

Meeting Diversified Needs in Commercial Printing

Management Approach

We are contributing to value creation in a new age of digital printing, targeting the market for high quality, on-demand printing using a wide range of media.

Canon's Approach

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In the field of commercial printing for publications, direct mail and other marketing materials, demand is growing annually for digital printing to enable small-run production of multiple items with quick turnaround rather than large traditional printing runs.

Leveraging its extensive track record of supplying MFPs, high-quality printers and other office equipment, Canon entered the digital commercial printing market in 2007 with the launch of the production printer imagePRESS C7000VP. Canon has continued to supply a range of digital printing products and related solutions.

In 2010, the Canon Group was strengthened with the arrival of Canon Production Printing (formerly Océ), a major player in commercial printing in Europe and the United States. By combining the unique skills of each company, we have augmented our lineup of products delivering superior quality, productivity and reliability, while also expanding our business to service a broad range of digital printing needs. PRISMA workflow software centrally manages the

print production workflow from order intake to post-press processes for increased productivity in short run printing jobs. In 2017, we launched continuous feed inkjet presses for the graphic arts market to meet the growing demand for high-quality printing of luxury catalogs and premium direct mail items.

To enable customers to experience having the latest digital printing solutions at their fingertips, we opened Customer Experience Centers in the Netherlands, Germany, the United States and Japan to demonstrate state-of-the-art digital printers. Besides showcasing the latest digital printing presses, the centers are equipped with printing server systems, cutting and binding machines, and other finishing equipment to provide an end-to-end experience.

Going forward, we will continue pushing to create original value in the fast-growing field of industrial printing.

Relationship with SDGs

Canon's commercial and industrial printing business contributes to the realization of SDG 9: "build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation." We will continue to create new value for society with high-quality, high-productivity printing solutions, while at the same time promoting innovation that utilizes digital printing technology.



Examples of Value Creation

Value Creation in the Graphic Arts Field

Designed for the graphic arts market, the ProStream1000 continuous feed digital press utilizes a proprietary media-pretreatment called ColorGrip which enables printing on a wide range of paper types by preventing ink from spreading and bleeding on papers and a specially developed polymer pigment inkset for realizing vibrant colors and enhancing abrasion resistance. In addition, air flotation non-contact drying technology is used to dry the ink while minimizing stress on the paper without using a paper conveyor belt. This ensures high speed double-sided printing while keeping haptics and gloss levels of the original paper unchanged. These technologies serve graphic arts needs for higher-quality, higher-definition images in the commercial printing market.



ProStream1000 continuous feed digital press for the graphic arts market

Digital Printing for Short Run Printing Applications

Canon is developing printers for various commercial printing needs.

The UV curing Colorado 1650 large-format production printer uses UVgel technology developed by Canon Production Printing. The proprietary UVgel ink minimizes the distinctive odor of UV ink and reduces thermal stress on the media, enabling printing for a wide range of media for either outdoor or indoor use.

In addition, the use of Canon Production Printing's proprietary FLXfinish technology allows the curing timing of the ink to be controlled enabling separate printing in two modes for a shiny gloss finish or a high quality matt finish.

In 2019, the Colorado's printing capabilities were showcased on a shuttle bus operating between Canon sites with a wrap-around design to advertise the Rugby World Cup 2019 (TM). The vivid and lightfast colors helped to build excitement for the inaugural staging of this event in Japan.



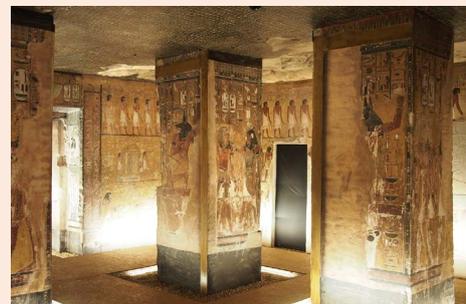
Canon shuttle bus featuring wrap-around graphics created using UV gel technology

Role for Elevated Printing Technology in Cultural Preservation and Diversity Support

The elevated printing technology offered by Canon Production Printing involves using UV curable ink and overprinting multiple layers of ink to produce an unprecedented visual appearance and texture. This technology has made it possible to achieve appearances and tactile feeling that were once impossible.

