

Ergonomics Assessment on Tractor Driving Postures

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ABSTRACT: Tractor driving imposes a lot of physical and mental stress upon the operator. If the operator's seat is not comfortable, his work performance may be poor and there is also a possibility of accidents. And discomfort of seating maybe causes Back pain, and it is a real life problem for drivers. If a driver continuously in the driving job means he will have affected by those kind of problems. So I planned to do a study from the drivers for any discomfort on the driver's seat. Forearm link, upper arm link, head link, thigh link, spine link, neck link, foot link this are the area are affected by those discomforting in seating. The study concerned with the measurements of the proportions, size and weight of the human body.

KEYWORDS: Tractor driving postures, REBA, MSD, Ergonomic

I. INTRODUCTION

Tractors in low-income countries are used both for farm and non-farm activities. Most of the tractors being manufactured in India are products of collaboration with other countries. The design of tractors manufactured in India has not changed much in the past five decades especially from an ergonomics point of view, because of economic considerations. This describes a tractor control layout assessment with respect to the Indian population and compares the location of controls with workspace envelopes and the IS12343 standard for commonly used tractors on Indian farms. Controls like steering, foot clutch, foot brake, foot accelerator are located in areas defined by IS12343 standard in some tractors but these are not placed in the workspace envelopes of the Indian population. Ergonomics is about designing for people. Defined as the science of fitting a workplace to the user's needs, ergonomics aims to increase efficiency and productivity and reduce discomfort. Think about the angle of your computer monitor, or the height of your desk.

I have conduct a study from the real time drivers and taking some photos about the driving position in the seat and make the REBA assessment about the comfort level in the driver seat and calculate the REB score and finally find out the risk level for the driving position.

And finally I get the full feedback from the drivers after I were given some alternate suggestions in that kind of seats.

1.1 ERGONOMICS

Ergonomics is about designing for people. Defined as the science of fitting a workplace to the user's needs, ergonomics aims to increase efficiency and productivity and reduce discomfort. Think about the angle of your computer monitor, or the height of your desk. Think about whether your eyes are strained by the end of the day or if your wrists hurt from typing. A sound understanding of ergonomics can prevent most workplace injuries by adjusting tools to the user, putting an emphasis on proper posture to reduce the impact of repetitive movements. The use of computers and rapidly changing technology in the modern workplace has greatly increased the need for ergonomics. Desks, chairs, monitors, keyboards and lighting all need to be assessed when creating a workspace, whether it is at the office or at home.

II. OBJECTIVE

Goal of this study is

- ✓ To find out the occupational health problems of operator working in driving.
- ✓ To analyse the fatigue and work place stress experienced by drivers.
- ✓ To analyse their work posture.
- ✓ To find out the good ergonomical posture for drivers.
- ✓ To assess the extent of bodily discomfort experienced by the driver working in driving.



TRACTOR SEATS

DRIVERS DETAILS:

S.NO	NAME OF THE DRIVERS	EXPERIENCE	HEIGHT	WEIGHT	PROBLEMS FACED
1	Kumarasamy	14	165	65	Backpain
2	Anbu	7	170	70	Backpain, neck pain
3	Ponnusamy	8	172	65	Hip pain and sweating problem
4	Laxmanan	8	163	60	Feel over vibration
5	Sathish	5	170	75	Sometimes feel neck pain and buttock pain
6	Vengadesh	5	175	80	Hip pain and sweating problem
7	Nandhakumar	10	163	70	Feel over vibration
8	Karthi	9	175	80	Backpain
9	velu	10	165	60	Backpain, neck pain



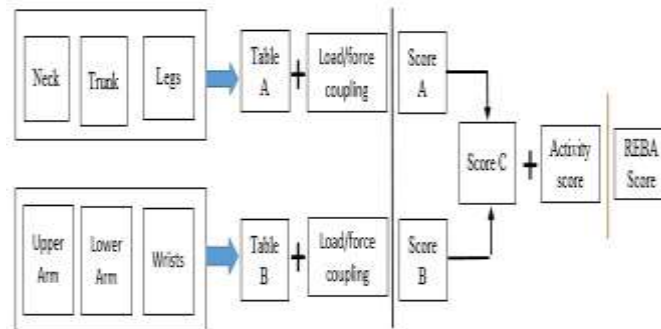
III. METHODOLOGY

RAPID ENTIRE BODY ASSESMENT (REBA)

A single page employee assessment work sheet is used to evaluate body postured forceful exertion, types of movement, repetition and coupling. The work sheet is divide into two body segment sections on the label A and B.

