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Design of Mathematical Model for Ergonomically Study of Video Display Unit Workstation Operators

Prof. Yogita B.Bhagat[1], Dr.S.G.Patil[2]
Asst. Professor, Mechanical Engineering, Sanmati Engineering College, Washim, India [1]
Principal, IBSS college of Engineering, Amravati, India [2]

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 Musculskeleton 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. INPUTFACTORS 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 operatorhave 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.
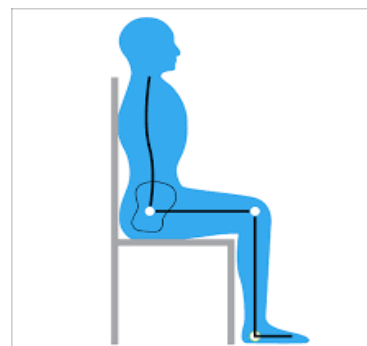

Fig. 2 VDToperator in Sitting Posture

Fig. 3 VDToperator 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 panheight means height between ground floor and seat of chair on which which VDT operator is sit.
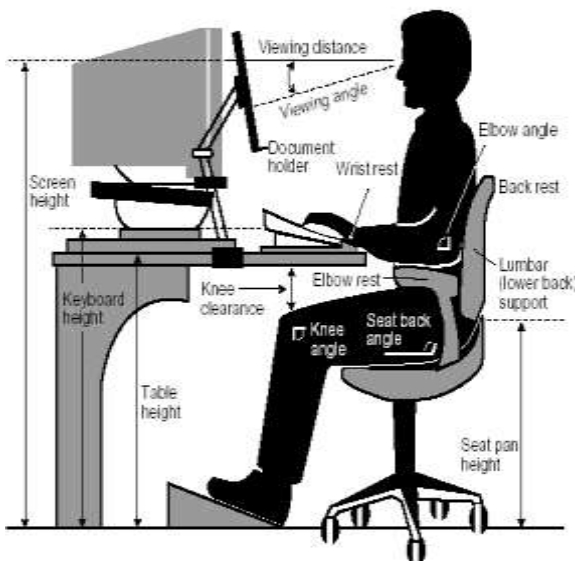

Fig. 6 Different Height from ground floor to computer system.

F. Task:

Various areasBank, Manufacturingshop, office, hospital etchave different task for VDT operators.Moslty 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, Environmentgender and age VDT operators face Musculoskeletal Disorder problem. Musculoskeletal Disorderpain the VDT operator in muscule, nerves, bodyjoint, tendons, limb, neck and back.

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

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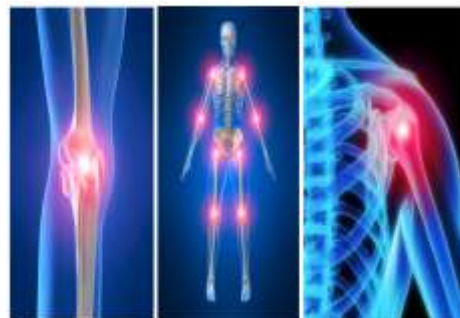

Fig.7 VDT operator has Back Pain.

Fig. 8 VDT operator has Joint Pain

B. Job Satisfactions:

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

In security VDT operator want secure from accident, health inform of money. In mode of Job

VDT operator want permanent job and increment ,Bonusin form of money.

C. *Visual Load:*

Due to improper height of table, chair, keyboard, screen of computer VDT operator cause eyestrain, eyestress, 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 arimethic calculation using sign and variables. MathematicalModel used to describe thereal problem using variables and sign, derivation and integrationetc.In this paper we take real problem of VDT operator work in different sector and facing many problem. Fordesigning 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 Arimethic model we take Q,r, s, q and t variable.Q means Musculoskleton disorder in VDT operator at eight and twelve hour shift.

Where

t_1- Eight hour shift for VDT operator
t_2- Twelve hour shift for VDT operator
r-task for VDT operator(assume)
s-height of chair and table (assume)
q_1-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 cisvariable.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)
Y_1=Job satisfaction for male VDT operator
Y_2=Job satisfaction for female VDT operator
X_1= Environment of workplace for male
X_2=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.

VI. ACKNOWLEDGMENT

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BIOGRAPHY

Yogita. B. Bhagat (Awate) M.E(CAD/CAM), Head of Department of Mechanical Engineering, Sanmati Engineering College, Washim Amravati University, Maharashtra, India. She has 8 years of teaching experience and 2 Papers published.