

Ironhand®

World's first soft robotic muscle strengthening system





Creating the Working Athletes of Tomorrow

The Challenge

Automation and industrialization of factories and work sites have been a great development in terms of improved health and safety for workers, but has led to more grasp intensive work tasks. This means exposure to high forces, repetitive and/or static work and involves a risk for the workers to develop strain injuries. To create sustainable workplaces, it is crucial to protect the workers by improving ergonomics and integrating them into the Industry 4.0/Factory of the Future concept.

- Over 2 Billion Euro in yearly costs in the EU due to work related upper limb disorders (OSHA)

- 48 % of all work related injuries are musculoskeletal disorders in the hand¹
- Musculoskeletal disorders is one of the most prevalent causes of sick leave (OSHA)

Strong. Smart. Sustainable

Ironhand strengthens the human grip, prevents strain injuries and reduces the number of sick leave. It is an active soft exoskeleton consisting of a glove, covering all five fingers and a power pack worn in a backpack. The glove is equipped with artificial tendons and pressure sensors that trigger the servo motors installed in the power pack. These motors provide the operator with an extra powerful grip. The grip can be easily adjusted to a specific work task by providing individual configuration possibilities. At the same time as it supports the operator, Ironhand collects data to enable a digital risk assessment of the hand in which use cases that run a potential high ergonomic risk is evaluated and identified. The data is used in combination with two scientific risk assessment methods, KIM/MHO and HAL/TLV, and provides a calculation of the operator's risk of developing strain injuries as well as the potential risk reduction which Ironhand can contribute.

Award-winning technology

Precisely engineered in Sweden by leading-edge engineers merging neuroscience, bionics and robotics.

Comfort on the edge

Comfortable, adjustable and flexible to ensure unrestricted movement – textiles and fit for maximized comfort and breathability.

Adaptive and intelligent

Digitalization of risk assessment collecting hundreds of variables for optimal performance while becoming smarter with every use.

Bioservo has developed Ironhand in cooperation with their development partners General Motors, General Electric, Airbus and Eiffage.

¹ Collinder, A. och Ekstrand, E. (2018) Hand ergonomics in early phases of Production Development. Göteborg, Sweden. Chalmers University of Technology.

“Our employees have tested Ironhand® in various work tasks within Eiffage, such as coating of roads, civil engineering work and work within both metal and energy. The results have been very positive both in terms of performance and versatility since the glove can be used in a variety of different workstations.”

ERICK LEMONNIER

Director of Prevention at Eiffage Infrastructures

Applications Ironhand

Ironhand is suitable for grasp intensive work tasks where the hands are exposed to high forces, repetitive and/or static work. The glove is highly configurable to suit specific work tasks and individual preferences.

Manually guided tools: All devices, tools and power tools that must be held static for a longer period of time, for example:

- grinder
- screwdriver
- torque gun/angle impact wrench tool
- polishing machine
- welding machine
- hammer
- pop rivet gun

