MARUBENI

shosha

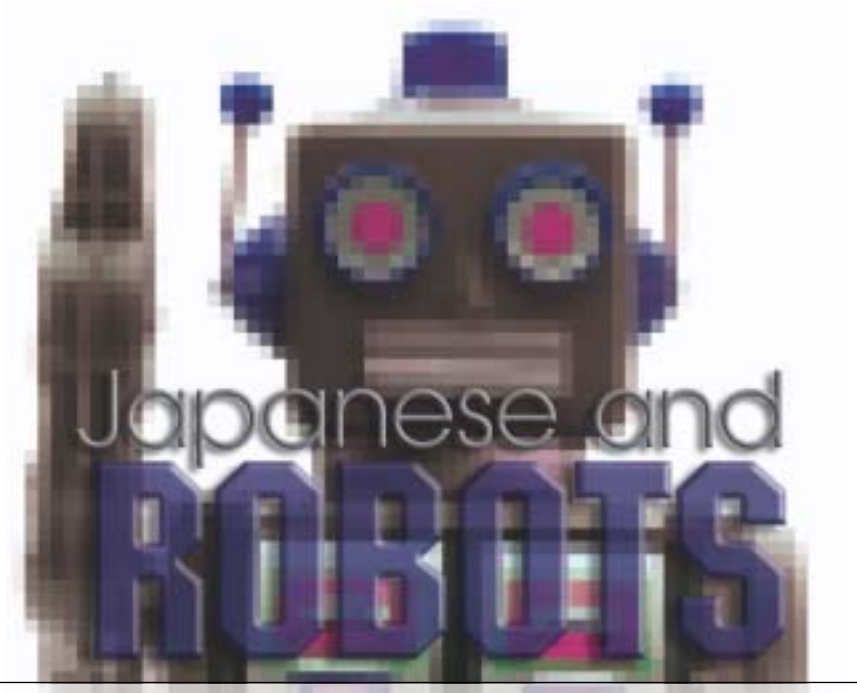
QUARTERLY • OCTOBER 2002 • VOL. 73

The Feature Story:

Japanese and Robots

— From Industrial Robots to Partner Robots —

Individuals raised in Japan and those surrounded by Japanese culture tend to develop a closeness and affinity towards robots. Although Japan's use of industrial robots for simple and dangerous tasks is the highest in the world, robots hold a much broader meaning beyond this in scope.



—From Industrial Robots to Partner Robots—

In countless comic books and animation, robots are glorified and adored as the star, the character that rescues the star or at times a character that is more human than actual humans. Moreover, there is even a national robot competition where high schools compete over technology and ideas. Robots embody the realization of many dreams for us as humans.

In the following pages we focus on robots, our co-inhabitants in Japan.

Japanese life and robots

Atom (Astro Boy), *Robocon* and *Doraemon* (a very popular cat robot with a magical pocket from which various convenient items are pulled out) are all cute living beings regarded as our friends to the extent that we seem to forget that they are robots. Influenced by these many imaginary robots, the Japanese have developed a sense of closeness and interest in robots, which has created a belief that robots are very similar and close to humans.

Japan's relationship with robots, nonetheless, is not limited to the imaginary. There are actually many industrial robots in Japan and robot competitions are commonplace. Among them, there is the famous "Idea Competition: National High-School and Vocational School Robot Contest" that is broadcast on the public television network NHK. In this contest, 124 teams from 62 schools battle it out over a different theme every year, such as making "flowers bloom" in a huge planter and making "butterflies flutter" above them. Thus the event requires both a wide range of ideas and technical skills.

Japan is also dotted with events such as the "Sumo Robot Contest" and other local robot contests including a "Program Robot Contest" where individuals make their own robots. In this manner, adults enjoy building robots and such and the keen curiosity in robots is also very high.

The History of Robots

Imaginary Robots

The history of robots is broadly divided into the historical image of robots found in dramas, literature and the like and the practical history of robots that are actually put to industrial use. The origin of the term robot comes from the play "RUR Rossum's Universal Robots" written by Czechoslovakian playwright Karel Capek in 1920. In the drama, he creates the word robot, meaning artificial human, from the Czech word for hard labor, "robota."

The first recorded mention of a "robot" is the Golden Woman found in Homer's "Iliad." The "Iliad" is the oldest written epic and was scribed in the 8th century BC. Hephaistos, the God of smiths, had mechanical attendants made from gold in the image of young maidens.

The origin of robots in Japanese literature is found in the Kamakura Period (1192 - 1333) and based on a collection of Buddhist tales called, "*Senshusho*" where the creatures in the story resembled humans.

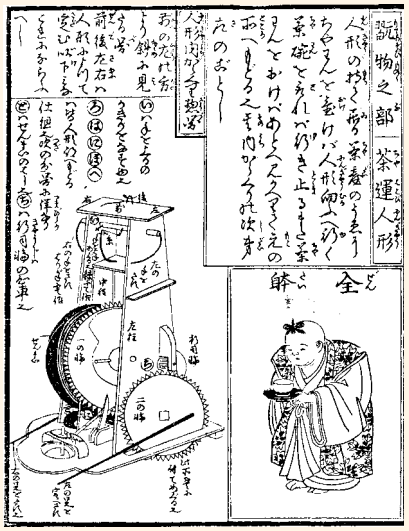
The first visual image of robots in Japan was brought to life in 1951 with animator Osamu Tezuka's "Astro Boy."

