

Design of Modernized Vehicle Physically Challenged People

Sathish Kumar. A. T¹, Praveen. M², Umesh. P³

Department of Mechanical Engineering, Magna College of Engineering, Magaral, Chennai, India^{1,2,3}.

ABSTRACT: As physically challenged peoples are unable to access the height which is so high above their heads so we are providing some suspensions for elevating them to certain heights. We are using the hydraulic concepts mixed with the power source for lifting their seating. Lifting concept is being used for elevating the seating of our wheel chair for the physically challenged people for accessing the inaccessible areas. Since, Hydraulics are a very powerful tool for applying a ton of force (no pun intended) where you want, when you want it, so they are used as a power source. It will be a much needed tool for the physically challenged people to be independent for doing their own work.

Main advantage of our mechanism is that you pack a lot of travel in to a small space. So, it is easy for the movement of the vehicle & compact. Hydraulic is a topic in applied science and engineering dealing with the mechanical properties of liquids. Fluid mechanics provides the theoretical foundation for hydraulics, which focuses on the engineering uses of fluid properties. In fluid power, hydraulics is used for the generation, control and transmission of power by the use of pressurized liquids. Hydraulic topics range through most science and engineering- disciplines, and cover concepts such as pipe flow, dam design fluidics, hydropower, computational fluid dynamics, etc.,

The word “hydraulics” originates from the Greek word *hyraulikos* which in turn originates from *hydor*, for water and *aulos*, meaning pipe. The elevation concept being used by the pressurized fluids will be efficient one for the physically challenged person. The development of elevators was led by the need for movement of raw materials including coal and lumber from hillsides. The technology developed by these industries and the introduction of steel beam construction worked together to provide the passenger and freight elevators in use today.

KEY WORDS: Hydraulics, Wheel chair ,Telescopic cylinder, Pressure boosters.

I. NEED FOR OUR PROJECT

In order to help physically challenged people. Our world is one of the clusters of both the physically challenged and the physically capable ones. Everyone is carrying for their own life and nobody cares for physically disabled ones so it is indeed our pleasure to help those people. When they are alone, this helps them to access the things at higher places Even people who suffer from orthopaedic problems and able to stand and stretch their legs for a long time can use this. As this project is being manually operated, it doesn't needs any electrical sources like batteries. This is more economically reliable and viable, as its using mechanical components rather than electrical components. Its eco-friendly and it doesn't pollute the nature. It's not necessary for the people to put their whole effort, as we are using hydraulics people can reach an elevated height with less energy by moving the lever.

II. COMPONENTS USED

1. Hydraulic telescopic cylinder

Telescopic cylinders are a special design of a Hydraulic cylinder or pneumatic cylinder which provide an exceptionally long output travel from a very compact retracted length. Typically the collapsed length of a telescopic cylinder is 20 to 40% of the fully extended length depending on the number of stages. Some pneumatic

International Journal of Innovative Research in Science, Engineering and Technology*An ISO 3297: 2007 Certified Organization**Volume 4, Special Issue 2, February 2015***5th International Conference in Magna on Emerging Engineering Trends 2015 [ICMEET 2015]****On 27th & 28th February, 2015****Organized by****Department of Mechanical Engineering, Magna College of Engineering, Chennai-600055, India.**

telescoping units are manufactured with retracted lengths of under 15% of overall extended unit length. This feature is very attractive to machine design engineers when a conventional single stage rod style actuator will not fit in an application to produce the required output stroke.

Heavy duty telescopic cylinders are usually powered by hydraulics whereas some lighter duty units could also be powered by compressed air. Telescopic cylinders are also referred to as telescoping cylinders and multi-stage telescopic cylinders. An application for telescopic cylinders commonly seen is that of the dump body on a dump truck used in a construction site. In order to empty the load of gravel completely, the dump body must be raised to an angle of about 60 degrees. To accomplish this long travel with a conventional hydraulic cylinder is very difficult considering that the collapsed length of a single stage rod cylinder is approximately 110% of its output stroke. It would be very challenging for the design engineer to fit the single stage cylinder into the chassis of the dump truck with the dump body in the horizontal rest position. This task is easily accomplished, however, using a telescopic style multi-stage cylinder

2. Hydraulic cylinder

Hydraulic cylinder is a mechanical actuator that is used to give a unidirectional force through a unidirectional stroke. It has many applications in engineering vehicles.

3. Hydraulic fluids

Hydraulic fluids, also called **hydraulic liquids**, are the medium by which power is transferred in hydraulic machinery. Common hydraulic fluids are based on mineral oil or water.

4. Physically challenged vehicle

The physically challenged vehicle is being welded using the electric arc welding the metal being used is cast iron. The thin bars are being welded together using the electric arc welding process.

5. Hydraulic storage tank

The hydraulic fluid storage tank is being made by bending the sheet metal work piece for desired volume of the fluid used. The hydraulic pistons source is from the hydraulic liquids which is stored under the free space of the vehicle known as reservoir. This reservoir is firmly fixed in chair which can bear the whole pressure exerted by the hand pump

6. Hydraulic pressure booster

Hydraulic pressure booster boosts the pressure to very high amount it leads to raising of the table. Air to hydraulic pressure booster is a device used for converting air into the higher hydraulic pressure which is required for operating hydraulic cylinder. Hand pumps are manually operated pumps, they use human power and mechanical advantage to move fluids or air from one place to another. They are widely used in every country in the world for variety of industrial, marine, irrigation and leisure activities.

