

Bioservo Technologies

Sector: Tech /Medtech

Inflection point getting closer

Redeye initiates coverage of Bioservo Technologies, a Swedish technology, and medical technology company. Bioservo develops and produces soft exoskeletons for industrial and Life Science use. We see an attractive case with significant upside potential. We now see that the company is approaching an inflection point for long-term growth.

Inflection point getting closer

Bioservo has developed its offering during the pandemic to come out stronger at the other end. The iHand clinical trial is planned to be completed within the year with results published during the first quarter 2022, which should give a runway for introducing Carbonhand 2.0. The GM trials are in their final stages, and we expect a positive outcome. With a return to a more normal business situation, we believe that Bioservo is approaching an inflection point regarding growth in the coming 6-12 months.

TAM – addressing two huge markets

The potential size of the two markets that Bioservo is addressing is immense. The Industrial and Life Science sectors show high numbers of strain injuries in the workplace and high prevalence in different clinical conditions that would benefit from the assistive or rehab glove. The population sizes in the target markets gives a very high TAM based on the high prevalence and trends. The aging populations will continue to drive growth in both segments.

DCF model valuation indicates substantial upside

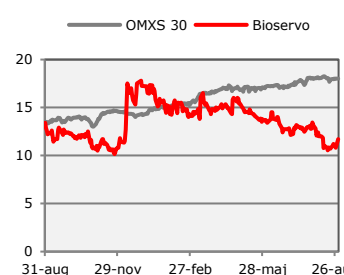
There could be more potential with the strong partners that we have not yet taken into full consideration; we have to see some more indications from the partners to discount the sales potential entirely. With what we believe to be a conservative growth scenario, considering the possibility in the market, our 20-year DCF model indicates a Base case fair value of SEK 19 per share. This represents close to an 60 % upside from current levels. We are aware that there may be a need for further financing; nevertheless, the sales potential and a very strong product offering makes an attractive case and entry point at current share price levels.

Key Financials (SEK)	2020	2021Q1	2021Q2	2021Q3	2021Q4	2021E	2022E	2023E
Revenues	11,7	1,5	1,0	2,0	4,0	8,5	29,8	47,8
Revenue growth	28%	-50%	-80%	11%	98%	-27%	249%	62%
EBITDA	-22,3	-8,0	-9,8	-9,2	-8,0	-35,0	-28,9	-20,6
EBITDA Margin (%)	-191%	-529%	-1030%	-460%	-200%	-414%	-81%	-43%
EBIT	-28,3	-9,0	-10,9	-10,0	-8,8	-38,7	-29,8	-23,4
EBIT Margin (%)	-226%	-598%	-1139%	-502%	-220%	-458%	-100%	-49%
Net Income	-28,3	-9,0	-10,9	-10,0	-8,8	-38,7	-23,1	-18,8
Net Income Margin (%)	-226%	-598%	-1139%	-502%	-220%	-458%	-78%	-39%
EV/Revenue	18,9	20,8	20,8	20,8	20,8	20,8	6,5	4,4
EV/EBITDA	neg	neg	neg	neg	neg	neg	neg	neg
EV/EBIT	neg	neg	neg	neg	neg	neg	neg	neg
P/E	neg	neg	neg	neg	neg	neg	neg	neg

FAIR VALUE RANGE

BEAR	BASE	BULL
10.0	19.0	28.0

BIOS.st VERSUS OMXS30



REDEYE RATING 1-5



KEY STATS

Ticker	BIOS.st
Market	First North
Share Price (SEK)	12.0
Market Cap (MSEK)	194
Net Debt 21E (MSEK)	-17
Free Float	68 %
Avg. daily volume ('000)	39

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Investment thesis

Inflection point getting closer

Bioservo has continued to develop its soft exoskeleton solutions for both industrial and healthcare use. There have been both clinical trials and trials with partners to build the product/solutions further. The commercialization process has been delayed by the Covid pandemic that brought the targeted industries to a standstill. With the iHand clinical trial soon to be completed and finalization of GM trials and positive feedback from Toyota, paired with a return to more normal business conditions, we believe that Bioservo is approaching an inflection point regarding growth in the coming 6-12 months.

Addressing two huge markets

The two markets targeted by Bioservo are huge. The TAM of the Industrial and Life science market exceeds EUR 18 bn and is expected to grow in high double-digit numbers in the coming years. The fundamentals, with increasing Musculoskeletal Disorders (MSD) or strain injuries in the industrial sector, are a real cost issue both for society and the employer. The aging population requires new solutions to deal with the effects of such problems as weak hands due to aging and stroke, to name a few.

Strong position in the soft exoskeleton market for hands

Bioservo has a very strong position in the soft exoskeleton market, especially regarding hands. Some competition addresses some of the same issues, but they are relatively alone in their niche in the soft solution, where most other competitors have rigid systems. The SEM™ technology has a strong patent with additions made with the new developments in sensors and other technologies introduced during last years.

Strong partnerships should make the difference

The partnership list is very impressive. The SEM™ glove technology contains 11 patents owned by Bioservo as well as a technical joint development project with GM and NASA, which is attractive regarding sales potential. Bioservo has entered into partnerships or collaborations with large companies in their focus verticals in the industry sector. In Automotive, Toyota is testing and providing feedback for development; in aerospace, in addition to Nasa, Airbus is also a partner. In the very large industry, Construction, the French construction company Eiffage is a partner. We believe that this will start to pay off in order in the coming years, even if the start has been a bit slow regarding orders.

Key Catalysts

We see a few near-term catalysts in a 6 - 12-month period. The **GM** and **Toyota trials** are to be finalized, and there is a potential order from them. GM has 155 thousand employees, so that a widespread implementation could prove significant. The **iHand clinical study** will be finalized within the year and results presented during Q1 2022, respectively, which would mean starting the commercialization for Carbonhand 2.0 with significant sales potential.

Improving growth, 2020 and 2021 has been a disappointment regarding sales and in relation to the clear potential. Indeed, there has been a Pandemic effect, but improving growth numbers towards the second half of 2021 could start new confidence in the long-term growth case.

Counter thesis – key risks

A less positive effect of the GM and Toyota trials

The GM and Toyota trials have been going on for quite some time. The delays due to Covid cost more than a year, we believe. The GM trials are close to being finished, and a negative outcome, i.e., no orders, would be negative for the short to medium-term term. The Toyota trials are not expected to be finished until 2022. An unfavorable outcome in either one or both would set up a difficult scenario since they have been evaluating the system for an extended time.

Huge market – enough resources to penetrate?

The TAMs are significant and mean that there should be an excellent growth potential; however, the company is still relatively small in size, and the question is will they be able to ramp up both the sales and production.

The clinical trial-related Carbonhand not giving significant effect on sales

While we are optimistic that the outcome of the clinical trial (iHand) will be positive, there is always the chance that it will not show a significant positive effect. The preliminary results are positive; will it be enough to create a positive impact on sales in 2022-2023 is the question.

Potential increased competition

The TAM and growth prospects could be attractive for competition. Even if the technology is patent protected, some of the competitors present in the field, but not in the soft exoskeleton segment, may start to show interest in this field Bioservo starts to have traction in the market. We believe that the technology is strong but not immune to competition.

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Bioservo – a short introduction

Bioservo is a tech/MedTech company founded in 2006 by collaborations between Kungliga Tekniska Högskolan and doctors at Karolinska Hospital in Stockholm. The SEM™ technology was developed during the 2000s and patented in 2006 and is the base of the company's products.

Through collaborations and partnerships, the company has continued to develop its products within the soft exoskeleton field with applications that are suitable both in an industrial setting and in the medical area, to prevent injuries in the industry and work as an assistive and rehabilitation device in the medical environment. The company has entered into agreements and partnerships with reputable industrial players to develop and test the products. The primary fields have been within Automotive, with companies such as GM and Toyota. Within the aerospace field, collaborations with NASA and Airbus are the main parties. The technology development has taken time, and the actual commercialization process started in 2017 when the company was also listed at First North.

With the pandemic in 2020, the commercial process slowed down because many of the testing parties and prospective customers went into survival mode; however, the company continued to develop its offering and launched the latest version of Ironhand® 2.0 in June 2021. The company is presently commercializing the Ironhand® and Carbonhand® systems, where trials for the Ironhand® systems are finalized with partners, and clinical trials for Carbonhand® are to be completed during the remaining of 2021. Results will be presented in Q1 of 2022, with a potential launch of the next generation of Carbonhand® in 2022.

Company timeline, Bioservo Technologies (major events)

2000's	Development of the SEM™ technology
2006	Bioservo is founded as a development company
2006	Patent for the strengthening glove
2007	Cooperation with KTH and Karolinska Institutet samt SLL
2010	A power enhancing glove is developed, receives CE marking/certification as a medical device
2012	New management and board and financing to start marketing and sales
2013	The SEM Glove (Carbonhand) is launched commercially - EU grant received
2014	Development of an international partner network
2015	Further development of the technique - Distribution agreement in Japan
2016	Signs a strategic agreement with GM/NASA to do further develop the portable robotics techniques
2017	Initiating collaborations with Airbus, GE and Eiffage - IPO First North Q2
2019	Ironhand ® introduced
2020	Ironhand ® 1.6 introduced (New generation) - Loxam order of 100 Ironhand systems - Several new distributor agreements - promising results in the clinical study for Carbonhand
2021	Ironhand ® 2.0 introduced - Additional orders from Loxam and another mile stone order of 100 Ironhand systems from Gobio, France.

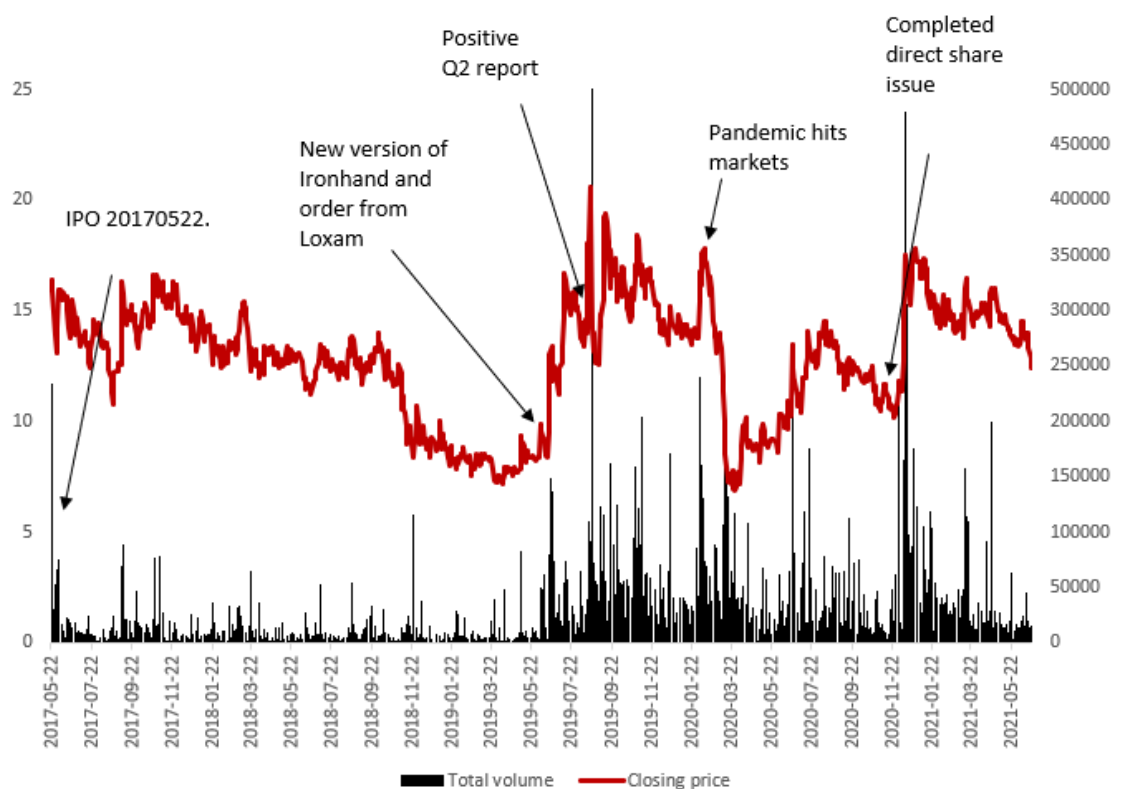
Source: Bioservo Technologies

Stock performance

Bioservo Technologies has been listed on First North since May of 2017. Since then, the total performance on the market has been volatile, partly due to the market volatility in the wake of the pandemic of 2020/21 and to a certain degree due to a longer time of no apparent progress in the commercialization process.

In 2019 the trend seemed to have improved with the new version of Ironhand and orders from Loxam. This was followed up by a positive Q2 report in 2019 that sent the share to an all-time high. When the pandemic hit at the beginning of 2020, both the share and commercialization were hit badly. The potential target customers shut down everything during a period, and the focus was elsewhere. The testing at Toyota and GM were delayed with apparent consequences. At the end of 2020, the company completed a direct share issue well received by the market, and in the aftermath, the share started to recover to above SEK 15 per share.

During 2021 the share has had a negative development and is down 32 % on the year, where the last Q2 report sent the share down over 10 % intraday. It is clear that the share is sensitive and naturally so to the news flow out of the company at this stage of early commercialization. The turnover in the share has at times been very low and is an explanation of some of the volatility in the share.



People and ownership

We have a positive perception of the company's board and management. We see a well-rounded team both on the management side and with regards to the board composition. The experience level regarding bringing a tech/Medtech device to market is extensive, and the board especially has several members with a proven track record in this field. The board is well balanced, with several independent members from the company's primary owner. The primary owner Tellaq AB is an investment company focused on investment in the healthcare sector. The team behind Tellaq AB has extensive experience both in transactions and operational expertise in this field. We would like to see a bit more ownership in the executive team apart from CEO Petter Bäckgren. The longer tenure persons have some exposure through options, however.

Executive Management				
Name	Position	Since	# of Bioservo shares	
Petter Bäckgren	CEO	2018	100 000 (237 855 Options)	Degree in Economics from Örebro, Freie Univ. Berlin. MBA from Stockholm School of Economics. CEO experience at Kibion AB and DiaSorin AB focus on commercialisation of tech platforms in medtech.
Jacob Michlewicz	CFO	2019*	4 500	MBA from University of Michigan. Business consultant at McKinsey and consulting firm Zitha Consulting.
Mikael Wester	Marketing Director	2020	(15 000 Options)	Extensive marketing and communications roles from IBM, Atlas Copco and Telenor. Broad spectrum of industries.
Christophe Pialot	Sales Director	2019	(22 500 options)	MSc in mechanical engineering from Arts et Métiers ParisTech and Chalmers University. Extensive international experience sales & marketing in high tech industries in such companies as Ericsson, Anoto, Thales etc.
Laurent Krummenacher	Production Director	2015	(43 000 Options)	Degree from EPSC Luasanne. Extensive track record of leadin production and laboratory teams in semiconductor and medtech industry.
Martin Remning Wahlstedt	Development Director	2017	(33 000 Options)	MSc in applied physics and electronics. Long experience in certification and developing medical devices.

