Aiming to become an environmentally friendly and customer trusted company

TAMAGAWA NEWS

2022.3
Vol. 28

i-FOG to demonstrate in solar synchronous orbit

Tamagawa Technology Forum 2021

Toward realization of "Carbon Neutrality"

Closed loop interferometric optical fiber gyro(i-FOG) On-orbit demonstration in JAXA Innovative Satellite Technology Demonstration Program

Since 2011, we have developed an inertial reference unit (IRU) for ultra-small satellites, and have accumulated numerous achievements. We have also developed an IRU with a high-performance closed-loop interferometric optical fiber gyro (i-FOG) and an inertial measurement unit (IMU), aiming to develop a lineup of inertial sensors mainly targeting small satellites and rovers (exploration vehicles).
The i-FOG was launched by Epsilon Launch Vehicle No. 5 on November 9, 2021, and was launched into the sun synchronized orbit at an altitude of 560 kilometers by the second small demonstration satellite of JAXA's innovative satellite technology demonstration program.

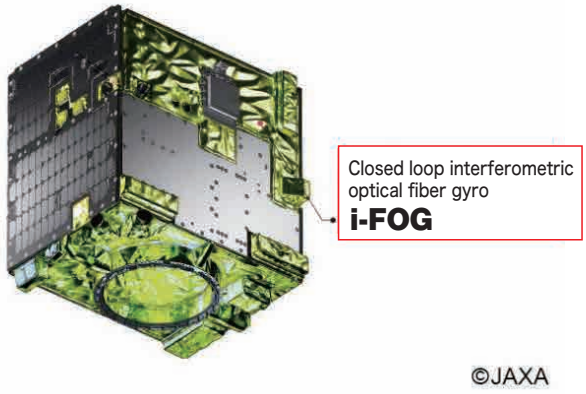
Main specifications of the flight model

The flight model (Fig.1) used for demonstration consists of a power supply board, MPU board (calculation board), and sensor unit (i-FOG ×1axis). They are housed in an aluminum alloy housing with 97×97×78 mm (excluding the mounting part). It weighs 900g and is mounted on the satellite body with four M4 screws.
When the external power supply is turned on, the i-FOG automatically starts operation and outputs the counter and status (self-diagnosis result and operation mode) to the outside in RS-422 format in addition to the single-axis angular velocity data. The output cycle can be set to 0.1 or 10 Hz using external commands and can be used depending on the mission.

Fig.1 Appearance of flight model with built-in i-FOG

Summary of the demonstration

In-orbit demonstration will be conducted focusing on gyro performance and resistance to space environment.
Regarding the performance on orbit, we will evaluate whether the angular velocity (equivalent to approximately 200 degrees/h) generated by earth orbit and the angular velocity (approximately 1800 degrees/h) generated by the satellite maneuver can be accurately detected.
As a reference, the IRU signal existing on the small demonstration satellite No. 2 is used to determine the difference between the reference angular velocity signal and the IRU signal.
In addition, space environment resistance is evaluated by observing changes in optical and electrical properties over time, and changes in electrical properties due to single events, especially in the radiation environment of outer space.



Small demonstration satellite No. 2 is a satellite used for orbital demonstration of six selected components and devices.
In 2018, one of the themes selected was "orbital demonstration of closed loop optical fiber gyroscopes" and we are currently conducting demonstration experiments.

Making proven results into future product development

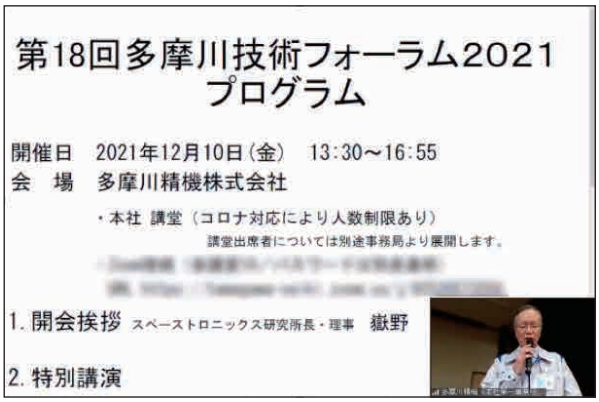
At present, we have completed the critical phase after launch and are in the steady-state phase of operation. The i-FOG data is also downlinked as needed to confirm normal operation.
In the next year or so, we would like to evaluate the performance and durability in orbit over a long period of time and demonstrate that it can actually be used in space.
Based on these demonstrations, we aim to commercialize IRUs that combine the rate bias instability of approximately 0.1degrees/h and the detection range of several hundred degrees/s, which are suitable for small satellites of the 100kg to several hundred kg class, with IRUs that are high-performance and low-cost, and will provide a stable supply of purely domestic products.

