MIT | School of Distance Education

A

PROJECT REPORT

ON

"HYDRAULIC SYSTEM FOR KIKOFF PLATFORM 2 MTON

UNDERTAKEN AT

"MIT School of Distance Education"

IN PARTIAL FULFILMENT OF

"PGDM IN OPERATION MANAGEMENT "

MIT SCHOOL OF DISTANCE EDUCATION, PUNE.

GUIDED BY

"P S LAD NAGPUR "

SUBMITTED BY

"PRAVIN S LAD "

STUDENT REGISTRATION NO.: MIT2021C01453

MIT SCHOOL OF DISTANCE EDUCATION PUNE - 411 038

YEAR 2023-2024

Exempt Certificate - If you're not able to provide the Project Executed Certificate

To
The Director
MIT School of Distance Education,

Respected Sir,

This is to request you to kindly exempt me from submitting the certificate for Project Work due to the reason mentioned below:

Tick the right option

1. As per the Rules of the Organisation
✓ 2. Self Employed
3. Working in Public Sector
4. Full-time Student

Thanking you in anticipation of your approval to my request.

Regards

Student Sign: -

Student Name:-

Student ID:

DECLARATION

I hereby declare that this project report entitled "**HYDRAULIC SYSTEM FOR KIKOFF PLATFORM 2 MTON** **"** bonafide record of the project work carried out by me during the academic year **2023-2024**, in fulfillment of the requirements for the award of **"PGDM IN OPERATION MANAGEMENT"** of MIT School of Distance Education.

This work has not been undertaken or submitted elsewhere in connection with any other academic course.

Sign:- **--------(OK .)**

Name:- PRAVIN S LAD

Student ID: MIT2021C01453

ACKNOWLEDGEMENT

I would like to take this opportunity to express my sincere thanks and gratitude to **"MIT PUNE"**, Faculty of MIT School of Distance Education, for allowing me to do my project work in your esteemed organization. It has been a great learning and enjoyable experience.

I would like to express my deep sense of gratitude and profound thanks to all staff members of MIT School of Distance Education for their kind support and cooperation which helped me in gaining lots of knowledge and experience to do my project work successfully.

At last but not least, I am thankful to my Family and Friends for their moral support, endurance and encouragement during the course of the project.

Sign:- **--------(OK.)**

Name:- PRAVIN S LAD

Student ID: MIT2021C01453

ABSTRACT

This is the study on Hydraulic system at Nagpur . Hydraulic systems are popular for use in heavy-duty machinery. It might seem odd that the original Greek word hydraulikós from which hydraulic comes referred to water (hydra) and also to a musical instrument made from a hollow tube (aulos).

The previous Pneumatics system are using in our industry (sspl Nagpur) .for lifting one platform of weight 2 mt. . since the system gets old need to change in new system .After study we find that instesd pneumatic system we can use hydraulic system .

Cont..page2 ---I

So I have study for hydraulic system and successfully implement

Means removed old 30 hp pneumatic system and installed 5 hp power pack Hydraulic system .

