

Design and Study of Analytical Model for Ergonomically Study of Video Display Unit

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Abstract: In this paper, Design of Mathematical Model for Ergonomically study of Video Display Unit workstation operators. For Design Model take Input factors are time, Posture, Environment, Gender, Height, Task and Output factor are Musculoskelton Disorder ,Job Satisfaction, Visual load ,Neck Pain and Joint.

Keywords: VDT, operator, Musculoskeletal, Height.

I. INTRODUCTION

Today, Video display unit operator suffers from many problems like Musculoskeleton disorder, neck pain, eye strain and mental stress. This problem of VDT operator due to working hours, lighting condition, working environment. This kind problem varies by male and female VDT operator. The drinking and smoking hobbit is not concern with problem in VDT operator.

II. INPUT FACTORS OF VDT OPERATORS

A. Time:

In computer workstation, VDT operators work in eight, twelve hours per day. Sometime they have extra shift to cover their company target. According to eight hour shift VDT operator work 200 hours in months after leaving Sunday and in year they spend 2400 hours of time in front of computer.



Fig. 1 VDT operator work in Computer work station

B. Posture:

VDT operators work in different sector .In Bank, Software Company, government office etc VDT operator have sitting posture and Manufacturing sector VDT operator generally in sitting, standing and bending posture. In eight or twelve hour shift VDT operator are in this posture.



Fig. 2 VDT operator in Sitting Posture



Fig. 3 VDT operator in Standing and Bending Posture

C. Environment:

VDT operator work in different types of Environment like air-conditioner room, non-AC room, proper and improper lighting system, noise etc.this kind of factors affects his working capabilities.



Fig. 4 VDT operator work in Different Environment.

D. Gender and Age:

In computer workstation, both male and female are work and having age range by eighteen to sixty year old. In this we make two groups for gender and age. one group for female range from eighteen to sixty year old and second group for male same range.



Fig. 5 Both Male and Female VDT operator.

E. Height:

In this we take different heights from ground. Screen height means height between top of screen and ground and keyboard height means distance between top of keyboard and ground floor. Mouse height means distance between top of mouse and floor and table height .seat pan height means height between ground floor and seat of chair on which which VDT operator is sit.

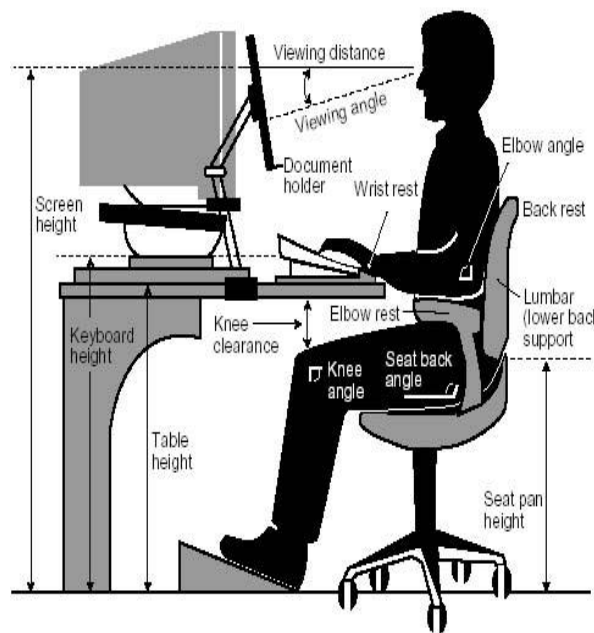


Fig. 6 Different Height from ground floor to computer system.

F. Task:

Various areas Bank, Manufacturing shop, office, hospital etc have different task for VDT operators. Mostly VDT operator have writing, reading and supervision work on computer workstation. In Bank VDT operators works on make entry about account details like cash, transfer, debit, credit etc of customer. In government office VDT operators works on make feeding data about of their respective department.

