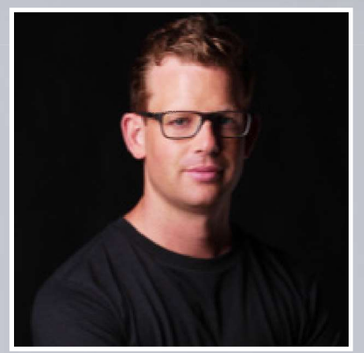
HOW AI IS CHANGING MANUAL HANDLING



An Interview with Matthew Hart, Founder & CEO of Soter Analytics

Reducing dangerous manual handling movements is a key component of many companies' health and safety policies.

Despite this, thousands of injuries are still caused each year by poor manual handling – the Health and Safety Executive (HSE) reported nearly 0.5 million work-related musculoskeletal disorders in 2020, with 8.9 million working days lost as a result of these injuries.

"While manual handling training has brought this figure down, clearly more can – and must – be done to reduce harm to employees.

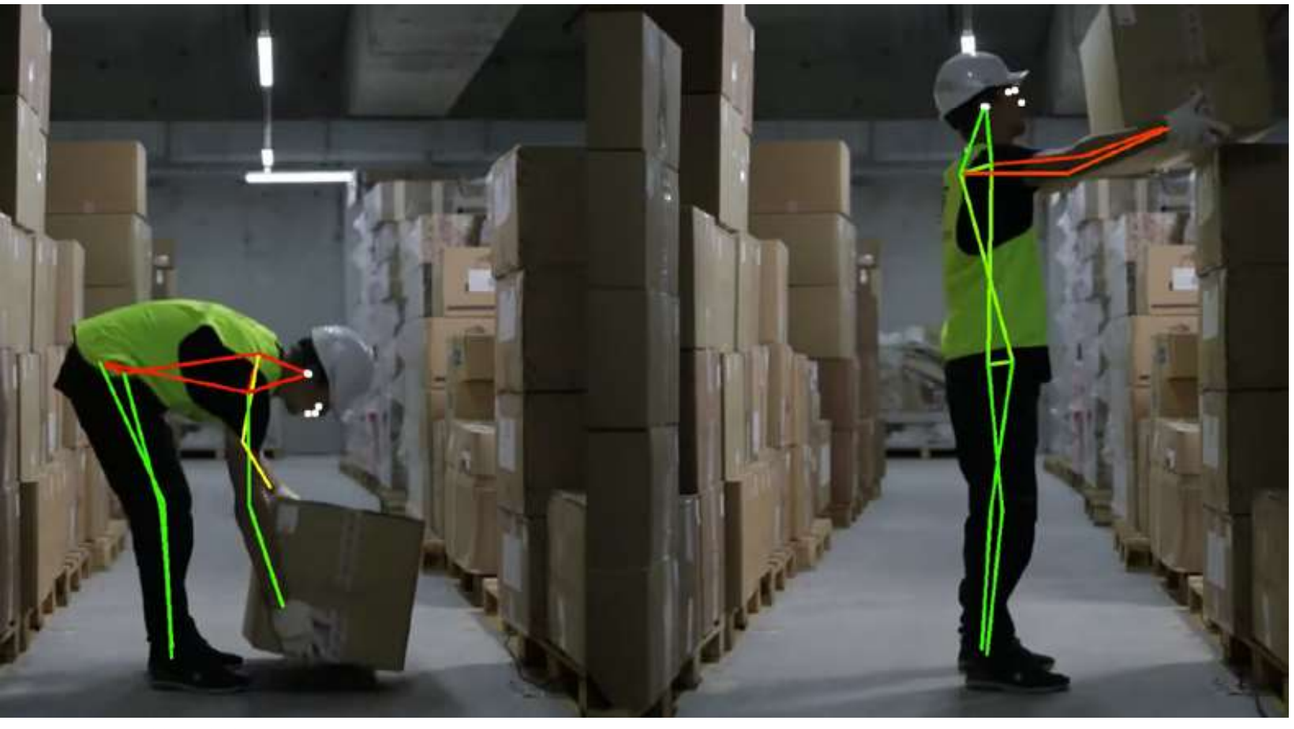
New advances in ergonomic training are helping companies make this step change in manual handling injury reduction. Wearable technologies – such as the Soter device – leverage the power of artificial intelligence (AI) to coach workers to self-correct their movements in real-time to avoid ergonomic injuries, reducing the risk of back and shoulder injuries by 40% in just two weeks.

And soon, combining AI with sensorless technology will enable health and safety professionals to analyse the risk of each job and eliminate or control any dangerous movements. Matthew Hart, Founder and CEO of Soter Analytics, discusses why this technology has been developed and how it can help improve safety in the workplace.

What are Soter Wearables and SoterTask?

