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Analytical Analysis of Hydraulic System
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The fundamental purpose of this design is to promote mobility, inclusion and enhanced quality of life of the user who are unable to move. With the help of this design they can do their artwork or anything like sketching etc without any need to move. Effective Mobility is the most important need of all people specially .We have proposed some in-home gravity balancing harness system that people with movement disabilities can build with limited resources. There are many people with weak muscles and other issues which make it hard for them to stand and do their work. We have tried our best to make it as simple and easy as possible. It is most important issue and should be given importance especially in this era in which technology has evolved to a great extent. The devices until now are really old design devices. Our goal is to make an advanced device with more functioning capabilities.

This is a senior level engineering project. The goal of this project is to design a device that helps the disable people. We have worked really hard to make this design as perfect as possible. This design can be used by disable people to draw an artwork or do sketching with any need to move hand. This device will be suitable for both people with moving disabilities and people having weak muscles which makes them unable to move their hands etc. Our main focus was to make the device safe to avoid any Misuse of equipment that can lead to serious injury. It helps approachability of the art to the disable people in an easier way. The shape of the chair makes it more stable and leaves fewer chances for any mishap. We have tried our best to make it as comfortable and feasible as possible. This device which we have built is to aid people with disabilities. W. L. Gore and Associates (a global engineering company with local offices) will be funding the projects.

TECHNICAL DESCRIPTION OF THE DESIGN:

Details of The physical Modeling:

Our design is simple yet efficient. The mount can have a paper, canvas anThe easel is connected to the front of the mount. It is constructed from an aluminum square 1'x1' frame. Its cross beams are bolted onto protruding square metal struts attached to the front of the mount. The struts connect to friction hinges, which increase the range of canvas tilt. Furthermore, a 2' x 3' aluminum frame can be attached to the front to accommodate larger canvas sizes. Four small C-clamps tightly fasten the painting canvas to the aluminum frame. Once a canvas is loaded onto the device, the rigid frame holds the system in place as the entire device is raised to the appropriate level by the Reliant lift.

There is a power source too. It is necessary to design the power supply side efficiently otherwise too small small of a motor to drive a pump may result in immediate failure. A large backhoe or forklift uses as much as 100 horsepower or more to operate a single cylinder under a heavy load.

Control Of the system:

The system has easel which is movable to 360 degrees. This easel is connected to the base of this system which consists of a Reliant Patient Lift. This is in control of the disabled person. The Reliant Lift is operated manually by a hydraulic system, and its height can be raised or lowered by the person on the relative position of his bed or his wheelchair.

I choose the hydraulic design that has the hydraulic system that will push the easel on the stand to go up and down to help the disabled people to control the easel on the highest that they want to make it. That will have a pressure on the system to make it go up and down by making the pressure give force to make the machine work. I will show how the hydraulic system works in Engineering Content by showing the equations and the data needed for this topic. This is the design which we are designing for this project. This hydraulic design system incorporate a hydraulic power unit, advanced circuitry and pressure transducers which will evaluate and react

to the pressures on and movements of the vehicle during access. This system is effective and, above all, safe to use.

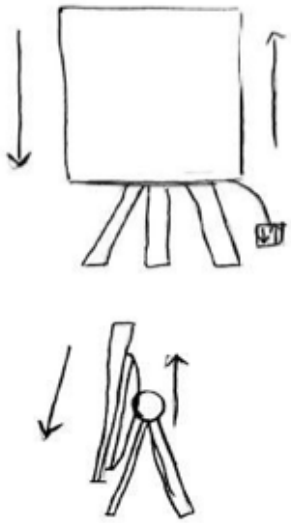


Fig 1 : Design

Our design is to make an easel for disable people who have body issues in their hands and legs. We are trying to make a design to help them draw easily and make them comfortable and we found 10 designs to make and every one chooses a design to talk about in this assignment. I chose the design of easel with hydraulic machine that can help the disable people work on drawing by just pushing the button and the machine will move the easel up and down to make the person who have an issue to reach all the points of the easel and draw on it.

