

INTERNATIONAL GROCERY RETAILER IMPROVES WORKER WELL-BEING, BOOSTS PRODUCTIVITY WITH EXOSUITS

New study shows distribution center employees increase output by 8% while decreasing back discomfort by 30%.

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INTRODUCTION

More and more organizations are adopting exosuits to improve quality of life for team members while reducing injury risk. The fact that exosuits reduce fatigue has been proven by multiple studies in and out of the lab.[1] The assumption has been that in addition to workers feeling better at the end of a shift, productivity will improve as well. However, few productivity studies have been conducted, and even fewer have been executed outside the lab.

HeroWear, an exosuit company developing products for workers who lift and bend every day, partnered with an international premium grocery retailer to analyze the impact exosuits have on worker productivity. To understand the effect, HeroWear equipped 40 team members with its Apex 2 exosuit. Over a nine-week study and four weeks of consistent exosuit use, the retailer observed an increase in productivity and a decrease in participant's work-related discomfort.

[1]https://www.sciencedirect.com/science/article/abs/pii/S0021929021003912 and https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7524767/

ABOUT EXOSUITS

Exosuits are a flexible, textile-based subset of a new class of wearable devices (exoskeletons) designed to improve the user's physical capabilities. This technology is applicable to a wide variety of industries, including logistics and warehousing, manufacturing and construction, military and defense and agriculture, to name a few. There are many types of exoskeletons on the market, including technology that supports different parts of the body (arms, legs, lower back, hands, etc.), elastic v. motorized, differing profiles, etc..



HEROWEAR'S APEX 2

The Apex 2 is an exosuit designed to provide physical assistance when bending and lifting, while allowing freedom of movement.

Key aspects include:

- **Lightweight: less than 3lbs, distributed evenly across the user's frame.**
- **Elastic bands (with no motors or batteries) work as an extra set of back muscles, offloading 20-40% of back muscle strain and reducing fatigue of back muscles by up to 40%.**
- **Modular and customizable to maximize comfort and the right amount of assistance for each user and task**
- **Abrasion-resistant fabrics, durable polymers, and aircraft-grade aluminum**

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CASE STUDY

The premium grocery retailer, together with HeroWear, conducted a nine-week study with 40 employees in a distribution center of the retailer. The key productivity measurement was the average cases picked per hour (CPH). The study compares 4 weeks of baseline data prior to exosuit use (Weeks -4 to -1), to 4 weeks of using the Apex 2 (Weeks 1 to 4). In between, one full week (Week 0) entailed fitting participants, training, and ramping up their use of the Apex 2.

"MY PERFORMANCE IS BETTER NOW, I'M LESS TIRED AFTER WORK AND MY BACK IS NOT TIRED AT ALL COMPARED TO HOW IT WAS BEFORE THE HEROWEAR."

By week one, team members were required to continuously wear the exosuit while performing their duties picking orders in the warehouse. This requirement was in place for the remainder of the study (weeks 1-4).

Productivity was tracked by the retailer throughout the study, while also collecting surveys about the user experience during weeks 0, 2 and 4. Following the training and ramp up (week 0), researchers observed a steady increase in productivity. During this time, nearly all participants reported substantially reduced work-related discomfort and overall effort required to do their jobs. At the end of the study, 81% of users expressed a willingness to continue using the Apex 2 - a strong score for any new piece of safety equipment.

THE RESULTS

By the conclusion of the study, researchers observed an:

"We are enthusiastic that our commitment to improving workers' quality of life can also provide tangible financial benefits to the companies they work for."

