ESD

Endoscopic Solutions Division

In its Endoscopic Solutions Business, Olympus uses innovative capabilities in medical technology, therapeutic intervention and precision manufacturing to help healthcare professionals deliver diagnostic, therapeutic and minimally invasive procedures to improve clinical outcomes, reduce overall costs and enhance the quality of life for patients and their safety. Starting with the world's first gastrocamera in 1950, Olympus' Endoscopic Solutions portfolio has grown to include endoscopes, laparoscopes, video imaging systems, digital and integrated customer solutions, as well as solutions for infection prevention and for service.

Features of ESD

01 Competitive product development

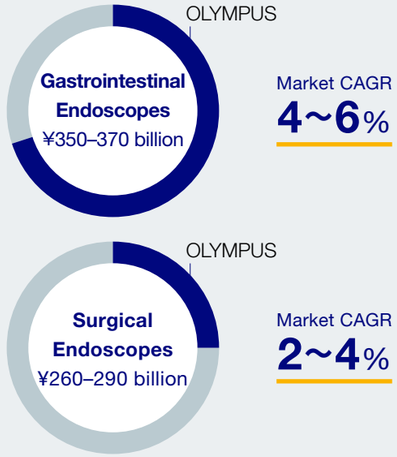
Gastrointestinal endoscope area

- From the time when Olympus developed the world's first practical gastrocamera in 1950 to today, Olympus has continued to refine its endoscope technologies in close collaboration with physicians
- Developing technologies that contribute to the improvement of the quality of endoscopy around the world, such as NBI, RDI, TXI, and EDOF

Surgical endoscope area

- Providing high-definition and high-quality products with 4K/3D technology
- Acquisition of advanced fluorescence imaging technology and promotion of research and development toward next-generation molecular imaging technology

Market scale and growth forecast of each product



Note: Market scale and growth forecast information for this page come from the Company's research. Market scale is as of March 31, 2021
Growth forecasts are projected for the fiscal year 2022 to fiscal year 2024, starting from fiscal year 2021

02 Solid business foundations

1 Global service network

Established a global network of service locations: Europe, the Americas, Middle East, Africa, Japan, China, and Asia, which is the largest network of service sites for any global medical device manufacturer

Large endoscope repair center

2 Support training endoscopists

Supporting training for endoscopists by opening training centers in China and other Asian countries, where demand for early diagnosis and minimally invasive treatment is expanding along with the economic growth

Olympus China Medical Training & Education Center Shanghai (C-TEC Shanghai)

3 Craftsmanship for meeting physician needs

Providing more than 300 types of endoscopes through advanced manufacturing technology and high-mix, low-volume production to meet diversifying customer needs

Endoscope

01 Competitive product development

Gastrointestinal endoscope area

Past

The Birth and Spread of Gastrocamera

At the department of surgery, the University of Tokyo Branch Hospital, with the support of Assistant Professor Takeo Hayashida, Dr. Uji and the Olympus technical team developed an experimental gastrocamera. This gastrocamera was launched in 1952 as the "GT-I Gastrocamera." However, as there were a number of problems with the early product and imaging techniques had not been well established, it did not catch on. Gastrocamera operations ran a deficit, and there were discussions at Olympus as to whether the business could continue on as it was. Amid this, the first place to recognize the potential of the gastrocamera and make an effort to popularize it was in the #8 Research Laboratory of the University of Tokyo Main Hospital First Department of Internal Medicine (Tasaka Internal Medicine Department: Professor Sadataka Tasaka).

The Tasaka Internal Medicine Department first assisted Olympus by offering advice regarding problems with this early instrumentation from a user's point of view. But the greater topic at the time was the need to establish a standardized technique for photographing the inside of the stomach. The gastrocamera differs from the fiberscope in that the doctor cannot directly observe the inside of the stomach during the examination. It is exceedingly difficult to get a satisfactory image while blindly maneuvering the instrument around inside the stomach.