Source: Redeye Research, Bioservo, Holdings.se

* Recruitment process initiated for replacement

Board of directors				
Name	Position	Since	# of Bioservo shares	
Anders Lundmark	Chairman of the Board	2016	1 526 000 (1 600 Options)	MSc in BA and Economics from Uppsala University. Extensive experience as CFO in both listed and unlisted companies. Chairman of Bioservos main owner Tellaq AB.
Kerstin Valinder	Board member	2021	100 000	Degree in journalism from University of Gothenburg. Extensiv experience in sales, marketing and business dev. in senior postions ast Astra Zeneca, Nycomed. Board member of several companies in the medical field.
Kunal Pandit	Board member	2018	-	Education, BA/MA from Cambridge University. MBA from Wharton. Background as healthcare private equity investor, experience from the financial sector.
Margit Alt Murphy	Board member	2021	-	Education, PhD in medical science. Associate professor in experimental rehabilitation at University of Gothenburg. Well published in her field.
Nikolaj Sörensen	Board member	2019	15 100	MsC in economics from Stockholm School of Economics and Copenhagen Business school. Current president and CEO of Orexo since 2013.
Runar Björklund	Board member	2016	1 600 Options	Education, MSc in Business from Lund university. CFO experience at Nycomed Pharma.

Source: Redeye Research, Bioservo, Holdings.se

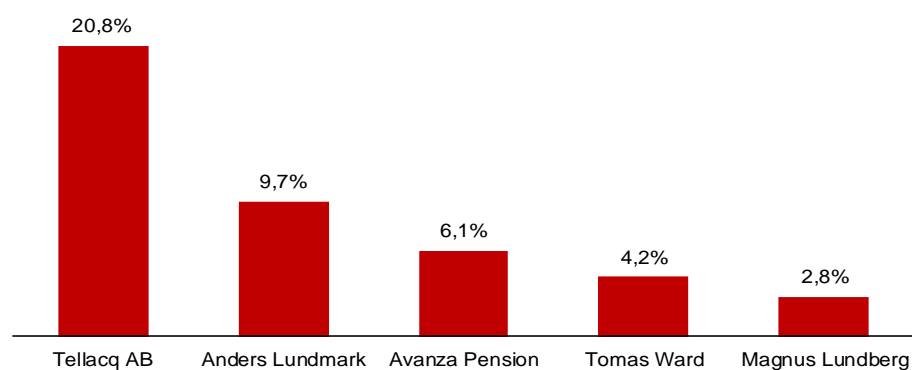
Ownership (million shares)

Rank	Shareholder	A-Shares	B-Shares	Total Shares	Share Capital	Voting Rights
1	Tellacq AB	3,3	0,0	3,3	20,8%	20,8%
2	Anders Lundmark	1,5	0,0	1,5	9,7%	9,7%
3	Avanza Pension	1,0	0,0	1,0	6,1%	6,1%
4	Tomas Ward	0,7	0,0	0,7	4,2%	4,2%
5	Magnus Lundberg	0,4	0,0	0,4	2,8%	2,8%
6	Simon Josefsson Datakonsult AB	0,4	0,0	0,4	2,7%	2,7%
7	Dobono AB	0,3	0,0	0,3	2,0%	2,0%
8	Nordnet Pension	0,2	0,0	0,2	1,0%	1,0%
9	Hans von Holst	0,2	0,0	0,2	0,9%	0,9%
10	Håkan Gabrielsson	0,1	0,0	0,1	0,9%	0,9%
11	Experita AB	0,1	0,0	0,1	0,8%	0,8%
12	Jens Miöen	0,1	0,0	0,1	0,7%	0,7%
13	Itabel AB	0,1	0,0	0,1	0,7%	0,7%
14	Kerstin Valinder Strinnholm	0,1	0,0	0,1	0,6%	0,6%
15	Petter Bäckgren	0,1	0,0	0,1	0,6%	0,6%
Total 15 Largest Shareholders		8,6	0,0	8,6	54,7%	54,7%
Others		7,2	0,0	7,2	45,3%	45,3%
Total Number of Shares		15,8	0,0	15,8	100,0%	100,0%

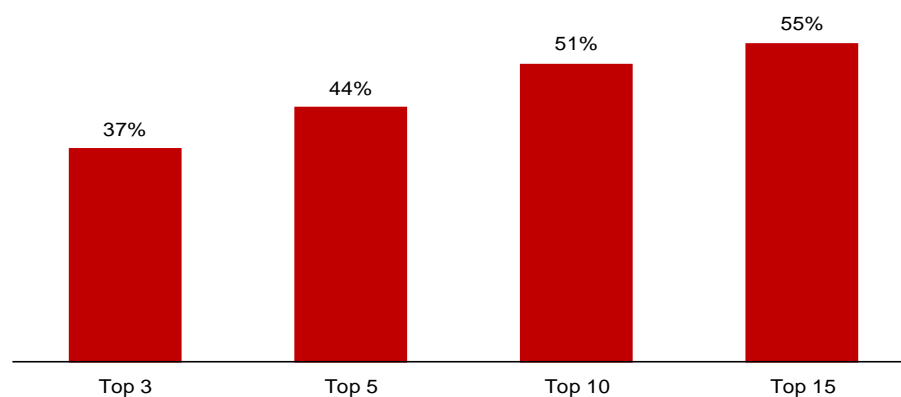
Source: Modular Finance

Free Float 68,0%

Top 5 Shareholders



Ownership Concentration



Source: Modular Finance & Redeye Research

Business model

Bioservo's business model is to develop products in close cooperation with cutting-edge academic research and experienced development partners in different market segments, such as GM in automotive and NASA in aerospace. The idea is that the various partnerships, collaborations, and distributor networks will take the different products to market. The professional segment has advanced most in this process with several reputable partners and alliances, and orders have been received primarily through rental companies focused on suppliers to the construction industry.

Within Life science (Healthcare), the process chosen is through distributor networks, however, focus during the last year has been on the professional segment, and not many resources have been put into sales of Carbonhand. With the new Carbonhand 2.0 and the study to be finished during 2021, focus on this area will return.

The sales model for the Ironhand® system means that revenue is generated partly from the sale of the hardware unit and more frequently and recurring income from the consumables, the inner gloves. This means recurring revenue over time from the installed base. The company estimates that the hardware unit has a 2-3 year lifespan while the inner glove (with the sensors etc.), depending on the use, will have to be replaced between 2-3 per year.

The revenue model will be adapted depending on the segment. The Life science/Healthcare segment is partly regulated and governed by reimbursements from authorities or insurance companies. Other more independent healthcare players can buy directly without interference or compensation if it suits their purposes. The professional segment will be where the model will be used fully and show the most significant consumable consumption over time.

The development of a distribution network is of utmost importance since Bioservo does not have the resources or intend to have a large sales force.

The exception is with the more significant industrial players where Bioservo has agreements, like GM, Airbus, and others. The potential sales volume is so important that the effort is worth going directly after the more prominent players. We can see that the communicated orders during the last years come primarily from the network of distributors, such as GOBIO or Loxam. The distributor network now spans the major industrial areas, where the company's main focus areas within Automotive, Aerospace, and Construction are a large part of the industry in each region.

Bioservo - Distributor network



Source: Bioservo Technologies

Strong partnerships are also an important factor as we advance. The GM/NASA agreement is the backbone of the development of Ironhand. The long-term testing with various partners has developed the Ironhand further, and the trials at GM are expected to be finalized soon. The partners' testing has generally taken quite a long time, and the Covid-pandemic brought delays to the process. The Toyota testing, which has shown promising results, has progressed well, and we expect some positive feedback during 2022.

The partnerships below represent excellent representatives for the verticals where Bioservo has put most of its efforts.

Bioservo - partnerships/collaboration

GENERAL MOTORS



Source: Bioservo Technologies

Business offering: The Ironhand® & Carbonhand systems

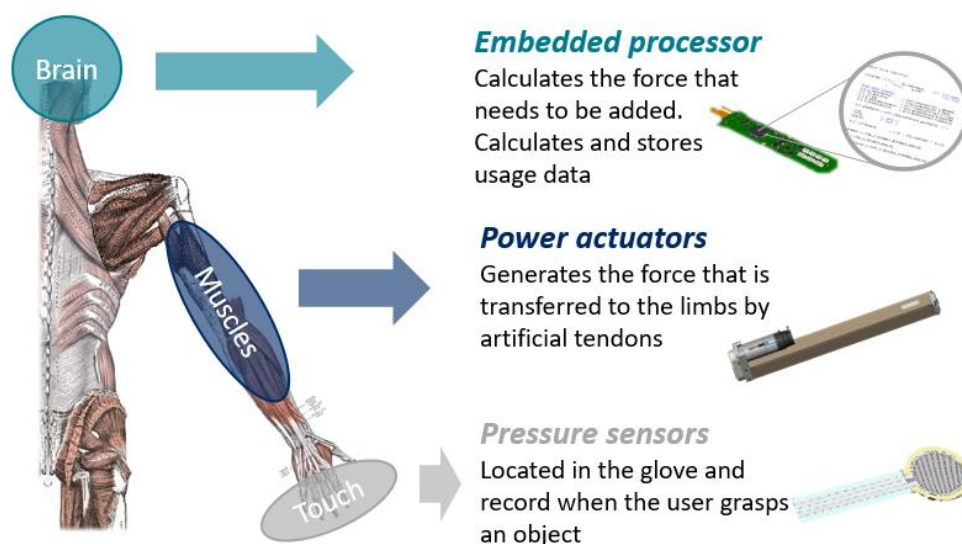
Bioservo has, since its inception, worked to develop commercially viable products based on their SEM™ technology. Early on, the focus has been on two primary market segments, Professional and Life Science, with their products called Ironhand® (latest version 2.0) and Carbonhand® for the respective segment. The SEM™ glove or Carbonhand was launched in 2013, while the first version of Ironhand was launched in 2019. Both of these products have been improved over time, and the latest version of Ironhand® 2.0 is deemed to be on the cutting edge globally in the soft exoskeleton market. The Carbonhand system has not been marketed extensively; we believe this has been a tactical choice to further improve the product to sell a more complete and better product to the challenging healthcare market.

The SEM™ technology

The SEM™ technology is a patented solution that was initially intended to rehabilitate patients with impaired hand function. The technology is different from other existing similar solutions on the market by providing support only if and when the user initiates a movement and is thus controlled by the user.

The servo glove senses this by the glove's sensors registering an object, and the harder grip the user gives, the more power the glove provides. The motors' activation is made to enhance the movement in the most natural way possible. The power is adjustable among the fingers to adapt to the different needs and applications. The illustration below shows how the technology is based on bionics, robotics as research and development in mechatronics and neuronics to mimic the body's movement.

Bioservo - SEM™ Technology



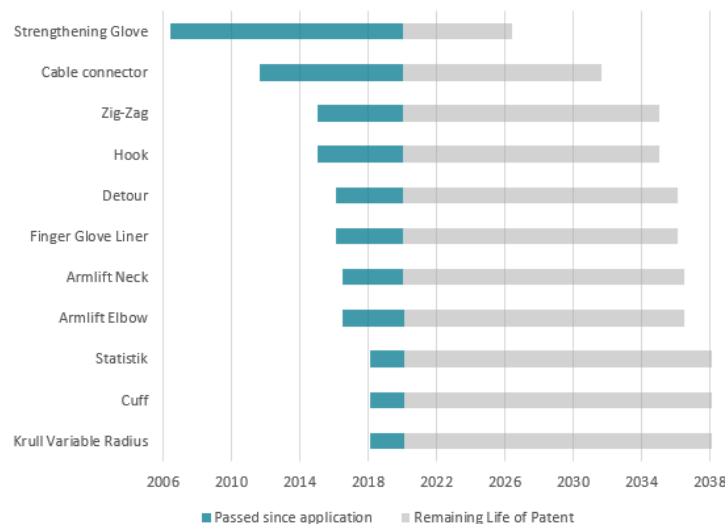
Source: Bioservo Technologies

The patents for SEM

Bioservo has an active patent strategy and has two essential patents for the SEM™ technology. The patent for the Strengthening Glove was already secured in 2006 at the company's inception; this expires in 2026. The other patent for the Cable Connector expires in 2032. However, we see that the company has continued to patent the innovations that have taken place as the technique and products have been developed over the years. The different

new patents connected to the technology are, in most cases, protected well into the mid-2030s. The picture below shows the different remaining life of the relevant patents, which points to a comprehensive protected technology. We deduct from the company's information that they have set themselves apart from the currently identified competitors by focusing on non-healthcare exoskeletons, which is the focus of the company-identified competitors.

Bioservo - patent schedule 2006 - 2038



Source: Bioservo Technologies

Based on the patents received by Bioservo, we believe that they are at the forefront in this area; there is research going on mainly in the university setting, which indicates that this is still a developing market.

The Historical Clinical data

There have been several clinical trials that have the results published during the years. These are primarily done for fields aimed towards the product Carbonhand. The trials have been done based on the SEM technology, the base for both segments that Bioservo has created their products. The five studies published have, as we see it, generated positive results. Each study had, of course, different setups and endpoints. We find the two latest published trials in 2019 confirming the optimistic view of the SEM glove function.

The clinical trial made by **Radder B, Prange-Lasonder G.B, Kottink A, Holmberg J, Sletta K, van Dijk M et al. (2019)**. A wearable soft-robotic device supports home rehabilitation for improving hand function in older adults. This was a pilot randomized controlled trial. The pilot was a study to explore the effect of prolonged use of the assistive IronHand glove during activities at home, in comparison to its use as a training tool at home, on the functional performance of the hand. The study included 91 older adults with a self-perceived decline of hand function, which was randomly assigned to a four-week intervention. It was with either assistive or therapeutic IronHand use or a control group with no additional treatment or exercise. Each participant performed a maximal pinch grip test (BBT or JTHFT) at baseline and after four weeks of intervention. The participants in the assistive and therapeutic group showed improvement in unsupported handgrip strength. Handgrip strength improved more in the therapeutic group compared to the assistive and control group. The study showed that with the support of the wearable soft-robotic, the IronHand system might be a promising way to counter hand function decline associated with aging.

The other pilot study of high interest is the one performed by **Osuagwu B.A. et al. (2019)**, a clinical Trial of the Soft Extra Muscle Glove to Assess Orthotic and Long-Term Functional Gain Following Chronic Incomplete Tetraplegia. In this study, 15 participants with (chronic) spinal cord injury (SCI) were selected to trial the SEM glove for 12 weeks to assist with activities of daily living (ADL). There was a significant improvement in gross handgrip strength between the initial and weeks 6 and 12. The results suggest that home use of devices designed to improve grip function directly affects hand function.

Both of these studies showed real effects on the participants. There are other clinical studies done; we can conclude after going through them that the results are clear and very promising for using the SEM technology.

The Ironhand system

Ironhand is designed to mimic the human body. The technology follows the user's actions intuitively and augments the gripping force when needed. The main ergonomic property is the ability to add energy to the flexion of the fingers, thus helping to relieve muscles responsible for flexing and gripping. As mentioned before, there have been constant improvements done to the original Ironhand® system launched in 2019.

The latest version was launched as late as in the summer of 2021 and is called Ironhand 2.0. The Ironhand system is based on SEM™ technology. With the strategic collaboration with GM/NASA from 2016, it was decided to jointly develop mobile robotics for use in the manufacturing industry. The first models were developed and tested with Airbus, Eiffage, and GE on top of the initial GM/NASA collaboration.

We can see a clear development through the years when looking back at the first versions. The new generation Ironhand® is more adapted to the environment that they are intended to be used.

The Ironhand 2.0 – the next step

With the launch of Ironhand 2.0 this summer, the product for the industrial segment has taken leaps forward in refinement.

