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## Human Powered Forklift

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### ABSTRACT:

Every day, the mechanical field advances. Many original concepts are being introduced to the industry. The goal of this project report is to provide a thorough analysis of the technical and theoretical components of "FORKLIFT." All of the subjects included in this report are crucial for a thorough comprehension and examination of the term "FORKLIFT." We looked into and adapted the forklift machine for the purpose. The reports are divided into many chapters, each of which is laid out in an orderly manner. including the fundamental introduction, description, application, and its applications in different sectors.

Forklifts are small, compact devices made to fit into limited spaces, and they are typically used to move heavy supplies and items from one location to another swiftly and with minimal effort. The best part is that you may select a forklift based on your demands that has the proper setup and capacity.

- The forklifts' ability to access items in high places is one of its advantages.
- The warehouses couldn't function easily and effectively without these machines.
- They operate sustainably and have a longer lifespan.

### INTRODUCTION:

In general, a forklift is a machine that can lift loads weighing hundreds of kilograms. A forklift is a compact truck-like vehicle used to lift items that has two metal prongs on the front. The forklift driver advances the forklift until the prongs press beneath the load, at which point the forks are operated to raise the cargo several feet into the air. Forks, which are often referred to as blades or tines, are typically constructed of steel and are capable of lifting up to a few tones.

Electricity, propane, or any of these fuels are used to power forklifts. For power, electric forklifts depend on batteries. Forklifts powered by gasoline or propane can occasionally be quicker or stronger than electric forklifts, but they require more maintenance and their fuel can be expensive. Due to the fact that they do not emit harmful gases like gas-powered devices do, electric forklifts are excellent for use in warehouses.

When operating a forklift, forklift operators must take all necessary safety precautions. Drivers need to be careful not to put too much weight on the forklift. Additionally, forklift drivers must be able to control the back wheel steering of the forklift. Similar to driving a car in reverse, operating a forklift requires regular steering to maintain a straight line of motion. The forklift's centre of gravity changes constantly, therefore the driver needs to be aware of it in order to prevent making any sudden sharp bends or driving too quickly. Any person who uses a forklift should be adequately trained and licensed.

### LITERATURE REVIEW:

The two-wheel go-cart appears to have been the initial contribution to scientific material handling instruments. We usually move the cloth throughout this process rather than carrying it. A Pennsylvania Railroad political candidate in Altoona in 1906 used an additional accumulator to power a cargo wagon, which was unquestionably the truck's main source of power. With an upright, cantilever platform, and a hoist, the first transportable lift on record in the Patent and Trademark Office Database was built of wood in 1867. In 1887, when a rudimentary truck capable of elevating its platform, a few inches was built, one of the earliest attempts to combine horizontal and vertical motion was made. The unit load theory with skids was probably first applied in this way. The creation of the first electrically powered self-propelled vehicle, the use of standardized pallets in the late 1930s, and the introduction of hydraulic power. It was stated that the state capital Bagnall firm, now a member of the KION cluster, created the first thin aisle electrical reach truck in 1954. Operator safety increased in importance from the 1950s to the 1960s as lifting heights and capacity increased.

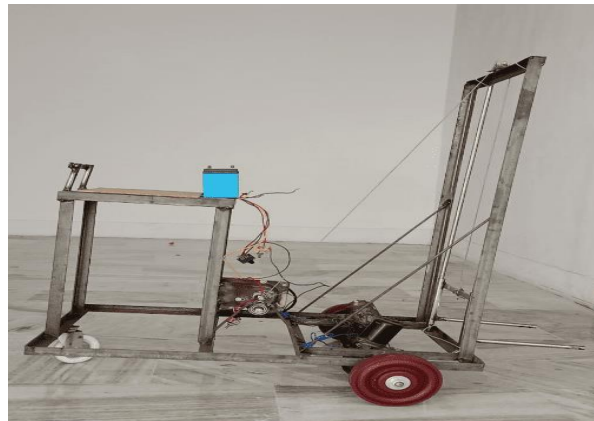
In our project, we typically use human strength to carry the cloth from the bottom while also utilizing battery power to move the vehicle horizontally. B. SCOPE: The "HUMAN POWERED FORKLIFT" project aims to raise the load using a chain drive. The most advantageous aspect of using this is the

ability to manage heavy loads by just turning on the engine. As a result, productivity will rise. The system was successfully designed and developed with the intention that a paradigm model (small model) would be constructed for demonstration purposes.

