

REVIEW ON HUMAN POWERED VEHICLE

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Abstract: Human Powered Vehicles (HPVs) include all vehicles which runs only by human muscular-strength. Although motorization has made human life smooth, many forms of human-powered transport still remains for reasons like lower cost, leisure, physical exercise and environmentalism. Human powered transportation is one of the major transportation media especially in underdeveloped or inaccessible regions. The current review discusses about the construction of HPVs, different variants of HPVs, their applications, the advantages and disadvantages of HPVs. The scope the review also includes discussion about the suitable materials that can be used to attain a good weight-strength ratio.

KEYWORDS: HPV (Human Powered Vehicles)

1.0 INTRODUCTION

The most efficient human-powered land vehicle is the bicycle. The recumbent bicycle may be faster on level ground or down hills because of better aerodynamics which is having similar power transfer efficiency. A recumbent bicycle is a bicycle where the rider is in a laid-back reclining position. Most recumbent riders choose this type of design for ergonomic reasons; the rider's weight is distributed comfortably over a larger area, supported by back and buttocks. On a traditional upright bicycle, the body weight rests entirely on a small portion of the sitting bones, the feet, and the hands. Most recumbent models also have an aerodynamic advantage; the reclined, legs-forward position of the rider's body presents a smaller frontal profile. A recumbent holds the world speed record for a bicycle, and they were banned from racing under the Union Cyclist International (UCI) in 1934, and now race under the banner of the Human Powered Vehicle Association (HPVA). Recumbent are available in a wide range of configurations, including: long to short wheelbase; large, small, or a mix of wheel sizes; overseas, undersea, or no-hands steering; and rear wheel or front wheel drive. A variant with three wheels is a recumbent tricycle.

HISTORY

As far as back in 1490, Leonardo da Vinci had envisioned a machine remarkably similar to the Morden bicycle. Unfortunately he did not attempt to build the vehicle. After the Second Word War, bicycle popularity slipped as automobiles flourished, but rebounded in 1970 during the oil crisis. The WHPVA (world human powered vehicle association) was originally called the, IHPVA (international human powered vehicle association) which was found in 1976 in the USA. The IHPVA was for many year an association of individual members. The IHPVA was reorganised into an international association with national organisation as member and an American association which adopted the name Human Powered Vehicle Association HPVA.

2.0 TYPES OF HUMAN POWERED VEHICLES

Following are the common types of HPVs;

- i. Land HPV
 - a. Recumbent bicycles
 - b. Velomobiles
- ii. Water HPV
- iii. Track HPV
- iv. Air HPV

2.1 LAND HUMAN POWERED VEHICLE

a) Recumbent Bicycle

A recumbent bike is a bicycle with a seat position that is inclined backwards and the bottom bracket and pedals are attached front. Most riders of recumbent bicycles choose this type of design as this bike is comfortable for long rides, but these types of bikes cannot participate in race as per UCI (union cyclist international).

b) Velomobiles

Velomobiles, Bicycles car, streamliners-these are names of bicycles with full fairing. The aerodynamic shell provides protection from wind and rain. Velomobiles are built for everyday use and for race. Most of the velomobiles have 3 wheels, but there are also 4 wheels velomobiles.



Land Human Powered Vehicles

2.2 WATER HUMAN POWERED VEHICLES

Most of the water HPV are used in leisure area. They are driven by canoeing, rowing and blade wheels or propellers. But in Human Powered Water competition, very fast boats are used driven by propeller or air screws. Some boats use hydrofoils to minimize the water resistance for more speed. Also, submarine is a type of human powered water vehicles. Today human powered submarine is free flooding wet submarine.



Water Human Powered Vehicle

2.3 AIR HUMAN POWERED VEHICLES

Airplanes are one of the most interesting areas of HPV. They are not many of them HPV-Aircraft Daedalus 88, remained almost 4hours in air A human powered helicopter is one of the largest and delicate Human Powered Vehicle.



