FINAL YEAR PROJECT REPORT **The Ergonomic Study In an Assembling Industry**

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The Ergonomic Study In an Assembling Industry

Project Report submitted to the Institute of Textile and Industrial Sciences, University of Management and Technology in partial fulfillment of the requirements for the degree of Bachelor of Science in Industrial Engineering

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Abstract This project presents the study of the ergonomics in the industrial company. The factory has manufacturing and assembling departments which have the most complicated hand movements for the workers to complete their job. The body structure and overall movement of the worker in the factory environment is observed. By using the qualitative and analytical methods the movements are to be optimized and minimized by using the most economical solutions possible. The study will relief the workers from stress and high motivation level will result in increased productivity for the factory. The workers will be brainstormed about the advantages of healthy movements in the human muscular system. The advantage of the worker will be assured before conducting this study as the involvement of the worker in the improvement process will be the essence of the study. The work study and time calculations will be re-checked before arriving to a conclusion.

Acknowledgements

This Project is an effort to understand and implement the principles learned in the industrial engineering disciplines. This Effort would never be possible without the help provided by *DR. Nabeel Amin* . Sir, you have provided me courage to use my knowledge and implement it the practical field. The disciplines of engineering were never so easy, but with the interest and enthusiasm provided by the knowledgeable project advisor it was possible. I pay my deep respect and thanks to the faculty members that have taught me the disciplines of engineering. I would also like to mention *Sir Iftikhar Hussain , Professor Ghauri , Sir Salman Butt.* The Honourable Rector *Dr. Hassan Shoaib Murad f*or encouraging me at every step to my studies with due diligence.

Ergonomic Study

This research project is submitted to the Institute of Textile & Industrial Science, University of Management & Technology, Lahore, Pakistan as a requirement for the partial fulfillment of the B.Sc. INDUSTRIAL ENGINEERING

Approved by

Project Supervisor Dr.Nabeel Amin

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List of Abbreviations

1. Human Factor Engineering HFE
2. Occupational Health and Safety Advisory Services OHSAS 18001
3. Industrial Management Science IMS
4. Allied Engineering Product Services AEPS
5. Private Company Pvt
6. Limited LTD
7. Pakistan Elektron Limited PEL
8. Alternating Current AC
9. Liquid crystal display LCD
10. Musculoskeletal Disorders MSDs
11. Work Musculoskeletal Disorder WMSD
12. Cummulative Trauma Disorder CTD

Chapter 1. Introduction

1 Ergonomics

The Evaluation of Human Factors in the organizational environment specifically assembling industry is conducted. The Employees are subjected to late working hours , repetitive work and the posture required for the job are not according to the healthy practice of Ergonomics. I would like to study and evaluate the current human factor in the organization and help improving them according to the best benchmarks available according to the nature of the organization. The method used for the project are researched and based on knowledge of the disciplines of industrial engineering. *"Human Factors Engineering (HFE) is the discipline of applying what is known about human capabilities and limitations to the design of products, processes, systems, and work environments. It can be applied to the design of all systems having a human interface, including hardware and software. Its application to system design improves ease of use, system performance and reliability, and user satisfaction, while reducing operational errors, operator stress, training requirements, user fatigue, and product liability. HFE is distinctive in being the only discipline that relates humans to technology."* [1] Human Factor focuses on the interaction of human being with its working environment. The tools placed their weight , dimensions, size are examined critically for the successful implementation of the discipline. The limitations of human being is understood and analyzed as it is the major focus to get maximum productivity within the limitation of fatigue and stress levels bearable by the individual. The standards are set according to cultural and environmental impacts on the human being. The physical structure of the human being in the geographical span is used to set the standards , as in Pakistan the average height of a worker will be 5 feet 5 inch whereas in the United States it is near to 6 feet.

