

## SSA Marine SuitX exoskeleton

lightweight exoskeleton which uses springs to store and release a worker's energy while working, reducing the force required, assisting the lift and decreasing risk of musculoskeletal injury

### *the challenge*

Musculoskeletal injuries are one of the most common risks to which employees working for SSA Conventional affiliates are exposed. These injuries can be especially prevalent when SSA Conventional affiliates are loading and unloading stores and bags on cruise ships. The activity of loading stores and bags is highly manual with each individual bag being required to be lifted onto trolleys, then onto a baggage belt and then back onto trolleys to the vessel. These bags weigh up to 30kg each and there are generally thousands to be loaded per shift. The challenge is finding a way to reduce the level of musculoskeletal harm and fatigue that was occurring to workers within the operation.

### *the innovation*

SSA Conventional affiliates have partnered with Ottobock to trial and potentially implement their SuitX exoskeleton. The exoskeleton has two parts. One part supports a worker's back and the second supports the worker's shoulders. The SuitX exoskeleton uses a number of springs tied to an adjustable exoskeleton to store and release a worker's energy while working. This alleviates the amount of force required as it uses the worker's own lifting and carrying motion to help with the lift.



The system also does not require any external power source and is a slim and lightweight design so it is easier to use in a congested environment.

#### *how it was implemented*

SSA Conventional affiliates implemented the SuitX exoskeleton system by distributing the system across three different cruise operational sites in Florida, primarily in relation to the lifting, carrying, and moving of luggage. The system supports workers' shoulders, backs and legs, where the greatest strain typically occurs.

Each of the three sites received a set of exosuits to trial, and staff members were encouraged to integrate them into their daily routines where applicable. This hands-on approach allowed a variety of employees across different roles to evaluate the exosuits' effectiveness in real work conditions. After using the exosuits, workers at each site provided feedback through structured polls featuring multiple-choice questions about functionality, comfort, and overall experience. Additionally, SSA Conventional affiliates gathered verbal feedback to capture more nuanced insights.

#### *result*

The introduction of the SuitX exoskeleton system resulted in a significant drop in the level of effort required by workers to lift bags. This also reduced the fatigue levels of the workers and has led to a reduction in the number of musculoskeletal injuries. In addition to this, the workers also gave really good feedback on the system and were fully in support of the system as was their union.



The combination of anonymous polls and direct conversations enabled collection of comprehensive data on the exosuit's performance across all test locations. The feedback informed SSA Conventional affiliates about potential benefits, limitations, and areas for improvement, offering valuable insights into how the exosuits could be effectively integrated to enhance worker well-being and efficiency in labour-intensive roles.



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### *conclusion*

SSA Conventional addressed a significant safety challenge—musculoskeletal injuries from lifting heavy bags in its cruise ship operations—by implementing the SuitX exosuit system. This exosuit was designed to reduce strain on workers' shoulders, backs and legs, supporting them in tasks involving heavy lifting and repetitive bending without requiring an external power source. It uses springs to store and release energy, effectively alleviating some of the physical effort needed for each lift and improving worker comfort and ergonomic form while lifting.

The trial involved three Florida cruise operation sites, where employees incorporated the exosuit into their routines to evaluate its impact. Feedback was gathered via anonymous polls, with multiple-choice questions on functionality and comfort, as well as open-ended responses. Verbal feedback was also collected, enabling SSA Conventional affiliates to capture detailed insights into the exosuit's effectiveness.

The results of the trial have been positive, showing a noticeable decrease in fatigue and musculoskeletal strain in the back and lower body among workers that have practiced exosuit use while performing their job tasks, along with strong approval from both employees and their union. This trial highlights the SuitX exosuit system's potential to improve safety and

efficiency in labour-intensive roles and the potential to reduce the amount and cost of musculoskeletal injuries.

LINK: <https://www.ssamarine.com/>

