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Improving The Work Position of Worker's Based on Quick Exposure Check Method to Reduce the Risk of Work Related Musculoskeletal Disorders

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Abstract

The manufacturing process of brick and well rings were conducted by workers who must bend down, sit, and stand to do the job. This body positions occur repeatedly, so it can cause muscular and back bone injury. This monotonous and repetitive work, plus unergonomic working tools can cause Work Related Musculoskeletal Disorders (WMSDs) to workers, and will have impact to work productivity. Because of that, analysis was conducted to assess work risk relating to worker muscular disorder in the work place by using Quick Exposure Check (QEC) to every task elements, and working position that have potential to cause WMSDs. QEC assess damage to the back, shoulder, wrist, and neck. Research results shows that parts of manufacturing process of brick and well rings that have potentials to cause WMSDs are material mixture and the bucket filling, with exposure level of 73.8% and 71.5%. Other activity elements need further investigation and change soon with exposure level of 54.5-67%, and another elements need investigate and change immediately action with exposure level of 41.9% - 49,3%. Working risk emerge because of worker's back and neck bend while working and wrist rotate while lifting load. Position improvements were conducted by making new design of working tools such as cement mixing container, brick making table, shovel, and brick plate. Therefore perform the design of the stirring bath aids, materials and work desk operators to minimize the risk of WMSDs using anthropometric data. Once the design is done, the exposure value decreased to 48.8% and 47,7 %.

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1. Introduction

Good working system has connection with work place and operational steps of work. Work place and tools Arrangement, plus body position while working will have big impact in creating integrated working system. Through improvements, industry will run effectively and efficiently [4].

One of ergonomic problems that often occur in the work place, relating to human strength and endurance while doing the job (biomechanic), is musculoskeletal or muscular strain. This problems were often occurred by workers who did repetitive movements continuously. According to United States Public Work Statistic Bureau, accident caused by Repetitive Stress Injuries (RSI), reach more than 60% [4].

One of the home industries that make brick and well rings, the making process of brick and well rings were conducted by one worker only for each job. Brick materials are mixture of sand, cement, pebbles, and water. By working for 8 hours a day, one worker can produce 300 bricks or 13 well rings a day. Workers who make bricks do the same activities repetitively, making bricks, arrange, condense, and drying. It is similar to manufacturing process of well rings. Worker's body position while doing the job are bent, squat, and stand to lift the product. This activity occur repetitively that able to cause muscular and back bone injuries. Unergonomic working system will affect worker's performance. Risk analysis is one of the efforts to prevent workers from this potential risk. Work-related musculoskeletal disorders (WMSDs) are one of the greatest occupational health concerns today. Of the many types of WMSDs, low back disorders (LBDs) are the most prevalent and by themselves constitute a major health and socioeconomic problems [5].

One method to prevent or reduce the risk to workers is by using *Quick Exposure Check (QEC)* method. QEC is a method to assess work risk related to muscle, or "Work-related MusculoSkeletal Disorders (WMSDs) at work place. QEC is a method to assess working risk related to the back, shoulder/ arm, wrist, and neck. The advantage of this method is that it considers worker's condition from two point of view : observers and workers. It will reduce bias from observer's subjective assessment [1]. This paper explains about how to assess musculoskeletal risk related to brick and well rings manufacturing process that will give information on how to improve working system by design tool aid to reduce and eliminate muscuskeletal disturbance, so workers can improve their health, efficiency, and productivity.

2. Quick Exposure Checklist (QEC)

QEC is a method to assess working risk related to muscular disturbance at the workplace. This method assesses disturbance in the back, shoulder, wrist, and neck. QEC helps to prevent WMSDs, such as repetitive action, pressure force, wrong position, and work duration (Stanton, 2004). QEC examine body static and dynamic task to estimate risk level of body posture by involving movement repetition elements, energy/burden, and work length to different parts of body [3].

Basic concept of this method is actually to identify exposure score of certain body parts, compare to the others. It is calculated for each body part such as back, shoulder/ arm, wrist, and neck by considering ± 5 combinations /interaction. For example: body posture with duration, movement with duration [2]. One of the important characteristics in this method is assessment, conducted by researchers and workers, where risk factors were considered and combined in its implementation, with existing table score (Li & Buckle. 1998). Factors that affect injury risk are as follows:

Table 1 : Factors That Affect Injury Risk

No	Factor	Injury Risk
1.	Back	Load weight, duration, movement frequency, body position.
2.	Shoulder/Arm	Load weight, duration, task complexity, movement frequency.
3.	Wrist	Strength, duration, movement frequency, body position.
4.	Neck	Duration, body position, visual aspect.

The load assessment stages of Quick Exposure Checklist (QEC):

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