These are the components which are required to make the easel of the design:

Item Number	Title	Material	Quantity	Category
1	Middle Plank	Wood	1	
2	Side Plank	Wood	2	
3	Axle	Steel	1	
4	Horizontal Plank	Wood	1	
5	Bolt M6 x 90mm	Steel	2	Standard Part
6	Washer D6mm	Steel	2	Standard Part
7	Wing nut M6	Steel	2	Standard Part
8	Washer D8mm	Steel	2	Standard Part
9	Wing nut M8	Steel	2	Standard Part
10	Spring Lock washer D8mm	Steel	2	Standard Part

Fig 2 : components for Easel

ASSEMBLING:

How to Assemble:
1) Carefully putting all three planks (Middle Plank and two Side Planks) in the position shown in picture. Now fasten them together with clamp, then drilling the hole (31 Inches) as shown in the picture.

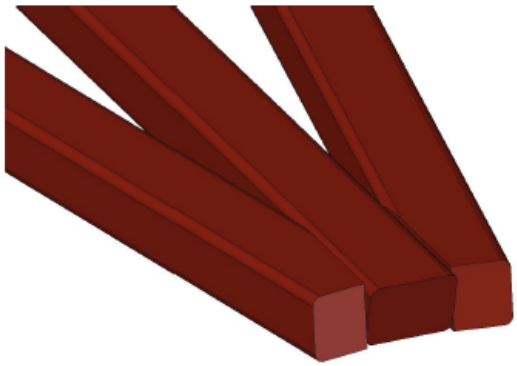


Fig 3 : Assembling 1

2) Now fastening these planks together in a position showed below.

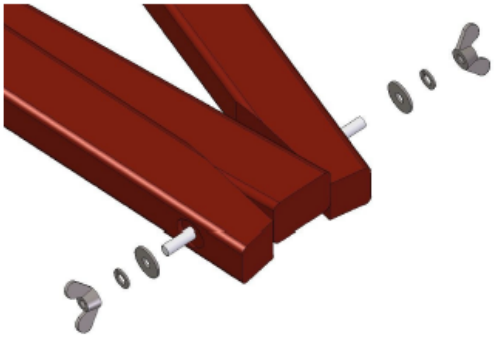


Fig 4 : Assembling 2

3) Fastened bolts at the ends of the planks to give it a shape as shown in picture:

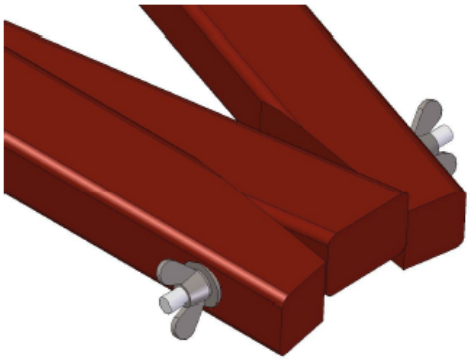


Fig 5 : Assembling 3

ENGINEERING MECHANISM:

The engineering mechanism behind this design is that when the force is applied by the patient to the hydraulic system, the pressure is applied to the air which in result applies force to the mount and it moves as per the patient's requirement and need.

This force and speed is variable and it can be changed by the patient. This is basically Pascal's principle.

WORKING:
This easel board has a top end and a bottom end, wherein said bottom end is pivotally mounted to front end of mount for rotation of easel board through substantially 180° relative to the board/mount between a substantially upright position and a horizontal position where, in said horizontal position.

The easel is further connected to the hydraulic cylinder and it stops at the damping setting of the hydraulic cylinder.

These are the equations related to this working system:
F = Ab * pb - Ah * ph
F = Pushing Force in N
Ab = (π/4) * (Bottom-diameter)^2 [in m2]
Ah = (π/4) * ((Bottom-diameter)^2-(Piston-rod-diameter)^2)) [in m2]
pb = pressure at bottom side in [N/m2]
ph = pressure at cylinder head side in [N/m2]

The dynamic model used for most simulations simply captures the pressure-force transformation and sometimes includes the cylinder friction and leakage around the piston seal. The defining equations for an ideal, friction-free, leakless cylinder are
F = P A
V = Q/A

The piston force depends on the difference in pressure across the piston, taking into account the area on each side. Referring to Figure6. the piston force is
FP = P1Acap − P2Arod

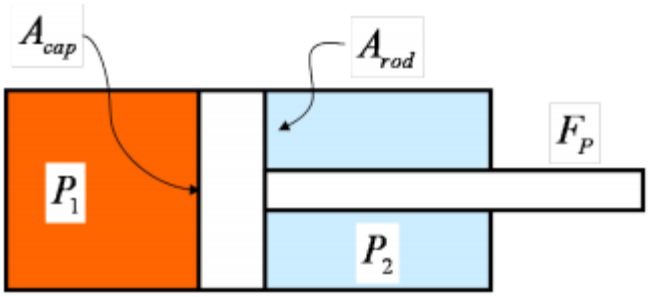


Fig 6: Mechanism of Hydraulic

Pressure and the piston velocity is
V = Q1 Acap = Q2 Arod
The rod area is the piston annulus around the rod and is
Arod = π^{4} (bore^2 – roddia^2)

The overall efficiency of a cylinder is given by the ratio of the output mechanical power to the input fluid power.

