# DESIGN OF HYDRAULIC SYSTEM OF CHAIRLESS CHAIR

Chandan patil[1], Saurabh Shirsath[2], Dixit Pawar[3], Achyut Dhokrat[4]

*1'Student of Mechanical Engineering,SVIT Maharastra,India*
*2'Student of Mechanical Engineering,SVIT Maharastra,India*
*3'Student of Mechanical Engineering,SVIT Maharastra,India*
*4'Student of Mechanical Engineering,SVIT Maharastra,India*

**ABSTRACT**

*The ability to sit anywhere and everywhere with the aid of a chairless chair. It's called the chairless chair and you wear it on your legs like exoskeleton , when it's not activated , you can walk normally or even run. Standing for hours or end causes a lot of distress to lower limbs, but most works get very few breaks and chairs are rarely provided , because they take up too much space. So the best idea was to strap an unobtrusive chair directly to yourself. So it was decided to have this innovative concept in reality, to help workers who work for hours on production line in standing position and tired. It will fit closely to lower part of the body as an external body part on which maximum body forces act upon.*

**Keyword:** *Exoskeleton* **,** *Chairless*

## 1.Introduction

It's an innovative and forward-thinking concept the ability to sit anywhere and every-where with the aid of a chairless chair. The concept was first conceived two years ago by Keith Gunura, co-founder and CEO of noonee, and since then the company has developed its Chairless Chair and entered talks with a number of leading manufacturers. Designed for static and dynamic industrial market applications, the Chairless Chair aims to increase user's health, comfort, and productivity. It's like a chair that isn't there, but magically appears whenever you need it. It's called the Chairless Chair and you wear it on your legs like an exoskeleton: when it's not activated, you can walk normally or even run. Like a chair that is now there. Standing for hours on end causes a lot of distress to lower limbs, but most workers get very few breaks and chairs are rarely provided, because they take up too much space. So we thought that the best idea was to strap an unobtrusive chair directly to you. The device never touches the ground, which makes it easier to wear, a belt secures it to the hips and it has straps that wrap around the thighs. A variable damper engages and supports the bodyweight, which is directed towards the heels of the shoes. These are specially designed and part of the mechanism, but an alternate version works with any footwear and touches the ground only when in a stationary position. The 'chairless chair', which Audi has further developed together with a Swiss start up company, is an exoskeleton that is worn on the back of the legs. It is fastened with belts to the hips, knees and ankles. Two leather covered surfaces support the buttocks and thighs while two struts made of carbon fiber reinforced plastic adapt to the contours of the leg.[1]

## 2.HYDRULIC SYSTEM:

The present case study or project aims to design and develop a simple chair for the body support. Before we start fabricate and assembly our design, we need to do technical drawing with correct dimension to get a clear vision on what we are doing so that it easy for us to refer in the future. below figure shows the hydraulic circuit used for the fabrication of chairless chair. Basically circuit consist of actuators, reservoir,4/3rotory valve.[3]

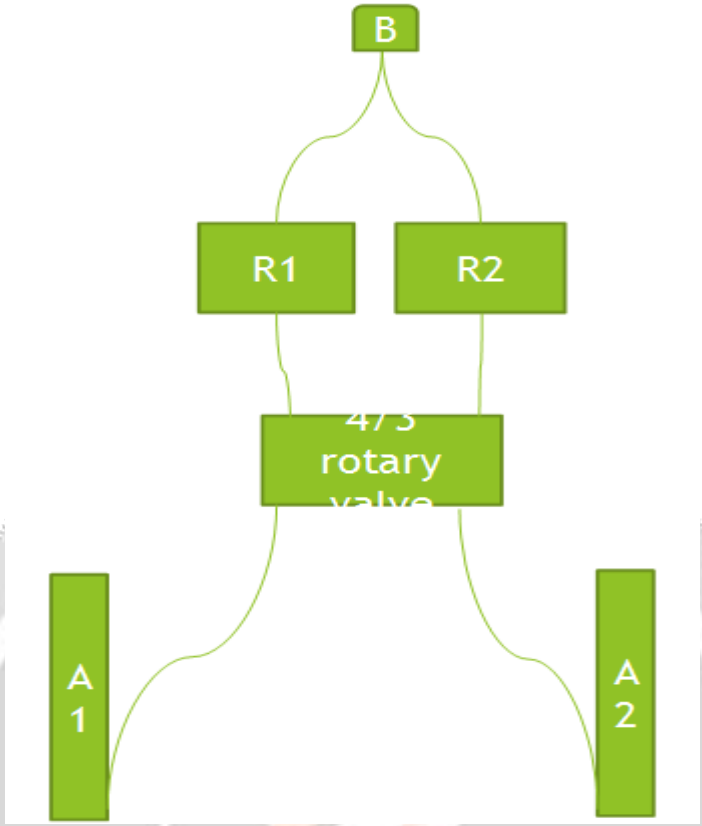


Fig.Hydrulic circuit design

Where,

A= Hydraulic actuator.

R= Oil reservoir.

B= Air breather.

**Calculation for Hudrulic actuators:**

Weight of the heaviest group member as sample, weight = 80kg.

Weight of the exoskeleton = 3.5 kg

Body weight acting on lower exoskeleton,

W= (80+3.5) kg x 9.81 ms-2 =819.135 N ≈819.14N

Bore diameter =32 mm

stroke length of cylinder =250mm

permissible cylinder pressure = 6 bar

Prssure = force/area

P=80x9.81/804.25

=0.9758 bar

## 3. CONCLUSIONS

In this project hydrulic design of chairless chair has been done. We can select the actuator having bore diameter 32mm and stroke length of cylinder is 250 and it is found to be safe under the load of 83kg. The main goal of our project was to give the comfort to workers, who work on production line for hours with actuating chair by hydraulic system. Also to make the model at least cost, that has been achieved. The work started with designing of model and procurement of required material.

## 5. REFERENCES

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|---|---|
|  | Chandan laxman patil<br>Mechanical engineer,<br>SVIT Nashik |
|  | Saurabh Jagdish Shirsathr<br>Mechanical engineer,<br>SVIT Nashik |
|  | Dixit dilip Pawar<br>Mechanical engineer,<br>SVIT Nashik |
|  | Achyut Sunil Dhokrat<br>Mechanical engineer,<br>SVIT Nashik |