In order to determine the location of the gastrocamera in relation to the various parts of the stomach, various daunting tasks had to be repeated, such as using X-rays and recording the gastrocamera's degree of insertion, twisting of the shaft and noting the result, and measuring the amount of air flow required to optimally insufflate the stomach. Through these experiments, a standardized imaging technique was established around 1956.

The role of the "Gastrocamera Research Group" (currently the Japan Gastroenterological Endoscopy Society), as first established and centered around the Tasaka Internal Medicine Department, cannot be forgotten. The first meeting of the Gastrocamera Research Group was held in 1955, and research reports focusing on cancer were presented. At the fifth research society meeting in 1958, there were 16 presentations and 200 attendees, and research had progressed to the clinical stage.

Along with Olympus as the manufacturer, the group established the Technology Committee (afterward the Gastrocamera Promotion Committee) in 1955. Once a month, they met to share opinions regarding failure prevention and device improvements. These efforts became the driving force behind the spread of the gastrocamera.

Dr. Uji (center), attending a clinical trial

First Gastrocamera Research Group meeting
(at the podium, Professor Tasaka)

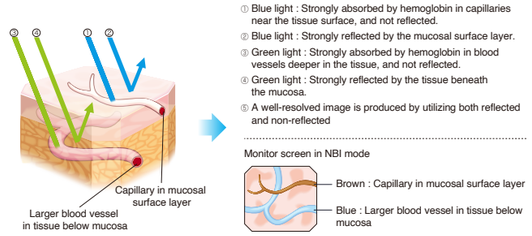
Present

Image-enhanced Endoscopy and NBI

The gastrocamera, developed by Olympus in 1950, greatly influenced early-stage stomach cancer diagnostics. Through the accumulated research that followed, it was understood that early-stage lesions could be found through slight differences in the color of mucosal surfaces within the digestive tract. A technique called "chromoendoscopy," spread rapidly starting in the 1970's. This procedure sprays various dyes on the tissue lining the GI tract in order to detect subtle lesions that are hard to detect using normal endoscopic imaging. Olympus expanded upon these principles and developed a technique called Narrow Band Imaging (NBI) that is designed to reveal subtle lesions through an optical method. NBI is one example of an imaging enhancement technique that uses a combination of optical and digital methods (opto-digital).

Narrow Band Imaging (NBI)

Olympus developed Narrow Band Imaging technology to enhance observation of mucosal tissue. NBI is an optical imaging technology that enhances the visibility of vessels and other tissue on the mucosal surface. NBI works by filtering the white light into specific light wavelengths that are absorbed by hemoglobin and penetrate only the surface of human tissue. As a result, with Narrow Band Imaging, capillaries on the mucosal surface are displayed in brown and veins in the submucosa are displayed in cyan on the monitor.



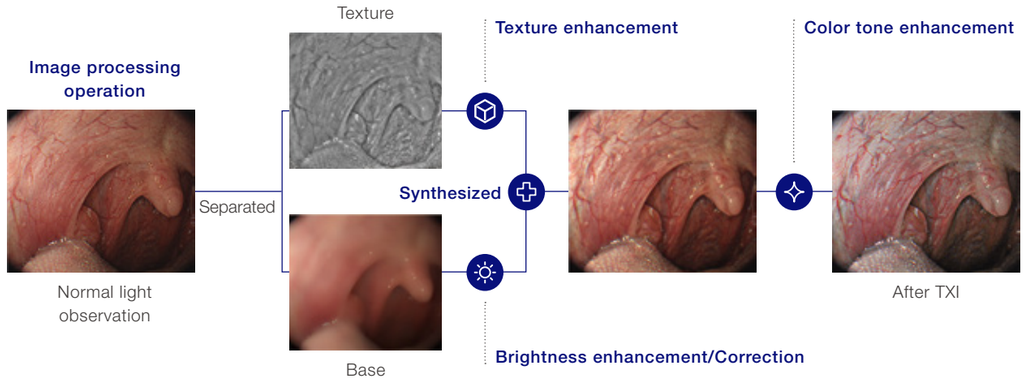
Innovative Imaging Technologies

In 2020, we launched the EVIS X1, the latest model of our endoscopy system, in Europe, Japan, and some parts of Asia. This model is equipped with the following three imaging technologies that will further improve treatment and diagnosis. It contributes to early detection, early diagnosis, and minimally invasive treatment of gastrointestinal diseases such as cancer.

