Manual Task Risk Assessment for Material Handling Exposure to WMSD

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***Abstract*- The Main Scope of this project is to Assess the Work-Related Musculoskeletal Disorder. Risk Assessment for Various Work Activity of Man - Machine, Material and Gas Cylinder Handling and movement in watch manufacturing industry. This project having main objective to ensure the Body mapping of WMSD (Lower limbs, Back, Neck and Shoulder and Hand-arm) of Workers and Assess the Risk Factor then make semi-quantitative judgements using a five point scale of five task characteristics (cycle time, force, speed, awkwardness and vibration) and Insists of Engineering Controls by arrangement Material handling Equipment to Ensure workers safe Movement and to make the Bench-marking Practices. A number of work areas have utilized the tool to identify key manual task risks for referral to the site occupational therapist for further analysis and control. Not only has this led to increased attention to manual task risk but has also resulted in the identification and implementation of high-level engineering controls to mitigate risk. Along with awareness and engagement, we expect that workplace understanding of specific manual task risk factors, and therefore control options, will naturally develop as use of the assessment increases. The driving intent for the development of this tool is to protect our workers and reduce injury. This Reduce the Material Movement Time can result in Reduce permanent injuries that can have a significant impact on a person's working ability and quality of life, as well as impacting on the productivity and economic performance of the company.**

***Index terms*- Ergonomics, Material Handling, mantra, Training**

I.INTRODUCTION

A. Consult your workers

Workers who perform manual tasks can provide valuable information about discomfort, Muscular aches and pains that can signal potential hazards.

- are difficult to do
- are very tiring (muscle fatigue reduces work capacity)
- are awkward or dangerous (for example, difficulty controlling loads)
- Cause discomfort.

B. Review available information

Records of workplace injuries and incidents, inspection reports and any workers compensation claims made for MSDs should be reviewed to help identify which manual tasks may cause harm. However, not all hazardous manual tasks will be associated with reported incidents, therefore it is important to gather additional information. Information and advice about hazardous manual tasks and risks relevant to particular industries and work activities is available from regulators, industry associations, unions, technical specialists and safety consultants.

C. Look for trends

You may be able to identify trends or common problems from the information you collect. Trends may show that certain tasks have more characteristics that make them hazardous or that some characteristics are more common in certain jobs. Trends may also show that workers in a particular location are exposed to more hazardous manual tasks than in other areas and this could indicate a problem with the design and layout of that work area or the way work is carried out there.

D. Observe manual tasks

Hazardous manual tasks can also be identified by looking at how people actually work and focussing on their postures and movements. A manual task is hazardous if it involves any of the following characteristics (described in Section 2.2):

- repetitive or sustained force
- high or sudden force
- repetitive movement
- sustained and/or awkward posture
- exposure to vibration

A Manual task Risk Assessment, as defined a task that requires a person to lift, lower, push, pull, carry or otherwise move, hold or restrain. They include:

- forceful exertions
- awkward and static postures
- vibration
- Repetition
- Duration

III. MANUAL TASK RISK ASSESSMENT SCORING MATRIX

II. MANUAL TASK RISK ASSESSMENT

	Task Codes									Cumulative Risk
Body Region	Total Time	Duration	Cycle time	Repetition Risk	Force	Speed	Exertion Risk	Awkwardness	Vibration	
Lower Limbs										
Back										
Neck/ Shoulder										
Arm/ Wrist/ Hand										

Cumulative risk is the sum of unshaded cells

Codes

Total time

1	2	3	4	5
0-2 hours/day	2-4 hours/day	4-6 hours/day	6-8 hours/day	> 8 hours/day

Duration of continuous performance

1	2	3	4	5
< 10 minutes	10 min – 30 min	30 min – 1 hr	1 hr – 2 hr	> 2 hr

Cycle time

1	2	3	4	5
> 5 minutes	1 – 5 minute	30 s – 1 min	10 s – 30 s	< 10 s

Force

1	2	3	4	5
Minimal force		Moderate force		Maximal force

Speed

1	2	3	4	5
Slow movements	Moderately paced	Little or no movement – static posture	Fast and smooth movements	Fast, jerky movements

Awkwardness

1	2	3	4	5
All postures close to neutral	Moderate deviations from neutral in one direction only	Moderate deviations in more than one direction	Near end range of motion posture in one direction	Near end range of motion in more than one direction

Vibration (Whole body or Peripheral)

1	2	3	4	5
None	Minimal	Moderate	Large amplitude	Severe amplitude

Scoring Keys for Repetition & Exertion

Scoring key for Repetition

	Duration				
Cycle Time	1	2	3	4	5
1	1	1	2	3	4
2	1	2	3	4	4
3	2	3	4	4	5
4	2	3	4	5	5
5	3	4	5	5	5

Scoring key for Exertion

	Force				
Speed	1	2	3	4	5
1	1	1	2	3	4
2	1	2	3	4	4
3	2	3	4	4	5
4	2	3	4	5	5
5	3	4	5	5	5

Action may be indicated if, for any region, the Exertion risk factor is 5, the sum of exertion and awkwardness is 8 or greater, or the cumulative risk is 15 or greater

Figure 1

IV. ACTIVITY SCORED SHEET

Activity Observed

1. Ladder Cutting In the Ground.
2. Pouring of Chemical in the Stirring Tank.
3. Package Box Cutting.
4. Chemical Barrel movement.

