



MULTIPURPOSE WHEEL CHAIR

Shashi Pratap Kushwaha¹, Anuj Singh², Md Akram³, Harsh Srivastava⁴, Pranav Kumar Singh⁵

^{1,2,3,4} Student of B. Tech third year, Dept. of Mechanical engineering, Rameshwaram Institute of Technology and Management, Lucknow

⁵ Assistant Professor Dept. of Mechanical Engineering, Rameshwaram Institute of Technology and Management, Lucknow

Abstract :

The goal of this project was to create a low-cost multipurpose wheelchair that would improve mobility and quality of life for persons who have difficulty walking. This tool allows users to lift the patient from the bed directly, which helps to reduce pressure injuries. Along with lowering the price of We also want to reduce pressure injuries and falls with our device. Another multipurpose expertise is We can use a wheelchair both indoors and outdoors. After that, we have successfully completed the project. In wheelchair, we accomplished what we set out to do. We created a superior multipurpose wheel chair with all of the necessary safety features. Low-cost, high-quality measures it allows for secure data transfer.

Key Words: Patient, Multipurpose, Wheel Chair

INTRODUCTION:

Thousands of families around the world have been affected by disability. Approximately 650 million individuals are disabled in the world today [3]. Nearly 21.9 million people in underdeveloped countries like India have some form of disability [3]. Regardless of their infirmities, these individuals must get up every day. Morning and live life to the fullest. For most people, this is only achievable with the assistance of a wheelchair. . A wheelchair is a gadget that can empower and enable a disabled person to live a normal, independent life. Wheelchairs have progressed dramatically over time, from manual wheelchairs to motorized wheelchairs. Nonetheless, these Wheelchairs have not been able to meet the demands of people with disabilities. As a result, it's vital that the Disabled people's problems are recognized, and wheelchairs are designed to meet their needs.

Origin of problem :

Because of our way of life, the number of sufferers is increasing every day. Patients are

overcrowding hospitals, but they are unable to provide better treatment for their patients due to a lack of technology or the high cost of the existing equipment, which is out of reach for most people and hospitals management. Patients who are paralyzed suffer the most [5]. The biggest issue that patients face is while transferring from a bed to a stretcher and vice. The paralyzed patient's biggest concerns are pressure injuries and falls. The major goal of our project is to create a low-cost multipurpose wheelchair that is affordable in our country without

sacrificing any of the services provided by traditional wheelchairs method. A multipurpose wheelchair is a medical tool that allows patients to shift from bed to chair stretcher and the other way around. Even if there are electrically operated devices, there is no such technology. Equipment that is quite costlier.

OBJECTIVE:

In this project, we will transform this into a system that is more appropriate and affordable for all citizens. When compared to the traditional technique of manufacture, this product is less expensive. Furthermore, this device is conveniently portable and can be used in hospitals, residences, and old age homes. Patients may be agitated. while manually changing from one location to another We assert in this project that no such concerns will arise. The patients are not in direct contact with one other during their shift. In a single use, multipurpose Commode chair, walker for awakening treatment, and other wheelchairs are available. The versatile wheelchair's goals are outlined. below:

- People who have difficulty walking should have their mobility and quality of life improved.
- The goal is to create a low-cost multipurpose wheelchair.
- Trying to get the patient out of bed as soon as possible.

- To provide a wheelchair that can be adjusted in height.
- To reduce the risk of pressure injuries and falls.
- To utilise a versatile wheelchair both inside and outside the house.

Principle Of Design:

Design is a multi-step, iterative creative process that starts with the identification of a desirable need and ends with a product or process that leverages existing resources, energy, and technology to meet that need within a set of stated restrictions.

