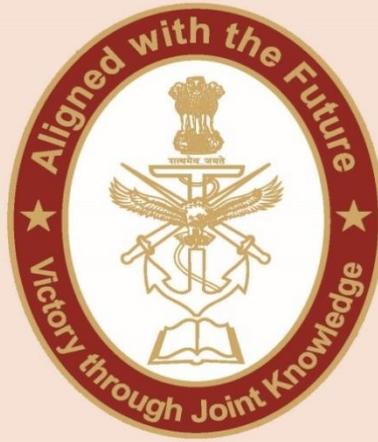


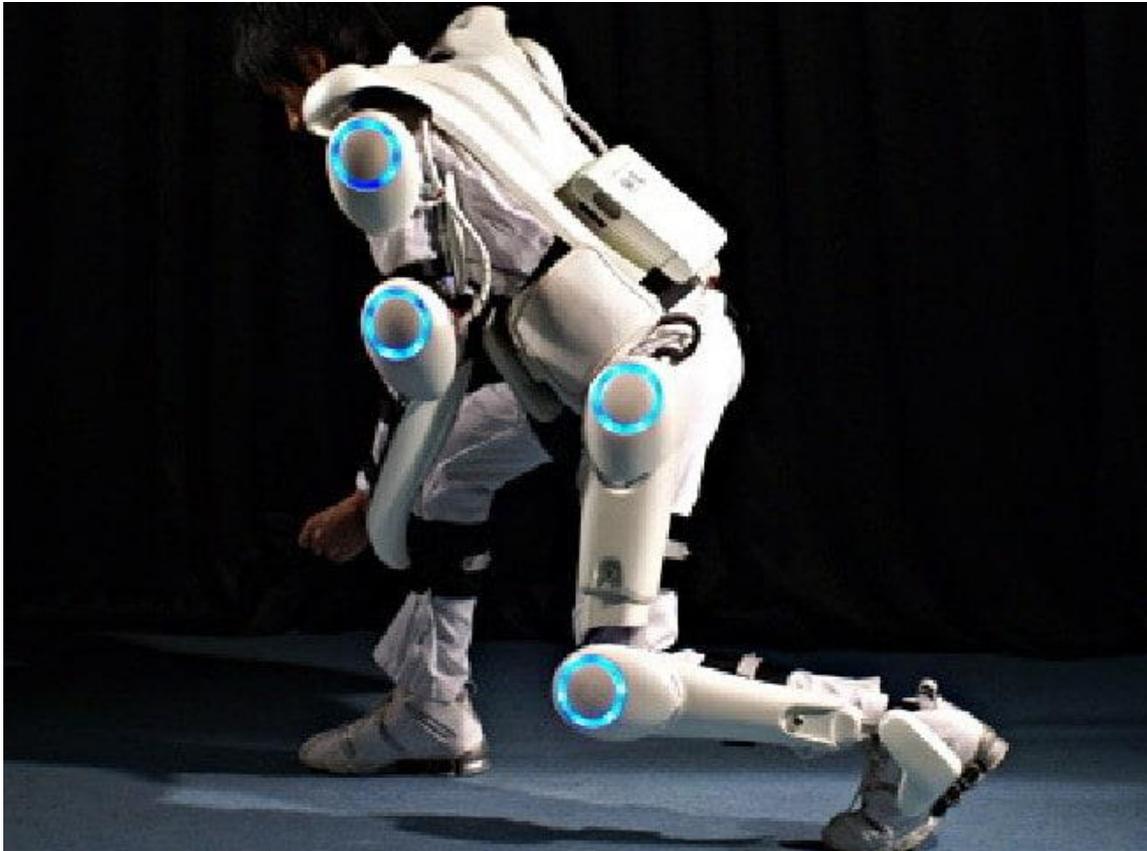
# CENTRE FOR JOINT WARFARE STUDIES



## CENJOWS

### MILITARY EXOSKELETONS – CHINESE ENDEAVOURS

China's Working on the Second Generation of Military Exoskeleton Evolving Exoskeletons.



