Creating an Ergonomic Workplace by Design

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ABSTRACT

A workplace with good consideration of ergonomics in the design which can prevent musculoskeletal discomfort, improve productivity and work efficiency, reduce production costs and optimize human well-being. This paper aims to summarize the research findings of six aspects of applying ergonomics principles in workplace design. This paper will answer the following questions: (1) Why should use ergonomics principles in workplace design? (2) Who should consult and consider in workplace design? (3) When should use ergonomics principles in workplace design? (4) Where should apply ergonomics in workplace design? (5) How to use ergonomics in workplace design? (6) What are the ergonomics principles in workplace design? The workplace design should consider full spectrum of users group with different physical and psychological needs. Ergonomics should be well considered in the design stage and the pre-occupant and post-occupant inspections should be used to evaluate the actual environment. The design should consider both the work and non-work area in the workplace that including the design of workstation, staff facilities, tools and work environment. Staff consultation should be organized in the design stage for collecting the opinion of the staff. A good workplace design can enhance employees’ satisfaction and well-being. The environmental comfort model by Visher (2008) illustrated that there are three levels of comfort, (1) physical comfort; (2) functional comfort; and (3) psychological comfort. In addition, a good quality of environmental quality will create a higher quality of employees’ work life and ultimately will have positive effect to the employee well-being and quality of life. In conclusion, ergonomic workplace design can facilitate occupational safety and health, work efficiency and employee well-being.

Keywords: Ergonomic, Workplace Design, Workplace Comfort, Workspace, Employees’ Work Life, Prevent Musculoskeletal Disorders, ESK-JES

1. Introduction

Ergonomics is a human centered approach to understand the interactions among humans and other components of a system. A workplace with good consideration of ergonomics in the design which can prevent musculoskeletal discomfort, improve productivity and work efficiency, reduce production costs and optimize human well-being.

According to chapter 509, Occupational Safety and Health Ordinance in Hong Kong, workplace means place where employees work which includes both work and non-work area in the workplace. A good workplace design can reduce the fatalities and injuries rate.

2. Aims

The paper aims to summarize the findings of six aspects of applying ergonomic in workplace design. This paper will answer the following questions: (1) Why should use ergonomics principles in workplace design? (2) Who should consult and consider in workplace design? (3) When should use ergonomics principles in workplace design? (4) Where should apply ergonomics in workplace design? (5) How to use ergonomics in workplace design? (6) What are the ergonomics principles in workplace design?

3. Discussion

(1) Why should use ergonomics principles in workplace design?

There are so many benefits of using ergonomics in workplace design. An ergonomics workplace design approach results in many benefits, including the prevention of injury and disease such as the prevention
of musculoskeletal disorders such as back pain, neck and shoulders pain, carpal tunnel syndrome, etc. by minimizing the physical workload of the working person. A good workplace can reduce the risk of musculoskeletal injuries. There is interdependence among the workplace components, the working person, the task requirements, the environment, and the habitual body movements and postures that working persons adopt. (Marmaras & Nathanael, 2006)

A friendly designed workplace also can improve usability of products, equipment, systems and facilities which facilities task execution and efficiency and achieve ease of user of the various workplace elements. It is not hard to know that an ergonomic workplace design will ultimately improve productive and reduced the production costs with a better prediction and management of production and operational costs over the lifecycle of a product.

Importantly, employers are also legally responsible to compliance with local occupational safety and health legislation and an ergonomic and safer workplace creates good employees’ wellness. If company is committed to create a safe and healthy work culture, it will lead to create better human performance and employees’ well-being.

(2) Who should consult and consider in workplace design?

When design a workplace, in addition to the usual and normal users of the workplace, we also need to consider the full spectrum of users group with the following special needs:
(a) Wheelchair users; (b) Left-handed as well as right-handed people; (c) Anthropometric extremes, such as a pregnant woman; an obese person; an adult who is outside the 5th to 95th percentile body build; (d) People with disabilities/during rehabilitation, such as hands that are weak or painful; inability to reach far, bend or twist without discomfort or pain; impaired vision or hearing.

(3) When should use ergonomics principles in workplace design?

Ergonomics should be well considered starting from the design stage. For effectively reduce the risk of musculoskeletal injuries, company should consider the risk factors of musculoskeletal disorders in relations to operation, cleaning, maintenance, machinery parts assembly in different stages. It is significantly important to play every effort to consider ergonomics at the design stage and take into account the feedback from operators/users and review past injuries record in relation to the workplace design, task requirements, workplace components, work environment and the body movement and postures of the working persons in such workplace setting.