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

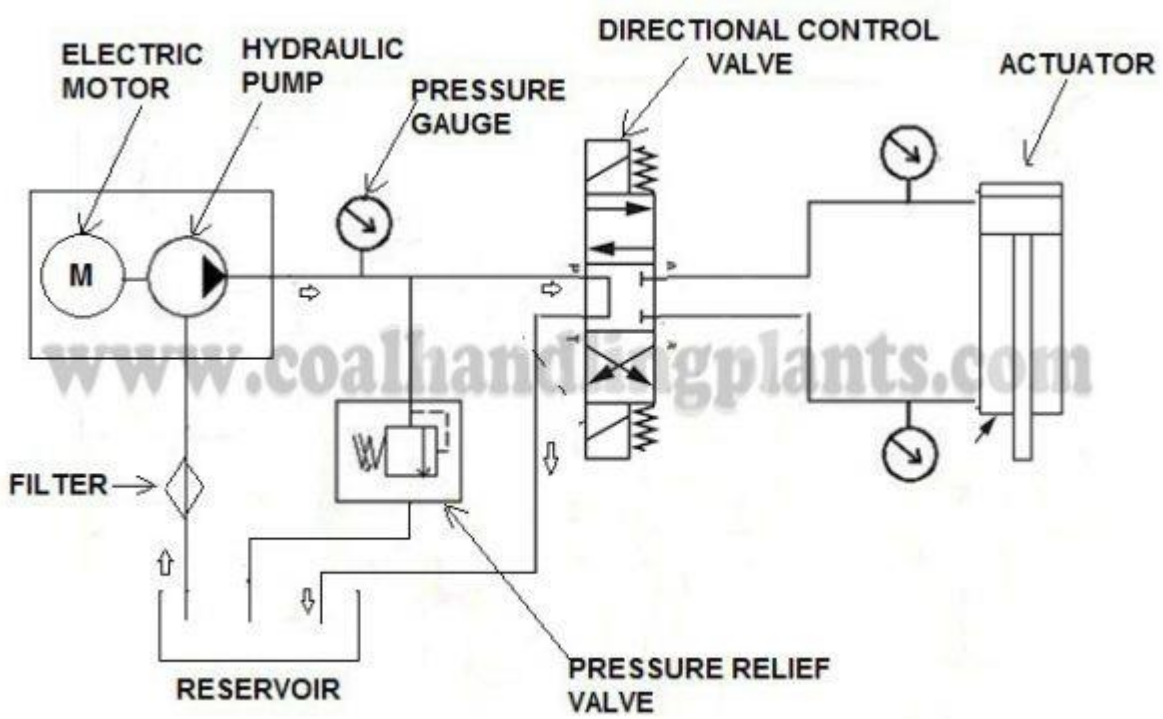
With a variety of applications, hydraulic systems are used in all kinds of large and small industrial settings, as well as buildings, construction equipment, and vehicles. Paper mills, logging, manufacturing, robotics, and steel processing are leading users of hydraulic equipment.
As an efficient and cost-effective way to create movement or repetition, hydraulic system-based equipment is hard to top. It's likely your company has hydraulics in use in one or more applications for these reasons.
We'll provide more information about hydraulic systems in this article, including covering the definition and basic designs and components.

An Overview of Hydraulic Systems

The purpose of a specific hydraulic system may vary, but all hydraulic systems work through the same basic concept. Defined simply, hydraulic systems function and perform tasks through using a fluid that is pressurized. Another way to put this is the pressurized fluid makes things work.
The power of liquid fuel in hydraulics is significant and as a result, hydraulic are commonly used in heavy equipment. In a hydraulic system, pressure, applied to a contained fluid at any point, is transmitted undiminished. That pressurized fluid acts upon every part of the section of a containing vessel and creates force or power. Due to the use of this force, and depending on how it's applied, operators can lift heavy loads, and precise repetitive tasks can be easily done.

Hydraulic Circuits

Transporting liquid through a set of interconnected discrete components, a hydraulic circuit is a system that can control where fluid flows (such as thermodynamic systems), as well as control fluid pressure (such as hydraulic amplifiers).
The system of a hydraulic circuit works similar to electric circuit theory, using linear and discrete elements. Hydraulic circuits are often applied in chemical processing (flow systems).



1. Reservoir / Oil Tank

They are used to hold the hydraulic oil.

2. Hydraulic Pump

They are used to pressurized the hydraulic fluid and force the fluid through the system.There are three types of hydraulic pump:

I. Fixed Displacement Pump – These pump has a set flow rate means every stroke of the motor moves same amount of fluid. Fixed displacement pumps are perfect for single jobs that to be repeated indefinitely over long periods of time. There are three types of fixed displacement pump : Gear Pump, Gerotor Pump, Screw Pump.

II. Variable Displacement Pump – In Variable displacement pumps flow rate and outlet pressure can be changed as the pump operates. They are used to power a wider variety of tool, but require more expense and more attention. There are four types of variable displacement pump: Bent Axis Pump, Axial Piston Pump, Radial Piston Pump, Rotary Vane Pump.

III. Hand /Manual Hydraulic pump – These pump are operated by hand and foot.

3. Hydraulic Motor

A hydraulic motor is a mechanical hydraulic actuator that converts hydraulic energy or hydraulic pressure into torque and angular displacement / rotation.

4. Hydraulic Cylinder

Hydraulic cylinder is a mechanical hydraulic actuator that converts hydraulic energy or hydraulic pressure into linear displacement. It consists of cylindrical barrel, piston and piston rod.

5. Pressure Control Valve

Pressure control valves limit the system pressure to protect the system components. There are four types of pressure control valve:

I. Pressure Relief Valve – They are designed to protect hydraulic system when pressure in the system increases beyond the specified design pressure or maximum working pressure. They are normally closed and it opens when the pressure exceeds a specified maximum value and diverts the pump flow back to reservoir or tank internally. They are located near hydraulic pump.

- **Working of pressure relief valve**

II. Pressure Reducing Valve – They are design to limit and maintain outlet pressure. They are normally open and closed if the pressure exceed beyond specified design pressure at outlet. They are located near hydraulic actuator.

