

8 Construction Exoskeletons You Should Know About

Used for years by a number of major U.S. manufacturers including Toyota, Boeing and GM, exoskeletons are a type of wearable technology that helps lessen worker strain from repetitive tasks. By providing support and reducing stress on the user's body, these machines — both powered and passive — enhance the ability to work quickly and safely and help reduce injuries. Apart from being protective and performance-enhancing, some exoskeletons also incorporate sensors that can monitor and respond to users' movements. Below is a roundup of some of the exoskeleton products available, or soon to be available, in the U.S.

Levitate's Airframe - Levitate's flagship product, the Airframe, relieves upper extremity muscle and joint strain, as well as discomfort for professionals and skilled trade workers who must repeatedly elevate their arms for construction or demolition activities. The device lowers exertion levels by up to 80%, the company says, comfortably providing all-day ergonomic support and reducing muscle fatigue. Levitate also recently launched a fire-retardant Airframe model, which can be used for hot work in open-flame settings such as welding, sanding and grinding. Users of Levitate products include Toyota, BMW and John Deere.



Sarcos Robotics' Guardian GT - The Guardian GT robot safely completes tasks in minutes that typically take several workers many hours to perform. The large-scale industrial exoskeleton provides dexterity and strength for the operator, the firm says. Mounted on an agile vehicle base that can be powered by batteries, diesel, or natural gas, the single or dual-armed system can lift and manipulate payloads up to 1,000 pounds with little human effort. Utilizing Sarcos' proprietary technology, the operator feels the scaled forces experienced by the 7-foot-long robot arms, whether the operator is riding inside the robot or the system is tele-operated from miles away.



Bioservo's Ironhand - Worn underneath a regular work glove, the Ironhand glove strengthens a worker's grip and supports potential lack of endurance while collecting and analyzing data for digitalized risk assessment. The Swedish-made system comes with a backpack power unit and pressure sensors that trigger motors in the glove that provide the wearer with an extra-powerful grip. Available in four sizes for the left and right hand, the glove's grip can be easily adjusted to each task, the company says. It is available in the U.S. via distributor Rhino Assembly.



Ekso Bionics' EksoVest - The EksoVest is an upper-body exoskeleton suit that elevates and supports a worker's arms to assist with tasks ranging from chest height to overhead. It is lightweight and low profile, making it comfortable to wear in all conditions while enabling freedom of motion, the company says. The unit's lift force can be adjusted to fit application and operator preference, from 5 to 15 pounds per arm. It comes in two configurations: general or customized for a specific worker. Retail price for the general configuration model starts at \$6,995. EksoVests are in use on Consigli jobsites.



Ekso Bionics' EksoZeroG - The EksoZeroG holds heavy tools on aerial work platforms like scissor lifts and to standard scaffolding. It works with any tools weighing up to 42 pounds that an operator can safely mount to the end of the ZeroG arm. Many tools are attached using a sling. The most common tools include rivet busters, chipping/demo hammers, rotary hammers and impact wrenches. ZeroG also works well with large grinders which can be easily attached using the ring gimbal to make large grinding jobs much easier by eliminating the weight of the tool. The unit can be mounted in less than a minute, according to the company.



Noonee's Chairless Chair - Called an "ergoskeleton" for the way it helps increase worker comfort, the Chairless Chair from Swiss firm Noonee allows for quick, easy and flexible changes between sitting, standing and walking. The unit can support a maximum load of 290 pounds and takes less than 60 seconds to put on or take off. Retail pricing starts at about \$4,200 for a single unit. The Chairless Chair allows users to walk while wearing it, without obstructing the work space and at the same time avoiding strenuous postures such as bending, squatting or crouching. Users include Audi, BMW and Renault.



SuitX's MAX System - The MAX system from SuitX is a flexible exoskeleton that can be adapted for a variety of different workplace tasks. The result is a versatile system that can allow workers to complete shoulder, lower back, and leg-intensive tasks with reduced injury risk while remaining comfortable enough to wear all day. MAX (Modular Agile eXoskeleton) is composed of three exoskeleton modules: backX, shoulderX, and legX. Each module can be worn independently and in any combination depending on need. Laboratory evaluations on MAX at the University of California indicate the MAX system reduces muscle force required to complete tasks by as much as 60 percent. Customers include Costco, the U.S. Air Force and Boeing.



Sarcos Robotics' Guardian XO - Currently under development and expected to be commercially available in the second quarter of 2020, the Guardian XO robot is the first all-electric, battery-powered, full-body industrial exoskeleton robotic system that enhances human productivity while keeping workers safe from strain or injury. The robot enables workers to perform hours of physical activity, including repetitively lifting and manipulating heavy or awkward objects weighing up to 200 pounds. The system requires minimal operator training because it permits natural, fluid and intuitive movement, the company says, and is designed to operate for up to eight hours on one charge.

