

ABSTRAK

CV Lintang Gemintang Scientech adalah perusahaan yang bergerak dalam penjualan peralatan laboratorium, farmasi, kesehatan manusia, asam teknis, basa teknis, pelarut teknis, dan peralatan kimia umum tingkat teknis lainnya. Pekerja dapat terganggu sistem otot saat proses distribusi bahan kimia seperti Kaporit dengan posisi kerja saat proses *loading/unloading* dari gudang ke atas motor, yang memerlukan penyesuaian postur kerja. Postur tubuh yang membungkuk, punggung melengkung dan beban kerja berlebihan merupakan kondisi yang berisiko menimbulkan cedera dan keluhan muskuloskeletal, sehingga diperlukan evaluasi dan perbaikan.

Penelitian ini dimulai dengan mengidentifikasi keluhan muskuloskeletal pada pekerja menggunakan kuesioner *Nordic Body Map* (NBM). Perhitungan gaya tekan dilakukan pada sendi L5/S1 untuk mengevaluasi risiko cedera pada kondisi aktual. Alat bantu angkut yang ergonomis dirancang menggunakan metode *Pahl & Beitz* berdasarkan hasil evaluasi tersebut. Tahapan perancangan alat terdiri dari penentuan kriteria, merancang konsep, perancangan bentuk, serta perancangan detail. Pada tahap akhir, alat bantu angkut yang diusulkan divalidasi melalui perhitungan gaya tekan L5/S1 untuk memastikan penurunan risiko cedera.

Hasil penelitian menunjukkan bahwa gaya tekan pada sendi L5/S1 pekerja sebesar 5.700,437 Newton, melebihi batas aman yang direkomendasikan NIOSH (3.400 N). Keluhan muskuloskeletal yang dirasakan berkorelasi dengan besarnya gaya tekan tersebut. Perancangan alat bantu angkut "Trolis Hidrolik" yang ergonomis dapat memperbaiki postur kerja pekerja. Hasil validasi menunjukkan gaya tekan L5/S1 berkurang signifikan menjadi 1.865,349 Newton pada penggunaan alat bantu angkut usulan. Rancangan alat bantu angkut ini dapat mengurangi risiko cedera dan meningkatkan kenyamanan kerja.

Kata kunci: *Loading/unloading*; *Nordic Body Map* (NBM); Gaya tekan L5/S1; *Pahl & Beitz*; Trolis Hidrolik.

**DESIGN OF CARPORITE TRANSPORT EQUIPMENT ON
A MOTORCYCLE BY PAHL & BEITZ METHOD
(Case Study at CV Lintang Gemintang Scientech,
Tamantirto, Kasihan, Bantul, DIY)**

ABSTRACT

CV Lintang Gemintang Scientech is a company engaged in the sale of laboratory equipment, pharmaceuticals, human health, technical acids, technical bases, technical solvents, and other general technical chemical equipment. In the process of distributing chemicals such as Calcium Hypochlorite, the working position of workers during the loading/unloading process from/to the vehicle can interfere with the muscular system and require work posture adjustments. Bent body posture, curved back, and excessive workload are conditions that risk causing injury and musculoskeletal complaints, so evaluation and improvement are needed.

This research began by identifying musculoskeletal complaints in workers using the Nordic Body Map (NBM) questionnaire. Furthermore, the compressive force on the L5/S1 joint was calculated to evaluate the risk of injury in actual conditions. Based on the results of the evaluation, an ergonomic carrying aid was designed using the Pahl & Beitz method. The stages of tool design consisted of determining criteria, designing concepts, shape design, and detailed design. In the final stage, the proposed carrying aid was validated through the calculation of the L5/S1 compressive force to ensure risk reduction of injury.

The results showed that the compressive force on the worker's L5/S1 joint was 5,700.437 Newtons, exceeding the safe limit recommended by NIOSH (3,400 N). The musculoskeletal complaints experienced correlated with the magnitude of the compressive force. Through the design of an ergonomic carrying aid "Hydraulic Trolley", the worker's work posture could be improved. The validation results showed that the L5/S1 compressive force was significantly reduced to 1,865.349 Newtons when using the proposed carrying aid. Thus, the design of this carrying aid can reduce the risk of injury and improve work comfort.

Keywords: *Loading/unloading, Nordic Body Map (NBM), L5/S1 compressive-force, Pahl & Beitz, Hydraulic Trolley.*