

# Ergonomics and workplace psychology assignment



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## Ergonomics and Workplace Psychology (Assessment 2) 1. 0 INTRODUCTION

DiNhardi (2003: 703) states that, “ Ergonomics is the science of fitting workplace conditions and job demands to the capabilities of the working population. “

If the jobs require repetitive, forceful or prolonged exertions of the hands, lifting, pushing, pull of heavy objects or prolonged awkward posture, the risk of causing musculoskeletal disorders will be high. This time, we choose the construction workers to analysis their works. Tak (2009: 665) states that, “ Construction workers are exposed to a variety of ergonomic hazards, including awkward postures, heavy lifting, forceful exertions, vibrations and repetitive motions. ” Page 2 of 35 Ergonomics and Workplace Psychology (Assessment 2) Smallwood (2000: 1) has a statistics, “ The rate of sprains and strain in construction – 1. per 100 full-time equivalent workers – is the second highest of al industries. shoulder. ” The top five problems are lower back, knee, wrist/hand, neck and In order to improve work organizational climate and prevent occupational musculoskeletal disorders in construction industry, we use participative ergonomics to analysis. According to the observations and the assessment results, there are some recommendations

to organizations and workers later on. Page 3 of 35 Ergonomics and Workplace Psychology (Assessment 2) 2. 0 ERGONOMIC ANALYSIS OF WORKSTATION

The ergonomics analysis workstation focuses on identifying hazards and feasible solutions for the major tasks associated with mixing of plaster, the first step of the plastering task. Pinder, et al. (2001: 38) also states, “Plastering is inevitably a heavy manual task because it involves transferring by hand large quantities of a wet and dense material to a wall or ceiling. ”

Page 4 of 35 Ergonomics and Workplace Psychology (Assessment 2) 2. 1 Tasks of plastering and tiling on construction sites In Hong Kong, most plasterers will perform both plastering and tiling tasks.

Their works can be mainly divided into several areas as below: 1. Mixing plaster manually by shovelling. (Figure. 1) 2. Wet plastering is a traditional work which put a thick base coat and a thin skim coat on the walls. block work. (Figure 2) Most likely, this would be done to brick or 3. Screeding of concrete floor such as applying a surface to the concrete base of a floor. (Figure 3) 4. Put the tiles on the wall or the floor (Figure 3 & 4). 5. Apply mortar on the treated spalling area (Figure 5). Page 5 of 35 Ergonomics and Workplace Psychology (Assessment 2) Figure 1. ) Mixing plaster by shoveling on floor; b) Mixing plaster by shoveling on the platform Figure 2. Wet plastering on the wall Figure 3. Screeding and tiling on concrete floor Page 6 of 35 Ergonomics and Workplace Psychology (Assessment 2) Figure 4. Tiling on wall near floor level Figure 5. Applying mortar on the surface (awkward position) Figure 6. Plaster Bag (45 Kg) Figure 7. Moving the plaster bag Page 7 of 35 Ergonomics and Workplace Psychology (Assessment 2) 2. 2 Literature <https://assignbuster.com/ergonomics-and-workplace-psychology-assignment/>

review In order to get more information about ergonomics on plastering field, we have done the research.

Unfortunately, it was so little about this the ergonomic on plastering. Pinder et al. (2001: 2) states, " There is no literature on wet plastering nor on floor screeding. " 2. 3 Ergonomic Assessment Extent So this ergonomics

assessment tries to implement the task specific basis on the plastering such as mixing the plaster, the very beginning work of plastering. In the coming future, we can implement the wet plastering, screeding and tiling. 2. 4

Methodology First of all, we performed site observations for plastering and tiling on construction site.

We have found that it is physical demand work including manual handling of heavy materials and also requiring reach. Page 8 of 35 Ergonomics and Workplace Psychology (Assessment 2) Sometimes, their works are lack of spaces and poor work planning. So they have to work in a variety of awkward postures such as the bottom of water tank. (Figure. 5) 2. 5 Musculoskeletal hazards identified by preliminary visual observations 1. Manual handling in squatting and stooping postures. 2. Handling of 45 Kg heavy plaster bags (Figure 6 & Figure 7), water bucket and mortar. Sometimes, the plasterer needs to move them upstairs and downstairs) 3. Frequently mix plasterer by shoveling. Each shovel is about 7 Kg. 4. Working on muddy and uneven ground. 5. Working in restricted spaces such as narrow room or under the facilities. 6. Postures stress such as screeding on ceiling and floor. Page 9 of 35 Ergonomics and Workplace Psychology (Assessment 2) In order to deepen the ergonomics on this field, we will do some exposure assessments by

Direct Observation Methods, Manual Handling Assessment Chart (MAC) and NIOSH lifting equation formula.