EVIS X1

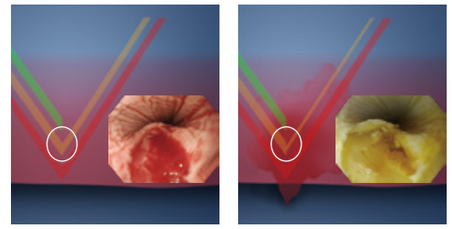
TXI Texture and Color Enhancement Imaging

TXI supports better visibility of potential lesions (such as areas of inflammation, flat or depressed lesions, or even tiny precursor lesions) through enhancing texture, brightness, and color to define subtle tissue differences more clearly. With its advanced imaging technology, TXI holds the potential to reinvent white light in endoscopy. By supporting better visibility of potential and extant lesions, TXI aims to contribute to higher detection rates and improve qualitative diagnosis.



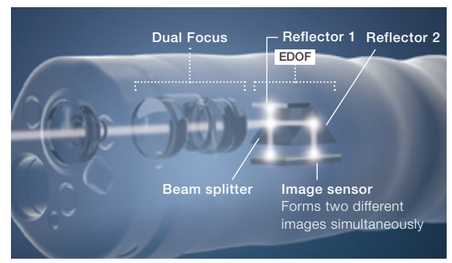
RDI Red Dichromatic Imaging

Gastrointestinal bleeding is a serious challenge, potentially involving considerable mortality risks and management costs. RDI enhances the visibility of deep blood vessels and gastrointestinal bleeding sources, thereby helping to identify blood vessels that could require immediate treatment. It utilizes green, amber, and red wavelengths to visualize deep blood vessels. Easier identification of bleeding spots makes hemostasis quicker and easier while potentially improving the efficiency of any corresponding treatment. This minimally invasive technology could also be expected to help reduce physician stress during endoscopic therapy.



EDOF Extended Depth of Field

EDOF combines two images at different focus distances into one perfect image to help aid diagnosis and confidant decision-making. It delivers observational excellence through continuous broad focus and seamless magnification. At the same time, the established Dual Focus function provides high magnification, which can be activated by the push of a button. This improved visibility and continuously sharp image has been developed to reduce the necessity for focal adjustments and could be expected to improve efficiency and decrease the oversight rate.



Surgical endoscope area

Higher Resolution and 3D

In the area of surgical endoscopes, we established Sony Olympus Medical Solutions Inc., a joint venture with Sony Corporation, in 2013. Sony Olympus Medical Solutions is engaged in the research and development of new products that combine Sony's cutting-edge electronics technologies in areas such as digital imaging with Olympus' manufacturing and R&D expertise in the area of medical products including lenses and optical technologies.

● 4K Surgical Endoscopy System

The 4K Surgical Endoscopy System, which has about four times the number of pixels compared to full high-definition video, contributes to improved visibility during surgery with clear, high-definition images down to the finest details. In addition, the rich color reproducibility supports easy identification of the boundaries of fine tissues (blood vessels, nerves, lymph vessels, etc.). The large screen monitor and magnified view of the electronic zoom can also support detailed surgery.

VISERA 4K UHD

Olympus launched VISERA ELITE II, a surgical endoscope system with an infra-red (IR) imaging capability in 2017. As of June 2021, the system is marketed in Japan, U.S., Europe, China (3D) and parts of Asia.

● Surgical Endoscopy System with Infra-Red Imaging Capability

Surgical endoscope systems that support IR imaging, which highlights blood flow information, NBI observation using specific light spectra, and 3D stereoscopic viewing, provide the best observation images for each case.

