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Discomfort Assessment of Workers at Glass Toughening Industry

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Abstract:

The working in industry in many cases becomes risky if the safety and human comforts are made compromised, even this; it also affects the productivity and quality. This paper contains the detail of discomfort assessment at glass toughening industry and the assessment aims to improve the safety and ergonomic features in the industry. The assessment is based on the NIOSH calculation for lifting and the general survey among 14 workers for 2 months in the industry. And the results and recommendations are made on respective points.

1. Introduction

Indicus Ventures Pvt. Ltd. is a Bhopal (Mandideep) based Glass Processing Unit spread over 4 acre with more than 38,000 Sq.ft. constructed area. It has the biggest Tempering Plant in Central India. The plant equipped with the best machineries and trained manpower to deliver world-class products at a reasonable price. The Plant is equipped to manufacture glass on state of the art equipment which is Saint Gobain Seva Furnace. The plant process glass to make it strong and functional . For this the glass plate is heated to a temperature above its softening point and then subjected to rapid cooling but before doing so the glass sheet is lifted to table , cut down in appropriate size, edges are then polished post this drilling holes, Washing , Drying and toughening is done.in this process there is large involvement of workers directly with glass sheet. Thus workers comfort plays a vital role in such industry in order to carry out the industrial work smoothly.

2. Methodology

SURVEY: A survey is any activity that collects information in an organised and methodical manner about characteristics of interest from some or all units of a population using well-defined concepts, methods and procedures, and compiles such information into a useful summary form. The assessment is comprised with questionnaire survey with the question relating their personal information like name designation, experience, age, and with the questions relating their pain or discomfort area. This helps us to find the exact discomfort zone in each worker involved in survey.

3. Calculations for Niosh Formula

The primary product of the NIOSH lifting equation is the Recommended Weight Limit (RWL), which defines the maximum acceptable weight (load) that nearly all healthy employees could lift over the course of an 8 hour shift without increasing the risk of musculoskeletal disorders (MSD) to the lower back. In addition, a **Lifting Index (LI)** is calculated to provide a relative estimate of the level of physical stress and MSD risk associated with the manual lifting tasks evaluated.

$RWL = LC \times HM \times VM \times DM \times AM \times FM \times CM = \dots\dots$

Lifting index= object weight / RWL

Where the following parameters with the required value of multiplier from NIOSH table is used in calculation

- Lc = 23 kg
- Hm: horizontal multiplier.
- Vm: vertical multiplier.
- Dm: distance multiplier.
- Fm: frequency multiplier.
- Am: asymmetric multiplier.

If the value LI raises from 1 then the higher the value, higher is the chance for back pain for the worker.

4. Calculation for Discomfort Score of Each Workers

The score for each worker is calculated by considering the number of injury or discomfort caused to individual and by multiplying with his age factor

- Score for reported injury in particular assessment (1 for each injury)=A
- Age group score (2 for 20yrs above, 3 for 25 yrs above, 4 for 30 yrs above)=B
- Total score C= A*B

Results: Results for discomfort assessment survey conducted among 14 workers.

position of pain	1st assessment	2 nd assessment	3 rd assessment	4 th assessment	reason
Back pain	12	04	01	05	Heavy lifts
Neck pain	01	00	01	02	Tilting of necks
Left hand pain	03	00	00	00	Grasping glass sheet
Right hand pain	05	01	01	01	Grasping glass sheet
Right knee pain	00	00	00	00	Nil
Left knee pain	00	00	00	00	Nil
Right shoulder pain	04	02	01	02	Holding the belt
Left shoulder pain	05	00	01	01	Holding the belt
Eye discomfort	02	01	00	00	During polishing
Buttocks pain	00	00	00	00	nil
total	31	08	05	11	
reason	Collective data for past working	Time bound data of 15 days	Low discomfort due less work	Discomfort rise as due to hike in work	

Table 1

Results for discomfort score for 14 workers in 4 bi-monthly assessment..

