

A Study of Fog Reducer in Aircraft Applications

Kavya Vaddadi, V.V.S. Nikhil Bharadwaj, T.V.Vineeta, B.V.Sai Anoop, N. Anirudh, Amujuri Suma Sri, Kiran Virat, Shaik Munna, Bheemarasetty.Prudhvi, P. Shiva Shashank

Design Engineer, Vaddadi Engineering Design & Analysis Services, Greater Noida .Uttar Pradesh.
Department of Aeronautical Engineering, MLR Institute of Technology, Dundigal, Hyderabad, INDIA.

Abstract the main content of this paper revolves around an innovative invention of a device which removes the fog. Humans have been facing many problems due to fog. The various problems which are created due to fog are discussed. The main problem which causes huge loss in case of both money and time is the flight delay and solution to these problems is found to be fog reducer, a reliable device which converts fog or moist air into dry air. The description, working, construction of fog reducer are showed in detail. The various applications of fog reducer are listed out, among which mainly focused one is fog reducer in aircraft applications. [1]

Keywords: Exhaust fan, Heat insulator, Convergent and Divergent Wooden frame.

I. INTRODUCTION

Fog disrupts human activity in a number of ways. Landing and takeoff of planes from air-port is impossible in heavy fog conditions. For example, Heathrow air-port, London was closed for two days during Christmas in December 2006 resulting in cancellation of 200 flights. The loss is estimated to be seven million pounds apart from the inconvenience caused to the travelers who planned to enjoy Christmas holidays. In India also Indira Gandhi international air-port and other air-ports in North India face the same problems now and then. High way traffic also comes to a standstill. [1] Arrival and departure of trains also becomes unpredictable. Photosynthetic activity of greenery reduces enormously. Diseases and pests reduce agricultural production. The duration and intensity of solar insolation also gets reduced. Human activity also slows down and public health also is affected. During Sevier winter number of people die in north India. So far, no device is available to reduce the fog. The innovative thought of fog reducer is described in this paper. [2]

II. PROBLEMS FOR FLIGHT DUE TO FOG

Many aircrafts get delayed due to the fog. There have been many losses due to delay in flights due to the fog in the airport. The fog usually makes the pilot unable to see clearly from the cockpit. This makes the pilot unable to control the aircraft in proper way, which may lead to air crash with several deaths. The engine damages when the fog enters into it and the blades will spoil, which again leads to air crash. In the airport the passengers who reach airport face many problems due to the fog. [4, 5]



Fig-1 Aircraft flying in fog [2]



Fig-2 Fog causing aircraft engine failure [2]



Fig-3 Fog causing air traffic causing aircraft accident. [2]



Fig-4 Aircraft wing in fog viewed from window [2]



Fig-5 Pilot's unclear view due to fog causing aircraft crash landing [2]

III. DESCRIPTION

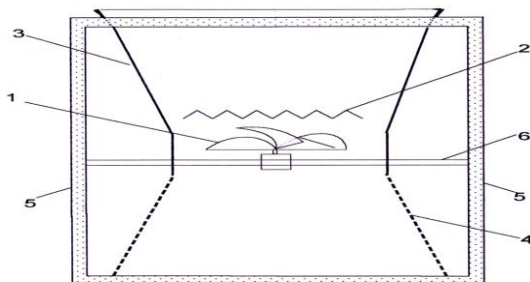
Fog reducer is a simple and reliable device. Frame, which is covered from ground to the neck, is covered with two layers the outer one made up of cotton or jute are any other hydrophilic material and inner one made of hydrophobic material. The upper part has a divergent funnel made of thin and stiff plastic or metal sheet leaving the top end open.



Fig-6 wooden pieces for frame [2]



Fig-7 wooden frame of assembled convergent and divergent parts [2]



Figure

Fig-8 Fog reducer sketch of assembled view [1]

The parts are as shown in figure are:

- 1- Exhaust fan
- 2- Heat insulator
- 3- Convergent part of wooden frame
- 4- Divergent part of wooden frame
- 5- Rectangular casing of hydrophobic and hydrophilic materials
- 6- Fan mount connecting fan, rectangular casing and wooden frame.

