CHAPTER 31
Design and Fabrication of Waterhyacinth Removal Machine

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ABSTRACT

Water hyacinth has direct effects upon water chemistry. It can absorb large amounts of nitrogen and phosphorus, other nutrients and elements. 8. It is this ability to pick up heavy metals which has led to the suggestion that water hyacinth could be used to help clean industrial effluent in water. By absorbing and using nutrients, water hyacinth deprives phytoplankton of them. This leads to reduced phytoplankton, zooplankton and fish stocks.Conversely, as the large amounts of organic material produced from senescent water hyacinth decompose, this leads to oxygen deficiency and anaerobic conditions under the floating water hyacinth mats.

The anaerobic conditions have been the direct cause of fish death, and changes in the fish community by eliminating most species at the expense of air breathing species. Stationary mats of water hyacinth also shade out bottom growing vegetation, thereby depriving some species of fish, of food and spawning grounds.The potential impact on fish diversity is enormous The conditions created by water hyacinth encourage the vectors of several human diseases, including the intermediate snail hosts of bilharzia (schistosomiasis) and most mosquito vectors, including those responsible for the transmission of malaria, encephalitis and filariasis

Keywords: *Water hyacinth, Stationary mats, malaria, encephalitis and filariasis etc.*

INTRODUCTION

One of the most invasive species in the world, the water hyacinth overruns waterways and ecosystems, causing a number of ecological, physical, and economic problems.Many problems are being caused by these water hyacinth plants present in the water body. Water hyacinth mats clog waterways, making boating, fishing and almost all other water activities impossible. Water hyacinth mats degrade water

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quality by blocking photosynthesis, which greatly reduces oxygen levels in the water. This creates a cascading effect by reducing other underwater life such as fish and other plants. A mechanical method of regulating water hyacinth overgrowth offered a solution to the chemical control lawsuit.We are presenting a technical solution for this problem by making a water hyacinth removal machine

WATER HYACINTH

Water Hyacinth is one of the fastest growing plants known. Its primary means of reproduction is by way of runners or stolons, which eventually form daughter plants. It also produces large quantities of seeds that are viable for up to 30 years. Because of water hyacinth's ability to quickly reproduce, populations often double in size in just two weeks. In the North America, water hyacinth is considered an invasive species. When not controlled, it will rapidly and thoroughly cover entire surfaces of lakes and ponds – dramatically impacting water flow, blocking sunlight to native submerged plants, and starving the water of oxygen; often killing wildlife such as fish.

Water hyacinth is an aggressive invader and can form thick mats. It is very important to control water hyacinth before the entire water surface is covered. In Florida, water hyacinth once clogged up and choked a major waterway.

Fig 1.1 WATER HYACINTH

Water hyacinth control is difficult. The most effective methods of control rely on prevention. Make sure to control the nutrient levels in your pond or lake to prevent the rapid and explosive growth. Do not introduce water hyacinth to new ponds unless you are willing to monitor it and take action if its growth gets out of control.

It is advised that you only introduce water hyacinth to your own personal ornamental water gardens. Introducing it into natural water bodies is asking for trouble. When harvesting or otherwise removing water hyacinth, do not discard it in a natural water way, instead put it into a compost pile.

LIFE CYCLE OF WATER HYACINTH

Water hyacinth, growing in ideal conditions, has an incredible mechanism to outgrow any native species occurring in the system. It can reproduce in two ways: vegetative and sexually. The main

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method of reproduction is vegetative.The “mother” plant produces new plants from stolon’s (see Figure 2.1). Winds, currents and wave actions help to

spread the plant to other areasFrom 10 adult plants, about 655 360 daughter plants can be produced in a single growing season. Thus it has the capacity to increase sevenfold in 50 days, doubling its size in as little as a week. The edge of the surface mat extends by 60cm per month.

Two plants can multiply to 1 200 plants in 120 days. The surface area increases by an average of 8% per day and the surface mat can double every 6.2 days. •Sexual reproduction is known to be limited. The ovary of one plant may produce up to 500 ovules, with an average of 44.2 and a maximum of 50 seeds per capsule/ovule. Research indicates that an average seed germination rate of as high as 87.5% is possible.

More than 90 000 capsules have been observed in an area of one hectare. .This equates to 45 million seeds per hectare. Seeds are produced several times a year following flowering. Pollination by insects rarely occurs, but when the plant starts to wilt, self-pollination is common.Water hyacinth seeds may remain dormant for up to 20 years until the correct climatic conditions arise for it to germinate. Seeds germinate in warm, shallow water or on moist sediments. Flowering may occur 10 - 15 weeks thereafter.

Plants may flower throughout the year if the climate and environmental conditions are favourable. The presence of nitrogen and phosphorus wastage in water bodies encourages an even faster growth of the plant.