VISERA ELITE II

Present

Fluorescence Imaging

In 2021, we expanded our portfolio in the growing fluorescence imaging market in the area of surgical imaging with the acquisition of Quest Photonic Devices B.V., a Dutch medical device manufacturer.

● Imaging System for Fluorescence-guided Surgery

Fluorescence imaging refers to special light imaging technologies that utilize the properties of fluorescent dyes directed to specific anatomical structures. By using targeted dyes, in combination with specific light wavelengths, tissues or lesions that are nearly invisible under normal white light become visible.

We have added Spectrum® to our portfolio, a fluorescence-guided surgical imaging system for both open and laparoscopic surgery.

Spectrum®

Future

Molecular Imaging

Research on molecular imaging technology to visualize cancer lesions using fluorescent drugs combined with antibodies that specifically bind to cancer is currently underway and is expected to be put to practical use. Quest Photonic Devices B.V., works with biotechnology companies that are developing next-generation molecular imaging dyes. These innovative dyes may enable Quest Photonic Devices B.V.'s technology to advance diagnostic opportunities in fluorescence-guided cancer surgery.

02 Solid business foundations

1 Global service network

Map of Olympus' repair locations around the world (● shows locations capable of major repairs*) (As of April 2018)

Endoscopes are precision instruments used within the human body. High-quality, after-sales service is necessary to maintain safety and provide maximum functionality. In order for patients around the world to receive safe endoscopic examinations and treatment, Olympus has established the industry's leading global repair and services system. In addition, we have established a system in which each repair site can provide mutual backup in the event of an emergency such as a disaster.

The World's Largest Endoscope Repair Center (San José, California, U.S.)
Olympus is proud of the "San José National Repair Service Center," which is the world's largest endoscope repair center. Within the walls of the 80,000 square-meter building accented in blue, Olympus' corporate color, 450 service staff members dressed in white lab coats meticulously carry out their repair work. The San José location was established in 1979 to perform concentrated, authentic repairs (major repairs)*, including full instrument disassembly and reassembly. Prior to this, major repairs of endoscopes had been performed at small service locations distributed throughout the U.S. However, it was decided that a centralized location where high-quality repairs coexisting with rapid repair turnaround was critical for the U.S. market. The centralization of major endoscope repair in one facility has improved both the quality and the efficiency of delivering repair services to our customers.

World's largest endoscope repair center (San José, California)

High Repair Quality
Endoscopes, which are inserted directly into the human body, must meet strict safety and performance standards. This applies both to new instruments and instruments being returned to healthcare professionals following service. Therefore, it is required that fully repaired items have the same level of quality as new products. "Safe, stable use" is one of the essential values of endoscopes. With this kind of thinking, Olympus has continued to strive to enhance its service system, ever since the start of the endoscope business in 1952.

*Major repairs: An overhaul involving the dismantling, inspection, and repair of malfunctioning equipment

❷ Supporting endoscopist training

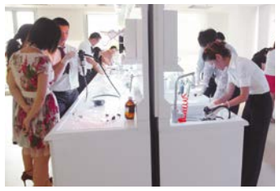
Demand for early diagnosis and minimally invasive treatment is expanding along with the rapid economic growth in China and other Asian countries. Like in Japan, the U.S., and Europe, Olympus actively supports training for endoscopists by providing training opportunities on the safe and effective use of Olympus products, which allows doctors to be familiar with new products and procedures in China and other Asian countries.

Efforts in China

In addition to the progress which the Chinese government is making in reforming medical care, China's population is also rapidly aging in a manner similar to U.S. and European countries. In medical facilities, therefore, the number of endoscopists are unable to keep up with the growing number of patients, making the development of new endoscopists an urgent matter. In 2008, Olympus built the China Medical Training & Education Center Shanghai in the research and industry development district outside of Shanghai in China. This site is conveniently located near Shanghai Airport, making it easy for doctors to visit from all over China. Behind the futuristic exterior of the building are located both a training center and a call center. The training center is set up to allow for the training of gastrointestinal endoscopic examinations, as well as training on the operation of endotherapy devices and surgical products. A lecture hall capable of seating close to 100 people is located on the uppermost floor and is wired for high-capacity broadband communications, making academic exchange possible for doctors both inside and outside China.