Wilson and Corlett (2005) define the direct observation method, " The measurement of the angles between body parts, or their angles in relation to the environment, are frequently required .... .. assess postures in relation to their contribution to discomfort, strain or force exertion. " There are several direct observation methods such as OWAS (Ovaka Work Analysis System), REBA (Rapid Entire Body Assessment) and RULA (Rapid Upper Limb Assessment). They are easily to learn. For these methods, the results are consistence and accuracy. In this case, we choose REBA because it is the proven utility of the OWAS format.

Page 10 of 35 Ergonomics and Workplace Psychology (Assessment 2) 2. 6 REBA for the mixing plaster activity by shoveling Hignett & McAtamney (1999) developed a postural analysis tool, Rapid Entire Body Assessment (REBA) and defines the initial body segment codes, specified simple tasks analysis with load variation, movement distance and height. The position of the arms and the posture of the head, arms and legs are recorded according to diagram in (Figure 10), Table A for the body or Table B for the arms (Figure 11). These scores are then combined in (Figure 12).

The final score is then assessed for the severity, the risk level and action will be indicated in (Figure 13). We mark the each section on the REBA form in next page and calculate the REBA score. shoveling is 11. Following the chart, the total score for mixing plastering by It indicates that the risk level is very high and the action is needed to take immediately. Page 11 of 35

Ergonomics and Workplace Psychology (Assessment 2) REBA for the mixing plaster activity by shoveling Page 12 of 35 Ergonomics and Workplace Psychology (Assessment 2) 2. Manual Handling Assessment Charts (MAC) for the mixing plaster by shoveling Health and Safety Executive (2002) states about MAC, " A traffic-light system was also selected to grade relative risks within each factor. " Health and Safety Executive (n. d. ) states, " MAC is a new tool designed to help health and safety inspectors assess the most common risk factors in lifting (and lowering), carrying and team handling operations" Now, we follow the MAC instructions to fill in the blank in the chart to analysis the manual handling activity (mixing plaster by shoveling)

Page 13 of 35 Ergonomics and Workplace Psychology (Assessment 2) Manual Handling Assessment Chart for mixing plaster by shoveling Figure 14.

Manual Handling Assessment Chart (MAC)-Score Sheet for mixing plaster by shoveling Figure 15. The level of risk (MAC assessment) Page 14 of 35

Ergonomics and Workplace Psychology (Assessment 2) According to data on the Manual Handling Assessment Chart for mixing plaster by shoveling (Figure 14), it indicates that there are several RED marks (High level of risk) on the table. Meanwhile, they all are in higher scores. Referring to the level of risk (Figure 15), it is in a RED zone. We have to do actions promptly to prevent manual handling injury in this mixing plaster task. Page 15 of 35 Ergonomics and Workplace Psychology (Assessment 2) 2. 8 NIOSH Lifting Equation for mixing plaster activity by shoveling National Institute for Occupational Safety and Health (1994) states, " NIOSH lifting equation is only one tool in a comprehensive effort to prevent work-related low back pain and disability" Liberty Mutual (2005) states, " The NIOSH equation

provides the Recommended Weight Limit (RWL). The equation has a multiplicative form with a Load Constant (LC) of 51 lb or 23 Kg. multiplied by each of the following multipliers: Horizontal Multiplier HM (Figure 16), Vertical Location Multiplier VM (Figure 17), Distance Multiplier DM (Figure 18), Asymmetry Multiplier AM (Figure 19), Frequency Multiplier FM (Figure 20) and Coupling Multiplier CM (Figure 21)” Page 16 of 35 Ergonomics and Workplace Psychology (Assessment 2) “ The lifting equation:  $RWL = LC \times HM \times VM \times DM \times AM \times FM \times CM$  where: H = Horizontal location in inches V = Vertical location in inches D = Travel distance in inches A = Angle of asymmetry in degree”

Through the equation, the final RWL is 5 Kg which is less than the actual weight of lifting (7 Kg). It means the task is dangerous. We have to improve this task right now to prevent injury. Page 17 of 35 Ergonomics and Workplace Psychology (Assessment 2) NIOSH Lifting Equation for mixing plaster by shoveling Page 18 of 35 Ergonomics and Workplace Psychology (Assessment 2) Through these three different ergonomics assessments (REBA, MAC and NIOSH lifting equation), the plaster mixing task by shoveling has same results. It is a high risk task to cause musculoskeletal disorders and is to have prompt action needed.

We have some suggestions to improve this task in the following chapter.

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**PRACTICAL RECOMMENDATIONS** By the observations and ergonomics assessment, we have some recommendation for the organizations, supervisors and workers. 1. Ergonomics Team For the organization, an ergonomics team should be formed and ensure all level of staffs

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represented. Then the team performs risk management cycle including Hazard identification, Risk assessment, Control development and implementation and Review and evaluation to keep monitoring and implementing the ergonomics improvement.

