

# **Ergonomics of Material Handling and Machine Guarding in CNC Industry**

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**ABSTRACT:** Poor working practices, twisted posture, bad posture is a common issue that can lead to various human body problems, At working site may cause instant and chronic effects on workers. The core reason for these effects is poor ergonomics of improper material handling and improper machine guarding in the workplace. Ergonomics is an engineering discipline that addresses the effect of work environments and tasks have on the employee. Ergonomics involves workstation setup and design, body posture, prevention of computer related injuries and more. Ergonomics education is often included in physical therapy treatment for back and neck injury and chronic pain. Material handling is the field concerned with solving the pragmatic problems involving the movement, storage, control and protection of materials, goods and products throughout the processes of cleaning, preparation, manufacturing, distribution, consumption and disposal of all related, goods and their packaging. Machine guarding is to protect against contact with dangerous and moving parts of the machine work in process and failure due to mechanical, electrical and human causes. The aim of the project is to implement proper ergonomics of material handling and machine guarding in the industry.

**KEYWORDS:** Ergonomics, Material Handling, Machine guarding.

## **I. INTRODUCTION**

My project is about implementing proper ergonomics of material handling and machine guarding in the CNC and conventional industry. Inadequate ergonomics will lead to many physiological problems and inadequate material handling leads to minor to major accident or even to fatal accident. Unsafe condition of machine guarding leads to malfunction and fencing around the machines. So, developing and sustaining proper ergonomics of material handling and machine guarding is essential.

### **1.1 Ergonomics**

Ergonomics is the science of work place design that tries the job fit the person rather than the person fitting the job. Ergo means work nomics means rules. The premises of ergonomics are to reduce physical strain by designing or modifying the work station, work method, and tools to eliminate excessive exertion and awkward posture and to reduce repetitive motions done of the job.

Ergonomics is the design of a workplace to ensure there is a good fit between the workers and what they interact with in their environment. Ergonomics is important because it make workers be in better health and shape and be more effective as they work in pleasant environments. Ergonomics generally improves productivity in companies.

Ergonomics is important because we can get injured if we spend a large amount of time in a position that is not proper. If you sit crooked or keep your wrist bent constantly, you might get pinched nerves or something similar. Get up and walk around and stretch.

### **Work-Related Musculoskeletal Disorders (WMSDs)**

The risk factors for developing work related musculoskeletal disorders include individual factors (e.g. inadequate strength, poor posture), physical requirements at the work place (e.g. Prolonged awkward static posture, highly repetitive work, use of vibrating tools), and organizational and psychosocial factors (e.g. prolonged work hours, poor work-rest cycle, shift work, low job security, little social support) in addition, comorbid medical conditions or past wrist trauma could increase the risk of work-related musculoskeletal disorders.

#### **1.2 Material Handling**

- ❖ Materials handling is the movement and storage of materials at the lowest possible cost through the use of proper methods and equipment.
- ❖ Materials handling is the moving of materials or product by any means, including storage, and all movements except processing operations and inspection.
- ❖ Materials handling embrace all of the basic operations involved in the movement of bulk, packaged and individual products in a semisolid or solid state by means of machinery and within limits of a place of business.
- ❖ The Manual Materials handling means the operation like lifting, placing, caring of material, pushing, pulling is carried out with the muscle power of human being by person individually or with the help of others.

#### **Objective**

- ✓ To increase equipment and space utilization.
- ✓ To reduce costs
- ✓ To increase capacity.
- ✓ To improve Customer Service
- ✓ To improve working condition.

#### **1.3 Machine Guarding:**

The Machine Guard Program is designed to protect Employees from hazards of moving machinery. All hazardous areas of a machine shall be guarded to prevent accidental "caught in" situations.

It is crucial to understand why machine and equipment safe guards are to be used on machines. An operator or maintenance worker must be informed as to the location of the safe guards on the machines, and should also be provided information on why safe guards protect them and what hazards they protect them from. In this process ergonomically identify the risk factors in CNC and Conventional during material handling and machine guarding.

