



Contract with Russia for military wire

Original of Electric Wire Handbook

FUJIKURA HISTORY

Entering into competition among three leading electric wire companies: Many electric wire manufacturers emerged in Japan with increasing export demands from Russia and other countries due to World War I. Fujikura, Furukawa Electric Co., Ltd. and Sumitomo Electric Industries, Ltd., which had an advantage in meeting government demand, have entered into a three-way contest after surviving an intensifying struggle during post-war recession.

Shaping the future with "Tsunagu" Technology.

FUJIKURA NEWS

2017 No.437 12

Special Issue

Introduction to Medical and Healthcare Products

Fujikura has described medical devices as one of the six key technologies that create future of an environmentally friendly information-based society in the 2020 Mid-term Business Plan devised in 2015.

We offer a wide range of products produced by applying our core technologies developed through our power and telecommunication business and electronics business. This special issue introduces to our products that play especially important roles as components in the area of medical devices. Our magnet, which uses an yttrium-based high-temperature superconductor and is capable of generating one of the strongest magnetic field in the world, contributes to increasing the performance of and decreasing the size of diagnostic devices and analyzers.

Our newly developed ultra-fine CMOS image sensor module with a diameter of far less than 1 mm enables the visual diagnosis and treatment of an inner body portion, which conventional endoscopes were not able to reach. Our WABE Package™, a high-density circuit board embedded with components, allows a drastic reduction in the size of electric circuits and burden on the body due to wearable and implantable medical devices.

In addition, in establishing "the 2015 Mid-term Business Plan," the previous mid-term business plan, we approved the idea that "good employee health is the basis for corporate competitiveness." Based on this idea, we

recognized the significance of employee health for the Group to remain to be a corporate entity needed by society 10 and 20 years after. In 2014, we also issued "the Fujikura Group Health Management Declaration.

In providing the employees a program for health promotion and disease prevention, we developed our original "the Fujikura Group Health Promotion Program" so that effective services become available. This program uses ICT technology to accumulate and utilize health-related data and effectively support each employee's voluntary health promoting activities. We also distributed pedometers to individual employees so that they can join the program. In addition, we installed body composition monitors and manometers at our sites for employees to easily check their health at their workplaces. These efforts resulted in the company being recognized under the 2017 Certified Health and Productivity Management Organization Recognition Program under the large enterprise category (White 500). This program is carried out by the Nippon Kenko Kaigi (the Ministry of Economy, Trade and Industry) to certify large-scale enterprises looking at employees' health care from a managerial point of view and strategically taking action.

2017
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Creation of Healthy Future

Medical and Healthcare Products



Image Fiber

Image fibers with several thousand or more cores (light paths) have the function of transmitting an image formed on an end face to the other end face. (Fig. 1) Fujikura's image fiber made of quartz glass has achieved high light transmittance, color reproducibility and durability, boasting the largest share in the world. The image fibers are combined with lens and optical fibers for lighting and mainly used as endoscopes for medical use. It is recommendable to use ultra-fine image fibers that have a high level of flexibility for use in angioscopes or other devices that require fineness.

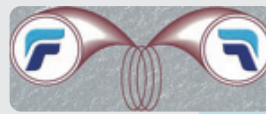
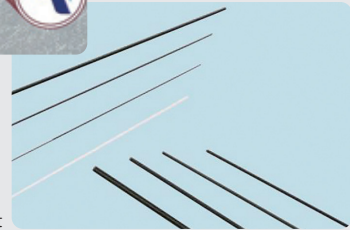


Fig. 1
Schematic diagram



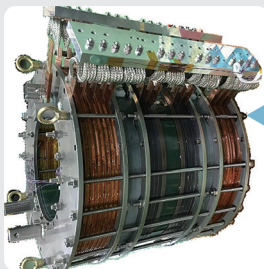
Appearance of product

✉ Optical Fiber Division

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Yttrium-based High-temperature Superconducting Wire

Yttrium-based high-temperature superconducting wire rod has a feature that it can carry high current densities in a high temperature range compared to traditional superconducting wire. In a current national project that uses Fujikura wire rod, we have successfully developed a liquid-helium-free high-temperature superconducting coil. The coil is expected to be used in next-generation MRIs free of helium, which may not be supplied sufficiently in the future.



