

FABRICATION OF TWO STROKE ENGINE OPERATED AMPHIBIOUS VEHICLE

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Abstract - An amphibious vehicle is means of transport, viable on land as well as on water even under water. It is simply may also called amphibian. Amphibious vehicle is concept of vehicle having versatile usage. It can be put forward for the commercialization purposes with respect to various application like in the field of military and rescue operations. Researchers are working on amphibious vehicle with capability to run adverse condition in efficient way.

Keywords:- Amphibious vehicle, Design and Analysis, Efficient way, excellent potentials, Future benefits, Research and Development, Versatile usage.

1. INTRODUCTION

An amphibious vehicle is a vehicle that is a means of transport, viable on land as well as on water. The idea of amphibious vehicle are came on mind of engineer is amphibious animal just like frogs, crocodiles. They can live on land as well as water.

Vehicle design is one of the important aspects for the performance of a vehicle. When the vehicle across a medium at high speed, the medium will acts on the vehicle in term of resistance. Air is one of the medium of space that provide resistance when vehicle travelling at high speed due to air space densities.

Therefore, in this paper designs process are documented according to stage which the design is start from scratch. Selection of materials for the manufacture of basic materials is an important vehicle for ensuring that the vehicle is able to float on the water. Among the criteria required material for manufacture of the vehicle is that it must be durable, has good properties of waterproof, easy to set up and easy to do the repairs in the event of damage and maintenance work.

1.2 Need of Amphibious Vehicle

About 75% of Earth's surface is covered by water. A vehicle that could travel on land and water could potentially change current transportation model. Transportation on land is very common but on the other hand water ways are naturally available but are not considerably used relatively, and here the Amphibian vehicles are proved to be beneficial.

2.1 Amphibious cycles

An Amphibious cycle is a human-powered vehicle capable of operation on both land and water. Saidullah's Bicycle uses four rectangular air filled floats for

buoyancy, and is propelled using two fan blades which are attached to the spokes. Moraga's Cycle Amphibious uses a simple tricycle frame to support three floaters which provides both the floatation and thrust. The wings on the powered wheels propel the vehicle in a similar way to a paddle wheel.



Figure 2.1 Amphibious cycle

2.2 Amphibious ATVs

Amongst the smallest non air-cushioned amphibious vehicles are amphibious ATVs (all-terrain vehicles). These saw significant popularity in North America during the 1960s and early 70s. Typically an amphibious ATV (AATV) is a small, lightweight, off-highway vehicle, constructed from an integral hard plastic or fiberglass body tub, fitted with six (sometimes eight) driven wheels, with low pressure, balloon tires.



Figure 2.2 Amphibious ATVs.

2.3 Amphibious Cars

Amphibious automobiles have been conceived from car. However the Second World War significantly simulated their development.

Two of the most significant amphibious cars to date were developed during World War second. The most proliferous was German Schwimmwagen, a small jeep-like 4x4 vehicle designed by the Porsche engineering firm in 1942 and widely used in World War II. The amphibious bodywork was designed by Erwin Komenda, the firm's body construction designer, using the engine and drive train of the Kübelwagen. An amphibious version of the Willys MB jeep, the Ford GPA or 'Seep' (short for Sea jeep) was developed during World War II as well. A specially modified GPA, called Half-Safe, was driven and sailed around the world by Australian Ben Carlin in the 1950s.



Figure 2.3 Amphibious Car

2.4 Amphibious Boats

There are few amphibious boats developed recently, as Sealers, a 3 wheels RIB from New Zealand, or Iguana Yachts. The objective of those different products is to enhance the yachting habits. Enabling a boat to walk autonomously means a lot to simplify and develop yachting no need of marina, access to the sea everywhere, Safe embarkation and disembarkation, easy load carrying. It has a lot of possible uses from the private use to professional.



Figure 2.4 Amphibious Boat

3 Design process:

3.1 A review on design and analysis of amphibious vehicle:

Researchers are working on amphibious vehicle with capability to run in adverse conditions in efficient way. This paper focuses on concept of amphibious vehicle in detail. In later stage of paper we have explain and described the design and analysis of amphibious car. We have followed proper design procedure and enlisted the material used in detail. Capabilities of efficient amphibious vehicle will fulfill all the emerging needs of society. Success of every concept largely relies on research and development, though amphibious vehicle is yet to travel a long journey of innovative development, it has shown excellent potentials for future benefits.

3.2 Design and development of amphibious vehicle body structure:

Amphibious vehicle is a concept of vehicle that can be put forward for the purpose of commercialization, especially in the field of military and rescue operation. This paper present the development process involve in developing the composite bodywork of the amphibious \ Hybrid Vehicle (AHV). It involves the process of design followed with the fabrication process. The total design method issued during the selection of the design stage and transformed into 2-dimensinonal and 3-dimensinal form using CATIA V5 software. Upon completion of design, the fabrication process is implemented to complete the bodywork of the amphibious vehicle.