Design Guidelines:

A set of standards created to ensure that a product is designed in such a way that it can be manufactured and installed with the least amount of work, time, and money. In terms of design, there are a few rules to follow:

- i) Pursue Simplicity
- ii) Harmonize
- iii) Make Product Design More Rational
- iv) Make Use Of As Many Tolerances As Possible
- v) Select Materials that are appropriate for The function and production process
- vi) Resources, energy, and technology to meet that need within a set of stated restrictions.

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Design Process:

The design process is an iterative, sophisticated, decision-making engineering activity that results in precise drawings that allow manufacturing to make a large number of identical goods at a low cost. Typically, the design process begins with

the recognition of a need and the determination to address it. After numerous iterations, the process culminates in the presentation of the plans or the satisfaction of the requirements. Need. Several design phases may be repeated depending on the nature of the design work. from the beginning to the end of the product's life cycle (Richard G. Budynas)J. Keith Nisbett, J. Keith Nisbett, J. Keith Nisbett, J. Keith Nisbett.

ADVANTAGE AND DISADVANTAGE

Many individuals miss the benefits of manual wheelchairs over motorized wheelchairs. Lightweight wheelchairs, for starters, are nearly usually manual. For someone who does not have a lot of bodily strength, this might be a significant selling feature. They're easier to manage, and even if power chairs don't need to be pushed, they're still more convenient. There's always the possibility that the battery will run out. Another advantage of physical labour is that it is less expensive. The advantage of wheelchairs is that they can go practically anyplace. It is not necessary for a person to They are concerned about whether the ground is lumpy or uneven, just as they would be with a power vehicle. Wheelchair. Manual wheelchairs have a number of drawbacks, one of which being the cost. the upper part of the body Yes, the activity is beneficial to people who, on the other hand, push themselves to the limit This identical action might cause harm over time, which is something wheelchair users aim to avoid. Whenever it is possible other disadvantages of a manual include the need to fill the tyres and the time it takes to do so. Keeping the chair's body in straight line Manual wheelchairs may not have all of the bells and whistles that electric wheelchairs provide. Whistles that powerful ones provide to handicapped people, but they can be dangerous. Compared to the bulky power chairs, these are less expensive and more efficient

FABRICATION PROCESS:

The process of fabricating machines and structures out of raw metal materials is known as metal fabrication. To make the final product, the process includes grinding, cutting, burning, welding, machining, shaping, and assembling. During the construction of a multipurpose wheel chair, three metal fabrication processes are used.



GRINDING:

Grinding is the removal of metal using abrasives that are joined together to form a revolving wheel. When the moving abrasive particles come into contact with the work piece, they each operate as a small cutting tool. Particle removing a very small chip from the work piece because grinding is a real metal cutting process, it is a subset of cutting. Mineral processing industries and the cement industry use a lot of grinding.

CUTTING:

Cutting metal pipes into two or more pieces or smaller portions is a common production procedure. The metal being cut in many applications is brand new and has yet to be moulded into anything specific. Pre-shaped metals, such as bars and measured panels, are submitted for cutting in other applications. Cuts are carried out using a variety of machines, ranging from lasers and plasma torches to more complex, high-tech components of equipment.



WELDING:

Welding, along with cutting, is one of the most common metal fabrication processes among hobbyists. Welding is the technique of connecting two separate metal components together. Sheets, panels, bars, and forms may be employed in welding applications. It doesn't matter as long as the component is composed of metal. Welding can be done with a variety of procedures and tools. A weld is frequently done with the use of a torch. Heat is applied at the point where the two components are supposed to be connected. First, there were a lot of metal workers. With welding projects in mind, pursue the field of metal fabrication.



PAINTING:

The most frequent substance used to protect steel is paint. Steel structure paint methods have evolved over time to comply with industrial environmental legislation and to meet the demands of bridge and building owners for increased durability. Previously, there were five and six coat systems.

Typically three coat alternatives have taken their place, and the most recent formulations have concentrated on application in increasingly tighter spaces. The number of coats is reduced, while the individual film thickness is increased.