In the reconstruction of the tomb of the Ancient Egyptian 19th Dynasty pharaoh Seti I in the Valley of the Kings, based on 3D data of the tomb the relief sculptures that are up to 15 mm thick were successfully produced using the large format UV flatbed printer with elevated printing technology.

In the Netherlands, elevated printing is also being used to create street signage featuring Braille and raised QR codes for greater ease of access by visually impaired residents or visitors. In France, it has been used to reproduce paintings and in providing technical assistance to visually impaired visitors at art museums.



Tomb of Seti I, reproduced using elevated printing technology

Creating a Safe and Secure Society

Management Approach

Leveraging its expertise in network visual solutions and social infrastructure inspection, Canon is helping to build resilient and sustainable urban infrastructure by ensuring enhanced public safety and security.

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Having positioned network cameras as one of its new core businesses under Phase V of its Excellent Global Corporation Plan, Canon is working to enhance its product lineup and to reinforce its solutions and development capabilities. This involves the integration of core camera technologies developed over many years, including optical, sensor and imaging engine technologies as well as video content analytic software, with the network management and cloud services that have been cultivated in MFP development.

The network camera market continues to grow due to increasing security demand as well as replacement of analog products with digital models. Market forecasts indicate double-digit growth over the medium and long term. To date, Canon's network camera business has achieved average growth of over 15%, outpacing the market. We have also grown our partner network in the field to an industry-leading 90,000 companies.

A major issue in Japan has been development of a safe and secure infrastructure, both to support large-scale sporting events such as the Rugby World Cup 2019 (TM) and the Olympic and Paralympic Games Tokyo 2020, and to respond to natural disasters associated with climate change. Amid social adoption of IoT technologies, Canon aims to promote development of social infrastructure by providing

high-quality, high-performance network cameras, along with video content analytic software to analyze the vast amounts of videos from network cameras quickly and accurately.

We have pursued an M&A strategy to accelerate development and strengthen our set-up in this area. Axis, a major player in the network camera industry from Sweden, and Milestone, a leading Denmark-based supplier of global video management software, have both joined the Canon Group. In 2018, we also welcomed BriefCam, a leading company in video content analytic software from Israel. Going forward, by strengthening collaboration and accelerating technical integration with these companies, we are aiming to develop network visual solutions for application in a variety of fields, including health, nursing care, education, transport, and urban infrastructure.

Canon has put AI technology to practical use for detecting cracks in concrete structures as part of addressing the global issue of obsolete and aging infrastructure such as bridges and tunnels. Combining imaging and AI technologies to create accurate inspection data efficiently, Canon's crack detection service significantly increases the efficiency of infrastructure inspections, contributing to the realization of a safe and secure society.

Relationship with SDGs

Canon's efforts to create a safe and secure society are contributing to the realization of SDG 11: "make cities and human settlements inclusive, safe, resilient and sustainable." By providing optimized solutions for various customers including governments and commercial facilities, Canon seeks to satisfy social demand for safe, resilient and sustainable urban infrastructure.



Examples of Value Creation

Network Cameras Support the Maintenance of Law and Order and Contribute to the Safety and Security of Society

The ME20F-SHN, an ultra-high-sensitivity network camera equipped with Canon's proprietary 35mm full-frame CMOS sensor, makes color video capture possible in low-light environments that had been difficult for conventional network cameras. Its ultra-high sensitivity enables to capture video even when there is hardly any light where a subject would not be visible to the naked eye, allowing it to effectively monitor critical facilities or border crossings, as well as disaster sites during the night.

Network cameras installed outdoors for crime-prevention or disaster-monitoring purposes operate under highly variable natural conditions. Canon developed Hydrophilic Coating II to suppress the loss of visibility due to rain or dirt. Cameras equipped with this coating maintain clear visibility even during and after rainfall.

