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Design and Fabrication of Manual Forklift Winch Operated

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Abstract: *This paper presents a comprehensive study on the design, analysis, and application of a manual forklift winch system. The manual winch serves as a mechanical lifting device, facilitating the vertical movement of loads in environments where powered equipment is impractical. We explore the mechanical design principles, material selection, performance metrics, and safety considerations essential for developing an effective manual forklift winch system..*

Keywords: forklift winch system

I. INTRODUCTION

Now days due to heavy work load environment in the mechanical industrial lines workers are been depressed for carrying a heavy load, where the workers are prone to unhealthy conditions. Due to these factors some load carrying machines were developed in the recent past years. Like lift A forklift is a powered industrial truck used to lift and move materials over short distances. Forklifts are available at the market which requires more energy to operate, and cannot be used on the uneven surface.

Working in the mechanical workshops or any other large fabrication unit, where load is to carry (bars, plates, machined jobs etc.) from one unit of the factory to the other unit this device is useful. The total number of injuries per year (non-serious, serious, and fatal) is 96,785.

The purpose of this project is to modify the design of the forklift in terms of its functionality and also human factors considerations. In this project we are designing forklift up to 200kg of lifting capacity. In the process of obtaining a suitable design, the customer needs will be translating to the engineering characteristic to obtain the concepts that need to be modified and fabricated. Most people are familiar with the basic forklift (Manually operated) that is still included as standard equipment with newest automated forklifts.

Improvement in forklift is really needed to make it more efficient, user friendly, and practical to use, & most importantly high safety features.

The In-plant goods carrier system is user friendly as designed. The device finds greater use in the industrial lines for transport of the machined jobs, carrying goods internally in the fabrication plant. Forklift is an industrial power truck used for lifting and transport materials. Through the steel fork under the load, the lifting and transportation have been done. At present, different kinds of forklift is available, according to the lifting weight of forklift is divided into small tonnage (0.5t) and (1t), middle tonnage (2t and 3t) and large tonnage (5t and above).

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PROBLEM DEFINITION:

Humans have always needed to lift stuff, but haven't always known the means to do so effectively. Hoist were developed and used but we cannot use hoist to lift loads in few places. A hoist is just a system of chain and wenches on platform that could somewhat be moved. Hoist were great for lifting but not for much for moving from one place to another in few places. The platforms could get under lifted goods and then moved with a handle for transportation of machines in few places was our idea to minimize the labour work. Forklift help moves stuff that humans couldn't move easily.

To overcome this problem, we are using Forklift to find the solution on how to design a forklift using the simplest and cheapest way while it is energy saving. Although there were many ways to solve this problem, we recommend that the design of forklift system is the practical way when we considered all the factors and consequences especially about the analysis to develop this product. Hence, this report had been prepared to recommend the design of the forklift that is user friendly and easier to operate as do not required too much money to develop this product.

SCOPE AND OBJECTIVE:

SCOPE

This project is about the designing and fabricating the forklift. The types of forklift that we used in this project are linear actuator operated forklift as it is more reliable and easy to operate. In order to develop new concept of the forklift design, we have done some survey by discussing with the forklift user. The scopes of project were on the designing 50kg maximum lifting capacity of forklift. To achieve our new design goals, we need to do some work on the existing forklift design and what kind of product transportation is using. Based on that work, we need to find what the shortcomings of existing designs are. The new design offers both new and improvised features, over what is currently available.

OBJECTIVE

The main objective of this work is to minimize the human effort by improving the design of lift. To fulfill the requirement of industry, to reduce the cycle time and improving the productivity of plant.

The following objective will focus in this work: -

1. To study the various types of lifting mechanism.

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2. To study the technical specification, critical dimensions and manufacturing process of various components of lift. The design of lift will be analyzed by using analysis tool for validation.

