Integrated Report 2022

Introduction

Autonomous Control Technology Moving Society Forward

ACSL pursues the advancement of autonomous control and other robotics technologies.
We specialize in the development, manufacturing and sale of drones to meet the challenges of our customers.
At ACSL, we are constantly developing cutting-edge technologies to improve social sustainability and productivity, and to free people from hazardous working conditions.

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Editorial Policy

This integrated report covers the ACSL Group on a consolidated basis and seeks to provide stakeholders with integrated financial and non-financial information, including the Group's vision, management policies for medium- and long-term value creation, business strategy, and recent business performance.

Reporting Period

April 1, 2021 to December 31, 2021

Some activities after January 2022 are included.

Reporting Organization

ACSL Ltd. and ACSL Group

Reference Guidelines

Integrated Reporting (IR), International Integrated Reporting Council (IIRC)

Guidance for Collaborative Value Creation, Ministry of Economy, Trade and Industry (METI)

GRI Standards, Global Reporting Initiative (GRI)

The World 30 Years from Now

To build a “fair” world

In today’s society where fewer people work, technological advances have made life more convenient and have made manual delivery and infrastructure inspections a thing of the past.

We now live in a society where individuality and preferences can be more freely expressed, and environmental considerations have become the norm.

This is the future that ACSL envisions.

Robots will eventually take over repetitive tasks such as deliveries, stocking shelves at supermarkets, and inspecting facilities, allowing humans to concentrate on value creation.

Whether on land, at sea, or in the air, robots serve to support the foundation of businesses, although they are usually unseen.

However, in disasters, drones and robots play an active role in rescue operations and in collecting information.

They are much appreciated and relied upon by those affected by disasters.

In countries where the working population is decreasing, robots will nullify the negative impact.

And in emerging countries where the working population is increasing, robots will serve to play catch up with developed countries by leaps and bounds.

Robots will play a role in making the “fair” world and it is our hope to be a part of this endeavor.

Mission

LIBERATE HUMANITY THROUGH TECHNOLOGY

Vision

Revolutionizing social infrastructure by pursuing cutting-edge robotics technology

ACSL pursues robotics technology, including autonomous control technology,
and is always at the forefront of technology development.
Through the social implementation of these technologies,
we will increase the productivity of human economic activities in the social infrastructure that is the foundation of human activities,
replace as many low value-added and dangerous operations as possible,
and promote the evolution of society for the next generation.

Message from the CEO

Enabling essential workers to achieve an intelligent and efficient society

First of all, I would like to express my sincere gratitude for your continuous support.

Since going public in 2018, ACSL has maintained a close dialogue with its shareholders, suppliers, employees, customers and other stakeholders and has shared accurate insight and information on the market and activities. Now that ACSL has entered a rapid growth phase, I feel that it is crucial that we improve our disclosure to include exhaustive and qualitative information about our strengths and strategies. As such, we have embarked on developing an Integrated Report. I hope that this report will enlighten all the readers on the vision of ACSL and prospects for the robotics market.

Satoshi Washiya, President and Representative Director

Profile

Born in Tochigi prefecture, Satoshi spent his childhood in Europe due to his father's work. After receiving a masters degree in architecture at Waseda University, he worked at McKinsey & Company Inc. Japan before joining ACSL in July 2016. He has served as Director, Chief Financial Officer (CFO) and Chief Strategy Officer (CSO), and has been President and Representative Director since June 2020.

Our Vision for the World

Helping our heroes who support our society with Autonomous Control Technology

I would like to first touch upon our vision of the world. At the time of the COVID-19 outbreak, the spotlight was placed on medical personnel who fought bravely against the virus and were regarded as heroes. However, I strongly believe that there were other heroes – those who maintained our social infrastructure, such as electricity, water supply, and logistics – and worked hard to keep our society functioning. Social infrastructure is often taken for granted, but it is an outcome of the hard work, sweat and dedication of the workers. I would like to see a smarter world where these essential tasks are conducted more efficiently and effectively.

I want to serve those workers working behind the scene. This is the vision of the world that we are striving towards, and I have reflected them into our mission statement "Liberating Humanity Through Technology".

ACSL is a company that will help achieve this vision of the world by providing autonomous control technology that enables unmanned operations in social infrastructure. Although our current focus is on the development and manufacturing of drones, our ultimate goal is the coexistence of humans and robotics, not limited to just drones. As part of this, ACSL acquired 40% share of an unmanned ground vehicle (UGV) company called REACT Co., Ltd. (formerly i-eat Co., Ltd.) and has entered into a capital and business alliance. In October 2022, ACSL seconded a representative board member to REACT. Drones may not always be the right answer to address customer issues, so we will continue to provide a wide range of robotics to meet our customers' challenges.

Introduction

True ownership and "can-do" attitude

I joined ACSL in 2016. I was 28 years old at the time and ACSL had just completed its Series A (start-up phase financing) fund raising. A colleague from a foreign consulting firm which I joined as a graduate, Hiroaki Ohta (former president of ACSL), was moving to ACSL so I also left the firm on a moment's notice. I also had a vague idea that I wanted to contribute to Japan by leading some industry that will mature in the near future. At first, I was in charge of engaging with external auditors for the company's IPO as CFO although I did not have any expertise in finance. I learned as I went along. One of the core values that I learned as a consultant was "ownership" and the "can-do" attitude, which helped me to throughout this early phase.

On a separate note, I studied architecture and environmental engineering in graduate school, which you may think has nothing to do with drones. The interesting thing about my studies was that you needed to go back and forth thinking between the macro and micro perspectives - or thinking from an urban level to the small equipment inside a building. The drone industry is also similar in that it involves a big picture of looking at society as a whole, while working on the micro aspect of the vehicle itself.

Later, I succeeded Ohta to become the ACSL president in my early 30s. There were good times and bad times. When you run a business, things happen for reasons that you cannot logically explain. You are hiring an interesting talent or spending some time with someone externally, and then one day it all clicks together and you see an opportunity. Serendipity! This is something I would not have experienced had I not taken this management position at ACSL. Of course, the management role comes with responsibilities, and stakeholders will sometimes give you a hard time. We invest heavily into R&D, which has taken us a long time to get back into the black. This timeline does not always match with that of stakeholders, and we make sure to explain carefully of our intentions.

Management Direction

Transitioning from a solution-based business to a mass producer

ACSL is a unique company whose key asset is autonomous control technology which is rare in the industry. I believe its future will be determined by how we leverage the technology. ACSL's early focus was on conducting proof-of-concept (PoC) trials and a profitable solution-based business. However, in order to achieve our world vision and to help essential workers who are supporting our social infrastructure, PoCs are not enough. PoCs are transient in nature and will not remain after 30 years. Thus, ACSL is trying to transition to become a mass producer. We want to be the first to provide a technology that is so embedded into society 30 years from now that everyone takes it for granted.

It is often said that Japan's drone industry has lagged behind, but I believe that this is a transient phenomenon. There are excellent materials manufacturers and processing manufacturers in Japan. There is no reason why a final product manufacturer that can compete globally, like ACSL, cannot come from Japan.

The economic environment has been a tailwind for us – in the context of economic security. In the past, there was a trend to globalize, but COVID-19 and Russia-Ukraine War have impeded cross-border trading, and now the question is on how to become self-sufficient. Meanwhile, the Japanese government's Digital Rural City concept was launched in June 2022, acting as an accelerator to solve social issues in rural areas by embedding digital technology. The demand for clean energy is also a tailwind for drones which use batteries as their primary energy source. We will continue to respond to these trends.

"To-Be" state in 10 years

Targeting more than JPY 100 billion in revenue and an annual production of 30,000 units

The first key milestone for ACSL is to achieve more than JPY 100 billion in revenue, JPY 10 billion in operating income, and an annual production of 30,000 units by 2030 and to become a global pioneer to solve social infrastructure issues. By back-casting from this milestone, numerous management agendas such as developing quality management and production capability to achieve 3,000 units monthly have surfaced. The key is to address these management agendas to transition our business model to become a mass producer. Our mid-term plan, "ACSL Accelerate", breaks down these long-term milestones into short and mid-term strategies. The first plan, "ACSL Accelerate FY20" (FY 2020-2022) enabled us to be at the starting line of this transition. The new plan starting FY2022 "ACSL Accelerate FY22" (FY 2022-2025) continues to focus on the key milestones to achieve mass production of drones in 4 applications (small aerial photography, pipe inspection, smokestack inspection and delivery) .

Once becoming a mass producer, it should take 2 to 3 years for a product to mature. A newly released product is only 60% as good as it can be no matter how hard we try. The important thing is for us to listen carefully to customer feedback, admit our mistakes, and refine the product as we go. I believe this "arduous journey" is something that is inevitable but important in order to grow as a mass producer. I want to be particular about this concept. It is vital for us to step back and always remember that "we are not perfect," and learn from the voices of those outside the company.

We are a fabless company with no in-house factory, but we are flexible to the idea of having an in-house assembly capability. I believe that being fabless is efficient at an early stage of growth. Once annual production reaches 30,000 units, we will not rule out owning our own factory. We will make decisions based on whether we can guarantee financial efficiency and make the necessary investments at the right time.

Mid-term plan, "ACSL Accelerate FY22"

Empowering key management functions and challenging overseas markets

Let me now turn to "ACSL Accelerate FY22". The main theme of this mid-term plan is to "shift to become a sustainable global manufacturer." Sustainability ultimately means to generate continuous profits. To achieve this, we need to reduce costs and SG&A, upgrade quality, and have our sales team understand the demands of the customer and feed it back to development, resulting in maximum efficiency and effective use of our time and resources. In other words, we need to take every function of the company to a high level.

Another important theme is to become a global manufacturer. Currently, almost 100% of our sales are in Japan, but in the near future, the overseas markets will be key for us. We are focusing on the U.S. and India, which have the potential to become large markets. However, the regulatory, political and geopolitical environment in the U.S. and India are completely different. While the U.S. is relatively politically stable, India is omnipresent, and regulations towards mandating domestic assembly of drones have been implemented. In view of this trend, ACSL has already established a joint venture in India and has the footprint to be able to meet mandates, making the regulations a tailwind for us. We were able to do this because we are a manufacturer that understands design, technology and production methods. We are also actively seeking ways to enter Southeast Asia while there is a growing interest in economic security.

In addition, as a robotics company, we are expanding into the UGV market as well. As I mentioned earlier, we have formed a capital and business alliance with REACT, a UGV company, for this purpose. The market for UGV is surprisingly large; for example, service robots like those used in restaurants are also a type of UGV. We are mainly looking at outdoor applications, such as for construction and agriculture, and intend to release new products in cooperation with REACT in the near future.

Through these efforts, we will capture demand related to economic security and clean energy, and respond to the government's Digital Rural City concept to achieve sales of JPY 10 billion, operating income of JPY 1 billion, and annual shipments of several thousands of units by FY 2025. The first year of the new mid-term plan is progressing steadily, with sales and orders growing rapidly, and we will accelerate our overseas expansion, which is the only area where we are still behind. In the future, we will expand our lineup of medium-sized drones to meet the demands of the market, which is becoming more oriented toward larger drones.

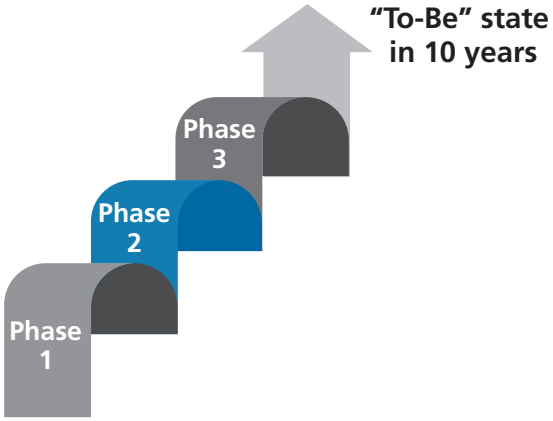
Mid-term plan, "ACSL Accelerate"

To achieve the "To-Be" state in 10 years, ACSL has defined its rolling mid-term plan, "ACSL Accelerate."

3 ACSL Accelerate FY24 (planned; 2024-26)

2 ACSL Accelerate FY22 (2022-25)
Shift to a sustainable global manufacturer

1 ACSL Accelerate FY20 (2020-22)
From Prototype Factory to Mass Production Manufacturer



ESG

Leading society through diversity and a global corporate culture

Reinforcing ESG initiatives is another important pillar in "ACSL Accelerate FY22".

Let's start from the social aspects. Though Diversity and Inclusion (D&I) is now a major theme for many Japanese companies, it is a natural thing for ACSL. From the day the company was founded, D&I has always been a normal thing, and thus we have built our corporate culture with an emphasis towards fairness that goes beyond D&I. We are proud to be a leader in society with a corporate culture of freedom and fairness. We are also a global company with foreign nationals accounting for 24% of our employees. As we expand our business overseas, we intend to operate our entities in various regions with top local talent, and Japanese nationals may eventually become a minority in our company.

In terms of social contribution, we place emphasis on disaster support. We have proactively signed disaster support agreements with local governments and the Japanese Self-Defense Force, and when a disaster occurs, we volunteer to use drones to survey the situation. Since ACSL was originally created to use drone technology for the benefit of society, we respect the wishes of our founder and continue to contribute to society in case of need.

Our contribution to the environment has been mainly through our business activities. In addition to participating in the "Debris Watchers" marine debris reduction project by using drones to take photos of debris washed up on beaches, we are also working with Japan Post on a demonstration test to reduce CO_2 emissions by replacing trucks with drones.

On governance, we have added one external director, increasing the number of external directors to two in FY 2022. The newly appointed board director, Tadaharu Shimazu, has long been involved with Toshiba and its technology. The other external director, Masanori Sugiyama, has management experience at two listed companies. Both individuals are indispensable to our management. On the other hand, there is still room for improvement, one of which is the lack of female board members. As a global company, we would like to consider appointing a non-Japanese external director, and will do so in due course.

Nagano Disaster Investigation

Sumida River Demonstration

Final message from the CEO

Contribute to the social implementation of drones by conducting the first Level 4 flight

December 2022 will be a major milestone for drone manufacturers. "Level 4 flights" (BVLOS over populated areas) will be permitted. In order to obtain the Class 1 type certification, which is required for Level 4 flights, we need to upscale the safety and reliability of our drones and show that they are safe to fly over populated areas.

