

“HYDRAULIC CRANE”

Ashish Shejwal¹, Kishor Giri², Mahesh Solunke³, Gaurav Rathod⁴, Suraj Balkhande⁵,
Prof. M. D. Sirsat⁶

¹ UG Ashish Shewal, Mechanical Engineering Department, SYCET Aurangabad, MH, India

² UG Kishor Giri, Mechanical Engineering Department, SYCET Aurangabad, MH, India

³ UG Mahesh Solunke, Mechanical Engineering Department, SYCET Aurangabad, MH, India

⁴ UG Gourav Rathod, Mechanical Engineering Department, SYCET Aurangabad, MH, India

⁵ UG Suraj Balkhande, Mechanical Engineering Department, SYCET Aurangabad, MH, India

⁶ Assistant Professor, Mechanical Engineering Department, SYCET Aurangabad, MH, India

ABSTRACT

Cranes do play the most vital role in the manufacturing industries. In this project we aim to create a machine that reduces man power that is additional. This hydraulic floor crane consists of Base truck, hydraulic jack, wheels, hydraulic hoses, levers, direction control valve, horizontal beam and hooks. There the beam is placed vertical can also called as support arm. It is connected to the base plate and the hydraulic jack touching the hook used to lift the heavy industrial load. The hydraulic jack is lifted or operated outward with the help of reciprocating movement of lever connected to the hydraulic jack. The crane is fabricated with complete clear front, small compact frame, good reach, high lift and with low center of gravity. The crane has the capacity of lifting 10 kg with wide spread application in the shop floor. Thus the floor crane would serve as a safe and versatile model for material handling.

Keyword: - Compact size, No electricity, Portable, Easy handling, Industrial work, Fatigue reduced.

1. INTRODUCTION

A 'crane' is a type of machine, generally equipped with a hoist, wire ropes or chains and sheaves that can be used both to lift and lower materials and to move them horizontally. It is mainly used for lifting heavy things and transporting them to other places. It uses one or more simple machine to create advantage and thus move loads beyond the normal capability of a man. Cranes are commonly employed in the transport industry the loading and unloading of freight, in the construction industry for the movement of materials and in the manufacturing industry for the assembling of heavy equipment. In material handling, the cranes play a vital role in modern manufacturing industries. Hydraulic cranes are heavy equipment used primarily for lifting. These Hydraulic floor Cranes, provide an efficient low cost alternative to other material handling equipment. Strong, robust, sturdy and built to very standard. Laden, these cranes are manoeuvrable and loading, unloading and shifting of heavy load. Crane structure consists of chassis, vertical column, inner boom and outer boom, and the hydraulic pump with cylinder assembly. The box frame can take heavy loads effectively, avoids and damage under rough and unskilled handling. Inner and outer boom is suitably reinforced the bow structure for better distribution of force. Inner boom has 3 locking points telescopes into the outer boom with 360° rotating forged steel hook. Moving on 4 Nos wheels, two wheels are fixed and two wheels are on swivel castors easy directional movement and all wheels are equipped with sealed ball bearing / taper roller bearings for better mobility. 2 Nos screw disc ground arrested are provided to prevent movement when transfer of load track. The hydraulic crane was invented in Newcastle by William Armstrong in about 1845 to help load coal into barges at the Quayside.

1.1 Parts and descriptions of hydraulic floor crane

1 .Base plate/ Truck/Pallet

2. Hydraulic jack
3. Vertical column
4. Horizontal arm
5. Hook
6. Nuts and Bolts
7. Wheels

2. Design, fabrication and testing of hydraulic crane

In this paper, design, fabrication and testing of hydraulic crane is intended to replace the local or traditional method of lifting heavy load with hand with emphasis being laid on performance, safety and reliability. Also, hydraulic crane is capable of carrying load up to 1000kg at a time was developed using locally available materials. The design of the hydraulic crane involved analysis of forces acting in various member of the crane structure, analysis of the links mechanism, determination of pressure developed in the actuator at maximum load, material selection and cost evaluation. Its fabrication details involved some workshop operations such as marking out, cutting, machining, welding and surface treatment which was accomplished using locally available materials.

2.1 DESIGN CRITERIA:-

There are three major considerations in the design of cranes.

1. The crane must be able to lift the weight of the load
2. The crane must not topple
3. The crane must not rupture.

3. MATERIAL SELECTION

3.1 Selection of mild steel frames:- The material selection is also very much important because what material we are using whether it is capable of sustaining that load or not. For our project it is of medium load capacity so we are using mild steel of composition : C 15 Mn 75. The percentage of carbon varies from 0.1 to 0.2 % and this material can easily sustain the load.