- Section A - trunk, neck, leg

- Section B – upper arm, lower arm and wrist. Initially, it needs to score group A (Trunk, Neck, Leg) and score group B(Upper arm,Lower arm and Wrist). For each position the postural score is assigned from the work sheet and some adjustment is made for force and coupling. Finally, from group A and group B scores C are obtained, and activity score is added to get final REBA score [20].



Examine 9 sample by working on farming tractors .

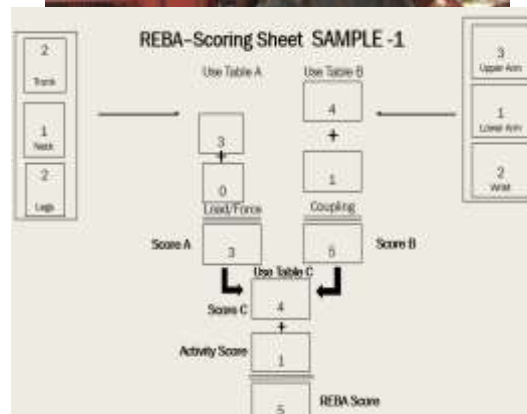
Farming tractors are divided into two they are

1. Straight position.
2. Reverse position.

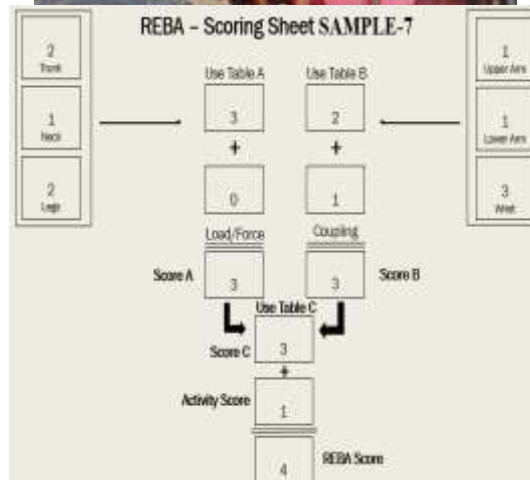
Each sample are clearly explain systematically to understand easily to find REBA score and its MSD risk level. Finally, all ten sample of reverse position are tabulate.