Once Level 4 is achieved, we believe that not only unmanned deliveries, which are often cited as an example, but also infrastructure inspections will change dramatically. Inspection of metropolitan highways, which are surrounded by cars and pedestrians, will be possible using drones, and this will be the beginning of the true social implementation of drones.

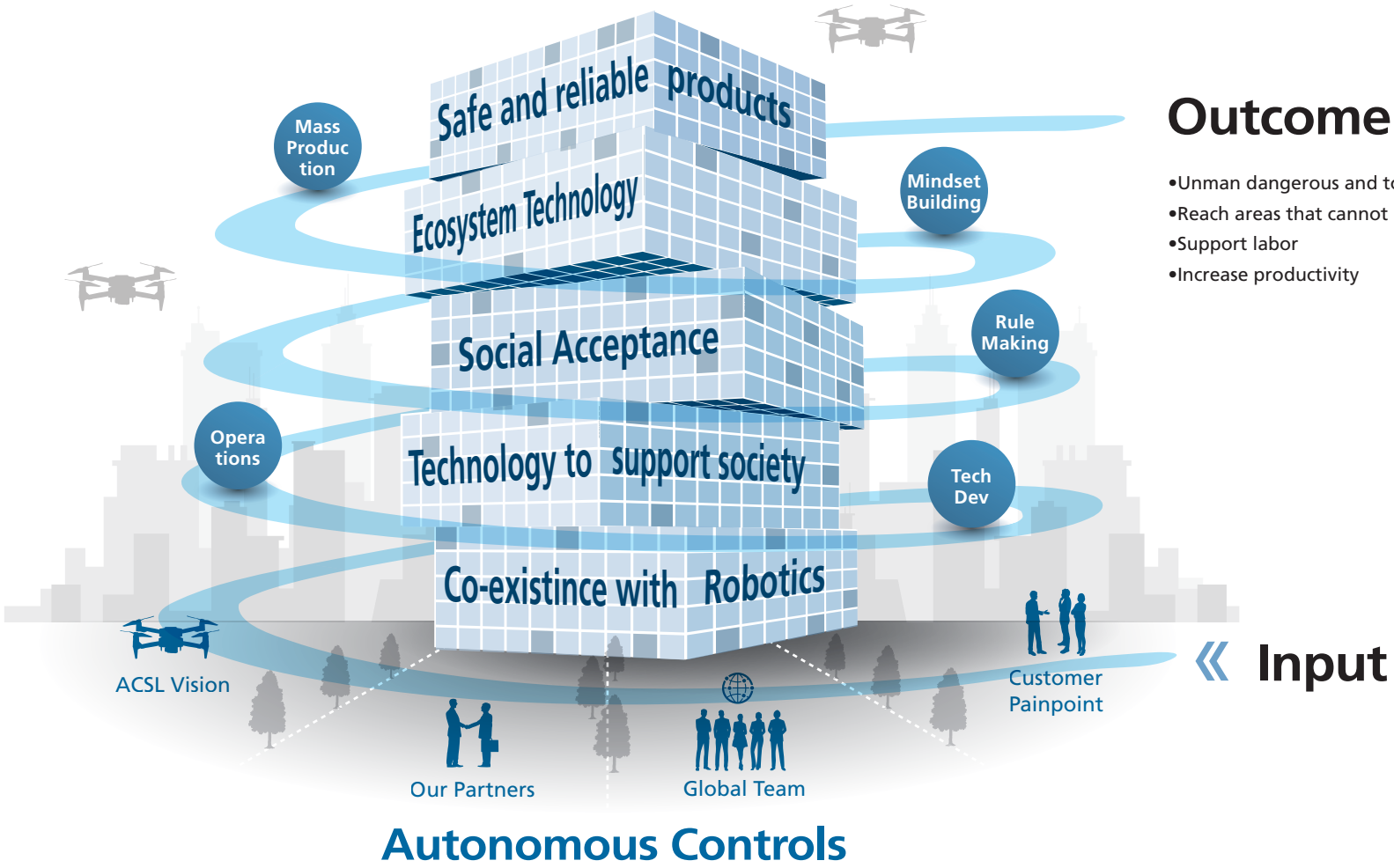
The major themes for ACSL are delivery and disaster response. We aim for immediate social implementation once the regulation comes into force. For example, drone deliveries between post offices, which was conducted in Fukushima before, will be rapidly implemented in numerous locations once the regulation is eased. A new market will be unlocked. Another example is the last mile delivery services where drones may replace bike deliveries with its on-demand characteristics. Drones can meet the need for faster delivery of goods.

The more drones are implemented in society, the closer we will be to attaining our goal of revolutionizing social infrastructure and unmanning heavy and dangerous tasks, as stated in "ACSL Accelerate FY22" and the "To-Be" state in 10 years. I believe that this will bring sustainability to society in the mid to long-term and lead to the creation of a "fair" society we dream of in 30 years from now. Robotics will supplement the declining labor force in developed countries while providing opportunities for emerging countries to make great strides. To this end, we will make the necessary investments and, of course, work to enhance our corporate value. I would like to ask for your continued support.

Value Creation Model

Co-creation Approach to realize value creation

LIBERATE HUMANITY THROUGH TECHNOLOGY



Outcome

- Unman dangerous and tough task
- Reach areas that cannot be reached
- Support labor
- Increase productivity

Input

ACSL's Cutting-edge Technology

Japan's first

- Autonomous flight of small single rotor helicopters (2001)
  (Kenzo Nonami, Professor, Chiba University)
- Autonomous drone flights by remote control using an LTE network (2016)
- Level 3 flights after the 2018 revision of the Civil Aviation Law (2018)
  * BVLOS over less-populated areas
- Inter-post office drone deliveries (2018)

The World's first

- Public listing of a specialized drone manufacturer (2018)

Technology

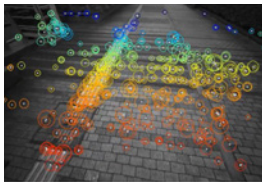
Our proprietary "Autonomous Control System" realizes the ideal.

We are trying to create a sustainable society in which people are liberated from heavy labor by using cutting-edge robotics technology, through "autonomous control systems" that govern robotics.
Our greatest strength is that we possess all the source codes for "autonomous control systems" that we have been developing independently since our founding and have optimized for robotics.

Key Features

1. Cerebrum
Environmental sensing by multiple sensors

"Environmental sensing" is a technology that enables drones to assess their surroundings autonomously and proactively. It is the equivalent of the human's five senses, and drones rely on this information to understand the "environment they are in".
Our drones process information from multiple sensors, such as stereo cameras, LiDAR (light-based detection and ranging) and TOF (time-of-flight) sensors, in a complex manner to provide position and posture information, identify objects in the surrounding environment, recognize distances and verbalize space.



2. Cerebellum
Control machine operation based on environmental information

Another unique strength of ACSL is the technology that allows drones to autonomously control their own movements based on information from "environmental sensing". It corresponds to the "autonomic nervous system" in humans and uses various sensors and drive systems mounted on drones to control their attitude, orientation, speed, height and other factors. The key feature of this technology is the model-based non-linear control technology. The system is highly responsive to sudden changes in the environment such as wind gusts, to ensure robustness.

3. Interface
UI/UX that connects machines and people

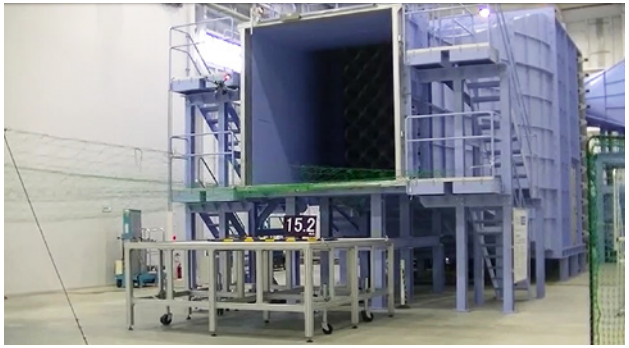
This technology is designed to help humans feel intuitive and at ease when handling drones. For humans to understand the data obtained by drones, it is necessary to convert the language of robotics into information that humans can comprehend, which requires the incorporation of human behavior and psychology. This is the "Human to Machine Interface" (UI/UX), and we have spent a lot of time refining our technology in this area as well.

"Co-creation Approach" to materialize autonomous control systems

In addition to developing robotics optimized for each mission, in order to implement user-friendly autonomous control systems into society, we need to have a system that makes our customers confident that they can use them in their operations. This is what we call our "Co-creation Approach." Based on close communication with customers, we will provide what is truly needed in the most appropriate form so that they can confidently take on the challenge of social implementation of drones.

1. Knowledge and experience to materialize new ideas

We have a wide range of skills and experience in aerodynamics, software, electrical and circuitry, mechatronics, communications, production engineering, quality assurance and regulatory knowledge, all in-house. All this knowledge is essential for developing robotics from scratch. With all of this in place, we can develop new systems and link them to existing systems, which is necessary for users to implement drones in society, and we are able to incorporate our clients' ideas.

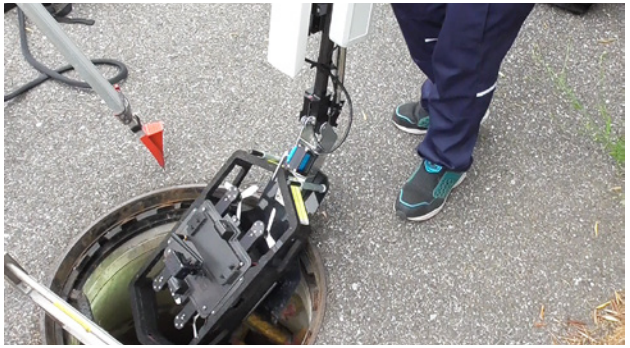


Wind Tunnel Testing
Study the optimal flight of drones in terms of aerodynamics to improve its safety

1,000-hour flight test
Conducted 1,000 hours of continuous flight testing in Malaysia in cooperation with Aerodyne Japan. Performance and durability of the entire drone system was evaluated for Level 4 flight.

2. Ability to approach social implementation

Social implementation of robotics will not be completed by creating a stand-alone drone. It is necessary to understand the psychology of the users by convincing them on the usability of the drone. Our unique "Co-creation Approach" makes this possible. We determine the effectiveness of drones through small-scale prototyping with little investment, and then work together with our clients to find ways to make it more effective, thereby "co-creating" new value for social implementation.



Fi4 into sewer pipes
Building a solution that is not limited to aircraft development and production, but to tailor it to the overall sewer inspection operation. (FINDi, a joint venture with NJS)

Drone in central Tokyo
(PoC on the Sumida River)
Proof of Concept for pharmaceutical deliveries assuming Level 4 flights. Verified package receiving operations, flight safety, etc.

Our Products

Small domestic aerial drone meeting international security standards

We develop, manufacture and sell drones specialized for various tasks, from logistics to pipe inspections. SOTEN, a high-security small aerial drone, is attracting particular attention. SOTEN is the outcome of a national project, "Technical Base Development for Secure and Reliable Drones" by the New Energy and Industrial Technology Development Organization (NEDO) and is the first drone to be mass produced, backed by the Japanese government's support for its development. It is one of our smallest drones, measuring just 637 mm by 560 mm and weighing 1.7 kg. It can fly for up to 25 minutes when equipped with a standard battery and camera.

Feature 1.
High Security

Security measures based on international standards for security, ISO 15408, have been implemented to prevent data leakage and extraction, and drone hijacking. Major components of the aircraft are either domestically produced or procured from highly reliable overseas sources, and security is enhanced by encrypting communication and photo data, and protecting acquired data on the domestic cloud.

Feature 2.
Cameras that can be switched with a single touch

Adopt a one-touch camera switching system, a first for a small aerial drone. In addition to the standard camera, it can be interchanged with an infrared camera + visible camera, a multispectral camera and an optical zoom camera.

Feature 3.
Level 3 flights

With the use of LTE communication, it will be possible to control drones via the internet, which will enable Level 3 flights by automatic flights in remote areas. The use of offline maps allows the drone to fly automatically by displaying offline maps on the base station application on the control side, even in an environment where the internet is not available.

Feature 4.
With a maximum airspeed of 15 meters per second it can be used during disasters

With a maximum airspeed of 15 m/s, it is wind resistant and can be used safely in harsh environments including disasters. It is also equipped with SLAS/SBAS (Sub-meter Class Positioning Augmentation Service of the Quasi-Zenith Satellite System MICHIBIKI), which can provide more accurate positioning information in Japan, enabling safer takeoffs and landings.

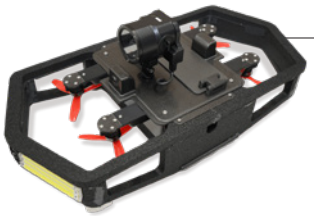
Promoting implementation of application-specific drones

We are promoting mass production and implementation of four application-specific drones including SOTEN through countrywide demonstrations and participation in public tenders.

Delivery drone [AirTruck]

Serving the last mile delivery in place of Humans

A drone with a maximum payload of 5 kg and a maximum flight time of approximately 50 minutes. Flight stability while reducing cargo sway through center-of-gravity control technology, 4D GRAVITY®, and high flight performance through aerodynamic optimization. Level 3 flights performed by remote control. The UX design is easy for users to understand and use, including a method for easily loading cargo from above, and is used for last mile deliveries in the logistics industry.



Pipe inspection drone [Fi4]

Safe and efficient pipe inspection

Smokestack inspection drone

Inspect inside of a smokestack without bumping into the wall

Message from the CTO

Toward the "next level of autonomy" to liberate workers from hazardous and uncomfortable tasks

As a tech venture, research and development is the source of ACSL's competitiveness and our most important undertaking. We asked Chris Raabe, CTO (Chief Technology Officer) and head of ACSL's R&D unit, where our technology is currently, and where it is heading.

Christopher Thomas Raabe (Chris Raabe)

Board Director and CTO

Born in California, Chris has been fascinated by aviation since his childhood, and after studying aerospace engineering and control theory at Georgia Tech, he joined the Boeing Company where he was involved in the development of autopilot and flight control technology for passenger aircraft. Later, at the invitation of Professor Shinji Suzuki, whom he met through work, he joined Suzuki's lab of the University of Tokyo, changed his research focus to drones, obtained a PhD, then continued his work with drones for several years as an assistant professor. He was introduced to ACSL by a friend, and joined the company in 2017, anticipating its future potential. Since then, he has served as ACSL's CTO.

Making the company "sustainable" with products that benefit society

- What is the role of the CTO at ACSL?