III. Sequence Valve – The sequence valve is used to ensure that a certain pressure level is achieved in one branch of the circuit before a second branch is activated.

IV. Counterbalance Valve – Counterbalance valves are used in hydraulic systems working with running-away or suspended load. They are designed to create backpressure at the return line of the actuator to prevent losing control over the load.

6. Flow Control Valve

A flow control valve is used for adjusting the flow rate of a fluid in a pipeline. The valve contains a flow passage or a port whose area can be varied.

7. Directional control valve

Types of directional control valve.

I. Check Valve – check valve or non return valve are simplest type of directional control valve used to allow free flow of fluid in only one direction.

II. Spool Type Directional Control Valve – These valve are used to control the direction of fluid flow.

8. Proportional Valve

They are used in a hydraulic system that need to vary either flow or pressure to reduce lunge and shock.

9. Cheque Q Meter

They control the returning flow in relation to the flow being directed into opposite side of the actuator. It is used in hydraulic system to influence the speed of hydraulic motor and hydraulic cylinder independent to the load (prevent running away).

10. Solenoid Valve

It is a electro mechanically operated valve. The valve is control by electric current through a **solenoid**. The function of solenoid valve in hydraulic system is to shut off, distribute and release fluid.

CHAPTER 2: ORGANIZATIONAL PROFILE

We Roll Mill Industries Ltd is considered as a leading manufacturer and exporter of Hot Steel Rolling Plants.

COMPANY PROFILE

Rollmill Industries Ltd. introduces itself as a reputed manufacturer and exporter of Hot Steel Rolling Plants. The company today enjoys a leading position and also manufactures and experts a complete rage of Rolling mill plants and various allied equipments, created using latest technology and techniques.

The range of different equipments the company produces includes all types of Gear Boxes, Pinion Stands, Speed Increasers, Roller Tables, Tilting Tables, Ejectors, Automation of Cooling Bed, Vertical Stands, Hot Saw, Coilers, Billet Handling Equipments and various types of Shears.

Each of our products retains some of the most advanced attributes thus has acquired wide recognition in both national and international markets. All our products come with best quality and innovative features thus we have never experienced rejection even for a single part of our plants and equipments.

We have been satisfying our worldwide customers who continuously forward their feedbacks as well as refer us to other organisations. Such positive state simply means that we are in position where our customers have turned into permanent clients as they also maintain trust, confidence, respects and above all an everlasting relationship with us.

OUR TEAM

We at Rollmill industries are completely backed by an expert team including designers, developers, engineers and other manpower which help us in creating a technologically advanced range of Rollmill plants and other equipments. Each member in the team holds thorough expertise of the domain and work with dedication in order to render every product to be called distinct among others, which are available for same applications. The team also provides required support for installation of these plants and equipments.

VISION & MISSION

Total Customer Satisfaction
Continous Improvement
Dedication to quality
Rollmill has the mission of providing quality services related to the Hot Rolling Mill and Machining of Metals according to the standards / specifications of our customers. Working towards our missions, we follow the axion of total quality assurance and continous improvement in product features and processes. We will strive to do this better to achive world class manufacturing systems and continually improve, so that all customers and members of the Rollmill Industries can share prosperity in long term growth.

OUR CAPABILITIES

Following are the capabilities, setting the company apart in the entire industry:

- Finding unique solutions to new problems
- Executing new rolling Mill Project on turn-key basis
- Also providing services for modernisation of existing mill
- Solving out particular condition and special needs of global clients
- Enhancement in the production capacity & diversification of product range

CHAPTER 3: PROJECT OBJECTIVES AND SCOPE

OBJECTIVE OF STUDY

Aim of Hydraulic system

is using an incompressible fluid to perform work by displacing areas, which will create either linear or rotary movement of actuators.

it works by

A positive displacement pump (gear, vane or piston pump) is driven by a prime mover (Electrical Motor or Engine) it sucs fluid from reservior and delivers oil to system.

During loading a resistance to flow creates the pressure which is utilised to do the work through cylinder for linear motion or through hydraulic motor for rotary motion, Direction of flow is changed with help of direction control valve & system pressure is regulated by pressure control valve & flow is regulated by flow control valve.

Hydraulics are a rather expensive but effective way of transferring power from one source to another on the same vehicle. This principle applies whether it is a garbage truck or a combat vehicle. Hydraulics on these vehicles translate power from the engine to to the dump bed hydraulics or the recovery winch or hydraulically powered ac compressor or hydraulically driven cooling fans. Hydraulics work when mechanical drives cannot because of location and electrical motors are impractical. So essentially just about every combat vehicle that has a winch that is driven by hydraulics. Dump trucks have dump beds that are driven by hydraulics. Farm tractors have implements run by hydraulics.