II. LITURATURE SURVEY

Aashishkumar L Sharnangat, M. S. Tufail,(2017), he said that the development of robotic forklift intended to operate alongside human personnel, handling palletized materials within existing, busy, semi structured outdoor storage facilities. The robot operates in minimally-prepared, semi structured environments, in which the forklift handles variable palletized cargo using only local sensing, and transports it while interacting with other moving forklifts.

LiaiPan (2017) , a, Qiulei Dub As a kind of industrial handling forklifts, forklift plays an role in people's life. Nowadays, in order to meet the needs of the people, the types of forklifts are more and more. In this project, based on already the basic parameters of the push forward forklift tin the market, the working device of the forklift has been introduced.

Praveen raj (2016) he pointed out that in the modern world though there are many developments in the field of engineering. Development of lift simplifies the effort of carrying heavy loads over stairs, it is not possible to use lift in all places like schools, college's constructional areas. This paper aims at developing a mechanism for easy transportation of heavy loads over stairs. The main objective is to find an efficient and user friendly method of carrying various objects through stairs using minimum effort from the user and to also provide a smooth movement while climbing the stair. A stair climber is manufactured with tri lobed wheel frames at both sides of the climber and three wheels on each side are used in the tri lobed frame. The wheel assembly is rotated by a gear- motor mechanism where a direct current (DC) gear motor is used to provide the necessary power for rotation and a pinion- gear mesh is used for reducing the rotating speed of the wheel.

Mr. Ravi R. Mishra (2016), he modified in the first design, the power transmission to the single or double wheel trolley is useless to climb the stairs due to height factor of stairs creates huge obstacle on the way of forklift. Also, the design of the straight wheel frame became more complicated and was needed modified with its curve- spherical shape to give proper drive, which create more frictional force. For these reasons, three-wheel set on each side of forklift attached with frame was introduced to provide smooth power transmission in order to climb stairs without obstacles. Frame arrangement is suitable to transmit exact velocity ratio also. It provided higher efficiency and compact layout with reliable service

Kulkarni et al.(2016), he clearly pointed that, as per the survey more number of accidents happen due to more number of trolleys connected to a single tractor along with more load and it becomes difficult for the driver to control the tractor and its attachment trolleys. In this paper, they have designed a collapsible trolley that can be adjusted in size. So, to eliminate all the trolley related problems and reduce the cost, they have designed a simple trolley so that the work of two trolleys can be done in a single trolley. With this kind of design, it becomes easy for the drivers to drive the tractor and the trolley to the long distance safely.

Md. A. Hossain. Nafis (2013) , he studied a new horizon for the transportation of the loads over the stair. Most of the buildings of the country are structurally congested and unavailing of elevator facility so it is difficult and laborious to lift up heavy loads. The stair climbing Trolley can play an important role in those areas to lift loads over a short height, like libraries, hospital, and in construction area. The Trolley, which can move upper level through strain, or run in very rough and rocky surfaces, is called stair climbing Trolley.

VegimImeri (2015) , he studied the dynamic occurrences on forklift during lifting of loads proves to be difficult using physical experimentation and current measurement devices. Creating the forklift's multibody model and applying computer simulations is very use full method to study these occurrences, which helps to explain the reasons of heavy oscillations, failures and accidents of forklifts, and gives conclusions that can be useful for design considerations and safety. The aim is to see how dynamic forces, moments, speed and oscillations effect the forklift's construction and its stability during load lifting. To do this work we designed entire "virtual forklift" using model design and simulation application [3] and performed simulations in order to gain results. Main parameters that are influential on the dynamic behaviour of forklift will be analysed and will be searched for conclusions that can be useful for better understanding dynamics of forklift. This paper identifies a set of parameters that have influence in main forklift parts, and gives results