### COMPONENTS OF HUMAN POWERED FORKLIFT:

The human powered forklift consists of the following parts

1. Mild steel L shaped angles
2. 12V electric gear motor
3. Polyurethane wheels
4. Battery
5. Castor
6. Bearing
7. Pulley



Schematic Diagram of Human powered forklift

### WORKING OF HUMAN POWERED FORKLIFT:

The mechanical fork lift machine consist of frame which is made up of steel square bars which are welded together to form a structure. Wheels are attached for easy movement of the fork lift. The machine consists of a chain & paddle mechanism which is helpful in easy movement of the machine. The handle wheel & the chain sprocket mechanism are used to give motion to the wheels & to turn the wheels. The paddle wheel and the chain sprocket mechanism are used to give motion to the lift for easy lifting of the substances or to place the substances or parts at the required place.

#### APPLICATIONS USED (machines):T

- ARC WELDING MACHINE

By utilising intense heat to melt the components together and then allowing them to cool, which results in fusion, welding is a manufacturing method that unites materials, often metals or thermoplastics. Welding is separate from lower temperature processes that don't melt the base metal (parent metal), such brazing and soldering.



Fig: 4.10 Welding machine

The base metal is normally melted first, followed by the addition of a filler material to create a pool of molten metal (the weld pool), which cools to produce a connection that, depending on the weld design (butt, full penetration, fillet, etc.), may be stronger than the base metal. To create a weld, pressure can either be applied alone, in combination with heat, or both. In order to prevent contamination or oxidation of the filler metals or molten metals during welding, a shield is also necessary.

#### **METALCUTTINGMACHINE:**

A cutting tool, also known as a cutter, is often a hardened metal tool that is used in the process of machining to cut, shape, and remove material from a workpiece using both machining and abrasive tools through shear deformation. Most of these tools are especially made for metals.



**Fig: 4.11 Metal cutting machine**

#### **LATHETMACHINE:**

Using tools that are applied to the workpiece, a lathe turns a workpiece about an axis of rotation to execute a variety of operations such as cutting, sanding, drilling, deformation, facing, and turning in order to create an item with symmetry about that axis.



**Fig: 4.12 Lathe machine**

Most solids of rotation, flat surfaces, and screw threads or helices may also be produced on the majority of well-equipped metalworking lathes. Stunningly sophisticated three-dimensional solids may be created on ornamental lathes. One or two centers, at least one of which may often be shifted horizontally to suit various workpiece lengths, are typically used to hold the workpiece in place.

#### **PROCESS SHEET:**

Following operations were done while fabricate the project

**Cutting:** This operation is used to cut the material as our required size. The machine used for this operation is power chop saw. A power chop saw, also known as a drop saw, is a power tool used to make a quick, accurate crosscut in a workpiece at a selected angle. Common uses include framing operations and the cutting of moulding. Most chop saws are relatively small and portable, with common blade sizes ranging from eight to twelve inches. The chop saw makes cuts by pulling a spinning circular saw blade down onto a workpiece in a short, controlled motion. The workpiece is typically held against a fence, which provides a precise cutting angle between the plane of the blade and the plane of the longest workpiece edge. In standard position, this angle is fixed at 90°. A primary distinguishing feature of the mitre saw is the mitre index that allows the angle of the blade to be changed relative to the fence. While most mitre saws enable precise one-degree incremental changes to the mitre index, many also provide "stops" that allow the mitre index to be quickly set to common angles (such as 15°, 22.5°, 30°, and 45°). The time required for this operation is 50 minutes.