Training of sales representatives and repair and service technicians is also performed at China Medical Training & Education Center Shanghai, which contributes to improving the quality of Olympus' marketing services. The call center handles communications with medical facilities, sales representatives, repair technicians, and dealers throughout the country, with an equivalent level to that of Japan, U.S., Europe. Olympus opened similar training centers in Beijing in 2010 and in Guangzhou in 2013, further accelerating support for training new Chinese endoscopists. Based at the three in-house training centers, as well as at collaborative training centers affiliated with nationwide, Olympus is supporting training for endoscopists throughout China by providing a range of learning programs. Olympus also invites Japanese doctors to China who tutor Chinese trainers. Most recently, we have been supporting Japanese doctors who provide online lectures on the activities of Chinese trainers and evaluate as well as comment on case presentations. Through these and other efforts, Olympus has achieved remarkable growth in recent years.

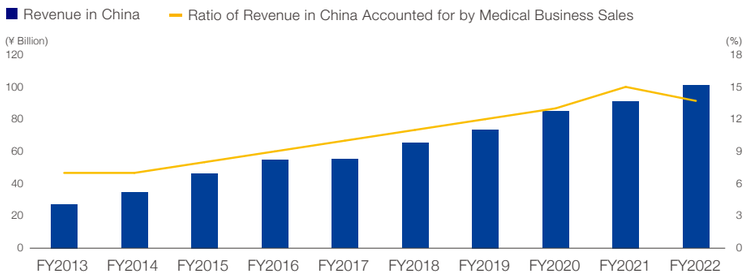
Olympus China Medical Training & Education Center Shanghai (C-TEC Shanghai)



Various forms of training can be given within the facility

Click here for the China page of our Integrated Report 2021 (Business Growth Driven by the Chinese Market, Doctors' Perspective, A Corporate Officer's Perspective)

Chinese Sales Growth Trends in the Medical Business



Approx. 3.7 times

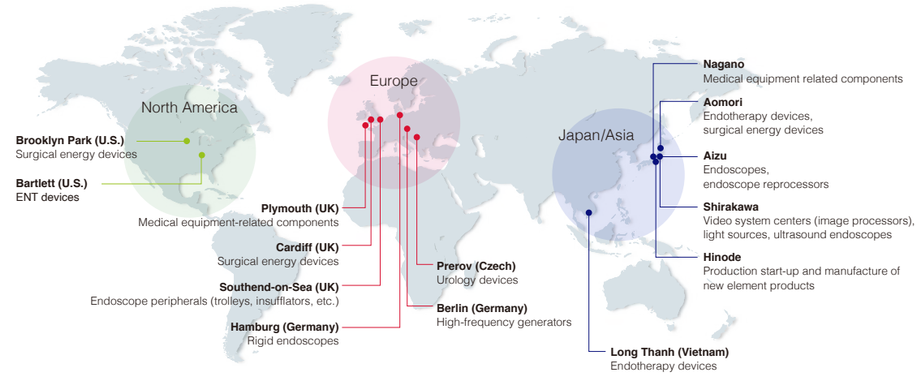
Comparison between sales in the Chinese market for FY2022 and FY2013

Efforts in Asian Countries

With a total population of over 1.3 billion people, India is the most promising new market second to China. From the size of its population and the speed of its economic growth, it is believed that the availability and use of medical devices in India will advance rapidly in the future. Similar to Japan and China, there are a number of gastrointestinal diseases in India amenable to endoscopic treatment, and endoscopic procedures for biliary and pancreatic diseases are very common. Olympus works with Indian academic societies and supports endoscopic training sessions. Having established a training center in Thailand in 2016 to serve healthcare professionals from Southeast Asia, Olympus is also striving to develop the medical technology infrastructure in the nations of the region and expand their use of endoscopy. Furthermore, Olympus Korea Medical Training & Education Center (K-TEC) was established in 2017. In the future, Olympus intends to continue contributing to improvements in patient quality of life (QOL) by working to help with endoscopy skill development and on the wider use of endoscopes for early diagnosis, minimally invasive treatment, and procedure.