s.no.	name of worker and his age	No. of discomfort area in each assessment. (i/ii/iii/iv)	Area of discomfort	Calculated Discomfort score. (i/ii/iii/iv)	reason
1	Manoj nayak (26)	3,0,0,1	Back, left hand, left shoulder.	9,0,0,3	Lifts problem
2	Vishal (23)	4,0,1,0	Back, left hand, right hand, right shoulder.	8,0,1,0	Lifts problem
3	Dhiru choubey(33)	3,2,0,0	Back, right hand, right shoulder	12,8,0,0	“
4	Moasim (27)	0,0,0,3	Back , neck , right hand.	0,0,0,9	“
5	Sanjay singh (32)	1,1,1,1	Back, right hand, right shoulder, left shoulder.	4,4,4,4	“
6	Prakash(25)	2, 0, 0, 0	Back pain, left shoulder	6,0,0,0	“
7	Ramesh(28)	3, 0, 0,3	back., right hand, right knee, left shoulder	9,0,0,9	“
8	Ravi(24)	2, 1, 1,2	Back, right shoulder, left shoulder.	4,2,2,4	“
9	Raju(27)	3, 0, 0, 0	Back, right & left shoulder.	9,0,0,0	Cutting glass
10	Niraj(28)	1, 1,0,0	Back pain	3,1,0,0	Holding sheet
11	Roshan(24)	1, 0, 2, 0	Back, neck, right hand	2,0,4,0	Bend posture
12	Rup singh(28)	2, 0, 0,1	Back, left hand	6,0,0,3	“
13	Afroz(29)	2, 3, 0, 0	Back, neck, right hand, eye discomfort	9,9,0,0	“
14	Hitesh(27)	4, 0,0,0	Back,right hand, right shoulder, eye discomfort	12,0,0,0	During polishing

Table 2

Results for NIOSH calculation for lifting sheet of 312 kg by 8 members and 52 kg by 2 members.

Worker no.	name of worker	Lifted weight (kg)	RWL (origin)	RWL (destination)	LI (origin)	LI (destination)	remarks
1	Manoj Nayak	39	11.50	12.30	3.39	3.17	High discomfort
2	Vishal	39	11.50	10.86	3.39	3.5	High discomfort
3	Dhiru Choubey	39	11.50	13.09	3.39	2.97	High discomfort
4	Moasim Siddique	39	11.50	14.40	3.39	2.7	High discomfort
5	Sanjay Singh	39	11.50	13.09	3.39	2.97	High discomfort
6	Prakash Chandel	39	11.50	13.09	3.39	2.97	High discomfort
7	Ramesh	39	11.50	13.09	3.39	2.97	High discomfort
8	Ravi Nagpure	39	11.50	13.09	3.39	2.97	High discomfort
12	Rup Singh	26	12.07	14.55	2.15	1.78	Discomfort
13	Afroz siddique	26	8.6	13.66	3.02	1.90	Discomfort
	Concluding statements				Exceed limit of 1	Exceed limit of 1	Probability of back Discomfort

Table 3

5. Conclusion

The survey's results and NIOSH calculation has been presented here for 14 workers here it is irony that the NIOSH calculation is for every worker is falling within danger zone thus the company has to improve the lifting functionality for the glass sheet. Moreover the impacted zone of discomfort are hands, shoulder, and back, thus the glass sheet has to be either lifted by proper number of workers satisfying NIOSH standards and also the company is recommended to use the vaccum lifter rather than to hold manually. The company is also recommended to improve the body posture of workers while they work on table by purchasing the ergonomically fit tables and the safety gadgets like gloves, shoes of appropriate size is also especially recommended.

6. References

- i. kooh choon chieh, kolej university, 2006, ergonomic assessment at manufacturing industry.
- ii. kellej mcauley, ohio state university, 2006, ergonomic evaluation of handles.
- iii. NIOSH, 1996, ergonomic intervention for soft drink delivery industry.
- iv. survey methods and practices, ISBN 978-1-100-16410-6, ministry of industry canada.
- v. worker compensation board of nova scotia, OHS act.