Interferometric Fiber Optic Gyro(i-FOG) Web page

https://www.tamagawa-seiki.com/products/gyros/1-axis-gyro-TA7774.html

18th Tamagawa Technology Forum 2021

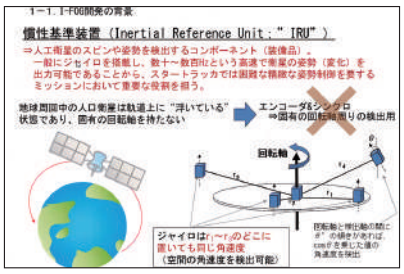
Tamagawa Technology Forum is held and Tamagawa Technology Report is published every year as opportunities to disseminate information on the latest technologies. Unfortunately, the the Forum and the publication of Tamagawa Technology Report was suspended in 2020 in order to prevent the spread of the new type of coronavirus infection.
However, in 2021, the forum was held for the first time in two years in a hybrid format between the lecture hall and the Web, while taking countermeasures against infection.
This forum has been held 18 times, and by using the Web in this year, it has been accessed from more than 170 locations, with about 300 attendees.
This year, Professor Kosaka of the Nagoya Institute of Technology gave a lecture on "Trends in Motors for Driving Automobiles - MagHEM's Efforts by the Nagoya Institute of Technology." As a technical lecture from us, we were able to present information on the latest technology on three topics: "Demonstration of closed-loop interference optical fiber gyro in orbit"; "Evaluation of magnetostrictive torque film characteristics of sensors using magnetic Kerr effect"; and "High-power/high-density motors for aircraft". We would like to continue the Tamagawa Technology Forum and the Tamagawa Technology Report next year.



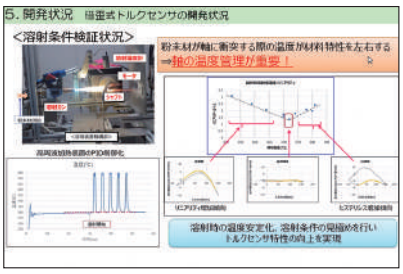
Tamagawa Technology Forum, a hybrid meeting at the hall and Web

Special Lecture by Professor Kosaka of Nagoya Institute of Technology
"Trends in Motors for Driving Automobiles - MagHEM's Efforts by Nagoya Institute of Technology "

●Lectures by Tamagawa engineers



"Demonstration of closed-loop interference optical fiber gyro in orbit"



"Evaluation of magnetostrictive torque film characteristics of sensors using magnetic Kerr effect"

"High-power/high-density motors for aircraft"

Renewal of career recruitment site in October 2021

We completely revamped our career recruiting website, as the source of information for those who wish to change jobs has been shifted to the Web more than ever due to the coronavirus.
In addition to the company information, job type information, employees' voices, and information on living in Iida and Hachinohe, this report provides information on how people who are considering a U or I turn(moving to countryside)to Iida and Hachinohe, two of our major bases, can more realistically imagine themselves working at Tamagawa Seiki.
By using pictures and illustrations, you can quickly and visually obtain the information you want, and you can check and enter the information on the site. Please take a look at them.
※Website is in Japanese only.

WORK & PEOPLE Making it easier to imagine Tamagawa Seiki's work

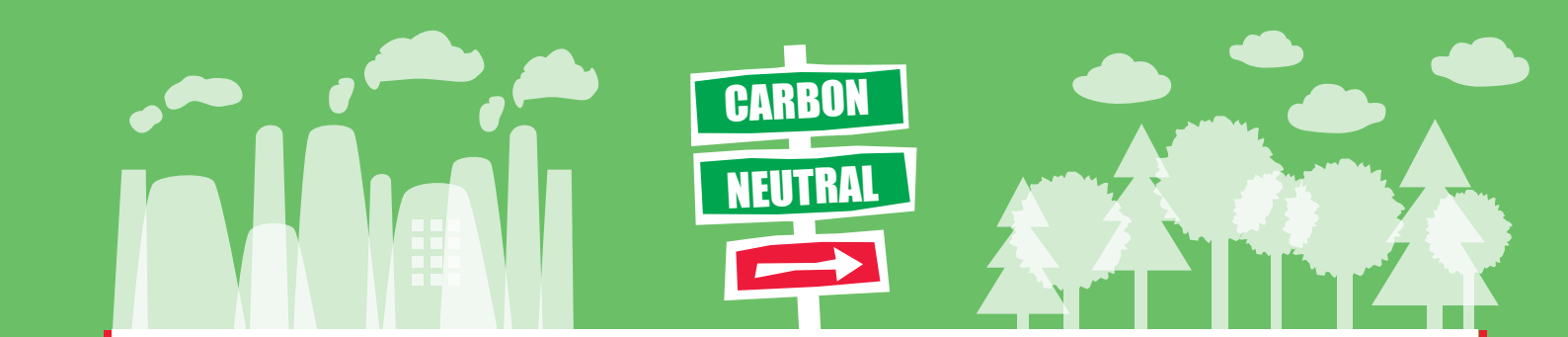
We divide the company into four departments, each of which is in charge of technology, sales, manufacturing, and management, and introduce the work of each department together with the opinions of employees.
We would be pleased if those who wish to change jobs could imagine how they can utilize the knowledge and experience they have acquired in their careers and feel the motivation of their employees and the attractiveness and atmosphere of Tamagawa Seiki.