η = F V ÷PiQi

From a modeling point of view there is no difference between an ideal pump and an ideal motor. Both are used to transform hydraulic energy to mechanical energy and some manufacturers even use the same parts.

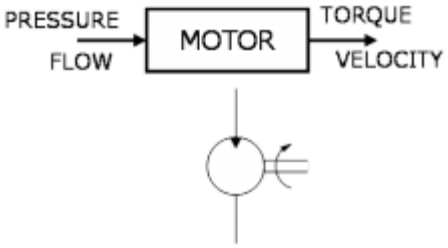
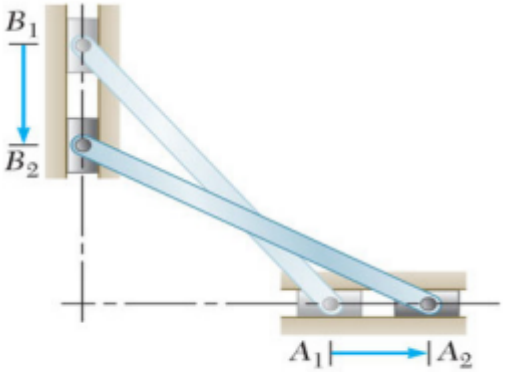


Fig 7 :Flow diagram of Motor

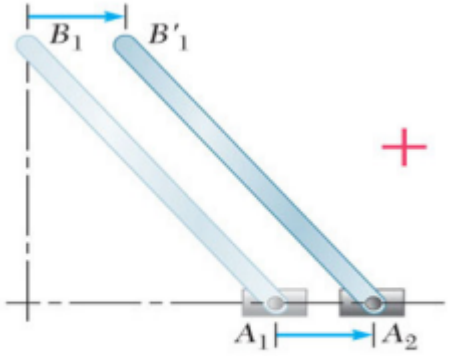
ENGINEERING MECHANISM OF DESIGN:

The easel is movable and is in control of the patient. Following are the states in which it can be moved.



Plane motion

Fig 8: Position of Easel



Translation with A

Fig 9: Position of Easel

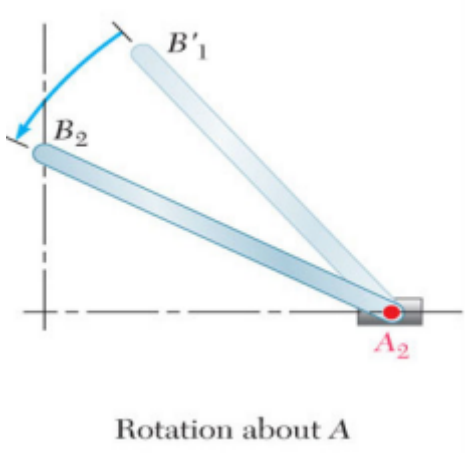


Fig 10: Position of Easel

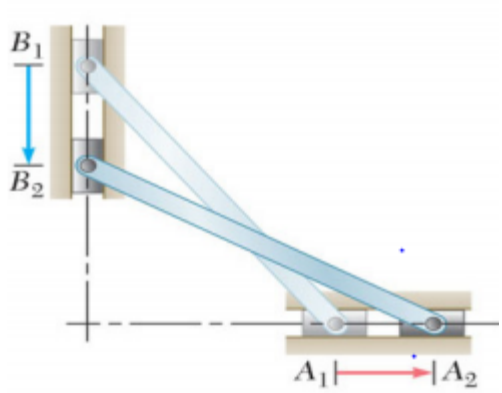


Fig 11: Position of Easel

These planks are further attached with hydraulic system which is in control of patient. The hydraulic system controls the easel as needed by the patient and as mentioned above in pictures.

These results and analysis showed that the project will be successful meeting the needs of the customers in a good way.

REFRENCES:

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