- **Biomechanical improvements** - Improved force transfer -Grip of the glove – Dexterity improvements – Textile improvements for reduced heat transfer
- **Smart Assist, an intelligent Adaptive Force Control** - a control algorithm based on previous grip – Intuitive – Less configuration for different tasks – Separate configuration.
- **Enable more applications** – Additional sensors opens up for more applications/tasks – New sensors in the middle phalanges enables better activation – Added palm sensor better in certain complex situations
- **Quicker Force Assist** – New system 60% quicker makes for force when needed, especially in high-frequency tasks, and gives a more intuitive experience.
- **Connected** – Communicates/collects data through 4G or WIFI – Local storage of data – Glove configuration through Bluetooth or WIFI.

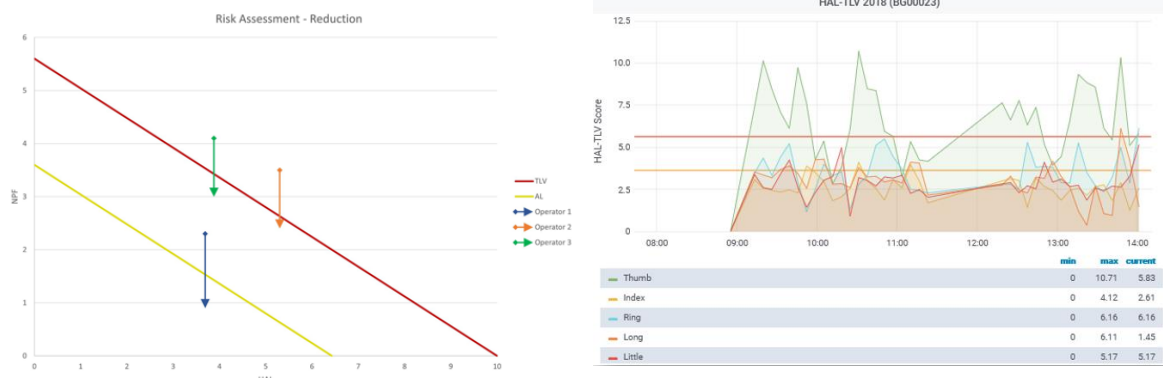
Bioservo - Ironhand® - Connectivity**Bioservo - Optimization made easier**

Source: Bioservo Technologies

The new Ironhand 2.0 system has, with its improvements both in function and connectivity, taken clear steps forward. The possibilities with the latest connectivity and the potential to gather data and analyze them is a real new selling point in our view. There are several methods to do the analysis and to arrive at Ergonomic risk reports. The data gathered with Ironhand 2.0 creates a lot of user data, such as the number of grasps, frequency, cycle, force level, level of assistance, and an Ergonomic risk assessment (HAL-TLV, DUET).

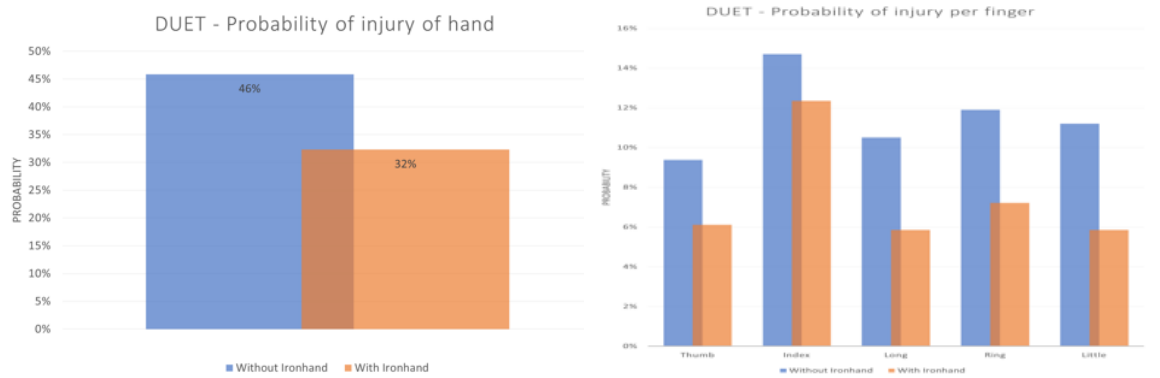
The data gathered in both methods will clearly show the risks and probability of injury. This feature, we believe, is a good selling point as it can clearly show the benefits of the Ironhand system; the HAL-TLV and DUET are established ways to measure the risks. Below is a graphic overview of how it can be presented in each method to clients. In the first example with HAL-TLV, it is shown on the graph on the left the different operators and where they would use the Ironhand system. Before use, two operators were clearly above the red line, which indicates a risk of injury; with the Ironhand, each operator has a risk reduction.

The picture on the right shows the time series data, which pinpoints the task with a high risk of injury. In this case, the thumb is primarily in the risk zone and clearly over the red line several times during the day.

Bioservo - Risk assessment tool HAL - TLV

Source: Bioservo Technologies

The DUET (Distal Upper Extremity Tool) calculates the probability of getting an injury. With this, Ironhand calculates a damage number for each grasp cycle. The accumulated damage is then used to calculate the DUET probability of getting an injury. The graphical explanation below shows the ease of the data better to understand the risks and benefits of the Ironhand system.

Bioservo - Risk assessment tool DUET

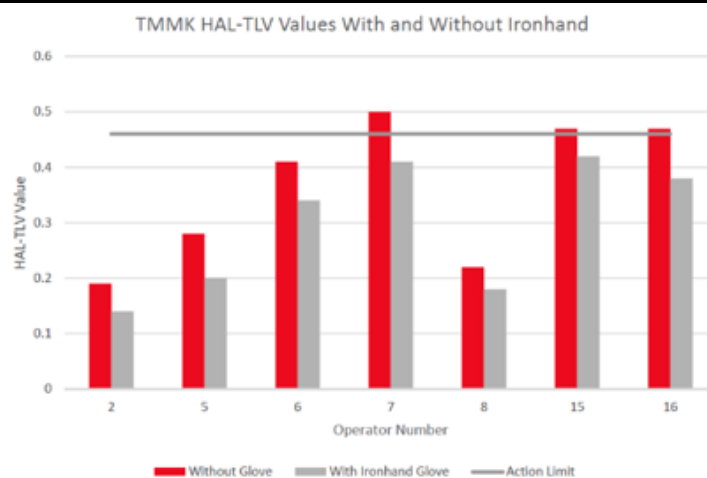
Source: Bioservo Technologies

The improvements to the overall system and the connectivity, and the possibility of data gathering and analysis are new strong points in the Bioservo offering going into 2022. The recent orders from Gobio and Loxam for the French market on the new system is a positive sign.

GM – Toyota trials entering the final phase

Bioservo has had on-site trials with the automotive giant's GM and Toyota for several years. The results have been positive as far as we can judge. The pandemic closedowns have delayed these trials' outcomes, and the GM trials are now in their final stages. The Toyota trials are ongoing and will be expanded into additional workstations. These trials are of great importance; while they have not rendered any orders, a breakthrough on one of these automotive companies would, apart from the actual value of the order, consist of tangible proof of concept in the manufacturing environment.

The process has been long, and the pandemic has, of course, not helped the situation. The results from the Toyota trials based on the HAL-TLV values are encouraging and show a precise value for the use of Ironhand. The graph below shows the current numbers for the tests at Toyota.

Bioservo - Toyota trial HAL - TLV values

Source: Bioservo Technologies

A final positive outcome at either of these manufacturers and an indication of the intended implementation rate across their factories could have a substantial effect on the value of Bioservo.

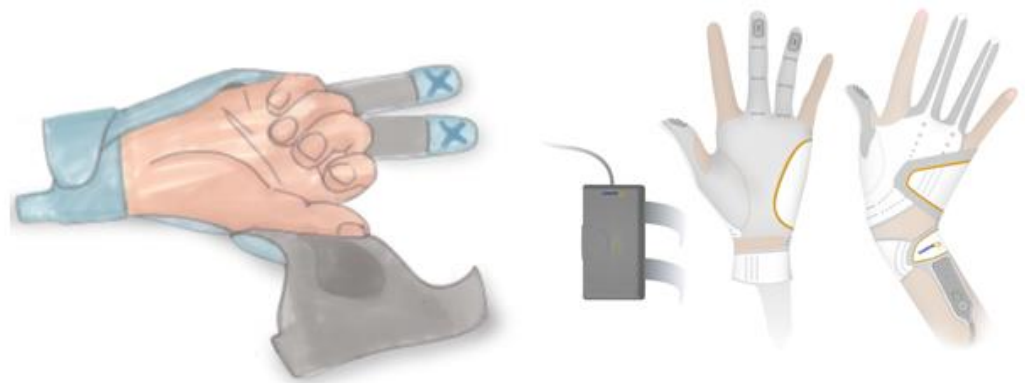
The Carbonhand® system

The Carbonhand® system has been commercialized since 2013, although under the SEM™ Glove name, developed primarily for rehab and support for weak hands. The solution is much less complex than Ironhand®.

The system is a glove and a power unit, where the glove has three fingers with sensors on each finger. A small power unit is placed on the hip. The concept is to enhance the grip by increasing strength and endurance; it can be individualized for each user. The pandemic has generated extra focus on developing the new Carbonhand 2.0 which is the latest iteration in the pipeline, planned for release to the market next year. The current Carbonhand system has lived, even though launched already in 2013, life on the backburner.

We believe that the company's focus has been mainly on the Ironhand system, and the development of the Carbonhand has not had a priority. We can see that this has changed during the last years, and with the current trial to be completed during the second half of 2021, barring no delays due to Covid, successful completion will lead to global commercialization in 2022.

Bioservo - Carbonhand® system overview

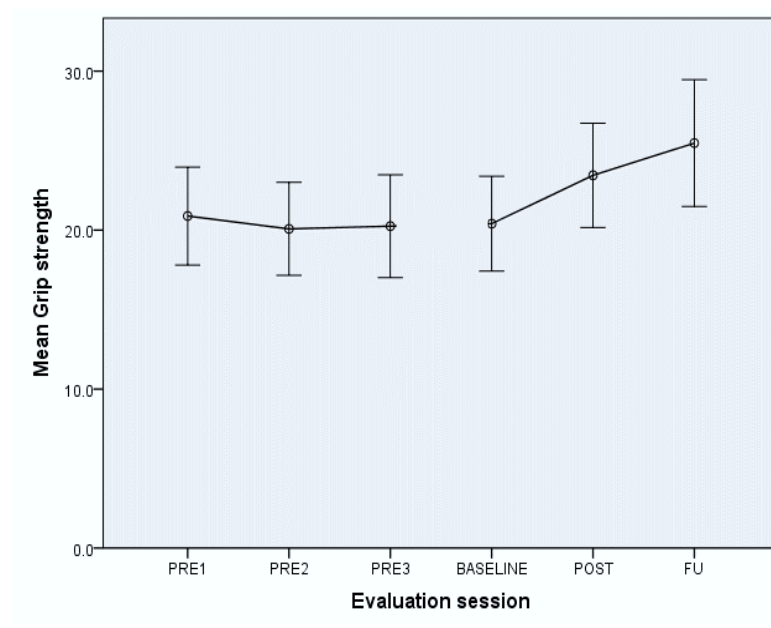


Source: Bioservo Technologies

The current Clinical trial

The preliminary results from the iHand clinical trial conducted in the Netherlands (Roessing Research and Development) show promise. The study includes 63 subjects with mainly orthopedic indications. The first patient was included in Q2 2019, and results indicate that Carbonhand has a therapeutic effect.

Preliminary data shows that an average patient's grip strength increases by 3 kg after six weeks of therapy. (As shown in the graph below). Encouraging was a high grade for donning the glove, which is typically one of the problems in using hand devices.

Bioservo - Carbonhand Trial preliminary results grip strength

Source: RRD & Bioservo Technologies

This trial will be completed during the second half of 2021 and most likely communicated in Q1 2022. The positive preliminary results indicate that the risk of non-success must be deemed low.

Other Applications of the SEM™ technology

Other development projects are running at Bioservo. One of the most interesting is the soft, active exoskeleton for the shoulders. The concept is to give active lifting support, which will provide between 50-100 % lifting power of the weight of the person's arm. This is in the early stages yet, however with the inroads to the equipment rental firms such as Loxam and others, the path to market could be considerably shorter than the previous products. The TAM for this market is considerable.



Market outlook

Bioservo develops and produces innovative products based on SEM™ technology. The company is primarily focusing on two market segments, professional and life science. The technology was created with a focus on the healthcare sector; however, after an increasing interest, the focus has been on the professional segment during the last years. Healthcare has once again regained momentum in the company. The upcoming iHand study will restart the commercialization again.

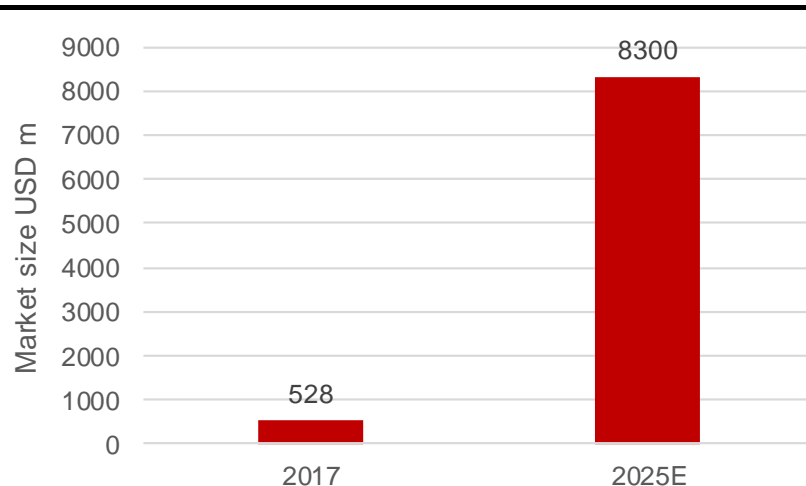
The global market for exoskeleton and power-enhancing mobile robotics-based technology is set to grow strongly in the coming years. The global exoskeleton market is primarily segmented by product type (soft & rigid), by power type (powered & passive), body type (complete body, upper extremities & lower extremities), end-use industry (industrial, military, healthcare & others), by mobility (stationary & mobile), and geography.

The rigid exoskeleton segment represents the largest share of the exoskeleton market. This is due to high demand from the military and industrial sectors. Based on end-users, the healthcare sector represents the largest share of the overall exoskeleton market. This is due to the fact of the rapid growth of the geriatric populations globally. While the healthcare sector has the largest market share, the industrial segment is expected to show the fastest growth in the coming years. According to Research and Markets, the global exoskeleton market will exhibit a CAGR of almost 50% until 2027. ABI Research expects the market to grow from USD 392 million in 2020 to over USD 6.8 billion in global revenue. The different independent reports claim different market sizes and growth, but they all agree that there will be high double-digit growth numbers in the next few years.

Market Size & Growth

There are many different views on the market size and growth in the exoskeleton market as a whole. The differences in the view of the market are mainly based on which scope the research is based. There is much room for interpretation since there are different product types, i.e., soft or rigid, power type, body type, mobility, and end-use. What we can deduct from all the various reports that we have identified looking at this market is that all of them have a positive view on the growth prospects both on the short- and long-term view.