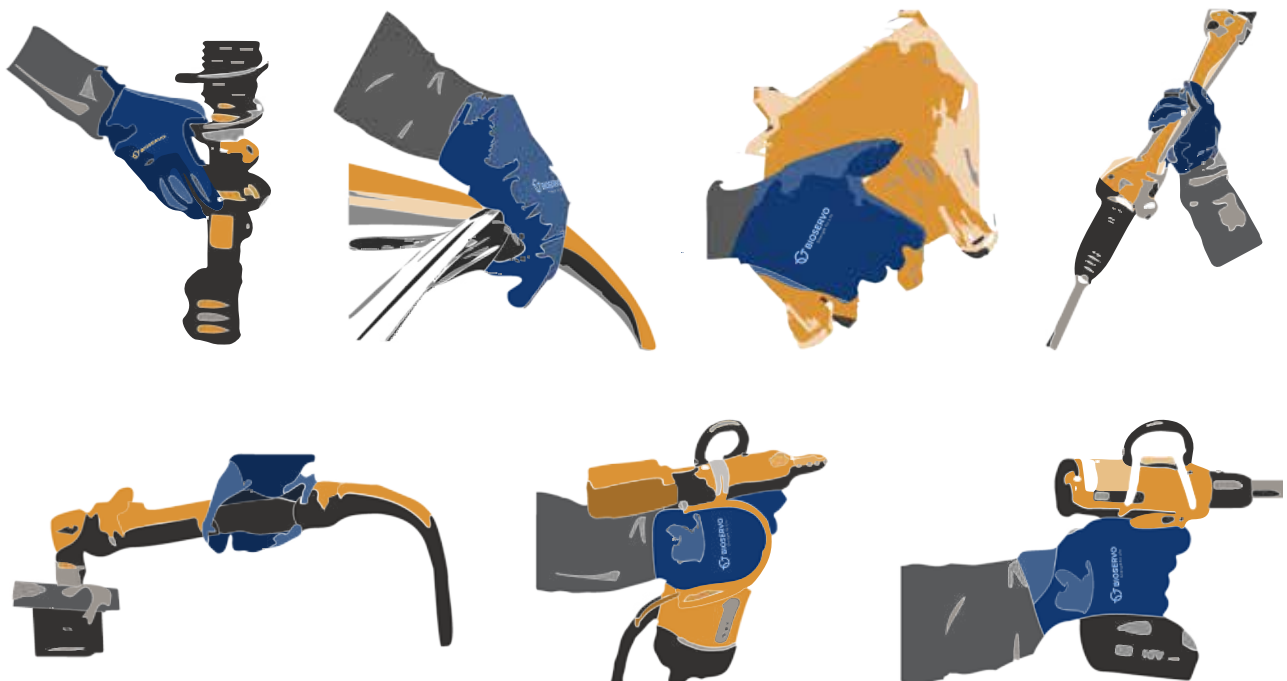
Assembly: Manual assembly work, for example pressing in, clipping or compressing something. Support for

1. Heavy objects
2. Light objects, but highly repetitive movement

Warehousing or similar: Lift, hold and carry loads where a secure grip is important.

Examples of industries with suitable work tasks:

Aerospace, automotive, construction, waste management, steel structure, manufacturing of household appliances, and transport.



Examples of grasps and tools suitable for Ironhand®.

Backpack with power pack

Remote control

Cord

Armstrap

Glove



- The Ironhand glove is available in four sizes for the left and right hand (S, M, L, XL).
- A normal working glove must always be worn on top of the Ironhand glove to be compliant with all relevant health and safety regulations.
- The total weight of the Ironhand system is approximately 2,5kg.
- The battery will last approximately 6-8 hours depending on the intensity of the work task.

Glove – contains the artificial tendons and the pressure sensitive sensors

Cord – the connection between the glove and the power pack

Power pack – contains the motors and the battery and is worn in an Ironhand backpack

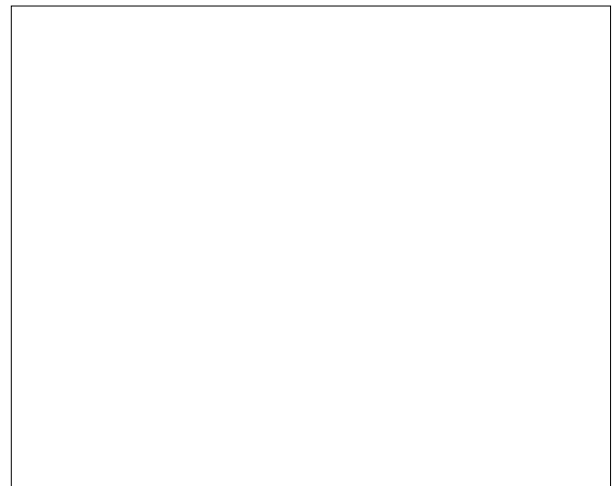
Remote control – gives the user full control at all times and can be used to adjust the volume of force as well as change between two configuration profiles.



Ironhand power pack



Bioservo Technologies (publ) is a technology and development company that combines medical science with modern robotics. The company holds a leading global position within soft exoskeleton technology – wearable non-invasive devices – for people in need of extra power to optimize the body's endurance and performance, or for people with reduced muscle strength.



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