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Aircraft Design for Noise Cancellation

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Abstract: The aircraft design is optimized in such a way that the annoying noise produced during the operation of aircraft from outside is reduced. This noise reduction is achieved through using water as the barrier between cabin and outside aircraft. This will enhance the passenger comfort during the flight.

Keywords: Airplane noise, flight sound control design, Engine sound reduction in flight, Passenger comfort.,

I. INTRODUCTION

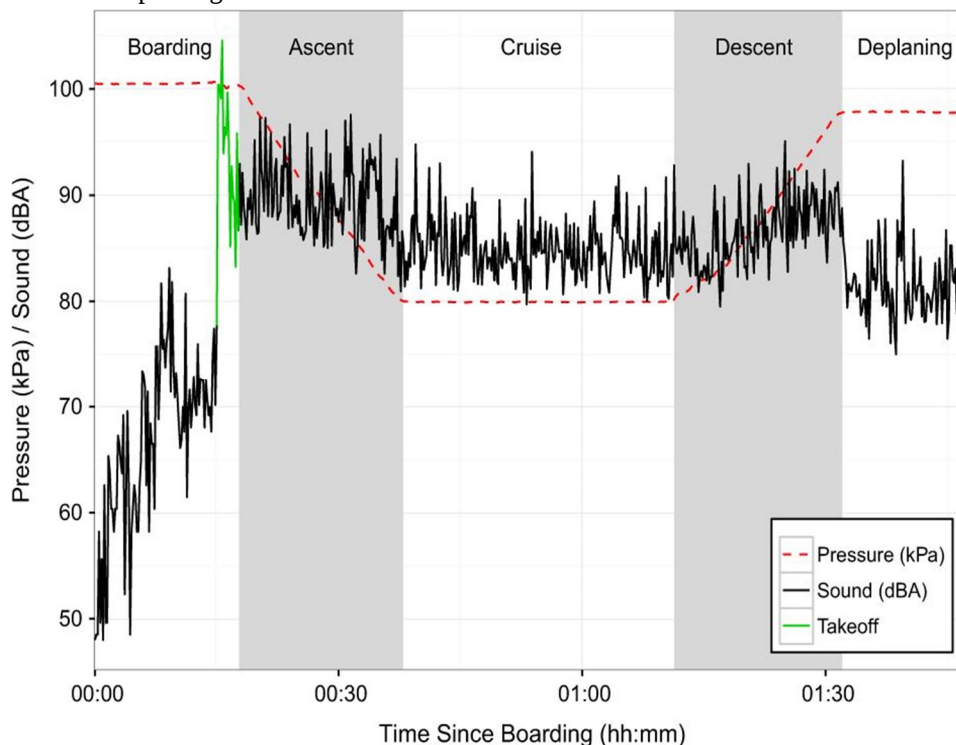
Today the travel becomes faster and more comfortable with the advent of aircrafts. Aircraft makes the world to develop in various fields however the aircraft itself is also developing day by day. This paper is on among the development endeavors. The aircraft creates huge noise during the flight particularly at the time of Takeoff and Landing. This noise makes the more uncomfortable to the passengers and takes adverse route for the cardio patients. Even some heart attacks are recorded during flight due to the noise of aircrafts. I here altered the design concept of an aircraft to reduce the sound at cabin.

II. CONCEPT

The water to be used during flight is stored separately in the tank which is generally located at the empennage. Here the tank configuration is changed to reduce the noise creation. The cabin (in which passengers are seated) will be enclosed by cylindrical shell. Between the cabin and the shell, the water to be used in flight is poured. This typically represents the capsule (cabin) inside the water shell. The sound from outside is absorbed by the water and send very few decibel sound inside the cabin.

III. DESIGN

The below graph shows the average sound of 200 flights during its operation. From the graph it is clearly come to know that sound during flight is unbearable to the passengers.



Graph 1. Sound during Flight.

The aircraft cabin is the capsule made up of steel or aluminum plate and fixed with the aircraft structure. The sound from the outside is travelling easily into the cabin. Here another shell is made diametrically as the enclosure for cabin as shown in the figure.

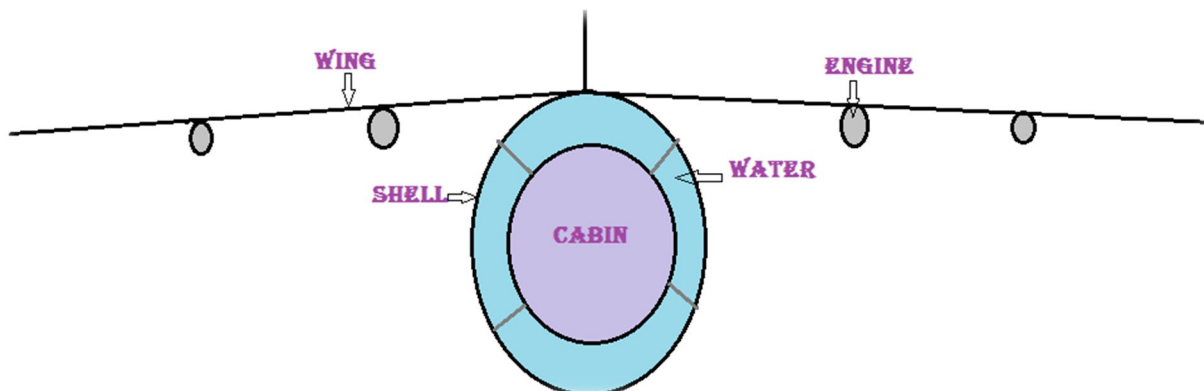


Fig1. Sectional View of Design.