The role of the CTO is different depending on each company and each CTO. In my case, I consider it my role to set the direction of ACSL's technology development and to make sure that we create quality products that benefit society. If we execute this well, then we will also make a profit, and ACSL will be a "sustainable" company where our employees and our families can continue to work with confidence and pride. This is my vision as CTO.

Japan's population is diminishing, and the social infrastructure is aging. I believe that drones are needed to compensate for this growing imbalance. For example, young people tend to concentrate in urban areas, so there may not be enough workers left in rural areas to support the logistics network. It is not sustainable to rely on humans to drive around to deliver a few postcards. If we can replace this task with drones, then we can expect significant benefits in all aspects including human resources, environmental impact and operational costs. In addition, a good product will enhance our corporate continuity and make our employees feel more secure in their jobs.

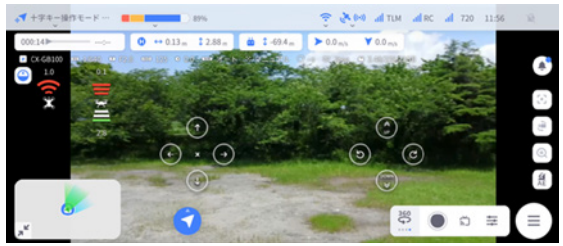
To achieve this vision, we have launched three new models to the market in 2022: the small aerial drone, SOTEN; the delivery drone, AirTruck; and PF2-AE, which can be used for a wide range of applications. There are still many aspects that can be improved, and we will continue to work hard to raise our products to the next level and beyond.

- What is the composition of the "R&D Unit" under your management?

The R&D unit consists of 35 full-time employees plus 8 interns and part-timers (as of June 2022) That's just under half of the company total. Making drones requires a broad range of physical expertise, such as structures, electronics, aerodynamics, radios, and so on. Much of the work is not really suited for telecommuting, since development is hampered if we can't actually touch the drone, the exception being a few of our pure software engineers. Right now, around 80% of the unit members come to the office at least a few times a week. Our members come from a total of 17 different countries. Many of them live near our head office in Kasai, partly because ACSL provides a "neighborhood housing allowance". In that sense, our team is kind of like a family.

The R&D unit is divided into five teams: 1) Flight Controls, which handles safety critical software and control algorithms; 2) Machine Intelligence, which specializes in computer vision, perception, and security; 3) Mechatronics, which handles structures and electronics; 4) Solutions, which integrates and builds prototypes; and 5) Research Project Promotion, which manages the development of future technologies.

The Mechatronics team must often work in isolation because of the wide range of technologies it integrates, whereas the software teams naturally work closely in collaboration with each other. However, president Washiya, made "what matters over who," one of the "7 values" that he established when he took office, and this has become part of the corporate culture, which has helped inspire us to keep communication open and has enhanced teamwork across these natural boundaries.



Polished control and image processing algorithms

- What makes ACSL's technology unique?

One is the control algorithm. Most drones use linear control, in which the basic attitude control is based around the hover (stopped in mid-air) state, but as airspeed increases, the robustness of linear control gradually decreases. In contrast, our drones are designed with model-based non-linear control, which is much better at maintaining robustness, for example, responding to a sudden gust, at any condition in the flight envelope.

The second is image processing technology, centered on Visual SLAM (self-position estimation using cameras and image processing technology) Although SOTEN is a small drone, it is equipped with a total of six computer-vision cameras, arranged in three pairs (stereo cameras), in order to acquire self-position information and detect obstacles. Our unique strength is that we have succeeded in developing very lightweight algorithms that can handle the large amount of data obtained from these cameras in an integrated manner, even with a lightweight, low-performance processor.

Before I joined, ACSL mainly used LiDAR (Light Detection and Ranging) technology, which uses scanning laser beams to detect the distance to the surrounding objects. It has many merits, but its major weakness is that the sensor is heavy, expensive, and consumes a lot of power. On the contrary, Visual SLAM requires ordinary digital camera sensors, which, thanks to the evolution of smartphones, have become light, inexpensive, and energy efficient. However, since the output is image data, the information density is much higher than LiDAR, and it's difficult to process this huge amount of data in real time. Our Machine Intelligence team has around 10 engineers, mainly experts in computer vision technology, who worked for years to optimize the algorithms and refine the technology to the point where it can be said to be one of the best in the world.

In the case of one major manufacturer's drone, although it's equipped with several computer-vision cameras, only the downward-facing stereo camera is used for position measurement. This means that when inspecting the underside of a bridge, for example, the position of the drone cannot be determined, since the downward cameras only see the non-stationary surface of the water below. SOTEN, on the other hand, uses all the cameras, downward-facing, forward-facing, and upward-facing, in an integrated way that allows it to ignore the moving features of the water and calculate its own position based on the stationary features of the underside of the bridge. This is just one example of the capabilities of our highly optimized algorithms that enable a light processor to process many onboard cameras simultaneously.

Furthermore, I believe that the overall balance of capability of ACSL aircraft is superior to that of other companies. This is the result of specializing internally in both software and overall aircraft design while leveraging the superior technologies of our partners for other aspects. We outsource most of the battery, camera, and communication equipment. We design the body and circuits in-house, but the actual manufacturing is done by our partners. The propeller design is also outsourced. A larger company would probably pursue more vertical integration, but at our company's scale, sometimes a drastic approach of allocating our limited resources as efficiently as possible is necessary.

- What part of society benefits from the drones you have created in this way?

Various use cases already exist. Two big ones are related to mail delivery and disaster prevention. One of the most memorable was the mudslide disaster at Mt. Izu in Atami city in 2021. Based on an agreement with the Japan Ground Self-Defense Force's (JGSDF) Eastern Army, we dispatched a pilot to the site and flew a PF2 that was customized for aerial photography, to provide images to JGSDF. The purpose was to help JGSDF direct rescuers in the vast disaster area. At the time, vehicles could not enter the affected area, and I believe that the rescuers were more effective thanks to the information that PF2 gathered for them.

We also hope to help inspect wind turbines soon. One of the problems that we are trying to solve is having the drone detect the angle and orientation of the blades to seamlessly realize autonomous inspections. I think we will be able to put this into practical use in the very near future.

Making drones that are even easier to use

- What are the areas you would like to refine in the future?

There are many detailed items that we would like to refine in the near future, but they all fall into 4 main categories: reliability, usability, capability, and profitability.

For reliability, we do exhaustive testing to look for hidden deficiencies or unexpected scenarios where our products do not behave as expected, and we look for ways to increase the robustness and safety features of our designs.

For usability, we are working to make it easier for our customers to accomplish their missions with little effort and annoyance. This includes items like reducing the latency of the video stream to make it easier for the pilot to fly manually when necessary, reducing the startup time so that missions can be completed quickly, and enabling better cloud connectivity to improve coordination with the back office.

For capability, we want to enable more kinds of missions by improving the drone's sensing and perception abilities. This means improving our Visual-SLAM for use in more challenging environments, improving our obstacle detection and avoidance to make it virtually impossible for the drone to hit something, and improving performance through better efficiency of the systems and increasing the amount of energy that can be carried on the drone.

Finally, we need to improve our profitability by reducing manufacturing costs. This means migrating to components with better cost performance whenever safely possible and refining the design to simplify the manufacturing process.

- What would you like to achieve in the future?

While I would like to stick with drones, I would also like to be involved in the development of other robots. We have recently entered a capital and business alliance with REACT, which is a company that makes unmanned ground vehicles (UGVs), and I believe that new opportunities will emerge from this alliance.

One of my goals is to lead ACSL toward the "next level of autonomy" to create products that further benefit society. Currently, drones can only either be piloted by humans or follow a pre-determined plan. In the future, however, I think the time will come when a human simply says, "go ahead and inspect," and the drone will start moving autonomously and perform the actions that it understands are necessary for the inspection. If during the inspection, it recognizes a damaged part, it will automatically call a fellow repair robot. In the case of logistics, when a fire is detected in the middle of a delivery route, the fire will be automatically reported, a new route will be automatically calculated, and permission to reroute will be automatically negotiated. When such a world comes, people will be even better shielded from dangers and inconvenience.

To get there, we must first make a profit. Then, with the profits we make, we will bring in new engineers and expand the scope of what we can do. That is what I am aiming for.

Clients and Us

The need for our drones is growing in response to the tailwind of increased attention to economic security, progress in decarbonization, and the government's Digital Rural City concept. In the fiscal year ended December 31, 2021, we released SOTEN, a small aerial drone, and successfully conducted a PoC combining drones and unmanned ground vehicles for delivery in collaboration with JAPAN POST Co., Ltd.

: Group Locations
: Business Development Areas

KEY FIGURES as of December 31, 2021

Sales	Operating profit	R&D expense	CO_2 emissions	Employees
JPY 501 million	JPY -1,188 million	JPY 604 million	66.08 t	70

Market

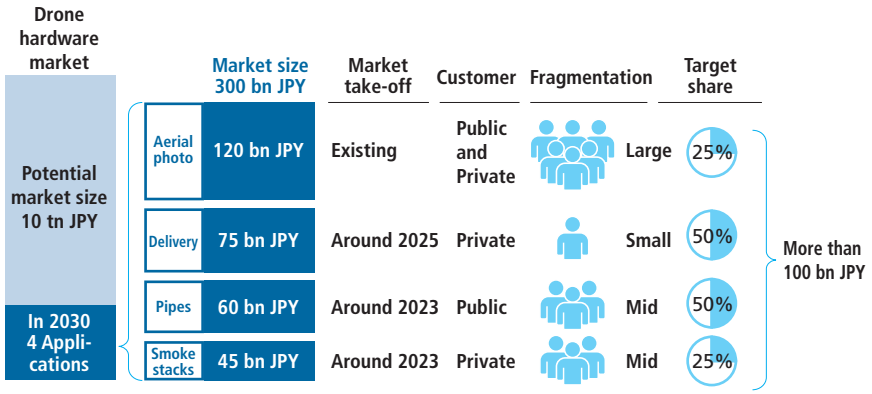
Domestic market

The drone market, our main target market, is still in its infancy. We believe that the future market will reach 10 trillion yen in Japan alone. We derived this figure from the total number of related equipment, facilities, and services in markets such as logistics, infrastructure maintenance, and disaster prevention, as drones will replace some portion of operations in such markets. A report released in June 2022 by the Ministry of Economy, Trade and Industry (METI) and others estimates the drone market to be worth 3 trillion yen by the 2040's, and it is expected to grow even larger if use cases such as disaster response and aerial photography, which are not included in the estimates, are considered.

The market for the four applications we are focusing on (aerial photography, delivery, pipe inspection, and smokestack inspection) alone is expected to expand to 300 billion yen by 2030, based on our estimates. The breakdown is as follows: 120 billion yen for aerial photography, 75 billion yen for delivery, 60 billion yen for pipe inspection, and 45 billion yen for smokestack inspection. The deregulation of Level 4 flights in December 2022, growing interest in economic security, and the acceleration of market creation in line with decarbonization and regional development are the backdrop.

Each of the four application markets has its own unique characteristics. For example, in the aerial photography market, the market is fragmented with a large number of customers in the public and private sectors in each region, while in the delivery market, companies promoting the use of drones are limited to large corporations.

We are developing strategies for full-scale market expansion by establishing cooperative frameworks with major players in each market, including a business partnership with JAPAN POST Co., Ltd. and Japan Post Capital Co., Ltd. in the delivery market and a business alliance with Seino Holdings Co., Ltd.



1:ACSLestimate

Overseas market

According to Yano Research Institute Ltd., the global drone market, total of military and private demand, is expected to grow at a CAGR of 7.7% from 2022 to 2027, and is projected to reach approximately 3 trillion yen by 2027*.

The U.S. drone market, the largest of all, is already very large at over $11 billion according to our estimate, but approximately half of the market is for military use, with industrial use limited to about 30%. Although major Chinese manufacturers have held a large share of the market so far, the National Defense Authorization Act (NDAA) ban on procurement for defense purposes in 2020 has attracted the attention of Western manufacturers for civilian use as well, and our small aerial drone SOTEN also received positive reviews at the exhibition. The market has strong future potential.

Another market with growth potential in the Asian region is India, where we have established a joint venture in 2021. While the Indian market is worth an estimated $890 million as of 2021, the import of finished foreign-made drones is banned in 2022 due to security concerns and other factors. The market, which until now has been dominated by Chinese manufacturers with approximately 60% of the market share, is undergoing a period of major change. We have already established a local joint venture, ACSL India, in cooperation with a local partner, and have high expectations for future market development.

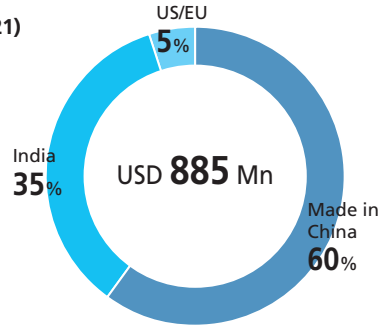
Transition and Forecast on Global Drone Market Size (Total of Military and Private Demand)

(Billion Yen)

2020	2021	2022 (Forecast)	2023 (Forecast)	2024 (Forecast)	2025 (Forecast)	2026 (Forecast)	2027 (Forecast)
1,711	1,868	2,069	2,247	2,448	2,648	2,828	2,998

Source: Yano Research Institute Ltd., "Global Drone (UAV/UAS) Market: Key Research Findings 2021" , April 25, 2022

Drone origin in India Market (2021)



Source: Research and Markets

Meeting diverse needs with application specific drones

If drones are successfully implemented in society, they will be able to shoulder various tasks that are currently performed by human labor and further enhance the productivity of society. However, it is difficult for general-purpose drones generally available on the market to achieve unmanned operation by considering a wide variety of social needs. What is needed is a drone optimized for the task based on the specific requirements of each need. Our drones are designed, developed, and mass-produced for specific applications through our "Co-creation Approach," enabling smooth replacement of people with drones.

Cargo delivery -> Delivery drone

Small and medium-sized trucks are mainly used to deliver cargo. Manpower is needed to drive and deliver the cargo, but in rural areas with a small population of young people, it is not easy to secure labor. If trucks could be replaced by drones, the delivery network could be greatly reduced in manpower.
In December 2021, we conducted a delivery PoC in Okutama-cho, Tokyo in cooperation with JAPAN POST Co., Ltd. A drone carried cargo to a village deep in the mountains, delivered it to a delivery robot running on the ground, and the robot dropped off the cargo for each household. Full-scale social implementation is scheduled for 2023 at the earliest.