Workplace design evaluation is part of the manual handling risk management and injury management process. The workplace design should be re-evaluated in regular basis and ensure new hazards can be identified. In terms of the risk management, it is important to avoid any control in place which does not create another risk/introduce new hazards.

(4) Where should apply ergonomics in workplace design?

Ergonomics principles should be applied in the design of the workplace including both the work and non-work areas. It includes the overall workplace layout, workstation design, seating, conveyor, storeroom, breakout area, canteen, restroom, gym room as well as the facilities such as ventilation system, lighting, sound-absorbing and windows.

(5) How to use ergonomics in workplace design?

According to the research article of FITS Model office ergonomics program (Chim, 2013), “F” is Furniture Evaluation and Selection element. A good workplace design should have suitable furniture according to the task perform at workstation, tools use, user’s specification and work environment.

For instance, a person’s body movement and posture when using a computer in the office depend largely on the task requirements, furniture specifications, workstation settings, and the person themselves. A combination of furniture and equipment options such as adjustable chairs, desks, computer mouse, and adjustable height monitor is suggested; the working posture of the user can be accommodated only when the selected furniture and equipment are appropriate to the task and the user group.

For instance, the anthropometric data of the user group should be defined in the furniture evaluation and selection process. The evaluation and selection normally includes an ergonomics task review, ergonomic assessment, user evaluation, and an employee-furniture-workstation fit evaluation.
Furniture comfort and suitability are influenced by the task as well as the furniture specifications. In order to select suitable furniture, office equipment, and computer accessories, an ergonomist should be invited to conduct an evaluation before the products are purchased. The overall workstation setup should be considered when purchasing new furniture or equipment for the workplace or replacing existing materials. This evaluation is a continuous process and a furniture standard can be developed to provide a useful guideline for office administrators on making appropriate selections and confirm the workplace design. (Chim, 2013)

(6) What are the ergonomics principles in workplace design?

An ergonomic workplace should promote the employees’ satisfaction and well-being. Viser (2008) developed the The environmental comfort model of workspace quality, there are three level of comfort: (1) Physical Comfort; (2) Functional Comfort; and (3) Psychological Comfort.

According to Viser’s model, (1) Physical comfort is defined as basic human needs such as safety, hygiene and accessibility, which must be assured usually through applying existing building codes and standards which consider the thermal comfort, relative humidity, air speed and freshness for ventilation comfort as well as brightness and contrast condition for lighting comfort. For instance in Hong Kong, Indoor Air Quality (IAQ) Certification Scheme has launched which to promote public awareness of the importance of IAQ which the program is to launch a voluntary IAQ Certification Scheme for offices and public places. Good IAQ offices can enhance comfort level of the occupants and increase productivity of employees.

(2) Functional comfort is defined as environmental support for users’ performance of work-related tasks and activities. In terms of the building system, the functional comfort includes the dimensions of air quality, thermal comfort and noise. For the functional comfort in building interior, it considers the spatial/workstation comfort, privacy, people noise, lighting quality and day-lighting. The benefits of functional comfort include the promotion of functional and productivity enhancement in the workplace by facilitating work flow and task requirements. It also can support individual, term and cross team efficiency by good cooperation within and between the team and external persons.

(3) Psychological comfort is defined as feelings of belonging, ownership and control over the workspace. Psychological comfort is the highest level of comfort in the environmental comfort model of workspace quality (Vischer, 2008). An ergonomic workplace can create psychological comfort such that users can have good sense of territory in the provided workspace. If the employees are invited to participant in the design process, users can have stronger feelings of belongings and ownership of the workplace by creating a stronger environmental empowerment.

4. Conclusion

A good workplace design should well considered the ergonomics principles which can fit to the full spectrum of users group. Ergonomics should be applied starting from the design stage and it helps to effectively reduce the risk of musculoskeletal injuries and to create a healthy workplace environment. The ergonomics concepts can be used in the design of work and non-work areas. Furniture evaluation and selection can assist procurement decisions and reduce the cost of replacing unsuitable furniture and compensating staff for injury due to non-ergonomic workplace design. It is important to note that an ergonomic workplace should promote the employees’ satisfaction and well-being. Three level of comfort are considered: physical comfort, functional comfort and psychological comfort. For creating an ergonomic workplace, staff consultation should be included in all design stages which their own experiences can provide many useful feedbacks in workplace design.

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References

