WORKPLACE EVALUATION

Evaluating a Given Working Environment for Musculoskeletal Disorders

SUBMITTED BY

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DECLARATION

We hereby declare that the work done hereby is our original work and any reference taken is duly mentioned else the study will render itself null and void.

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AIM OF THE STUDY

This study is done to examine possible solutions to common challenges in work area setup. Health and safety issues associated with workplace exist in many degrees. In some cases, the design of the equipment or procedures or the work area design may cause discomfort or short term pain. A well designed work area is only part of the solution followed by using proper work habits and techniques.
INTRODUCTION TO ERGONOMICS

Today, changes in technology, changes in the way we perform work, where and how we work is occurring at a rapid pace. Along with the expanding use of this technology have come reports about adverse health changes for machine, tool or equipment users. Here we will examine the factors that may impact your health and performance while using machine, tool or equipment.

Ergonomics is a Greek term which represents the scientific study (nomos) of human work (ergon). It is the study of designing equipment and devices that fit the human body, its movements, and its cognitive abilities. The International Ergonomics Association defines ergonomics as follows,

“Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.”

Thus ergonomics considers the physical and mental capabilities and limits of the worker as he or she interacts with tools, equipment, work methods, tasks, and the working environment. Hence the goal of ergonomics study is to reduce work-related musculoskeletal disorders (MSDs) by adapting the work to fit the person, instead of forcing the person to adapt to the work.

MUSCULOSKELETAL DISORDERS (MSDs)

This term represents the illnesses and injuries that affect one or more parts of the musculoskeletal system; which includes sprains, strains, inflammation, degeneration, tears, pinched nerves or blood vessels, bone splintering and stress fractures. Symptoms are discomfort, pain, fatigue, swelling, stiffness, or numbness and tingling.
APPRAOCH

Here the sewing operators in a garment manufacturing unit are taken; the physiological problems faced by them are considered. The tools handled by them are studied, their material handling procedure and other sustained postures are studied.

We have taken “Attaching Waistband to the Yoke” and “Spot Removal” as operational study. The former operation of waistband attaching includes,

- Taking front bodice panel out off the bundle
- Putting the left-side panel under needle
- Putting waistband panel over it & stitching
- Reversing the bodice & placing wash-care etc labels
- Stitching
- Covering the inner-side off bodice waist with band by folding
- Cutting the extra length off folded waistband
- Placing under needle & top-stitch
- Similar operations for right-side panel
- Cutting the extra length off folded waistband
- Placing under needle & top-stitch

Employees often perform fine work or tedious jobs at cutting, sewing, and quality control stations. Many times these jobs have acute visual requirements, coupled with intense wrist, hand, and finger movements. Following are potential risk factors and possible solutions involved in this process.
OPERATION STUDY: 1 (RESPECTIVE MSDs)

As per the operation breakdown, following are the observations for various elemental operations;

CUTTING

The waistband requires initial cutting by scissors, followed by stitching and finally trimming the threads. Following can be the problems which can be there if cutting is not done properly;

▶ Employees use a pinch grip to hold small scissors between the index finger and thumb. Repeated pinch grip may cause hand or wrist injuries.
▶ Holding small scissors between the index finger and thumb also can cause contact stress on the fingers.
▶ While holding scissors or manipulating fabric, employees often maintain awkward arm, wrist, hand, and finger posture.
▶ Cutting and manipulating fabric requires the employee to use repeated motions.
STITCHING

Stitching the waistband involves taking cut material, placing it on the sewing mount, and then running it through a sewing machine. This operation may require pinch grips and awkward arm, neck, and trunk postures. Force may also be required to push fabric through the machine.

Pulling the waistband from behind

- Employees push fabric through the sewing machine, which may require extending arms, bending at the waist, and applying force.
- Awkward posture causing ergonomic stress to arms, shoulders, and back.
- Repetitive strain injuries (RSI) caused due to local mechanical stress, followed by awkward postures and forceful exertions

- Frozen shoulder (caused due to stiffness in joint), shoulder dislocation; calcify tendonitis, slap lesion, biceps tendons rupture etc.
- Continuous shoulder pain if left unattended can result in Bursitis/Torn-Rotator Cuffs.
CHECKING

During stitching and even after the stitch is done, the operator used to check the panels repetitively for any such fault, the possible problems associate with this operation is as follows;

> Employees hold their neck, trunk, and arms in an awkward position as they strain to see detail in an object.

