

Design and Development of Multipurpose Ergonomic Cart for reducing physical workload: Implication towards occupational safety

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Abstract

The study narrates the development of “Multipurpose Ergonomic Cart” with a rotating feature aiming to enhance the safe and efficient handling of various items throughout diverse environments like hospitals, restaurants, offices and households. Traditional cart systems cause physical strain due to repetitive bending and improper anthropometric usage, resulting in musculoskeletal disorder. The proposed Cart integrates rotatable shelves with maneuverability that allows user easy access to items at an ergonomic height, focusing on less physical strain and improved operational efficiency. The insights which are obtained to lead the design process, which was created through a House of Quality analysis aligning customer demands with engineering specifications. The Cart’s Design was developed following a stern stress analysis to ensure durability, usability, and safety. Material selection and processes were firmly observed based on index calculations, compliance with safety standards. Choosing components were carefully conducted in terms of user-friendly interface, reliability for the validation of the design. This user-centered ergonomic cart which meets the condition of sustainability, promoting the vibrant user comfort portion and convenient to multiple workplaces usage minimizing the body forces can substitute traditional cart systems. This approach impacts on Human Factor by maintaining operational standards, ensuring human well-being (SDG 3), filling the work-envelope standard design requirements, minimizing disk pressure with static loading of back muscles, and easy adjustability to reduce postural movement.

Keywords

Ergonomics, User-Centered, Occupational Safety, Maneuverability, Sustainability

Biographies

Md. Ariful Islam is currently pursuing B.Sc degree in Industrial & Production Engineering at Ahsanullah University of Science and Technology. At Present, He is involved with multiple extracurricular activities, he is the Director of Branding & Promotion at IEOM Society AUST Student Chapter. His core interests include Supply Chain, Critical Thinking, Data science, Industrial Internet of Things, Automation, Production Planning, Project Management, Ergonomics and Human factor with high potentiality. He participated in multiple activities like Business Case competition, Project showcasing, Content writing. He is a pure illustration of prospects in mentioned fields like Data Analytics, Power BI data visualization, Quality management. He has excellent proficiency in Google Sheet, Graphic Design, MS office, Python, CAD simulation.

Md. Rayan Haque, a student of Industrial and Production Engineering at Ahsanullah University of Science and Technology. He is the General Secretary of AUST Photography Club. He is interested in supply chain management, industry 4.0, CAD Simulation, sustainability, industrial engineering, and operation research. He has extensive

expertise in CAD Design, presentations, team management, and event planning, and he is proficient in Microsoft Office.

Md. Farhan-E-Noor Labib is a devoted student of Industrial and Production Engineering, specializing in operations, supply chain optimization, and sustainability. During his internship at YSSE, he contributed to process improvement and functional effectiveness in the Operations Management Department, gaining real-world experience. Labib has participated in various exploration and contests pertaining to product systems and decision analysis since he is passionate about applying engineering achievements to real-world problems. Fully equipped with design operation tools and Microsoft Office, he is dedicated to developing his artificial engineering and promoting innovation in the industry.

Mr. Shah Murtoza Morshed is currently a lecturer of Mechanical & Production engineering department at Ahsanullah University of Science & Technology, Dhaka. His research interests include Human Factors Engineering, Machine Learning Application, Additive Manufacturing, Healthcare System, Data Driven Digital Manufacturing, Sustainable Circular Supply Chain Management, Multicriteria Decision Making, Multidisciplinary Optimization, Operations Research and Decision Sciences, Healthcare System, Quality Management.