Hydraulics have the ability to exert extreme pressure in movement. Pumping fluid into a cavity or tube, if done properly can exert tremendous force. In a press to form steel panels, hydraulic pumps can move the forms or presses to easily bend & shape metal. In some cases, several hundred tons of pressure.

Hydraulic systems are used in a wide range of applications today, from small assembly processes to integrated steel and paper mills. The reservoir, pump, valve(s), and actuator(s) are the main components of a hydraulic system (motor, cylinder, etc.).

1. The hydraulic reservoir's purpose is to hold a volume of fluid, transfer heat from the system, allow solid contaminants to settle, and aid in the release of air and moisture from the fluid.

2. The hydraulic pump transmits mechanical energy into hydraulic energy. This is done by the movement of fluid which is the transmission medium. There are several types of hydraulic pumps including gear, vane, and piston.

3. Hydraulic valves start, stop, and direct fluid flow in a system. Hydraulic valves are composed of poppets or spools and can be actuated pneumatically, hydraulically, electrically, manually, or mechanically.

4. Actuators are the point at which hydraulic energy is converted back to mechanical energy.

5. This can be accomplished by using a hydraulic cylinder to convert hydraulic energy into linear motion and work, or a hydraulic motor to convert hydraulic energy into rotary motion and work.

Vtech hydraulic is the company that offers the best hydraulic equipment that is well-maintained, safe, and secure. It is a well-known and trusted dealer, supplier, and distributor. Their support, service staff, and engineers are available for any questions, and they also visit their customers' sites every six months to raise awareness and maintain hydraulic equipment. To get more information, visit: www.vtechhydraulic.com

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION

Any foreign matter present in the circuit of the hydraulic system will have an adverse effect on the efficiency of the hydraulic components and the circuit. Contaminating foreign objects may be solid, liquid or gaseous.

Most foreign matter contamination will cause frictional movement between the workpiece and the tight clearance between the workpiece, which will lead to accelerated wear and cracking of the workpiece.

hydraulic performance are particulate or water contamination, clogged filters, high fluid temperature and incorrect hydraulic fluids

Environmental hydraulics is a branch of fluid mechanics that deals with the study of the interactions between water and the environment. It focuses on the behavior of water in natural systems, such as rivers, lakes, oceans, and wetlands, and how it affects the surrounding environment. Environmental hydraulics involves the study of a wide range of topics, including flow dynamics, sediment transport, water quality, erosion and sedimentation, and the interaction between water and vegetation. It is used in a variety of fields, including environmental engineering, hydrology, coastal and marine engineering, and water resources management, to understand and manage the impact of water on the environment.

Environmental hydraulics is an interdisciplinary field that combines principles from fluid mechanics, environmental science, and engineering. It involves the application of mathematical and computational models to study the complex interactions between water and the environment. Some of the specific areas of research in environmental hydraulics include:

1. River and stream hydraulics: This involves the study of the flow dynamics of water in rivers and streams, including the effects of channel geometry, flow velocity, and sediment transport.

2. Coastal and marine hydraulics: This involves the study of the behavior of water in the coastal zone and in the open ocean, including the effects of waves, tides, currents, and sediment transport.

3. Wetland hydraulics: This involves the study of the interactions between water and vegetation in wetlands, including the effects of hydrology, vegetation type, and sediment transport on wetland ecosystems.

4. Water quality and pollution transport: This involves the study of the transport and fate of contaminants in water systems, including the effects of flow dynamics, sediment transport, and chemical reactions on water quality.

Environmental hydraulics has many practical applications, including the design of hydraulic structures such as dams, levees, and water treatment facilities, as well as the management of water resources in natural and engineered systems. It is also used to study the impacts of human activities on the environment, such as the effects of land use changes, urbanization, and climate change on water systems.

In addition to the areas of research mentioned earlier, environmental hydraulics also includes the study of various physical and biological processes that occur in water systems. Some examples of these processes include:

1. Erosion and sedimentation: This involves the study of how water transports and deposits sediment in different environments, such as rivers, estuaries, and coastal zones. The study of erosion and sedimentation is important for understanding the impact of human activities, such as land use changes and construction, on water systems.

2. Aquatic ecosystems: This involves the study of interactions between water and living organisms in aquatic environments, such as fish, plants, and microorganisms. Environmental hydraulics is used to understand the physical and biological processes that affect the health and functioning of aquatic ecosystems.

