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Noise Prevention and Control at Aviation Station

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***Abstract:** In recent years, noise has become one of the major environmental pollution in the world. The noise are generated by many different sources, one of the major source is aircraft. Aviation in india, broadly divided into two major categories (i.e) military and civil aviation. India is fastest-growing aviation market in the world, according to the International Air Transport Association (IATA). But when we think about safety, aircraft is one of the major source of environment noise pollution. The human exposure to excessive of noise is the major avoidable cause of permanent hearing impairment and it can also causes other major health effects are lack of concentration, irritation, headache, sleep disturbances, etc.*
***Keywords:** Sustainable environment, Noise pollution, health*

I. INTRODUCTION

In recent years, the world is getting rapid growth towards the advance technologies. By using the advance technologies and devices, the environmental noise pollution is also increased simultaneously. The environmental noise is commonly generated by roadways, railways, airways and of course by industries. The people who are exposure to excessive noise is the major avoidable cause of a permanent hearing loss and some of the other major health effects are lack of concentration, irritation, fatigue, sleep disturbances, etc. Earmuffs, ear plugs and ear canal caps are the main types of hearing protector, wearing these hearing protector in the workplace can minimize the noise pollution. Every industries have to give training and education regarding harmful effect noise pollution.

II. SOURCES OF AVIATION NOISE

Aircraft noise is noise pollution produced by aircraft during the various phases of a flight. Sound production is divided into three categories:

1) *Mechanical Noise* - rotation of the engine parts, most noticeable when fan blades reach supersonic speeds.
2) *Aerodynamic Noise* - from the airflow around the surfaces of the aircraft, especially when flying low at high speeds.
3) *Noise from Aircraft Systems*- cockpit and cabin pressurization and conditioning systems, and Auxiliary Power units.

The industry has been working to reduce noise for decades. On average, aircraft are already 50% quieter today than they were ten years ago, and 75% quieter than the first generation of jet aircraft. It is estimated that the noise footprint of each new generation of aircraft is at least 15% lower than that of the aircraft it replaces.

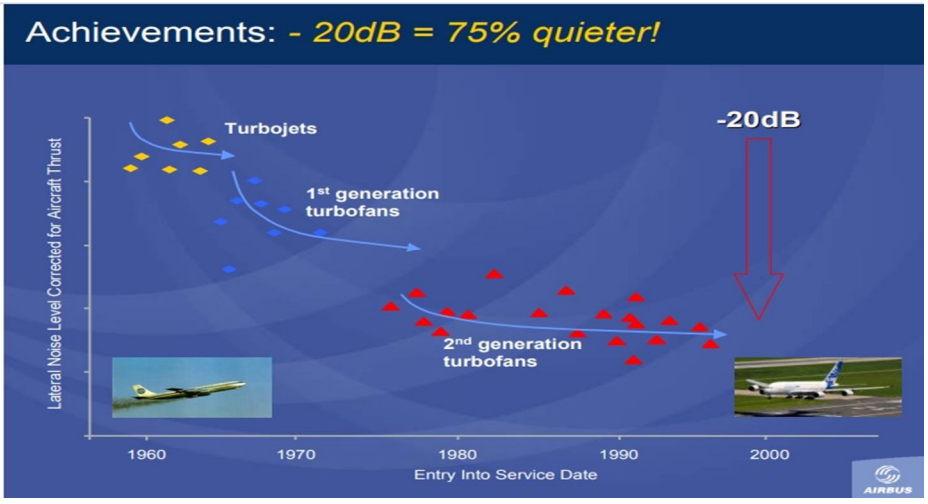


Fig 1 : Achievements

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III.METHODOLOGY

The International Civil Aviation Organization (ICAO) recommends the certification standards for the noise characteristics of aircraft. The main overarching ICAO policy on aircraft noise is the "Balanced Approach to Aircraft Noise Management". The balanced approach consists of identify the noise problem at a specific airport and analyzing various measures available to reduce noise through the exploration of various measures which can be classified into four principal elements. The goal is to address noise problems on an individual airport basis and to identify the noise-related measures that achieve maximum environmental benefit most cost-effectively using objective and measurable criteria.

