Design And Analysis of Floating Bag With Carry Heavy Weight

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Abstract- *A temporary means of water transportation, floating bridges play an important role in the military and other fields. However, traditional floating bridges have limitations such as large size, heavy weight and slow construction time. In this paper, we propose a rigid and flexible composite folding floating bridge. The main structure of the floating bridge consists of three layers: bridge deck, airbag and water bag. The units of the floating bridge are connected by flexible connectors that allow pre-connection and folding of the bridge, reducing storage and transport space and improving the efficiency of the structure. The proposed floating bridge also has a complete engineering application design and has been reviewed for safety and reliability (including strength, buoyancy and bearing capacity of joints). We used aqwa software to simulate and analyze the mooring scheme of the floating bridge and its response to wave loading, and performed a load test on the floating bridge model to verify its feasibility as a main support body. The results show that the floating bridge we designed has the advantages of being lightweight, less consumables, small storage and transportation space, and can be built quickly*

I. INTRODUCTION

1.1BACKGROUND:

In Indian armed force, stack carriage is an unavoidable portion of field operations which is the reason why warriors regularly make utilize of a military rucksack. Infantry warriors more often than not carry loads weighting more than 30% of their body weight. When the warrior carries a certain weight, his vitality use increments, which causes a lessening in execution.

The transported stack encompasses a development comparative to the vertical relocation of the center of mass of the officer while walking. This leads to a critical increment within the increasing speed strengths created by the activity of said stack on the body which clarifies the increment in vitality expenditure.

1.2 SCOPE:

The scope of work might incorporate the taking after:

1. Writing REVIEW/SURVEY
2. Plan AND Advancement OF FSMO
   DESIGN OF Outline
   DESIGN OF MECHANISM
3. Choice OF Fabric AND CONFIGURATION
4. PROCUREMENT
5. FABRICATION
6. ANALYSIS
7. FIELD TRIALS
8. EROGONOMIC STUDY

1.3 OBJECTIVES :

The objective of this venture is to create a stack carriage framework that suspends the stack and decreases its vertical displacement. There will be the decrease in both the vertical outing of the stack and within the add up to vertical ground response drive when carrying a stack with the created model, with regard to the routine military rucksack and will offer assistance military strengths to transport supplies, hardware, individual things, ammo and clothing in preparing or field operations. This rucksack is based on suspended stack innovation which decreases the vertical development and strengths created by the stack on the carrier driving to lively benefits.

It drastically diminishes the affect powers amid motio n, indeed allowing running comfortably with overwhelming loads.

1. Muscle weariness due to delayed utilize of routine backpacks
2. Reduces the perseverance capabilities
3. More chances of wounds such as stretch breaks, knee torments and backpain
4. Rucksack paralysis (Rucksack paralysis could be a footing or compression damage to the brachial plexus, caused by the bear straps of the rucksack. The quiet presents with paresthesia, loss of motion, cramping with torment, and muscle shortcoming of the upper appendage).

II. LITERATURE SURVEY

The comprehensive design methodology is based on a systems engineering approach to design and analysis. While due importance has been given to the design procedure, various methods and procedures have been analyzed to design a reliable model for reducing the force exerted by the bag on the human body. Reference was made to a number of research papers and analytical papers that formed the basis of our model. Some of these papers are as follows:

Laurence c rome, andy l ruina, et al. [1] shows that an ergonomic suspended load backpack has been developed that dramatically reduces the dynamic forces on the body (e.g., 82-86%) and subsequently reduces the metabolic rate for carrying the load (e.g., by 40 w per 60 lb load), providing the ability to carry a significantly greater load for the same metabolic cost (5.3 kg more). The ergonomic backpack with a suspended load according to the invention can be used for faster and more comfortable transport of loads at running speeds - unlike a conventional backpack, running with a heavy load is basically impossible.

Camilla perez, evan campo et al. [2] shows that in military life, carrying cargo is an inevitable part of field operations, and therefore soldiers often use a military backpack. Infantry soldiers typically carry loads weighing more than 30% of their body weight. When a soldier carries a certain amount of weight, his energy expenditure increases, causing a reduction in performance. The transported cargo has a movement similar to the vertical shift of the soldier's center of gravity when walking. This leads to a significant increase in the acceleration forces generated by the action of said load on the body, which explains the increase in energy output. The goal of this project was to develop a support system that suspends the load and reduces its vertical displacement. The results show a reduction in both the vertical deflection of the load and the total vertical ground reaction force when carrying the load for the developed prototype, compared to a conventional military backpack.