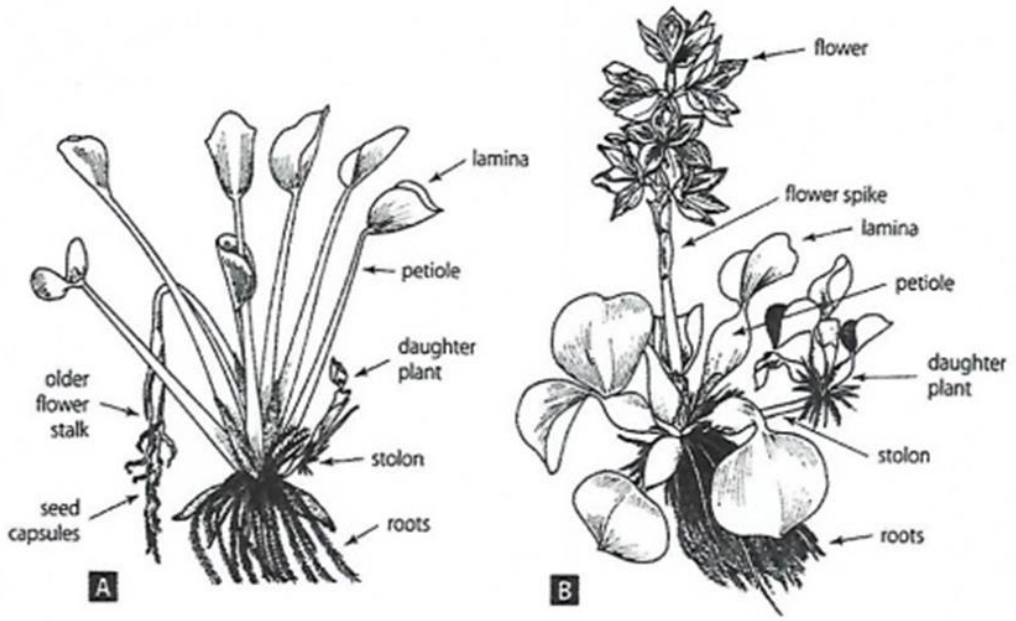

Fig 1.2 LIFE CYCLE OF WATER HYACINTH

LITERATURE REVIEW

Nower days the water hyacinth has become at overruns waterways and ecosystems, causing a number of ecological, physical, and economic problems our aim is to remove these plants from water body many methods are available for removing these plants in this project we are adopting the mechanical method

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since the chemical method has caused many problems the above given technology is used nower days to remove the water hyacinth it has a lot of drawbacks or limitation

EXISTING TECHNOLOGY

In the present situation the water hyacinth is removed by a machine which can be moved through the water. The system consist of a cup which moves the water hyacinth to the land area from where it is pulled out of water by the cup of the earth mover or it is carried out by the cup of the machine itself. The main problem of the machine is that it does not have a storage area. So each time the machine removes the hyacinth it should either move to the land area to remove it

Fig 2.1 EXISTING TECHNOLOGY

LIMITATION OF EXISTING TECHNOLOGY

1. Time consuming process
2. Two machines are required
3. Wastage of fuel

So in order to remove the problem of water hyacinth and to overcome these limitations of existing technology. We come up with the new model of water hyacinth removal machine. In order to develop over project we had to go Sthrough various books. We have faced many problems and at last we come up with the solution of water hyacinth removal machine we have to go through many problems, we try to rectify this defects

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PROBLEM OF WATER HYACINTH

Water hyacinth can change water quality by altering water clarity and decreasing phytoplankton production, dissolved oxygen, nitrogen, phosphorous, heavy metals, contaminant concentrations. Water hyacinth has mixed effects on zooplankton abundance and diversity. Zooplankton abundance tends to decrease in response to decreased phytoplankton availability, but populations may increase in response to increased refuge from predators.

Macro invertebrate abundance and diversity generally increase in response to increased habitat heterogeneity and structural complexity provided by water hyacinth Effects of water hyacinth on fish are largely dependent on original community composition and food-web structure

A more diverse and abundant epiphytic invertebrate community may increase fish abundance and diversity, but the loss of phytoplankton may decrease the abundance of certain planktivorous fish species which can subsequently affect higher trophic levels.

Little is known about the effects of water hyacinth on water bird communities; however, increases in macro invertebrate and fish abundance and diversity suggest a potentially positive interaction with water birds when water hyacinth is at moderate densityThe socio-economic effects of water hyacinth are dependent on the extent of the invasion, the uses of the impacted water body, control methods, and the response to control efforts.

Water hyacinth has direct effects upon water chemistry. It can absorb large amounts of nitrogen and phosphorus, other nutrients and elements. 8. It is this ability to pick up heavy metals which has led to the suggestion that water hyacinth could be used to help clean industrial effluent in water. By absorbing and using nutrients, water hyacinth deprives phytoplankton of them. This leads to reduced phytoplankton, zooplankton and fish stocks.Conversely, as the large amounts of organic material produced from senescent water hyacinth decompose, this leads to oxygen deficiency and anaerobic conditions under the floating water hyacinth mats.

The anaerobic conditions have been the direct cause of fish death, and changes in the fish community by eliminating most species at the expense of air breathing species. Stationary mats of water hyacinth also shade out bottom growing vegetation, thereby depriving some species of fish, of food and spawning grounds.The potential impact on fish diversity is enormous The conditions created by water hyacinth encourage the vectors of several human diseases, including the intermediate snail hosts of bilharzia (schistosomiasis) and most mosquito vectors, including those responsible for the transmission of malaria, encephalitis and filariasis

CONTROL OF WATER HYACINTH

The water hyacinth is causing many problems to the society there are many methods to remove the water hyacinth from water.There are three main ways of reducing the spread of the water hyacinth. They are also the methods of controlling the water hyacinth. These are mechanical, chemical, and biological methods. Control of water hyacinth should be the concern of everyone in Zambia.