Global exoskeleton market size - 2017-2025E

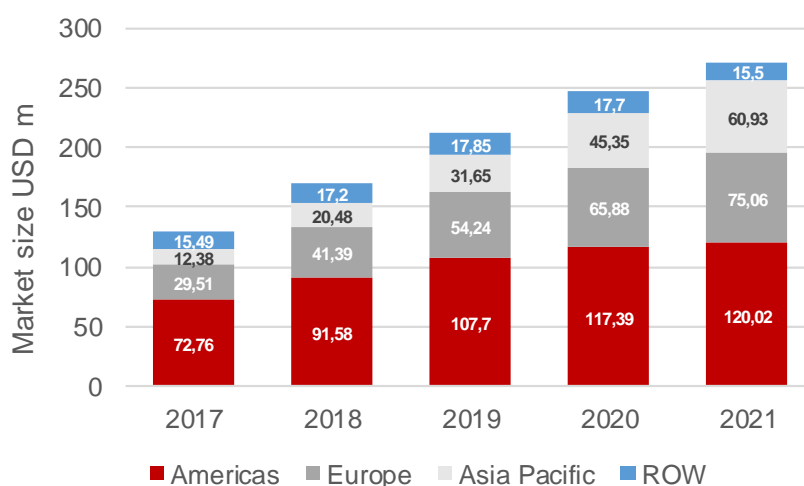


Source: Statista, Research and Markets, Redeye Research

In the graph above, based on data from Statista and Research and Markets, the global exoskeleton market is expected to show strong growth and reach a market size worth over USD 8.3 billion in 2025E.

Another interesting example from Statista is the sales value of the powered human exoskeleton market by region. This part of the exoskeleton market has grown substantially and is also expected to grow in 2021E. Europe and the Americas are the regions where the most value is created, typical with high industrialization.

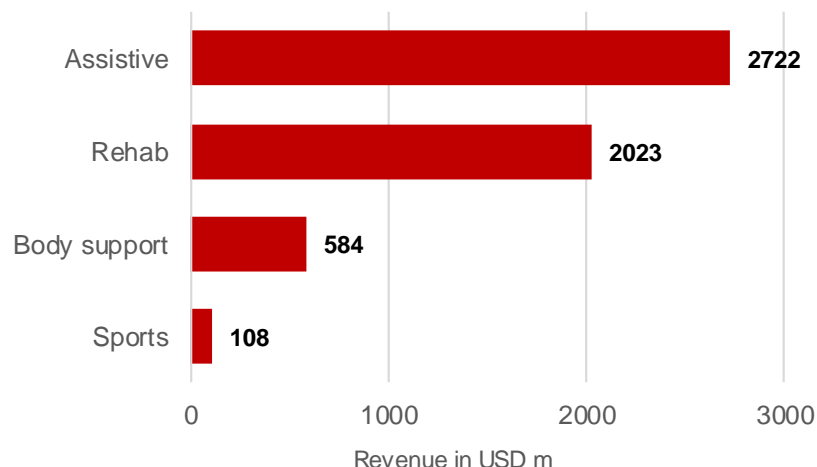
Sales value powered human exoskeleton - by region 2017-2021



Source: Statista, Redeye Research

The two areas that are dominant in terms of market size are Assistive and Rehab exoskeletons. According to Statista and BIS Research, the wearable robotic exoskeleton market will represent a market above USD 5 billion in 2028E.

Global wearable robotic exoskeleton market size 2028E

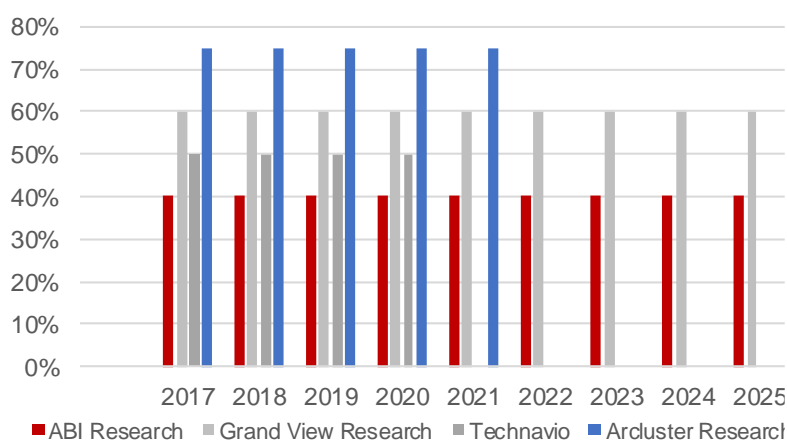


Source: Statista, BIS Research, Redeye Research

As seen in the graph below, we acknowledge the many views on market size and growth rates among different institutes; however, the consensus is that growth will be vital during the next 5-10 years. The primary factors behind the positive growth expectations are a growing geriatric population, increasing MSD's, the advent of robotic technologies, growing patients'

purchasing power, and increased investment in the sector based on higher industrial demand. The growing rehabilitation market is also a strong point for growth in many research reports.

Exoskeleton global growth expectations



Source: Bioservo Technologies, Redeye Research

Industrial segment

In the industrial segment, exoskeleton and force-enhancing technology are mainly used by healthy people for preventive purposes to avoid occupational injuries. Many repetitive and grip-intensive work steps in different industries (not limited to Bioservos focus areas) must be handled manually, even with an increasing amount of industrial robots used.

Stress injuries can occur during prolonged work or repetitive work. In this segment, it is primarily the company themselves that decides and pays for the use of the products.

A driving factor for the increased interest in products that can be used for preventive purposes in occupational injuries is increasing Musculoskeletal Disorders (MSD) or strain injuries.

MSDs are a real problem in the EU and the US. Some of the most common work-related MSD are Carpal tunnel syndrome, Sprains, Strains, Hernia, and Inflammation.

What are WMSDs

The term WMSDs is a generic expression used for relatively diverse disorders that may affect different structures such as tendons, muscles, joints, nerves, and vascular systems.

Dependent on the structure involved and type of affliction, these could be referred to as **Tendonitis, Tenosynovitis, Bursitis, Carpal tunnel syndrome**, to name a few. MSDs can also occur outside the work environment. Some sectors are more affected than others by WMSDs. The common factor in the sectors most associated with these problems is characterized by repetitive manual work. Typical sectors are food, manufacturing, and assembly plants.

The trend towards more injuries has not been diminished; even if there have been improvements is, the faster pace in industry tends to increase the repetitive work in general. The aging workforce could be more vulnerable to musculoskeletal injuries as well.

Different WMSDs have similarities in their symptoms. The overloaded region is often painful and sensitive when touched, while specific movements or efforts may cause pain. In the more severe instances, the pain may not subside when at rest.

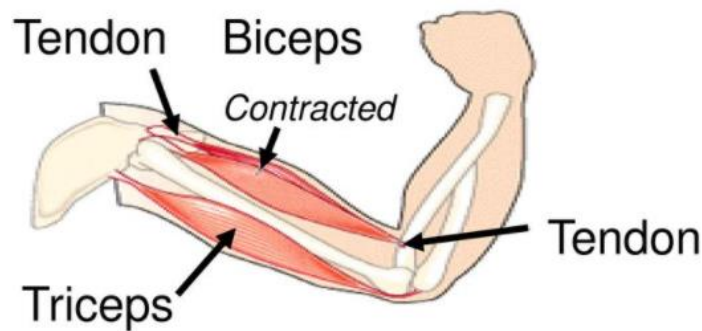
Four well known musculoskeletal injuries – upper limbs

There are quite a few musculoskeletal injuries that affect the upper limbs that may be caused by work. We will only go into four of these here to overview some of the best-known ones. 3 of the 4 are "itis" diseases that have that ending in their name. The "itis" is a suffix indicating an inflammation.

Tendonitis

As the name indicates, Tendonitis is an inflammation of the tendon. Tendons are structures that connect muscles to the skeleton. The tendon is being used every time the muscle works, which means that when the muscle is overburdened by, as an example, repeated effort, the tendon may be overused. If the tendon is injured, the body will try and repair it, hence the inflammation. When overuse is continued, the injured tendon with its inflammation increases the sensitivity to overload and produces Tendonitis.

Tendons - connect muscles to bones

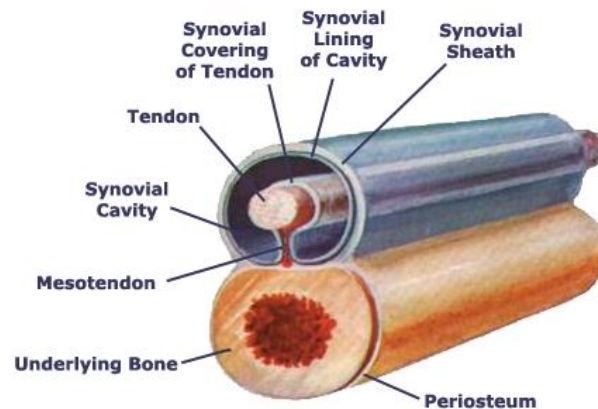


Source: Redeye Research

Tenosynovitis

Tendons are protected by the synovial sheath that surrounds them. The synovial sheath protects the tendons from excessive friction. It works as a lubricating cover enclosing the tendon in a space where it can glide freely in a lubricating fluid called synovia. If Tendonitis sets with a resulting swelling of that tendon, the sheath is compressed by the tendon. The risk is then that the sheath itself becomes irritated and inflamed. Tenosynovitis is the simultaneous inflammation of a tendon and its surrounding synovial sheath.

Synovial sheaths - protects tendons

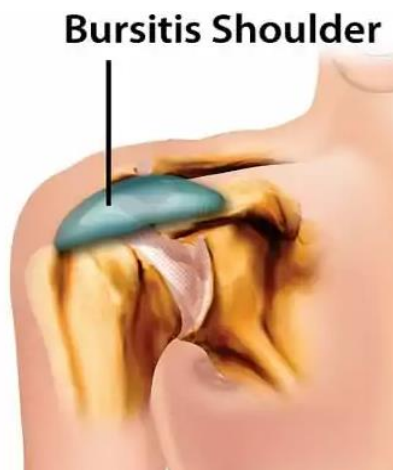


Source: Redeye Research

Bursitis

Tendons are also found in the shoulder. They could be injured by friction with a location just above a bone (head of the humerus). The tendon is protected by a sac containing synovial fluid between the tendon and the bone, called the bursa—the bursa acts like a lubricating cushion that allows the tendon to glide without damage. Bursitis is, as indicated by the name, an inflammation of the bursa. This generally follows Tendonitis, where the bursa ends up being compressed between two bones. The friction/compression can injure the bursa and cause bursitis. The bursa can remain swollen even if the Tendonitis subsides and can cause the Tendonitis to come back.

Bursitis - shoulder



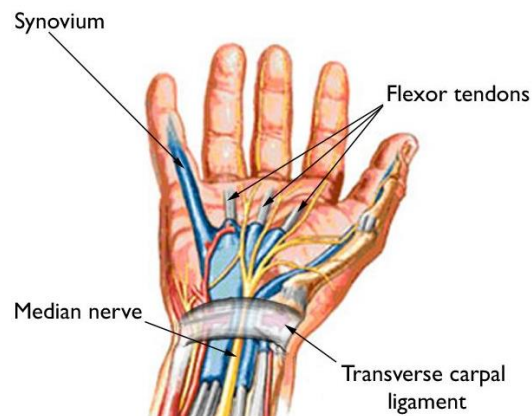
Source: Redeye Research

Carpal tunnel syndrome (CTS)

Carpal tunnel syndrome occurs when the median nerve, which runs from the forearm into the palm, becomes pressed or squeezed at the wrist. The carpal tunnel is a narrow, rigid passageway of ligament and bones at the base of the hand, which houses the median nerve and the tendons that bend the fingers. The median nerve provides feeling to the palm to the side of the thumb and the index, middle, and part of the ring fingers. The cause of CTS is often a result of a combination of factors that increase pressure on the median nerve and tendons.

in the carpal tunnel. Factors that can contribute are trauma or injury to the wrist that cause swelling. Other factors contributing to the compression are mechanical problems in the wrist joint and repeated use of vibrating hand tools. There are often multiple causes involved. There are workplace factors that come into play. More reported instances come from assembly line work such as in manufacturing and similar hand-intensive tasks.

Carpal tunnel

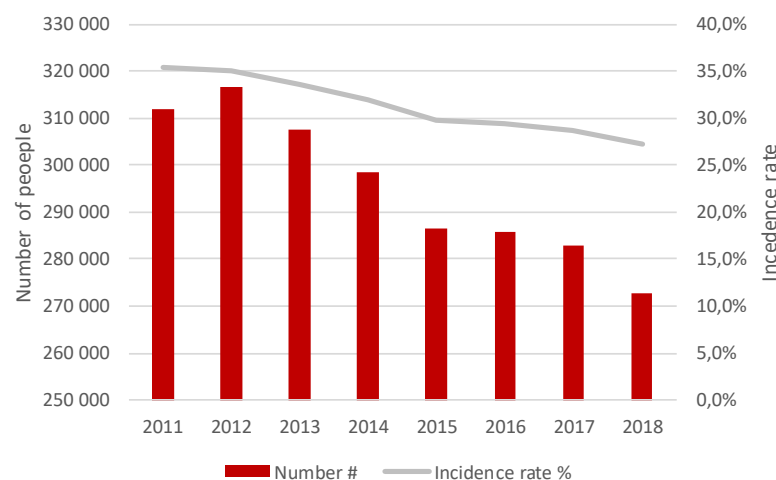


Source: Redeye Research

US – example of WMSD development

Suppose we look at one of the largest markets, the US, the MSDs account for one-third of all worker's compensation costs. The direct costs are estimated at around USD 20 billion a year. The total costs are more than double that figure. Still, they can, in specific cases, be up to five times that amount. The WMSD in the graph below, statistics from the US Bureau of labor statistics indicates that the situation has improved over the years; however, there are still incidence rates closer to 30%, and the numbers are only slowly decreasing. The reasons are most likely an increasing awareness among employers due to the high costs involved in these injuries. The average time away from work in the average injury in the US is eight days, while for MSD, it is 38 % higher at 11 days.

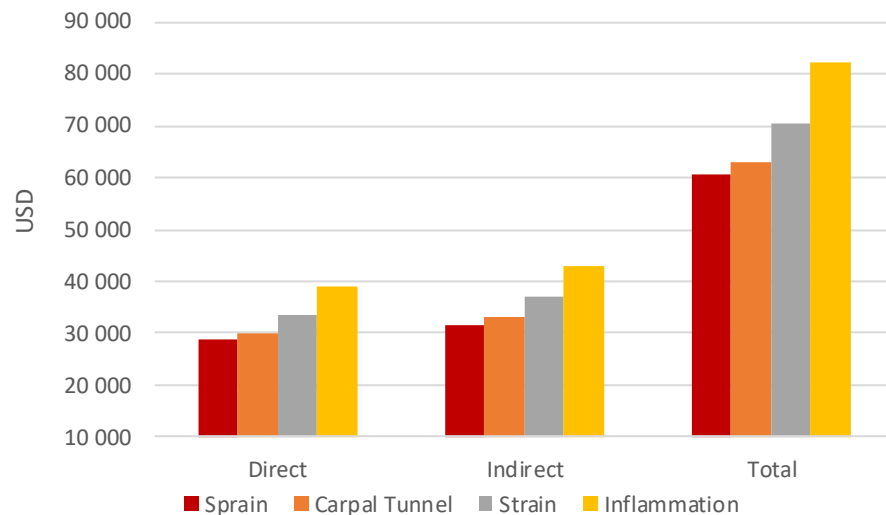
WMSD - Number of people, Incidence - US 2011 - 2018



Source: US Bureau of labor statistics, Redeye Research

The costs of the typical MSDs are very high, and a clear incentive to address the issue and lower the risk of MSDs. As indicated in the graph below, both the direct and indirect costs are high. A typical injury, Carpal tunnel syndrome, incurs a total cost of over USD 60 000 for an injury. The indirect cost, such as lost productivity, absenteeism, and cost to train replacements, is higher than the direct cost on average.