The Soter wearable is a small device that can be worn on the collar at the back of the neck or on the arm, which tracks the movements of the user and – alongside the SoterCoach app – coaches the wearer on how to self-correct their movements in real-time to avoid back and shoulder injuries.

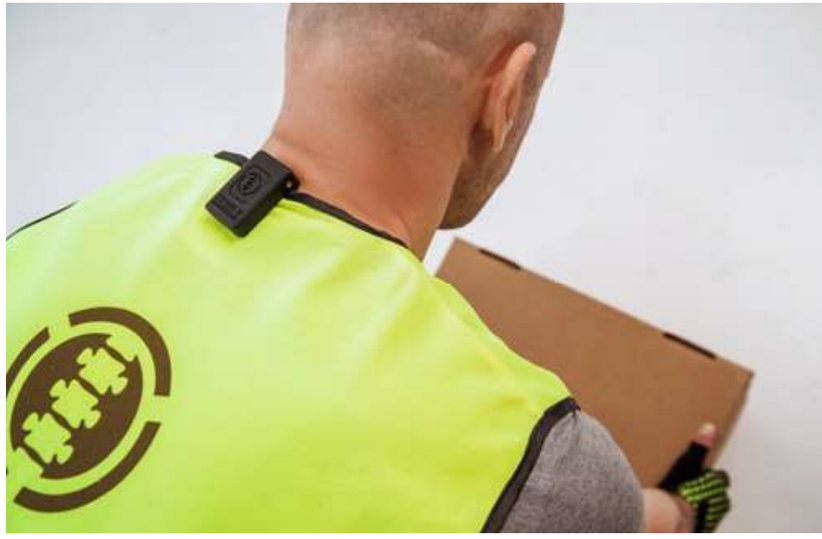
We have taken this a step further with SoterTask, which does not require any wearable devices. Instead, the user is tracked by the AI on the SoterTask video application, which has been trained to detect the different body parts and determine if any movements are potentially dangerous. This allows health and safety professionals to accurately measure the risk of each task, enabling them to objectively analyse and design out movements or introduce controls.



Why are traditional approaches less effective?

Traditional workplace safety standards specify what 'typical' humans can withstand. In the case of ergonomics and manual handling risk, these usually estimate how many higher-risk movements a person should make within a given time period and how much weight or force a person should be able to carry out safely.

These limits are created for all humans as if we are equal in size, strength, fatigue, stress level and injury status. They do not consider if one person is a weightlifter or another has a fused spine. This was the driving factor behind building what is known as our 'Intensity Model', which is one of the 10 different measurements that the Soter devices capture. Unique to Soter, we believe our Intensity Model technology provides a more personalised approach to the existing standards.



How were the algorithms created to distinguish a movement as unsafe?

Our team of doctors, ergonomists, technical engineers, data scientists and movement specialists conducted a 2-year study. The intensity model was conceptualized and built based on an individual's natural movements and synthetic movements. Over 10,000 high- and low-intensity movements were recorded, and the device was taught to distinguish them.

The Soter device measures up to 10 different high-risk movements and in relation to the intensity of a movement; the weight of an object is not measured, but rather the intensity of how a movement is performed. The movement is defined as highly intensive when a person finds it physically difficult to execute and, in many cases, this often means working with a heavy load, but not always. If a large load is carried, even a small amount of bending can lead to injury, since the fibres of the discs are much less tolerant to load at this position. Jerky and fast movements are also defined as high intensity, as fast extension movements create a larger window during which the spine is exposed to instability and injury because of lack of muscle forces. Physical conditions such as fatigue, stress or disease can dramatically lessen the weight that can be lifted safely, and this may also be measured as high intensity.

How does the intensity model work?

Every time a person makes a movement (e.g. lifting an object) the Soter wearable device collects high-frequency Inertial Measurement Unit (IMU) data.

This data is fed into a neural network which, based on our 2-year study, is trained to understand if the person finds the particular movement difficult or not. The devices measure things like the speed of a movement, jerkiness of a movement, the angle of the back when the movement has been completed (some people lean forward because the object is heavy, others lean back to compensate for the weight), and 29 other complex features.

Based on the above measurements, through machine learning, the Intensity Model continually self-learns to calculate how the worker's risk is adjusting and can spot when a worker is becoming fatigued, when objects are stored in a way that makes the movement more awkward, or when an object is too heavy based on the above indicators. It can also estimate how much rest is required to allow the body to recover.

SoterTask works similarly but does not require a wearable device. Instead, the user is tracked via video and the AI determines which movements and positions are potentially dangerous. The AI detects and marks each body part and indicates the risk with a simple colour system, where green is safe, yellow is higher risk, and red is potentially unsafe.