1. Mechanical removal can be done using machines or hand tools.
2. Chemical control is done using chemical substances (known as herbicides) that destroy plants.
3. Biological control uses insects and fungi which feed on the water hyacinth.

Besides these three mainstream forms of control, reduction of nutrient inputs to the water is said to be a factor that can reduce proliferation of water hyacinth.

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A reduction in nutrients in the water body will result in a reduction in the proliferation of water hyacinth. The most effective methods of control rely on prevention. Make sure to control the nutrient levels in your pond or lake to prevent the rapid and explosive growth.

Do not introduce water hyacinth to new ponds unless you are willing to monitor it and take action if its growth gets out of control. It is advised that you only introduce water hyacinth to your own personal ornamental water gardens.

WATER HYACINTH REMOVAL MACHINE

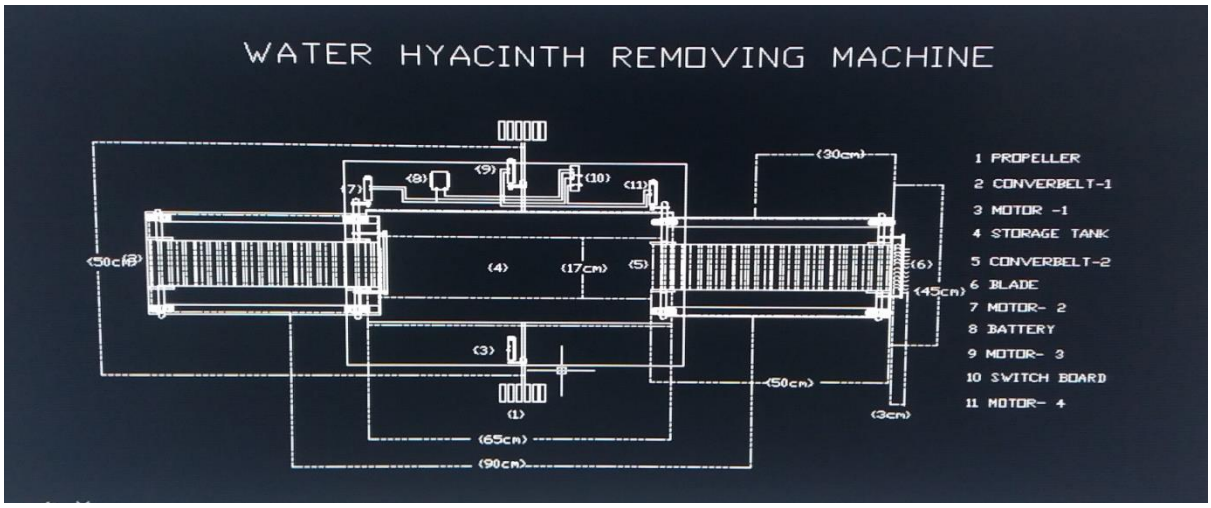

Fig 4.1 WATER HYACINTH REMOVAL MACHINE

The various components used in the water hyacinth removal machine are the following:

1. Propeller
2. Conveyor belt
3. Steel blades
4. Motor
5. Battery
6. Bearings
7. Pulleys
8. Storage tank
9. Remote

DDESIGN

The 3d design of the machine is as shown below the system consist of a cutter, two conveyors two propeller blades a storage tank and

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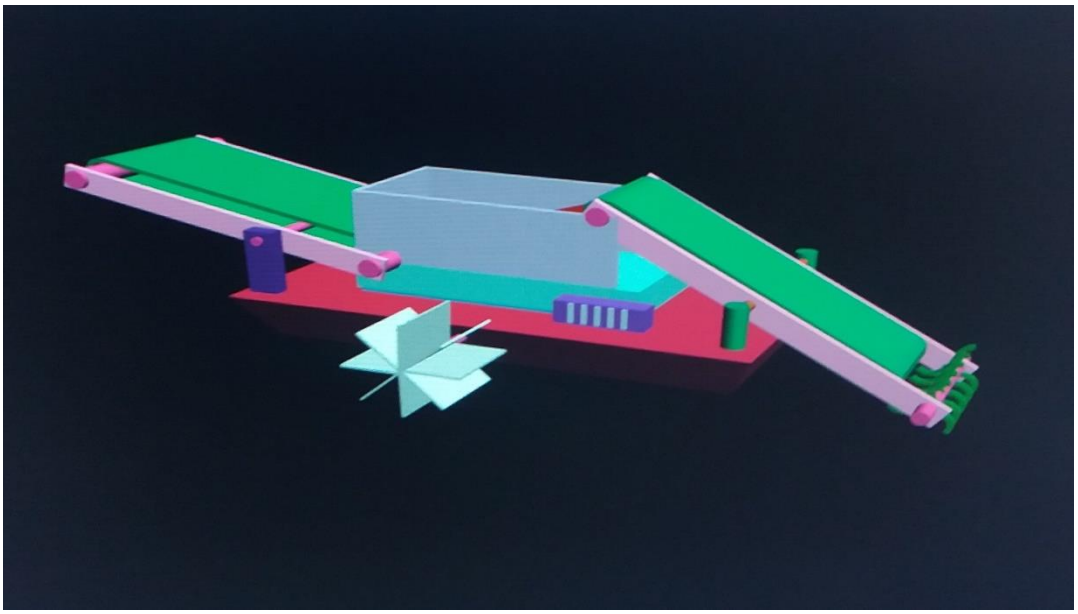