1. (Doing Cutting operation for Step ladder in the Ground)

ACTIVITY-1			(Doing Cutting operation for Step ladder in the Ground)						
S.no	Age	Body Region	Total Time	Duration	Cycle time	Force	Speed	Awkwardness	Vibration
1	36	Lower limbs	5	4	5	1	2	3	1
		Back	5	4	5	3	3	3	2
		Neck/Shoulder	5	4	5	4	2	3	2
		Arm/wrist/Hand	5	4	5	4	4	5	3
2	44	Lower limbs	5	4	5	1	3	3	1
		Back	5	4	5	2	3	3	2
		Neck/Shoulder	5	4	5	2	3	3	2
		Arm/wrist/Hand	5	4	5	4	4	5	3

Figure 2

Activity 2-pouring Chemical in the Stirrer tank

ACTIVITY-5			(Neutral Sodium Cyanide taking by Bucket and pouring to tank.)						
S.no	Age	Body Region	Total Time	Duration	Cycle time	Force	Speed	Awkwardness	Vibration
Person 1	26	Lower limbs	3	1	5	1	1	3	1
		Back	3	1	5	4	1	3	1
		Neck/Shoulder	3	1	5	4	1	3	1
		Arm/wrist/Hand	3	1	5	5	5	5	1
Person 2	21	Lower limbs	2	1	5	1	1	3	1
		Back	2	1	5	4	1	3	1
		Neck/Shoulder	2	1	5	4	1	3	1
		Arm/wrist/Hand	2	1	5	3	15	5	1
Person 2	21	Lower limbs	3	1	5	1	1	3	1
		Back	3	1	5	4	1	3	1
		Neck/Shoulder	3	1	5	4	1	3	1
		Arm/wrist/Hand	3	1	5	5	5	5	1