III. OUTPUT FACTORS OF VDT OPERATORS

A. Musculoskeletal Disorder:

Due various input factors time, height, task, Environment gender and age VDT operators face Musculoskeletal Disorder problem .Musculoskeletal Disorder pain the VDT operator in muscle, nerves, body joint, tendons, limb, neck and back.

Back pain creates pain in low or upper back including affecting the bony spine, disc, spinal cord and internal organs chest, abdomen, tumors and skin.

Joint Pain in VDT operators suffering pain in joint of shoulder, hand legs and arm.VDT operator suffer from neck pain.

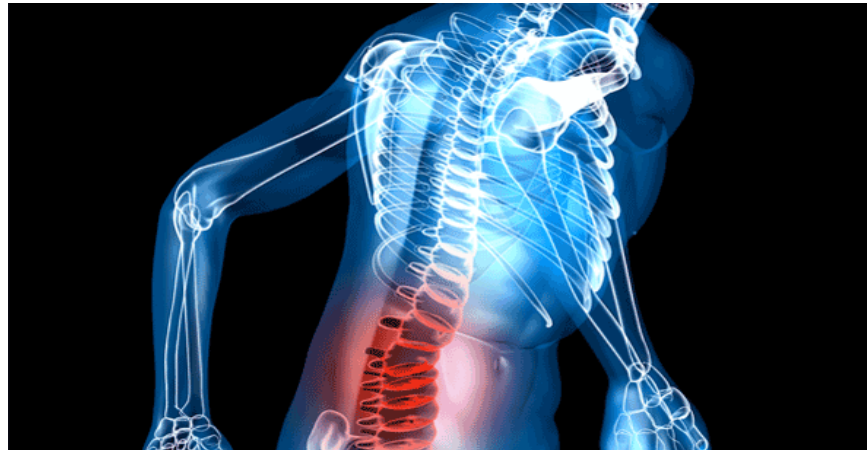


Fig.7 VDT operator has Back Pain.



Fig. 8 VDT operator has Joint Pain

B. Job Satisfaction:

Job satisfaction means VDT operator want employee's satisfaction like Security, Increment, Bonus, Mode of job and mental relaxation.

In security VDT operator want secure from accident, health in form of money. In mode of Job VDT operator want permanent job and increment ,Bonus in form of money.

C. Visual Load:

Due to improper height of table, chair, keyboard, screen of computer VDT operator cause eye strain, eye stress, eye lead ,eye burning etc.

Due improper visual angle between eye and screen of computer and Environment like proper and improper illumination system and Time result in eye pain.

IV. DESIGN OF MATHEMATICALLY MODEL

Mathematical Model means simple arithmetic calculation using sign and variables. Mathematical Model used to describe the real problem using variables and sign, derivation and integration etc. In this paper we take real problem of VDT operator work in different sector and facing many problem. For designing the Mathematical Model we take ergonomically study of input and output parameters of VDT operators works in different sector

A. Model-I

In Model-I is Arithmetic model we take Q, r, s, q and t variable .Q means Musculoskeleton disorder in VDT operator at eight and twelve hour shift.

Where

t₁- Eight hour shift for VDT operator

t₂- Twelve hour shift for VDT operator

r- task for VDT operator(assume)

s- height of chair and table (assume)

q₁- gender (male)

q₂- gender Female VDT operator

$$Q(t_1) = r(t_1) + s(t_1) + q_1(t_1)$$

$$Q(t_2) = r(t_2) + s(t_2) + q_2(t_2)$$

B. Model-II

Model-II is linear mathematical model, we take Y, x, m, and c is variable. Y means job satisfactions for male and female VDT operator.

$$Y_1 = mx_1 + c$$

$$Y_2 = mx_2 + c$$

Where

C=constant

M=slop (assume)

Y₁=Job satisfaction for male VDT operator

Y₂=Job satisfaction for female VDT operator

X₁= Environment of workplace for male

X₂= Environment of workplace for female.

V. CONCLUSION

Ergonomically study of input and output parameter of VDT operators work on different workstation we design Mathematical Model-I, Model-II.

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