Plant inspection -> Inspection drone

Huge wind turbines, chemical plants with complex structures, and smokestacks over 100 meters high. Currently, these inspections are carried out visually by humans, which is not only dangerous but also requires a lot of time. This is an area where unmanned drone operations would be highly beneficial.
In October 2020, we conducted a PoC for wind turbine inspection using an autonomous drone flight. The inspection, which took one hour per unit when using a conventional camera with a telephoto lens mounted from the ground, was reduced to approximately seven minutes, while maintaining the same image quality as that of the telephoto lens.

Damage assessment -> Aerial photography drone

In the past, damage assessment in the event of disasters such as typhoons and earthquakes required humans to take on the risk of going to the site. Our aerial photography drones can quickly fly to the site and assess the latest situation in place of humans.
When torrential rains hit Nagano prefecture in August 2020, the Nagano Prefecture Public Enterprises Bureau requested us to survey the damage. We used the PF2, a customized drone for aerial photography, to survey an area near Oshika village in Shimoina district, which was inaccessible to humans due to landslides, and were able to quickly confirm that there was nothing wrong with the water intake of the local hydroelectric power plant.

History

Autonomous control system for small unmanned helicopters is where it all began

Convinced of the coming of the robotic society, an engineer founded our company in November 2013. After nine years of twists and turns since, we are now recognized as the only publicly-listed, specialized drone manufacturer in Japan. Here we introduce the episode of our founding and our subsequent history.

Kenzo Nonami,
Founder

Cutting-edge "Laser SLAM" technology enabled drone flights inside the nuclear power plant building

On March 11, 2011, the Great East Japan Earthquake struck. TEPCO's Fukushima Daiichi Nuclear Power Station was hit by a tsunami more than 13 meters high, losing all power and causing three reactors to melt down, leading to an unprecedented accident. In 2013, Kenzo Nonami, a professor at Chiba University who had been researching drones, received a request from the Agency for Natural Resources and Energy of the Ministry of Economy, Trade and Industry (METI) The request was for the use of a small drone to conduct an indoor survey of a nuclear reactor building, which was inaccessible to humans due to high radiation levels.

Nonami has been a leading researcher on drone autonomous control since the 1990s. In 2001, when the name "drone" was not even commonly used, he was the first person in Japan to succeed in the autonomous flight of a radio-controlled helicopter. After the earthquake, he conducted a survey of the damage using drones in the tsunami-affected areas of Iwate, Miyagi and Fukushima prefectures. Some of the results are archived at the National Diet Library.

Upon receiving the request, he immediately accepted, saying, "I would be happy to contribute to society if drones could be used to address the serious national crisis." Over the next year, he developed a technology called "Laser SLAM," which can estimate the drone's position by emitting laser beams and recognizing the surrounding environment through the reflections of the beams. With this technology at the core, he created a drone that could fly autonomously even indoors where GPS signals could not be received, and succeeded in an autonomous flight inside a nuclear power plant building. At the time, the practical application of Laser SLAM was unprecedented in the world.

ACSL was founded to meet the growing need for autonomous control

On the other hand, drones were becoming popular, and there was growing demand in the business community for drones equipped with Laser SLAM technology, but no company had been able to meet this demand. In response, Nonami launched a startup company, Autonomous Control Systems Laboratory, to commercialize drones based on autonomous control technology. The company would later be renamed to ACSL. With the cooperation of Nonami's former students, who were established researchers in various countries, the company began mass production of its first model in the spring of 2015. Even before that, he was convinced that the future would definitely be a robot society. He was also considering applying his autonomous control technology to terrestrial and marine robots.

In March 2016, the company bolstered its financial standing with a 720 million yen investment from Rakuten, Inc. and the University of Tokyo Edge Capital Partners Co., Ltd (UTEC) In parallel with development, the company focused on improving the durability and reliability of its drones, dramatically improving their performance. In December 2018, we were listed on the Mothers market of the Tokyo Stock Exchange, becoming the first drone manufacturer in the world to be listed, paving the way for the continued success to this day.

To date, we have been steadily expanding our business. We conducted the first "Level 3" flight after the revision of the Civil Aviation Law in 2018, signed a business partnership with JAPAN POST Co., Ltd. and Japan Post Capital Co., Ltd., began mass production of the secure small aerial drone SOTEN, and entered into the Indian market.The autonomous control technology developed by Nonami is still evolving day by day as our core technology.

History of ACSL

2013

Founding of the company

Autonomous Control Systems Laboratory Ltd.
(currently ACSL Ltd.) is established.

2015

Drone regulations issued

Aviation Law amendment enforces flight rules for "unmanned aerial vehicles."

2016

"PF1"

Launched an industrial platform drone, PF1.

2017

Roadmap is set

The "Roadmap for the Aerial Industrial Revolution" is released by the Public-Private Council for UAS Promotion and Regulation.

2018

First Level 3 flight

Conducted the first Level 3 flight in Japan after the revision of the law
Provided drones for Japan Post's inter-post office delivery project.

Word's first listing

Listed on the Mothers section of the Tokyo Stock Exchange.
Became the world's first specialized drone manufacturer to go public.

Level 3 regulation comes into effect

Level 3 flights (BVLOS over less-populated areas) allowed by permit-only.

2019

"PF2"

Launched a new platform drone, PF2.

2020

Government procurement policy

The government announced its policy of limiting procurement to security-guaranteed drones, and promptly replacing existing drones.

2021

Renamed to ACSL

Changed the official trade name to ACSL Ltd.

Partnership with Japan Post

Entered into a business partnership with JAPAN POST Co., Ltd. and Japan Post Capital Co., Ltd.,

Established ACSL India

ACSL India is established with Aeroarc.

"SOTEN"

Launched a secure small aerial drone, SOTEN.

Unmanned aircraft registration

Registration for unmanned aircraft and ID display, remote-ID become mandatory.

Level 4 regulation comes into effect

Level 4 flight (BVLOS over populated areas) regulation comes into effect.

2022

Industry Trends in Japan

Perspective

04

A Global Culture and Workstyle

Official Language	Percentage of Non-Japanese Employees	Number of Nationalities	Paid Vacation Usage Rate	Childcare Leave Usage Rate By Men
Japanese & English	24% (2021)	17 countries (2021)	80% (2021)	50% (2021)

7 Values

The Driving Force of ACSL

7 Values - There are seven sets of values to be upheld by everyone at ACSL. These seven elements are indispensable to achieve our mission and vision as a professional organization. We go over them at every companywide meeting, post them throughout the office, and apply them in our staff evaluation. Employees have a good understanding of the values which serve as the driving force behind our growth that enables us to recruit talent and contribute to society.

ルールより原則
Principle over rules

論理的・科学的アプローチを重視し、正しい方向に導く

Make the right decisions through logical and scientific approach

変化を楽しみ失敗から学ぶ
Enjoy change, learn from mistakes

大きな挑戦に向けて、常に変化・失敗を恐れず、まずは small step を踏み出す

Take the small step, enjoy the risk of change or failure to achieve a greater goal

オーナーシップ
Own it

個人の裁量最大化を目指して、やると決めたことは自分ゴトとしてやりきる

To maximize individual discretion, make it your own matter the things you feel needs to get it done

誰かではなく何をするか
"What" matters over "Who"

組織や肩書に固執せず、互いを対等としてリスペクトし合い、ベストな手法を常に模索する

Never be constrained by teams or titles, respect each other and pursue the best direction

多観的視点
Multilateral perspective

利他の精神をもって、1 つの視点に捉われることなく、多様性を尊重し、自由に物事を考える

Have altruistic spirit, look at things from many angles, respect diversity, and think freely

当たり前を創る技術
Naturally accepted technology

社会に「当たり前」として受け入れられる圧倒的な安全、安心、高品質を追求する

Pursue safe, reliable and quality technology to make it naturally accepted in society

一歩を踏み込める余裕
Room to take the extra step

常に全力で走り続けるのではなく、95% で走り、あと一歩を踏み込む余裕を常に持つ

Don't run at 100%, but run at 95% to have room to take the extra step

ACSL

Our Values

Diversity & Inclusion

Diversity & Inclusion is an important management agenda for us. More than 20% of our employees are non-Japanese, and we also have many female employees. As a company that is still in its growth phase, we have yet to institutionalize them, but we aim to create a fair environment where every individual can play an active role and advance regardless of nationality, gender or family status.

Basic Stance

In our 7 Values, which are the most important values that we constantly pursue, we commit to "What matters over who" and "Multilateral perspectives". The former means that we respect each other as equals regardless of attributes or titles, and the latter means that we welcome diversity and gain free and flexible ideas from it. Based on these values, we aim to be a company where diverse talents can fully demonstrate their individuality and abilities and play an active role regardless of nationality, age, religion or political ideology, disability, marital status, parental status, gender, sexual orientation, or gender identity.

We will continue to promote diversity and inclusion to meet society's expectations and to be a sought after company.

D&I at ACSL

Satoshi Washiya,
President and Representative Director

For ACSL, D&I is energy itself. Any vehicle or robot will break down quickly if it uses poor quality gasoline or batteries. Conversely, if you use good ones, they will last longer and perform better. Having the best D&I for the company is important for the company to last longer and contribute more to society.

However, I don't actually like the term diversity and inclusion. I think it is a narrow concept when expressed in such a way in the first place, and I feel that we should not be obsessed with the terms. What we are aiming for is a "fair" society. In order to make society fair, we must first make the company fair. At ACSL, Japanese language is not a prerequisite for employment. Childcare leave should be taken by those who wish to take it, whether they are men or executives. My definition of the word, "fair," is the respect for nationality, gender, religion, way of speech, way of thinking, and everything else.

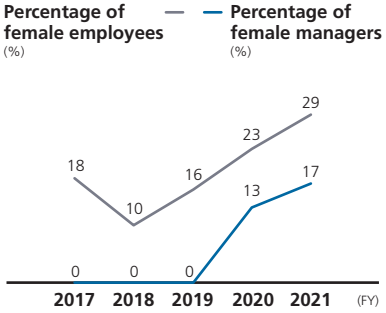
On the other hand, the word, "fair," is not the same for everyone. It is important that those who want to grow are given the opportunity to do so, and that the company responds positively to the efforts of the individual. Specifically, ACSL is working to refine its evaluation system to provide growth opportunities and rewards to its employees, and to support those who wish to learn through company benefit plans.

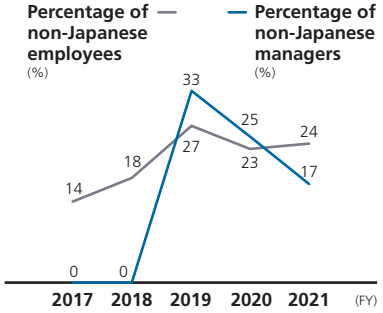
Finally, these values are shared by all employees. This is the reason why we place so much effort into companywide training and meetings for all staff members. We are an organization that seeks "fairness," heading towards a common direction.

Female and Global Talent

We have hired talented people from diverse backgrounds based solely on individual skill sets and empathy for our mission and values. In particular, in the R&D Unit, we have been actively recruiting global talent and accepting interns from overseas universities. As a result, about half of the Unit members are now foreign nationals, who comprise about a quarter of the entire company. In addition to measures to deal with language differences, such as in-house interpreters, rules and regulations, meeting materials, and in-house announcements in two languages (Japanese and English), various other measures are also in place, including housing search support and a mentoring system.

On the other hand, as the company grows, the percentage of female employees has increased year by year, and many female employees are active in leadership and active playing positions.





Work-Life Balance

We believe it is important for each employee to independently design his or her own way of life, balancing various life events and daily lives with his or her career. We promote the following measures to improve the working environment and to offer flexible work styles.

- Encouragement of male employees to take childcare leave
- Introduction of remote work
- Various work styles such as short working hours system, flextime system, discretionary work system, etc.

Balancing work and childcare

Corporate Management / Administration (Legal)

When I changed jobs, our child was still a handful. When I frankly told President Washiya that there were restrictions on how I could work, he said, "You can work anywhere you want as long as you do your job well." True to his words, since joining the company, I have been working mainly from home. Since many members of the firm, including the president, have children, we often comfort each other by saying, "It's okay to put your family first." As my colleagues also have children, we can quickly relate with each other when something unexpected happens.

Working efficiently

Our executives regularly tell us that they do not expect us to work long hours; the quality of work and output are more important and they expect employees to work efficiently. In addition to "ACSL Holidays", we have "suggested paid leave" during summer and year-end to make it easier to take holidays. Many employees, especially foreign nationals, take long vacations during the new year holiday season to go home. Hence, we coordinate work in advance both within and outside the department to accommodate their needs.

On overtime work management, company directors use the time management system's alert function to control the amount of overtime work by adjusting work tasks. If overtime hours exceed the permissible number of hours twice, a meeting with the director and an industry physician are held to check the health status of the employee.

A workplace where everyone can be true to themselves

Diversity and Inclusion (D&I) is one of the most important management issues for us.
We asked three employees of the R&D Unit on how they see the current status of D&I at ACSL.

A flat team where you can say what you want to say

– What is it like to work at ACSL?

A.J. It's a great place to work. I am given various opportunities so I can build my career and learn new things. I am not singled out because I am a foreign national. When I went back to Belgium a few weeks ago, they were flexible enough to allow me to work remotely.

I used to work for a big company in Belgium, where everything was decided by my boss and I just had to do it. At ACSL, I can participate in the decision-making process.

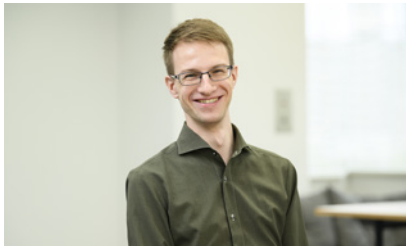
M.Y. I have changed jobs 6 times and this is the most comfortable job for me. I have known CTO Chris Raabe for 10 years and he invited me to join. Relationships here are flat, anyone can say what they want, and not be judged for it. Everyone is equal.

T.W. I have considerable freedom in working hours and location. Now that COVID-19 has receded and I can go abroad, I can work even in my home country. Relationships are also positive.

A.J.
Born in Belgium, male, joined the company in 2021. Responsible for the development of flight controller software.

M.Y.
Born in Japan, female, joined the company in 2020. Project manager for drone customizing and proof-of-concept (PoC) trials. Her responsibilities range from managing budgets, contracts and resources to operate the drones.

