

Date 30th September 2011

GOVERNMENT OF INDIA
CIVIL AVIATION DEPARTMENT
DIRECTOR GENERAL OF CIVIL AVIATION

AIRWORTHINESS ADVISORY CIRCULAR

Subject: - Duty Time Limitation – Aircraft Maintenance Engineer.

Introduction:

The aviation maintenance system is heavily dependent upon people being able to perform their jobs reliably and efficiently. The advent of modern industrial processes, the globalization of the economy, and the proliferation of information technology, among other factors, have contributed to the creation of a 24-hour society in recent times. As the demand for 24-hour availability of goods and services has risen over the past few decades, the prevalence of shift work has likewise increased. Further the opportunity to work abroad and constant migration to pursue better avenues by Aircraft Maintenance Engineer (AME) has brought a great challenge for managers to manage the shift optimizing the available manpower resources. Managing the shift with shortage of maintenance personnel should have obvious outcome of over-stressing and as a result fatigue becomes a contributing factor for casual approach in maintenance.

Purpose:

Though there have been Duty Time Limitation (DTL) prevalent for Pilot and Cabin crew for some considerable time but no serious thought has been perceived in this area for AME. Purpose of this AAC is to highlight the major concerns in the area of DTL for AME and to provide guidelines to Aircraft Maintenance Organization (AMO) to frame policy to address the issue without prejudice to any other requirements.

Shift work:

As most of the Aircraft maintenance activities are undertaken by shift system therefore impact of shift work in the behavioral pattern of AME while carrying out maintenance work should be understood and taken cognizance. Shift work can

be defined as any arrangement of daily working hours that differs from the standard daytime hours. The nature of shift systems can vary widely along several dimensions, including the number and length of shifts, the presence or absence of night work, the length of the shift cycles, the start and stop times of each shift, and the number/ placement of days off.

The individual who regularly work atypical hours is at greater risk for physical and psychological impairment or disease than typical day worker. This risk is assumed to originate from the physical and psychological stress that develops from work schedule-related disruptions of their biological functions, sleep, and social and/or family life. Considering Aircraft maintenance and servicing is a Safety Critical occupation with a direct link in the chain of events that can lead to a major aircraft incident/ accident, relationship between shift work and health and safety should be adequately addressed by all organizations.

Following factors which advocates DTL for AME should be taken cognizance by all organization to avoid any fatigue related error of AME as contributory factor for weak link in safety chain.

Effect of shift work on health:

For sustaining operational requirement, many organizations have to maintain round the clock Aircraft maintenance activities and therefore to maintain 24 hrs, 7 days shift system. The maintenance personnel who are working in this system have to adhere different shift patterns/ time scales for each shift, therefore susceptible various physiological disorders.

Fatigue/ Sleepiness disorders:

The different time schedule of shift may cause circadian (around a day) rhythms and internal body clock desynchronization with sleep/ wake cycle and as a result could be contributory factor for fatigue/ sleepiness at work place.

Sleep is the primary human function disrupted by shift work. Many bodily processes, such as temperature, blood pressure, and heart rate, are at their lowest ebb at night; so, it is not surprising that people who try to work at night and sleep during the day often report that they cannot do either very well. Shift workers who need to sleep during the day may have difficulty in falling asleep and remaining asleep because they are attempting sleep when they are at odds with their circadian rhythms. And, because of the conflict between work and personal demands, shift workers rarely achieve full adjustment to their shift work schedules

Psychological/Emotional Disorders:

A common finding in shift system is that psychological and emotional distress frequently accompanies shift work although the magnitude of the effects is sometimes low. These findings are consistent with the psychological effects of shifting schedules and the resulting sleep disruption discussed previously. The psychological distress that often accompanies shift work from its onset may be the primary factor that provokes many to leave shift work.

Gastrointestinal Disorders:

Gastrointestinal disorders are the most prevalent health complaint associated with shift and night work. Irregular bowel movements and constipation, heartburn, gas, and appetite disturbances are to name the few which people have to manage beside their work.

