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# Pneumatic Truck Crane System

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**ABSTRACT:** Truck cranes are mounted on crawlers or tires and offer greater mobility than standard cranes. Some mobile cranes are even able to be driven on the highway. Their ability to navigate around job sites and carry large amounts of weight makes mobile cranes a very popular addition to many projects. A truck crane is cable-controlled crane mounted on crawler rubber-tired carrier or hydraulic powered crane with telescoping boom mounted on truck type carrier. Basically, it is combination of hydraulic and pneumatic system. Basically, our paper concern with the truck cranes and its specification. Paper contains introduction about truck cranes types of truck cranes companies involved in truck cranes and it contain literature survey on truck cranes contains superstructure of crane hydraulic system, chase structure of the truck crane and it parts and applications. Overall specification of chase is mention. Specification of Superstructure is mention in the paper.

**KEYWORDS:** Truck crane, hydraulic system, superstructure etc.

## I. INTRODUCTION

Cranes have a long history of being a staple in construction that reaches back thousands of years. Records indicate the ancient Greeks invented the first cranes and used them as early as 515 BC. Some reports indicate cranes were used for water irrigation in ancient Mesopotamia, thousands of years earlier. In fact, many ancient structures, if built today, would need to use some sort of crane. It was during the Industrial Revolution that cranes became integral to the modernization of the world, replacing the manual pulley system with an engine and an operator that preceded them. Today, different types of cranes can be found on almost any construction project, each one specializing in its own specific task. A crane is a type of machine, generally equipped with a hoist rope, 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. The device uses one or more simple machines to create mechanical advantage and thus move loads beyond the normal capability of a human. A Truck crane is a cable-controlled crane mounted on crawlers or rubber-tired carriers or a hydraulic-powered crane with a telescoping boom mounted on truck-type carriers or as self-propelled models. They are designed to easily transport to a site and use with different types of loads and cargo with little or no setup or assembly. Basically, it is combination of hydraulic and pneumatic system. Basically, our project concern with the braking system and use of pneumatic in braking system. Cranes are commonly employed in the transport industry for 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. The truck crane contains composition of typical hydraulic system. The composition of hydraulic system for truck crane contains a) tonnage b) Oil Pump c) Main Valve d) Control Methods. There are many types of truck cranes like truck mounted, rough terrain, floating crawler and etc as in this research paper we going through truck mounted. Critical study and analysis of the working principle of the machine. Detailed study and analysis of the machine component. Visit to places where similar machines are in use to know the similarities and differences in design and the problem associated with their uses.

## II. LITERATURE SURVEY

A crane is a significant type of construction machine that's utilized to move the loads horizontally. Equipped with a hoist rope, cable ropes and sheaves, it may be used to lift heavy loads or transport them to other places. The mechanical benefits created by several elements on the crane may produce powerful strength. Cranes are part of the construction process since its invention in Greece. The cranes are basically for heavy construction work and for all types of lifting tasks. Equipped with pulleys and cables and based on the use of fundamental mechanical principles, a



crane could lift and lower loads that no human working capacity could. Crane design has evolved to meet the requirements of a wide variety of industrial needs, and modern cranes often coordinate simple systems to do complex lifting jobs – sometimes in environments that could be dangerous for human workers. High-quality key hydraulic components such as main oil pump, rotary pump, main valve, winch motor, and balancing parts etc. are adopted to achieve stable and reliable operation of the hydraulic system. Superior operation performance is guaranteed by accurate parameter matching. Through the adoption of load sensitive variable displacement piston pump, pump displacement can be adjusted in real-time, achieving high-precision flow control with no energy loss during operation. Electrical control valve has flow compensation and load feedback control function, enabling stable and convenient control of single action and combined action under different operation conditions. Different types of cranes are as follows. Telescopic Crane, Mobile Cranes, Truck Mounted Crane, Tower Crane, Rough Terrain Crane, Overhead Crane, Bridge Crane, Crawler Crane, Aerial Crane, Hydraulic Crane, Carry Deck Crane, Floating Crane, Bulk-handling Crane, Hammerhead Crane, Stacker Crane, Railroad Crane, Harbor Cranes, Level Luffing Crane.