**CNC Process:**

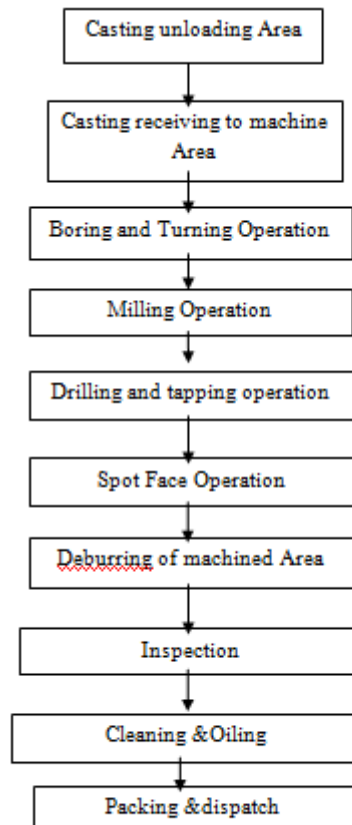


Table 1: Machine shop layout

## II. METHODOLOGY

(a) Assessment of improper ergonomics in material handling s by using checklist:

Assessing all possible defects in ergonomics in the workplace by providing a checklist to the workers to get the data about the effects caused by improper ergonomics and assesses the identified effects.

<b>Employee details</b>	
Name:	
Age:	
Location:	
Operation:	
Designation:	
Working hours:	
<b>Hazard Identification</b>	
<b>Disorders</b>	<b>Yes/No</b>
Wrists pain:	

**International Journal of Innovative Research in Science, Engineering and Technology**

An ISO 3297: 2007 Certified Organization

Volume 6, Special Issue 8, May 2017

**International Conference on Advances in Biotechnology, Civil & Mechanical Science (ICABCMS-17)**

**17<sup>th</sup> & 18<sup>th</sup> March 2017**

**Organized by**

**Selvam College of Technology, Namakkal, Tamilnadu, India**

Forearms pain:	
Back pain:	
Neck pain:	
Shoulders pain:	
Hand Pain:	
Leg pain:	
Reduced the range of shoulders motion:	
Tension, headache:	
Numbness:	
Burning in the hand:	
Tingling:	

**Safety Officer**

**Head**

**Supervisor**

<b>Risk Assessment</b>		
<b>Risk Factor</b>	<b>Potential Risk</b>	<b>High Risk</b>
Contact Stress		
Repetition		
Grip Force		
Lift/Lower Force		
Awkward Posture		
Vibration		

Table: 2 Check List

(b) Implementation of proper ergonomics of material handling and machine guarding. Implementing the adequate solution for each assessed effect came up with and checkout for results.

### **III. RESULTS**

By performing checklist analysis among CNC and conventional operators all the ergonomically functions of material handling and machine guarding hazards have been assessed and solutions have been recommended for each and every ergonomically functions of material handling and machine guarding hazard on different operation basis. Soon all the recommended solutions will be implemented resulting in reduction of ergonomically material handling and machine guarding hazards and risks.

### **IV. CONCLUSION**

Thus by implementing checklist analysis method, the risk related to ergonomics of material handlings and machine guarding are assessed. The assessed ergonomically material handling risk will be eliminated or controlled by provided ergonomical solution.

### **REFERENCES**

- [1] John Howard, Len Welsh, M.S., J.D "A complex Manual Material Handling Activity" 2007.
- [2] Division of Workers' Compensation "Manual Material Handling: An Ergonomic Approach"
- [3] Yuvin Chinniah "Analysis and prevention of serious and fatal accidents related to moving Parts of machinery" 2015.
- [4] Baba Md Deros , Dian Darina Indah Daruis , Ishak Mohamed Basir "A Study on Ergonomic Awareness among Workers Performing Manual Material Handling Activities" 2015.
- [5] O.N. Aneziris, I.A. Papazoglou, M. Konstandinidou, H. Baksteen, M. Mud, M. Damen, L.J. Bellamy, J. Oh "Quantification of occupational risk owing to contact with moving parts of machines" 2013.
- [6] Antonio C. Caputo, Pacifico M. Pelagagge, Paolo Salini "AHP-based methodology for selecting safety devices of industrial machinery" 2013.
- [7] Nurul Hayati Abdul Halim Ahmed Jaffar, Noriah Yusoff, Ahmad Naufal Adnan "Gravity Flow Rack's Material Handling System for Just-In-Time (JIT) Production" 2012.
- [8] Abdulrahman M. Basahel "Investigation of work-related Musculoskeletal Disorders (MSDs) in warehouse workers in Saudi Arabia" 2015.
- [9] J.R. Ayu Bidiawati , Eva Suryani "Improving The Work Position of Worker's Based on Quick Exposure Check Method to Reduce the Risk of Work Related Musculoskeletal Disorders" 2015.
- [10] Colleen Low Principal Specialist (Occupational Hygiene) OSH Specialist Department Occupational Safety and Health "Manual Material Handling & Ergonomic Management Program" 2010