INVESTIGATION OF ERGONOMICS RISK FACTORS IN THE TYRE MANUFACTURING INDUSTRY

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I declare here that the following research work is my individual research work and the dissertation content does not incorporate without previous acknowledgments any academic materials which are heretofore submitted for any Degree, Diploma or Certificate courses in another university, institution or higher education collage according to the best of my acquaintance, as well as the belief that it does not incorporate any other academic materials previously submitted, written or issued by other individuals or higher educational institution except where the acknowledgment is made within the chapters in the report. Correspondingly, I hereby grant a non-exclusive right to continue, duplicate or distribute to the University of Moratuwa for my thesis dissertation works, in entire or in part in printed or electronic versions or other mediums.

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The above candidate has carried out research for the Masters/MPhil/PhD thesis/ Dissertation under my supervision.

Signature of the supervisor: Date: 01/12/2022

Dr. H.K.G. Punchihewa

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Abstract

Sri Lankan tyre manufacturing industries are a source of employment for many workers. The incentive production manufacturing system is operating in these industries, and inherited operating systems were used in the present to achieve the outcome. The workers in tyre manufacturing industries associate with job-relevant activities such as material unloading, rubber milling, bead making, calandering, tyre building, curing, and tyre inspection. Semi-automated machines and considerable manual operations have been involved in the manufacturing process, and therefore workers expose to risk of musculoskeletal disorders (MSDs). As a result of awkward posture, health risks are generated and muscles, nerves, tendons, and body structures are affected from that. This research study aimed to determine the prevalence of MSD and assess the ergonomic risk level of workers in the tyre manufacturing industry. Also, introduced the factors that can be used to reduce the risk level relevant to individual operations. In this research, a questionnaire survey was carried out to identify the ergonomic risk factors among workers in the tyre manufacturing industries. The Nordic Musculoskeletal Questionnaire (NMQ) was used in 16 activities covering 3349 workers in 10 different tyre manufacturing plants. Their tasks were also further observed. The survey also captured the discomfort of their body parts according to their job tasks. The Rapid Entire Body Assessment (REBA) analysis tool was used to analyse awkward postures. NMQ results demonstrate that the lower back, upper back, neck, and shoulders were at higher risk of MSD than other body regions. REBA scores behaved between seven and twelve. This analysis showed that job activities need to be restructured to be comfortable and safe for workers.

Key words: Musculoskeletal disorders (MSDs), NMQ, REBA (rapid entire body assessment), Tyre manufacturing

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