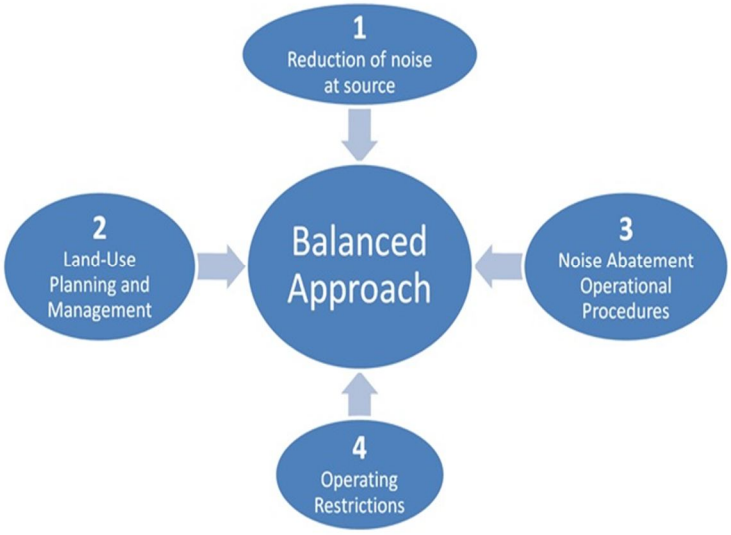


Fig 2: Balance Approach

A. Reduction Of Noise At Source

An important pillar of the Balanced Approach to Aircraft Noise Management is the reduction of noise at source. Aircraft noise ("noise at source") has been controlled since the 1970s by the setting of noise limits for aircraft in the form Standards and Recommended Practices (SARPs) contained in Annex 16 to the Convention on International Civil Aviation (the "Chicago Convention"). This continues to be the case today. Noise provisions appear in Volume I of Annex 16. The primary purpose of noise certification is to ensure that the latest available noise reduction technology is incorporated into aircraft design and that this is demonstrated by procedures that are relevant to day-to-day operations. This aims to ensure that noise reductions offered by technology are reflected in reductions around airports.

B. Land-Use Planning And Management

Land-use planning and management is an effective means to ensure that the activities nearby airports are compatible with aviation. Its main goal is to minimize the population affected by aircraft noise by introducing land-use zoning around airports.Compatible land-use planning and management is also a vital instrument in ensuring that the gains achieved by the reduced noise of the latest generation of aircraft are not offset by further residential development around airports.

C. Noise Abatement Operational Procedures

These procedures aim to minimize noise pollution around the airport by optimizing how aircraft use the facilities.The possibilities include noise preferential runways and routes, and noise abatement procedures for take-off and landing. For example, by extending the usable runway in the direction away from inhabited areas, aircraft can fly at higher altitude when they pass above nearby residential buildings. This technique is used at Montreal-Trudeau airport. Another technique is to require pilots to make a turn once they have reached a safe altitude, thereby avoiding overflying certain zones.

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D. Operating Restrictions

Restrictions can be placed on aircraft operating at certain airports.

1) Global restrictions which apply to all traffic at an airport.
2) Restrictions specific to certain aircraft types (depending on their noise emissions characteristics)
3) Partial restrictions which apply at certain periods (times of day, daytime/night-time, days of the week)

IV. REVIEW OF LITERATURE

Several regulations have also been enacted by the government to ensure that working men and women have safe and healthy working conditions. The Factories Act, 1948, The Environment (Protection) Act, 1986 and the Noise pollution (Regulation and control) Rules, 2000; These are the steps towards noise control

"The responsibility as to enforcement of noise pollution control measures-

1) The noise level in the area/zone shall not exceed the ambient air quality standard in respect of noise as specified in the schedule.
2) The authority shall be responsible for the enforcement of noise pollution control measures and the due compliance of the ambient air quality standards in respect of noise.
3) The respective state pollution control boards or pollution control committee in consultation with the Central Pollution Control Board (CPCB) shall collect, compile and publish technical and statistical data relating to noise pollution and measures devised for its effective prevention, control and abatement.

However, as the noise levels in the workplace are reduced through regulations and general public comes bettered informed of the potential consequences of noise exposure, the importance of an industry`s contributions to overall noise level in the community will no doubt increase.

