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EXTENDED WORK HOURS (MAINTENANCE)

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To enhance aviation safety, should there be limits on extended working/on-duty hours and specific rest periods for aircraft maintenance technicians/ground engineers (aircraft maintenance personnel)?

Current situation

There is a large body of research and knowledge that clearly establishes a direct relationship between human performance, alertness and physiological conditions – with rest/sleep being a major factor. Despite this relationship between performance and fatigue, there are currently no known standards codified in regulatory directives to limit and/or manage aircraft maintenance personnel's on-duty hours. This is especially important in situations such as aviation maintenance where an error or mistake on the part of a fatigued individual, with less than an acceptable standard of alertness, may result in creating an unacceptable safety risk and thereby constitutes a safety issue. The absence of work/rest STANDARDS for aircraft maintenance personnel, when viewed from a human factors safety perspective, requires addressing by industry and regulatory agencies.

Brief background

The human body and mind when fatigued do not function as well as when they are rested. Regulatory actions for work periods, in relation to rest periods, have been applied to numerous critical work groups/situations to enhance safety. For example, commercial airline pilots have been regulated, by governing authorities in most parts of the world, regarding on-duty time, coupled with the number of flying hours that

can be flown without a specific minimum rest period. The criticality of this factor is also reflected in the fact that compliance with crew duty time directives is always one of the first items reviewed in accident investigations. These directives also apply in other sectors of transportation, also interested in safety, such as Air Traffic Control Officers and road transport drivers, all having legislated regulations addressing mandatory hours they can be on duty, with defined rest periods. Presumably these regulations were developed based on fatigue factors, occurring due to lack of rest/sleep, that have had an unsatisfactory impact on safety.

Proper manning and task planning are recognized as an explicit requirement of European legislation. JAR 145, (now ECAR 145) makes this an important part of standards for approved organizations. Once again this legislation does not specifically address the extended on-duty hour safety risk that exists today, particularly in aviation maintenance.

As previously noted legislation and regulation for other areas of aviation and transportation recognizes and embraces the issue of mandatory minimum rest periods after specific on-duty work periods. Despite repeated industry/regulatory discussions focused on establishing work/rest standards for aircraft maintenance personnel, no known action has been taken to establish those standards. This absence of regulation

IFA has its main interest in promoting internationally improved knowledge and understanding of Airworthiness issues, through its Technical Committee, combining a wide range of aviation disciplines and worldwide experience. Members participate in international committees, meetings and conferences

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or published guidance regarding work/rest requirements, or parameters for aircraft maintenance personnel, fosters situations that allow aircraft maintenance personnel to be utilized for extended durations, sometimes in excess of 36 hours without a mandatory rest period, while performing corrective action(s) and certification of aircraft and engine work. It is not uncommon to hear of individuals working extended periods, after their normal 8-hour shift of duty, of 16, 24 or more on-duty hours, without an adequate rest break.

Individuals would probably not wish to expose themselves to the known hazards of trying to perform work when impaired by fatigue or risk the safety implications of decreased alertness that could contribute to missing a required step in critical maintenance procedures or accidental failure to secure a necessary bolt, electrical connection etc. These individuals who place themselves in this situation carry, by regulation and law, the first level of responsibility and liability, in addition to that carried by their supervisors and their employers.

Most labor agreements address the issue of shift work hours & overtime pay, but without any limitation on the duration an individual may stay on duty without adequate rest. In addition to the safety risks that are amplified by fatigue are the unacceptable levels of alertness and reduced performance capabilities. Poor planning and the inherent cost of staffing for contingencies most likely drive the requirement for unplanned, extended on-duty work hours.

Research into the specific impact body rhythms and shift work might have on individuals, such as unacceptable performance, have been undertaken by the Department of Psychology, University of Wales Swansea in the United Kingdom and the University of South Australia. This research, although not specific to aviation, notes other related safety performance factors emanating from extended time on duty. We suggest any performance study of extended work related alertness and performance should also address the factors of environmental elements, such as excessive heat, cold, wind, rain etc., and the extent they accentuate the lack of alertness and reduced performance levels, especially as related to aviation maintenance.

RECOMMENDATION

The International Federation of Airworthiness (IFA) Technical Committee, with its recognized degree of experience and first-hand knowledge of the issues and aviation human factors, recommends and suggests that this issue be addressed and actioned by organizations such as, but not limited to, airlines, overhaul, repair and refurbishment organizations that perform any work that requires a "Return to Service" certification. These same organizations have the responsibility for establishing safe aircraft maintenance operations, taking into account human factors

considerations. It is recommended that they consider development and implementation of internal standardization for extended on-duty hours. These standards should provide workable safety based guidelines for industry until regulatory standards can be defined and requirements established by regulatory action. Written procedures to resolve the stated issues should be an integral component of any airline's Maintenance Error Management System (MEMS), as part of a total organization Safety Management System (SMS).

The basic premise made is that after one and one-half (1½) normal work periods, with special attention to shift work-body rhythm phenomenon (12 hours on duty without an extended rest period), and noting that environmental and cultural conditions (of a country) can alter and do affect any established work period, normal or extended, certain enforceable company rules must be developed for the establishment of safe, minimum alert levels for on-duty work hours with mandatory rest periods. This is illustrated in the following *example*:

Persons who are in leadership positions are required to adhere to the following criteria:

Certificated/authorized individuals who are on duty 12 hour continuous hours, without adequate rest, and who are involved with repairs or return to service activities, may NOT inspect or accomplish the return to service certification actions and/or critical in process inspection, unless they have had at least 8 hours of rest (off-duty time) since the last duty period, if that last period was over 12 hours on duty.

In addition individuals accomplishing maintenance work may not work, or be on duty, more than 24 continuous hours, without at least 8 hours of off-duty time to rest.

Summary

The implications to personnel and equally to safety should be obvious. However, any person who has worked in or around a repair shop, carried out aircraft maintenance, especially in an aircraft line maintenance operations environment, can attest that long hours on duty have been and are utilized frequently. Human factors recognize that fatigue can and does impact the ability of the human brain by reduced alertness levels and by the body not functioning as well when fatigued as when rested.

IFA submits that this area of human factors, with its unmeasured risk, has implications for aviation safety, and suggests that corrective action in the form of written procedures be developed. These procedures should be shared with the international aviation community to establish realistic on-duty time standards. These time standards should provide reduced risk of human error by aircraft maintenance personnel, such as accidental omissions and/or induced errors. Fatigue can cause diminished alertness levels, which are generally increased by over-extended on-duty periods, without mandatory minimum rest periods.