

Innophys Co., Ltd.

Muscle Suit®, a compact and lightweight wearable exoskeleton device that supports the lower back muscular system by providing up to 35.7 kg of extra power

<https://innophys.jp>

Innophys Co., Ltd.
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Founded in:	2013
CEO:	Takashi Furukawa
No. of employees:	15
Type of Ownership:	Private

December 2018: Invented by Prof. Hiroshi Kobayashi, Department of Mechanical Engineering, Tokyo University of Science, the Muscle Suit® is becoming an indispensable device for the elderly care services as well as many other heavy lifting tasks. Venture Valuation (VV) interviewed Takashi Furukawa, CEO.



VV: **What is Muscle Suit®?**

Furukawa: Muscle Suit® actualizes McKibben pneumatic artificial muscles, which were first developed in the 1950's in artificial-limbs research in the U.S. It is distinguished by its high level of functional resemblance with human skeletal muscle.

While most similar products are battery powered, Muscle Suit® is battery free with simple operation procedures. It weighs quite light (as little as 4.3 kg) and is easy to wear like a backpack.



Currently we have three different types: Muscle Suit Power, Muscle Suit, and Muscle Suit Edge. Each type provides two sizes. Depending on their bending and lifting needs, the users choose an appropriate type and size.



In collaboration with Prof. Kobayashi and his team in the university and by carefully listening to the users' feedback and requests, we are able to speedily improve functionality and create new products. As we are moving fast, we are not worried about being copied.

VV: With the rapidly aging population and the decreasing work force in Japan, labor intensive jobs can be made more productive by assisted devices such as Muscle Suit®.

Furukawa: Our customers are caretakers at nursing homes, construction workers, agricultural workers, and those who wish to protect their lower back when bending over and lifting heavy objects.



The chart below¹ shows industries are affected by lower back injuries in Japan. It is based on the number of workers who took more than four sick days in a row due to lower back pain in 2011. The most affected is the non-manufacturing sector which includes construction, road freight, retailing industries, and other industry such as agriculture (37.1%).

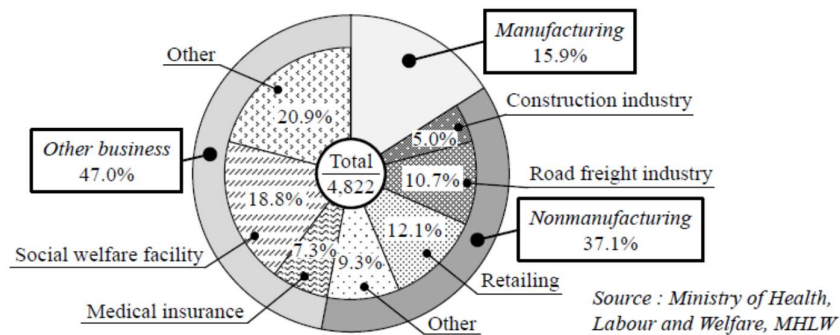


Fig. 1 Lower back pain it taken a rest more than 4 days that occurred in 2011

The second largest group is the healthcare industry categorized as social welfare facility and medical insurance (26.1%). A growing number of nurses and caretakers at nursing homes quit their jobs due to MSDs (musculoskeletal disorders) caused by lifting patients. MSDs in the lower back are around 60% of total work related diseases.

With the aging society, the elderly are more and more involved in taking care of the elderly. And the number of workers over aged 65 staying in good physical shape has increased in Japan. We believe that Muscle Suit® provides them with additional physical strength and encourages confidence and independence.

VV: What is your next step for growth?

Furukawa: First, we are going to introduce more affordably priced devices. The minimum price of current device costs 498,000 JPY (about 4,580 USD).

¹ “Development and assessment of muscle suit” published in the Bulletin of the Japan Society of Mechanical Engineers Vol.83 No.847, 2017

For nursing home care, the government subsidizes 300,000 JPY (about 2,760 USD) per device. Our objective is to make Muscle Suit® part of daily life for all who require assisted devices.

Second, we keep developing innovative products. Recently we announced Muscle Upper, a different type of exoskeleton device supporting both arms and lower back. Another product in development is a rehabilitation system for physically challenged people. The details will be disclosed in due course.

We will expand globally. Our unique exoskeleton devices are drawing attention from several countries in Asia and Europe as well as the U.S. This year we were lucky to be one of the 2018 Red Herring Top 100 global winners², a prestigious award for startup companies in the world. This is a great opportunity to make Innophys better known.

VV Comments after the interview:

The Lancet, a weekly peer-reviewed general medical journal, published in March 2018³ a series of papers warning that “lower back pain is the leading cause of disability globally affecting over 540 million at any one time.” “Prevalence of the condition is expected to continue to increase with an aging and increasingly obese population”.

The French National Research and Safety Institute (www.inrs.fr) for the prevention of occupational accidents and diseases published in June 2018 a research report on exoskeletons for different parts of body.



Various noteworthy technologies including Innophys' Muscle Suit (see left) are being watched.

In fact, the healthcare assistive robots market is projected to be worth around \$1 billion by 2025.⁴

² <https://www.redherring.com/2018-red-herring-top-100-global-winners/>

³ www.thelancet.com/series/low-back-pain

⁴ “Healthcare Robotics for Elderly Soars by 2025” Health Management.org

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