### III. HYDRAULIC SYSTEM

The composition of hydraulic system of truck crane

- 1) Telescoping mechanism
- 2) Luffing mechanism
- 3) Slewing mechanism
- 4) Winch mechanism
- 5) Superstructure system
- 6) Undercarriages
- 7) Horizontal outrigger
- 8) Vertical outrigger

The hydraulic crane is made up of the following components;

- (i) The hydraulic actuator or actuating (slave) cylinder
- (ii) The master cylinders
- (iii) The fluid reservoir
- (iv) Pumps
- (v) Seals, valves and conductor

Specification of Superstructure: A) Operator's cab: Spacious comfortable crane cab, large arc windscreen, broad vision. Operation parameters indicated, graphic symbols displayed for diagnosis, alarm function. B) Main winch High pressure automatic variable displacement hydraulic motor with planetary gear type speed reducer, spring-loaded constant-close brake set in lifting and rising reduce. C) Main boom 4 section, hexagonal profile. D) Aux: winch High pressure automatic variable displacement hydraulic motor with planetary gear type speed reducer, spring-loaded constant-close brake are set in lifting and rising reducer. E) Counterweight 3.2t basic counterweight fixed on the swing table by bolts. F) Elevation Deadweight dropping amplitude is controlled by amplitude balance valve. G) Hydraulic system CY: Triple gear type main pump, and the upper multiway valve controlled by pilot joysticks to ensure the driving work. The 1st pump activates all actions except the slewing; the 2nd pump is functions for outrigger and swing table, and the 3rd pump provides power for fluid and pressure control. CS: Triple gear type main pump, and the upper multiway valve is driven by a hand lever, the 1st and 2nd pump activate for all actions except slewing and 3rd pump functions of outriggers and swing table. H) Slew Slewing motor with rotary speed reducer, rotary buffer valve and single direction throttle valve equipped, reliable and safe start/stop actions can be ensured. Max. slewing speed  $\geq 2.5$ r/min. I) Safety devices LED touch monitor indicates important parameters: torque percentage, hook load, rated load, extension length of main boom, angle, slewing radius etc., and graphic symbol display for diagnosis, load chart and working parameter setup integrated. It can also function as black box