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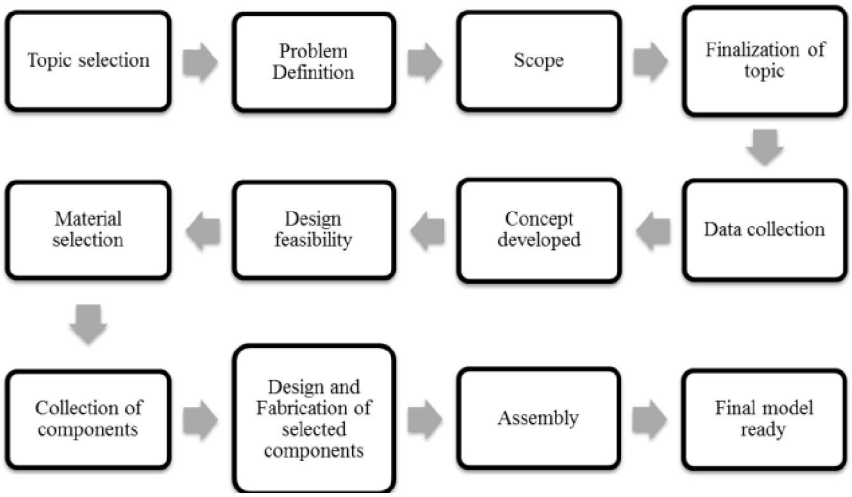
with graphs and tables with values that are dynamic in nature, with high amplitudes and frequencies that effects directly in causes of material fatigue or failure.

Muthukumar K (2014),he pointed put, forklifts offer many benefits such as reducing manual material handling and enhancing productivity, there are factors that cause Musculoskeletal disorders (MSDs) to the forklift operators, such as severely twisted postures, prolonged sitting and exposure to vibration etc., ultimately leading to low productivity. The main objective of this study is to evaluate different make forklifts in a heavy equipment manufacturing industry (Voltas-diesel, Godrej-diesel, Doosan-diesel, Voltas-electrical and MacNeil-electrical) and forklifts with different types of engine (diesel and electrically operated) based on subjective discomfort reported by the forklift operators using Corlett and Bishop's method of body mapping and Cornell Musculoskeletal Discomfort Questionnaire (CMDQ). Fourty four operators aged between 20-58 years driving five different make forklifts were the subjects. Operators working on Godrej diesel reported more discomfort while operators working on Voltas- electrical reported less discomfort. Operators working on diesel operated forklifts reported higher discomfort compared to electrically operated forklifts but the difference is small. Body part wise analysis revealed that the operators reported the highest level of discomfort at the lower back irrespective of the engine type.

Ben T Rails back (2014), he said, significant hazard related to the use of stand-up lift trucks, or stand-up forklifts, is the hazard of a lower limb crush injury or foot crush due to the opening across the rear of the operator compartment. According to one lift truck manufacturer's statistics, there have been over 500 accidents that resulted in an injury to the lower limb of the operator in the last 30 years that involved their stand-up lift trucks. [1] Other manufacturers have had similar accidents. The injuries have occurred to the lower limb of the operator due to the close proximity of the operator's lower limbs to the exterior of the lift truck, and the confined areas that stand-up lift trucks operate in. The operator's lower limb can become pinned and crushed between the moving lift and another fixed object such as a rack system, a column or another lift truck. Objects, such as a fork tine, can also intrude into the operator compartment, injuring the operator's lower extremities.

III. METHODOLOGY

1. Data collection regarding machine dimension and their weights.
2. Concept development.
3. Checking design feasibility
4. Checking of various stresses acting on the body due to axial load. Thus, the different parts of forklift are designed, manufactured as per dimensions.
5. Design in term of comfort.
6. Experimental calculations & Analysed using Analysis software for validation.



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Data Collection

1. Forklift Introduction.
2. Deciding types of lifting mechanism.
3. Advantages & Disadvantages of forklift.
4. Research papers regarding forklift design, manufacturing & Analysis.
5. Technical specifications of forklift components, c channel, frame on welding machine.

Material Selection:

1. Design of each component and validation as per experimental results.
2. Selection of Steel Material and justification. Section selection, deciding modelling strategy, property definition.

Assembly of model in SOLIDWORKS

1. Import each frame and pulley model in Software.
2. Meshing analysis in SOLIDWORKS.
3. Finding Stress, Strain analysis with our calculation.
4. Identifying critical sections.