MSD - Direct and Indirect cost per injury - US



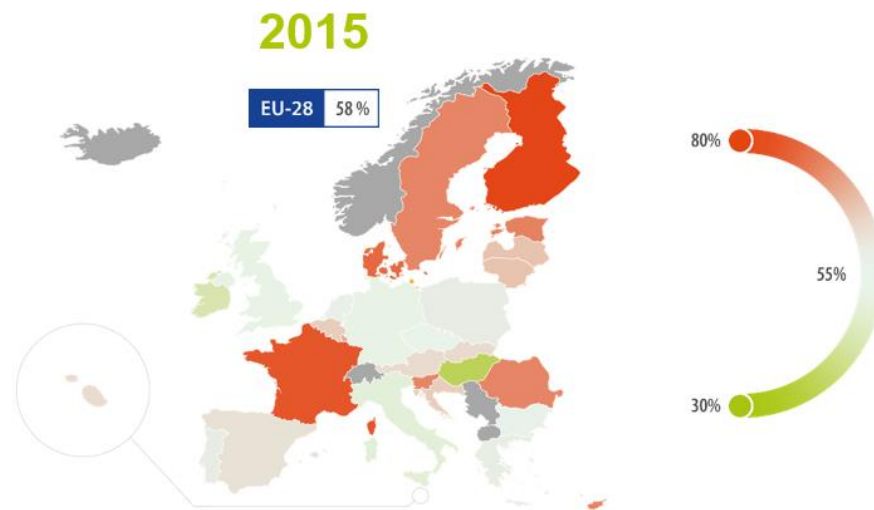
Source: US Bureau of labor statistics, OSHA, Redeye Research

Europe – not much better

The situation in Europe concerning WMSD is not better than in the US. MSDs are the most prevalent work-related health problem in the EU. According to the EU-OSHA, roughly 3 out of every five workers in the EU-28 report MSD complaints. Of all the work-related health problems, 60 % are identified as the most serious. There are indications that the cost represents a staggering 2% of GDP in the EU yearly. In Germany, a powerhouse in manufacturing in Europe, the MSDs generate higher costs than all other disease diagnoses groups. According to BAuA (2018), it was estimated that a EUR 17.2 billion production loss incurred and EUR 30 billion gross value added arise from musculoskeletal system diseases. These represent 0.5 % and 1% of Germany's GDP (2016).

There is a high degree of variation in the different member states in the EU. In total, 58 % of workers reporting that they suffered from one or more musculoskeletal disorders in the last 12 months. The data is from 2015, and we have no reason to believe that the conditions have changed drastically since then. From 2010 to 2015, the figures were marginal down from 60% (2010) to 58% in 2015.

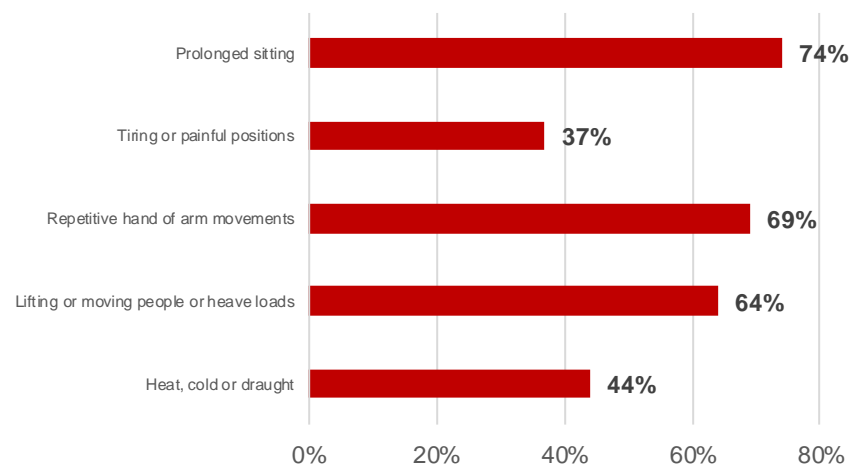
MSD - High degree in EU 28



Source: Panteia, EU, Redeye Research

The most prevalent risk factors are closely related to the type of work done. In the graph below, the repetitive and heavy loads lifting is most relevant to the industrial setting that we focus a great deal on in this report.

Most prevalent MSDs - related risk factors (EU28)



Source: EU-OSHA, Redeye Research

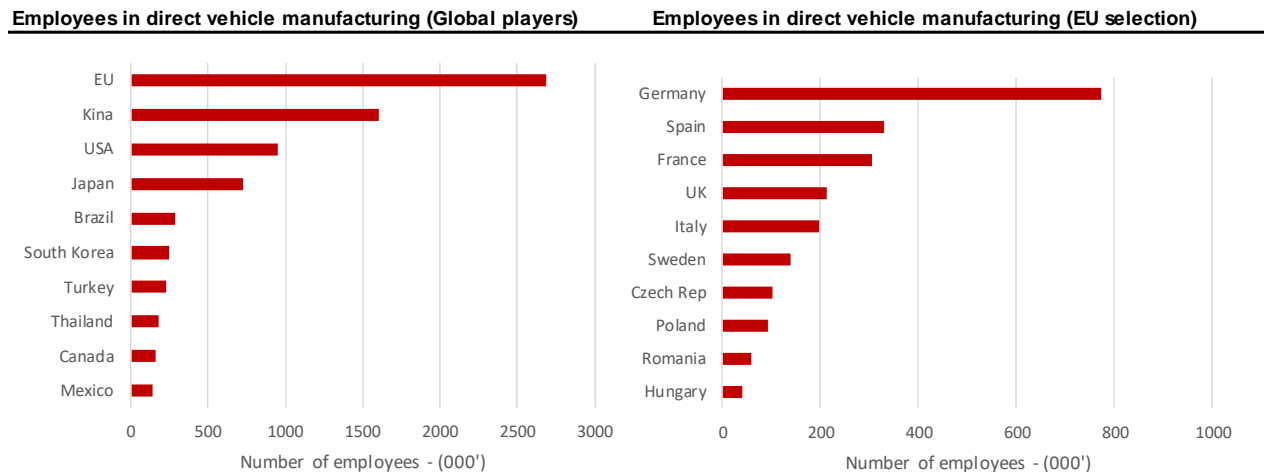
Primary focus on three verticals – Automotive, Aerospace, Construction

Since the manufacturing industry spans many areas, Bioservo has decided to focus on verticals with many employees and hand-intensive, intensive work tasks in manufacturing industries. The agreements and collaborations initiated to give a good indication of where the focus lies.

The automotive sector - under pressure

Globally, the automotive sector is a major player in manufacturing. The industry employs over 8 million people globally and accounts for around five percent of the world's total manufacturing employment. In addition to this, another five times more are employed indirectly in related manufacturing and services. As can be seen, by the graph below, over 2.5 million people in the EU are directly associated with vehicle manufacturing and over 950 thousand in the US.

This indicates that even though the automotive industry has been at the forefront of robotics in manufacturing, there is still a considerable workforce doing manual tasks worldwide.



Source: OICA, Redeye Research

The automotive industry is under pressure from several directions. The climate change and the emergence of new competitors in the EV field put pressure to increase efficiency across the board and open up a lot of change in the business practices. The rising healthcare costs for companies have risen and gives a clear incentive to work with all the health-related issues as WMSDs.

The early partner of Bioservo, GM, has changed their healthcare system during the last years as the costs in the earlier design were spiraling out of control. In the 2000's GM spent over USD 4 billion annually to cover its 1.2 million workers.

Aerospace – complexity and hand-intensive

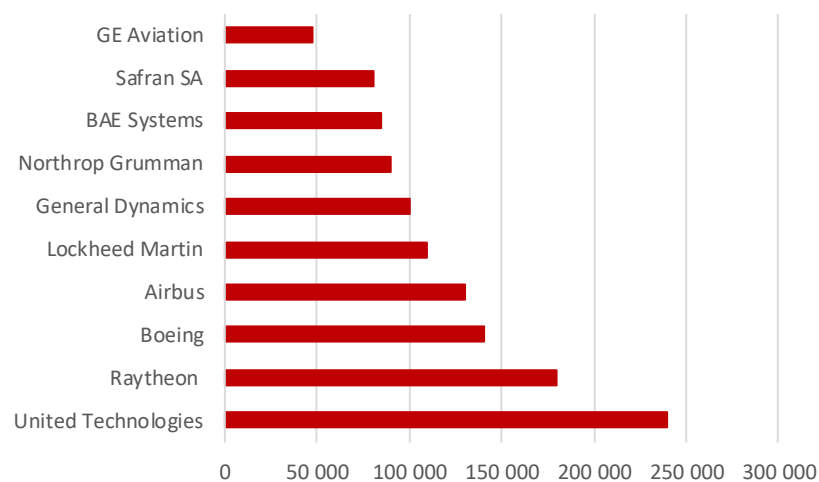
A great deal of complexity can characterize the Aerospace segment in production simultaneously as extreme quality requirements exist. Production is mainly manual and with many elements that place significant demands on ergonomics and protection against injury. However, the aerospace segment is a global business with a certain tilt towards the US and EU.

The partnership with NASA and Airbus indicates the importance the industry sees in preventing injuries to their workforce. Interestingly, the US's aerospace and defense industry are dominated by the older age bracket, 46-55-year-olds, which concerning MSDs are a risk group.

The aerospace market is expected to grow from USD 298 billion in 2020 to over USD 430 billion in 2025 at a rate of 7,7% annually. The recovery comes after a difficult 2020 where the

Covid-pandemic has virtually stopped all flying globally. The significant players below are some of the essential players in this field, including some defense companies. These companies employ together over 1.2 million people; of course, not all are in manufacturing. Still, it shows the size of these players and how important this field could become to Bioservo. They already have a foot in the door at Airbus and NASA while relatively small compared with some other significant manufacturers but prominent in stature.

Aerospace & Defence - # employees (top 10 market)

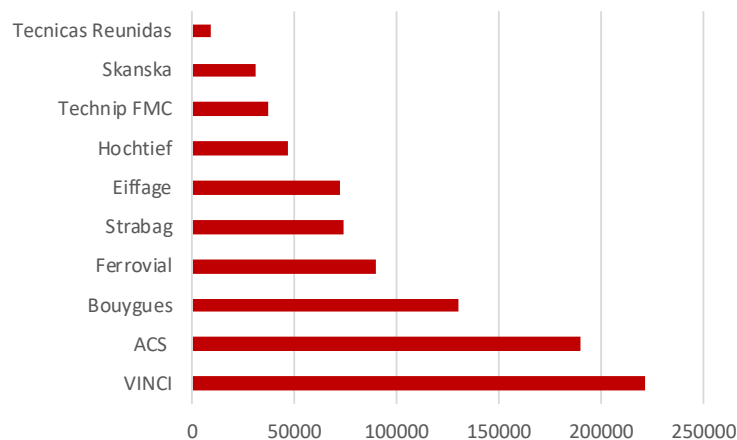


Source: Company reports, Redeye Research

Construction

The construction sector is a substantial employer worldwide and, in many ways, hand-intensive. In Europe, the construction sector accounts for 7.5% of the total European employment and 28% of the industrial employment in the EU. There are approximately 15 million workers directly employed in the sector. There are over 3 million construction firms in Europe, from the very small to the global firms. As we can see from the graph below, there are some real giants in the market.

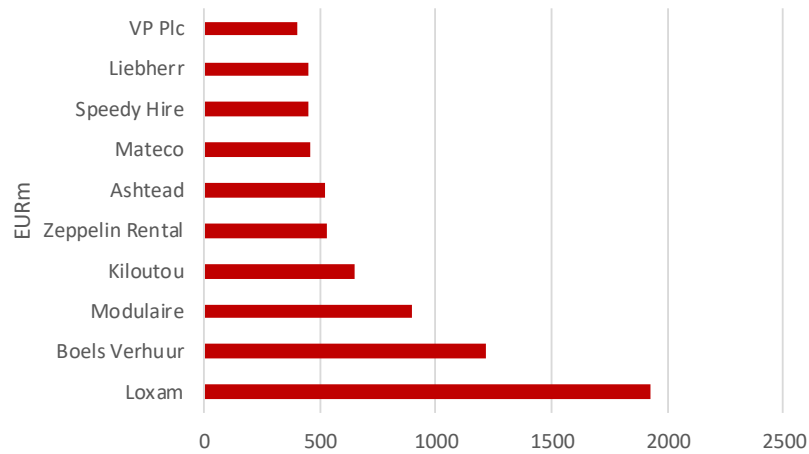
Construction EU - # employees (Selection top firms)



Source: Company reports, Redeye Research

Apart from these large companies and the thousands of smaller companies, rental companies like Loxam have already placed orders with Bioservo. The equipment rental market is an excellent path into new markets where conservative clients can easily rent the equipment to get acquainted with the products without initially investing in the equipment.

Equipment rental EU - Revenue EURm



Source: Statista, Redeye Research

Indicative TAM – Industry verticals in focus – EUR 3bn market

There are several ways to look at the total available market (TAM). The manufacturing industry employs more than 85 million workers in the OECD countries, and in the US, the number is above 12 million people in manufacturing alone. Utilizing these figures gives very high TAMs, and we have reduced our indicative TAM for the industry segment and geographical areas where Bioservo currently focuses. The TAM still becomes large with a large number of potential workers that would use the products. We have calculated that 2-3% of the workforce would be eligible to use Ironhand, and we have used prices that we deemed correct. The eligible number is towards the low side, to be cautious. The potential is thus immense given the number of people and prices used. However, this is a clear indication of the potential and shows that there is abundant growth potential.