**Finishing:** This technique is used to finish the edges with grinder using grinding wheel. The machine used for this operation is hand grinder. An angle grinder, also known as a side grinder or disc grinder, is a handheld power tool used for cutting, grinding and polishing. Angle grinders can be powered by an electric motor, petrol engine or compressed air. The motor drives a geared head at a right-angle on which is mounted an abrasive disc or a thinner cut-off disc, either of which can be replaced when worn. Angle grinders typically have an adjustable guard and a side-handle for two-handed operation. Certain angle grinders, depending on their speed range, can be used as sanders, employing a sanding disc with a backing pad or disc. The backing system is typically made of hard plastic, phenolic resin, or medium-hard rubber depending on the amount of flexibility desired. The time required for this operation is 20 minutes

**Welding:** This method is used to weld square pipes of different lengths to make frame. The machine used for this operation is electric arc welding. Electrical arc welding is the procedure used to join two metal parts, taking advantage of the heat developed by the electric arc that forms between an electrode (metal filler) and the material to be welded. The welding arc may be powered by an alternating current generator machine (welder). This welding machine is basically a single-phase static transformer Suitable for melting RUTILE (sliding) acid electrodes. Alkaline electrodes may also be melted by alternating current if the secondary open-circuit voltage is greater than 70 V. The welding current is continuously regulated (magnetic dispersion) by turning the hand wheel on the outside of the machine, which makes it possible to select the current value, indicated on a special graded scale, with the utmost precision. To prevent the service capacities from being exceeded, all of our machines are fitted with an automatic overload protection which cuts off the power supply (intermittent use) in the event of an overload. The operator must then wait for a few minutes before returning to work. This welding machine must be used only for the purpose described in this manual. Read the entire contents of this manual before installing, using or servicing the equipment, paying special attention to the chapter on safety precautions. Contact your distributor if you do not fully understand these instructions. The time required for this operation is 120 minutes.

**Polishing:** This technique is used to polish the welded joints with hand grinder using grinding wheel. The machine used for this operation is hand grinder. With refinement, grinding becomes polishing, either in preparing metal surfaces for subsequent buffing or in the actual preparation of a surface finish, such as a No. 4 polish in which the grit lines are clearly visible. Generally speaking, those operations which serve mainly to remove metal rapidly are considered as grinding, while those in which the emphasis is centred on attaining smoothness are classified as polishing. Grinding employs the coarser grits as a rule while most polishing operations are conducted with grits of 80 and finer. If polishing is required, start with as fine a grit as possible to reduce finishing steps. There is a wide range of grinding and polishing tools on the market and advice is available from ASSDA members to assist in particular applications. Polishing operations are conducted with the abrasive mounted either on made-up shaped wheels or belts which provide a resilient backing. The base material may be in either a smooth rolled or a previously ground condition. If the former, the starting grit size may be selected in a range of 80 to 100. If the latter, the initial grit should be one of sufficient coarseness to remove or smooth out any residual cutting lines or other surface imperfections left over from grinding. In either case, the treatment with the initial grit should be continued until a good, clean, uniform, blemishfree surface texture is obtained. The initial grit size to use on a pre-ground surface may be set at about 20 numbers finer than the last grit used in grinding, and changed, if necessary, after inspection. Upon completion of the initial stage of polishing, wheels or belts are changed to provide finer grits. Polishing speeds are generally somewhat higher than those used in grinding. A typical speed for wheel operation is 2500 metres per minute. The time required for this operation is 20 minutes.