IV. WORKING

When the exhaust fan is switched on, the fog reducer sucks the air from the convergent inlet and the air is passed into the Heat insulator. The heat insulator changes the state of the moist air, and air reaches the exhaust fan. The air from the exhaust fan reaches the divergent part of the fog reducer. The fan is fixed into the casing with the help of the fan mount. The casing consists of hydrophobic and hydrophilic materials, by which the water from the air is absorbed and air becomes dry. The water from the casing is then collected into a container.

V. APPLICATIONS

An exhaust fan with motor and heater above it or a propeller and I.C. engine above it are fixed at the neck of the frame. When the fan or propeller is run, the surrounding air is sucked through the bottom curtain. The outer layer absorbs mist and inner layer repels mist allowing dry air to flow in. The combined action of two layers removes the mist in air and the mist drips down as water. The air rises up with in the frame and gets heated by the heater over the fan or by IC engine over the propeller. The warm air rises up and mixes with top layers of air and reduces fog at that level. As fog reducer runs, the surrounding air with mist continues to flow into the fog reducer and process continues. As the mist gets cleared solar insulation enters and heats the air thereby reduced the mist quickly. The range of clearance depends on the intensity of the fog and the power of the motor or the IC engine and the running time. This is very much essential in places where heavy fog occurs and forces the people to sit around fire place which burns all types of trash. This emits carbon flakes which grow up in the atmosphere and such layers are conceder to be worse than green-house gases. [6, 7] Fog reducer has to be developed and standardized to meet the requirements of places like air-ports, railway stations, high ways, in cities, agriculture and horticulture etc.

VI. REQUIREMENTS AND MATERIALS

- 1- Ply wood: 1.5 mm thick
100x50 cm (4 in quality)
- 2- 8 L Clamps (made of metal) for fan mount
- 3- Bolts and nuts 16 sets
- 4- Heat insulator

VIII. SOFTWARE MODEL OF FOG REDUCER



Fig-10 L shaped clamps [2]

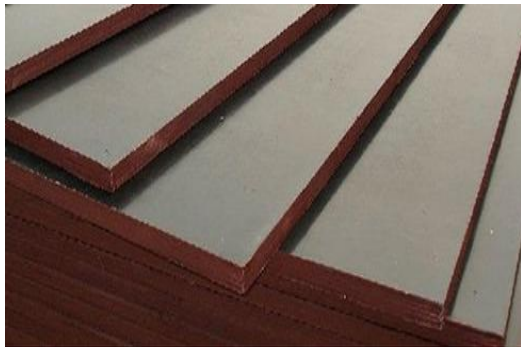


Fig-11 Ply wood pieces [2]



Fig-12 Bolts and nuts [2]

VII. CONSTRUCTION

1. The casing is arranged with the hydrophobic and hydrophilic materials.
2. The wood pieces are fixed in convergent and divergent manner as shown in the figure.
3. Exhaust fan is fixed with the help of L clamps onto the wooden frame.
4. The heat insulator is then arranged in front of the exhaust fan which changes the state of the absorbed moist air.

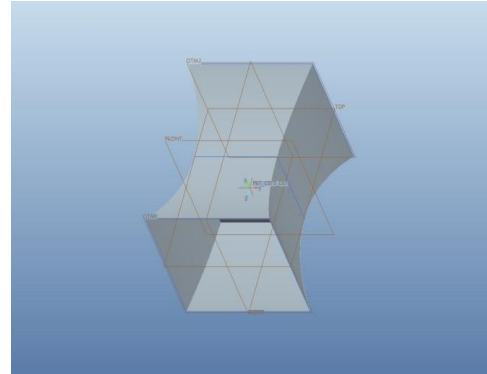


Fig-13: Convergent-Divergent frame of fog reducer [3]

