



Journal of Scientific Research in Allied Sciences
ISSN NO. 2455-5800
 DOI No. 10.26838/JUSRES.2021.7.6.513



Contents available at www.jusres.com

ERGONOMICS POSTURE FOR LATHE MACHINE OPERATORS

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ARTICLE INFO

Article History

Received: Sept 2021

Accepted: Nov 2021

Keywords:

Ergonomics
 application, Operator,
 Posture

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ABSTRACT

Most of the ergonomics conditions are prepared for a better environment, and some environmental conditions are obtained by tests to bring attention to their occupational exposure to potentially strenuous activities in a hot and humid climate. The working environment was non-ergonomic, not only because of the work-related problems themselves but also because of stressful tasks, extensive use of muscle force, old machinery, economic constraints, and a lack of enforcement of work regulations and labor legislation are survey in this review work.

REVIEW ARTICLE

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1. INTRODUCTION

Ergonomic applications, therefore, work together to satisfy the needs of changing local people's attitudes, local work methods, and/or traditional ways of doing things. Ergonomic applications are important because the effects of poor health and lack of safety facilities conditions exist in various workplaces are social progress in the industry. Small and medium-sized enterprises (SMEs) are mostly privately-owned companies and more profitable than state-run enterprises due to efficient use of the labor force, and the joint effort of workers and industry owners. However, it is known that labor management and productivity profile are not identical in all industries. SMEs have always remained outside the soft of organized industries, however, this sector influences the industrial economy. Health, safety, and ergonomic measures should therefore be strengthened in various industries so that every workplace can meet the minimum standard of health and safety. It is also important because industrial production is the backbone of an industrial

economy, for which there needs to be a consideration of the harmonization of work tasks. It is believed that the working population in the industry will have a significant impact on economic growth if there is access to safety services, including personal hygiene and environmental protection. There is also a correlation between industrial production and the industrial economy.

2. WORKING ENVIRONMENT

Working condition is one of the most important factors affecting the overall performance in any industry. Ergonomics has usually been used to improve the workers' performance by discovering the factors that contribute to their performance. The floor should be free from grease, oil, shavings, and clutter, which can cause someone to slip or trip. There should be proper air ventilation and plenty of light. Keeping the lathe and its accessories in good shape is an important safety procedure. Check regularly for any damaged parts, misalignment, and wear on moving parts. Sharpen tools regularly, and avoid working with dull or makeshift tools.

Lathes are machine tools used for cutting and shaping hard materials, most commonly metal and wood. Lathes hold the workpiece in place and rotate it along its axis, allowing the user to cut, sand, knurl, drill, or form the object using accessory tools. Before mounting the workpiece, make certain that the machine is set to the correct RPM. A speed chart should be consulted to determine the correct RPM for the workpiece size, length, material, and nature of the work being done. It is better to select a speed that is too slow, which can then be increased. Operating the lathe at too high a speed can be dangerous. Make sure the lathe setup is safe and all parts are securely in place, including the workpiece, chucks, and tool rest, if using one. The tool rest should be parallel to the workpiece and as close as possible to it without touching. Rotate the workpiece fully by hand to ensure it has full clearance on all sides.

3. LITERATURE REVIEW

Kim [1] proposes that there is a need for an increase in training programs to reduce the onset of WMSDs amongst the construction workers. Although there have been significant improvements to the acquirement of fundamental information, the demand to establish further enhancements of safety and health practices is still required in the construction industry. Here is need to detect early signs of any risk and/or illness on building workers so that sustained intervention actions should be taken to reduce incidents and prevent permanent health damage of work-related sicknesses due to construction works. Building workers are exposed to excessive construction site dangers that can result in injuries or even death.

Yuvin et al. [2] researches on a study revealed that reduced-energy values depend on many factors and that the wide variety of possible situations makes it necessary to conduct an in-depth risk analysis. The application of ROHS section 186 is, therefore, an integral part of the risk assessment and reduction process for tasks where workers have no alternative but to enter the zone where machine parts are in motion. The purpose of this process is to achieve a level of risk comparable to that contemplated in ROHS

section 182, by taking protective measures that will compensate for opening a guard or starting up the machine. These protective measures are based on three principles: reduce harm, increase the possibility of avoiding harm and reduce exposure to the hazard. Yet the issue of determining reduced-energy levels remains unresolved. A risk analysis must be conducted. The study identified some reference points or factors that will guide designers and users as they analyze specific cases and try to decide on the most appropriate values for reduced speed, force, kinetic energy, and contact pressure.