– Mark Harris, CEO and Co-founder of HeroWear



8% INCREASE in productivity



30% DECREASE in back discomfort



81% of workers willing to **CONTINUE** use



EXPECTED REDUCTION IN RISK for lower back disorders (injuries)

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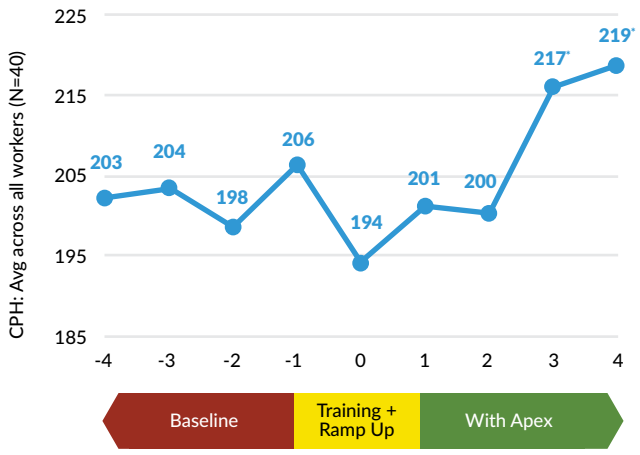
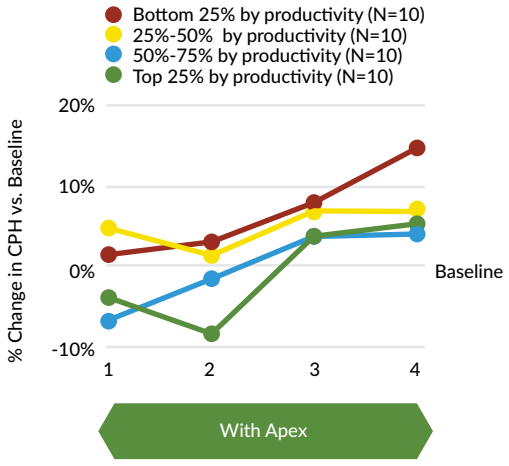
PRODUCTIVITY

As outlined below, nearly all team members experienced productivity gains, with the greatest gains seen by team members who were the least productive prior to using the Apex 2. Researchers observed a clear adjustment period with a decrease in CPH during week zero and one while workers adjusted to the exosuit, and then a ramp in productivity increases over the following weeks. This is expected when adopting new technology, with workers using 1-2 weeks to reach a new equilibrium.

Apex 2 Utilization Increases Average Cases Per Hour Picked



Productivity Over Time Following Introduction of Apex 2 Exosuit



These graphs shows the increase in average cases picked per hour (CPH) by workers before introducing the Apex 2, during training, and after the exosuit was implemented.

These increased pick rates result in a typical warehouse worker moving between 1,000 to 5,000 lbs of additional cases per shift. However, this did not increase bodily discomfort scores or effort required for work as reported by workers (seen in the following section). This is largely because, in terms of lifting assistance and back strain relief, the Apex 2 reduces the handheld weight experienced by a warehouse worker by 10,000 to 30,000 lbs per worker, per shift.

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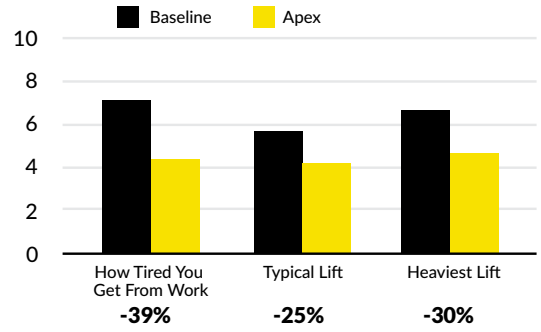
EMPLOYEE EXPERIENCE

After four weeks of use, employees reported a positive experience using the exosuit. Employee experience was calculated based on self-reported data from surveys measuring employee effort at work and work-related discomfort on various parts of the body. Surveys taken after the study were compared to baseline surveys that were gathered before exosuit use began.