National Institute for Occupational Safety and Health (2008: 26) states, " Management must provide necessary resources in terms of time, training, policy goal development, and budgets necessary to conduct proper risk management activities. " Page 20 of 35 Ergonomics and Workplace Psychology (Assessment 2) 2. Reduce the pack size of plaster / cement bag In the market, the plaster bag is 45Kg. We have known that the manual We suggest to handling of bags of plaster and bucket of water is inevitable. reducing the plaster bags from 45 Kg to 20 Kg and provide mechanical aids to workers. work. It will reduce the risk of handling significantly in the eginning of Molen et al, (2005: 388) suggest organizations to purchase of mechanical lifting aid together with tailored education and training Page 21 of 35 Ergonomics and Workplace Psychology (Assessment 2) 3. Training Training is an important part to enhance worker's knowledge and make them aware the working hazards around them. DiNhardi (2003: 735) " establishes a training schedule in which an outside expert, familiar with the operations, teaches ergonomics principle to management and workers. " Bust et al (2005: 420) states, "... ... to raise awareness of manual handling issues by educating staff at all levels. Zalk (2001: 287) states, " Participatory training, using hands-on exercise and learner-centered instruction, was found to be extremely useful in acquiring and retaining ergonomic knowledge. " Page 22 of 35 Ergonomics and Workplace Psychology (Assessment 2) Krajewski et al



(2007: 161) states, "... ... the general knowledge gained from the training by both employees and management allowed them to understand the problem.

" 4. Morning Warming-Up Exercise According the scientific literature about the athletes, the active warming-up exercises is a basic step for practicing.

It also can apply on the construction workers which work on the physically strenuous jobs. Holmstrom and Ahlborg (2005: 518) states, "... ... a short dose of MWU (Morning Warming Up Exercise) could be beneficial for increasing or maintaining joint and muscle flexibility and back muscle endurance for workers... ..." Page 23 of 35 Ergonomics and Workplace

Psychology (Assessment 2) 5. Providing proper power tool to reduce repetitive work Mixing plaster manually by shoveling is easy to cause musculoskeletal disorders because of repetitive work. In Hong Kong situation (especially aintenance work), mixing of plaster always carry out manually because smaller amounts of plaster for skimming (neither mixed by a machine nor pumped mortar / plaster to the exact working areas). We recommend the employer to providing powered mixers to plasterers. If the workplace is without power supply, a small generator has to be supplied simultaneously. Maintenance of tools is also an important factor in preventing or reducing ergonomics hazards. Page 24 of 35 Ergonomics and Workplace Psychology (Assessment 2) 6. Rest Period / Job Rotation The employers should allow plasterers to take rest between demanding works.

Because of the fixed price tender, the employers and the plasterers would like to finish their works as fast as possible to maximize the earning. We suggest the employers to give fair wages and rest periods to workers to give them support on the health and safety issues. Occupational Safety and

Health Administration (n. d. ) states, " Rotation of assignments can be an effective means of limiting the amount of time employees are exposed to these stressors. " Page 25 of 35 Ergonomics and Workplace Psychology (Assessment 2) 7. Housekeeping Establishing a strong housekeeping program will keep the workplace tidy and reduce the risk of tripping. workers to work on. to balance themselves. Keep the area dry. the floor surface. Wet floor with muddy sand are slippery for They may not stand well and need to use much effort It increases the risk to get musculoskeletal disorders. Use the container to mix the plaster / mortar instead of 8. Communication Channel Two ways communication channel should be set up between organization and workers such as displaying safety posters on the safety bulletin board, setting up some meetings to give chances to report risk factor exposures by workers. Ergonomics promotion is also a good way to increase worker's awareness.

Page 26 of 35 Ergonomics and Workplace Psychology (Assessment 2) 9. Medical Surveillance Active surveillance such as conducting standardized questionnaires or passive surveillance such as examining medical injury or illness records can help to analysis the ergonomics issues and to identify the problems, patterns and changes over time. Page 27 of 35 Ergonomics and Workplace Psychology (Assessment 2) 4. CONCLUSION Through ergonomics assessment, we can determine the risks which related on the task and their severity. Then we can set priority to establish measures to Limerick et al (2007: 149) states, " There is no liminate or reduce the hazards. doubt that the participative ergonomics process.... , translating the results into reduced risk exposure required..... " By the assessment results, mixing plaster by

shoveling is a high risk to get musculoskeletal disorders. as far as practicable. We must not ignore it and must take imminent action This ergonomic analysis of mixing plaster is a very first step to understanding the ergonomics on this industry. manpower. Almost every task for plastering relies on the It is Most of them have a certain amount of ergonomics hazards. time to us to concern on this group of workers.

Page 28 of 35 Ergonomics and Workplace Psychology (Assessment 2) Safety working environment depends on three parties including government, employers and employees. Every party has his responsibility. Every one doesn't want to see any injury and illness. In the reality, the most suffering one should be workers (plasterers). They may feel pain in his/her life and lose their abilities in the worse case. So worker should take the initiative and more proactive to improve their jobs to reduce exposure to risk factors. Page

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