



# When We Merge With Machines

Human Augmentation in the Construction Industry

# Introduction

While popular sci-fi films and comic books may depict ‘human augmentation’ as some sort of futuristic tech that creates cyborg-like beings somewhere between human and machine, the reality is much less extreme.

The term commonly refers to technology that is integrated with a user’s body to help enhance his or her

productivity or capability and prevent personal injuries.

In its essence, human augmentation is nothing new or obscure. For example, the first eyeglasses were constructed in Italy sometime during the 13th century. Now an estimated 164 million Americans wear glasses to correct their vision.

## Let’s Take A Closer Look...

Types of human augmentation technology can be distilled down into three categories based on its function: replicating, supplementing, or exceeding human ability.

Replicating human ability - This type of human augmentation aims to replicate and/or restore abilities achievable by a typical person.<sup>1</sup>

Maybe no sector explores this category more than the medical field where pacemakers, prosthetics, and wearable devices have been advancing for decades.

Supplementing human ability - Devices that artificially aid one’s strength, intelligence, sight, or any other ability beyond normal limits.<sup>1</sup>

In the construction industry, different types of wearable devices are being utilized to help reduce strain and fatigue



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for users – and enable contractors to tackle health and safety issues.

Exceeding human ability - Human augmentations that make it possible to do things that we are not normally able to do on our own – such as fly, breathe underwater, superhuman sensory enhancement, etc.<sup>1</sup>

An interesting example is Brain-Computer Interfaces (BCIs), a field which has grown rapidly in the last few decades. While largely conceptual, BCIs are interfaces that allow an individual to interact with a computer or machine using only their mind.

## Public Opinion Snapshot

Maybe it's sci-fi lore; maybe it's fears it'll somehow exceed human ability and render us obsolete. But not everyone is comfortable with the idea of human augmentation. For example, 39% of people think human augmentation will be dangerous for society.<sup>2</sup>

However, many see the positive ways in which human augmentation can improve lives. 63% would consider augmenting our bodies with technology to improve them – either permanently or temporarily.<sup>2</sup> That's particularly true for industries such as construction, where human augmentation can help make working on jobsites safer, address labor shortages, and enhance productivity.



# 48%

of men feel it's 'completely' or 'mostly' acceptable to augment a body with technology, compared to 38% of women.<sup>2</sup>

# 63%

would consider augmenting our bodies with technology to improve them – either permanently or temporarily.<sup>2</sup>

# 53%

of those in favor of augmentation believe it will improve quality of life.<sup>2</sup>

# 40%

would use augmentation to improve their overall physical health.<sup>2</sup>

# 39%

of people think human augmentation will be dangerous for society.<sup>2</sup>

## ...What about the construction industry?

With the global market for human augmentation projected to reach US \$22.4 billion by the year 2027,<sup>3</sup> many players in multiple industries will begin driving development of human augmentation for their applications.

There is growing momentum behind human augmentation in the construction industry and as a result construction technology is getting safer. While these innovations will never replace highly-skilled construction workers, the technology can help support them – making working on jobsites safer, addressing skilled labor shortages and enhancing productivity.

One way the industry is implementing human augmentation is through exoskeletons – wearable systems that provide physical assistance to its users through assistive torque and/or structural support. The system is worn on the body and follows the user's movements, no – or very limited – modifications of the workplace are required.

# Exoskeleton Addressing Productivity and Increased Demand

Musculoskeletal injuries caused by overhead construction work have a profound effect on the construction industry's businesses and employees. Companies lose productivity due to musculoskeletal injuries and an employee's wellbeing is at a risk if they suffer any kind of injury.

Exoskeletons are designed to enhance productivity by reducing stress on the body, causing less pain and fatigue due to a reduced load on muscles and joints. This reduced stress and increased comfort when working, enables users to improve their health and reduce the number of sick days they

take – provided that they still take the required rest breaks for physical and mental wellbeing.

Studies have shown effectiveness of the exoskeleton in terms of reducing stress on a worker's muscles and joints, to improve the health of a worker and minimize days lost through poor health.<sup>4</sup>

By being able to retain skilled workers for longer periods of time due to fewer employee sick days, construction companies can utilize exoskeletons to improve operations twofold by improving employee wellbeing and increasing on-site productivity.

**498,000**

workers reported to be suffering from work-related musculoskeletal injuries in 2018/19 with...



**41%**  
of these injuries relating to upper limbs and neck.<sup>5</sup>



**8.9** million

million working days were lost due to work-related musculoskeletal injuries in 2019/20.<sup>5</sup>

## Final thoughts...

Human Augmentation technology has the ability to enhance the lives – and work – of people around the globe.

Today's construction companies must be aware of the issues caused by musculoskeletal injuries – from health and safety issues that affect employee wellbeing – through to productivity issues.

The time to act against musculoskeletal injuries and support construction workers is now.

### REFERENCES

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To learn about Hilti's wearable exoskeleton for construction, please visit:

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