Testing

1. Theoretical analysis of forks & comparison.
2. Load testing.
3. Von-Mises Stress, Strain evaluation and calculations based upon testing calculation.
4. As per experimental calculation, plotting graphs (Load vs. Stress, Stress vs.).

IV. CONSTRUCTION

FRAME

The frame is usually made of mild steel. It is strong enough to withstand all types of loads in working condition. All other parts are fitted to the frame. Frame is helping the supporting of the various light load support. Frame shows the good aesthetic loop. every machine should have required the good frame design. Frame material should have high strength because frame balancing of another machine load. in ours project the frame showing important role. the vertical pulley and sprocket are mounted on vertical support of the frame. Main whole project assembly our project mounted on frame. The proper selection of material for the different part of a machine is the main objective in the fabrication of machine. For a design engineer it is must that he be familiar with the effect, which the manufacturing process and heat treatment have on the properties of materials. The Choice of material for engineering purposes depends upon the following factors:

1. Availability of the materials.
2. Suitability of materials for the working condition in service.
3. The cost of materials.
4. Physical and chemical properties of material.
5. Mechanical properties of material.

The mechanical properties of the metals are those, which are associated with the ability of the material to resist mechanical forces and load. We shall now discuss these properties as follows:

1. Strength: It is the ability of a material to resist the externally applied forces
2. Stress: Without breaking or yielding. The internal resistance offered by a part to an externally applied force is called stress.
3. Stiffness: It is the ability of material to resist deformation under stresses. The modules of elasticity of the measure of stiffness.

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4. Elasticity: It is the property of a material to regain its original shape after deformation when the external forces are removed. This property is desirable for material used in tools and machines. It may be noted that steel is more elastic than rubber.

5. Plasticity: It is the property of a material, which retain the deformation produced under load permanently. This property of material is necessary for forging, in stamping images on coins and in ornamental work.

6. Ductility: It is the property of a material enabling it to be drawn into wire with the application of a tensile force. A ductile material must be both strong and plastic. The ductility is usually measured by the terms, percentage elongation and percent reduction in area. The ductile materials commonly used in engineering practice are mild steel, copper, aluminium, nickel, zinc, tin and lead.

7. Brittleness: It is the property of material opposite to ductile. It is the property of breaking of a material with little permanent distortion. Brittle materials when subjected to tensile loads snap off without giving any sensible elongation. Cast iron is a brittle material.

8. Malleability: It is a special case of ductility, which permits material to be rolled or hammered into thin sheets, a malleable material should be plastic but it is not essential to be so strong. The malleable materials commonly used in engineering practice are lead, soft steel, wrought iron, copper and aluminium.

9. Toughness: It is the property of a material to resist the fracture due to high impact loads like hammer blows. The toughness of the material decreases when it is heated. It is measured by the amount of absorbed after being stressed up to the point of fracture. This property is desirable in parts subjected to shock an impact load.

10. Resilience: It is the property of a material to absorb energy and to resist rock and impact loads. It is measured by amount of energy absorbed per unit volume within elastic limit. This property is essential for spring material.

11. Creep: When a part is subjected to a constant stress at high temperature for long period of time, it will undergo a slow and permanent deformation called creep. This property is considered in designing internal combustion engines, boilers and turbines.

12. Hardness: It is a very important property of the metals and has a wide verity of meanings. It embraces many different properties such as resistance to wear scratching, deformation and mach inability etc. It also means the ability of the metal to cut another metal. The hardness is usually expressed in numbers, which are dependent on the method of making the test. The hardness of a metal may be determined by the following test.

a) Brinell hardness test

b) Rockwell hardness test

c) Vickers hardness (also called diamond pyramid) test and

d) Share scleroscope.