T.W.
Born in Poland, raised in Austria, male, founding member of the company in 2013, currently working as a director of the solutions team, managing the team and doing practical work himself. He has lived in Japan for over 20 years and speaks fluent Japanese.



Meetings are bilingual (English and Japanese) with interpreters

– How does the company support you?

A.J. Since I can speak Japanese to some extent, I only require HR administrative support such as medical insurance and work visa renewal, and do not require support in daily matters.

T.W. Since I have been in Japan for 21 years, I do not need linguistic support either, but for those who do not speak Japanese, our labor relations staff provides an explanation individually along with English materials. We also have a staff member who specializes in interpretation, and meetings are held in both English and Japanese as needed.

M.Y. Not only does the company offer a full range of general support services, including nursing care and childcare leave, but I also feel that the company is proactive on D&I. In terms of a fair corporate culture and flat human relations, it is the best among the Japanese and foreign companies I have experienced so far. As for the percentage of female employees, the numbers don't show it yet, but it is unavoidable because the percentage of women in science is still low, and it is difficult to hire women. What is important is the corporate culture. Even if the ratio of women exceeds 50%, if the company does not provide equal opportunity or lacks a culture that respects diversity, it cannot truly be called D&I. If ACSL could become a role model, I believe it would lead to a change in the values of society.

Education and experience in communication is crucial

– On the other hand, what do you think is lacking in ACSL's D&I?

A.J. There are two things. One is that many of our internal documents are only in Japanese. This is especially painful when they are technical documents. The rules are not standardized, and some documents mix Japanese and English. I would like to see a unified set of rules to make them easier to understand.

The other is the issue of language and interaction with colleagues. I would not say that there is a wall between Japanese and English speakers, but it has not reached the point where they get along well with each other.

M.Y. I think it is because of the lack of social mixers (social events for people with different attributes). The company I used to work for had offices in 8 different countries, and they would get together in one location and have a social mixer. It makes the team stronger and more united. There is still a lack of such activities at ACSL.

I also wish there were "cultural officers" like in Silicon Valley companies. Without someone in charge of bringing the culture of a company to a certain level, some people will be left behind. Having someone in such a role would help solve the problem of language barriers.

T.W. At ACSL, it is the R&D unit where half of the employees are foreign nationals, but in other departments it is close to zero. I wonder if it is because sales and administrative work requires a high level of communication in terms of language.

M.Y. To begin with, what is D&I? Is it diverse merely if there are women and foreign nationals? What is the D&I that we are aiming for? We have never had such a discussion.

A.J. I can also act as a go-between for colleagues who do not speak Japanese, but if you ask me if that means I am contributing to D&I at ACSL, I honestly don't know. But I would like to be a bridge between colleagues, like the cultural officer.

T.W. I feel that the current R&D unit has a mixture of Japanese and Western cultures. There are currently no problems with these two groups, but perhaps we should think more deeply about supporting other groups. When problems related to culture occur, it is usually unintentional, but due to improper remarks without being aware of the matter. Education is the only way to solve this problem. If we have experience in communication and cultural education, we can find clues to solving problems. It is important to get to know each other through regular communication, and I would like to create such opportunities.

M.Y. The other thing is to treat people with respect. It is natural that everyone is different, so I don't want people to stereotype me as a man, a woman, etc. and I never do that to others. I want to create a workplace where everyone's individuality is accepted, and where people can always be true to themselves.

Human Resource Management

Talent development is essential for us to achieve our mission, vision and values.
We want to create an environment whereby each employee can exercise ownership and enjoy the growth of the company.

Human Resource Management Concept

We have coined the term, “Our Professionalism”, as part of our HR strategy concept. This is the axis of our training and evaluation system.
We seek a mindset from our employees that emphasizes ownership and challenge. We take the time to train all our employees to think and act autonomously and take responsibility for results, rather than to wait for instructions. At the same time, we have very diverse talents, with foreign nationals accounting for about a quarter of our total workforce. We believe that it is important for each individual to acquire strong communication skills in order to understand and be receptive to various values, and have made this a priority in talent development.

Our Professionalism

01 Be brave and engage in science

Have a sense of mission
Take on difficult challenges
Accomplish one’s own project
Celebrate success and learn from mistakes

02 Unifying our strengths

Welcome diversity
Be respectful and supportive of others
Communicate logically and openly
Discuss the essentials

03 Change the world with enthusiasm

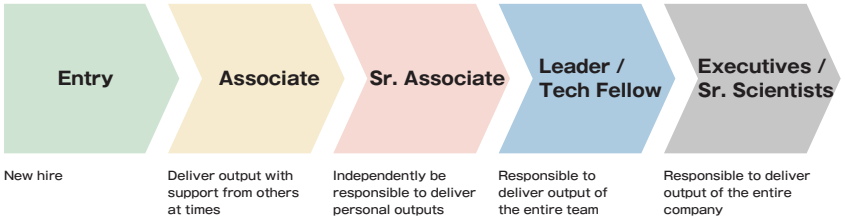
Enjoy growth
Think freely and act responsibly
Become a "professional" in your field
Be obsessed with the world

01

Be brave and engage in science

Clear Grading System - Our HR evaluation system "ACSL Career Track"

To ensure fair personnel evaluation and talent development, we have established our own HR evaluation system, ACSL Career Track. There are two career paths: managerial and specialist. The roles and rewards for each are clearly defined, from the entry level to that of the executive/senior scientist. Evaluation is based on output and behavioral metrics over the course of a year. Process as well as results are important, and we expect employees to set their own goals and take on new challenges, and for leaders to support them daily and provide them with appropriate feedback. We improve our methods every year to ensure better corporate operations.



02

Unifying our strengths

Distinctive Training Method

Monthly company-wide meetings are held on-site to share information among units, conduct compliance training, and discuss important topics related to company goals and policies.
In addition, we hold an on-site company-wide training program annually called "ACSL Camp" to discuss our future vision. In FY 2021, employees were divided into teams across units and spent two days discussing the future and how to create value for society, the company and individuals.
By having employees spend time together to share ideas on the direction of the company and its values, we seek to deepen the connection, and encourage engagement between the organization and employees as the company grows and remote work becomes the norm due to COVID-19. In other words, we need to stress more internal communication as individualization of work becomes more pronounced.

03

Change the world with enthusiasm

Diverse Growth Opportunities - Learning while working

Our talent development policy is not to provide uniform group training for all employees, but to foster a mindset to have them raise their own hands and take on challenges, and to provide as much support to them as possible. Employees will be provided with financial assistance for professional study and certification examinations by aligning work and skill development as part of their career goals. To date, several employees have enrolled in PhD programs and professional certification courses while on the job.

Balancing work and obtaining a PhD in engineering
R&D/Machine Intelligence

I received my PhD in 2021 and have also obtained several professional certifications while working. The challenge was to plan in advance with my team director. I received the full support of my team when I was busy working on my dissertation and presentation. I believe that I was able to create a virtuous cycle between work and skill development: I acquired knowledge from my studies that I could apply at work, and I also gained knowledge and experience on the job which were helpful in passing the exams.

Financial Results and ESG

2025

Net sales

JPY 10 bn

Operating profit

JPY 1 bn

Mass-produced drone sales

Over 60% of total

2030

Net sales

More than JPY 100 bn

Operating profit

More than JPY 10 bn

Mass production volume

30,000 units/year

Message from the CFO

Boosting the next growth stage with an aggressive capital policy

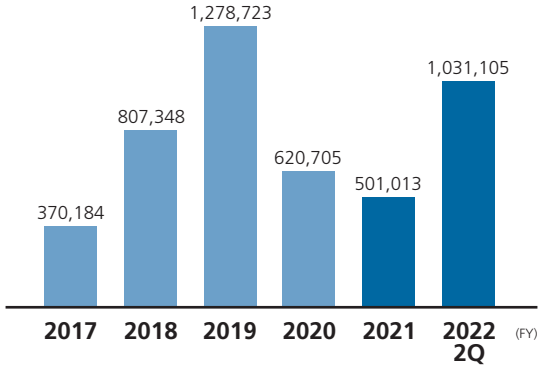
As an R&D-oriented venture, we require an aggressive capital policy to drive future growth. I want to explain my thoughts, what we should do to finance our growth, and how to raise capital through earnings growth for the next stage to improve both corporate value and sustainability.

Kensuke Hayakawa
Board Director and CFO
Born in Tokyo, Kensuke received a BS in engineering at Waseda University and attended the graduate school at Tokyo Institute of Technology to study mathematical finance. He worked for McKinsey & Company Inc. Japan and KKR Capstone, where he was engaged in management transformation of manufacturing companies. In 2017, he joined ACSL as CFO, attracted by the potential of the company as a Japan-based global manufacturer.

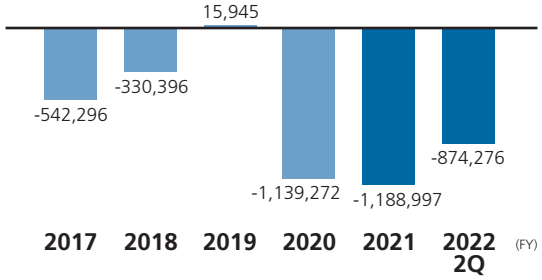
FY 2021 - FY 2022 2Q Financial Results

From a Solution Business to a Mass Producer

Net sales
(in JPY thousands)



Operating profit(loss)
(in JPY thousands)



Notes: Actual results are as of end FY 2022 2Q. FY 2021 was an irregular 9-month period, and results prior to FY 2019 are non-consolidated.

On FY 2021 and onwards, while the impact of COVID-19 is gradually subsiding, there is an increasing emphasis on economic security, which is a tailwind for a company involved in the domestic drone manufacturing business. This trend originally stemmed from the intensifying conflict between the U.S. and China, but Russia-Ukraine War has heightened our sense of crisis and awareness that it would be more prudent and sensible to manufacture key equipment such as drones within one's own country. It has been proven that drones for civilian use can also be used for military purposes, and there is a growing sense that drones must be managed and regulated by the government.

In addition, social implementation of drones is advancing, partly due to the influence of national projects. We participated in the "Technical Base Development for Secure and Reliable Drones" a national project headed by the New Energy and Industrial Technology Development Organization (NEDO), and utilized the results of this project to commercialize a secure small aerial drone, SOTEN. In the area of delivery, our projects with Japan Post and ANA Holdings have led to immediate social implementation rather than advanced demonstration testing.

Under these circumstances, the first quarter of FY 2022 marked a turning point for us, as we switched in earnest from a "solution business", which had been our main revenue source since going public in 2018, providing demonstration tests and custom development of drones for major customers, to the "manufacturing business," or the sale of mass-produced products, including SOTEN. As of the end of second quarter of FY 2022, 481 units of SOTEN had been delivered, and sales for the period from January to June reached a record high of 1,031 million yen. Including the backlog of orders, we are already seeing sales of about 1.5 billion yen or more as of the end of June 2022, and we are on track to record a new high in annual sales. The solutions business, although highly profitable, is difficult to scale, so a switch to the manufacturer business was inevitable in order to achieve our sales target of 100 billion yen for FY 2030. On the other hand, the ordinary loss increased to 874 million yen due to the establishment of a mass production system for SOTEN and upfront investment for "Level 4" flights (BVLOS over populated areas), which is scheduled to take effect in December 2022 after government deregulation.

Another notable event was the business partnership with Japan Post and Japan Post Capital in 2021, which resulted in raising approximately 3 billion yen. This enabled us to secure a partner committed to development and social implementation, and to fund the R&D costs required to develop delivery drones over the next several years. We have also established a leadership position in the logistics drone industry. Going forward, we would like to contribute to the advancement of Japan Post's 24,000-station delivery network and become a leader in the world of delivery drones.

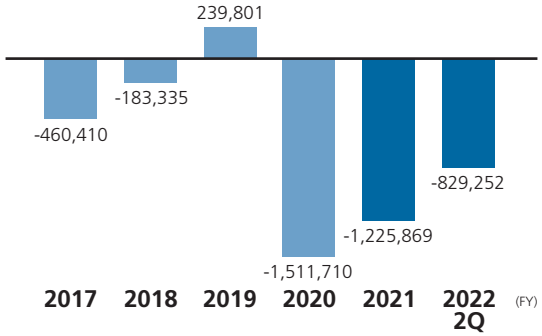
Please note that we are changing our fiscal year end in FY 2021. The purpose is to improve the visibility of business results. Our sales tend to be recorded from January to March, when companies and government offices are busy with their budget execution, and investors have pointed out that earnings visibility is poor until the very end of the fiscal year.

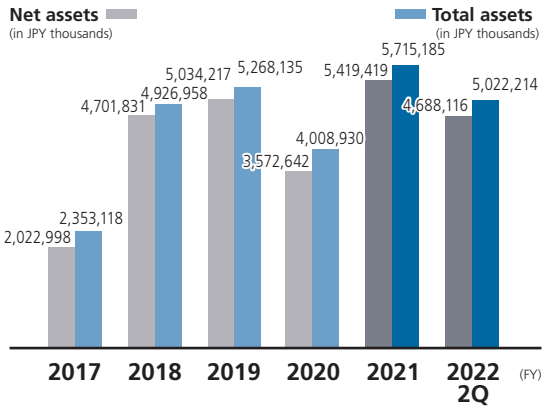
In FY 2022, we also implemented a reduction of share capital and appropriation of surplus to increase the liquidity of the capital and to create a structure for future dividends and other payments. Since this is balance sheet restructuring, there will be no impact on cash or shareholders' equity.

Financial Policies and Financing

Seeking the best financing method for the use of our funds

Net income (loss) attributable to owners of the parent
(in JPY thousands)





Notes: Actual results are as of end FY 2022 2Q. FY 2021 was an irregular 9-month period, and results prior to FY 2019 are non-consolidated.

Under our med-term business plan, "ACSL Accelerate FY22" (FY 2022-FY 2025), we have set targets of 10 billion yen in net sales and 1 billion yen in operating profit for FY 2025. This is our main focus for the time being. To achieve this goal, we will need to invest aggressively in growth, and the core of our future financial policy will be to procure funds at critical moments.

We focus on the following three indicators as KPIs. The most important is the sales growth rate: to achieve 10 billion yen in sales by 2025, we need an annual growth rate of 50% or more. The sales composition, or the breakdown of sales, is also important. To realize the theme of our med-term plan, "Shift to a sustainable global manufacturer," we want to increase the ratio of drone sales to total sales to 60% by FY 2025.