WALKER:

Our product is well fitted for therapies especially for walking therapy. The wheelchair frame is in such a design that it provides support for patients who find difficulties when walking.



Cost Analysis :

Steel	2500
Big wheel	900
Small wheel	500
Ply	1200
Structure	900
Paint	100
Foam & structure cover clothes	300
Total cost	6400 (INR)

SCOPE OF THE PROJECT:

The versatile wheelchair must be readily available and economical in the country of use, as well as maintainable and long-lasting. This is not always straightforward, as wheelchair users are a diverse group with varying needs, as well as environmental and socioeconomic factors [2]. For many persons with impairments, a multipurpose wheelchair is more than an aid; it is a necessity. A mechanism by which individuals might enjoy their human rights and achieve equal participation and inclusion. A wheelchair promotes mobility, improves health and quality of life, and aids those with disabilities. Allowing people with impairments to participate fully in their communities. There are many different moving and handling devices on the market. However, these technologies offer their own set of advantages. They have their own limits that limit their use, and they must be acquired separately, raising the cost. The price of wheel chair. As a result, there is a need to investigate fresh ideas. This product's manufacture is low-cost in comparison to the traditional way.

RESULT AND DISCUSSION:

As a result of this project, we designed and manufactured a better multipurpose wheelchair for transferring patients from bed to stretcher and vice versa at a cost that is more appropriate in the Indian context. Wheelchair analysis was carried out both theoretically and practically. During the practical examination The weight of 110 kg was loaded and using a multifunctional wheelchair, I was able to lift myself. The cost of a versatile wheelchair is 6400Inr, which is relatively affordable when compared to other wheel chairs. On the international market, there are both electric and manual wheel chairs. With the use of material failure theories, the design was validated. There are five of them, so we took two of them here. The maximum shear stress theory and the maximum main stress theory were the two theories that were used. For a design to be safe, the maximum permitted stress must always be less than the material's ultimate strength. Since we've been using galvanized iron, it has a maximum tensile strength of 350 MPa. Shear stress theory states that the maximum shear stress created in the structure should be lower than the yield stress of the material.

CONCLUSION:

For caregivers, transferring patients from bed to wheelchair is a difficult task. Because paralyzed patients may grow obese, the way we handle them could become a life-threatening dilemma. According to studies, the number of injuries sustained by caregivers while transferring patients is extremely high. Even if it exists, very advanced equipment; nonetheless, it is prohibitively expensive for most people. As a result, we've come up with a budgeted advanced three-in-one wheelchair that includes a screw and nut mechanism which is a reasonably priced option easy to construct and maintain. In comparison to other wheelchairs, the total cost of the versatile wheelchair is quite low. On the international market, there are both electric and manual wheelchairs. The wheelchair will allow you to

move about more easily. To patients to a considerably superior method one caretaker can easily do the patient's task in a short amount of time and with minimal complexity, because there is no direct touch with the patient during the moving, the amount of disruption is limited. Despite the fact that our project is less expensive, it does not compromise the quality of service offered by traditional methods. The effort required to turn the handle can be considerably reduced by replacing the screw nut mechanism with a ball screw nut mechanism. As a result, the product requires further refinement in order to provide significant benefit to patients.

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BIOLOGRAPHY:

He is currently Student of B. Tech Third year, Dept. of Mechanical Engineering at Rameshwaram institute of technology and management lucknow



He is currently Student of B. Tech Third year, Dept. of Mechanical Engineering at Rameshwaram institute of technology and management lucknow



He is currently Student of B. Tech Third year, Dept. of Mechanical Engineering at Rameshwaram institute of technology and management lucknow



Er .Pranav Kumar Singh Is an Assistant professor in Mechanical Engineering Deptt. in Rameshwaram Institute of Technology And Management, Lucknow.



He is currently Student of B. Tech Third year, Dept. of Mechanical Engineering at Rameshwaram institute of technology and management lucknow

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