Design and Fabrication of Drum Handling Equipment- A REVIEW
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\textbf{Abstract}— This paper presents the use of drum handling equipment in the industries to reduce worker for drum handling. The study effect of material handling on human is done in this paper. Also study different material handling equipment used in industries.

\textbf{Key words:} Industries, Material Handlings, Material Handling Hazards

I. INTRODUCTION

In many industries raw material and finish product handled in 210lit. Drum. They handle drum manually. In work place drum transported, lifted, Loaded, tilted etc. manually. Handling heavy load manually takes more time, worker also it is hazards and risky. In small pharmaceutical company around 25 different type of raw material use. It is in liquid form which is taken out from 210lit. Drum by loading on horizontal stand. Company cannot use barrel pump because it will require maintaining 25 barrel pump which is costly. In automobile work shop require around 8 type oil for vehicle which comes in 210lit. Company requires effective material handling equipment for effective material handling. Manual drum handling equipment is use to do various function like transport, tilting, lifting, loading, unloading etc. In small industries or work shop drum barrel is handled manually which takes more time and more worker. Handling drum manually without using any equipment is hazards.

A. Hazards and Risks Associated With Manual Handling in the Workplace:

Manual handling of load may cause cumulative disorder due to gradual and cumulative deterioration of the musculoskeletal system through continuous lifting / handling activities.

Manual handling causes low back pain and injuries which are most common musculoskeletal disorder. Risk of injury increases due to too heavy and large load, difficult to grasp or unstable. There is limitation of load carrying capacity of worker.

B. Drum Handling Equipment

Drum handling equipment are used for proper handling of Drum. This equipment reduces worker to do work and hazard while handling drum. These give proper holing system for drum. These are classified according as follows

1) Manual Handling equipment
2) Semi-automatic Manual handling equipment
3) Automatic Manual handling equipment.

Fig. 1: A Drum Lifter/ Tilter

II. CONCEPT

In this, following objectives is to be carried out –

1) To minimize worker for Drum transporting, loading, unloading, lifting and tilting process.
2) To study material handling equipment for Drum handling.
3) To study the lifting and loading effect on human.
4) To study the ergonomic of material handling.
5) To Design modified drum tilting mechanism.
6) To fabricate prototype model.
7) Testing and conclusion.

III. LITERATURE REVIEW

Literature review areas of research considered in the past, to be explained the approaches used & the new ideas. It is an assignment of previous task done by some authors and collection of information or data from research papers published in journals to progress our task. It is a way through which we can find new ideas, concept. There is lot of literatures published before on the same task; some reference papers are taken into consideration from which idea of the project is taken, the other reference will we discussed later.

A. Work Safe Victoria:

In this title “A Guide to Manual Handling in the Food Industry” explains material handling in food industries. Hazards while handling material in food industries. Information contained in this Guide is derived from the 2003 guide Manual Handling in the Food Industry and from a workshop held during Work Safe Week2005. The workshop brought together unions, workers, industry associations, employers, training organizations,
ergonomists, industry safety consultants and health and safety representatives to share ideas for addressing the risks in the food industry due to manual handling tasks. The Guide demonstrates both Work Safe’s and the industry’s expectations on how to best reduce the risk of musculoskeletal disorders arising from manual handling in the food industry

B. Work Cover:
In this title “Manual Handling Resources” Explain Australia Post is one of the largest road transport operators in Australia, handling tens of thousands of mailbags, letter trays and other items every day. In the past these mail bags and letter trays were handled manually at post offices and mail centres. This often required repetitive bending, twisting and reaching while lifting loads of up to 16 kg into and out of trucks and vans. This manual handling task has now been significantly reduced with the introduction of the Folding Unit Load Device (FULD), a stackable steel mesh container that is lifted and moved by forklift, even at centres where there is no loading dock. A further innovation is a pneumatically operated device developed by Australia Post (NSW) for securing the FULDs in trucks. The device is basically a steel channel, suspended from the roof of the truck that descends to clamp down the FULDs in the truck. The better use material handling equipment for the different application like in cleaning of floor, storing easy method etc; Also explain how to reduce work load and maximize safety.

