is unable to attend the team meeting, he is expected to notify the team leader at least 24 hours prior to the team meeting.
- If people are not able to adjust schedules for certain days team members should interact over social media or video conference.

Roles and Responsibilities of each team member:

Reuben Ghosh: Reuben's role in this team is to provide a detailed explanation of the overall operation of the internal combustion engine to the audience; he provides the important framework that will provide clarity in understanding how the mechanism of the engine works and the principles related to his subtopics and research questions. His role is also to lay the base foundation and introduce the cabinet to every team member work and facilitate smooth transition

Alexandre Dinh: Alex's role in this team is to take over from where Reuben left and explain the key concepts behind his subtopic which includes phenomenon of chemical combustion which is a prerequisite for any mechanical operation in an engine. His main responsibility is the combustion

sub topic of our project; his will list the product/pollutants that are created as a result of these chemical combustions.

Abdul Rehman: Abdul's role in this team is follow up from Alex and explain to the class how well or bad these combustion reactions that involve fuel then to go. He will provide the audience with possible methods to improve on the current fuel efficiency rates. His main responsibility is the fuel efficiency sub topic of our project; he will identify the factors that determine the fuel efficiency of an internal combustion engine present in an aircraft.

Bomi Garuba: Bomi role in this team is to take over from where Abdul left and explain different ways of reducing noise pollution in an internal combustion engine. He will also describe audience that what is sonic boom and how does it affect an aircraft with the help of using pressure as an engineering principle. His main responsibility is noise as a subtopic of our project. During presentations, his role is to finish it effectively.

How will we communicate (by email, Facebook, phone, etc.)?

- Throughout the project, the team members will be communicating through Facebook messages.

Back-up communication (alternative ways to reach team members)

- Each team member will have an email address of every other member, so that they can interact via email, provide feedback on Google Docs or catch up with the group members after class.

How will we make decisions as a group?

- We will make decisions on consensus as a group in person.

Use of log books/discussion groups for meeting agendas and minutes (action items/follow-up):

- Make a google document and sharing it with everyone so each team member has access to it.
- Each person in the team must submit their research notes on cu learn before the due date.
- Questions regarding the project should always be posted on Facebook group chat.

Guidelines for sharing research resources, and research notes:

Research notes must follow the following order:

- Title for research notes
- The research question 1
- Engineering principle for question 1
- Point form notes to answer the question
- Source in IEEE format
- The research question 2
- Engineering principle for question 2
- Point form notes to answer the question
- Source in IEEE format

The CCDP 2100 Style Guide should be used for formatting.

Problem solving approaches/ensuring equal opportunities for team participation:

- Firstly, the team must be resolved in the Facebook group chat.
- If the solution of the problem not found, then it would be discussed during a team meeting.
- Each team member will be given equal amount of work that should get finish on time.

Conflict resolution:

- Find the source of the conflict.
- Give an opportunity to everyone who was involved in the conflict to express his perception.
- Coming up with a contingency plan that will bring a fair and balanced result i.e. Should two or more members be involved in a conflict about workload share, the contingency plan for said situation shall be taken to Professor Luke Russell.

Consequences:

- If a team member is not able to attend a meeting, a grid is designed to keep track of total number of absences of each team member:

Table 3: Keep track of absences of each team member

Meeting No:	**Name of Group Member:**	**Date of Team Meeting:**	**Discipline Step and Action:**

- If a person misses more than two team meetings, he pays a penalty of ten dollars.
- A team member who is late at the meeting but for only under 5 minutes will not face any consequences. But after that, for every 10 minutes someone is late, coffee for every group member at second cup.

The final consequence of not working in accordance with the members is being fired from the team.

RuebenGhosh ---------- Bomi Garuba ----------

AbdulRehman ---------- AlexDinh ----------