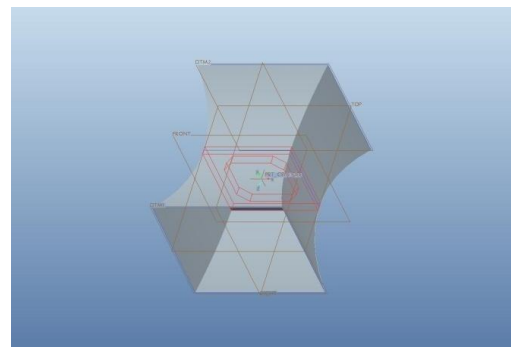


Fig-14: Fan frame in the convergent-Divergent wooden frame [3]

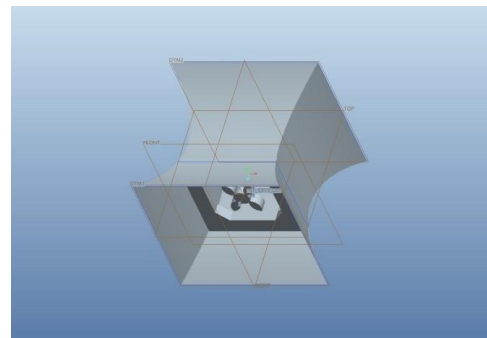


Fig-15: fan assembled in the C-D frame [3]

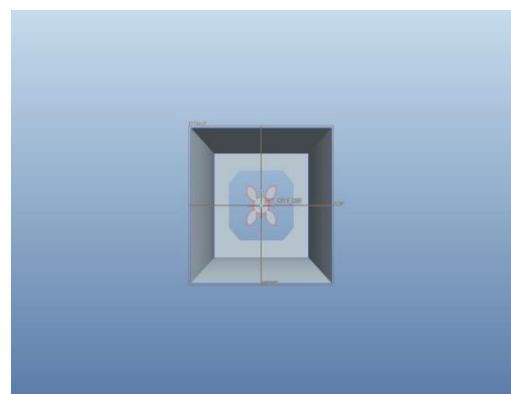


Fig-16: Front View of fan and C-D frame [3]

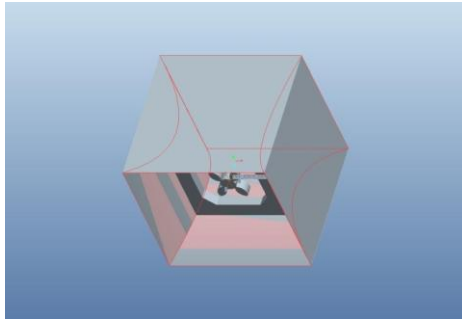


Fig-17: Assembled parts of wooden frame, Exhaust fan and Rectangular casing (made of hydrophobic and hydrophilic materials) [3]

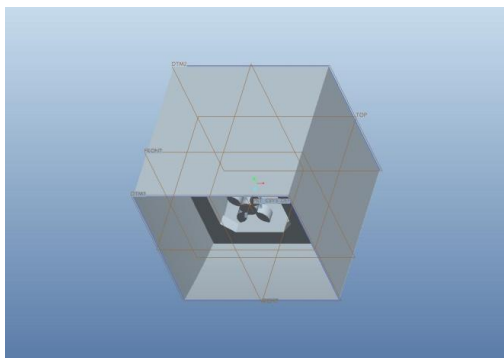


Fig-18: Final assembly of fog reducer [3]

IX. CONCLUSION

The fog reducer has been manufactured and its working has been tested, which can be used for the following problems:

- Decrease in agricultural production due to fog which reduces photosynthesis.
- Arrival and departure of trains becomes unpredictable due to fog.
- During Sevier winter number of people die in north India. So far, no device is available to reduce the fog.
- Problem in road transportation due to fog.



