

# Exoskeleton Suit for Indian Army by DRDO



## What are Exoskeletons?

Exoskeletons or exo-suits are the gadgets worn by a soldier over a regular uniform to augment his strength. The gadget comes with powered special devices and AI to enhance the capabilities of a soldier. They can either be made up of rigid materials such as metal and carbon fibre or soft and elastic materials.

## Benefits of Exoskeleton

- An exo-suit rigged up on a soldier is expected to enhance his additional load carrying capacity by 100kg for a minimum of 8 hours of operational time and has 3-5 hours of battery backup.

- Soldiers who patrol in high altitude terrains wear a leg-gear that assists them in walking in the snow.
- It also reduces fatigue and exhaustion faced by the soldiers in a thin oxygen climate.
- They relieve more than 50% of the load burden, thereby reducing the injury to the soldiers.

## **India's position on Exoskeletons**

DEBEL (Defence Bioengineering and Electromedical Laboratory), the nodal lab doing Research and Development on the exoskeleton, is using in-house expertise in disciplines of Biomedical or Biomechanics, actuators and control systems. Exoskeleton systems are being designed and developed for specific military logistic applications involving bending, lifting of payload, walking with payload anterior to the body, and unloading the same.

DRDO in a response to Financial Express on the current status of Exoskeletons stated, "*DRDO has been entrusted with a requirement to augment the soldier's capability during logistics activities performed by the military. Therefore, the biomechanical characteristics of the soldier during various logistics activities such as transportation of goods, ration, ammunition etc., through diverse terrain, for long distances with their complete military gear has been systematically captured and analyzed.*"

Various concepts and configurations are being designed and developed currently. DRDO has been progressing on the different design approaches to build an augmentative exoskeleton for the Indian Army.

There have mainly been two schools of thought/approaches for the design of augmentative exoskeletons, namely

- Passive/unpowered augmentative exoskeleton
- Powered augmentative exoskeleton.

## Passive Augmentative Exoskeleton



The passive exoskeletons use passive elements such as springs, dampeners etc., to transfer the payload to the ground, however active exoskeletons not only transfer the payload to the ground but also impart energy through the actuators resulting in reduced energy consumption by the soldier,

## Powered Augmentative Exoskeleton

A powered exoskeleton is a wearable mobile machine that is powered by a system of electric motors, pneumatics, levers, hydraulics, or a combination of technologies that allow for limb movement with increased strength and endurance. Its design aims to provide back support, sense the user's motion, and send a signal to motors which manage the gears. The exoskeleton supports the shoulder, waist and thigh, and assists movement for lifting and holding heavy items,



## **DRDO works on Exoskeleton Technology ‘Super warriors’**

Major countries all over the world are looking at the exoskeleton technology for their soldiers which will not only have built-in advanced technology at the disposal of the wearer but also reduce the weights of several equipment that a soldier has to carry with him, like helmets, radios, night vision goggles, body armour.

Exoskeletons or Exo-suits are dual-use technology gadgets worn as a harness by a soldier to increase the strength. A soldier with an exoskeleton is capable of faster movements and possesses the extra load-bearing capability



Artificial Intelligence and C4I expert Milind Kulshreshtha states that each of the soldier's muscle micro-motion is measured for its correlated moment on the joints, so that a similar smooth response from the Exo-suit can be obtained.

For Military applications, an Exo-suit rigged up on a soldier is expected to enhance the soldier's additional load carrying capacity by 100 kg for a

minimum of 8 hours of operational time and 3-5 hours of battery backup, he was quoted as saying by Financial Express. Several private sector companies too are doing research and development for the Exo-suit design for the conditions specific to Indian soldier.

Exo-suits can also help soldiers who have been disabled in the combat to live a close to normal life.

## **Conclusion**

The greatest invention created by DRDO for the Indian army soldiers to develop the body skills to defeat the enemies. And to improve the spirit and strength of every soldiers.

**By**

**Cadet K.SOMA SUNDARA VELAN**