#### FINAL OUTPUT



Fig: 5.1 Front view



Fig: 5.2 Left side view



Fig: 5.3 Back view

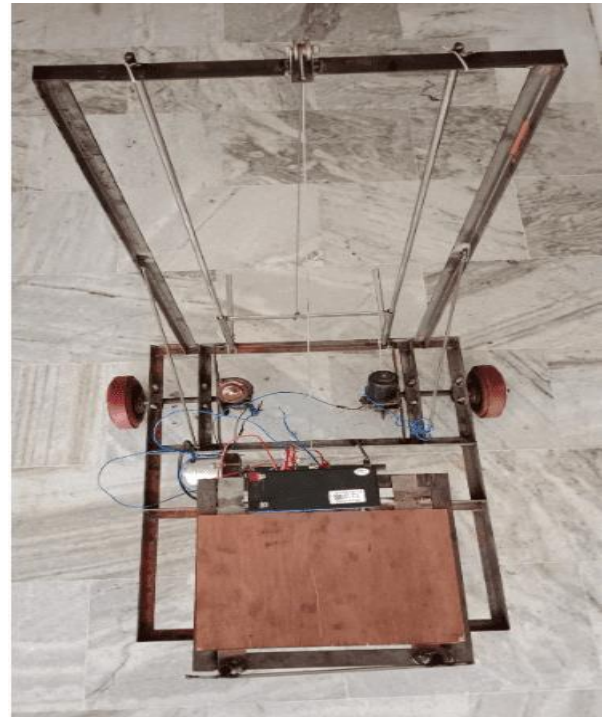


Fig: 5.4 Top view

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#### ADVANTAGES OF VORTEX TUBE:

- Suitable for indoor use.
- Longer life.
- Minimum noise level.
- Eco-friendly operation
- It can be used in hazardous areas.
- Huge advantage of forklift is that they have no fuel cost.
- The operation cost is low.
- The life of electric forklift is greater than other types.
- Maintain better control of material management
- Reduce product damages
- Reduce manpower
- Increase productivity
- Suitable to transfer frames

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#### DISADVANTAGES OF VORTEX TUBE:

- The speed is low.
- The capability of lifting weight is lower than other forklifts.
- You can't handle it until you are fully trained.
- They are usable only indoor.
- The main disadvantage is the area should be properly dry and should have controlled temperature, otherwise you face accidents.

**SAFETY PRECAUTIONS:** The following points should be considered for the safe operation of machine and to avoid accidents

- All the parts of the machine should be checked to be in perfect alignment.
- All the nuts and bolts should be perfectly tightened.
- The operating switch should be located at convenient distance from the operator so as to control the machine easily.
- The inspection and maintenance of the machine should be done from time to time.

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## CONCLUSION:

We believe that this initiative will be beneficial for small-scale enterprises since it is simple to use, requires little maintenance, and indirectly lowers labor costs. This machine will pay for itself quickly thanks to the savings it produces, and it may be a fantastic helper in any industry that deals with corroded and unusable metals. It is a mechanical gadget that does not require power or a battery from an external source. The creation of mechanical forklifts ensures the operator's or worker's ergonomic comfort and cuts down on the time needed for manual lifting and handling. This improves productivity efficiency and ensures operator safety when handling the material.

Utilising this technology has the primary benefit of enhancing operator safety by allowing forklift operation from a distance. Since human mistakes brought on by low visibility may be reduced, this improves production efficiency. The system has been successfully conceived and developed; a prototype module (small module) is built for demonstration purposes, and the results are satisfactory. After examining the facts and figures gathered from many publications and research papers, we came to the conclusion that the remote-controlled forklift is the sole solution to problems in the industry such as labour costs and hazardous material handling. Our project is only a prototype, and no electronic micro-controllers were employed.

Ours features a straightforward mechanical body and an easy electrical heart. We have a wired remote for manual operation because this is the simplest one. It may be altered to fit any premium application. We came to the conclusion that this project is the right one after taking into account the project time and all the required processes.

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## FUTURESCOPE

We believe that the project we completed has a bright future in any technical business. Although this gadget has minimal running expenses, its expensive upfront cost is its principal limitation. Based on the size, the machine should be developed. This equipment will quickly pay for itself thanks to the savings it produces, and it may be a tremendous helper in any technical field that deals with the transportation of products. One can effectively design to support loads more than 0.5 tonnes. The gadget offers lots of room for tweaks, additional enhancements, and operating efficiency, which should make it marketable and appealing.

We are confident that if it is produced commercially and appropriately marketed, the industry will accept it. It has a lot of potential if the gadget is grown larger in order to retain the load and weight bearing capabilities. Using a typical lead screw setup, the fork's distance between its two arms may be changed.

Even though the project team has done a considerable deal of work, the actual operating system still has to integrate extra features like speed control, high speed, etc. By offering more flexible control, the control structure can yet be further improved in this aspect. The mechanical design needs to be strengthened by making use of the proper gears and bearings. In emergencies, the speed must be raised, and when the speed is increased, the braking system must be used. Similar to how many changes may be carried over into subsequent projects.

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