Joseph j knapik, katy l reynolds, everett harman et al [3] reviewed the historical and biomedical aspects of troop cargo transportation. Before the 18th century, foot soldiers rarely carried more than 15 kg on the march, but since then the load has gradually increased. This increase in load is likely due to the weight of weapons and equipment that incorporate new technologies to increase protection, firepower, communications and mobility. Research shows that placing the center of gravity of the load as close as possible to the center of gravity of the body results in the lowest energy cost and tends to keep the body in an upright position similar to walking without weight. The load transferred to other parts of the body results in higher energy expenditure: each kilogram added to the foot increases energy expenditure by 7% to 10%; every kilogram added to the thigh increases energy expenditure by 4%. Backpack waist belts should be used whenever possible as they reduce shoulder pressure and increase comfort. A low or medium load location may be preferable on uneven terrain, but a high load location may be best for flat terrain.

Problem statement :

Today the environmental impact of agricultural production is highly concentrated and demand in the industry is increasing. In the current context many countries do not have sufficient capacity in the agricultural sector and that affects the growth of developing countries. Farmers should therefore use advanced technologies in farming (digging, sowing, fertilizing, spraying, etc.). So it's time to dump her and move on. In India there are 70% of the population who depend on agriculture. So we need to learn to develop agricultural assets. A new idea of our project is to automate the drilling process, here The motor can be changed both in the clock and in the opposite direction. This allows the auger to drill a hole in the ground and return it to its original position, in order to overcome the cost problem for the farmers to make it easier to work there.

III. METHODOLOGY OF DESIGN

Design morphology refers to the study of the chronological structure of design projects. The following stages are usually part of any design project. In order to give the project a concrete form and structure, and before starting the actual design, we have done preliminary studies on the material properties, material selection and construction aspects of the raw material we will use to build the project, the construction of the project includes the construction of the frame, pulleys, shafts, springs , screws and elastic rope.

First we started with the selection of raw materials to make the frame for our mechanism, because it is the most important part of the project, on which all the other components are to be mounted. Then we got to the pulleys, which are mounted on a fixed frame. Then we attached the moving frame to the stationary frame with an elastic rope that allows the backpack to move up and down.

In this section we will see a detailed study of the material used to construct the frame and mechanism based on their properties.

3.1 frame :

The initial research of the frame on our part dealt with the materials from which it will be made. First we decided that the frames would be made of mild steel. But mild steel would not be feasible due to its weight limitations. So we had to change the material of the frames. After some study and help from our guide, we came to the conclusion that aluminum would be used to make the frames.

Why aluminum is feasible

1. Aluminum has a lower density than any other commercial metal
2. It has excellent corrosion resistance
3. It can be cast, machined and shaped quickly.

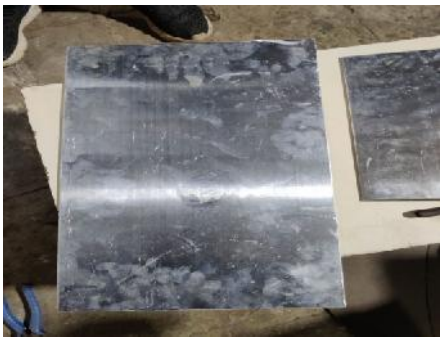

Figure 3.1 Aluminium plates for frame

Pop rivet:

A rivet is a permanent mechanical fastening. Before assembly, the rivet consists of a smooth cylindrical shaft with a head at one end. The end opposite the head is called the tail. During installation, the rivet is placed in a punched or drilled hole and the tail is disturbed or bulged (ie deformed) so that it expands to approximately 1.5 times the original diameter of the shaft and holds the rivet in place. In other words, pounding creates a new "head" at the other end by breaking the "tail" material flatter, resulting in a rivet that is roughly shaped like a barbell. To distinguish between the two ends of the rivet, the original head is called the factory head and the deformed end is called the shop head or buck-tail.

Figure 3.2 Pop rivet

Nylon pulley:

A pulley is a grooved wheel that holds a rope, rope or wire on a pulley system. The pulley is located on an axle or bearing inside the pulley and the operator can set the amount of force and direction needed for lifting. The movement of the pulley helps reduce friction and wear on the rope or cable. Pulleys can be found in forklifts, cranes, cable braiding machines and wire drawing machines.