Olympus Korea Medical Training & Education Center (K-TEC)

❸ Craftsmanship for meeting physician needs



The current trilateral approach of Japan/Asia, North America, and Europe is supported by the following manufacturing centers. In Japan and Asia, we have five domestic plants in Aizu, Shirakawa, Aomori, Hinode (Tokyo), and Nagano, and a plant in Vietnam. All of our mainstay gastrointestinal endoscopes are manufactured in Japan. Surgical devices are manufactured in North America based at the two manufacturing facilities. The main products are surgical devices for ear, nose and throat and surgical energy devices. In Europe, rigid endoscopes, therapeutic devices for urology/gynecology, surgical energy devices and endoscope-related equipment are manufactured at six sites in Germany, the Czech Republic and the UK.

Strength in Advanced Manufacturing Technology

The factories in Japan develop and manufacture gastrointestinal endoscope systems from basic components and have a unique strength in manufacturing that requires a high level of precision and one-of-a-kind assembly expertise on the part of the manufacturing staff. Flexible endoscopes are manufactured exclusively at the Aizu factory. For the main components of the endoscope, such as the imaging unit, control section, and electrical connector, there are plans to unify development and manufacturing and to isolate and develop essential key technologies, while realizing high-mix, low-volume production. For example, Olympus decided to develop the machining equipment necessary to manufacture the stainless steel distal tip of the endoscope in-house, thus keeping this knowledge within the company. Products manufactured by the Shirakawa factory include video processors and light sources for endoscopes, ultrasound endoscopes, and capsule endoscopes. The strengths here are component technologies for electrical equipment (including semiconductors and circuit boards), circuit design, and quality assurance. By employing the Kaizen (improvement) activity, quality improves daily and production lead times are dramatically shrinking. The Aomori factory features high-tech production of endotherapy devices. The factory specializes in therapeutic devices such as electrosurgical snares for gastrointestinal polypectomy, devices for use in biliary ducts, etc. The Hinode factory manufactures disposable products and prototypes. The Vietnam factory, which was established as a satellite factory of the Aomori facility, produces endotherapy devices and related products.

Characteristics of Endoscopy System Manufacturing Techniques that Realize High-Mix, Low-Volume Production

The number of different variations of endoscopes we offer grows each year, and we currently offer more than 300 different models of endoscopes. Creating endoscopes requires sophisticated manufacturing technologies as well as high-mix, low-volume production systems. On top of fulfilling these requirements, we have maintained a stance toward production that compels us to develop components and equipment ourselves should the market be unable to supply us with items that meet our expectations for craftsmanship. As the components of endoscopes have incredibly intricate structures, it is impossible to find ready-made blades for their production. Therefore, each time we need to develop new endoscope components, we start by creating custom blades and other tools capable of meeting our design specifications. The unique products Olympus offers are the result of an ongoing, comprehensive process of in-house craftsmanship, which entails resolving issues on our own. This thorough process has enabled us to earn the trust from the world that we hold today.

Detailed eye for customer needs

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High-Mix, Low-Volume Production

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In-house development of materials, capabilities, and crafted components not otherwise available

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High-precision crafting technologies that create components accurate to the micron

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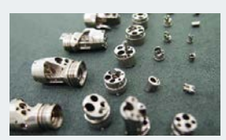
Japanese assembly technologies that make fine adjustments based on combinations of various technologies and expertise



High-precision endoscope tips

Highly precise scope assembly process