STRAIGHT POSITION

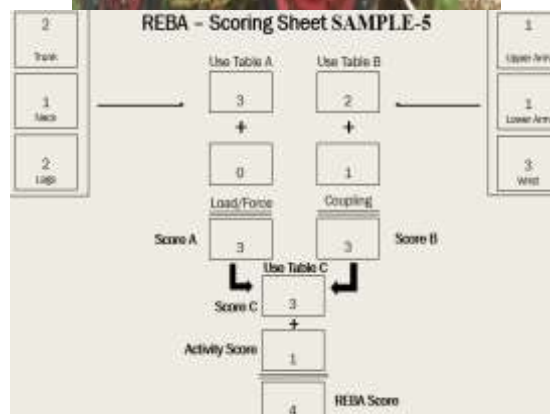
Sample 1

Sample 2

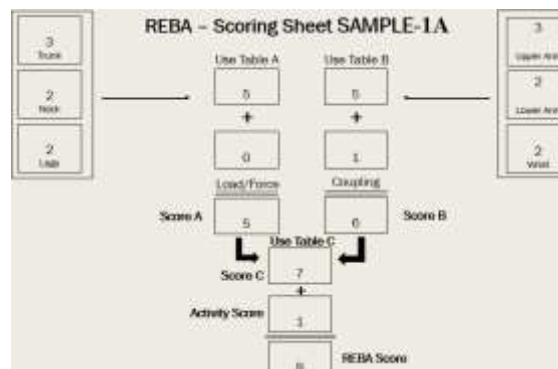


Sample 3

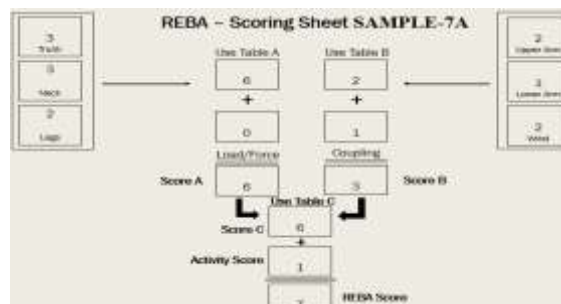


REVERSE POSITION

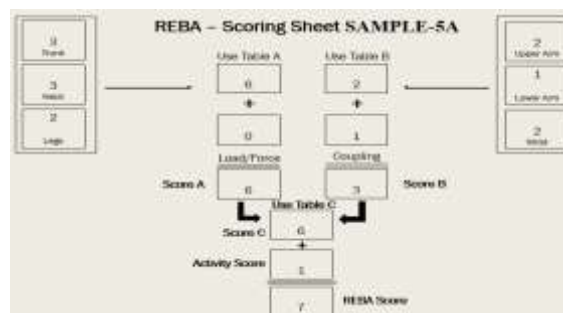
Sample 1A



Sample 2A



Sample 3A



REBA SCORE FOR STRAIGHT DRIVING POSTURES:

	NECK	TRUNK	LEG	T-A	LOAD	S-A
S-1	1	1	2	3	0	3
S-2	1	2	2	3	0	3
S-3	1	2	2	3	0	3

	U arm	L arm	wrist	T-B	LOAD	S-B
S-1	3	1	2	4	1	5
S-2	1	1	3	3	1	3
S-3	1	1	3	3	1	3

	S-C	A.C	REBA
S-1	4	1	5
S-2	3	1	4
S-3	3	1	4

REBA SCORE FOR REVERES POSTURES

	NECK	TRUNK	LEG	T-A	LOAD	S-A
S-1A	2	3	2	5	0	5
S-2A	3	3	2	6	0	6
S-3A	3	3	2	6	0	6

	U arm	L arm	Wrist	T-B	LOAD	S-B
S-1A	3	2	2	5	1	6
S-2A	2	1	2	2	1	3
S-3A	2	1	2	2	1	3

	S-C	A.C	REBA
S-1A	7	1	8
S-2A	6	1	7
S-3A	6	1	7

IV. RESULT

This report provides ergonomic study on the tractor drivers' seating position and the analysis report of two different posture, first one is straight driving posture and another one is their posture while taking reverse. By the above REBA score the risk level were found out and the solution were given by considering the above scores.

- ✓ This report provides ergonomic study on farming tractor seating position. Here step-by-step REBA score was clearly analysed for 18 postures. First 9 postures are for straight driving position in his **REBA score 5** (medium risk, investigate and change soon). So here we can change in the Seat adjustability (seat height, seat front and back adjustability), Improve the line of sight, Cushion stiffness, Seat cushion materials etc.,
- ✓ In another 9 postures is when the driver is taking reverse, the **REBA score 7** medium risk, in investigation process all 9 samples are turn back and their trunk also twisted more. So that we can use here their twisted seat like right side 20° and left side 20°, Seat back rest, Seat back size, Thigh support, Seat dimension, Enhance mirror or camera use, Seat back tilt, Lumbar support.

V. CONCLUSION

The purpose of this study was to rise ergonomics consciousness among farming tractor drivers. The study shows that there are evidences to suggest that the general working conditions of drivers are poor and must be seriously improved in order to reduce MSD risk factor.

- In this study REBA assessment tool is used to find out the postural discomfort for real time drivers. and taking some photos of those driving position, **REBA assessment was done** to assess the comfort level and REBA score was

calculated and finally the risk level was determined.

- And finally, feedback was collected from the drivers and some alternate suggestions were given for those kinds of seating positions.
- Seat adjustability (seat height, seat angle, seat swivel), Improve the line of sight, Enhance mirror or camera use, Seat back tilt, Lumbar support, Cushion stiffness, Seat cushion materials, Seat back size, Thigh support, Seat dimension, Seat back rest.

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