3. Flood management: This involves the study of the behavior of water during floods, including the effects of floodplain topography, flow velocity, and sediment transport. Environmental hydraulics is used to design flood management structures and to predict the impacts of floods on communities and ecosystems.

4. Water resources management: This involves the study of the availability, quality, and use of water resources, including surface water and groundwater. Environmental hydraulics is used to develop models for managing water resources, such

as predicting the impacts of climate change on water availability and designing systems for water storage and distribution.

Overall, environmental hydraulics is an important field for understanding the complex interactions between water and the environment, and for developing sustainable solutions for managing water resources and protecting the environment.

It depends on the hydraulic system, the oil in it, and the components. Many hydraulic systems (most mobile systems) use motor oil as hydraulic fluid since it absorbs the moisture and burns it off instead of leaving it in the bottom of the tank to enter the pump and cavitate the pump.

Upvote

Hydraulic system itself does not “generate” power. The system does “transfer” or “amplify” the power. Power generated by the power source (electric motor, petrol engine, manpower, etc) transferred through the hydraulic system then often amplified to get greater force. This amplification is explained by theory called Theorem of Bernoulli (a French scientist). You push one end with smaller power for longer distance provides greater power for shorter distance at the other side of hydraulic system. This is based on the fact that liquid would not change its volume by pressurizing it. Maybe this explanation is too much of simplification, but I believe principle of physics is always simple.

It is where the system operates under constant pressure. All directional valves are closed center. That means they only release pressure to the load when activated. as opposed to an open circuit system, which is what a forklift and most mobile hydraulic applications use. In this case the spools on the valving flow freely from pressure to tank. and when a valve gets operated, it shuttles a portion of the oil to the load. Closed circuit systems generally require a pump that can destroke when the system pressure is reached for max efficiency. You can use a constant volume pump with a pressure relief, but it wastes a LOT of energy. You can use a constant volume pump, a check valve, pressure sensing switch, a normally open dump valve along with an accumulator to make a cheap version of a variable volume pump system.

CHAPTER 5: CONCLUSION AND FINDINGS

CONCLUSION

Hydraulic systems can move heavier loads and provide more force than rotary, electrical, or compressor systems can.

Defined simply, hydraulic systems function and perform tasks through using a fluid that is pressurized. Another way to put this is the pressurized fluid makes things work. The power of liquid fuel in hydraulics is significant and as a result, hydraulic are commonly used in heavy equipment.

Based on the experiment we have tabulated our data collection and analyze it. We can conclude that the objective of the experiment is achieved. From this experiment, we experience on how to do the setup and function of each double-acting cylinder and 4/2-way valve and 4/3-way valve. After the assembly part, we measured the travel time. However, before measuring times, the piston rod should be advanced and retracted several times in order to force out any air which might have flowed into the cylinder's piston rod chamber during the last exercises. The time measured we took is compared to the actual measured values by using the formula. Nevertheless, the data collection is not exactly as the actual measured due to some error that occur during the experiment. The error exist could be systematic error and technical error. Thus, the time measured is slightly different with the actual measure value.

FINDINGS

This work has provided a n excellent opportunity and experience, to use limited knowledge. It has gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. The work is a good solution to bridge the gates between institution and industries. The work is completed the work with the limited time successfully. The "HYDRAULIC SYSTEM FOR KIKOFF PLATFORM MACHINE" is working with satisfactory.

SUGGESTION /RECOMMENDATIONS

Hydraulic systems should use hydraulic fluid that has a viscosity of 130 - 225 SSU

at 100 degrees F / 38 degrees C. Hydraulic fluids of petroleum base with anitwear properties and high viscosity indexes over -140 will meet recommended hydraulic fluid requirements over a wide range of operating temperatures.

In the design stage of a power unit and its installation, it is always best to try to minimize and bends in the system as this will allow the hydraulic fluid to flow more freely and efficiently. Pipe sizing is crucial to minimize pressure losses that add to the power requirements.

Hydraulic oils have a significant impact on the system's productivity. Hydraulic systems are often made for high-speed, high-pressure, and high-temperature applications. Premature system failure can be avoided by analyzing and adequately maintaining the oil.

Hydraulic Preventive Maintenance Task List

Check hydraulic fluid levels. ...

Check breather caps, filters, and fill screens.

Check return/pressure/hydraulic filter indicators and pressure gauges for readings.

Sample hydraulic fluid for color, visible signs of contamination, and odor.

CHAPTER 7: ANNEXURE

CHAPTER 8: REFERENCES AND BIBLIOGRAPHY

The hydraulic handbook by T. Hunt and N. Vaughan.

This is book is pretty simple and easy to learn from. Also good for references.

End of Project Report

1. .

End of Project Report