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Fabrication of Exoskeleton Chair with Simple Linkage Mechanism.

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ABSTRACT

In manufacturing company keeping employee health has been a major problem and challenges for companies around the world. Working with standing position for long time may gives the tiredness and indirectly affects on the productivity. The equipment like Exoskeleton chair may provides the rest pauses to the worker with ergonomically comfortable seating posture. This work gives an idea about the exoskeleton based wearable chair is a modification of the normal chair. It can also set according to the sitting posture at the required angle. It will improve working efficiency and reduce adverse effects on human health due to continuous standing position. The characterstics like light in weight, easy to carry and handle, partability in nature, flexibility in seating position has the advantages over normal chair and may do the miracle in manufactiting industry.

Keywords: *Working Efficiency, Exoskeleton, Effective, Comfort, Ergonomics*.

I. INTRODUCTION

It is terribly tough to stand and work for an overall shift within the company by an employee. this may cut back the potency of the employee. the solutions to the current drawback are to possess a conveyable device that has an ergonomic design, low-value exoskeletons. during this work a mechanical ergonomics device that's designed around the shape and function of the physical body, with segments and joints resembling those of the person it's externally coupled with. It functions as a chair whenever it's required and is coined as

Chairless Chair. It is an ergonomic device that's designed around the shape and performance of the physical structure, with segments and joints resembling of those of the person it's outwardly coupled with. It's sort of a chair that isn't there, however as if by magic seems whenever required. In industrial, it's referred to as the Exoskeleton chair and employee in industrial will wear it on legs like a skeleton. though lower-body exoskeletons exist already on the market, they still have shortcomings that forestall widespread use among the overall public. Our methodology of achieving our goal consists of splitting up into smaller groups; permitting us to finish work more efficiently. A worker in industrial will wear it on legs like a skeletal system. It locks into place and an individual will be able to sit down thereon. The device never touches the ground, that makes it easier to wear: a belt secures it to the hips and its straps that wrap around the thighs These are specially designed and a part of the mechanism. The user simply moves into the required pose. it'll match closely to lower a part of the body as an external body part on that most body forces influence. It is a price effective product. Workers in workshops and industries have to be compelled to undergo many sitting and standing postures for long hours counting on their work. we tend to stumble on an employee during a native producing industry. He mentioned that he suffers from severe muscle pain on a daily basis after his work. So, as a remedy to reduce muscle stress and to work freely, providing support below the hip was a solution. Finally, we tend to detected concerning skeletal system support which will be provided to the body as a support while doing work. This skeleton primarily based support would be helpful to individuals whose current job needs them to stand for long hours. This new and modernized "chair" can ease the aches within the thighs and back. The device that is simpler to carry, a belt secures it to the leg and it has straps that wrap the thighs. A damper engages and supports the bodyweight damper is on variable height, that is directed towards the shoes. A variable damper engages and supports the weight, that is directed towards the heels of the shoes.

II. OBJECTIVE

The objective is to enable the employee to possess the ability to move around with absolute ease, with the utilization of a lower-body skeleton. i.e Exoskeleton chair. To develope a conveyable device capable of providing ankle joimt mechanical help throughout walking while not using external power from onboard actuator. Thedevice should not hamper the traditional gait cycle of an individual however should solely enhance it. Our goal was to provide all of the advantage of an actively powered skeleton however transportable framework while not motor or an external energy source to provide ease within the gait cycle.

- To develop an exoskeleton with a simple link mechanism to support human walking, sitting and standing motions synchronously with a human.

- To fabricate a mechanism that It also helps to take a significant portion of load-carrying by the user.
- To manufacture a chair that will reduce the work fatigue & efforts during working.
- To develop an exoskeleton that will increase productivity & workability among the workers those are working on the shop floor.

III. CONSTRUCTION&WORKING

Firstly, theprocurement of a leather safety shoe that fastened on frame, which is able to hold the shoe (shoe holder)completely. The shoe holder is fastened to the heel of the shoe. Currently, a small block one end of that is pivoted to shoe holder and another end is fastened to the lowest end of Piston rod is employed.

Table. Raw material and standard material:

Sr.No.	Part Name	Material	Qty.
1	Cylinder 25 bore 250 stroke	STD	2
2	Support Pad	Cotton fibre	2
3	Belt	Nylon	4
4	Shoe	Leather	2
5	Shoe Holder	Mild Steel	2
6	Pivot Joint	Aluminium	2
7	Nut Bolt	Mild Steel	12
8	Square Pipe	Mild Steel	5 Feet's.

Above table shows the list of raw materials and standard parts.Here we will use a pressurized cylinder filled with compressed air, depends upon a load of the user. The cylinder has twenty-five-millimetre bore diameter, 250-millimetre stroke length. Now, a leg holder created which is able to hold the thigh and is formed by taking 2mm MS sheet bent to the shape. The leg holder is pivoted to square block and block is fastened to the cylinder using fasteners. the cylinder pivoted with the assistance of this part to leg holder. we have used M-10 nut bolts for all pivots. Now, as the person will sit stand and walk well. The "Exoskeleton Chair" consists of 2 identical "chairs," one strapped to each of the wearer's legs. it is necessary for the Exoskeleton Chair to be adjusted to each user. similar to a bit of covering, if the chair does not work, it will not feel good. once adjusted properly, you'll be able to comfortably relax with all of your weight on the chair. "With the lower member of the chair strapped to the calf, a cylinder presses the upper member against the rear of the thigh. as the user squats, the released compression bar pushes the leg of the chair to a locked position, thereby supporting the body. once the user rises, the lower member is unlocked and is retracted by a cylinder

to its original position, where it'll not interfere with the user's movements. a Slider is provided with a bush pin arrangement to adjust any locking positions as per conditional requirements.

Fig. Concept drawing of Exoskeleton chair (one sided).

IV. ADVANTAGES, LIMITATIONS & APPLICATIONS.

➢ Advantages:

- The movements of the worker are copied by the exoskeleton, i.e. the limbs of the human and the exoskeleton are aligned duringmotion.
- No external power sourcerequired.
- Increases efficiency of the operator.
- Robust in design requires less space, can be assembled &disassembled easily.

➢ Limitations:

- Free body motions arerestrained.
- May require costly materials like carbon-fibre,aluminium.
- It may vary according to size and height of individual.

➢ Applications:

- Medical /Rehabilitation purposes where the devices are aimed to support physically weak, injured, or disabled people to perform a wide range of motions.
- A small number of exoskeletons have also been designed for military applications

forsoldiers.

- In industry to increase efficiency of worker by providing sitting support during work.
- In civilian areas, exoskeletons could be used to help firefighters and other rescue workers survive a dangerous environment.

CONCLUSION

The aim of this work is to develop an exoskeleton to support human walking, sitting, and standing posture as well as motions and this is achieced successfully by designing and fabrication. Thisexoskeleton helps to human being for taking rest pauses while working in standing position. The exoskeleton is powerful mechanical devices and transfers load directly to the ground and helps to reduces fatigue and increases working efficiency with comfortable working position.

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