Fig 4.2 3D DESIGN

The system find wide application in day today life many of the problems caused by water hyacinth can be removed the system reduces the problem caused by other removal methods

The main components of the water hyacinth removal machine are as shown in the next page

WORKING PRINCIPLE

The 3D diagram of water hyacinth removal machine is as shown below. The whole machine is operated by using a remote. The machine consists of a cutter, two conveyor belt, two propeller, a battery, four motors, and a storage tank.

The remote consist of four switches, one is to start the machine second is to run the propeller in forward direction or backward direction. Second one is to change the direction of machine that is towards left or right. Third one is to operate the two conveyor belt

When the engine switch is made on by the remote, the machine starts. When the 1st switch is pressed in Forward direction the machine moves in forward direction, when the required position is reached that is when the machine reaches near the water hyacinth, the motor is made to stop so engine stops there now the conveyer belt is switched on from the remote, now the cutter rotates and cut the water hyacinth and put it on to the conveyor belt which carries it to the storage tank

when the direction is to be changed, the second switch in the remote helps to move the machine either left or right when the storage tank is full or when the water hyacinth is fully cut the 1st switch is pressed in the opposite direction and when the machine reaches the land areathe second conveyor belt operates and the hyacinth in the tank is disposed of.

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PRINCIPLE OF FLOATING

Object is floating because the upward force of buoyancy is equal to the downward force .In science **buoyancy**, or **upthrust**, is an upward force exerted by a fluid that opposes the weight of an immersed object.

In a column of fluid, pressure increases with depth as a result of the weight of the overlying fluid. Thus the pressure at the bottom of a column of fluid is greater than at the top of the column. Similarly, the pressure at the bottom of an object submerged in a fluid is greater than at the top of the object.

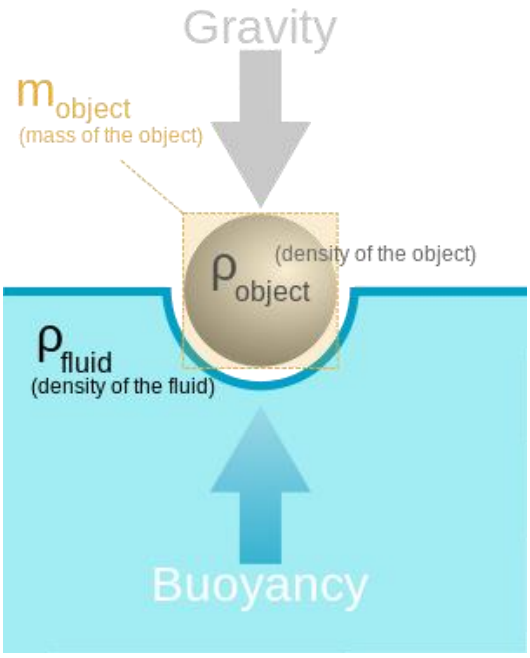

Fig 5.1 PRINCIPLE OF FLOATING

This pressure difference results in a net upwards force on the object. The magnitude of that force exerted is proportional to that pressure difference, and (as explained by Archimedes' principle) is equivalent to the weight of the fluid that would otherwise occupy the volume of the object, i.e. the displaced fluid.

For this reason, an object whose density is greater than that of the fluid in which it is submerged tends to sink.If the object is either less dense than the liquid or is shaped appropriately (as in a boat), the force can keep the object afloat.

This can occur only in a reference frame which either has a gravitational field or is accelerating due to a force other than gravity defining a "downward" direction (that is, anon-inertial reference frame).

In a situation of fluid statics, the net upward buoyancy force is equal to the magnitude of the weight of fluid displaced by the body.[3]The **center of buoyancy** of an object is the centroid of the displaced volume of fluid

ARCHIMEDES PRINCIPLE

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Archimedes' principle is named after Archimedes of Syracuse, who first discovered this law in 212 B.C.[4] For objects, floating and sunken, and in gases as well as liquids (i.e. a fluid), Archimedes' principle may be stated thus in terms of forces:.

Any object, wholly or partially immersed in a fluid, is buoyed up by a force equal to the weight of the fluid displaced by the object.— *Archimedes of Syracuse*with the clarifications that for a sunken object the volume of displaced fluid is the volume of the object, and for a floating object on a liquid, the weight of the displaced liquid is the weight of the object.