The science of the metal is a specialized and although it overflows in to realms of knowledge it tends to shut away from the general reader. The knowledge of materials and their properties is of great significance for a design engineer. The machine elements should be made of such a material which has properties suitable for the conditions of operations. In addition to this a design engineer must be familiar with the manufacturing processes and the heat treatments have on the properties of the materials. In designing the various part of the machine, it is necessary to know how the material will function in service. For these certain characteristics or mechanical properties mostly used in mechanical engineering practice are commonly determined from standard tensile tests. In engineering practice, the machine parts are subjected to various forces, which may be due to either one or more of the following.

· Energy transmitted

· Weight of machine

· Frictional resistance

· Inertia of reciprocating parts

· Change of temperature

· Lack of balance of moving parts

The selection of the materials depends upon the various types of stresses that are set up during operation. The material selected should with stand it. Another criterion for selection of metal depends upon the type of load because a machine part resist load more easily than a live load and live load more easily than a shock load.

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Selection of the material depends upon factor of safety, which in turn depends upon the following factors.

· Reliabilities of properties
· Reliability of applied load
· The certainty as to exact mode of failure
· The extent of simplifying assumptions
· The extent of localized
· The extent of initial stresses set up during manufacturing
· The extent loss of life if failure occurs
· The extent of loss of property if failure occurs

Material used

· Mild steel

Reasons:

1. Mild steel is readily available in market.
2. It is economical to use.
3. It is available in standard sizes.
4. It has good mechanical properties i.e. it is easily machinable.
5. It has moderate factor of safety, because factor of safety results in unnecessary wastage of material and heavy selection. Low factor of safety results in unnecessary risk of failure.
6. It has high tensile strength.
7. Low co-efficient of thermal expansion.

Properties of Mild Steel:

M.S. has a carbon content from 0.15% to 0.30%. They are easily wieldable thus can be hardened only. They are similar to wrought iron in properties. Both ultimate tensile and compressive strength of these steel increases with increasing carbon content. They can be easily gas welded or electric or arc welded. With increase in the carbon percentage weld ability decreases. Mild steel serve the purpose and was hence was selected because of the above purpose

Basic Frame:

The Ms angles of material of mild steel are selected for the frame. The Ms angles are cut into required size by cutting machine. The end of the Ms angles cut into 90 degrees(angle) to form rectangular frame. After cutting, the end of the Ms angles is grinded so that it became smooth and convenient for welding. The Ms angles are welded together to form a rectangular basic frame.

MS SHEET METAL:

These MS sheets and mild steel sheets confirm to various standards like ANSI, API, MSS, BS, DIN, JIS & IS standards. We can provide these ms sheets and mild steel sheets in different grades, thickness, length and weight as per the requirements. Sheet metal is metal formed by an industrial process into thin, flat pieces. Sheet metal is one of the fundamental forms used in metalworking, and it can be cut and bent into a variety of shapes. Countless everyday objects are fabricated from sheet metal. Thicknesses can vary significantly; extremely thin sheets are considered foil or leaf, and pieces thicker than 6 mm (0.25 in) are considered plate steel or "structural steel".

Sheet metal is available in flat pieces or coiled strips. The coils are formed by running a continuous sheet of metal through a roll slitter.

In most of the world, sheet metal thickness is consistently specified in millimetres. In the US, the thickness of sheet metal is commonly specified by a traditional, non-linear measure known as its gauge.

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Figure 3 Milds steel angle

Guage	Thickness mm	Weight kg/sq.m
8	4	31.4
9	3.55	27.9
10	3.15	24.75
11	2.8	22
12	2.5	19
13	2.25	17.6
14	2	15.7
15	1.8	14.15
16	1.6	12.55
17	1.4	11
18	1.25	9.8
19	1.12	8.8
20	1	7.85
21	0.9	7.05
22	0.8	6.3
24	0.63	4.95
26	0.5	3.9
28	0.4	3.15

WINCH

A **winch mechanism** in a **manual forklift** is a simple mechanical system used to raise and lower loads by converting manual effort (usually through a handle or lever) into lifting force. Here's a breakdown of how it works and its components:

A **winch** is a mechanical device that winds a rope, cable, or chain onto a drum to move or lift heavy objects. In a **manual forklift**, it is typically used to **lift the forks or load platform** vertically.