Another indicator we emphasize is the gross profit ratio as we consider it to be almost equivalent to the added value we generate. Price competition in the drone market is fierce, but if our products can generate profits, we should be able to secure gross profit margins of 40-50% in the future. The scale of production is also important to increase the gross profit ratio. We intend to establish a system capable of shipping several thousand units per year by FY 2025.

The third is R&D expenses. Since we are a technology company, upfront investment in R&D is absolutely essential. But not all development themes can be recovered in one or two years. To refine our products so that we can earn sufficient gross profit, we will invest in up-front product development by securing talented professionals and joint development with partner companies. However, we will also conduct proper screening of investments in product development. When investing in product development, we set up several gates as part of the product design review process, and ultimately, no investment in development will be approved unless all CxOs approve it.

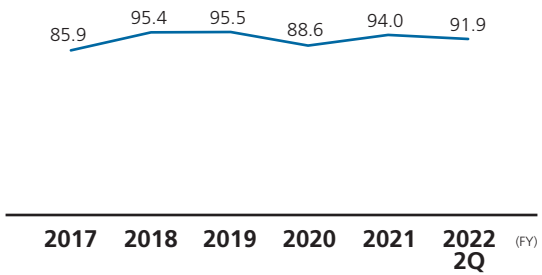
Note that we do not see a need for a large facility until FY 2025. The manufacturing process is not a point of differentiation. If we remain completely fabless, we will not be able to accumulate the production expertise needed to collaborate with external partners. Thus, there is room to consider pilot plants and laboratories. But we do not want to jump ahead in capital expenditures.

Regarding financing, we want to optimize our financing scheme depending on the use of the cash. First, we intend to raise working capital, which is indispensable for our activities as a manufacturer, mainly from operating cash flow and debt. We are thinking of raising capital for R&D expenses through equity since they are an upfront investment for growth. As overseas expansion accelerates in the future, capital will be needed to launch overseas operations, expand recognition, and respond to local laws, regulations, and needs. Our policy is to use equity financing to cover these costs. Ideally, we would like to procure capital from strategic investors with whom we can collaborate in business and share our vision, as well as those who will not restrict our future business development. Japan Post is a good example of this. There is also room to consider procurement from the public market.

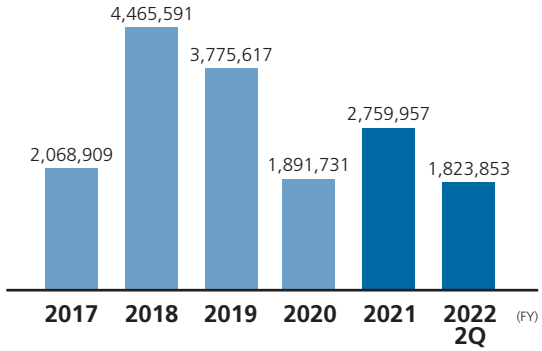
Shareholder Returns and IR

Sharing a clear picture of the future through intensive dialogue

Capital adequacy ratio
(%)



Cash and cash equivalents at end of period
(in JPY thousands)



Notes: Actual results are as of end FY 2022 2Q. FY 2021 was an irregular 9-month period, and results prior to FY 2019 are non-consolidated.

Finally, I would like to explain our shareholder return policy. As a startup company in the process of growth, our first priority is to invest in growth. We will use cash for the next growth stage to increase corporate value and create capital gains to shareholders.To this end, we have engaged in thorough dialogue with shareholders and investors. We hold 50-60, one-on-one meetings with institutional investors every quarter, and we hold financial results briefings and individual investor briefings four times a year in recent years.

During the dialogue, we first explain our company's vision. We also include medium- to long-term market forecasts to give the shareholders a clear image of what we are aiming for. In our financial results presentation materials, we start with the macro information, explain the major trends and recent developments in the drone industry and on social implementation, and finally touch upon our financial results for the current fiscal year. We want shareholders and investors to make an informed decision based on the environment surrounding our company, our initiatives and all other information. We will further enhance our IR activities by providing videos and other content to be posted on our IR website, as we expect to start Level 4 flights by the end of FY 2022, which will be followed by a period of widespread use that could be called the "beginning of drones."

ESG and overseas disclosure will be enhanced in the future, and the launch of our Integrated Report is part of this effort. We would like to invite investors to our head office to see drone flights and observe R&D sites to give the investor a more realistic impression of our business.

Board of Directors (as of March 25, 2022)

President and Representative Director

Satoshi Washiya

Number of company shares held:93,870
Number of Board meetings attended in FY 2021:17/17

Board Director and CFO

Kensuke Hayakawa

Number of company shares held:159,195
Number of Board meetings attended in FY 2021:16/17

Board Director and CTO

Christopher Thomas Raabe

Number of company shares held:30,000
Number of Board meetings attended in FY 2021:17/17

External Director

Masanori Sugiyama

Number of company shares held:0
Number of Board meetings attended in FY 2021:17/17

External Director

Tadaharu Shimazu

Number of company shares held:0
Number of Board meetings attended in FY 2021:0/17

* Appointed at the General Meeting of Shareholders held on March 25, 2022.

Audit and Supervisory Member

Akira Ninomiya

Number of company shares held:0
Number of Board meetings attended in FY 2021:17/17

Audit and Supervisory Member

Hideki Shimada

Number of company shares held:0
Number of Board meetings attended in FY 2021:17/17

Audit and Supervisory Member

Takeshi Ohnogi

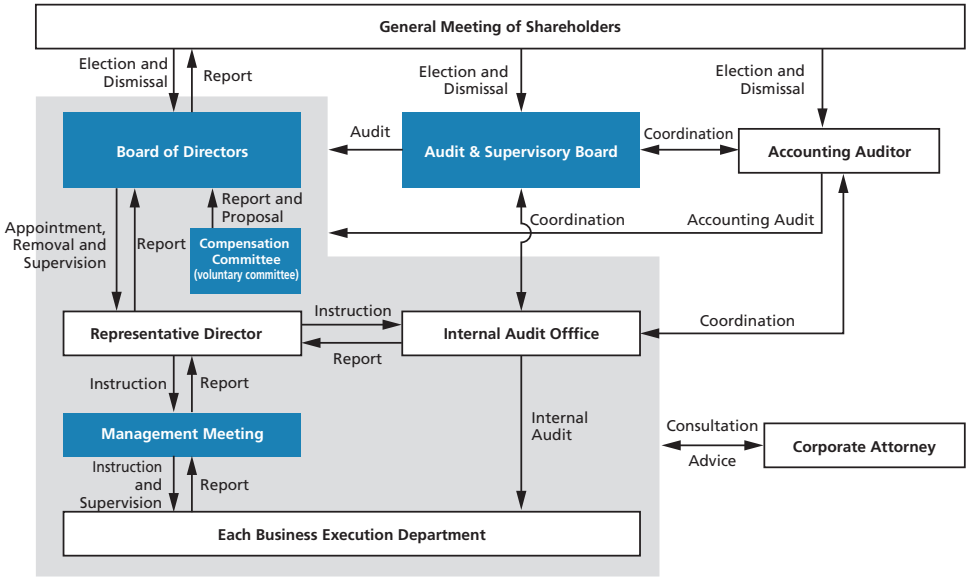
Number of company shares held:0
Number of Board meetings attended in FY 2021:17/17

Reason for Appointment

(name)	Post	Reason for Appointment	Skill Matrix							
			Corporate Management	Innovation Technology	Global Business	Public Policy and Regulation	Partnerships (including procurement and manufacturing)	Industry and Business Knowledge	Accounting and Finance	Legal, Compliance and Risk Management
Satoshi Washiya	President and Representative Director	Since joining the Company in 2016, he has held the positions of CFO, CSO, and CMO. He has had a wealth of business experience and was instrumental in generating growth of the Company's business. In June 2020, he was appointed President and COO of the Company. We believe that he can contribute to the sustainable enhancement of our corporate value by utilizing his extensive work experience, knowledge and leadership.	✓	✓	✓	✓	✓	✓	✓	✓
Kensuke Hayakawa	Board Director and CFO	As CFO, he has been responsible for the Company's administrative functions since his appointment to the Board of Directors in June 2017. He has a proven track record in finance, accounting and financing. We believe that he is qualified to contribute to the sustainable enhancement of our corporate value by bolstering management functions, including governance, and promoting the efficiency of company-wide operations.	✓		✓		✓	✓	✓	✓
Christopher Thomas Raabe	Board Director and CTO	He has deep knowledge of drone-related technologies, and since joining the Company in 2017, he has overseen the R&D department as CTO and has led the Company's product development. He was appointed to the Board of Directors in June 2018, and we believe that he is qualified to contribute to the sustainable enhancement of our corporate value by further reinforcing our development and promoting the global expansion of our business.		✓	✓	✓	✓	✓		✓
Masanori Sugiyama	External Director	He has extensive experience as a representative director of listed companies, and we expect him to provide advice and counsel on business execution based on his experience.	✓	✓			✓		✓	✓
Tadaharu Shimazu	External Director	He has extensive experience in product and technology development, and through his knowledge and expertise, we expect him to provide advice and counsel on business execution from a professional perspective.	✓	✓			✓	✓		✓
Akira Ninomiya	Audit and Supervisory Member	He has abundant knowledge and experience having worked for several companies and has a broad insight, We expect him to perform auditing and supervisory functions for the overall management of the Company.	✓			✓	✓			✓
Hideki Shimada	Audit and Supervisory Member	As a representative attorney at Sanbancho Law Office, he has expert knowledge and a broad insight on law (especially on FIEA, Companies Act and IP law), and we expect him to provide auditing and supervisory functions for the overall management of the Company.	✓		✓	✓				✓
Takeshi Ohnogi	Audit and Supervisory Member	As a representative partner of Seinan Audit Firm he has expert knowledge and broad insight on accounting, and we expect him to perform auditing and supervisory functions for the overall management of the Company.	✓		✓				✓	✓

Corporate Governance

Based on our mission of "Liberate Humanity Through Technology," we have a vision of "Revolutionizing social infrastructure by pursuing cutting-edge robotics technology," and we believe that our mission is to build and maintain a relationship of trust with our shareholders and all other stakeholders (employees, business partners, customers, creditors, local communities, etc.) and to manage our company in the best interests of everyone. To this end, it is essential for our business to achieve stable and sustainable development. We recognize that a strong and coherent corporate governance is a key management issue to improve the soundness and transparency of management, and is at the very foundation of our development. We have continued to work hard on this.



Basic Concept

We have established the General Meeting of Shareholders, the Board of Directors, the Audit and Supervisory Board, and the Accounting Auditor as organizations under the Companies Act, and have established an Internal Audit Office to audit the Company's day-to-day operations, to ensure sound and efficient management through cooperation among these bodies. In addition, to further bolster the auditing and supervisory functions of the Board of Directors, further improve corporate governance, and increase corporate value, we plan to transition to a company with Audit and Supervisory Committee, subject to approval at the 11th Ordinary General Meeting of Shareholders to be held in March 2023.

Board of Directors

Number of members: 5, Number of meetings held in FY 2021: 17

The Board of Directors functions as a decision-making body for important management matters and as a supervisory body for the execution of duties by board directors. As of the date of submission of this report, the Board of Directors consists of five board directors (including two external directors) In principle, the Board of Directors holds a regular meeting once a month, and extraordinary meetings are held as necessary to enable prompt management decision-making. The Board of Directors makes decisions on important management matters in addition to those stipulated by law and the articles of incorporation, and supervises the execution of duties by each board director.

Audit and Supervisor Board

Number of members: 3, Number of meetings held in FY 2021: 11

Audits by Audit and Supervisory members are conducted by one full-time Audit and Supervisory member, who divides duties as appropriate with two other members, by attending meetings of the Board of Directors and other important meetings, exchanging opinions with representative directors and other board directors, and by inspecting important documents. The Company ensures that a system is in place to monitor the board directors' execution of their duties without shortcomings.

As of the date of submission of this document, the audit and supervisor board consist of three Audit and Supervisory members (including three external members). In principle, the Audit and Supervisor Board holds a regular meeting once a month, and extraordinary meetings are held as necessary to share information among the Audit and Supervisory members, including the formulation of audit plans, the status of audit implementation, and the review of audit results. The Audit and Supervisory members also hold meetings with the Internal Audit Office and the Accounting Auditor as necessary to share information and promote mutual cooperation.

Management Meeting

Number of members: 12, Number of meetings held in FY 2021: 36

The Company has established a Management Meeting for the purpose of promoting management execution aimed at enhancing corporate value. The Management Meeting consists of three full-time directors, executive officers, and other participants as instructed by the full-time directors. The Management Meeting is held once a week in principle, and extraordinary Management Meetings are held as necessary to deliberate and make decisions on matters authorized to the Management Meeting among basic management policies and matters related to the execution of management operations as determined by the Board of Directors, and also functions as a supervisory body for business execution divisions. In addition, extrnal directors and Audit and Supervisory members are allowed to attend the Management Meetings and express their opinions when deemed necessary.

Compensation Committee (voluntary committee)

Number of members: 2, Number of meetings held in FY 2021: 2

We have established a voluntary Compensation Committee, which consists of one internal board director and one external director, and whose chairman is an external director. Policies regarding the determination of the amount of remuneration, etc. of the Company's board directors or the method of calculation thereof, as well as matters pertaining to individual remuneration, etc., are determined by the Board of Directors after consideration by this committee and after reporting or submitting a proposal to the Board of Directors.

Remuneration, etc. of Board Directors and Audit and Supervisory Members

The Board of Directors determines the remuneration of each board director within the total amount of remuneration approved by the General Meeting of Shareholders, taking into consideration the director's duties and the Company's situation. In order to strengthen the independence, objectivity, and accountability of the Board of Directors' functions regarding the nomination and compensation of board directors and executive officers, etc., we established a voluntary Compensation Committee on April 14, 2020, consisting of one internal board director and one external director, with an external director as the Committee Chairman. The basic policy on remuneration for the board directors, the policy on determining the amount of remuneration, etc. or its calculation method, and matters related to individual remuneration, etc. are determined by the Board of Directors based on a report and proposal by the Committee after its review.

In addition, remuneration for Audit and Supervisory members is determined by consultation of the Audit and Supervisory Board within the total amount of remuneration approved by the General Meeting of Shareholders, as basic remuneration only. The Board of Directors has confirmed that the method of determining the details of remuneration, etc. for individual board directors for the current fiscal year and the details of remuneration, etc. determined are consistent with the policy for determining the details of remuneration, etc. for individual directors and that the report from the Compensation Committee has been respected. We have judged that the policy is in line with such determination.