With a range of potential applications, Canon's network cameras help to promote public safety day and night and regardless of the weather.

Video Content Analytic Software to Meet Safety and Security Needs

The network camera market has stimulated demand for solutions to record and analyze captured videos. Canon is promoting the development of video content analytic software products to support value-added solutions in sectors such as security, customer service and marketing.

To enhance the utility of videos captured by network cameras, Canon developed People Counter, a video content analytic software that can count from a small number of people to approximately 1,500 people, and,

in 2019 we introduced Crowd People Counter for Milestone XProtect, a video content analysis software that can count thousands of people in real time even in crowded conditions. The software uses enhanced crowd counting AI that leverages deep learning to count numbers of people in crowded areas, which can assist in deployment of security personnel or related security planning for public spaces or urban surveillance. It can also help authorities to provide appropriate instructions at large venues, events, or in disaster situations.



Monitor screen indicating crowd count

While the use of network camera video is expanding, privacy concerns exist around its use. Canon has developed Moving Object Mask, video content analytic software that helps to realize both the respect of privacy and monitoring for the safety in areas where network cameras are operating by silhouetting people within the video feed.

In providing video analytics solutions combining video content analytic software with video from high-quality, high-definition network cameras, Canon is contributing to the creation of a safe and secure society.

Applying Video Synopsis® Technology for Efficient Video Analysis

The rapid adoption of network cameras has necessitated development of a method for efficiently extracting specific data from the vast quantity of video generated. BriefCam's video content analytic (VCA) software utilizing its proprietary Video Synopsis technology enables videos captured at different times to be superimposed and displayed at the same time, thus shortening the video stream to roughly 3–5% of its original length. It gives the user instant access to videos of interest by enabling video images to be filtered by object size, color or various other characteristics.

Functions to boost the efficiency of video analytics include the automatic charting of results using various filters, heat mapping, and alert functions based on characteristics or movement of objects.



Original 30-minute video compressed to review in 53 seconds

Expanding Our Medical Business

Management Approach

By integrating imaging and manufacturing technologies, we are contributing to better medical care through the development of advanced technologies in such areas as diagnostic imaging systems, healthcare IT and in vitro diagnostics.

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Canon's founder and first president, Takeshi Mitarai, who was also a doctor, was strongly committed to "contributing to society through medicine." In 1941, not long after the company was established, Canon launched the first radiographic camera made in Japan to help detect pulmonary tuberculosis. Ever since, Canon has contributed to the early detection and treatment of disease by supplying ophthalmological instruments and diagnostic equipment using digital radiography and other technologies. In Phase V of the Excellent Global Corporation Plan, Canon is reinforcing medical operations as one of its new core businesses. The Canon Group expanded in 2016 to include Canon Medical (formerly Toshiba Medical Systems). Canon Medical has been developing medical systems operations for around a century, building up technical expertise in diagnostic equipment such as CT, MRI, X Ray and Ultrasound systems that reduce the burden on patients while providing highly detailed images for diagnostic purposes. Our aim is to supply solutions for patients and health professionals by combining AI with our proprietary image-processing technologies to support better medical diagnoses and improve patient outcomes.

With demand for wide-ranging healthcare services rising worldwide as populations age, the market is projected to grow. In July 2019, as part of moves to

strengthen the medical business further, Canon invested in Japanese Organization for Medical Device Development, Inc. (JOMDD). The aim is to create original value and help to accelerate business development using JOMDD's open innovation platform to support incubator alliances focused on the commercialization of medical devices and other products.

In August 2019, Canon also initiated joint research with the Center for iPS Cell Research and Application, Kyoto University (CiRA) aimed at realizing high-quality autologous iPS cells. The aim is to develop techniques for low-cost examination based on Canon's proprietary optical, measurement, image-processing and quality control technologies to support the manufacturing of iPS cells at lower cost and with shorter lead times.