More tersely: **Buoyancy = weight of displaced fluid.**

Archimedes' principle does not consider the surface tension (capillarity) acting on the body,[5] but this additional force modifies only the amount of fluid displaced, so the principle that *Buoyancy = weight of displaced fluid* remains valid.The weight of the displaced fluid is directly proportional to the volume of the displaced fluid (if the surrounding fluid is of uniform density).

In simple terms, the principle states that the buoyancy force on an object is equal to the weight of the fluid displaced by the object, or the density of the fluid multiplied by the submerged volume times the gravitational acceleration, g. Thus, among completely submerged objects with equal masses, objects with greater volume have greater buoyancy. This is also known as upthrust.Suppose

a rock's weight is measured as 10 newtons when suspended by a string in a vacuum with gravity acting upon it. Suppose that when the rock is lowered into water, It displaces water of weight 3 newtons. The force it then exerts on the string from which it hangs would be 10 newtons minus the 3 newtons of buoyancy force: 10 − 3 = 7 newtons.

Buoyancy reduces the apparent weight of objects that have sunk completely to the sea floor. It is generally easier to lift an object up through the water than it is to pull it out of the water.

Assuming Archimedes' principle to be reformulated as follows,

Apparent immersed weight = weight – weight of displaced fluid then inserted into the quotient of weights, which has been expanded by the mutual volume

$$\frac{\text{Density}}{\text{Density of fluid}} \quad \frac{\text{Weight}}{\text{Weight of displaced fluid}}$$

(This formula is used for example in describing the measuring principle of a dasymeter and of hydrostatic weighing.)

Example: If you drop wood into water, buoyancy will keep it afloat.

Example: A helium balloon in a moving car. During a period of increasing speed, the air mass inside the car moves in the direction opposite to the car's acceleration (i.e., towards the rear).

The balloon is also pulled this way. However, because the balloon is buoyant relative to the air, it ends up being pushed "out of the way", and will actually drift in the same direction as the car's acceleration (i.e., forward). If the car slows down, the same balloon will begin to drift backward. For the same reason, as the car goes round a curve, the balloon will drift towards the inside of the curve.

Archimedes' principle shows buoyant force and displacement of fluid. However, the concept of Archimedes' principle can be applied when considering why objects float. Any floating object displaces its own weight of fluid.In other words, for an object floating on a liquid surface (like a boat) or floating

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submerged in a fluid (like a submarine in water or dirigible in air) the weight of the displaced liquid equals the weight of the object.

Thus, only in the special case of floating does the buoyant force acting on an object equal the objects weight. Consider a 1-ton block of solid iron.

As iron is nearly eight times as dense as water, it displaces only 1/8 ton of water when submerged, which is not enough to keep it afloat. Suppose the same iron block is reshaped into a bowl.

It still weighs 1 ton, but when it is put in water, it displaces a greater volume of water than when it was a block. The deeper the iron bowl is immersed, the more water it displaces, and the greater the buoyant force acting on it. When the buoyant force equals 1 ton, it will sink no farther.

When any boat displaces a weight of water equal to its own weight, it floats. This is often called the "principle of flotation": A floating object displaces a weight of fluid equal to its own weight

Every ship, submarine, and dirigible must be designed to displace a weight of fluid at least equal to its own weight. A 10,000-ton ship's hull must be built wide enough, long enough and deep enough to displace 10,000 tons of water and still have some hull above the water to prevent it from sinking.It needs extra hull to fight waves that would otherwise fill it and, by increasing its mass, cause it to submerge

. The same is true for vessels in air: a dirigible that weighs 100 tons needs to displace 100 tons of air. If it displaces more, it rises; if it displaces less, it falls. If the dirigible displaces exactly its weight, it hovers at a constant alti

It is important to realize that, while they are related to it, the principle of flotation and the concept that a submerged object displaces a volume of fluid equal to its own volume are*not* Archimedes' principle. Archimedes' principle, as stated above, equates the *buoyant force* to the weight of the fluid displaced.

One common point of confusion regarding Archimedes' principle is the meaning of displaced volume. Common demonstrations involve measuring the rise in water level when an object floats on the surface in order to calculate the displaced water.

This measurement approach fails with a buoyant submerged object because the rise in the water level is directly related to the volume of the object and not the mass (except if the effective density of the object equals exactly the fluid density).

Instead, in the case of submerged buoyant objects, the whole volume of fluid directly above the sample should be considered as the displaced volume..Another common point of confusion regarding Archimedes' principle is that it only applies to submerged objects that are buoyant, not sunk objects.

In the case of a sunk object the mass of displaced fluid is less than the mass of the object and the difference is associated with the object's potential energy.The name of this upward force exerted on objects submerged in fluids is called the **buoyant force**.So why do fluids exert an upward buoyant force on submerged objects?

It has to do with differences in pressure between the bottom of the submerged object and the top. Say someone dropped a can of beans in a pool of water. Because pressure (P_{gauge}=\rho gh)(*Pgauge* =*ρgh*)left parenthesis, P, start subscript, g, a, u, g, e, end subscript, equals, rho, g, h, right parenthesis increases as you go deeper in a fluid, the force from pressure exerted downward on the top of the can of beans will be less than the force from pressure exerted upward on the bottom of the can.