TAM, Ironhand - Hardware and consumables

	2021E	2022E	2023E	2024E	2025E	2026E
Total number of employees						
Automotive						
Total	4 379 000	4 449 790	4 512 193	4 575 770	4 640 545	4 706 540
EU	2 700 000	2 754 000	2 809 080	2 865 262	2 922 567	2 981 018
US	954 000	963 540	963 540	963 540	963 540	963 540
Japan	725 000	732 250	739 573	746 968	754 438	761 982
Construction						
Total	15 500 000	15 752 000	16 009 040	16 271 221	16 538 645	16 811 418
EU	5 200 000	5 304 000	5 410 080	5 518 282	5 628 647	5 741 220
US	7 400 000	7 548 000	7 698 960	7 852 939	8 009 998	8 170 198
Japan	2 900 000	2 900 000	2 900 000	2 900 000	2 900 000	2 900 000
Aerospace						
Total	1 406 000	1 420 060	1 434 261	1 448 603	1 463 089	1 477 720
EU	870 000	878 700	887 487	896 362	905 325	914 379
US	509 000	514 090	519 231	524 423	529 667	534 964
Japan	27 000	27 270	27 543	27 818	28 096	28 377
Estimated number employees potential usage						
Automotive						
Total	131 370	133 494	135 366	137 273	139 216	141 196
EU	81 000	82 620	84 272	85 958	87 677	89 431
US	28 620	28 906	28 906	28 906	28 906	28 906
Japan	21 750	21 968	22 187	22 409	22 633	22 859
Construction						
Total	310 000	315 040	320 181	325 424	330 773	336 228
EU	104 000	106 080	108 202	110 366	112 573	114 824
US	148 000	150 960	153 979	157 059	160 200	163 404
Japan	58 000	58 000	58 000	58 000	58 000	58 000
Aerospace						
Total	28 120	28 401	28 685	28 972	29 262	29 554
EU	17 400	17 574	17 750	17 927	18 107	18 288
US	10 180	10 282	10 385	10 488	10 593	10 699
Japan	540	545	551	556	562	568
Total (Automotive, Construction, Aerospace)	469 490	476 935	484 232	491 670	499 251	506 979
Share % employees eligible Auto	3%	3%	3%	3%	3%	3%
Share % employees eligible Construction	2%	2%	2%	2%	2%	2%
Share % employees eligible Aerospace	2%	2%	2%	2%	2%	2%
ASP per Hardware (EUR)	5000	5100	5202	5306	5412	5520
ASP consumables (2/year) (EUR)	800	800	800	800	800	800
TAM, WW (EURm)	2 723	2 814	2 906	3 002	3 101	3 204
Hardware (EURm)	2 347	2 432	2 519	2 609	2 702	2 799
Consumables (EURm)	376	382	387	393	399	406
TAM, WW (SEKm)	27 829	28 758	29 703	30 682	31 697	32 748
SEK/EUR	10,2	10,2	10,2	10,2	10,2	10,2
Price increase /year	0%	2%	2%	2%	2%	2%

Source: Redeye Research, Industrial sources, EY, World Bank

Life Science sector – sizeable addressable market

In the Life Science/Healthcare sector, the use of the exoskeleton refers to the rehabilitation or as an aid or support in the event of illness, disability, or injury. There are quite a few conditions where the technology can be applied. Some of the cases in the industrial section apply here if the conditions occur with a WMSD. The significant groups identified by Bioservo are:

- Musculoskeletal injuries (Carpal Tunnel Syndrome, Epicondylitis)
- Traumatic injuries (Central Nervous System)
- Reduced hand function due to aging
- Stroke
- Arthritis
- Cerebral Palsy
- Multiple Sclerosis
- Tetraplegic Spinal Cord Injury

These significant groups have, especially four of them, very high numbers worldwide. Given the high prevalence in musculoskeletal injuries, Traumatic injuries and Stroke, and reduced hand function due to aging.

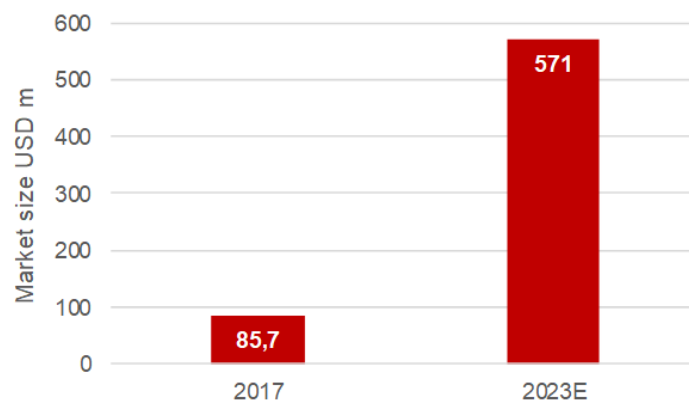
This market is generally regulated, and decisions are often made through purchasing through various authorities or insurance companies. Less so when it comes to rehabilitation, where hospitals and clinics sometimes have autonomous decision-making powers. General for the market is that the products must be approved as medical devices, i.e., a certification by the Swedish Medicines Agency, FDA, or similar. This often requires extensive and well-founded clinical studies.

The driving forces in this segment are the same forces that are the same for all healthcare around the world.

The aging population is a strong force, especially in the western world, where the aging population leads to many different disabilities of varying degrees of severity. Reduced hand function is one of the most prominent problems, with a prevalence of 5%. The increasing MSDs in both US and Europe also with a high prevalence, these MSDs as discussed in the Ironhand section, leads to high costs both in the working population and as well in the aging one, the WMSDs can also show up after a couple of years when the age factor also contributes.

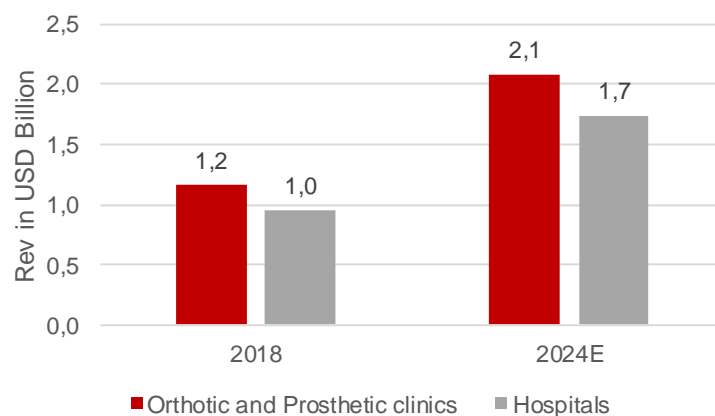
Of course, there are other damages such as Stroke, arthritis, traumatic injuries, and the less frequent but still many multiple sclerosis and spinal cord injuries. These conditions will need rehabilitation to a certain degree which will drive growth for equipment in this field.

As seen by the graph below, the market for medical exoskeletons is expected to grow substantially, the actual levels are hard to judge, but there is a clear growth pattern.

Medical exoskeleton market size worldwide - 2017 - 2023E

Source: Statista, Markets and Markets, Redeye Research

The graph below also shows the growth trend; the clinics are important growth drivers. As they are often independent decision-makers regarding equipment, it is a highly interesting market to penetrate.

Global market - prosthetics and exoskeletons 2018-2024 (End user)

Source: Statista, BIS Research, Redeye Research

Indicative TAM (Lifescience) – a vast market

When we look at the total available market for Carbonhand, it is clear that this is a very high number calculation. The numbers of patients in the different markets that we have included here are very high. The prevalence of some of the clinical indications is between 5-8%, which, of course, gives high numbers when looking at the large populations of Europe, the US, and Japan. We have looked into possible penetration rates for the Carbonhand glove for both the Assistive and Rehab markets. We have been prudent and used lower penetration rates than may be the case.

The TAM numbers for the Assistive and Rehab market for Carbonhand are very high at EUR 9.5 bn and EUR 5.5 bn, respectively. Of course, these numbers are pretty uncertain but show the potential in the market and not the actual sales.

TAM, Carbonhand - no potential patients

		2021E	2022E	2023E	2024E	2025E	2026E
Clinical Indication	Prevalence						
US							
Musculoskeletal injuries	6,5%	21 320 000	21 746 400	22 181 328	22 624 955	23 077 454	23 539 003
Reduced hand function - aging	5,0%	6 560 000	6 691 200	6 825 024	6 961 524	7 100 755	7 242 770
Traumatic injuries (CNS)	8,0%	26 240 000	26 764 800	27 300 096	27 846 098	28 403 020	28 971 080
Stroke	1,3%	4 329 600	4 416 192	4 504 516	4 594 606	4 686 498	4 780 228
Arthritis	2,6%	3 411 200	3 479 424	3 549 012	3 619 993	3 692 393	3 766 240
Cerebral Palsy	0,2%	656 000	669 120	682 502	696 152	710 075	724 277
Multiple Sclerosis	0,0%	117 752	120 107	122 509	124 959	127 459	130 008
Tetraplegic Spinal cord injury	0,0%	35 096	35 798	36 514	37 244	37 989	38 749
Total		62 669 648	63 923 041	65 201 502	66 505 532	67 835 642	69 192 355
Age adjusted population		131 200 000	133 824 000	136 500 480	139 230 490	142 015 099	144 855 401
US population		328 000 000	334 560 000	341 251 200	348 076 224	355 037 748	362 138 503
Europe/EU-28							
Musculoskeletal injuries	6,5%	24 050 000	26 984 100	27 523 782	28 074 258	28 635 743	29 208 458
Reduced hand function - aging	5,0%						
Traumatic injuries (CNS)	8,0%	35 280 000	35 985 600	36 705 312	37 439 418	38 188 207	38 951 971
Stroke	1,3%	9 768 000	9 963 360	10 162 627	10 365 880	10 573 197	10 784 661
Arthritis	2,6%	9 620 000	10 793 640	11 009 513	11 229 703	11 454 297	11 683 383
Cerebral Palsy	0,2%	1 480 000	1 509 600	1 539 792	1 570 588	1 602 000	1 634 040
Multiple Sclerosis	0,0%	265 660	270 973	276 393	281 921	287 559	293 310
Tetraplegic Spinal cord injury	0,0%	79 180	80 764	82 379	84 026	85 707	87 421
Total		80 542 840	85 588 037	87 299 798	89 045 793	90 826 709	92 643 244
Age Europe - adjusted population		370 000 000	415 140 000	423 442 800	431 911 656	440 549 889	449 360 887
Total Europe population		740 000 000	754 800 000	769 896 000	785 293 920	800 999 798	817 019 794
EU28 - population		441 000 000	449 820 000	458 816 400	467 992 728	477 352 583	486 899 634
Japan							
Musculoskeletal injuries	6,5%	4 422 600	4 549 545	4 640 536	4 733 347	4 828 014	4 924 574
Stroke	1,3%	1 663 200	1 679 832	1 713 429	1 747 697	1 782 651	1 818 304
Cerebral Palsy	0,2%	252 000	254 520	259 610	264 803	270 099	275 501
Multiple Sclerosis	0,0%	45 234	45 686	46 600	47 532	48 483	49 452
Tetraplegic Spinal cord injury	0,0%	13 482	13 617	13 889	14 167	14 450	14 739
Total		6 396 516	6 543 200	6 674 064	6 807 545	6 943 696	7 082 570
Age adjusted population		68 040 000	69 993 000	71 392 860	72 820 717	74 277 132	75 762 674
Japan - population		126 000 000	127 260 000	129 805 200	132 401 304	135 049 330	137 750 317
Total US -Europe + Japan							
Musculoskeletal injuries	6,5%	49 792 600	53 280 045	54 345 646	55 432 559	56 541 210	57 672 034
Reduced hand function - aging	5,0%	6 560 000	6 691 200	6 825 024	6 961 524	7 100 755	7 242 770
Traumatic injuries (CNS) ex japan	8,0%	61 520 000	62 750 400	64 005 408	65 285 516	66 591 226	67 923 051
Stroke	1,3%	15 760 800	16 059 384	16 380 572	16 708 183	17 042 347	17 383 194
Arthritis ex japan	2,6%	13 031 200	14 273 064	14 558 525	14 849 696	15 146 690	15 449 623
Cerebral Palsy	0,2%	2 388 000	2 433 240	2 481 905	2 531 543	2 582 174	2 633 817
Multiple Sclerosis	0,0%	428 646	436 767	445 502	454 412	463 500	472 770
Tetraplegic Spinal cord injury	0,0%	127 758	130 178	132 782	135 438	138 146	140 909
Total potential patients		149 609 004	156 054 278	159 175 363	162 358 871	165 606 048	168 918 169
Total population US - EU - Japan		895 000 000	911 640 000	929 872 800	948 470 256	967 439 661	986 788 454
Total population US - Europe (total) - Japan		1 194 000 000	1 216 620 000	1 240 952 400	1 265 771 448	1 291 086 877	1 316 908 614

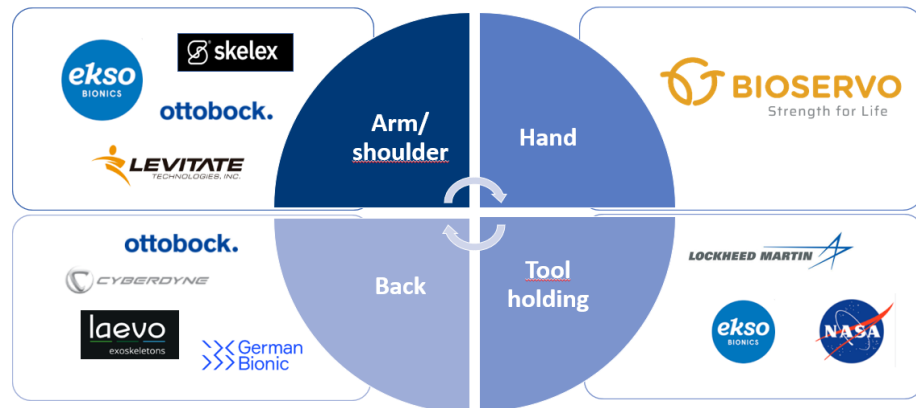
Potential Units at penetration rates	Assistive	Glove volume	Rehab	Glove volume	Total TAM - Glove volume
	Penetration rate %		Penetration rate %		
Musculoskeletal injuries	2%	995 852	1%	497 926	
Reduced hand function - aging	2%	131 200	0%	0	
Traumatic injuries (CNS)	1%	615 200	1%	307 600	
Stroke	2%	315 216	2%	315 216	
Arthritis	2%	260 624	2%	195 468	
Cerebral Palsy	2%	47 760	2%	47 760	
Multiple Sclerosis	2%	8 573	2%	8 573	
Tetraplegic Spinal cord injury	2%	2 555	2%	2 555	
Total units		2 376 980		1 375 098	3 752 078
Price Carbonhand (EUR)		4000		4000	4000
TAM, WW (EURm)		9 508		5 500	15 008
TAM, WW (SEKm)		97 171		56 214	153 385
SEK/EUR		10,2		10,2	10,2

Source: Redeye Research, WHO, World Bank

Competitive landscape

The competitive situation is limited in the niche that Bioservo primarily operates. The primary competitors in the exoskeleton market focus mainly on "hard" solutions, mainly in steel or prosthetics with a focus on the lower extremities as legs and feet. Some products are on the market for hand rehabilitation, such as HandTutor, Amadeo, and others. We can see going through the market that some of the products come close in their purpose but do not offer the soft solution that Bioservo offers. In the industrial setting, the competition regarding soft exoskeleton for the hand is currently not very strong.

Bioservo - competitive overview



Source: Bioservo Technologies

The picture above shows that the competition is tougher in the arm/shoulder and back segments. For example, the well-known brands of Ottobock are well established in the orthopedic market but primarily not competing directly with Bioservo. There are, of course, some university studies and projects ongoing, but what we can see at present is that there are not that many soft exoskeletons solutions close to the market. There is, of course, a risk that with expected strong growth in the market driven by increased indirect and direct costs for rehabilitation, it will create new competitors with time.

Case in point – Myomo Inc

One exciting company has come a little bit further than Bioservo in the Life Science segment. Myomo is a US-based robotic company that offers expanded mobility for neurological disorders and upper-limb paralysis patients. The company was founded in 2004 and was introduced to the stock market in New York in 2017.

The solution is a bit more of a ridged construction as we see it; however, they have shown improving sales in the Life Science segment, and Q2 of 2021 showed sales of USD 3.1 m with a vastly improved gross margin to 71% (51%). However, they are competitors; we feel that the Bioservos solution is more user-friendly and important in daily life. The importance here is that there seems to be a willingness to pay for these solutions in the market.



Financials

Bioservo has had as many other companies a challenging 2020/21, where limited access was the norm as clients and prospective clients worldwide closed down. For a company like Bioservo in the early stages of commercialization, this was not positive as products need to be marketed and tested on-site. The net sales development in 2020 was still positive, up 26%, but not to the extent that could have been expected, and the shutdowns seem to have more affected the sales in the first half of 2021, with roughly half the sales than the same period 2020.