A. Legal Details

Following are applicable statutory requirements in case of noise pollution and control:

1) As per Factories Rules, 1948, "High noise level" means any noise level measured on the A weighted scale is 90 dB or above
2) As BIS Code IS-4954-1968 (Noise abatement in town planning recommendations) to avoid annoyance and disturbance caused to the community from various sources of noise.
3) As per The Noise Pollution (Regulation and Control) Rules, 2000, under Environment (Protection) Rules,1986, notified by the Ministry of Environment and Forests

B. Regulatory Guidelines: General

As per Factory Rules: Permissible limit of exposure for Continuous Noise

1) As per Factories Rules, 1948, "High noise level" means any noise levelmeasured on the A weighted scale is 90 dB or above
2) In every factory, a suitable engineering control or administrative measures shall be taken to ensure, so far as is reasonably practicable, that no worker is exposed to sound levels exceeding the specified maximum permissible noise exposure levels:

Hrs of Exposure	Intensity of Exposure in dB(A)	
	Indian Standard	OSHA
8 Hr	85	90
6 Hr	92	92
4 Hr	95	95
3 Hr	97	97
2 Hr	100	100
1 Hr	105	105
30 Min	110	110
15 Min	115	115

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C. The Noise Pollution (Regulation & Control) Rules, 2000

As per The Noise Pollution (Regulation & Control) Rules, 2000; the ambient air quality standards in respect of noise has been mentioned for different areas/zones shall be such as:

Area Code	Category of Area/Zone	Limits in dB	
		Day Time	Night Time
(A)	Industrial Area	75	70
(B)	Commercial Area	65	55
(C)	Residential Area	55	45
(D)	Silence Zone	50	45

V. HEALTH EFFECTS OF AIRCRAFT NOISE

Aircraft noise results impacts on various health endpoints including cardiovascular disease, night-time effects on sleep disturbance, children's cognition, psychological effects, performance and annoyance.

There can be health related consequences of exposure to aircraft noise. For example, cardiovascular effects that may arise as a consequence of stress caused by noise, sleep disturbance where sleep patterns are disturbed and conscious and premature awakenings may occur, and noise related annoyance that can cause negative emotions. Noise can also cause cognitive impairment in children, which can lead to a subsequent impairment in the quality of life. In residential areas, outdoor aircraft noise-induced equivalent noise levels of 60 dB(A) in the daytime and 45 dB(A) at night are associated with an increased incidence of hypertension. There is a dose-response relationship between aircraft noise and the occurrence of arterial hypertension. The prescription frequency of blood pressure-lowering medications is associated dose-dependently with aircraft noise from a level of about 45 dB(A). Around 25% of the population are greatly annoyed by exposure to noise of 55 dB(A) during the daytime. Exposure to 50 dB(A) in the daytime (outside) is associated with relevant learning difficulties in schoolchildren Or long-term noise exposure, diagram representing the possible pathways that lead to health outcomes as a result of noise is shown below. In view of the experimental findings indicating that people do not physiologically habituate to noise exposure, even after being exposed for many years and even when they do not consciously report any disturbance during sleep. The model considers two pathways.

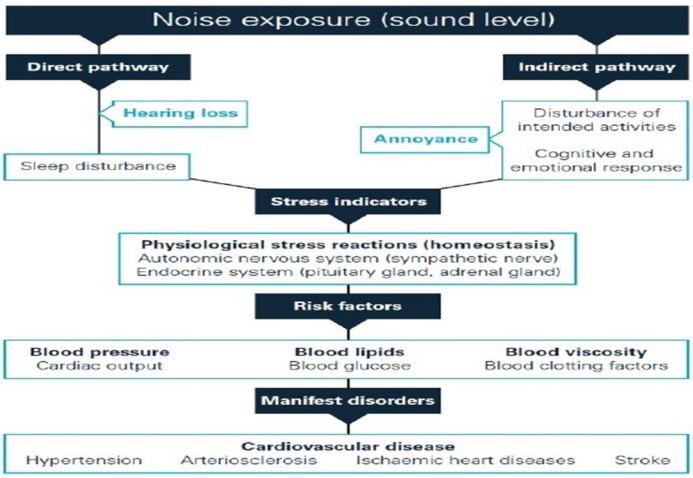


Fig 3: Health Effect

VI. PREVENTION AND CONTROL OF NOISE POLLUTION

A. Aircraft Noise Reduction

One way to protect the population from aircraft noise is active noise protection. That is, reducing the noise directly at the source. There is a considerable amount of noise generated from the aircraft during its take- off and landing. These include the improvement of engine technology. Since the introduction of jet engines, the volume has already been reduced by 25 decibels. This corresponds to an 80% noise reduction. As a result, the more modern aircraft cause significantly less noise than the older aircraft.