C. Environment, Health, and Safety:
In paper title “Safe Manual Material Handling” by University Of California explain frequent lifting, carrying, pushing, pulling, lowering and raising materials by hand. These job tasks are often referred to as manual material handling. Staff who lift or perform other materials handling tasks may be at risk for back or other injuries.

D. Rajib Kumar Bhattacharyya:
In this title “Engineering Mechanics” Explain Truss , forces , torques and friction in Engineering mechanic.

E. European Agency for Safe and Health in His Title
“Hazard and risks associated with manual handling in the workplace” Explain the risk associated with manual material handling at work place. Also explain back injury due to load handling.

F. Health and Safety Executive:
In His title “Making the best use of lifting and handling aids” Explain the how to use the material handling equipment for various application in industries. by www.hse.gov.uk/pubns/indg398.htm.

G. Clyde Material Handling:
In His title “Material Handling Solution for the Food & Pharmaceutical Industries” Explain the use of material handling equipment in pharmaceutical industries. And also explain requirement of in material handling in pharmaceutical industries.

H. California Department of Industrial Relations:
In This Title “Manual Material Handling” written for managers and supervisors in industries that involve the manual handling of containers. It offers suggestions to improve the handling of rectangular, square, and cylindrical containers, sacks, and bags. “Improving Manual Material Handling in Your Workplace” lists the benefits of improving your work tasks. It also contains information on risk factors, types of Ergonomic improvements, and effective training and sets out a four-step proactive action plan. The plan helps you identify problems, set priorities, make changes, and follow up.

1. Worksafe Victoria in This Title “Safety by Design”:
Explain The transportation of goods plays a major role in Australia’s national and international activities. With so much of our wealth on the move, transport related activities contribute significantly to Australia’s work injury toll. More than 80% of severe injuries among transport workers are sustained while not driving. These injuries are related to manual handling. Severe sprains and strains can happen when loading and unloading a truck as well as slips, trips and falls that occur when getting on and off a vehicle. Many of these injuries are serious and disabling, and in some cases, fatal. But there are ways to reduce the risks. This booklet helps to identify some of the potential risks and provides solutions and tips to help reduce injuries in the transport industry.

J. R. A. Gujar1, S. V. Bhaskar :
“Shaft Design under Fatigue Loading By Using Modified Goodman Method” In this paper, shaft employed in an Inertia dynamometer rotated at 1000rpm is studied. Considering the system, forces, torque acting on a shaft is used to calculate the stresses induced. Stress analysis also carried out by using FEA and the results are compared with the calculated values. Shaft is having varying cross sections due to this stress concentration is occurred at the stepped, keyways ,shoulders, sharp corners etc. caused fatigue failure of shaft. So, calculated stress concentration factor from which fatigue stress concentration factor is calculated. Endurance limit using Modified Goodman Method, fatigue factor of safety and theoretical number cycles sustained by the shaft before failure is estimated and compared results with FEA.

IV. RESEARCH METHODOLOGY
The research methodology will cover follows.

1) Sufficient literature related to manual drum handling equipment is available.
2) Initially effect of manual handling of loading, lifting, transporting etc. on human being is studied from the available literature.
3) Existing machine for manual drum handling equipment will be studied thoroughly.
4) Advantages of drum handling equipment using in pharmaceutical industries and automobile work shop are studied.
5) Ergonomic of material handling be studied.
6) Design of modified drum tilting, racker(stacker) mechanism will be made.
7) Simulation with help of software will be made. Also modified fabricated model will be prepared. The conclusion and future scope of work will be discussed in the end.
V. PROBLEM IDENTIFICATION

1) Problem of taking out different type chemical (around 25 types) from Drum in Pharmaceutical industries.
2) Problem for Loading of oil barrel on the rack in compact space at Automobile work shop.
3) Reduce worker from 4 to 1 to doing work of Drum tilting.
4) Problem of Back pain while lifting load.
5) Danger of Muscular injury while handling drum manually.
6) It should non-reactive to chemical used in the company.
7) Limitation of safe load lifting capacity for human.
8) There is no proper holding arrangement on drum.

VI. CONCLUSION

The main conclusion will be drawn find out whether it is possible to automate a skilled manual process which would avoid worker fatigue. Also the future scope for developing the generalized mechanism for any profile can be identified.

REFERENCES

[8] California Department of Industrial Relations “Manual Material Handling”