> Insufficient lighting makes it difficult for employees to see their work, and may cause eye fatigue and headache.

> Permanent loss of vision, if the lighting conditions are not good and the stress so observed is left unattended.
MATERIAL HANDLING

The flexor tendons are important because they allow operators to move fingers and hand such as when they grasp cut panels. These tendons are covered by a material called Tenocynovium, which are slippery thus allowing tendons to glide against each other during grasping.

![Tenocynovium](image)

- While manipulating fabric, employees repeatedly use a forceful pinch grip between the thumb and index finger.
- Thickening and swelling of Tenocynovium, leading to carpal tunnel syndrome.

Similarly two types of injuries occur in lower back viz. muscular (strains & sprains) and other at Spine disc serving as cushion.

![Continuous and repetitive twisting operation](image)
OTHER FACTORS

Apart from cutting, stitching, checking and material handling, there are several other factors which can cause MSDs in garment industry; a few of viz. are listed viz.

1. Sewing Table

The dimensions of the sewing table that should be considered are viz. height, size, shape, tilt and leg room. The common observed problems are;

- Sewing tables are not easily adjustable. Tables that are too high create elevated shoulder postures and non-neutral elbow and wrist postures. Tables that are too low causing the operator to lean forward and flex his or her neck.
- Some tables are not large enough to support the weight of the garment. Other tables are too large and get in the way of easy pickup and deposit, particularly when using automated transport systems. Many tables are not the appropriate shape for the job.
- Almost all sewing tables are flat. Flat sewing tables do not maximize visibility and compromise the posture of the upper extremity and neck.
- Sewing machine operators have limited legroom because of drawers and/or trash chutes (for over-lock) attached to the underside of the table.

2. Chairs

The chair is a critical piece of equipment for sewing machine operators who work in a seated position. It can have a very large impact on the comfort of the worker and can affect the risk of muscle pain and injury. Operators if provided with very poor chairs such as stacking chairs; which are not adjustable, provides no cushioning or back support and the edge of the seat constricts blood flow at the back of the legs because of a large rounded hump or square edge.
OPERATION STUDY: 2 (RESPECTIVE MSDs)

For removing the stains, a spot gun is usually used in the garment industry. The general elements include:

- Picking the panel and searching for the spot
- Holding the spot tight over the finger
- Taking the gun and aiming at spot
- Spotting
- Visual checking for the spot removal
- Taking the next piece

Many times these jobs have acute visual requirements, coupled with intense wrist, hand, and finger movements. Following are potential risk factors and possible solutions involved in this process.
**SPOTTING**

As per the procedure, the operator has to hold the gun and aim at the spot. The approximate weight of a filled gun is about 1 kg, and if followed by repetitive process, can cause several disorders in the wrist;

- Formation of carpal tunnel syndrome with symptoms as reduced gripping strength.
- Awkward posture causing ergonomic stress to arms, shoulders, and back.
- Repetitive strain injuries (RSI) caused due to local mechanical stress, followed by awkward postures and forceful exertions.
- Severe headache in case of mask is not used during spotting operation. This can even get worsened if left unattended, causing loss of smelling sense

- Chances of various nose allergies/infections and other nasal deformity can be there, which is somewhat common in finishing operators.

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*Nasal blockages*
VISUAL CHECKING

The spotting is one of the finishing operations; hence visual appearance of the garment at this stage plays an important role in deciding the quality of the final finished product. But continuously visualizing the spots, especially under low light can create serious problems viz.

- Dry eye, Glaucoma (damage of the optic nerve due to too much stress on the eye)
- Permanent loss of vision if left unattended.
- Muscular (strains & sprains) problems associated with Spine disc serving as cushion, due to continuous standing.

- Continuous bowing posture can cause severe neck problems like Muscle spasm, cervical spondylosis.

- Arthritis is the common problem which is observed when neck is kept in lower bend position for a long period of time.
CONCLUSION

As shown in this study, ergonomics can be used as an effective guide to enhance the worker ease which can in turn materialize into profits through higher productivity. The various operational elements taken here possess common work problems among all the operators, hence a deep and further study over the same can prove to be a profitable step
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