Canon USA's Healthcare Optics Research Laboratory in Boston conducts research into the latest technical advances in areas such as diagnostics and healthcare support in partnership with Harvard Medical School-affiliated institutions Massachusetts General Hospital and Brigham and Women's Hospital.

Going forward, partnering with leading medical institutions in Japan and abroad, we plan to strengthen and expand our medical business centered on Canon Medical.

Relationship with SDGs

The expansion of Canon's medical business helps contribute to the realization of SDG 3: "ensure healthy lives and promote well-being for all at all ages." By further broadening open innovation programs with advanced medical institutions in Japan and other countries, we hope to contribute to SDG 17: "Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development" by finding solutions in the healthcare field and creating new value.



Examples of Value Creation

Solutions Developed Across Three Domains

Canon's medical business spans the three domains of diagnostic imaging, healthcare IT and in vitro diagnostics. Across all these fields, our aim is to provide solutions that increase medical efficiency while ensuring patient comfort.

In diagnostic imaging, based on the pursuit of open innovation with leading medical institutions and universities worldwide, we are focusing on development of technologies to provide high-resolution images enabling accurate diagnosis while making procedures less invasive for patients based on reduced radiation exposure and shorter scan times.

In healthcare IT, by applying AI and other approaches, we aim to make medicine more efficient by providing medical information with high utility value based on integration and analysis of the vast amounts of data spread across medical institutions.

In the field of in vitro diagnostics, to detect disease earlier and help prevent the spread of infections, we are trying to introduce more advanced medicine through solutions to test blood, genetic and other samples, and with DNA chips for high-speed genetic analysis.



Clinical laboratory system (Canon Medical)

Deep Learning Technology for CT Image Reconstruction

The challenge with diagnostic scanners that utilize X-rays is exposing patients to as little radiation as possible while ensuring sufficiently high-resolution images to allow accurate diagnosis. Canon Medical has developed a technology called Advanced intelligent Clear-IQ Engine (AiCE) for CT image reconstruction. Employing a type of AI technology called deep learning to reduce noise in CT images, AiCE makes possible high-quality images while exposing patients to a lower dose of radiation. This technology is used in the world's first ultra-high-resolution CT scanner Aquilion Precision, the Aquilion ONE/GENESIS Edition dynamic volume CT scanner, and the Aquilion Prime SP scanner. In July

2019, we added it to the Vantage Centurian MRI scanner as well. The unprecedented image quality and speed of imaging provide high-resolution diagnostic images while making procedures less invasive for patients using shorter scan time.

In Vitro Diagnostic Systems for Rapid, Patient-friendly Diagnoses

Applying its know-how in sensitive detection technology, Canon Medical supplies in vitro diagnostic systems that detect the significantly small amount of virus present in the early stages of infection. Detecting viruses such as influenza accurately at an early stage is extremely useful to medical practitioners. The rapid detection system only requires the patient to sneeze into a paper tissue, making it ideal for testing even small children. Faster detection will make it possible to treat infections earlier, reducing the incidence of serious cases and limiting the spread of disease.

Canon Medical's wide range of in vitro diagnostic systems for testing blood and other samples enable a range of clinical tests. With tropical viruses such as Ebola and Zika posing a growing global threat, we are developing DNA testing kits to help the early detection of infections in partnership with Nagasaki University under a research program sponsored by the Japan Agency for Medical Research and Development (AMED). In 2018, we began selling the first RNA reagents in Japan for Zika virus detection. In 2019, we also developed a fluorescent LAMP reagent capable of room temperature storage and transportation. Field tests for Ebola virus detection have been conducted in the Democratic Republic of the Congo to support its use in tropical regions, and the research program is continuing.

Our aim going forward is to reduce patient burden while enabling more efficient medical care by developing faster tests that require smaller quantities of specimen.



Ebola virus testing in the Democratic Republic of the Congo

Supporting Industrial Innovation

Management Approach

We are contributing to next-generation semiconductor and electronic equipment manufacturing by applying proprietary optical and image-processing technologies.