Norinco, China's state-owned manufacturer of armored vehicles and heavy ground munitions, has debuted its second-generation military exoskeleton, a battery-powered

body brace designed to help infantry members carry some 100 pounds (45 kgs) of weapons, supplies, and ammunition.

Compared to a previous Norinco exoskeleton, which came out in 2015, this second generation has a better battery, more robust hydraulic and pneumatic actuators, and a streamlined harness. The new exoskeleton will include physiological and biological sensors, and actuators that serve as the muscles to power the suit. The suit's helmet has also been built to include a thin, transparent glass with ballistic protection and a heads-up display. Powered knee joints will also allow exoskeleton wearers to climb 100 flights, while still engage in combat.

The new version is also lighter, which will likely reduce strain felt by the exoskeleton's wearer, making it a better choice for troops in mountainous terrain. These refinements in weight, ergonomics, and power supply could also boost the second-generation exoskeleton's co-efficiency ratio. Basically: the higher the ratio, the less physical effort is needed to wear it. A ratio of 5:1 means that the wearer's body only needs to exert the effort it takes to carry 10 pounds in order to carry 50 pounds. Norinco's first-generation exoskeleton had a top speed of 2.8 miles per hour, for 12 miles. This new version improves on that and with enough charge it can walk 20km at a speed of 4.5 km/h (Lockheed Martin's HULC also has similar speed and endurance figures). The exoskeleton demonstrated enough flexibility to allow lateral ground movement: crawling in the mud while under enemy fire, for example.

Norinco isn't the only Chinese exoskeleton builder. In January 2018, the China Shipbuilding Industry Corporation's (CSIC) 707th Institute showed off its own powered exoskeleton to senior Chinese military officers. CSIC is marketing theirs as ideal for the shipyard, where people are expected to carry huge loads. In addition, Chinese military engineers at EEAE have developed the L-70 exoskeleton, which was first revealed by the 202 Institute of China Ordnance Industry Group in 2014 at the Zhuhai Airshow, and then in June 2015. Before that, the Nanjing Military Region's General Hospital built an exoskeleton that helped its wearer lift up to 80 pounds.

China's push to develop powered exoskeletons has implications for almost every area of combat operations. If the plans prove successful, Chinese infantry and special operators could not only carry heavier equipment for longer distances, but also attach body armor to individuals. Also, the exoskeletons would look like the Americans concepts that include the Tactical Assault Light Operator Suit.

Practically, exoskeletons are designed to assist soldiers in a wide array of support tasks, including loading supplies and ammunition, getting heavy missiles onto airplanes, and repairing ships. So far, such exoskeletons, whether in the U.S., China or Europe, are generally intended for logistical and engineering purposes with time limitations due to their short range and battery life.

**Comparison with the United States' Exoskeleton.** The U.S. Army is investing millions of dollars in experimental exoskeleton technology to make soldiers stronger and more resilient, what is being called as advanced gear to equip a new generation of "super-soldiers." The technology is being developed by Lockheed Martin Corp (LMT.N) with a license from Canada-based B-TEMIA, which first developed the exoskeletons to help people with mobility difficulties stemming from medical ailments like multiple sclerosis and severe osteoarthritis.

Worn over a pair of pants, the battery-operated exoskeleton uses a suite of sensors, artificial intelligence and other technology to aid natural movements.

For the U.S. military, the appeal of such technology is clear: Soldiers now deploy into war zones bogged down by heavy but critical gear like body armor, night-vision goggles and advanced radios. Altogether, that can weigh anywhere from 90 to 140 pounds (40-64 kg), when the recommended limit is just 50 pounds (23 kg).

Exoskeletons shown by the USA appear to be more advanced. US Special Forces are building the TALOS (tactical assault light operator suit) exoskeleton. It will provide protection against shrapnel and small arms fire, but could be targeted by an electromagnetic pulse weapon.

The United States is not the only country looking at exoskeleton technology. Russia, in particular, was working on several versions of exoskeletons, including one that it tested recently in Syria.

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