Essentially it's that simple. The reason there's a buoyant force is because of the rather unavoidable fact that the bottom (i.e. more submerged part) of an object is always deeper in a fluid than the top of the object. This means the upward force from water has to be greater than the downward force from water.

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Knowing conceptually why there should be a buoyant force is good, but we should also be able to figure out how to determine the exact size of the buoyant force as well.

FLOATING OF SHIP

Ships float in the water at a level where mass of the displaced water equals the mass of the vessel, such that the downwards force of gravity equals the upward force ofbuoyancy.As a vessel is lowered into the water its weight remains constant but the corresponding weight of water displaced by its hull increases.

If the vessel's mass is evenly distributed throughout, it floats evenly along its length and across its beam (width). A vessel's stability is considered in both this hydrostatic sense as well as a hydrodynamicsense, when subjected to movement, rolling and pitching, and the action of waves and wind

Stability problems can lead to excessive pitching and rolling, and eventually capsizing and sinkingAll boats can float, but floating is more complex and confusing than it sounds and it's best discussed through a scientific concept called **buoyancy**, which is the force that causes floating. Any object will either float or sink in water depending on its **density** (how much a certain volume of it weighs). If it's more dense than water, it will usually sink; if it's less dense, it will float.

It doesn't matter how big or small the object is: a gold ring will sink in water, while a piece of plastic as big as a football field will float.

The basic rule is that an object will sink if it weighs more than exactly the same volume of water. But that doesn't really explain why an aircraft carrier (made from dense metal) can float, so let's explore a bit further.

Positive, negative, and neutral buoyancy

Buoyancy is easiest to understand thinking about a submarine. It has diving planes (fins mounted on the side) and ballast tanks that it can fill with water or air to make it rise or fall as it needs to. If its tanks are completely filled with air, it's said to be positively buoyant:the tanks weigh less than an equal volume of water and make the sub float on the surface.

If the tanks are partly filled with air, it's possible to make the submarine float at some middle depth of the water without either rising up or sinking down. That's called neutral buoyancy.

The other option is to fill the tanks completely with water. In that case, the submarine is negatively buoyant, which means it sinks to the seabed. Find out more about how submarines rise and fall.

Buoyancy on the surface

Now most boats don't operate in quite the same way as submarines. They don't sink, but they don't exactly float either. A boat partly floats and partly sinks according to its own weight and how much weight it carries; the greater the total of these two weights, the lower it sits in the water.

There's only so much weight a boat can carry without sinking into the water so much that it. Does actually sink completely! For ships to sail safely, we need to know how much weight we can put in or on them without getting anywhere near this point.

If the weight of displaced water is at least equal to the weight of the ship, the ship will float. The displaced water around a coin weighs less than the coin, so the coin will sinkWhen any boat displaces a weight of water equal to its own weight, it floats. This is often called the "principle of flotation": A

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floating object displaces a weight of fluid equal to its own weight. Every ship, submarine, and dirigible must be designed to displace a weight of fluid at least equal to its own weight.

FLOATING CALCULATION

The floating of a boat is based on Archimedes principle Any object, wholly or partially immersed in a fluid, is buoyed up by a force equal to the weight of the fluid displaced by the object. This is the Archimedes principle

According to him the boat will sink only when the buoyant force becomes more than the force of gravity of the objects

The volume of water displaced, Vs

The density of water is D = 1000kg/m3

The buoyant force is calculated by the formula

Fb = Vs * D * g

V = Volume of water displaced

D = Density of water

g = acceleration due to gravity

The force of gravity is calculated by using the formula

F = weight/ 9.81

When the gravitational force is less than the force due to buoyancy. The boat floats.

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The volume of water displaced, V

s = 0.00315m3

The density of water is D = 1000kg/m3

The buoyant force is calculated by the formula

Fb = Vs * D * g

V = Volume of water displaced

D = Density of water

g = acceleration due to gravity

Fb = 0.00315*1000*9.81

= 309.015 N

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Thus the buoyancy force is 309.015N

The force of gravity is calculated by using the formula

F = weight/ 9.81

= 31.5/9.81

= 299 N

Since the gravitational force is less than the force due to buoyancy. The boat floats

COMPONENTS OF WATER HYACINTH REMOVALMACHINE

PROPELLER

The propeller is used to move the boat through the water. It is made of steel .The size of the propeller blades is 12.8cm X 6.5cm, it is welded on to the propeller shaft which is connected to the motor. So when the motor rotates the propeller also rotates which leads to the movement of the boat. When the motor rotates in anti-clockwise rotation, the boat moves in forward direction and when the motor runs in clockwise direction, the boat runs in back ward direction. When only one motor runs the boat moves changes the direction towards left or right. The

Rotation of the motor is controlled by remote.