Main Components

Crank Handle or Lever:

The operator turns this manually.

It provides mechanical advantage for lifting heavy loads.

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Gear System:
Increases torque from the handle to the lifting cable or chain.
Often includes a **reduction gear** to make lifting easier but slower.
Drum or Spool:
Cable or chain winds onto this as the handle turns.
Controls the up/down movement of the forks.
Cable or Chain:
Connects the drum to the fork carriage.
Translates drum rotation into fork movement.
Brake or Locking Mechanism:
Prevents the forks from dropping under load.
Usually automatic and engages when the operator stops turning the handle.
Mast and Fork Carriage:
The vertical frame (mast) guides the forks.
The carriage is lifted by the cable/chain and holds the forks.

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The various machining operations conducted after material selection are as follows:

PROCESS SHEET:

Following operations were while fabricate the project

Cutting: -

Cutting is the separation or opening of a physical object, into two or more portions, through the application of an acutely directed force.

Implements commonly used for cutting are the knife and saw, or in medicine and science the scalpel and microtome. However, any sufficiently sharp object is capable of cutting if it has a hardness sufficiently larger than the object being cut, and if it is applied with sufficient force. Even liquids can be used to cut things when applied with sufficient force (see water jet cutter).

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 work piece 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 work piece in a short, controlled motion. The work piece is typically held against a fence, which provides a precise cutting angle between the plane of the blade and the plane of the longest work piece 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°).

Welding: -

Welding is a ((fabrication or sculptural ((process that joins materials, usually metals or thermoplastics, by using high heat to melt the parts together and allowing them to cool causing fusion. Welding is distinct from lower temperature metal-joining techniques such as brazing and soldering, which do not melt the base metal.

In addition to melting the base metal, a filler material is typically added to the joint to form a pool of molten material (the weld pool) that cools to form a joint that, based on weld configuration (butt, full penetration, fillet, etc.), can be stronger than the base material (parent metal). Pressure may also be used in conjunction with heat, or by itself, to

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produce a weld. Welding also requires a form of shield to protect the filler metals or melted metals from being contaminated or oxidized.

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.

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 of 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.

Drilling: -

Drilling is a cutting process that uses a drill bit to cut a hole of circular ((cross-section in solid materials. The drill bit is usually a rotary ((cutting tool, often multi-point. The bit is pressed against the work-piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work-piece, cutting off chips (swarf) from the hole as it is drilled.

In ((rock drilling, the hole is usually not made through a circular cutting motion, though the bit is usually rotated. Instead, the hole is usually made by hammering a drill bit into the hole with quickly repeated short movements. The hammering action can be performed from outside the hole ((top-hammer drill) or within the hole (down-the-hole drill, DTH). Drills used for horizontal drilling are called drifter drills.

In rare cases, specially-shaped bits are used to cut holes of non-circular cross-section; a ((square cross-section is possible.

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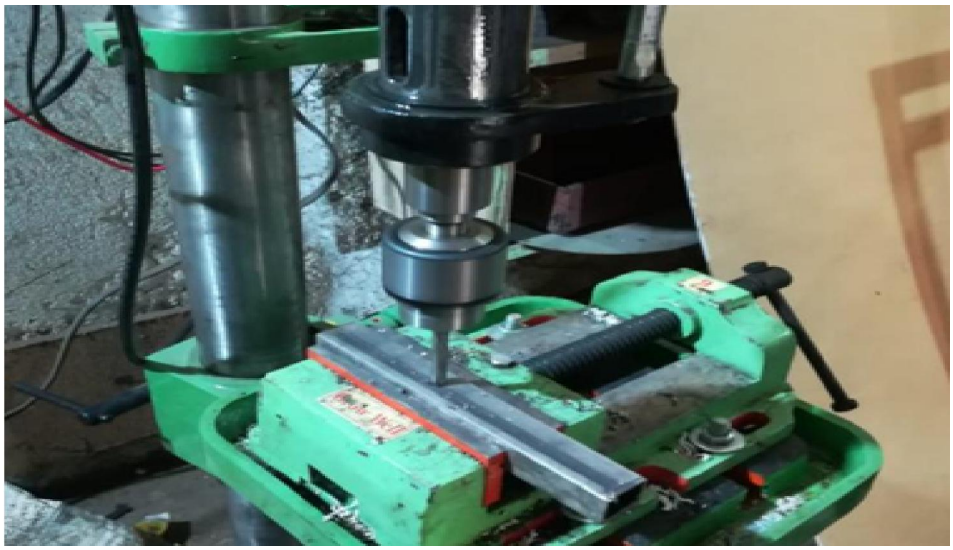