The resolution of the general meeting of shareholders regarding remuneration, etc. for directors was approved at the extraordinary general meeting of shareholders held on August 21, 2018, with an annual amount of 90,000,000 yen or less (the number of members at the time of the resolution: 8), and the resolution of the ordinary general meeting of shareholders held on March 25, 2022, with an annual amount of 25,000,000 yen (number of members: 3) for Audit and Supervisory members. In addition, at the ordinary General Meeting of Shareholders held on June 25, 2020, it was resolved that the maximum annual amount of compensation for stock acquisition rights shall be 50,000,000 yen that are allocated to board directors (excluding external directors) as stock options as stock-linked compensation, which is separate from the above maximum amount of compensation.

Remuneration of Board Directors and Audit and Supervisory Members and Policy for Determining Remuneration, etc.

a. Remuneration, etc. of Board Directors

The Company's basic policy on remuneration for board directors is to make the remuneration system and remuneration level function as an incentive to contribute to the enhancement of corporate value over the medium to long term in order to realize the Company's mission of "Liberate Humanity Through Technology."

The Company's remuneration for board directors consists of base remuneration and stock price-linked remuneration, and the policy for determining the details of remuneration, etc. for each individual director is as follows.

- **Base Remuneration**

  The fixed-amount remuneration is based on the position of each director, and is determined in accordance with the responsibilities of the position, taking into consideration the business environment and the level of other companies.

- **Stock Compensation-type Stock Options**

  Stock compensation-type options are granted to directors (excluding external directors) to share with shareholders not only the benefits of a share price appreciation but also the risks associated with a decline for the purpose of further motivating them to increase corporate value. The number of stock options to be allocated to each director (excluding external directors) will be determined by the Board of Directors in accordance with his/her responsibilities.

b. Remuneration of Audit and Supervisory Members

The remuneration of Audit and Supervisory members is limited to basic remuneration (monthly remuneration) only.

Total remuneration by type and number of directors subject to remuneration by director classification

(FY 2021)

Director classification		Total compensation (in JPY thousands)	Total remuneration by type (in JPY thousands)				Number of directors covered
			Basic remuneration	Performance-linked compensation	Non-monetary compensation	Retirement benefits	
Board Directors (excluding external directors)		66,764	44,000	—	22,764	—	4
Audit and Supervisory Members (excluding external members)		—	—	—	—	—	—
External Directors and External Audit and Supervisory Members	(External Directors)	6,155	6,155	—	—	—	2
	(External Audit and Supervisory Members)	14,610	14,610	—	—	—	3

Note: Non-monetary compensation consists of stock acquisition rights granted as stock compensation-type stock options, which were recorded as expenses for four directors in the current fiscal year.

Criteria for Independence of External Directors and External Audit and Supervisory Members

We have not established standards or policies regarding the independence of external directors and external Audit and Supervisory members at the Company. However, we have referred to the criteria for determining the independence of external directors and corporate auditors stipulated by the Tokyo Stock Exchange and have selected persons who meet the requirements under the Companies Act and are satisfied with their independence, based on their backgrounds and relationships with the Company.

Basic Policy on Internal Control System

The Board of Directors has established the "Basic Policy for Establishment of Internal Control System" as a system to ensure the appropriateness of business operations in accordance with the Companies Act. We will continue to improve and operate our internal control system.
For more information, please refer to our Corporate Governance Report.

Corporate Governance Report (Japanese language only)
https://ssl4.eir-parts.net/doc/6232/tdnet/2131633/00.pdf

Status of Internal Audits

We have an independent Internal Audit Office, which conducts internal audits to cover all departments. The Internal Audit Office maintains and improves internal controls by reporting audit results to the President and Representative Director and instructs audited departments to make improvements and report the results.
In addition, the Internal Audit Office, Audit and Supervisory members, and Accounting Auditor exchange information as appropriate to ensure that audits are conducted effectively and efficiently.

Cross-Shareholdings

About the classification of shares held for the purpose of pure investment or otherwise, we classify investments that are held for the purpose of making capital gains from the share price appreciation or from dividends as pure investment shares. Shareholdings held for purposes other than pure investment are for improving and maintaining business alliances in accordance with our growth strategy that contribute to the enhancement of the Company's medium-term corporate value.

Number of issues and balance sheet amounts

(FY 2021)

	Number of issues	Total amount shown on balance sheet (in JPY thousands)
Unlisted stocks	4	690,128
Stocks other than unlisted stocks	—	—

Issues whose number of shares increased in FY 2021

	Number of issues	Total acquisition price for the increase in the number of shares (in JPY thousands)	Reason for increase in number of shares
Unlisted stocks	1	30,000	Collaboration with companies that create new services for infrastructure management
Stocks other than unlisted stocks	—	—	—

Issues whose number of shares decreased in FY 2021

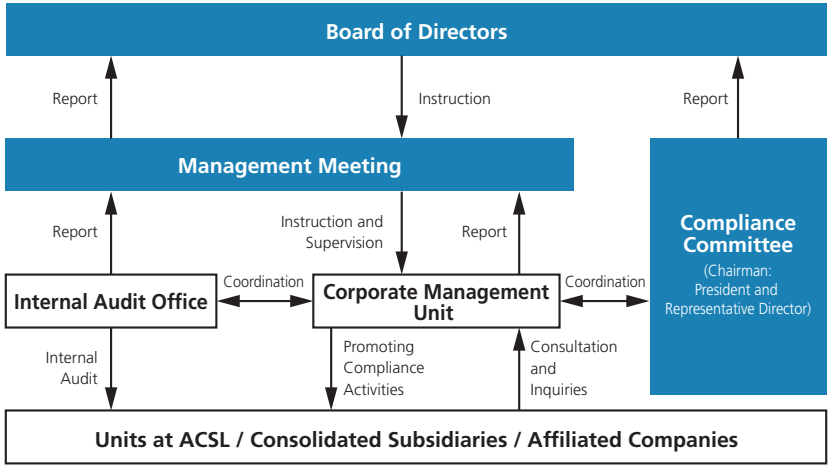
	Number of issues	Total sale price from the decrease in number of shares (in JPY thousands)
Unlisted stocks	—	—
Stocks other than unlisted stocks	—	—

Compliance

We have established our Compliance Rules that summarize our compliance-related initiatives, aiming to ensure thorough compliance and to secure and enhance our social credibility.

Compliance Promotion System

The Corporate Management Unit, the department in charge of compliance, plans, drafts, and promotes specific measures such as education and training for directors and employees to raise awareness of compliance among all employees. In the event of a sudden compliance violation, we establish an ad hoc Compliance Committee to consider and implement appropriate countermeasures.



Compliance Training and Awareness Activity

To foster compliance awareness and knowledge among directors and employees, we have conducted compliance training in a wide range of areas, from export control to harassment prevention. In the FY 2021, a total of five training sessions were held, with almost all directors and employees participating. In FY 2022, we further expanded the content of the training to disseminate knowledge. In addition, training on insider trading, export control and the reporting system are also provided as part of the training for new employees.

<Main Trainings>

- Insider trading
- Export controls
- Labor Standards Act
- Intellectual property
- Information security
- Transaction-related laws and regulations
- Foreign laws and regulations
- Labor union
- Harassment and internal reporting system

Internal Reporting System

To detect and correct violations of laws and regulations by the Company, its directors and employees at an early stage, we have established an internal reporting system that can be accessed by telephone or e-mail. The contact person for internal reporting is the Admin team leader of the Corporate Management Unit, and the contact person for external reporting is the Audit and Supervisory member who is an attorney. Cards with contact information and instructions on how to reach the contact person have been distributed to directors and employees to make the system known to all. The identity of the whistleblower, the content of the report, and all information obtained in the investigation are treated as confidential information.

The following are subject to reporting:

(1) Violation of laws and regulations
(2) Violation of internal rules, manuals, etc.
(3) Actions that have or may have a significant impact on our management resources, business performance, brand value or reputation
(4) Harassment or other behavior detrimental to the work environment
(5) Other acts similar to the above items

There were no reports in FY 2021 and one report in FY 2022.

COMPLIANCE CARD
ACSL
法律や社内規程に違反していませんか？ / Is it against the law or company regulations?
家族や友人に胸を張って話せますか？ / Can you be proud to tell it to your family and friends?
相手のことを尊重した行動ですか？ / Is it an act that respects the other person?
ACSLを傷つける行動ではありませんか？ / Isn't it an act that damages ACSL?
ACSLと、ACSLで働く人たちを守るのは、あなたのコンプライアンス行動です
It is your compliance actions that protect ACSL and the ACSL members
迷うときは、上司や同僚、または最寄の各窓口に相談してください。
通報によって、あなたが会社から不利益な取り扱いを受けることはありません。
If in doubt, please consult with your superior, colleagues, or the contact points listed on the back.
You will not be penalized by the company for whistleblowing.

Risk Management

We have established "Risk Management Rules" to identify and evaluate risks, outline countermeasure risks and take measures to prevent risks and minimize the Company's losses.

Risk Management System

The President and Representative Director is ultimately responsible for risk management, and the Corporate Management Unit (unit manager:CFO) is the lead department for risk management operations and reporting. The Corporate Management Unit is responsible for accurately identifying risks associated with the business activities and promoting measures to prevent them from materializing. In accordance with the Risk Management Rules, each unit manages risks that may arise in relation to the operations for which it is responsible. For risks that require company-wide management, the Corporate Management Unit determines a response policy after assessing the risks and establishes an appropriate system based on this policy.

In the event of a major risk or a serious accident or disaster, the Risk Management Committee is established to take company-wide and systematic measures to minimize the risk. The committee meets regularly, usually once every quarter.

Information Security

We have established "Information Security Management Rules" and aim at effective use of information equipment (hardware and software) related to networks and databases, preservation of assets, and efficient and consistent execution of information business processing using our computers and outsourced information business processing. The CFO, who is responsible for overall management, is in close contact with each unit to ensure proper operation and design of the information system. in December 2021, we obtained the ISO27001 certification, an international standard for information security management.

Key risks and how we manage them

Item	Key Risks	Risk Management
Drone Safety	• In the event of a serious drone crash, not only at ACSL(the Company) but also at other companies, public trust in the safety of drones may be eroded, leading to a decline in demand from customers and a slowdown in market growth due to stricter regulations, which may affect the Company's business and earnings. In this case, our business and business performance may be affected. • In the unlikely event that a drone manufactured by our company crashes and causes damage to people, property, etc., there is a possibility that our business and business performance will be affected due to significant product liability compensation, large payments and expenses due to a recall, and loss of public trust.	• We are striving to realize drones that can coexist safely with people without causing accidents. In addition to promoting intrinsically safe design based on risk analysis, we are developing drones that can fly safely even in environments where GPS cannot be reached or in bad weather by utilizing some of our technologies. • In preparation for any eventuality, we are working with insurance companies to develop dedicated insurance for drone and operations to cover liability and expenses incurred in the event of a serious accident.
	• In the event that security is compromised by malicious hackers, etc., the drone may become uncontrollable, causing damage to people and property, or data leaks may cause damage to users, etc., which may have an impact on our business and business performance due to large payments and expenses for serious product liability compensation and recalls, and loss of public trust.	• Our company places a high priority on safety in the selection of components related to data security, and we are working on the advancement of security technology on the drone side, such as communication encryption to prevent hijacking. In addition, we have selected solution partners and are able to identify all of our sales partners through direct transactions with our customers.
Laws and regulations surrounding the drone business	• With regard to the Product Liability Law, since we manufacture products such as drones, if a victim proves that they have suffered life, body, or damage due to a defect in our products, etc., a claim for damages may be recognized.	• With regard to the Civil Aeronautics Law and the Radio Law, we have obtained permission and approval based on the said laws. • To mitigate risks, we have had our instruction manuals reviewed by an external technical writer and have worked with an insurance company to develop a dedicated insurance policy. We have also acquired ISO 9001 certification for quality management and airframe certification from the Japan Unmanned Aircraft Manufacturers Association (JUAV).
	• With respect to the Foreign Exchange and Foreign Trade Law, some of the products and parts sold by the Company may be subject to regulations. In the future, it is assumed that unexpected regulations may be enacted, revised or abolished, or that planned deregulation may not proceed as planned. In such cases, if the Company is unable to flexibly respond to the relevant laws and regulations, the Company's activities may be restricted due to the revocation of permits and licenses, which may affect the Company's business and earnings.	• When we export drones or provide related technologies to overseas markets, we comply with the Law and strive for appropriate export control. • We have established a system to check compliance with laws and regulations not only internally, but also with outside experts such as legal counsel.
Procurement, pricing, and inventory of parts and materials	• The Company procures most of the parts and materials necessary for its production and R&D activities from external suppliers. However, in the event of interruptions in supply from suppliers or supply shortages due to a rapidincrease in product demand, various activities may be restricted, which mayhave an impact on the Company's business and earnings. • In the event of quality problems, problems with the production system and quality control system at the supplier of the procured products, or other events that may have a significant impact on our business operations, our business performance may be affected. • There is a possibility of opportunity losses and lost profits due to inventory shortages, or additional expenses such as inventory management costs and impairment due to excess inventory, which may occur due to demand being different than initially expected.	• In the procurement process, we carefully conduct quality checks and other incoming inspections. • Inventory will be maintained at an optimal level in line with product plans and sales scale with regular revision according to the demand forecast. • We conduct regular audits of our major business partners to confirm the status of their production, development and other activities.
Product Quality	• In the unlikely event that a product defect occurs, depending on the nature of the defect, it could result in the incurrence of significant costs and loss of trust, which could have a negative impact on our business performance and financial position. Specifically, if the incidence of product defects within the warranty period exceeds our expectations, or if unforeseen defects occur, we may incur after-sales service costs, free repair costs, recall costs, and other expenses. • In the event that a victim proves that they have suffered damage to life or limb due to a defect in one of our products, etc., there is a possibility that a claim for damages will be approved based on the Product Liability Law. In the event that our response to these risks is prolonged and exceeds the scope of coverage by our insurance, our business activities may be hindered and our business performance and financial position may be affected.	• We have established quality assurance management rules and production management rules, and are striving to maintain and improve the quality of our products through manufacturing and quality control in accordance with these rules. • We will continue our efforts to improve the quality of our products, especially with regard to continuous improvement against defects, promotion of product designs that are less prone to defects, reinforcement of testing during development and prior to shipment, including the introduction of reliability testing, continued development of emergency countermeasure functions for our products, establishment of rules for operations such as flight and drone management, and strengthening of processes for handling customer complaints, malfunctions, and crashes.