Table - 2

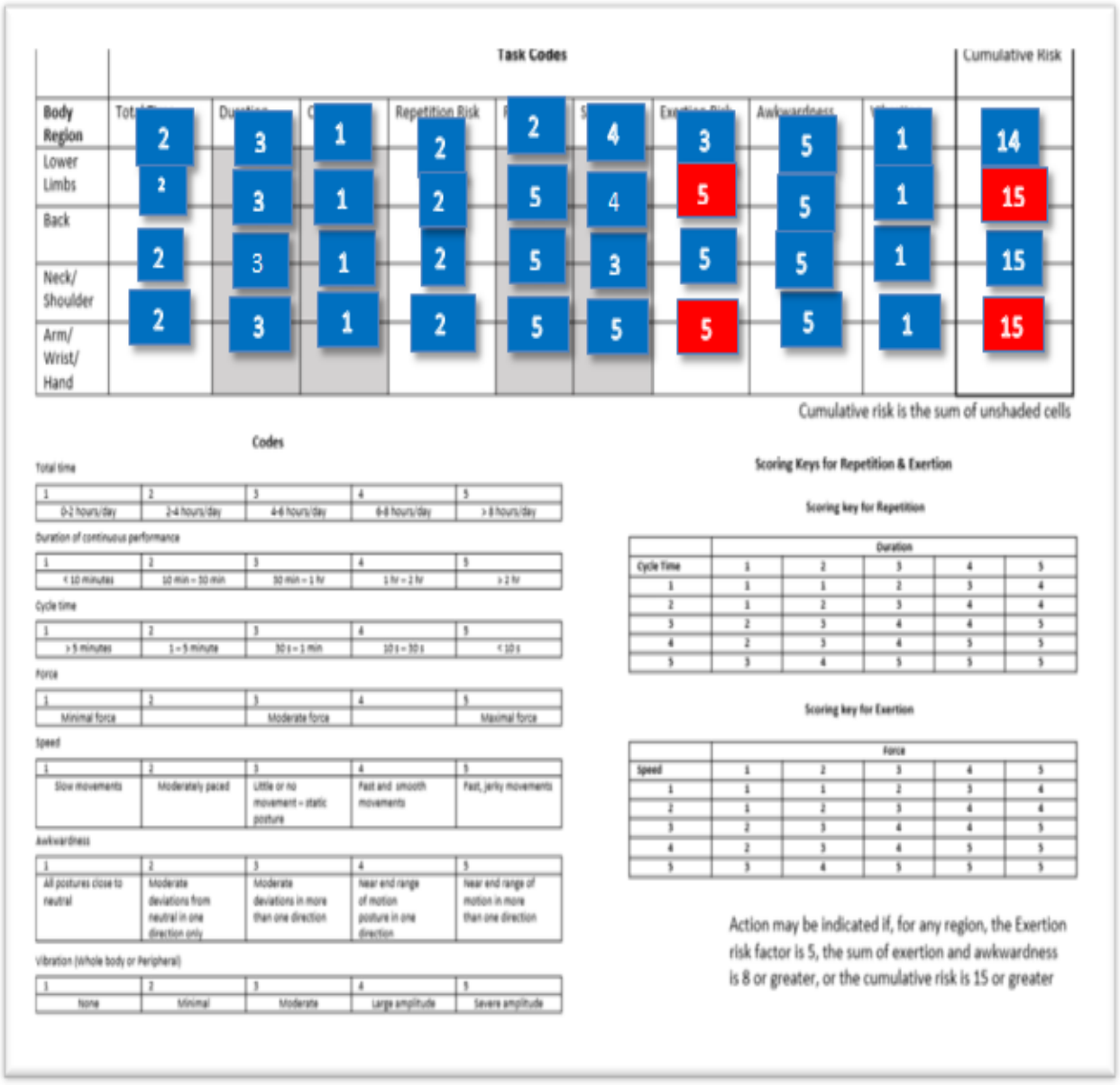
Consolidated Score for Activity -2

Activity -3- Chemical Barrel Movement

ACTIVITY-6			(Chemical Barrel Movement)-155 Kg						
S.no	Age	Body Region	Total Time	Duration	Cycle time	Force	Speed	Awkwardness	Vibration
Person 1	21	Lower limbs	2	3	5	4	1	5	1
		Back	2	3	5	4	1	5	1
		Neck/Shoulder	2	3	5	4	1	5	1
		Arm/wrist/Hand	2	3	5	5	5	5	1
Person 2	18	Lower limbs	2	3	5	4	1	5	1
		Back	2	3	5	4	1	5	1
		Neck/Shoulder	2	3	5	4	1	5	1
		Arm/wrist/Hand	2	3	5	4	15	5	1
Person 2	31	Lower limbs	2	3	5	4	1	5	1
		Back	2	3	5	4	1	5	1
		Neck/Shoulder	2	3	5	4	1	5	1
		Arm/wrist/Hand	2	3	5	4	5	5	1

Table - 3

Consolidated Scoring Value for Activity 3



V. DISCUSSION

1. All the observed data are derived only Titan Contract Labor & No data are been collected / Observed the Titan Employees.
2. All the Observation are been Observed from the Contract Workers in General Shift of 9 A.M To 5:30 P.M
3. All Observations are been observed inside the Factory Premises not Outside the Factory Premises.
4. All the Data collected by the Workers action of Material and Tools handling By Visually not done any EMG Method (Electromyography).
5. The Data collected by different Worker who carried out the same task of activity from 1 to 5 of Close Monitoring of each Moves of Body Mapping which is high Chances of Work-Related Musculoskeletal Disorder.
6. The Same person of Observed data of Activity 1 to 5 are Continuously weekly Observed and Noted Down and consolidated of Number of Same Value for the Worker are been noted and Updated in the Consolidated Table.
7. For the Observation for Data Collected We Formed Team of 4 Numbers which are Titan Safety Department & Myself done the Assessment.
8. All the Work Activity which Workers are used tools/material/Equipment/ Work Environment are been Observed what makes the deviation for the Value of Exertion risk value 5.
9. Then planning & Execute of new Trends of Advanced Tool/Equipment's /Work bench to reduce the value of Exertion risk value for the Body mapping for to Avoid the Work-related Musculoskeletal Disorder.

VI. RESULTS

1. Arranging Ergonomics Training Program of "Ergo Point" for to Make the Bench Marking Practices.
2. Advice the Gas Cylinder vendor not to bring Ammonia Gas cylinder without collar (Shrouds) Inside the Factory Premises.
3. Proper Planning & Scheduled use of New Drum Lifter & Tilted Type trolley for only for Chemical Barrel movement.
4. For the Activity 1 they should be Work table for the Workers to carried out the Work.
5. For the Gas cylinder unloading/ Loading from the Lorry is the Wrong Method.
6. For the Chemical Barrel movement use the new drum Lifter & Tilting Trolley.
7. For the Box Cutting use the new Ergonomic Cutter which will be avoid Cut injury & Hand Pain.
8. For Box cutting Activity raise the table height from 2 feet to 4 feet which will be reduce the Workers Back & Neck/shoulder Exertion Risk value.
9. For Activity 5 the Workplace is more neutralized Sodium Cyanide fumes are makes us uncomfortable & the Bucket are not having Handle Bar are said by 3 Workers. But I noticed all the Workers are not Wearing the Respiratory Mask and Chemical Resistant Gloves
10. For the Activity 5 arrangement of Proper Ventilation or arrangement of Automatic Feeding of Neutralized Sodium Cyanide for the Sterilization Process To avoid the Manual activity.

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