Ambedkar et al. [3] present work concerned an experimental study of turning on chromium-molybdenum case hardening alloy steel of AISI 4140 grade. They proposed Grey relation analysis to study the optimization of process parameters on machining AISI 4140 alloy steel using a tungsten carbide tipped cutting tool. The range of each parameter is set at four different levels. Mathematical models were deduced by software design Experts to express the influence degree of the main cutting variables such as cutting speed, feed rate, and depth of cut on output responses. After taking the responses grey relation analysis apply on all experiments to optimize the input parameter for optimum response.

Somnath et al. [4] purpose paper on examine and overview the issue of workspace for the efficient and safe working environment, also enhance the awareness of the ergonomics venture circumstances in relation of human and their nature of work which may occur in the power loom industry and to make recommendations for quality criteria in ergonomic interventions research. To avoid ambiguity in terminology a list of definitions of the ergonomic is highlighted. Based on the literature, the most significant ergonomic risk aspects are awkward posture in handling job task, force and repetition of specific movements including vibration and noise. Other ergonomics risk aspects include uncomfortable static position, contact stress of muscles and tendon and also extreme temperature and environmental conditions, this increase stress level which is significantly related to musculoskeletal disorders, effective

ergonomic interventions for improved musculoskeletal health in the workplace. This study will enhance the awareness of the risk aspects related to working postures, system layout and working environment which may occur in the power loom industry.

Prajitsen et al. [5] works on the productivity of the workers in mat manufacturing unit depending on workstation design as well as environmental condition as well as their comfort depends on working postures and working environment. Awkward, extreme and repetitive postures have been connected with work-related musculoskeletal disorders and injury to the lower back of workers engaged in the deburring process of PP Mat industries. This process is performed manually while sitting with folding legs at knee posture on the hard floor. In that situation which leads to various injuries associated to low back as well as neck and shoulder. The present study was carried out in M/S Varun Polymer, Jalgaon MIDC District of Maharashtra State India to study the physical and physiological parameters as well as the work station layout of the respondent engaged in Mat manufacturing unit. A total of 46 subjects were selected to study involved in mat-making enterprise and to make the provision of technology selection to reduce the hard work as well as musculoskeletal disorders, thus enhancing the productivity and comfortness. Factors like BMI, Popliteal height, buttock-knee length, seat base height, backrest height and room temperature are considered for an experiment. Taguchi L27 orthogonal array (OA) was applied to evaluate the effect of these parameters and signal-to-noise and analysis of variance (ANOVA) was used for work out the importance and their effect on the response parameter in summer environmental days. The results showed that the seat base height was the most significant parameter followed by BMI and the least influence was room temperature in winter season. Experimental results are provided to confirm the effectiveness of this approach.

Ansari & Sheikh [6] work is being carried out manually in most of the small-scale industries therefore the issues of work-related musculoskeletal disorders and injury in

different body sites are of top priority. Postural analysis tool using Rapid upper limb assessment (RULA) and Rapid entire body assessment (REBA) were applied for assessment which indicates that the workers are working above the secure limit. This ergonomic study sheds light on the posture analysis of the workers in small-scale industry. The study was conducted on 15 workers engaged in a small-scale industry situated at MIDC Wardha (Maharashtra, India). Videotape on different activities of the workers was prepared and then images were cropped from it for the analysis. This study presents an assessment of the work posture of workers engaged in different activities of small-scale industry. Evaluation of posture was carried out using RULA and REBA. Assessment is carried out using a worksheet. The RULA method determined that the majority of the workers were under high-risk levels and required immediate change. The REBA method determined that some of the workers were under lower levels and the majority at high-risk levels. Hence it was concluded that; there is a lack of ergonomics awareness and understanding in small-scale industries. Evaluation using postural analysis by RULA and REBA indicates that the workers are working above the secure limit. The major percentage of the workers have awkward postures.

Alex et al. [7] work on ergonomics and human factors (E/HF) perspective, characteristics of manufacturing tasks, and the effects of aging provide an insight into how the industry will have to adapt to support the user needs of the older worker in the future. The approach taken is drawn from Ilmarinen's framework of age, experience, and work performance, from which specific E/HF issues are explored. There would appear to be potential to support physical decline in older workers within manufacturing jobs through increased mechanization and automation; however, those factors associated with cognitive human factors are less clear. Increased mechanization and automation can place greater loads and demands on the older worker where cognitive decline is more subtle and varied between workers. Using historical

and contemporary findings and the relationship between age, experience, and work performance is redrawn to include both cognitive skills and physical attributes to provide recommendations for future job design and worker needs.