Fig-19 Fields covered by a layer of fog [2]



Fig-20 Problem in road transportation due to fog [2]



Fig-21 Arrival and departure of trains also becomes unpredictable due to fog. [2]

The capacity of the fog reducer is found to be 2 kilometers. For bigger applications, the capacity can be increased by increasing the size of the fan and accordingly other parts of assembly. The RADAR signals transfer problem due to fog has already been solved, but the Problems faced by the pilot cockpit vision during flight still exist. These problems can be eliminated by arranging fog reducer to the aircraft.

X. FUTURE SCOPE

An aircraft which overcomes the problem due to fog can be designed by Embedding fog reducer on to the top of Aircraft cockpit. The fog reducer can be equipped with solar panels above the surface so that the fan in the fog reducer runs with solar power also.

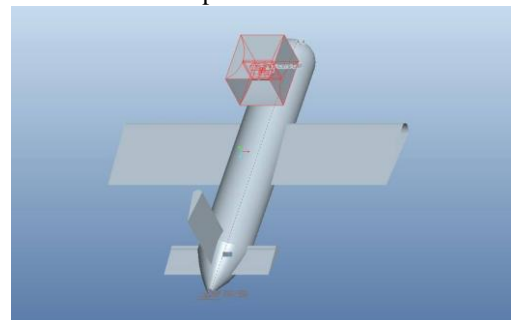


Fig-22 Assembled side view of Fog reducer above aircraft [8]

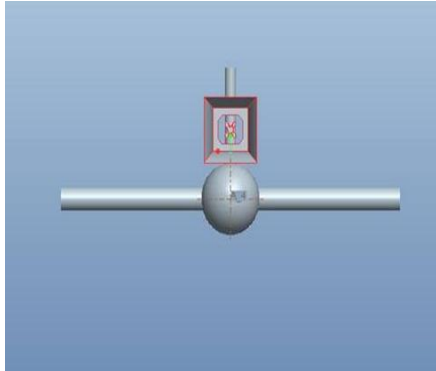


Fig-23 Fog reducer on aircraft Front view [8]

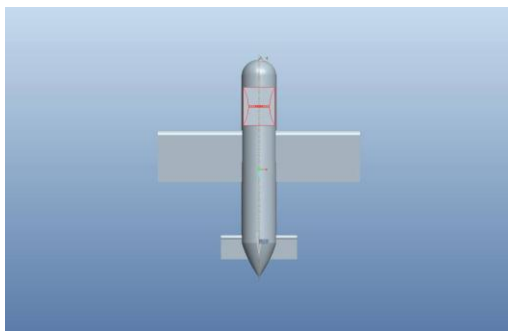


Fig-24 Top view of Fog reducer on aircraft [8]

XI. ACKNOWLEDGEMENT

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- [9] Images Taken From Pro-E Model of Fog Reducer On Aircraft.

AUTHOR'S BIOGRAPHY

Kavya Vaddadi is design engineer, vaddadi engineering design & analysis services. Greater noida.



V.V.S.Nikhil Bharadwaj Is Research Scholar at Ancient Aeronautics and Student, MLR Institute Of Technology, Dundigal, Hyderabad.



T.V.Vineeta Is Research Scholar at Ancient Aeronautics and Student , MLR Institute Of Technology , Dundigal , Hyderabad .



B.V.Sai Anoop is research scholar at ancient Aeronautics and Student , MLR Institute Of Technology , Dundigal , Hyderabad .



N.Anirudh Is Research Scholar at Ancient Aeronautics and Student , MLR Institute Of Technology , Dundigal , Hyderabad .



Suma Amujuri is Student, MLR Institute of Technology, Dundigal, Hyderabad.



Kiran Virat is Student, MLR Institute Of Technology, Dundigal ,
Hyderabad .



Shaik Munna is Student , MLR Institute Of Technology , Dundigal ,
Hyderabad .



Bheemarasetty.Prudhvi is Student , MLR Institute Of Technology ,
Dundigal , Hyderabad .



P.Shiva Shashank is Student, MLR Institute Of Technology, Dundigal,
Hyderabad .