Drilled holes are characterized by their sharp edge on the entrance side and the presence of ((burrs on the exit side (unless they have been removed). Also, the inside of the hole usually has helical feed marks.

Drilling may affect the mechanical properties of the work piece by creating low residual stresses around the hole opening and a very thin layer of highly ((stressed and disturbed material on the newly formed surface. This causes the work piece to become more susceptible to corrosion and crack propagation at the stressed surface. A finish operation may be done to avoid these detrimental conditions. For ((fluted drill bits, any chips are removed via the flutes. Chips may form long spirals or small flakes, depending on the material, and process parameters. The type of chips formed can be an indicator of the machinability of the material, with long chips suggesting good material machinability.

Finishing: -

Finishing is a broad range of industrial processes that alter the surface of a manufactured item to achieve a certain property. Finishing processes may be employed to: improve appearance, adhesion or wettability, solder ability, corrosion resistance, tarnish resistance, chemical resistance, wear resistance, hardness, modify electrical conductivity, remove burrs and other surface flaws, and control the surface friction. In limited cases some of these techniques can be used to restore original dimensions to salvage or repair an item.

An unfinished surface is often called mill 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.

Decision Making Process

No methodology is available for material and method selection except decision making in multi attribute environment. Material selection is vital and crucial activity in any industry nowadays. This substantially reduces the risk of wrong material or method selection.

State the Problem

Identify the Alternatives

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Evaluate the Alternatives
Make a Decision

Cost estimation

Cost estimation may be defined as the process of forecasting the expenses that must be incurred to manufacture a product. These expenses take into a consideration all expenditure involved in a design and manufacturing with all related services facilities such as pattern making, tool, making as well as a portion of the general administrative and selling costs.

PURPOSE OF COST ESTIMATING:

1. To determine the selling price of a product for a quotation or contract so as to ensure a reasonable profit to the company.
2. Check the quotation supplied by vendors.
3. Determine the most economical process or material to manufacture the product.
4. To determine standards of production performance that may be used to control the cost.

BASICALLY, THE BUDGET ESTIMATION IS OF TWO TYRES:

1. material cost
2. Machining cost

MATERIAL COST ESTIMATION:

Material cost estimation gives the total amount required to collect the raw material which has to be processed or fabricated to desired size and functioning of the components.

These materials are divided into two categories.

1. Material for fabrication: In this the material in obtained in raw condition and is manufactured or processed to finished size for proper functioning of the component.
2. Standard purchased parts: This includes the parts which was readily available in the market like Allen screws etc. A list is forecast by the estimation stating the quality, size and standard parts, the weight of raw material and cost per kg. For the fabricated parts.

V. RAW MATERIAL & STANDARD MATERIAL

SR NO	COMPONENTS	PRICE
1.	WINCH	2500
2.	WHEEL	1000
3.	WIREROPE	500
4.	MS BRIGHT BAR	500
5.	PULLEY AND WHEELS	500
6.	FRONT FRAME	1500
7.	SCREW, NUT BOLT, ETC.	500
8.	FABRICATION WORK	2000
9.	MISCELLENEOUS	2000

TOTAL COST =11000

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