Nylon is a popular pulley material for its durability and versatility. Nylon pulleys actually offer a number of advantages over their metal counterparts. Learn more about the benefits and applications of pulleys.

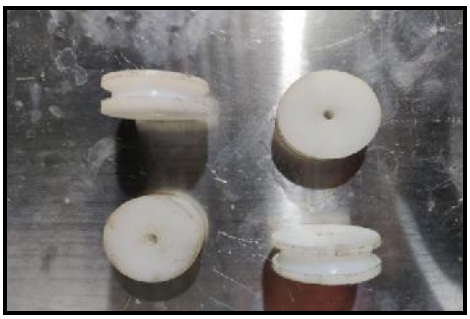

Figure 3.3 Nylon Pulley

IV. DESIGN AND FABRICATION

4.1 Morphology

Engineering design means formulating a plan or applying scientific and mathematical principles to practical purposes such as the design, manufacture and operation of efficient and economical structures, machines, processes and systems.

For our project, we designed a frame, shaft, spring, pulley and screw.

Design considerations for the above parts are as per the design data manual:

pulley

A. The pulley diameter is selected to have the desired speed ratio.
B. Alignment should be perfect.
C. It should have good friction and wear.

rod

A. Power should be fully transmitted.
B. There should be no diversion.
C. It should withstand torsional stress.

elastic rope

A. It should transmit maximum power
B. It should not wear out easily
C. Voltage should not be lost over time

springs

A. The tension should be maintained
B. Spring alignment with pulleys
C. The springs should have sufficient strength.

screw

A. It should provide a connection between the mechanism and the bag
B. They should withstand stress

V. COST ESTIMATION

Cost estimation can be defined as the process of predicting the costs that must be incurred to produce a product. These expenses take into account all design and manufacturing expenses with all associated services such as model making, tooling, manufacturing, as well as some general administrative and selling expenses.

Purpose of cost estimation:

1. Determine the selling price of the product based on the offer or contract in such a way as to ensure a reasonable profit for the company.
2. Check the offer from suppliers.
3. Determine the most economical process or material to manufacture the product.
4. Establish production performance standards that can be used to control costs.

Based on the budget estimate for two tires:

1. Material costs
2. Machining costs

Material cost estimate:

The material cost estimate indicates the total amount needed to collect the raw material that must be processed or manufactured to the desired size and function of the components.

These materials are divided into two categories.

1. Material for production:

In this case, the material is obtained in the raw state and is manufactured or machined to the final size for the proper function of the part.

2. Standard purchased parts:

This includes parts which were readily available in the market like allen screws etc. The list is predicted by estimation with the quality, size and standard parts, weight of raw material and cost per kg. For manufactured parts.

Machining cost estimate:

This cost estimate is an attempt to predict total costs, which may include manufacturing in addition to material costs. Estimated cost of manufactured parts can be considered as an assessment and after careful consideration that includes the labor, material and factory services required to produce the desired part.

Procedure for calculating material costs:

The general procedure for calculating the material cost estimate is

1. After designing the project, a bill of materials is drawn up, which is divided into two categories.
   A. Manufactured components
   B. Standard purchased components
2. The rates of all standard items are taken and added together.
3. The costs of the purchased raw material taken over and added up.

VI. CONCLUSION

1. Our product is going to satisfy the physiological and musculoskeletal problems faced by the soldier on duty.
2. Due to the design of the double frame and pulley system, this backpack reduces the dynamic forces on the body.
3. It helps in long marches with less strain on the body and also reduces the chances of overuse injuries to the back, neck or knees.
4. In the future this can be further extended to small scale power generation and casualty evacuation.

Result:

Field trials are an integral part of the project. Not only does it provide an idea of the functional status of the project, but we also learn about the issues in the model and the mistakes that have been made to fix them.

We have performed the tests of our project, which are described below.

6.1 test i

We conducted the first test of the project on the premises of the university. All members of the syndicate were present and the trial was held in the presence of our guide.

1. Walking without weight.
2. Walking with a traditional weight system used by soldiers (carried mass weighs 20 kg).
3. Walking with a prototype of the carrying system (carrying weight weighs 20 kg).

6.2 examination ii

The second attempt took place in the presence of all members and under the supervision of our guide.

1. Fast running of 3 individuals and their experience with different weights
2. Backpack jumping
3. Field movements

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