Effects of Manual Bach Assembly Methods on Worker Productivity

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Abstract

Researchers suggest that when an ergonomics approach is followed, the impact, in terms of performance improvement and return on investment, is considerable. However, it must be noted that without appropriate experiments and testing of specific design, it is very difficult to realize the achievable gain on performance and productivity. Industrially developing countries face great difficulty in achieving high quality and productivity in manufacturing industries and in attaining good working conditions for workers at a low cost to compete in the global market. Ergonomics could be the solution for some of these problems. However, there have only been a few ergonomic studies conducted in Omani industries. Assembly procedure and task methods are believed to have a great impact on worker's productivity. This project has investigated the effect of the use of ergonomically designed workstation and batch assembly with alternate assembly methods. It was carried out at the ergonomics laboratory 'Sultan Qaboos University' with a simulated industrial assembly task. The parts assembly was carried out in an ergonomically designed workstation. Alternate assembly methods were investigated and productivity in terms of the output of parts assembled were evaluated. Results showed a significant change between the conventional workstation and the ergonomically designed workstation. The use of ergonomically designed workstation, with improved layout, increased the productivity of the participants by about 43%. This was achieved through more economical use of hand movements. Moreover, for the batch assembly size there was no significant change between one, two and three units (Plugs) assembly. However, the four parts assembly method showed a significant decline in the performance. The study showed that the use of ergonomics in the workstation, including redesign approach together with changes to the workplace layout, is feasible and could lead to improvement in productivity. The results obtained from the discomfort questionnaire distributed to the participants showed that 44% reported some discomfort in different parts of their body. Back pain and neck and shoulder pain was highest for 38% and 22% of total participants, respectively. This proved that providing ergonomically designed workstation alone is not enough. Workers, in general, should be given enough ergonomics awareness training to recognize workplace risk factors and to understand the control measures.
Ergonomics practice in Oman is still at its early stage. Further closer work with the industry is deemed to be beneficial and measurable to gain the support of management. This research study is intended to add to the understanding and practice of ergonomics in Oman.