Fig 6.1 PROPPELLER

CONVEYOR BELT

The conveyor belt is used to carry the water hyacinth to the storage tank and from the storage tank to the outer area that is to the outer surface of water that is to the land area

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The conveyor belt is made of elastic material. There are two conveyor belts one is used to move the water hyacinth which is cut by steel blades to the storage area, second conveyor belt is to move the water hyacinth from the storage tank to the land area the length of two conveyor belt is 70 and 60cm respectively. Its operation is made by using switches in the remote

Fig 6.2 CONVEYOR BELT

4. Steel blades

Steel blades are fitted at the front of the machine which rotates at high speed, so the hyacinth will not lock on the blades it will be cut at high speed, the blade is connected to the motor by pulley through conveyor belt. The belt rotates in anticlockwise rotation as a result the blades also rotates in anticlockwise direction, so when the cutter cuts the hyacinth it falls on to the conveyor belt and the conveyor belt carries it into the storage tank where it is stored and is disposed of when the tank gets full by moving the land area its operation is made by using switch in the remote.

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Fig 6.3 STEEL BLADES

5.MOTOR

The ignition motor is used to run the full apparatus or machine, 4 motors are used, the power for the motor is taken from 12v battery ,2 motors are used to run the propeller of the motor other 2 motor is used to run the conveyor, when only one motor rotates one of the propeller as a result the boat moves ether left or right the motor is of 1 hp power the motor is connected to pulley and its is connected to other apparatus through belts. .the motor is fixed inside the boat the motor is operated by using switch in the remote

Fig 6.4 MOTOR

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6.BATTERY

12V Battery is used to run the full apparatus the battery connected to the switch and from the switch it is giving power to all the motors. From the battery the power is given to various motors to function through a remote, the remote has 4 switches. One is tostart the machine, other is to change direction of rotation of motor and conveyor belt for all process power is given from the battery battery connected to the switches through wires

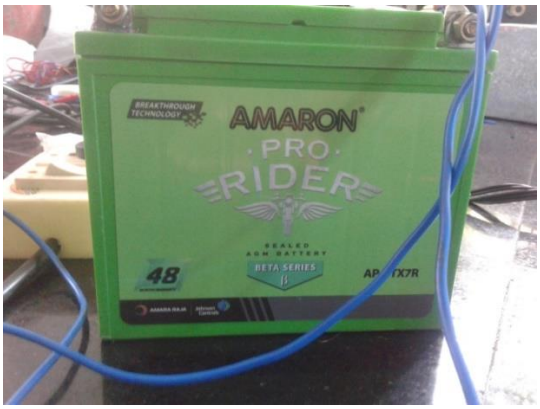

Fig 6.5 BATTERY

7.BEARINGS

The bearing is used for the transmission of movements the bearing used for the machine is 6401 the bearing is shownbelow the bearing is used to have a free rotation of blades conveyor belt and propeller. 16 bearing are used . 8 bearings are used for 1st conveyor belt which rotates in forward direction. Six bearing are used for 2ndconveyor , two bearings are used for propeller , if the bearings are welded it may causes problem to bearing and it may not work properly. So a iron pipe is bored into the required size so that the bearing can be tightly fitted and the pipe is grinded to get the required dimension

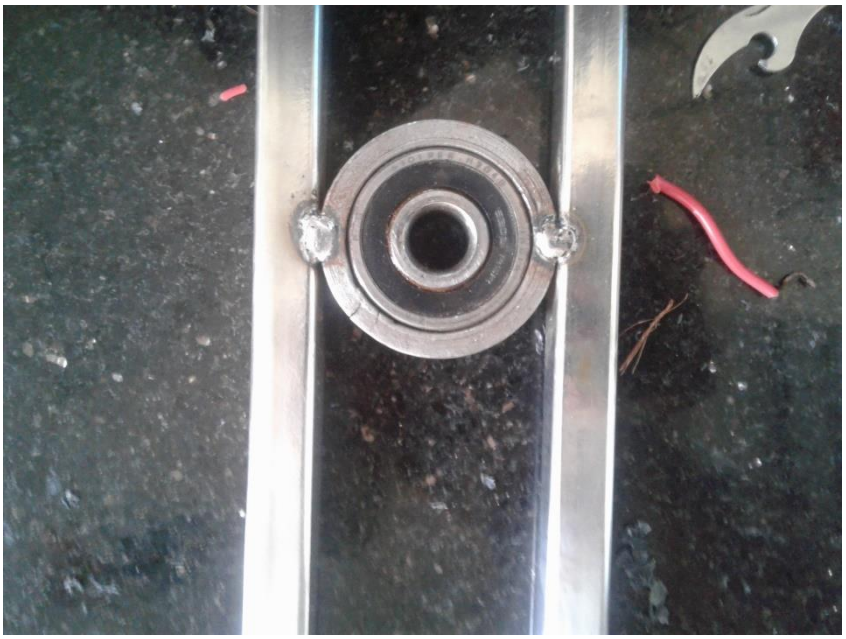

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Fig 6.6 BEARING

8. PULLEYS

The pulleys are used to transmit the motion from one shaft or motor to another shaft the pulley is shown below. The pulley is used to transmit the power from the motor to connecting rods.

FIG 6.7 PULLEY

10 pulleys are used .out of which 4 pulleys are used or fitted on the motor and others on the shaft and cutters and propeller blade

9.STORAGE TANK

The storage tank is used to store the water hyacinthStorage tank is made of bamboo plywood the storage tank is shown bellow.