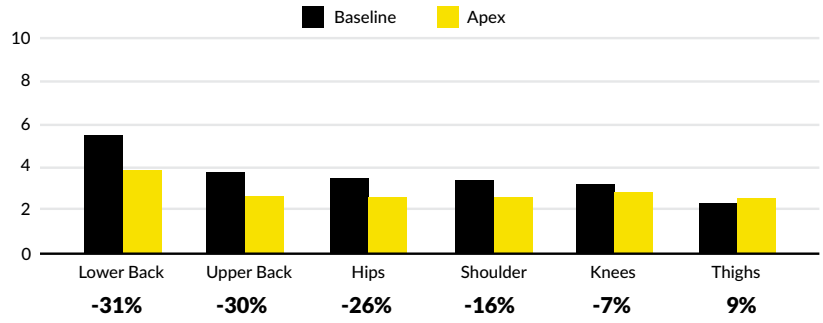
On average, employees stated their jobs overall required 39% less effort when wearing the exosuit. This was established based on the survey question “How tired did you get from work?” Employee scores for the effort required for a “typical lift” dropped by an average of 25% while the effort for the heaviest lift decreased by an average of 30%.

Users were also asked about work-related discomfort on various specific parts of the body. Substantial reductions in back discomfort (>30%), and moderate reductions in hip and shoulder discomfort (16-26%) were observed. Knee and thigh discomfort scores were low both with and without the exosuit, and wearing the exosuit had negligible (<10%) effect.

Effort At Work



Work-Related Discomfort



These graphs illustrate survey responses from participants measuring their effort at work and level of discomfort. Productivity measures were on all 40 workers, while effort and discomfort scores were based on surveys from 31 participants with 9 users not completing the survey.

Reducing worker discomfort and decreasing fatigue allows employees to spend more time doing what they love outside of work. By increasing productivity, the exosuit is making the workplace more efficient while benefiting workers with each lift.

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INJURY RISK REDUCTION



The productivity and musculoskeletal relief results found in this study align with Apex results in prior academic and industry studies. In 2022, a Journal of Applied Ergonomics publication[2] used occupational injury databases and an ergonomic assessment called Exo-LiFFT[3] based on established fatigue failure principles to estimate the effect of back exosuits on injury risk. Based on field study data, it concluded that the Apex may reduce low back disorder risk by 20-60% for material handling jobs. This aligns with the 30% reduction in back discomfort reported by case pickers in this study. In 2023, a Vanderbilt University study[4] found that exosuits increased lifting endurance and that because exosuits reduce peak musculoskeletal loading, individuals can increase the number of lifting repetitions they perform without canceling out the projected injury risk reduction benefits. In 2024, an Iowa State University study[5] found that wearing an Apex exosuit reduced muscular fatigue, which resulted in increased cognitive performance on work tasks. This converging evidence further corroborates the potential for exosuits like the Apex 2 to have dual benefits on work performance and injury risk reduction.

[2]https://pubmed.ncbi.nlm.nih.gov/34740072/
[3]https://lab.vanderbilt.edu/zelik/resources/exo-lifft/
[4]https://www.techrxiv.org/doi/full/10.36227/techrxiv.23643633.v1
[5]https://journals.sagepub.com/doi/abs/10.1177/00187208231221890



RETURN ON INVESTMENT

Assuming an average wage of a warehouse worker in the U.S. of $17 /hr[6] the total cost for employers with benefits is about $23.80 /hr[7], productivity improvements using the Apex 2 would result in a payback period under 5 months. Savings could exceed $150k in year one for 40 workers alone. Over a 5-year period, allowing for occasional maintenance costs, this 8% productivity improvement for only 40 workers could result in over $700k in savings, a more than 13x return on the initial investment of the Apex 2s - all while improving the workers' quality of life.

In addition to productivity improvements, cost savings may also be seen in reduced lost work days and medical costs due to reduced injury risk, as well as improved employee retention and recruiting. HeroWear has developed an ROI Calculator to help companies analyze the costs and benefits of the Apex 2 using their own data.

Estimate your company's ROI on the Apex 2 at HeroWearExo.com/ROI

ROI Calculator

[6]Zip Recruiter, National Average in the US - https://www.ziprecruiter.com/Salaries/Warehouse-Worker-Salary
[7]Bureau of Labor Statistics - https://www.bls.gov/news.release/archives/ecec_12152022.pdf

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