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Even in future models, the arrangement of the engines is increasingly crystallized at the rear and above the fuselage, so that the noise radiates upwards rather than towards the ground. The latest Airbus model constitutes another major step forward. Compared to the types of aircraft it replaces, the A320neo reduces perceived noise by half.

VII. CONCLUSIONS

Awareness should be created among workers about the harmful effects of noise on hearing and other body systems by implementing compulsory education and training programs. Aircraft Noise pollution is the excessive noise that may harm the activities of human being and animals. The source of most outdoor noise worldwide is mainly caused by transportation and industries. Noise pollution is very dangerous to both human and animals, because it can cause many effect to their health and also to the environment. So noise pollution should be control and be under consideration

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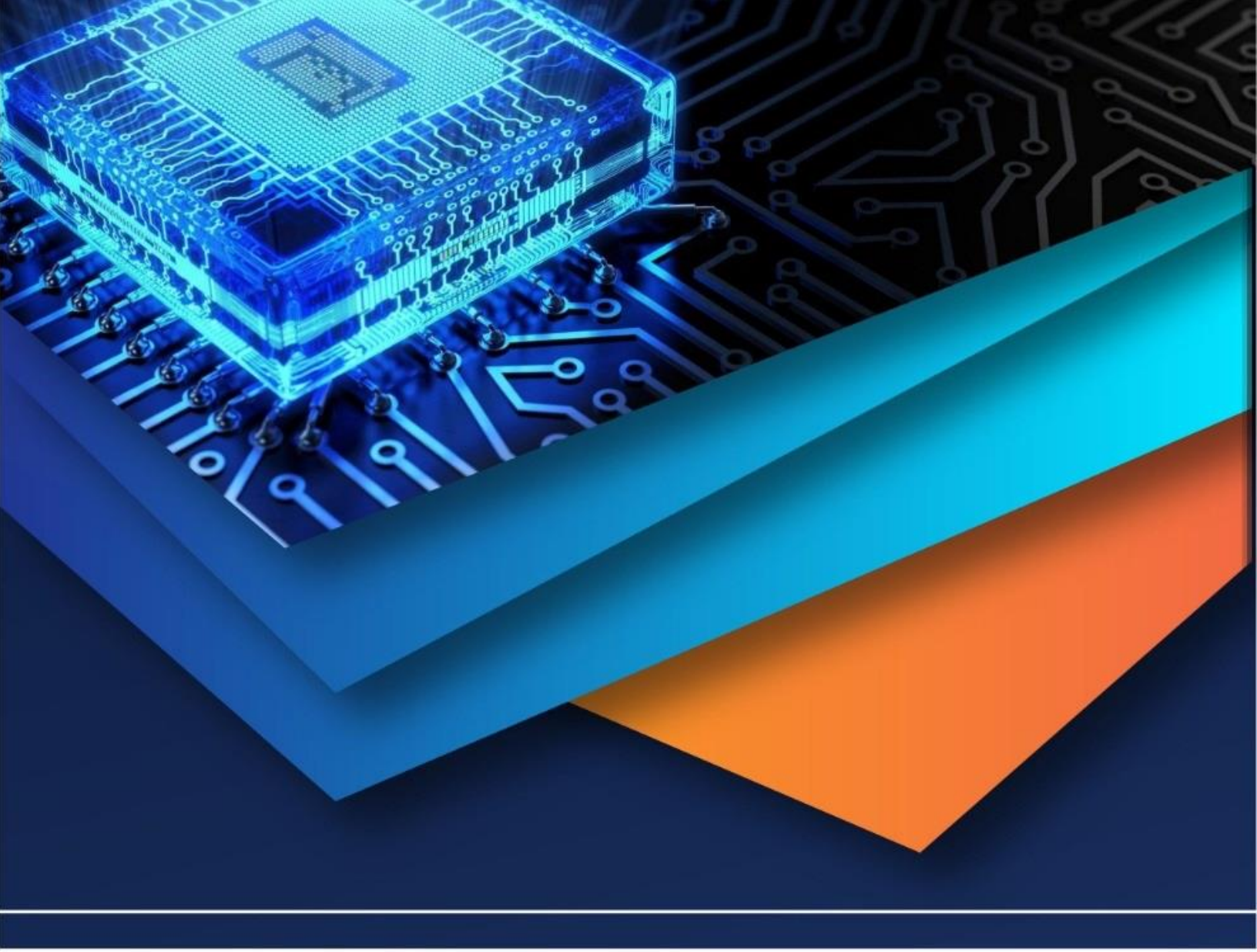
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