Létourneau, & Potvin [8] Studied on worker was killed when she unjammed a trolley at the entrance to a shot-blasting machine. Unjamming the trolley restarted the overhead conveyor and the worker got caught between the next trolley and the open doors of the shot-blasting machine. The small amount of clearance and the conveyor speed of 230 mm/s combined to trap the victim within six seconds, because she couldn't get out of the way. The CSST determined the causes to be (1) an easily accessible drawing-in and entrapment zone, (2) the unjamming that exposed the victim to the hazards of being drawn in and entrapped, and (3) inadequate occupational health and safety management concerning unjamming the shot-blasting machine (underestimated risk, poor communication of new work procedures).

Abhang et al.[9]have analyzed the accident data analysis for different types of machine tools. Accident data analysis has been carried out for the machine tools by considering each machine tool into various sub-systems which is useful for identifying the condition monitoring needs of the machine tools.

Selvam & Priyadarshini [10] Works on various safety and control measures (SCM) of accidents in building projects to minimize accidents' occurrence and consequent waste generation. A research methodology, consisting of a literature review and a field study was used to achieve the research objectives. The field survey involves a designed questionnaire that was administered through convenience sampling technique within Lagos State and descriptive analysis tools were used for the analysis. The field survey reveals different control measures in place and their rate of usage on building projects. On the other hand, the literature survey sheds light on the types of accidents on building projects and their respective control

measures with methodologies for accidents' preventions

Beriha et al. [11] developed an appropriate construct to benchmark OHS performance in the Indian industrial setting so that deficiencies can be highlighted and possible strategies can be evolved to improve the performance. They used data envelopment analysis to test the economic consequences of the occupational health and safety administration caused due to dust in industries.

Zhang et. al. [12] focused on the workers' safety behavior in compliance with workplace safety than determining the actual hazardous scope of work and finding effective measures to reduce fatality at the workplace. We are astounded by the fact that limited studies have been focused on the scaffolding industry although this scope of work contributes quite high accidents in the construction industry. It is reported by the Social Security Organization of Malaysia that the most prevailing accident in the construction field is the slip and fall type. This study will identify factors that affect employees' safety behavior in the industry.

Satopathy et. al. [13] has proposed a measurement technique for organizational safety causal models in capturing the relation between organizational factors and safety performance using a Bayesian approach. Occupational health and safety in the Indian industry has been considered as an important issue with the construction industry being the most dangerous. This is especially applicable to most of developing countries because of the lack of Safety Acts.

Vinod kumar & Bhasi [14] stated that safety climate and health have undergone significant changes mainly because of the use of new production technology and the proliferation of legislation and regulations in this area. Managers are realizing that a safe working environment increases productivity

Kongtip et al. [15] have presented an overall picture of OHS management in small and medium-sized industries to gain information related to employment, welfare and health facilities, health education, accident statistics, occupational health and safety management and safety activities in Thailand.

Main et al. [16] have discussed this effect. They stated, "Change can have the net effect of increasing risk or reducing risk. Seldom does change on the plant floor or even in a service industry have zero net effect on risk. Lean efforts can and will at times be implemented in ways which fail to adequately consider safety". The emphasis should be to optimize all the assets of the manufacturing system, but those implementing lean at times fail to recognize that the operators are also asset. During the lean evaluation process, the contribution of the operators should not be just looked at from a value-added or non-value-added point of view, but also a health and safety perspective.

Manuele [17] found that monetary losses due to employee injuries are significant for organizations. Manufacturing companies should include safety as part of a holistic approach to improving efficiency, productivity, and profitability. Improving safety does not directly lead to profits similar to those associated with the introduction of new products or services, safety improvements can result in increased profitability by eliminating needless waste.

Saurin et al. [18] have analyzed construction safety management practices from three cognitive systems engineering perspectives (flexibility, learning and awareness). The safety management processes considered in the study are transparent, safety planning, proactive performance measurement, accident investigations, and identification and monitoring of pressures.

Walder et al. [19] stated that for lean thinking to be implemented correctly it will require effective ergonomics. Effective ergonomics is a necessary part to sustain the lean efforts of any organization. Neither concepts of lean nor ergonomics are new, but the appropriate application of both is vital to short and long term success.

4. CONCLUSIONS

From the available literature, it can be seen that though some work has been reported on the influence of ergonomics in machining. Moreover, back pain, hand pain and leg pain are the efficient conditions for the operator. Therefore, there should be research endeavors

to apply multi-objective optimization techniques to achieve efficient condition for machining.

- To analyze the optimization of worker pain has been never investigated for lathe machining operator.
- The atmosphere condition has to never suggest by any research for which on is happened summer season.
- Efficient use of time reduction in stress has been never prepared for lathe operation.

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