Superconductive coil in MRI mini-model (courtesy of Mitsubishi Electric Corporation)

High-temperature superconductive wire



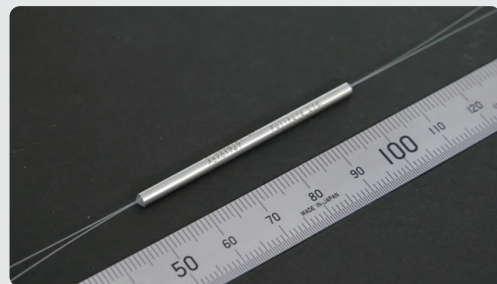
This research was conducted under a project commissioned and supported by the Ministry of Economy, Trade and Industry (METI) and The New Energy and Industrial Technology Development Organization (NEDO) in 2013 and 2014. In 2015, the research was also carried out under a project, Fundamental Technology Development for High Temperature Superconducting Coils, jointly with METI and Japan Agency for Medical Research and Development (AMED).

✉ New Business Development Center

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Optical Fiber Coupler

Optical fiber couplers have functions of separating or multiplexing light at any ratio. Fujikura's highly reliable optical fiber couplers have been used in optical undersea cable systems for many years. We have released a new optical fiber that uses wavelengths ranging from visible light to near infrared light for medical use. This new product has been used as a key component of optical coherent tomography (OCT) equipment for 3-D tomographic imaging of retinas.

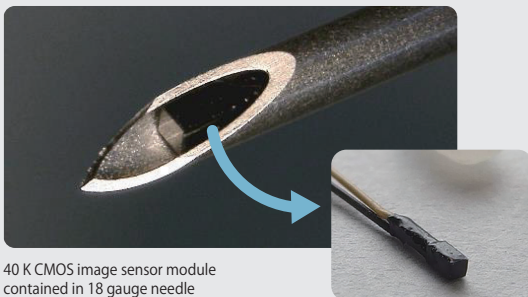


✉ Optical Fiber Division

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CMOS Image Sensor Module

Fujikura's CMOS image sensor module has been developed for medical device use and is the smallest in the world with its edge of 0.63×0.63 mm outer dimensions and 40 k pixels. Use of this product leads to more compact medical devices with a small diameter and minimally invasive surgery and examination. In addition, use of the sensor module for visualizing a feeding tube allows users to insert the tube not blindly but visually into the body of a patient. This eliminates the need of verifying the place of the tube using X-ray after insertion, which results in the securing of safety and reductions in costs for patients.



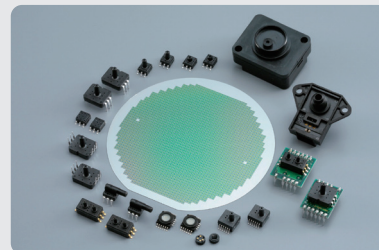
40 K CMOS image sensor module contained in 18 gauge needle

✉ New Business Development Center medical@jp.fujikura.com

Oxygen and Pressure Sensors

Our pressure sensor consists of a diaphragm, which is a silicon substrate thinned down by etching, and uses piezoresistance formed through diffusion or injection of ions in the surface. This sensor is small and lightweight and capable of measuring pressures from 25 kPa to 1 MPa. The product is widely used in medical devices such as tonometers, non-contact ophthalmodynamometers, and air mattresses to prevent bedsores, which need pressure control.

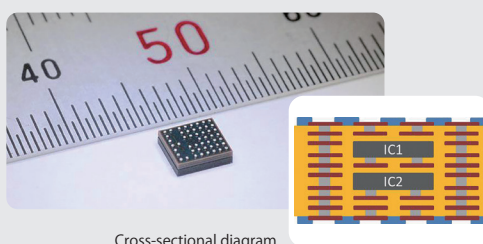
Our oxygen sensor, which measures a limiting current of oxygen and uses ceramics, is capable of determining a range from 1000 ppm O_2 to 95% O_2 , is highly precise, and does not require calibration during use. It is used for measuring oxygen concentration of oxygen concentrators.



✉ Sensor Business Unit sensor@jp.fujikura.com

Chip-stack WABE Package™

We have started shipping samples of Chip-stack WABE Package™, a polyimide-based multi-layer circuit board that accommodates two or more stacked IC chips. This module with multiple IC chips can be significantly reduced in outer dimensions using our production technology compared to those of the modules produced by other mounting technologies. This product is also so highly regarded by customers that they are considering using it. In the future, we will take advantage of reduced size of devices to contribute to minimal invasiveness of medical treatment devices and substantial alleviation of patients' burdens of being connected to examination equipment or healthcare equipment.

