



The Future of Construction Safety? You're Wearing It

PROCORE

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I. Is construction actually ahead of the game?

It could be said the construction industry's adoption of new technologies puts the rest of the workforce to shame. The supposedly old-school toolbelt crowd jumped right in when mobile tech and cloud-computing proved useful tools on the jobsite, so it shouldn't surprise anyone that some of the coolest new "wearables"—electronically-augmented clothing and accessories designed to improve construction worksite safety—are being designed expressly for the hard hat set.

About 20% of workplace deaths in the U.S. every year occur on the construction site—a grim statistic the industry has been at pains to improve.

The term Wearables is shorthand for Wearable Computers, the original term for an array of work-complementing devices designed to be worn on the person rather than carried in the hand or pocket. The term is a bit of a misnomer, since wearables include a number of different electronic gadgets, not all of which “process” or compute. Some of the wearables are sensors that monitor a worker’s vital signs and posture, while others improve workplace safety by

adding illumination or warning of the presence of moving machinery. There are also wearables that add to a worker’s strength or balance by offering a sort of ergonomic bracing. In other words there are as many kinds of “wearables” as there are perceived shortfalls that need addressing in the working environment.

Some wearables have gone to market, some are in beta-testing phase, and still others are in the R & D pipeline. Do wearables really have a future on the construction job site, or is it much ado about nothing? Take a look at this short list of wearables and decide for yourself:



II. Halo Light

The Halo Light wearable solves a problem, and in grand style.
The construction jobsite is an inherently hazardous work
environment on a good day.

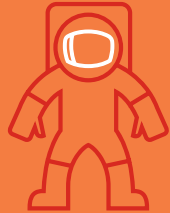
The fact is, 37% of construction work-zone fatalities occur at night, typically along poorly lit highway job sites.

The Halo Light banishes that darkness. This wearable solution is an LED-based luminescent ring that slips down onto the brim of a hard hat and throws out a brilliant 360° blast of LED light—276 lumens worth—bathing the entire work area in detail-revealing light.

Perhaps more importantly, Halo Light makes the wearer a light source, visible from as far away as a quarter mile. At a scant nine ounces (the small

lithium-ion battery clips to the hip), the Halo Light is the illumination source you wear. Its omnidirectional radiance allows the worker in dimly lit or nighttime conditions to work in a light-saturated environment, and to be supremely visible, to both the highway driver approaching the job site, and to the colleague operating heavy equipment.

These twin elements of the Halo Light's design function address the two pressing workplace safety needs that prompted the founders of Illumagear, (which makes the Halo Light), to begin the company in 2012.



III. Effort-Augmenting Exo-Skeleton

Readers of a certain age may remember the climactic scene in the film *Aliens* when astronaut Ripley puts on some futuristic heavy machinery suit to do battle with her space Beast nemesis. Well guess what? Ekso Bionics, a company that produces a weight-bearing “reciprocal-gait” exoskeleton for the medical industry, (stroke victims make particular use of the product), has produced an exo-solution that allows a construction worker to wield heavy power tools with comparative ease.

The company is presently developing a line of exo-wearables tailored to wielding specific heavy tools on the job site, using counterbalance. These are non-powered wearable structures that use counterweights to offset the loads being lifted. The rigors of construction work may be wearing unnaturally on the workforce. Designers are particularly focused on wearable exo-assistance where loads are being lifted to chest height or higher. The damage to shoulders and backs is notable.

The exoskeleton as an augmenting tool for help in hoisting toolboxes and pneumatic hammers, could be just the ticket for the construction worker worn down, not by the job per se, but by the hauling and lifting alone.



IV. Wearable Motion and Muscle Activity Sensors

The way we move determines much, (and we're not talking about the dance floor here). **What if all the spontaneous, random motion that takes place in your workday could be measured?** And then that data could be leveraged into conscious movement that works with, rather than against, the body's natural architecture?

A handful of companies have got your back on this one; and your shoulders, and everything else you are inclined to wear out. Wearable and wireless motion sensors record data at approximately 200 units of data per second, offering a richly detailed picture of your movement patterns, and answering questions you might never have thought to ask. Questions about the relationship between your pelvis and your spine area during an average workday, for instance.

The attached sensors and the rich feedback they offer are a first step in the process of adopting habits of workplace movement that are healthier and less likely to lead to injury.



V. Smart Helmet

There is something slightly redundant in the idea of a Smart Helmet, since any helmet's primary design function is already the protection of one's smarts and the head in which they reside. But these hard hats go one better than shielding the noggin from falling hammers.

How about a helmet visor whose Augmented Reality display shows you a projected overlay of what needs to be done in the immediate visible work area, even as you gaze safely through the array and continue the work at hand?

The helmet would also feature 360° cameras and 3D mapping capability. Because this headgear would be in constant communication with a cloud-based server, it effectively become a hands-free mobile device, replacing the tablet or cell phone in the field, a value-added in work environments where handholds are a necessary part of moving safely about the space. Front and back depth-sensors on the helmet would also provide warning alerts to the worker unknowingly entering the realm of in-motion heavy equipment.



VI. Smart Glasses

Smart Glasses are a partial response to the axiom, “There is no substitute for experience”. These smart glasses were designed to help address the shortfall of skilled labor in the construction sector, projected to become dire in the coming decade. The glasses come equipped with a camera connected to the Internet, where experienced technicians can conceivably talk new workers through certain tasks for which they’ve not yet been fully trained. The two-way cameras allow new laborers access to expert guidance, and managers can check in and get a quick point-of-view look at what the worker is doing at any given moment.





VII. Safety Vests

This is not your father's or mother's construction site vest. Yes, the vest is brightly colored and comes equipped with visibility-enhancing reflective surfaces. But that's just the beginning.

This wearable features an in-built GPS device that dynamically geo-targets the worker. In the event of a remote emergency the worker could be immediately located, whether or not she could communicate with home base.

Programmable geo-synchronous technology would also tell the vest where the more hazardous locales are on a worksite (according to whatever definition the users desire), and alert the wearer when he is nearing or has entered such a pre-defined danger zone, vastly increasing the worker's positional awareness and general alertness on the job.

Actuating devices in the vest can even disable operational heavy equipment when the vest is in proximity. Many of these construction site safety vests also come equipped with monitors to measure and broadcast heart rate, temperature, and other metabolic metrics, to alert supervisors to oncoming physical events and allow intervention in those cases. Repetitive motion sensors can even capture data related to worker movement and issue automated warnings.





VIII. The Pursuit of Job Site Safety

The construction job site will never be a completely safe work environment; that's just the nature of the work. But innovative strides are being made to mitigate the danger, using all the technologies currently available to throw at the problem.

As these devices are more universally adopted, the economies of scale should also make the price points more palatable to the construction sector's budget. A helmet, gloves, and a hernia-preventing truss are still standard issue on the job site. Add to these a 21st century array of warning systems, personal locators, and posture alerts, and you've gone a long way towards surrounding today's construction worker with a cocoon of awareness. And isn't situational awareness the number one goal in the pursuit of job site safety?



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