3.2 Selection of wheels:- PREMIUM rubber caster wheels have a special compound of highly resilient soft rubber bonded to thick aluminum wheel centers. Unlike Conventional Mold on rubber caster wheels, PREMIUM rubber caster wheels can be moved manually when loaded to their rated capacities.

3.3 Types of contaminates:- There are many types of contaminates. The most common are: Particulate (dust, dirt, sand, fiber, rust, rubber, paint chips, metal flakes, etc.) 3.MANUFACTURING PROCESS.

4. Manufacturing:-

The hydraulic crane which was manufacture has 7 part. They are base plate/Truck/Pallet, Vertical column, Horizontal arm, Secondary horizontal arm, Hydraulic jack, Hook, Nut and bolt. Base plate are made of metal rod. The roads are cut according to dimension and they are welded using metal arc welding. Vertical column are fitted so it can rotate 360°. The fixed horizontal arm is welded. And secondary horizontal arm was fixed with hook. Hydraulic systems are selected according to the power required and capacity of tank.

4.1 Machining process:-

Surface finishing
 Marking out
 Metal cutting
 Surface grinding
 Welding
 Finishing

5. FUTURE SCOPE

In subsequent development a robotic device should be incorporated in the machine to enable it function automatically by self-maneuvering. In this way there will be work station for its mode of operation. This will save time and energy because it will be faster and more efficient. It will also help to minimize accident in the workshops and factories. If more time and more efforts put into the model, more complexity could have brought out. More over instead of manual operation of syringes could have been replaced by pre-defined computer program or merely by pressing switch operated. Furthermore varieties and more flexibility to add or replace any part according to the requirement can be done to improve its use and increase field of usage and make it more universal and flexible. On some mobile cranes, there may be numerous load charts for differing boom and counterweight configurations. The load charts may be complex and include numerous conditions that must be complied with to ensure the crane can safely lift a load. Two important factors that are often overlooked when reading load charts are. The need to subtract the mass of the hook block and lifting slings from the capacity of the crane at the particular radius, unless otherwise noted on the load chart. For example, if the load chart states the crane can lift 20 tones at a given radius, but the hook and lifting gear have a combined mass of one tone, the load to be lifted cannot be greater than 19 tones. This issue becomes critical for heavier hook blocks and lifting gear.

6. ADVANTAGES

1 Most powerful means of lifting objects:- It is one of the most powerful means of lifting objects is with the strength of a hydraulic crane. By harnessing the strength that liquid under pressure gives, and the ease with which it can be used, it is possible to transfer a relatively small amount of effort from one place to another, and hydraulic cranes are amongst the most efficient lifting systems available in the modern workplace.

2. Extremely stable in use:- Because the hydraulic cranes use a fixed system of pipes, constant pressure can be maintained once a part of the system has been moved into place, and this makes them extremely stable in use, and able to support relatively large weights.

3. Very easy to maintain:- Hydraulic cranes are amongst the simplest systems that you can use within any industrial process, and are very easy to maintain. Provided that all the pumps and pistons are regularly checked for any leaks, and potential stress points where the levers are supported are inspected for damage, the crane will continue to operate completely reliably for long periods of time.

4. A very versatile tool:- Most hydraulic cranes are comparatively light weight, and the ease with which they can be moved from one area to another within the factory or distribution center, makes them a very versatile tool with lots of uses on a day to day basis. From simple loading jobs in your loading bay area where the portable hydraulic cranes can be used to lift objects into a waiting truck to more complex jobs within the main factory, the lifts will come in very useful.

7. DISADVANTAGE

1. The capacity of the hydraulic jack lifting the load is less than hydraulic cylinder.
2. Manually operated hydraulic crane is time consuming for transmission of work.

3. Manually operated hydraulic crane is slow than automated hydraulic crane i.e. remote control hydraulic crane.
4. It requires more floor space.

8. CONCLUSIONS

The aim of our project was to build a fully functional HYDRAULIC FLOOR CRANE mechanism which is capable of lifting load up to 2 tonne . We accurately achieved our first goal of lifting the load and 360° rotary motion of the vertical column .

We feel that our design and fabrication was a great success both in terms of strength and stiffness. Our project weighed 20kg which is capable of lifting load up to 2 tonne using hydraulic power.

9. REFERENCES

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