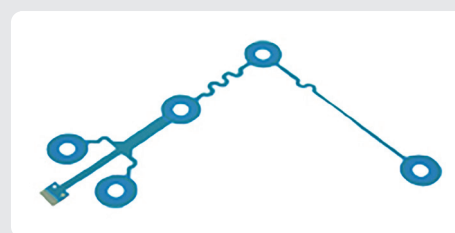


Cross-sectional diagram

✉ New Business Development Center askwabe@jp.fujikura.com

Membrane

Fujikura manufactures flexible circuit board using functional paste technology and printing technology. The company supplies membrane switches in keyboards of PCs, capacitance sensors to the electronics market and seat sensors and film antennas to the automotive market. Using the technologies developed for these markets, we contribute to improvement in quality of life by providing monitoring sensors to prevent wandering and disposable holter electrodes of electrocardiographs in the healthcare and medical market.



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Fujikura Awarded "Excellent Facility Management Award" by Public Service Corporation Japan Facility Management Association (JFMA)

Fujikura has received Excellent Facility Management Award in Japan Facility Management Awards, one of two measure awards in the office environment industry. The company won this award thanks to the cooperation from Itoki Co., Shimano Inc., Ergotron Japan Inc., and National Institute of Advanced Industry and Technology.

This award is subjected to facility management (FM) in cooperation with our health management efforts that have been continued



since 2011. The management regards employees' health promotion and disease prevention as challenges for management and include this issue in the Mid-term Business Plan. In cooperation with health management, FM is considered to be places where employees' health is promoted and activities that create their health. In 2016, these efforts were expanded to branch offices throughout Japan. JFMA highly valued our active engagement in converting health management into numbers and visuals as advanced attempts. As one example of our engagement in our project, standing desks (height adjustable) are also introduced to the branches nationwide.

* The headquarters of Nishinippon Densen (Oita Prefecture), our group company, has already introduced 100 standing desks. Standing desks aims at not only health promotion but also ease of work and improvement in productivity and is effective as a tool to promote in-house communication.

Although this is only for the headquarters, conventional meeting areas were renovated into places called Fujikura Health Activity Base (FHAB), where employees can gather to communicate. This was also well evaluated.

Use of Big Data Analysis for Health Management

The number of users' (employees') vital data (the number of steps, calories consumed, body composition, blood pressure) accumulated through our health promotion program exceeds several ten thousands to 100 thousands every day. It is essential for the program how such huge data is processed and arranged in a form which every user can easily obtain findings about their health.

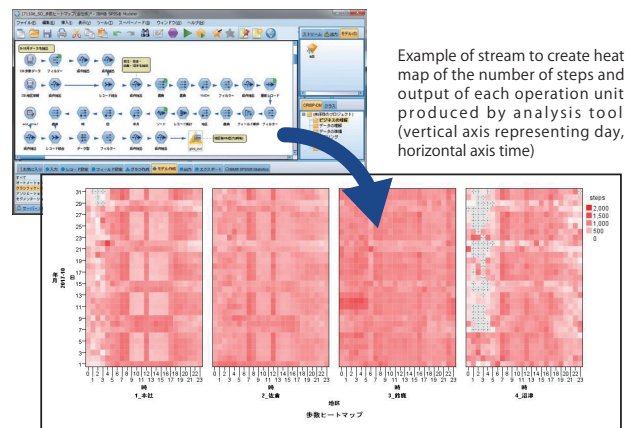
In addition, it is also important that the features of data for each branch, business unit, and type of job are analyzed and used as evidence for formulating health promotion measures. So we established a data analysis team within Healthcare Strategy Group, so that they can brush up their skills as data scientists using some tools. For instance, they construct a stream to create heat maps of the number of steps users took per day and time using IBM Japan's analysis tool, SPSS.

Each user regularly reports through the health promotion program and looks back their activity so that they change their activities based on their findings.

As a result of gathering data and visualizing it by each operation unit, specific features of each operation unit were clarified, and this led to

our taking measures based on the results.

We will further improve the technique of data utilization to contribute to society by achieving a company where employees work lively.



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