There is still a bit of uncertainty in the short-term development due to the lingering effects of the pandemic; however, we are optimistic that Bioservo will return to growth numbers in 2022, with some improvements in Q4 of this year. The GM trial and the iHand clinical trial will focus on the possibilities again, and there seems to be a lot of interest from both the industrial sector and the Life Science sector. The interest now has to be turned into orders and sales. So far, the sales impact from the collaborations and partnerships has been limited. The coming 6-12 months are important since the GM and iHand trials are closing. Still, the promising results from the Toyota trials could stir new interest not only from Toyota but also from other hand-intensive industries.

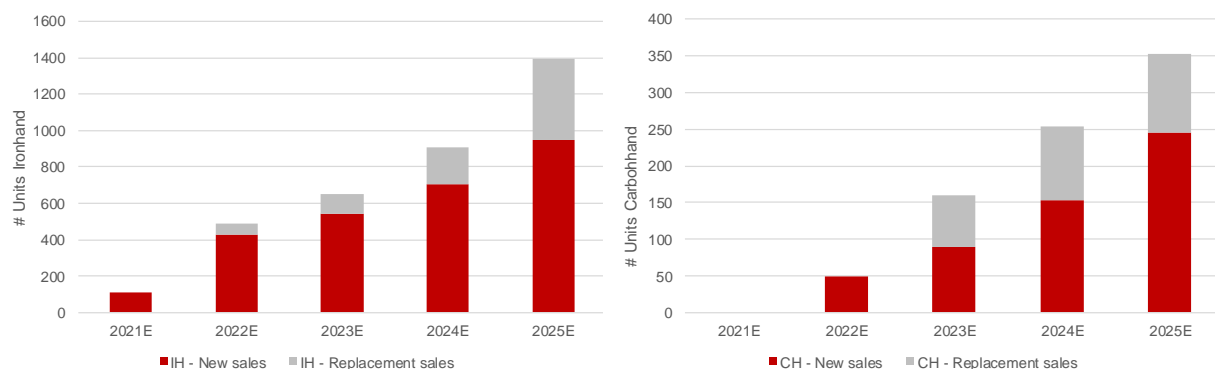
With these events soon and increased market activities post-Covid, we see high growth potential in the mid (2022) and long term. With the slow last 12 months in sales development, we choose to be somewhat conservative in our estimates. We do not pencil in significant sales from GM or Toyota, but more than a token number than the total potential. The need for the products is there, and the potential market is vast; it is now time to deliver.

Focus on improving the product offering during the pandemic

When the world closed down last year, Bioservo realized that it would be difficult to sell their systems. While the sales development was positive during the year, the focus has been on improving the product offering according to the company. This has resulted in the Ironhand 2.0 and Carbonhand 2.0 planned to reach the market next year, which are considerably enhanced from the previous generation. The improving business conditions (currently) will give the company a chance to start normal sales processes again. Both systems will now be commercialized with Ironhand 2.0 already began in 2021. Carbonhand 2.0 will be commercialized in 2022, pending a positive outcome of the iHand clinical trial.

We estimate that Bioservo has an installed base of approximately 250 Ironhand and 200 Carbonhand at the end of 2020. So far this year, the company has communicated total orders of 110 Ironhand from Gobio and Loxam. In our estimates for the year, we have set our expectations low on new orders; we estimate a total of 150 Ironhand ordered and no Carbonhand. We recognize, of course, the difficulty of assessing when and if new orders come in. However, we are confident that the positive signals from the trials, both for Ironhand and Carbonhand, will render new orders.

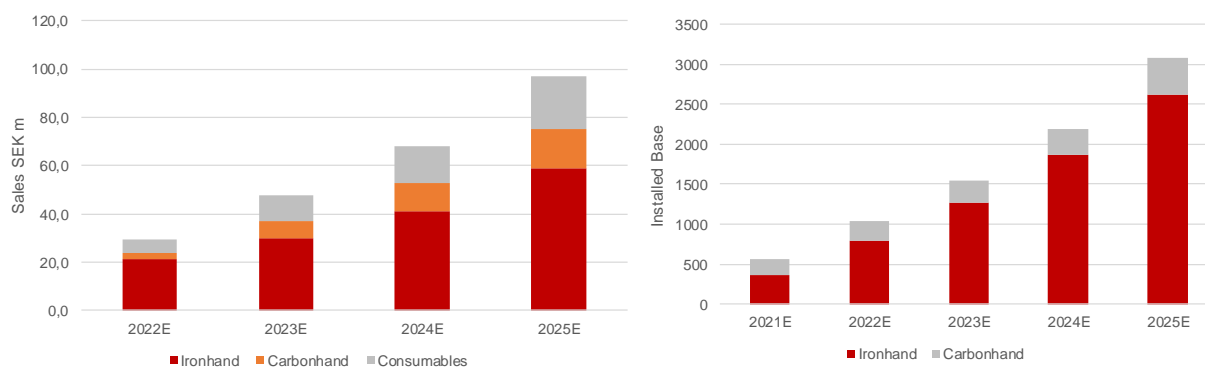
We estimate that Bioservo during 2022E will have significantly higher order inflow, the timing is uncertain, but we expect that Ironhand will have a good year. We forecast 430 Ironhand new systems to be sold during 2022E, and in 2023E, we expect a total number sold to be 600 systems, of which 60 are replacement orders from the previous base that need to be replaced.

Estimated number of Ironhand - Carbonhand sold

Source: Redeye Research

We are relatively conservative on the expected number of Carbonhand to be sold going forward. The Life Science market is hard to penetrate with all the rules and regulations; we expect Carbonhand to succeed but hold down our expectations until we have more indications from the market. Since both products are breaking new ground in many respects with their soft exoskeleton, it will take time to market.

The sales estimates are based on the assumption that Bioservo will receive orders from several partners during 2022E. The major contributors are GM, Loxam with almost half of the 430 new units expected to be sold. In 2023 we expect some contribution from Toyota and Eiffage as well as continued orders from GM. In 2023E, we expect some replacement orders to come in for orders received in 2021 that need to be replaced.

Estimated sales - installed base

Source: Redeye Research

We expect that by 2025E, Bioservo will reach sales just below SEK 100 m and achieve profitability. The sales growth and profitability could be substantially higher, and profitability comes earlier if GM decides to implement the Ironhand system worldwide.

Order from one of the more significant Partners a potential game-changer

We have high hopes for the first substantial order from one of the more significant partners. This could potentially become a game-changer. The total number of employees at GM is in excess of 150 thousand; if we estimate that the Ironhand system would help 10 % of these in their daily work, it would mean 15 thousand potential systems. The potential is exciting, and a substantial order from GM would change the fundamentals drastically.

Growth will require capital

Bioservo has invested heavily during the last years to further develop their product; the pandemic has delayed the commercialization by about 1,5 years. We believe that the organization is strong enough to take the growth to a new level without significant new investments in personnel. We have accounted for a certain increase in OPEX over the coming years to generate the growth numbers we estimate. We see sustainable profitability on an annual basis will be reached by 2025/26. In 2026 we expect to see EBIT margins of 13%, which will continue to rise to around 23 % in 2028. At the end of our forecast, we estimate an EBIT margin of 20%. (2036).

Income Statement	2019	2020	2021E	2022E	2023E	2024E	2025E
Revenues	9	12	8	30	48	68	97
Y/Y Growth (%)	38,2%	25,8%	(27,5%)	249,4%	61,8%	42,6%	42,3%
Cost of Revenues	4	7	4	15	22	31	43
Gross Profit	5	5	5	15	25	38	54
Gross Profit Margin (%)	55,3%	43,8%	56,9%	50,0%	53,0%	55,0%	56,0%
Other External Costs	17	11	12	13	14	17	16
Employee Expenses	22	23	28	29	33	34	36
R & D Expenses	-	-	-	-	-	-	-
Other Op. Expenses / (Income)	(15)	(6)	(0)	(1)	(2)	(3)	(4)
Exchange Rate Differences	-	-	-	-	-	-	-
EBITDA	(19)	(22)	(35)	(27)	(21)	(11)	7
EBITDA Margin (%)	(209,1%)	(191,1%)	(413,8%)	(91,0%)	(43,0%)	(16,0%)	7,0%
Depreciation	-	-	-	-	0	0	0
Amortization	4	4	4	3	3	2	2
Amortization of Right-to-Use Assets	-	-	-	-	-	-	-
EBIT	(23)	(26)	(39)	(30)	(23)	(13)	4
EBIT Margin (%)	(250,7%)	(225,7%)	(457,7%)	(100,0%)	(49,0%)	(19,7%)	4,5%
Associated Income / (Loss)	-	-	-	-	-	-	-
Interest Income	-	0	-	1	0	0	0
Interest Expenses	(0)	-	-	-	1	1	1
Interest Expenses, Lease Liabilities	-	-	-	-	-	-	-
Exchange Rate Differences	-	-	-	-	-	-	-
Non-recurring Income / (Expenses)	-	-	-	-	-	-	-
EBT	(23)	(26)	(39)	(29)	(24)	(14)	3
Income Tax Expenses	-	-	-	(6)	(5)	(3)	1
Effective Tax Rate (%)	0,0%	0,0%	0,0%	20,6%	20,6%	20,6%	20,6%
Non-Controlling Interests	-	-	-	-	-	-	-
Net Income	(23)	(26)	(39)	(23)	(19)	(11)	3
Non-Recurring Items / (Loss), Post Tax	-	-	-	-	-	-	-
Recurring Net Income	(23)	(26)	(39)	(23)	(19)	(11)	3
Net Income Margin (%)	(250,7%)	(225,7%)	(457,7%)	(78,0%)	(39,4%)	(16,8%)	2,7%

Source: Bioservo & Redeye Research

Financial position

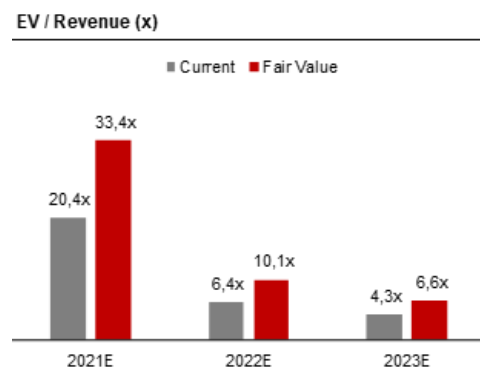
Bioservo's cash balance (and equivalents) amounted to SEK 34.5m at the end of Q2. There is only a short-term liability of SEK 5.7m at the end of Q2, giving a net cash position of SEK 34.5 m. On our estimates for the rest of the year, the year-end cash position would be SEK 17 m. This would suggest that there will be a financing need during the first half of 2022, on our estimates. The financing need is not substantial; however, it still needs to be sorted to drive growth, especially when Carbonhand 2.0 is commercialized in 2022.

Valuation

To value Bioservo, we apply a discounted cash flow (DCF) model. Our model uses a WACC of 11% (reflecting both current market rates of return and risk specific to the company) across our Base, Bull, and Bear cases to discount the forecasted cash flows. This WACC is derived from our proprietary Redeye rating model with a risk-free interest rate of 1%.

Bioservo's share was trading at very low levels during the market dip at the beginning of 2020 when the pandemic entered the stage. The share recovered but has been trading negatively during 2021; we believe it is primarily due to the lower sales during the first half of 2021. The share has, however, reacted very positively to news in general. The announcement of the direct share issue in November sent the share up more than 60%. Even with a free float of 68 %, the share is not very liquid on the stock market, which explains some of the volatility.

The valuation on EV/S on our estimates for 2023E are not challenging either on the shares current value 4,3x and in on our Base case fair value is 6,6x.



DCF

Base case – SEK 19

Our Base case of SEK 19 represents an upside of almost 60% from current trading levels and corresponds to a 2023E EV/S multiple of 4,6x. Given the transformational journey that the company is on, the EV/S multiple is the most relevant, and the other EV multiples will come down rapidly as the results improve in the coming years. We expect the partnerships and trials to push the sales in the coming years for both the industrial and Life Science segments. The order backlog will start to show up at the end of 2021E. There is no doubt that the market potential is there. We believe that the growth inflection point will occur within the coming 6-12 months. Our key assumptions are stated below:

DCF assumptions in Base				
Assumptions:	2021E-2025E		2025E-2034E	DCF-value
CAGR Revenue	84%		22%	WACC 11%
Average EBIT-margin	-124%		18%	NPV of FCF 129
				NPV of Terminal Value 135
Terminal				
Sales growth	2,0%			Sum of NPV 265
EBIT-margin	13%			Net Debt -34
				DCF-value 299
				Fair value per share 19
				Current share price 12

Source: Redeye Research

Key assumptions

- Sales CAGR 2021E-2025E: 84%
- Sales CAGR 2025E-2034E 22%
- Terminal growth: 2%
- Average EBIT margin 2021E-2025E: -124%
- Average EBIT margin 2025E-2034E: 18%
- Terminal EBIT margin: 13%

Bear case – SEK 10

Key assumptions

- Sales CAGR 2021E-2025E: 84%
- Sales CAGR 2025E-2034E 18%
- Terminal growth: 1,5%
- Average EBIT margin 2021E-2025E: -124%
- Average EBIT margin 2025E-2034E: 16%
- Terminal EBIT margin: 11%

In the Bear case, we expect that the impact of Bioservos products has less of an effect than the clinical data and benefits indicate. Even if we see the same growth during the first years, we see lower organic growth later and lower operating margins based on a higher cost to improve sales. We also expect that the new opportunities within Carbonhand are slower to make a difference on the top line.

Bull case – SEK 28

Key assumptions

- Sales CAGR 2021E-2025E: 84%
- Sales CAGR 2025E-2034E 24%
- Terminal growth: 2,5%
- Average EBIT margin 2021E-2025E: -124%
- Average EBIT margin 2025E-2034E: 20%
- Terminal EBIT margin: 16%

In the Bull case, which is more of a blue-sky scenario, the impact of GM and Toyota's trials pays off. We also expect that Carbonhand becomes somewhat of a new standard of care for some indications.

Peer valuation

To further evaluate the value of Bioservo, we analyze the share against other companies in related fields. This approach relies on the assumption that similar companies will sell at similar valuation multiples. Bioservo is both a tech and Medtech company in our view, and we have decided to use our Medtech universe as a reference in this case, even if direct competitors are few. As Bioservo is still some time away from profitability, the most relevant measure is the EV/S multiple. We have included one of the more relevant companies, Myomo Inc as well.

The EV/Sales multiple for the group trade in a wide range of EV/S of 2,2x to 31,5x on the 2022E, where the young and more unproven companies trade in the lower end of the spectrum. The Median of the group trades at 15x on the 2022E. Bioservo is currently trading at 6,4x, and 4,3x EV/S for 2021 and 2022 and 10x EV/S on our Base case motivated value in 2022E.

