Abstract

Introduction:
In Yogyakarta, Indonesia, there are varied small scale industries. One of them is art stone industry. In art stone industry, workers used simple equipment. There were no adequate work facilities. Many powered tools could cause strains or sprain. There are several processes in making art stone handicraft. The sculpture process needed long time process. There are several symptoms during sculpture process. The workers experienced musculoskeletal disorders. The purpose of this research was to develop work facility improvement to decrease processing time. The work posture could induce negative effect for worker, for example: increasing spend energy, long time work (Sanders & McCormick, 1993). Work posture that not optimum could give injury at muscular, bone, and others (Niebel, 2003). Assembly workstation needed to be redesign to eliminate awkward postures and anthropometrics mismatches to lower MSDs problem and improve productivity among assembly workers (Deros, Khamis, Ismail, Jamaluddin, Adam, & Rosli, 2011). Work facility affected work posture. The work posture could affect processing time in working. In designing a work station for a seated operator, one must consider in particular the free space by the legs and feet (Kroemer, Kroemer, & Elbert, 2001). Long period of sitting will also be a health disadvantage. Grandjean (1980) claims that poorly designed chair and work postures may lead to back and neck aches, curvature of spine, and slackening of the abdominal muscles. Poor seating can lead to many ailments, including fatigue and poor performance (Pulat, 1996). Of the main incidents that precipitated an injury, the majority involved the tool striking the user (Bridger, 2003). Workstation layout and work design are two major factors of ergonomics of worker’s efficiency (Shinde & Jadhav, 2012).

Method:
The research was conducted in a small scale art stone industry in Yogayakarta, Indonesia. There were 3 workers in this industry. The materials that used in the industry were limestone and coral stone. The industry produces a kind of art stone products, such as wall ornaments. There were several process in making the art stone products. They were cutting process, material grinding process, sculpture process, and finishing process. The workers sit on the ground when they worked. Variables analysed in this study were work posture and processing time. Standardised Nordic Questionnaires was used to analyzed musculoskeletal symptoms (Kuorinka, et al., 1987). Rapid Upper Limb Assessment (Mc Atamney & Nigel, 1993) was used to analyzed work posture. The CATIA V5R20 (Joseph, 2011) was used to design the work facility.

Results and discussion:
The work posture assessment could evaluate work posture. Improvement of the work posture could be done, after evaluation the work posture. In sculpture process needed long time. Sculpture process had longest time, seven hours per day. The work posture was then evaluated. There were several symptoms. They were neck symptom, shoulder symptom, and leg symptom. The RULA (Rapid Upper Limb Assessment) score was 7. The work facility needed investigation and implement changing. In this research, improvement was done by designing table and chair for workers. After work facility improvement was implemented, then work posture evaluation was done. The RULA score of work posture decreased 20-39% from previous condition. The processing time also decreased 3%.

Key words: work facility design, processing time, work posture
References