Environment

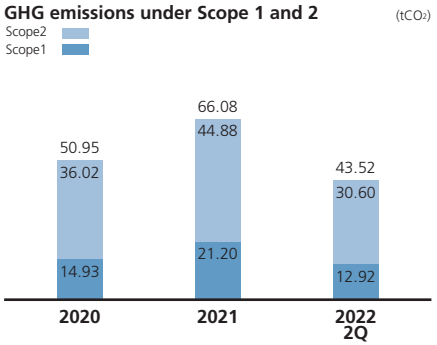
For example, if drones could replace trucks and airplanes for deliveries to remote areas such as mountainous regions and islands, the environmental impact of transportation could be greatly reduced. In other words, growth of our business itself will contribute markedly to achieving a sustainable society.
While aiming to develop our business based on this approach, we promote the development of products and services that consider the reduction of environmental impact.
All our employees recognize the importance of environmental conservation, and we strive to conserve energy and water, reduce waste, and recycle.

Climate Change Response Policy

We are committed to reducing greenhouse gas emissions to fulfill our responsibility to the planet in the future. We will measure and disclose our greenhouse gas emissions and improve our energy efficiency.
We will also reduce greenhouse gas emissions throughout our value chain by helping to reduce greenhouse gas emissions from our own activities and from the use of our products and services.

Carbon Neutral Initiatives

We have started to calculate our greenhouse gas (GHG) emissions (Scope 1 and 2) from FY 2022. As a fabless company with no factories of its own, our direct emissions from business activities are limited, but we will make further efforts to address climate change issues by improving operational efficiency and developing environment-friendly products throughout the entire supply chain.
In terms of the way employees work, the company encourages remote work and no dress-code to reduce CO_2 emissions from commuting and air conditioning.



Waste Reduce and Recycling

We are promoting a paperless office by replacing back-office operations such as internal approvals, expense reimbursement, payroll notifications and contract signing with cloud services. In addition, we have introduced a paper resource dissolution and processing recycling service to recycle some of our discarded paper.

Contribution in Business - Marine Debris Reduction Project in Academia-Industry Collaboration Participation in Debris Watchers

We are participating in "Project Ikkaku," which aims to implement a sustainable business system to address the ever-increasing problem of marine debris as a drone team. We are continuing development and demonstration tests for marine litter analysis using drones and AI.
Project Ikkaku is organized by The Nippon Foundation, Japan Advanced Science and Technology Organization for Education, Human Development and Research (JASTO), and Leave a Nest Co., Ltd. to build an economic system to reduce marine debris. Among the three teams in the project, we participated in "Debris Watchers," which aims to visualize debris drifting ashore around the world, and developed an analysis service for marine debris using drones. In the future, we aim to conduct efficient trash collection and drift forecasting on a global level.

Business Contribution - Reducing CO_2 Emissions through Drone Delivery

Currently, trucks are mainly used to deliver small amounts of mail in rural areas, but considering the CO_2 emitted during transportation, we must assume that the environmental impact is much higher than necessary. If electrically-charged drones could replace these trucks, they would fly in a straight line to take the shortest possible route, thus reducing CO_2 emissions even further. In response, we, together with JAPAN POST Co., Ltd. are making steps toward reducing the environmental impact by conducting demonstration tests of drone-based delivery in Minami-soma-shi, Fukushima-ken, and Okutama-shi, Tokyo. The Minami-soma-shi experiment showed that the use of drones was more effective in reducing CO_2 emissions than the use of trucks.

Stakeholder Communication

We consider our customers, shareholders, investors, employees, local communities, government, and business partners as our key stakeholders, and we are working to increase communication with them through a variety of measures.

Customer

We are improving the quality of our products and services based on our quality management system in accordance with ISO9001 standards, and enhancing customer satisfaction.
In order to practice the "Co-creation Approach," our sales team, R&D team and quality assurance team communicate closely with customers to receive a variety of opinions and link them to quality improvement. In addition, we regularly conduct surveys on our products and services, and have a system in place to not only improve the current situation, but also to utilize the results in the development of the next products and services.

ISO9001 Quality Policy and Targets

Quality Policy
Under the mission of "Liberate Humanity Through Technology", we promote the evolution of society for the next generation through the implementation of "autonomous technology". We regard safety and quality as our top priority, and supply products and services that satisfy customer requirements and legal and regulatory requirements. At the same time, we will continuously improve our quality management system.

Quality Targets
In FY 2022, ACSL will begin shipping mass-produced products in the order of several hundred units per year for the first time. In this fiscal year, we will continue to operate our quality management system to ensure that the product shipped to our customers comply with their requirements and legal regulations. As a result, we aim to reduce the percentage of defects (caused by us) to less than X% of the total number shipped. In addition, the causes of defects are analyzed based on customer feedback, both short-term and permanent countermeasures are considered, and customer communication is promptly implemented for any defects that occur. Furthermore, to improve customer service and contribute to business growth, we continue to work for the reduction of customer complaints.

Quality targets for each department
- Business Development Unit
  Production and Quality Assurance: Less than X% of defects in products shipped to customers.
  Product Development: To maximize customer satisfaction and ensure continuous business growth, learn from market problems and continuously improve product specifications, functions and costs.
- Customer relations: reliable feedback when problems occur. Claims incidence less than X%
- R&D Unit: 100% of the defects identified as "requiring corrective action" is addressed.
- Corporate Management Unit: Ensure compliance with relevant laws and regulations.

Shareholders and Investors

We will fulfill our accountability to shareholders and investors by disclosing information about our mission and vision, management policies, business strategies and performance trend etc. in a timely and appropriate manner. We will strive to maintain a fair share price and increase corporate value by providing an accurate understanding of our business and environment through the following:

- We hold regular company and business briefings with individual shareholders and investors, and engage in direct dialogue through Q&A sessions with participants.
- We hold quarterly meetings with institutional investors to explain our financial results. We also engage in dialogue with them through individual meetings and participation in conferences organized by securities firms and other organizations.

Employees

We have a flat organizational structure with few levels of hierarchy, and management and employees communicate closely with each other daily. In addition, the management explains company-wide strategies and financial results at monthly on-site all-staff meetings, and employees actively ask questions and engage in discussions to ensure organizational synchronization.

Local Community

Since 2020, we have been supporting disaster-stricken areas by providing disaster response customized drones free of charge. We started this program based on our desire to help the Self-Defense Forces, local governments and companies solve problems together during disasters through use of our technology and experience gained while supporting typhoon-stricken areas in Nishitama-gun, Tokyo in October 2019.

Government

We are participating in a variety of projects in collaboration with the industry, academia and government to develop cutting-edge technologies for social implementation of drones. To date, we have participated in several national projects, including the New Energy and Industrial Technology Development Organization (NEDO) projects, "Realization of an Energy-Saving Society with Robots and Drones" and "Technical Base Development for Secure and Reliable Drones."
In addition, we work as appropriate with the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), the Ministry of Economy, Trade and Industry (METI) and other government agencies related to regulatory development.

Business Partners

We are committed to bolstering communication and deepening relationships of trust with our business partners. We educate our employees on our basic stance on business transactions and compliance with laws and regulations such as the Act against Delay in Payment of Subcontract Proceeds, etc. to Subcontractors. In the future, we will further solidify our procurement policy, which includes respect for human rights and environmental considerations, and strive to ensure that our employees and suppliers are fully aware of the policy and that we are building a responsible supply chain. In addition, we are working to strengthen cooperation with our distributors, with whom it is important to have a good relationship as we move into the mass production phase, by holding biweekly meetings, providing education on products and related laws and regulations, and planning study sessions and opinion exchanges. In July 2022, we held the largest exhibition booth at the International Drone Show in collaboration with our distributors, introduced our products to visitors and provided them with a hands-on experience of flying a drone.

5-year data

Financial index

		2017	2018	2019	2020	2021 (FY)
Net sales	in JPY thousands	370,184	807,348	1,278,723	620,705	501,013
Operating income (loss)	in JPY thousands	(542,296)	(330,396)	15,945	(1,139,272)	(1,188,997)
Ordinary income (loss)	in JPY thousands	(454,155)	(176,977)	231,427	(1,081,647)	(1,213,748)
Net income (loss) attributable to owners of the parent	in JPY thousands	(460,410)	(183,335)	239,801	(1,511,710)	(1,225,869)
Comprehensive income	in JPY thousands	—	—	—	(1,508,567)	(1,213,246)
Net assets	in JPY thousands	2,022,998	4,701,831	5,034,217	3,572,642	5,419,419
Total assets	in JPY thousands	2,353,118	4,926,958	5,268,135	4,008,930	5,715,185
Net assets per share	in JPY	(218.47)	457.93	468.56	325.92	436.03
Net income (loss) per share	in JPY	(72.02)	(19.42)	23.00	(139.54)	(103.94)
Capital adequacy ratio	%	85.9	95.4	95.5	88.6	94.0
Ratio of net income to shareholders' equity	%	—	—	4.9	—	—
Price-earnings ratio	Times	—	—	85.19	—	—
Cash flow from operating activities	in JPY thousands	(517,401)	(176,941)	(407,985)	(1,163,945)	(1,345,852)
Cash flow from investing activities	in JPY thousands	107,965	(58,063)	(369,860)	(749,238)	(751,875)
Cash flow from financing activities	in JPY thousands	2,320,263	2,631,687	87,872	29,407	2,965,517
Cash and cash equivalents at end of year	in JPY thousands	2,068,909	4,465,591	3,775,617	1,891,731	2,759,957
Number of employees		44	39	45	65	70
[Besides the above, Average number of temporary employees]		—	6	6	7	12

*Non-consolidated financial figures are shown for FY 2019 and earlier, as consolidation of financial statements stated in FY 2020.
*FY 2021 is a nine-month period.

Non-Financial index

Number of Employees		44	39	45	65	70
Number of female employees		8	4	7	15	20
Percentage of female employees	%	18	10	16	23	29
Number of non-Japanese employees		6	7	12	15	17
Percentage of non-Japanese employees	%	14	18	27	23	24
Number of managers		7	8	6	8	12
Number of female managers		0	0	0	1	2
Percentage of female managers	%	0	0	0	13	17
Number of non-Japanese managers		0	0	2	2	2
Percentage of non-Japanese managers	%	0	0	33	25	17
Paid vacation usage rate	%	—	80	83	57	80
Childcare leave usage rate by men	%	0	0	0	0	50
Childcare leave usage rate by women	%	0/0	0/0	0/0	0/0	0/0
Number of employees taking nursing care leave		0	1	1	0	0
Employment rate of the handicapped	%	0	0	0	0	0
Occupational accident frequency rate	%	0	0	0	0	0
Number of directors		8	6	6	5	5
Number of external directors		3	2	2	1	2

Company Outline

Company name: ACSL Ltd.

Representative: Satoshi Washiya

Established: November 2013

Location: Hulic Kasai Rinkai Building 2F, 3-6-4 Rinkaicho, Edogawa-ku, Tokyo 134-0086, Japan

Business activities: Manufacturing and providing industrial drones, solution services for automation with autonomous technology

Consolidated subsidiaries: ACSL1 Limited Liability Partnership (Edogawa-ku,Tokyo, investment business)

Group companies: ACSL India Private Ltd. (New Delhi, India; manufacturing and sales of industrial drones),

REACT Co., Ltd. (Utsunomiya-shi, Tochigi-ken; development, manufacturing and sales of ground-based robots)

Stock Information (as of June 30, 2022)

Total number of authorized shares: 35,000,000 shares

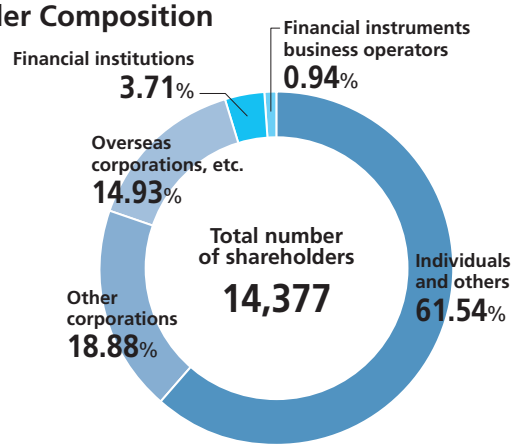
Total number of issued shares: 12,379,935 shares

Number of shareholders: 14,377

Listed exchange: Growth Market of the Tokyo Stock Exchange

TSE securities code (ticker): 6232

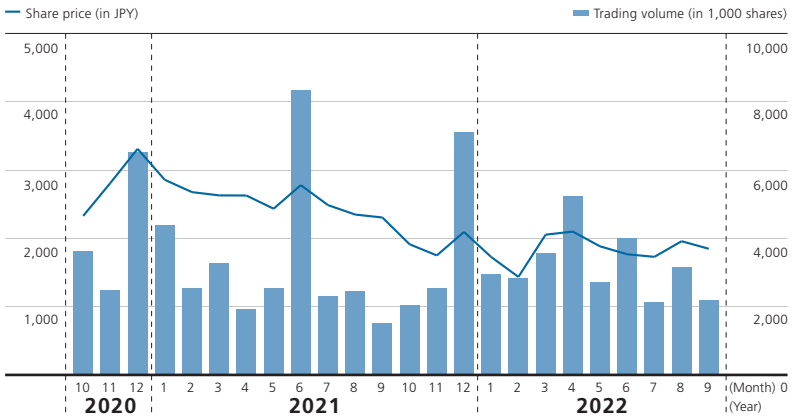
Shareholder Composition



Major Shareholders (as of June 30, 2022)

	Number of shares held (thousands)	Ratio of shares held to total number of shares issued (excluding treasury stock, %)
Japan Post Capital Co., Ltd.	1,259	10.17
Kenzo Nonami	1,200	9.69
iGlobe Platinum Fund II Pte. Ltd. (Standing proxy: Mizuho Securities Co., Ltd.)	871	7.04
Kikuchi Seisakusho Co., Ltd.	700	5.65
The Master Trust Bank of Japan, Ltd.	340	2.75
Hiroaki Ohta	255	2.06
Kensuke Hayakawa	232	1.88
Makoto Ota	179	1.45
State Street Bank and Trust Company 505019 (Standing Proxy: The Hongkong and Shanghai Banking Corporation Limited, Tokyo Branch, Custody Business Department)	140	1.14
CGML PB Client Account/Collateral (Standing proxy: Citibank, N.A., Tokyo Branch)	138	1.12

Trends in share price and trading volume



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