Cardiovascular Disorders:

It is acknowledged fact that there exists relationship between shift work and cardiovascular disease. Various studies in related area reported increased risk of cardiovascular disease in shift workers specially working in groups (e.g. smoking). A mismatch between circadian rhythms and the timing of sleep, problems with family and social life, the behavior of shift workers including poor eating habits and increased tobacco and alcohol consumption are some of the ill effects of working in shift which can increase the risk of cardiovascular disease for maintenance personnel.

Other Individual Factors:

Over the age of 45 - 50 years, shift workers increasingly encounter difficulties in altering their sleep-wake cycles. Specifically, aging people experience a decrease in "deep sleep", an increase in "light sleep". Due to physiological effects of aging it becomes more difficult to cope up with the work pressure of shift for the people over the age of 50.

Guidelines for Good Practices:

Some of the good practices while managing the shift work should be practiced by every organization in order to:

1. Minimise the buildup of fatigue over periods of work
2. Maximise the dissipation of fatigue over periods of rest
3. Minimise sleep problems and circadian disruption

Daily Limits:

As performance of maintenance personal exponentially varies with extended period of shift work, therefore, the time schedule of shift should be scrupulously adhered, to avoid fatigue related issues. Generally shift durations are 8 hrs, which may extend due to demand of work. However, working more than 12 hrs should be considered undesirable. Maintenance personnel should get adequate rest period between two shifts.

Breaks:

As fatigue builds up over a period of work and that this can be, at least partially ameliorated by the provision of breaks. Therefore, working longer duration without any break should as far as possible be avoided.

Longer Limits:

As some of the residual fatigue may accumulate over weeks and months despite the provision of rest days, therefore limiting the work which can be undertaken over longer period of time and provision of leave in reasonable time is important.

Limits on Night Shifts:

There is good objective evidence that risk is increased at night by about 30% relative to the morning/day shift working staff. The risk becomes more prominent when night shifts are performed successively. Therefore, number of continuous night shift should not exceed more than two and same should be followed by at least two successive days rest period.

Recommendations:

1. Employers should consider developing risk management systems to enlighten the AME in this regard.
2. Employer should develop educational programme to increase aircraft maintenance engineers' awareness of the problems associated with shift work. In particular, it is important to draw their attention to the objective trends in risk with a view to increasing their vigilance at points when risk may be high despite the fact that fatigue may not be. It is also important to provide information on how to plan for night work, and to give guidance on the health risks which seem to be associated with shift work, particularly at night.

3. Aircraft maintenance personnel should report for duty after adequately rested.
4. No scheduled shift should exceed 12 hours.
5. A minimum rest period of 11 hours should be allowed between the end of shift and the beginning of the next, and this should not be compromised by overtime.
6. A maximum of four hours work before a break.
7. Scheduled work hours should not exceed 48 hours in any period of seven successive days. Total work, including overtime, should not exceed 60 hours or seven successive work days before a period of rest days.
8. The finish time of the night shift should not be later than 08:00.
9. A morning or day shift should not be scheduled to start before 06:00, and wherever possible should be delayed to start between 07:00 and 08:00.
10. Wherever possible aircraft maintenance engineers should be given at least 28 days notice of their work schedule
11. Aircraft maintenance personnel should be discouraged or prevented from working for other organizations on their rest days, and hence from exceeding the proposed recommendations on work schedules despite their implementation by their main employer.
12. Vigorous campaign shall be made for avoidance of working under the influence of Alcohol / psychoactive substances to cope up with stress / Fatigue by AME.

In the conclusion it is advisable that in line with pilot and Cabin crew every organization should frame policy for AME duty time limitations and adequate rest period. AME who are releasing the Aircraft to service after maintenance are practically ensuring the airworthiness and safety. Therefore, an AME performing duties whilst fatigued may become potential threat and safety hazard for operation of aircraft if the issue is not properly addressed.

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