3.3 Conceptual design of an amphibious vehicle:

This work is to present conceptual design of an amphibious vehicle named "VECTOR" that has great high-speed and long range capabilities. The vehicle is designed to carry up to 50+ personnel or 14 tons of payloads in a range of 1800 km at nominal speed of 360 km/h. The VECTOR not only possesses pros of current helicopter technology, that is, efficient vertical flight and hover capability, but also is capable to take-off/land on water, land, grass, and other relatively flat surfaces. It also introduces a brand new concept of fuselage and chassis design. Tilt rotor continues to be the best candidate for diverse field and rescue operations. All the important aspects, including material, power, propulsion systems, aerodynamics and stability are thoroughly studied and analyzed.

- Studying the present mechanisms.
- Field survey.
- To identifying the potential problems.
- Problems definition.
- Literature review.
- Calculation.
- Drawing of project.
- Fabrication.
- Testing of project.
- Result.

4 Calculations:

Maximum power produced by engine,

$$P = 4.7 \text{ bhp}$$

$$= 4.7 \times 746$$

$$P = 3506.2 \text{ W}$$

$$\frac{2\pi NT}{60}$$

$$60$$

$$T = 3506.2 \times 60 \quad (N=140 \text{ RPM})$$

Buoyant force calculation:

Weight of vehicle = 140 kg Weight of person = 60 kg

Total weight (W) = 200 kg

$$W = m \cdot g$$

$$W = 200 \times 9.81$$

$$W = 1962 \text{ N}$$

By principle of Floatation,

$$W = F_b$$

Weight of fluid displaced by body

$$F_b = w \cdot v \quad (w = \text{specific weight of water, } v = \text{volume of submerged body}) = \rho \cdot g \cdot v$$

$$= 1000 \times 9.81 \times (l \times b \times h)$$

$$= 1000 \times 9.81 \times (1.55\text{m} \times 1.28\text{m} \times 0.10\text{m})$$

$$F_b = 1946.30 \text{ N}$$

5. Engine Specification:

Table 5.5 Engine Specification

Engine Specification of M80	
Engine Type	Air cooled 2stroke
Engine Displacement	74.08 cc
Engine starting	Kick start
Maximum Power	4.7 bhp @ 6000 rpm
Maximum Torque	5.4 Nm @ 4500 rpm
Transmission	3-speed

6. Dimension of vehicle:

Table 6 Dimension of vehicle:

Part of Vehicle	Dimensions/ Weight
Size of vehicle body	1550 mm × 1280 mm
Wheel diameter	480 mm
Diameter of rear shaft	48 mm
Size of blade	440 mm × 250 mm
Distance between front & rear wheel	1260 mm
Total height of vehicle	1650 mm
Ground clearance	500 mm
Total weight of vehicle	140 kg
Distance between rear shaft to floating shaft	620 mm

7. Blade:

Blades have rectangular cross section, which made of wood having a length of 44cm and width 25cm which is placed at the back side of the vehicle to run vehicle on water surface. It takes power from engine driven rear shaft with the help of chain and sprocket mechanism to move the vehicle forward on water.



Figure 7 Blade

8. Chassis:

A body without structure is known as chassis. A chassis consist of an internal frame work that supports a man-made object in its construction and use. It is analogous to an animal's skeleton. An example of a chassis is under part of motor vehicle; consist of frame (on which the body mounted). If the running gear such as wheels and transmission, and sometimes even the driver's seat, are included then the assembly is described as a rolling chassis.



Figure 8 Chassis

9. Advantages:

- This type of vehicle is drive on land and water
- Good speed obtained on land as well as on water.
- Comfortable for operator's body.
- Easy to maintenance.
- Light in weight

10. Application:

This concept is use for,

- Amphibious small passenger cars.
- Big transportation vehicle like amphibious buses (public transportation), amphibious transportation.
- For military vehicles like as truck, buses.
- Used to cross river, ponds, and lakes in villages.

11. Objective of Project:

- The main objective of project is to run on land and water.
- To utilize two stroke IC Engine (Bajaj M80) for the power.
- It can be use forward for the commercialization purpose with respect to various applications like in the field of military and rescue operations.

12. Conclusion:

The development of body for amphibious is carried out based on the technical specification information required. The process started from the design selection stage and completed with the fabrication process of the bodywork. The AHV composite bodywork produced using steel and plywood suit the AHV capability to work on both the ground and water surface.

13. Acknowledgment:

Though perseverance and enthusiasm combined with effort in the right direction can bring forth the thing called success, but the realization of the harsh reality that the path towards the success is full of myriads, temptations impediments and pitfalls often Proves to be disheartening in such situation.

It is able guidance of knowledgeable person that steers one through difficulties and help them to achieve success.

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