WORK STYLE Introduction to life in Iida and in Hachinohe

We introduce our two major bases" Iida City and Hachinohe City, which have set "regional bases" as our corporate philosophy, from the viewpoints of nature, festivals, food, transportation, and living environment.
Employees living in Iida and Hachinohe on the U or I turn(moving to countryside)tell us about the charms and impressions of the community and how to spend time on holidays.
The Work STYLE page also contains information on the personnel system, training and education, and child-rearing, making it easier to imagine life after joining the company.

Career recruitment site
https://www.tamagawa-seiki.co.jp/recruit/career/
※Only Japanese

Entry page
https://www.tamagawa-seiki.co.jp/recruit/career/entry/
※Only Japanese



Environmental Initiatives

Toward realization of "Carbon Neutrality"

More than 120 countries and regions worldwide, including Japan, have set the "Carbon Neutrality by 2050" goal. In fiscal 2022, we set "Carbon Neutrality" as one of our goals in order to develop our industry and contribute to the local community, and to pass on the rich natural environment to the next generation.
Specifically, each division is promoting activities aimed at achieving carbon neutrality by realizing products and process designs with low environmental impact, introducing renewable energy facilities, and rationalizing and improving the efficiency of operations that contribute to the reduction of carbon dioxide emissions.
We began addressing environmental issues in 1997, when the Kyoto Protocol was adopted and the world's first mass-produced hybrid car was released.
In 1998, we acquired external certification for ISO 14001, an international standard for the environment, and started green procurement in 2004, and we have been working on environmental issues together with companies we have dealing with.
At the time of preparations to obtain ISO 14001 certification, we thought that environmental problems would need to be addressed across regions beyond corporate boundaries and in 1997 we called on Iida city and Shimoina regional offices to create a volunteer group called "Community for Environment ISO Study Group".
Twenty-five years have passed since then, as a company and as a local resident. Here are some examples.

Green Procurement Guidelines published in 2004

Exhibition at Minami-Shinshu Environmental Messe 2021

On December 4 and 5, 2021, the Minami-Shinshu Environmental Messe 2021 was held at the Minami-Shinshu Industrial Center in Iida.
Schools, governments, and various organizations working to realize a zero-carbon society in this region participated in this event, and as members of the community-wide ISO study group, we exhibited the SDGs on the theme of dissemination. At the exhibition booth, in addition to introducing the examples of activities through video, we distributed mobile straps to 350 visitors that meant to challenge the SDGs with the community.

Exhibition booth of the community-wide ISO study group


Distribution of "Kurumi" mobile strap to Visitors

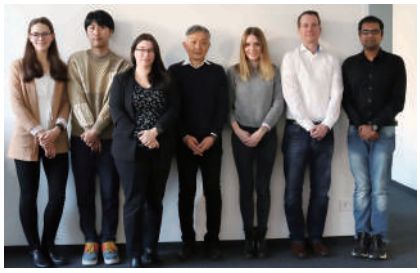
INFORMATION 01

Tamagawa Europe GmbH Office Relocation Notice

The German representative office was established in the city of Ulm in 2012 and then changed to Tamagawa Europe GmbH in 2014. On January 11, 2022, we moved our office to increase the number of employees in order to improve our services to our customers in Europe. Located close to Magirus Street Station, the city's streetcar is more convenient than its former office.
Please be advised that the address and telephone number have changed.

【New Address】

Address :Emmy- Wechßler-Weg 7, 89077 Ulm, Germany
Phone :+49 731 963 389 51
Fax :+49 731 963 389 57(No change)



INFORMATION 02

New Resolver/Digital Converter at ENEX2022 NEDO Energy Conservation Technology Development Award

We exhibited a new resolver/digital converter (brand name: VRDC) at the 46th Harmonization of the Global Environment and Energy Exhibition (ENEX2022) held at Tokyo Big Sight from January 26 to 28.
This exhibition was held as one of the decarbonization and energy exhibitions based on the concept of "carbon neutral realized by energy saving, renewable energy, and energy management".
In this context, we decided to participate in the "Strategic Energy Conservation Technological Innovation Program," a technology theme that contributes to energy conservation, which was solicited by the New Energy and Industrial Technology Development Organization (NEDO). We adopted the research and development of this product as a technology that contributes to energy conservation in next-generation automobiles, and realized much higher precision and faster responsiveness than conventional products.
During the exhibition, a seminar was held on product development, and the NEDO Energy Conservation Technology Development Award was held to commend the themes that achieved excellent results in the program. The research and development theme of the product was awarded the Excellent Company Award for Energy Conservation Technology.