7. Rollers or Castors

Rollers are being provided for the trolley like of arrangement of the vehicle which can be carried to the different places very easily. The shape of castors is shown in Figure 1



Figure 1 Castors

International Journal of Innovative Research in Science, Engineering and Technology*An ISO 3297: 2007 Certified Organization**Volume 4, Special Issue 2, February 2015***5th International Conference in Magna on Emerging Engineering Trends 2015 [ICMEET 2015]****On 27th & 28th February, 2015****Organized by****Department of Mechanical Engineering, Magna College of Engineering, Chennai-600055, India.**

Caster on a desk or chair is an undriven, single, double, or compound wheel that is designed to be mounted to the bottom of a larger object (the “vehicle”) so as to enable that object to be easily moved.

8. Hoses, tubes and pipes

Hydraulics tubes are seamless steel precision pipes, specially manufactured for hydraulics. The tubes have standard sizes for different pressure ranges, with standard diameters up to 100mm. The tubes are supplied by manufacturers in lengths of 6m, cleaned oiled .

III. CONSTRUCTION DETAILS

The iron bars are being cut into different dimensions for welding the physically challenged vehicle. The iron bars made of wrought iron which are very tough are used for construction of the base of the wheel chair. The iron bars are being welded using the electric arc welding process. After the base of the vehicle is being made the other parts are being mounted above the base of the vehicle. The hollow iron is being cut into 4 different pieces of similar size and being welded horizontally above the base of the iron bars. These hollow iron bars which acts as a balancing medium for the whole vehicle and provides the safer side for the user. The seating arrangement is being made in the vehicle by cutting the pieces of wrought iron for the physically challenged vehicle and they are being welded. The iron bar pieces are being put on the 4 edges of the seating arrangement so that they have the movement above the hollow iron bars. The rollers or castors are being welded firmly below the base of the vehicle so that they can be revolved all the directions around the vehicle 360°. Especially swivel caster being welded around the vehicle for complete rotations. The seat is being supported by the upper portion of the vehicle for the comfortable seating arrangement of the vehicle. The bolts and nuts are bolted below the seating and the head of the telescopic piston for the complete balancing of the vehicle. The telescopic cylinder is being welded below the base of the vehicle so that it is place below the seating of the users. The telescopic cylinder of two stages is compactly place below the seating of the user space. The hydraulic hoses and the fitting are connected at the base of the piston and they are not permanent joints. The reservoir storage tank is being made from the sheet metal work piece by bending sheet metal. The reservoir is being made by the gas welding process so that the damage of the storage tank is being reduced. The leakage of the storage tank is being controlled by the bolting the tank below. The sheet metal is been bolted in the above for the fitting and removal of the hand pump and for withstand the pressure created by the user. The hydraulic piston is being lifted by the pump pressure so the handle is being provided for the easy movement of the hand pump. The handle is being made with the iron bar on the sides of the vehicle for balancing the storage tank. The supporting bars are provided for support of the cushioning arrangement of the vehicle.

IV. WORKING PRINCIPLE

Main principle behind this is Pascal’s law which states that “the pressure generated at any point in a confined fluid acts equally in all directions”. The working principle of general physically challenged vehicle is so simple that it moves in only one direction forward or backward. But this modernized physically challenged vehicle can move in linear and upward and downward directions. The physically challenged vehicle is such a way designed that it rotates or swivels about 360 degrees of directions. The full rotation in the vehicle enable the user to move in any direction as possible. The hydraulic hoses is being fixed in the telescopic pistons and then the oil is being poured in the reservoir tank. The oil carrying tank is been screwed using the screw firmly to the hand pump. The oil tank is designed in such a way that there is no leakage and the vacuum is created in the oil storage tank. The pumping action of the hand pump pumps the oil from the tank to the piston one end. The other end of the piston is being automatically being pushed by the force. The pumping action by the user pushes the piston in turn the bolt which is being firmly fixed to the seating of the vehicle is being forced. The strength of the vehicle is lying in the seating arrangement of the vehicle and the pressure exerted by the vehicle is being evenly distributed in the bolts to the surrounding of the vehicle.

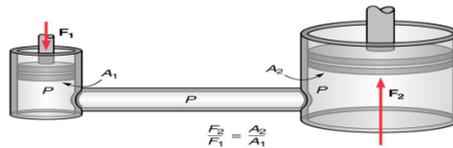


Figure 2: Working Principle

Caster on a desk or chair is an undriven, single, double, or compound wheel that is designed to be mounted to the bottom of a larger object (the “vehicle”) so as to enable that object to be easily moved.

V. SCOPE OF OUR PROJECT

Advantages

Main advantage of this project is that you pack a lot of travel in to a small space. It is easy for the movement of the vehicle & compact. Transforming the lifestyle of these challenged People. The required challenged ones in their real life. The project is an real challenge for our team for bringing up it as an success. Elevation can be obtained. The return movement of the vehicle is so simple that there is no jerk or tension in the vehicle. The arrangement is so simple that is can be dismantled and can be carried easily. The frequent change of the oil is not required. It does not cause any pollution. The pressure exerted by the user is very low. The vehicle can be suitable for more than 100kg weight is easier for any age groups. The setup generally less in weight. The elevation can also be increased by some kinematic arrangements in the vehicle.

VI. APPLICATION

This can be used for the house hold application of physically disabled people. It can be used for taking material from the shelves and higher places by the physically challenged people who is alone. It can be used by both adults and the children especially.

VII. CONCLUSION

Main objective of our project is for transforming the life of physically challenged people in this modern world. Today everyone is caring about their own duties and their own life and leaving these kind of people alone without any shelter or any captivity. So we decided to make some changes to the project and we finally brought the whole project especially for the challenged ones in their life. The project is an real challenge for our team for bringing up it as an success.

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