Air Human Powered Vehicle

3.0 APPLICATIONS OF HUMAN POWERED VEHICLES

- 1) Human powered vehicle is a Fitness device it is a plus point to all the fitness freak people
- 2) It can be used for travelling purpose for nearby distance, where it also occupies less space so one can use this HPV usually
- 3) This HPV is handy if one wants to ride it, as the maintains and repair works are less
- 4) One can enjoy the nature while riding this bike as it's an ecofriendly bike

4.0 MATERIALS USED IN HUMAN POWERED VEHICLE

The most important part of the bicycle is the diamond-shaped frame, as it joins all the components together in the proper geometric configuration. The frame provides strength and rigidity to the bicycle and determine the handling of the bicycle. For much of the bicycle's history the frame was constructed to be heavy, but strong, steel and alloy steel. Frame material was continuously improved to increase strength, rigidity, lightness, and durability. The 1970s ushered in a new generation of more versatile alloy steels which welded mechanically, thereby increasing the availability of light and inexpensive frames. In the following decade, lightweight aluminum frames became a popular choice. The strongest metals, however, are steel and titanium with life-expectancy spanning decades, while aluminum may fatigue within three to five years. Advances in technology by the 1990s led to the use of even lighter and stronger frames made of composites of structural fibers such as carbon. Composite materials, unlike metals, are anisotropic; that is, they are strongest along the axis of the fibers. Thus, composites can be shaped into single-piece frames, providing strength where needed. The components, such as wheels, derailleurs, brakes, and chains, are usually made of stainless steel. These components are generally made elsewhere and purchased by the bicycle manufacturer.

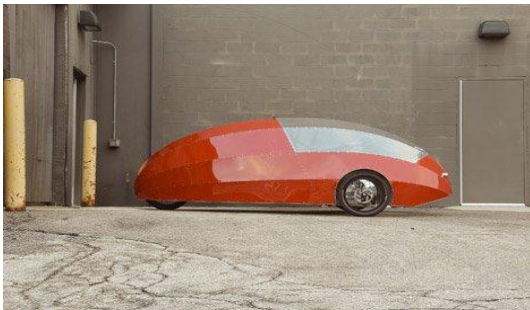
WORLD'S FASTEST BICYCLE

The Eta bike—as Canadian engineering company Aerovelo named it—takes a bullet shape, thanks to a large carbon fibre outer shell that cuts down on drag. The bike recently broke the

world record for max speed on a bike, at 89.59 mph. to which the weight of bike weighs only 55 pounds.

Future Scope of a Human powered Vehicle

The small and aerodynamically designed Zeppelin is one of two new concept designs unveiled as part of the Future Cycles project by The Future People, which aims to "combine the weather protection and carrying capacity of a car with the efficiency of a bicycle. The vehicle can achieve a cruising speed of 25 miles per hour on flat ground using a combination of human pedaling and an electric motor. The structure of the vehicle was created using lightweight materials including aluminum and polycarbonate, resulting in a total weight of just 123 kilograms. The pod-like body comprises a series of curved horizontal panels that have been bolted together. The vehicle is designed for two riders to sit side by side underneath the domed roof, which hinges up from the back to provide access. Each person has their own set of pedals to propel the car forward, while a 750-watt electric rear motor offers a 20-mile range.



Advantages:

1)Health

Pretty much any kind of human-powered vehicle is powered by a human ... you. And that means exercise. Depending on the type of vehicle, you may be using different muscle groups, but you're pretty much guaranteed to be doing some work to get around, especially climbing hills, etc.

2)Environment

As a rider, you're part of the "green" revolution. You're not burning fossil fuels. You're not adding noise to the environment, and you're reducing the demand for automobile facilities like roads, parking garages, etc.

3)Cost

Generally the cost of such bike are cheaper comparatively, that requires no gasoline. Repairs and maintenance are also

substantially cheaper

Disadvantages

- 1)Ageing It may be problem for the elderly people to ride this bike as this bike require human power
- 2)Speed of the bike varies as stamina differs from person to person to ride the bike.
- 3)The average cyclist may still be a bit wary. The height and length of these bicycles have long raised concerns about visibility and handling.

Conclusion

From the above review it is clear that when compared to the normal bicycles recumbent bikes can be preferred to obtain maximum speed. Human-powered vehicles were originally designed for transportation, and that is still their most important use. HPVs today provide clean, quiet, and efficient transportation. Perhaps the most compelling reason to use HPVs is sustainability: the environmental footprint of HPVs is typically much, much smaller than that of other modes of transportation. Despite these commonalities, HPVs are used by a variety of different people for a wide range of diverse reasons, including recreation, competition, cost, health, transportation, and concern for the environment.

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