### VLSPECIFICATION/CHASSIS

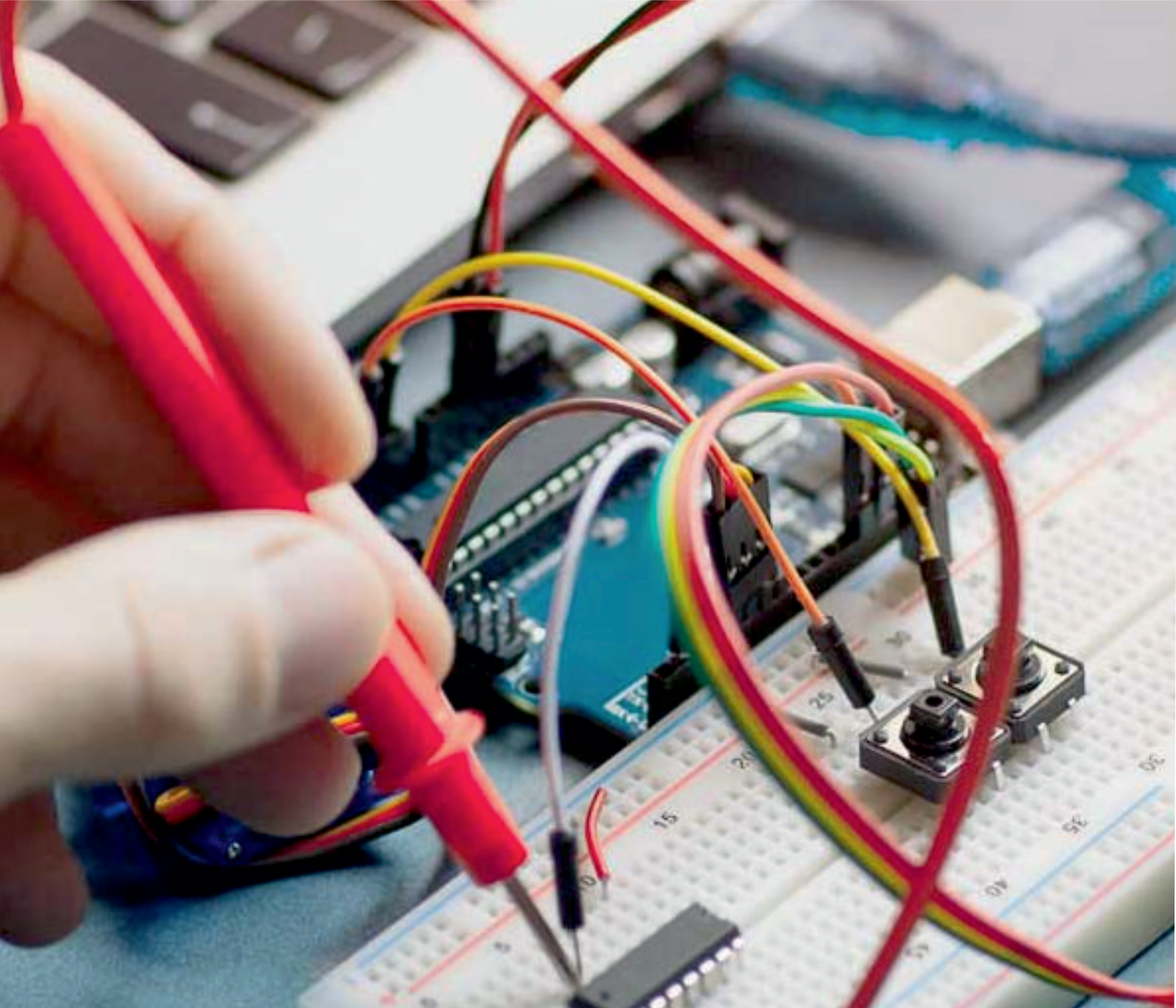
- A) Frame: Overall welded structure made of high-tensile steel plate, optimized design and hard endurance tests.
- B) Electrical system: 24V, Single line system.
- C) Outrigger: H shaped, hydraulic telescoped into horizontal and vertical direction, outrigger span
- D) Engine: Dongfeng Cummins, Fuel tank capacity 300L
- E) Axle: Axle 2,3 driving, axle 1 steering
- F) Transmission system: Fast 8-speed gear box
- G) Suspension: The front suspension: band spring suspension and double action sleeve shaped vibrating reducer. The rear suspension: band spring and balance beam structure
- H) Tyre: 10 tyres.
- I) Brake: Service brake: dual circuit air booster brake acted by foot plate. Hand brake: parking brake and emergency brake control. Additional brake: exhaust brake.
- J) Steering: Single-circuit hydraulic power assistance steering system with mechanical steering limit.
- K) Hydraulic system Outrigger telescoping is driven by a fixed displacement gear pump.

### VLAPPLICATION and CONCLUSION

Cranes exist in an enormous variety of forms – each tailored to a specific use. Sometimes sizes range from the smallest jib cranes, used inside workshops, to the tallest tower cranes, used for constructing high buildings. For a while, mini - cranes are also used for constructing high buildings, in order to facilitate constructions by reaching tight spaces. Finally, we can find larger floating cranes, generally used to build oil rigs and salvage sunken ships. These days hydraulics principle is being used extensively in material handling processes through cranes. Depending on the loads to be handled and the operations to be performed there are different types of cranes like Crawler Cranes, Truck Cranes, Floor Cranes. Hydraulic Crawler cranes are used for picking and moving huge amount of loads. Generally, loads are kept in containers for Bulk loading. Hydraulic truck cranes have good flexibility with high load carrying capacities. Hydraulic workshop foldable crane used in industries for moving small to medium sized materials from one place to other. The load carrying capacity can vary from half ton to 2 ton or more.

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