Canon's Approach

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Semiconductor chips, which are often likened to the brain of electronic equipment, are an essential part of modern life due to their presence in equipment ranging from smartphones and PCs to televisions, air conditioners and automobiles. In line with the Society 5.0* vision promoted by the Japanese government, the key to a future sustainable society will be the use of data through innovative science and technology such as AI, IoT and robots. This is expected to drive further evolution of semiconductor chips and demand expansion.

Advancing the expansion of B-to-B operations as part of Phase V of its Excellent Global Corporation Plan, Canon aims to create new value by using proprietary optical and image-processing technologies developed over many years in the industrial machinery field.

In semiconductor manufacturing, building on conventional lithographic approaches as high-end device manufacturing moves into the IoT era, Canon is working to establish nanoimprint technology to achieve semiconductor-device miniaturization at lower cost.

In other sectors, OLED panel manufacturing equipment (Canon Tokki) and sputtering equipment

(Canon ANELVA) are supporting the front line of manufacturing.

In addition, in the field of factory automation, we are advancing our development for system solutions. We will accelerate our collaboration with robot manufacturers in a bid to help increase industrial manufacturing productivity.

* Society 5.0 is the Japanese government's vision for a new form of society in which scientific and technical innovations such as AI, IoT, robots and big data are integrated widely across industry and society as part of realizing this new future society.



Sputtering equipment (Canon ANELVA)

Relationship with SDGs

Through the expansion of business in the industrial machinery sector, Canon is contributing to the realization of SDG 9: "build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation." Besides promoting increased efficiency for existing industries, we also aim to foster innovation that is continually adaptive of changes in society as part of our active contribution to the development of new industries.



Examples of Value Creation

Technology Supporting Enriched Lifestyles

The functionality and memory capacity of semiconductor devices continue to rise as chip manufacturers adopt more complex circuit patterns and large-scale integration. Canon supplies lithography equipment for semiconductor mass production. Our focus is on the use of nanoimprint lithography, groundbreaking technology for stamping circuit patterns onto wafers at high resolution rather than following the conventional lithographic approach. This will support process migration while also achieving significant reductions in manufacturing costs. Our semiconductor lithography equipment using nanoimprint technology is currently installed at a leading chip manufacturer, where its suitability for mass-production purposes is being assessed.



Nanoimprint semiconductor lithography equipment in testing for mass production use at a memory chip manufacturer

Moreover, Canon ANELVA manufactures sputtering equipment employing high-vacuum thin-film process technology for use in semiconductor production, and it is the world's sole supplier of sputtering equipment for hard disk drive (HDD) head production. In addition, equipment supplied by Canon ANELVA is helping to boost performance while dramatically reducing production costs for communications devices used in high-speed 5G networks.

With demand for OLED displays on the rise, the OLED panel manufacturing equipment developed and manufactured by Canon Tokki has become a critical component in production processes. Demand is expected to grow in the future as these displays offer new possibilities in smartphones, televisions and other electronic devices for thin-light and foldable forms. Based on overwhelming technological superiority compared to competitors in the OLED panel-manufacturing field, Canon is working to create innovative value to cater to rising demand for OLED displays for use in various products.



OLED panel manufacturing equipment developed and manufactured by Canon Tokki

Technology Supporting Innovation in Manufacturing

Canon is focusing efforts on the field of factory automation (FA), where demand has grown in recent years due to rising labor costs combined with labor shortages. Responding to these market trends, we are developing the Canon Industrial Imaging Platform as a system solution for shop floor visualization. By combining imaging technologies used in network cameras and industrial cameras with image-processing technology, we aim to support greater automation of production while helping to boost productivity. In 2019, we launched Vision Edition-U image-processing software that is compatible with collaborative robots made by Universal Robots and Canon network cameras. The image acquisition and processing capabilities of the software add value by enhancing the robots' operational capabilities from the laboratory to the shop floor, enabling development of automation solutions for various factory environments. Going forward, we plan to collaborate with varied partners to help automate production facilities and increase productivity.