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HEAT STRESS

Effects of Heat Stress Among Aviation Maintenance Workers At ERAU

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ABSTRACT

Aviation mechanics work in a dynamically complex environment and are exposed to various occupational hazards. Heat exposure in aviation maintenance facilities in the space coast area can show significant hazards to workers due to the hot climate and work heat load. This study assesses heat stress on aviation mechanics workers at ERAU fleet maintenance hangar in Daytona Beach, FL. The objective is to propound innovative engineering hazards control of thermal hazards associated with aviation maintenance work. The WBGT was measured by a heat stress monitor at the ERAU fleet maintenance hangar. The measurements were obtained between 1:00 PM and 2:00 PM EST. The WBGT average collected from the hangar was 81.8 ± 0.11°F. Based on the ACGIH screening criteria for TLV for heat stress, the workload of metabolic rate at 415 Watts and 81.8 ± 0.11°F WBGTeff, was exceeding the ACGIH TLV (81.5 °F) indicating that ERAU aviation mechanics are under heat-related illness risk. The ACGIH action limit for a heavy workload at 82°F is to have work/rest regimen of 50% work, 50% rest, each hour. Hence, engineering control can be implemented to prevent heat-related injuries, provide maximum comfort, and consequently enhance the productivity of aviation mechanics.

Hangar Doors

INTRODUCTION

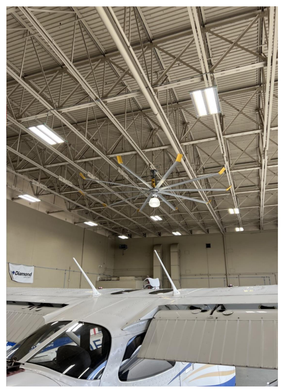
The aviation industry depends on maintenance personnel to ensure aircraft safety and efficiency. However, these mechanics and technicians work in challenging conditions, including extreme heat and humidity, which can cause heat stress. Heat stress can have profound consequences, such as compromised cognitive function and decision-making ability, which could lead to errors or accidents (Færevik, 2001). Therefore, maintaining a safe and comfortable work environment is crucial to minimize the risk of accidents and improve the well-being of maintenance personnel.

Working in hot and humid conditions can affect an individual's productivity, concentration, and general well-being. Moreover, heat stress can have several short-term and long-term effects on mechanics, such as dizziness, heat exhaustion, and heat stroke, which could lead to accidents. The objective of this study is to mitigate the prevalent heat stress in aviation workplaces in hot environments through engineering hazard controls (Noweir, 2007).

METHODS

- Location: ERAU fleet maintenance hangar in Daytona Beach, where WBGT monitor was used between 1:00 PM and 2:00 PM EST on March 1st.
- Targeted Subjects: Full-time Aviation Maintenance Workers.
- Testing Equipment: REED Heat Stress Meter.

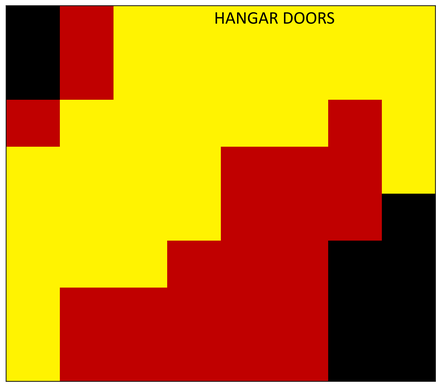
REED Heat Stress Meter



Large Ceiling Fan

RESULTS

- WBGT average collected in the hangar was 81.8 ± 0.11°F.
- This exceeded the TLV of 81.5°F (ACGIH).
- This shows most the work area is in the yellow to red risk zone, meaning there is high risk of heat related illness & injury.
- The data in the diagram correlates to a recommended work to rest ratio depending on how demanding the task is and what temperature the work is being done at.
- At 82°F average the work/rest ratio is 50% work, 50% rest for each hour.



A diagram of the hangar showing color coded temperatures in various of its spaces. The top represents the main door from which most of the air is let in.

Work-rest ratio for workload
- Green: 40/20 min
- Yellow: 30/30 min
- Red: work should not be permissible due to risk level
- Black: work should not be permitted

RECOMMENDATIONS

We expect that using active cooling technology will significantly reduce the levels of heat stress among aviation maintenance workers in hot environments. This will lead to improved safety, decreased errors and injuries in the workplace, and increased productivity. The findings from this study can also provide valuable insights for developing effective heat stress management strategies in other industries.

CONCLUSION

There are clear heat related injury and illness risks involved in workers of the ERAU's aviation maintenance hangar. Furthermore, we found that some areas of the hangar were consider to have so hot of conditions where work should not be permissible. The engineering hazards control we recommend is an AC system in the hangar in conjunction with a quick door system.

The implementation of an AC system and a quick door system would eliminate the need of personal fans

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