Sales of this product started after the mass production shift was completed in November last year. We also provide samples, so if you are interested, please contact our nearest sales office.

Notice of Officer Personnel

We are pleased to inform you of the appointment of Executive Officers at the General Meeting of Shareholders in February 2022 as follows.

Senior Managing Director	**Hiroshi Hagimoto**	TAMAGAWA SEIKI CO., LTD.
Senior Managing Director	**Masashi Uryu**	TAMAGAWA SEIKI CO., LTD.
Senior Managing Director	**Yasuo Hagimoto**	TAMAGAWA SEIKI CO., LTD. TAMAGAWA TRADING CO., LTD.
Senior Managing Director	**Tadanori Matsuo**	TAMAGAWA SEIKI CO., LTD.

The cover of this issue

Iida Oneri Festival Three special days once every seven years: March 25 to 27, 2022

The Iida Oneri Festival is held once every seven years as a regularly festival of the Omiya Suwa Shrine in the center of Iida City. It has a history of about 350 years, starting with the ritual of Mikoshi Togyo with a series of ancient processions, and many lion dances and traditional performing arts represented by the Daimyo Procession and Higashi-no Ohjishi parade around the central city center lively.

Iida Oneri Festival site
https://oneri.iidacci.org/

Higashino Ohjishi

It is a horo lion dance with a large lion head weighing 30 kg, and it is one of the central dances of the Iida Oneri Festival.
The sleeping great lion is forced to wake up by Utennou pulling a rope, and become so violent that they can't be held in hand. However, the lion become quiet by “Ohayashi” which is accompaniment music. The elegant and gorgeous dance of Utennou, which is said to be the starting point of Noh, the memorable lion with a feeling of weight, and the flute and drum are excellent.

Did you know? Urugi Urugi vil. Minami-Shinshu Municipalities Vol.2

~Introducing the of food and culture of local areas around Tamagawa Seiki~

The Minami-Shinshu Region is located in the South of Nagano Prefecture. The region is blessed with a mild climate and a magnificent natural environment facing the Southern Alps.

Urugi Village is one of the southernmost villages in Nagano Prefecture, adjacent to Toyonemura Village in Aichi Prefecture, and located on the northern side of Mount Chausu. Surrounded by four ridges, 88% of the village area is small mountain villages where forests occupy.
Only one of the villages in the Tenryu-Okumikawa Quasi-National Park has abundant natural resources and is the best place to enjoy hot springs, camps, tours and other outdoors.

Village where you can talk with full of stars and forest

Camp! The village is very popular with the corona devastation. There are five distinctive camping sites with stars. The selection can be tailored to the camp style, such as a large auto camp, a site beside a stream that enjoys nature, or a bungalow in a forest.

One-coin hot springs

The hot spring quality of The Urugi Onsen Komadori-no-Yu is sodium bicarbonate chloride hot spring, and it has a reputation for its good spring quality. There are 5 types of baths such as indoor bath and open-air bath, and you can heal your body and mind in the hot spring where you can enter while looking at the scenery of the mountains. It is used for those who use camping facilities and those who enjoy day trip bathing.

Running village Semi-highland suitable for sports training

The center of the village is 850 meters above sea level, and the mountain top of the neighboring Mount Chausu is 1,415 meters high, with an altitude difference of about 560 meters. Oxygen levels are about 12% lower than those on the plains, making the area ideal for sports training (camp) in summer. In 2018, the construction of the Urugi Village Athletic Stadium was completed. It is fully equipped with a 400m truck, night lighting, shower room, etc., and is mainly used by business groups and students. We will do our best to support our players and teams, so please come to Urugi village.

Urugi village map

My recommendation for spending time:

From Urugi Village Tamagawa Trading Co.,Ltd. **katsutomo Natsume**

①Fishing in Mountain Stream→Barbecue→Hot springs→ Camping studded with Stars

②Golf→"Scream" in loud voice→Inquest of golf score in spring inn.

For about 30 years after leaving the local area at a hot spring inn, this place creates a leisure facility where people and nature coexist as if everything has stopped is wonderful. We would appreciate it if you could go out with your loved ones.

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