The Objectives is to enhance the effectiveness and efficiency with which the work is carried out. The improvement Of Safety Standards is also one of the main objective. The discipline of Industrial Management Science IMS has introduced many new systems i.e. OHSAS 18001(Occupational Health and Safety Advisory Services) for the implementation of high safety standards recognized by international governments. Such systems can be used as a guide for the implementation of safety standards. Human values and respect are rudimentary while implementing the Study, as it is being implemented to help the human workforce. Fatigue should

be lowered which will give a desired job satisfaction from the worker to the employer , in turn it will signal the success of the research. The Objectives when achieved shall give a improved quality of life to the worker and a happy workforce. The approach taken for the study should be that any tool , equipment or workstation that is to be designed should be for human use and optimized. The workstation should have flexibility and designed upto the mark. The ergonomics engineer should have a commitment to the idea that machines serve the needs of human beings, and human beings are not to be enslaved by the machine neither should be involved in a robotic attitude towards serving a machine. The individual difference in human being varies as some workers are hard working , fast and muscularly strong than their peers. This will create difference in productivity levels ,so a flexible and desirable attitude should be envisaged. The training of the workers is mandatory for the achievement of reliable outcomes. The data collection shall be based on a scientific method and the external environmental factors shall be considered for appropriate results. There is always space for improvement in the methodology. The Basic Principles involved in Ergonomics Study are as follows:

● Workstation: A workstation is the place a worker occupies when performing a job. The workstation may be occupied all the time or it may be one of several places where work is done. Some examples of workstations are work stands or work tables for machine operation, assembly or inspection; a work table where a computer is operated; a control console; etc.

Workstation Ergonomic Principles

● Sitting and chair design: If a job does not require a great deal of physical strength and can be done in a limited space,then the work should be done in a sitting position.The worker needs to be able to reach the entire work area without stretching or twisting unnecessarily.A good sitting position means that the individual is sitting straight in front

of and close to the work.The work table and the chair should be designed so that the work surface is approximately at the same level as the elbows.The back should be straight and the shoulders relaxed.If possible, there should be some form of adjustable support for the elbows, forearms or hands.

Ergonomic Sitting Habits

● Standing workstation: Standing for long periods of time to perform a job should be avoided whenever possible. Long periods of standing work can cause back pain, leg swelling, problems with blood circulation, sore feet and tired muscles. If a job must be done in a standing position, a chair or stool should be provided for the worker and he or she should be able to sit down at regular intervals.Workers should be able to work with their upper arms at their sides and without excessive bending or twisting of the back.The work surface should be adjustable for workers of different heights and for different job tasks.If the work surface is not adjustable, then provide a pedestal to raise the work surface for taller workers. For shorter workers, provide a platform to raise their working height.

Standing Workstation Habits of workers

● Hand tools and controls: The tools should be designed according to ergonomic requirements. Poorly designed hand tools that do not fit the individual worker or the task can cause negative health effects and decrease a worker's productivity. In order to prevent health problems, as well as to maintain the worker's productivity, hand tools should be designed so that they fit both the individual and the task. Well designed tools can contribute to good body positions and movements and can increase productivity. The poor quality hand tools should be avoided.Tools that allow the worker to use the larger muscles in the shoulders, arms and legs should be chosen, rather than the smaller muscles in the wrists and fingers. Avoid holding a tool continuously in a raised position or gripping a heavy tool. Properly designed tools allow the worker to keep the elbows next to the body to prevent damage to the shoulder or arm. Additionally, properly designed tools do not require the worker to bend the wrists, stoop or twist.Choose handles that are long enough to fit the whole hand. This will help to reduce uncomfortable pressure on the palm of the hand or on the joints of the fingers and hand.

Ergonomically Designed Hand Tools

● Heavy physical work: Manual work must be designed properly so that workers will not overexert themselves and develop muscle strain, especially in the back. Performing heavy physical work for long periods causes the rate of breathing and the heart beat to increase. If a worker is not in good physical condition, he or she is likely to get tired easily while doing heavy physical work. Whenever possible, it is helpful to use mechanical power to do the heavy work. This does not mean that employers should replace workers with machines, rather, that workers can use machines to perform the most arduous tasks. Mechanical power reduces the risks to the worker and at the same time provides more work opportunities for people with less physical strength.

● Job design: It is important to design jobs taking into consideration human factors. Well designed jobs consider the worker's mental and physical characteristics as well as health and safety conditions. The way a job is designed determines whether it is varied or repetitive, whether it allows the worker to be comfortable or forces him into awkward positions, and whether it involves interesting or stimulating tasks or boring repetitive ones. The following are some ergonomic factors that should be considered when designing or redesigning jobs:

○ the types of tasks that need to be done;
○ how tasks need to be performed;
○ how many tasks need to be performed;
○ the order in which tasks need to be completed;

○ the type of equipment needed to complete tasks.

● Health and safety : The goal of ergonomics is to look for ways to make the job fit the worker, instead of forcing the worker to conform to the job.