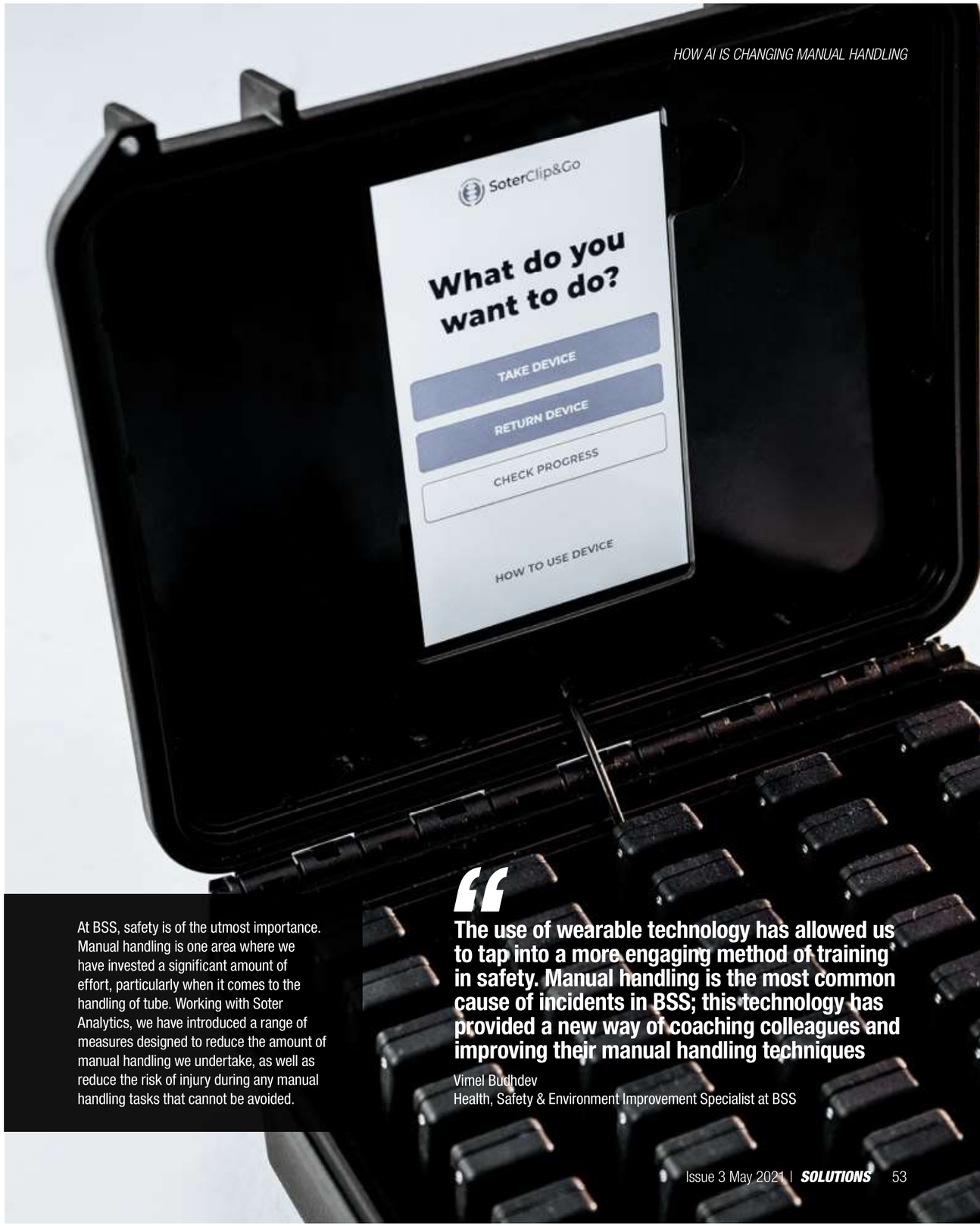
What are the benefits of AI-based manual handling training?

At Soter Analytics, we have built a system that self-learns and gives personalised feedback to each individual worker, helping them avoid the movements that might increase their own risk of injury.

This is a step-change from traditional standards that only estimate the weights that people can safely move but completely ignore a person's inherent strength and fatigue. The Soter Wearables and SoterTask can provide specific insights to workers and their employers.

Measuring the capability of each individual, personalising manual handling training, and making informed decisions about how a task can be done safely provides an objective edge to keeping your workers safe.

Learn more at Soteranalytics.com.



At BSS, safety is of the utmost importance. Manual handling is one area where we have invested a significant amount of effort, particularly when it comes to the handling of tube. Working with Soter Analytics, we have introduced a range of measures designed to reduce the amount of manual handling we undertake, as well as reduce the risk of injury during any manual handling tasks that cannot be avoided.

"The use of wearable technology has allowed us to tap into a more engaging method of training in safety. Manual handling is the most common cause of incidents in BSS; this technology has provided a new way of coaching colleagues and improving their manual handling techniques

Vimel Budhdev
Health, Safety & Environment Improvement Specialist at BSS