Peer valuation												
Company	EV (MSEK)	EV/Sales			EV/EBITDA			Sales CAGR 20-23E	EBITDA CAGR 20-23E	EBITDA margin		
		2021E	2022E	2023E	2021E	2022E	2023E			2021E	2022E	2023E
Nordic												
Vitrolife	57 375	35,1x	21,1x	20,1x	99,2x	58,1x	53,1x	32%	33%	35%	36%	38%
Biotage	15 699	13,1x	11,5x	10,3x	44,2x	40,9x	36,2x	12%	16%	30%	28%	29%
Cellavision	11 131	20,0x	16,8x	14,4x	38,8x	47,4x	39,7x	18%	27%	34%	35%	36%
Xüvo Perfusion	12 392	25,0x	18,7x	21,7x	174,1x	107,2x	110,6x	47%	-263%	14%	17%	20%
Sedana Medical	8 639	60,8x	31,5x	19,7x	-129,2x	367,4x	74,3x	46%	-36%	-41%	9%	26%
Bactiguard	5 836	23,2x	15,2x	NA	75,8x	33,7x	NA	NA	-26%	26%	45%	NA
Surgical Science	9 970	32,2x	15,0x	12,9x	36,5x	58,4x	40,9x	95%	-24%	28%	26%	31%
Genovis	3 982	47,9x	27,8x	22,6x	94,9x	65,0x	47,6x	42%	-26%	26%	43%	47%
Boule Diagnostics	1 212	2,6x	2,3x	2,0x	35,0x	12,0x	10,2x	14%	49%	13%	19%	20%
SynthicMR	2 428	37,8x	25,9x	22,8x	129,9x	58,4x	47,5x	30%	119%	29%	44%	48%
Senzime	1 328	51,2x	12,1x	6,6x	NA	NA	44,9x	180%	-193%	-257%	-15%	15%
Irras	226	6,4x	2,2x	1,2x	NA	NA	-5,4x	194%	-29%	-344%	-97%	-22%
OssDsign	278	6,9x	2,8x	1,9x	-3,0x	-4,2x	-10,3x	81%	-30%	-232%	-68%	-18%
Myomo INC	425	3,2x	2,3x	1,6x	-1,3x	-2,6x	NA	59%	NA	-65%	-22%	NA
Median	4 909	24,1x	15,1x	12,9x	41x	53x	43x	32%	-26%	20%	22%	28%
Bioservo	173	20,4x	6,4x	4,3x	-4,9x	-7,0x	-10,0x	59%	-2%	-412%	-90%	-44%

Source: Factset *Redeye Research

Income statement & Balance sheet

Income Statement	2019	2020	2021E	2022E	2023E	2024E	2025E
Revenues	9	12	8	30	48	68	97
Y/Y Growth (%)	38,2%	25,8%	(27,5%)	249,4%	61,8%	42,6%	42,3%
Cost of Revenues	4	7	4	15	22	31	43
Gross Profit	5	5	5	15	25	38	54
Gross Profit Margin (%)	55,3%	43,6%	56,9%	50,0%	53,0%	55,0%	56,0%
Other External Costs	17	11	12	13	14	17	16
Employee Expenses	22	23	28	29	33	34	36
R & D Expenses	-	-	-	-	-	-	-
Other Op. Expense / (Income)	(15)	(6)	(0)	(1)	(2)	(3)	(4)
Exchange Rate Differences	-	-	-	-	-	-	-
EBITDA	(19)	(22)	(35)	(27)	(21)	(11)	7
EBITDA Margin (%)	(209,1%)	(191,1%)	(413,8%)	(91,0%)	(43,0%)	(16,0%)	7,0%
Depreciation	-	-	-	-	0	0	0
Amortization	4	4	4	3	3	2	2
Amortization of Right-to-Use Assets	-	-	-	-	-	-	-
EBIT	(23)	(26)	(39)	(30)	(23)	(13)	4
EBIT Margin (%)	(250,7%)	(225,7%)	(457,7%)	(100,0%)	(49,0%)	(19,7%)	4,5%
Associated Income / (loss)	-	-	-	-	-	-	-
Interest Income	-	0	-	1	0	0	0
Interest Expenses	(0)	-	-	-	1	1	1
Interest Expenses, Lease Liabilities	-	-	-	-	-	-	-
Exchange Rate Differences	-	-	-	-	-	-	-
Non-recurring Income / (Expenses)	-	-	-	-	-	-	-
EBT	(23)	(26)	(39)	(29)	(24)	(14)	3
Income Tax Expenses	-	-	-	(6)	(5)	(3)	1
Effective Tax Rate (%)	0,0%	0,0%	0,0%	20,6%	20,6%	20,6%	20,6%
Non-Controlling Interests	-	-	-	-	-	-	-
Net Income	(23)	(26)	(39)	(23)	(19)	(11)	3
Non-Recurring Items / (Loss), Post Tax	-	-	-	-	-	-	-
Recurring Net Income	(23)	(26)	(39)	(23)	(19)	(11)	3
Net Income Margin (%)	(250,7%)	(225,7%)	(457,7%)	(78,0%)	(39,4%)	(16,8%)	2,7%

Source: Bioservo & Redeye Research

Balance Sheet	2019	2020	2021E	2022E	2023E	2024E	2025E
Current Assets							
Cash & Equivalents	57	53	17	15	10	10	10
Inventories	5	3	5	10	15	17	18
Accounts Receivable	3	1	1	2	6	8	12
Other Current Assets	2	4	3	6	9	10	15
Total Current Assets	68	60	25	33	40	45	54
Non-Current Assets							
Property, Plant & Equipment, Net	1	0	0	1	2	4	7
Goodwill	-	-	-	-	-	-	-
Intangible Assets	13	10	8	8	7	6	6
Right-of-Use Assets	-	-	-	-	-	-	-
Shares in Associates	-	-	-	-	-	-	-
Other Long-Term Assets	0	-	-	-	-	-	-
Total Non-Current Assets	13	10	8	9	9	10	12
Total Assets	81	71	33	43	49	55	66
Current Liabilities							
Short-Term Debt	-	-	-	15	26	27	17
Short-Term Lease Liabilities	-	-	-	-	-	-	-
Accounts Payable	2	3	2	6	9	13	18
Advances From Customers	-	-	-	-	-	-	-
Prepaid Income	-	-	-	-	-	-	-
Accrued Expenses	-	-	-	-	-	-	-
Other Current Liabilities	4	6	6	21	31	44	58
Total Current Liabilities	6	8	8	41	67	84	93
Non-Current Liabilities							
Long-Term Debt	-	-	-	-	-	-	-
Long-Term Lease Liabilities	-	-	-	-	-	-	-
Other Long-Term Liabilities	-	-	-	-	-	-	-
Other Long-Term Liabilities, % of Rev.	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Total Non-current Liabilities	-	-	-	-	-	-	-
Shareholder's Equity	75	62	24	1	(18)	(29)	(26)
Book Value Per Share	5,3	3,9	1,5	0,1	(1,1)	(1,8)	(1,7)
Total Liabilities & Equity	81	71	33	43	49	55	66
Net Debt	(57)	(53)	(17)	(0)	16	17	7
Net Gearing (%)	-75,6%	-84,4%	-69,2%	-39,0%	-92,2%	-60,1%	-26,8%

Source: Bioservo & Redeye Research

Summary Redeye Rating

The rating consists of three valuation keys, each constituting an overall assessment of several factors that are rated on a scale of 0 to 1 points. The maximum score for a valuation key is 5 points.

Rating changes in the report

People: 4

Extensive experience is found among both senior executives and board members. Positive rating effect from the tenure of executives and board.

Business: 3

We see a clear business opportunity with increasing strain injuries in the workplace as well as an aging population that will increase clinical conditions that will create need for assistive and rehab solutions.

Financials: 1

Bioservo is not yet profitable and is in an intensive startup phase of their commercialization that requires capital. We expect that the company will have to raise further capital within 12 months to drive growth and reach profitability by 2025E.

	2020	2021E	2022E	2023E				
INCOME STATEMENT					DCF Valuation	Cash Flow, MSEK		
Revenues	11.7	8.5	29.8	47.8	WACC (%)	11%	NPVFCF Initial	-19
Cost of Revenues	6.8	3.8	14.8	22.5			NPVFCF Momentum	105
Gross Profit	5.1	4.8	14.8	25.3	Initial period	2021-2028	NPVFCF Stable	179
Gross Profit Margin (%)	44%	57%	50%	53%	Momentum period	2029-2038	Value of Firm	265
Operating Expenses	27.4	39.8	41.7	45.9	Stable period	2037 -	Net Debt	-34
Exchange Rate Differences	0.0	0.0	0.0	0.0			Equity Value	299
EBITDA	22.3	-35.0	-28.9	-20.8	Assumption to end of momentum period		Fair Value per Share	1895
EBITDA Margin (%)	-191%	-414%	-91%	-43%	Revenue CAGR (%)	35%	Current Share Price	1222
Depreciation & Amortization	4.0	3.7	2.7	2.9	Average EBIT margin (%)	-25%	Current EV	176
EBIT	26.3	-38.7	-29.8	-23.4				
EBIT Margin (%)	-226%	-458%	-100%	-49%				
Associated Income / (loss)	0.0	0.0	0.0	0.0				
Net Financial Items	0.0	0.0	0.5	-0.3	CAPITAL STRUCTURE			
Non-recurring Income / (Expense)	0.0	0.0	0.0	0.0	Equity Ratio	0.9	0.7	0.0
EBT	26.3	-38.7	-29.1	-23.7	Debt to equity	0.0	0.0	11.7
Income Tax Expenses	0.0	0.0	-6.0	-4.9	Net Debt	-52.8	-16.8	-0.5
Effective Tax Rate (%)	0%	0%	21%	21%	Capital Employed	623	24.3	1.2
Non-Controlling Interest	0.0	0.0	0.0	0.0	Working Capital Turnover	-18.7	-21.9	-3.8
Net Income	26.3	-38.7	-23.1	-18.8				
Non-Recurring Items / (Loss), F	0.0	0.0	0.0	0.0	GROWTH			
Recurring Net Income	26.3	-38.7	-23.1	-18.8	Revenue Growth	26%	-27%	249%
Net Income Margin (%)	-226%	-458%	-78%	-39%	Basic EPS Growth	-23%	34%	-40%
					Adjusted Basic EPS Grw	-23%	34%	-40%
BALANCE SHEET								
Assets					PROFITABILITY			
Current assets					ROE	-38%	-89%	-181%
Cash & Equivalents	52.8	16.8	15.0	10.0	ROCE	-42%	-159%	-2379%
Inventories	3.1	4.8	10.1	15.4	ROIC	-275%	-402%	-183%
Accounts Receivable	0.8	0.8	2.4	5.9	EBITDA Margin (%)	-191%	-414%	-91%
Other Current Assets	3.9	2.5	5.9	8.8	EBIT Margin (%)	-226%	-458%	-100%
Total Current Assets	60.2	24.8	33.5	39.9	Net Income Margin (%)	-226%	-458%	-78%
Non-current assets					VALUATION			
Property, Plant & Equipment, Ni	0.4	0.3	1.2	2.5	Basic EPS	-1.8	2.5	-1.5
Goodwill	0.0	0.0	0.0	0.0	Adjusted Basic EPS	-1.8	2.5	-1.5
Intangible Assets	10.0	7.8	7.9	6.8	P/E	neg	neg	neg
Right-of-Use Assets	0.0	0.0	0.0	0.0	EV/Revenue	18.9	20.8	6.5
Shares in Associates	0.0	0.0	0.0	0.0	EV/EBITDA	neg	neg	neg
Other Long-Term Assets	0.0	0.0	0.0	0.0	EV/EBIT	neg	neg	neg
Total Non-Current Assets	10.4	7.9	9.1	9.0	P/B	4.4	7.9	155.4
Total Assets	70.6	32.6	42.5	49.0				
					SHAREHOLDER STRUCTURE			CAPITAL %
Liabilities					Teliaq AB		21%	21%
Current liabilities					Anders Lundmark		10%	10%
Short-Term Debt	0.0	0.0	14.5	26.2	Avenza Pension		6%	6%
Short-Term Lease Liabilities	0.0	0.0	0.0	0.0	Tomas Ward		4%	4%
Accounts Payable	2.5	2.0	6.1	9.2	Magnus Lundberg		3%	3%
Other Current Liabilities	5.8	6.3	20.7	31.1	Simon Josefsson Datakonsult AB		3%	3%
Total Current Liabilities	8.3	8.3	41.3	66.5	Dobono AB		2%	2%
					Nordnet Pension		1%	1%
Non-current liabilities					Hans von Holst		1%	1%
Long-Term Debt	0.0	0.0	0.0	0.0	Håkan Gabrielsen		1%	1%
Long-Term Lease Liabilities	0.0	0.0	0.0	0.0				
Other Long-Term Liabilities	0.0	0.0	0.0	0.0	SHARE INFORMATION			
Total Non-current Liabilities	0.0	0.0	0.0	0.0	Reuters code			BIO:ST
					List			First North
Non-Controlling Interest	0.0	0.0	0.0	0.0	Share price			1222
Shareholder's Equity	62.3	24.3	1.2	-17.6	Total shares, million			15,798,321
Total Liabilities & Equity	70.6	32.6	42.5	49.0				
CASH FLOW					MANAGEMENT & BOARD			
NCPAT	26.3	-38.7	-23.5	-18.8	CEO			Petter Bäckgren
Change in Working Capital	5.7	-0.2	7.9	2.1	CFO			Jacob Michlewicz
Operating Cash Flow	-16.8	-35.2	-12.5	-13.8	Chairman			Anders Lundmark
Capital Expenditures	0.0	0.0	-0.9	-1.4				
Investment in Intangible Assets	-1.2	-1.2	-3.0	-1.4	ANALYSTS			
Investing Cash Flow	-1.2	-1.2	-3.8	-2.9				
Financing Cash Flow	13.4	0.7	14.5	11.7				
Free Cash Flow	-17.8	-36.5	-16.3	-16.7				

Redeye Rating and Background Definitions

Company Quality

Company Quality is based on a set of quality checks across three categories; PEOPLE, BUSINESS, FINANCE. These are the building blocks that enable a company to deliver sustained operational outperformance and attractive long-term earnings growth.

Each category is grouped into multiple sub-categories assessed by five checks. These are based on widely accepted and tested investment criteria and used by demonstrably successful investors and investment firms. Each sub-category may also include a complementary check that provides additional information to assist with investment decision-making.

If a check is successful, it is assigned a score of one point; the total successful checks are added to give a score for each sub-category. The overall score for a category is the average of all sub-category scores, based on a scale that ranges from 0 to 5 rounded up to the nearest whole number. The overall score for each category is then used to generate the size of the bar in the Company Quality graphic.

People

At the end of the day, people drive profits. Not numbers. Understanding the motivations of people behind a business is a significant part of understanding the long-term drive of the company. It all comes down to doing business with people you trust, or at least avoiding dealing with people of questionable character.

The People rating is based on quantitative scores in seven categories:

- Passion, Execution, Capital Allocation, Communication, Compensation, Ownership, and Board.

Business

If you don't understand the competitive environment and don't have a clear sense of how the business will engage customers, create value and consistently deliver that value at a profit, you won't succeed as an investor. Knowing the business model inside out will provide you some level of certainty and reduce the risk when you buy a stock.

The Business rating is based on quantitative scores grouped into five sub-categories:

- Business Scalability, Market Structure, Value Proposition, Economic Moat, and Operational Risks.

Financials

Investing is part art, part science. Financial ratios make up most of the science. Ratios are used to evaluate the financial soundness of a business. Also, these ratios are key factors that will impact a company's financial performance and valuation. However, you only need a few to determine whether a company is financially strong or weak.

The Financial rating is based on quantitative scores that are grouped into five separate categories:

- Earnings Power, Profit Margin, Growth Rate, Financial Health, and Earnings Quality.

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Disclaimer

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Redeye Rating (2021-09-07)

Rating	People	Business	Financials
5p	19	15	3
3p - 4p	99	76	37
0p - 2p	6	33	84
Company N	124	124	124

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Mats Hyttinge owns shares in the company: /No
Filip Einarsson owns shares in the Company: /No
Redeye performs/have performed services for the company and receives/have received compensation from the company in connection with this.