The storage tank is used to store the water hyacinth which is cut by the cutter. The hyacinth which is cut by the cutter falls on the conveyor belt From the conveyor belt it falls on to the storage tank when the storage tank is full the bottom of the storage tank is opened and the hyacinth falls on to the conveyor belt , from the conveyor belt it is removed of.

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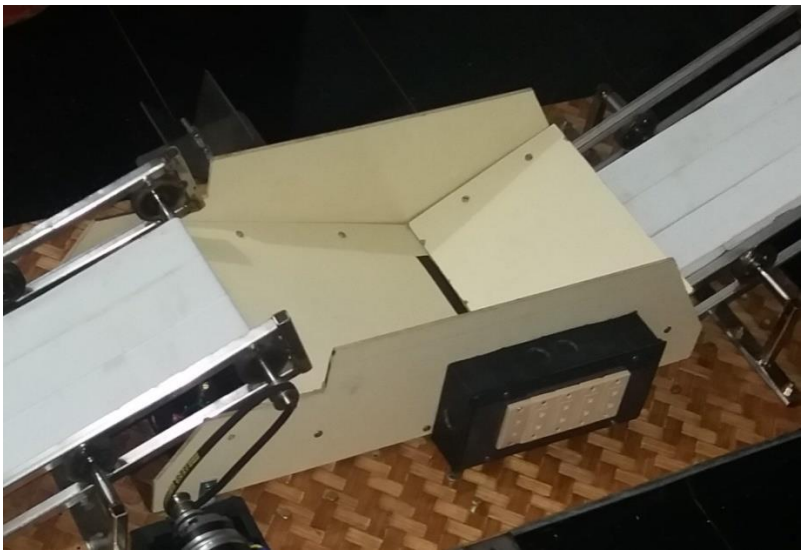

Fig 3.10 STORAGE TANK

10,REMOTE

The remote consist of switches to start and stop the machine, to run the propeller, to run the conveyor belt. the remote of the machine consist of 4 switches.

Fig 3.11 REMOTE

Out of which one switch is used to start the engine. Other is used to

operate the conveyor beltand the two switches are used to run propeller

The switches is a special one that is it has there position , one position makes the propeller moves in one direction and one position make the motor 00moves in opposite direction one position makes the motor stop if two switches is made on then the propeller makes the boat moves in forward or back ward direction

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If only one motor is made on the boat moves in left or right one switch is used to operate the conveyor belt. When the switch is pressed in one direction the front conveyor rotates when the switch is in other position the conveyor belt stops, when the switch is made one another position then the back conveyor belt rotate

MATERIALS REQUIRED

Sl.No	Material	Quantity	Size
1	Steel Pipe	8	¼ inch, 50 cm
2	Intalium Sheet	8	1.50m2
3	Steel Plate	12	150cm2
4	Rubber sheet	2	60cmx20cm
5	Bearing	14	¼ inch

EQUIPMENTS REQUIRED

1. 12V BATTERY
2. DC ELECTRIC MOTOR – 4NOS
3. BELTS

SPECIFICATIONS

LENGTH 0F CUTTER = 20CM
LENGTH OF CONVEYOR BELT = 60CM, 70CM
PROPELLER BLADE MATERIAL = STEEL
PROPELLER BLADE LENGTH = 15CM
CUTTER BLADE MATERIAL = STEEL
BATTERY VOLTAGE = 12V
NO OF BEARINGS = 12
NO OF BELTS = 5
NO OF PULLEYS = 8
NO OF CONVEYOR BELTS = 2
CONVEYOR BELT MATERIAL = ELASTIC

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STORAGE TANK MATERIAL = MULTIWOOD
BOAT MATERIAL = INTALIUM
MOTOR SPEED = 99RPM
MOTOR POWER = 0.5HP
NO OF MOTORS = 4
MASS OF FULL SYSTEM = 30.5
MOTOR CASE MATERIAL = PLASTIC

MATERIAL COST

S.NO	COMPONENTS	PRICE
1	Intalium sheet	Rs 3000
2	Steel pipe, steel sheet	Rs 2000
3	Bearing	Rs 250
4	Motor	Rs 2000
5	Pulley	Rs 400
6	conveyor belt	Rs 200
7	battery	Rs 1500
8	. clips	Rs 50
9	switch	Rs 400

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10	Switch board	Rs 400
11	1. Multiwood	Rs 2000
12	2. Bamboo wood	Rs 1000
13	3. Nut and screw	Rs 250
14	4. CONVEYOR BELT	Rs 500
15	5. Clamp	Rs 150
16	6. Motor case	Rs 500

OPERATION COST

OPERATION	**COST**
Welding	Rs 1000
Drilling and Cutting	Rs 1600
Grinding cost	Rs 500
Boring cost	Rs 400

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OPERATIONS

Following are the operations carried out in this project

1. Boring
2. Grinding
3. Drilling
4. Machining
5. Welding

CONCLUSION

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between the institution and the industries.

We are proud that we have completed the work with the limited time successfully.The**"DESIGN AND FABRICATION OF WATERHYACINTH REMOVAL MACHINE"**is working with satisfactory conditions. We can able to understand the difficulties in maintaining the tolerances and also the quality. We have done to our ability and skill making maximum use of available facilities.

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