The water to be used for various purposes are in flight is poured into the shell. The sound waves travels through the outer skin of aircraft and reaches the water shell. Here the water absorbs the sound from outside. The University of RHODE ISLAND conducted a research and found that as the sound travels through the medium of water, the part of acoustic energy is converted into the heat energy. Thus the sound is reduced inside the cabin and the acoustic energy is transformed into the heat energy and stored in the water. The heat generated in this process is useful to compensate temperature loss at higher altitude. Hence the cabin pressurization can be attained at low energy consumption. The system is designed in such a way that both the fresh water and used waste water are stored subsequently in the shell as there is no facility to drain at flight. However the system is efficient only at the availability of full water throughout the flight. Both the walls of the shell are made up of stainless steel because of its high corrosion resistance and low in weight. As the water is stagnant for long time inside the shell, the additional powerful corrosion resistance coating is mandatory.

IV. LIMITATIONS AND SOLUTIONS

A. Weight

Due to the addition of material in the formation of enclosure shell, the weight of the aircraft will increase. But in modern day flights, aircraft performance is altered for providing comfort to the passengers.

B. Corrosion

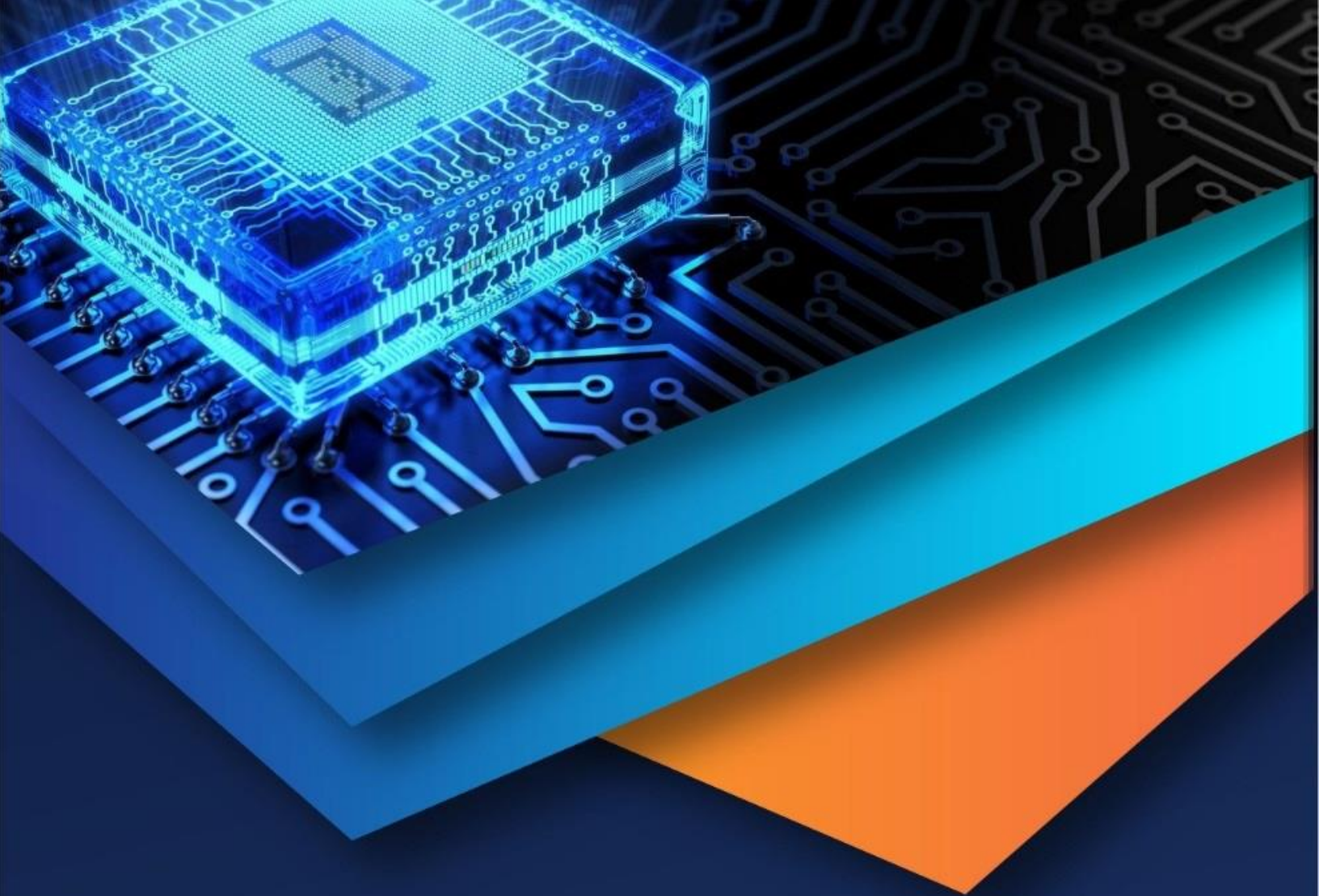
There may be corrosion problem due to the usage of water. It can be reduced by using corrosion resistant coating. Further casasco sensor is used to find the corrosion in water.

V. CONCLUSION

With the formation of enclosure shell and pour it with water, the sound from outside of the airplane is reduced. This sound reduction will improve the flight comfort.

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