Actual Robots

The roots of automated robots go back to the Heron of Alexandria, an ancient Greek inventor. He devised various automatic contraptions using steam and weights as the force to operate mechanisms in the 1st century BC.

Later on in 18th century AD, Europe went through a fad of mechanical dolls that used clock technology. Germany had their "Giant Gorem" while the Swiss had their writing dolls and dolls which played the organ. Furthermore, in 1738, the Mechanical Duck was introduced at the Science Academy in Paris.

In the 17th century, Japan's "robot forefather," Ohmi Takeda, built the "Takeda Karakuri Puppet," set up on a corner of the entertainment district in Dotonbori, Osaka. In 1796, the oldest robot manufacturing manual "*Kikouzui*" was written by Karakuri Hanzo (derived from Hosokawa Hanzo Yorinao). (See Box on page 3)



"*Kikouzui*," Japan's first mechanical engineering document

(Photo courtesy of "Karakuri Hanzo Kenkyu Doshikai")

Industrial Robots

Unimation Inc. and American Machinery and Foundry (AMF) in the U.S. gave birth to the first industrial robot in 1962, when both companies independently released program-controlled robots. Technical innovation has since continued to the point that industrial robots today are not designed exclusively for repetitive operations or processes but must be able to be easily reprogrammed and change their operation cycle. Robots generally need to be controlled and therefore they are connected to computers, their "brain," while the size of robots are becoming more and more compact. An emerging theme is sensory robots equipped with the five senses (sight, hearing, touch, smell, and taste). The types of robots have increased to the extent that the Japanese Industrial Standards (JIS) divide robots into the following six categories:

1. Manually Manipulated Robots: Operated by humans
2. Fixed Sequence Robots: Pre-programmed to operate in a sequence within set parameters, but the program is not alterable
3. Variable Sequence Robots: Operational program is alterable
4. Playback Robots: Pre-conditioned by humans. In doing so, the operational sequence, parameters and other information are stored in memory and the robot can function accordingly. Used for such as welding and painting.
5. Numerically Controlled Robots: Procedures and settings are commanded numerically. Used for such as precision instrument processing.
6. Intellectual Robots: Able to determine action with sensory and cognitive functions installed in a sensor. Used for such as inspection, measurement and assembly.

Penetration of Industrial Robots

At the end of 2000, Japan ranked first in the world with 389,442 operational robots, Germany was second with 91,184 units and the U.S. was third with 89,880 units (source: International Federation of Robotics). Evidence of robot penetration in Japan is clear in that it accounts for 51.9% of the global share. Many countries strongly oppose the use of robots since it leads to a reduction in employment at factories. Wage hikes and vacation time increases have been used to appease workers, which diminish the advantages of having robots installed. However, it is the opposite in Japan where there is less opposition and robots have been adopted without much difficulty. There are several reasons for this. In general, the Japanese industrial structure is centered on home electronics and automobiles, which have promoted automation. In addition, conditions such as wages, labor unions and other factors differ from the West. Thus, Japan tends to be ahead in the penetration of technology for manufacturing industrial robots that excel in precision and endurance.

The whole concept of robots differs among Japanese and Westerners. Japanese have a close association with robots—as seen in the case of *Astro Boy*—whereas, Westerners feel that as robots advance, distinctions between robots and animals or humans will diminish and that eventually humans will come into conflict with robots—as portrayed by the "Terminator."

Current and Future Robots

Robots in general are created to perform tasks in place of humans. A typical example is industrial robots made to perform repetitive tasks accurately and quickly. Furthermore, robots are utilized in environments that are hazardous for humans. They contribute in areas such as skyscraper window cleaning, cleaning inside explosive tanks, landmine removal, deep-sea expeditions, and disaster rescue sites. In addition, robots are being developed to work in outer-space.

Another unique robot being developed is the "sushi robot," which doesn't need to go through the long training process that humans require to make sushi. Robots can also produce sushi more quickly and in larger volume than humans.

Recently, robots are also demonstrating their prowess in the medical arena. In the case of surgery assisting robots, there is an arm like robot operated by surgeons in endoscopic and other types of surgery. There are great expectations for these robots that can conduct surgery, previously impossible with human hands. There are such robots that are used in surgery for replacing joints, which are precision controlled equipment used to grind the bone when implanting artificial joints.

Partner (Personal) Robots

A robot for which demand is expected in the rapidly aging society of Japan is the nursing care support robot. This nursing care robot helps patients and elderly people with such tasks as getting from their beds to the bath and helping them get into their wheelchairs. A "seeing eye" robot is also presently being developed for practical use. This robot is for the visually impaired and provides a voice interface needed for the visually impaired to operate it. It detects and audibly notifies the user of various obstructions and vehicles. It also secures safety for the user by judging the color of a traffic signal and detecting the location of crosswalks.

It is foreseen that a relationship where "robots and people are friends" will be realized in the near future. Robots given (pseudo) lives will support humankind in areas they are not skilled in or find difficult. In contrast, humans will create robots and supply their energy. Thus, a good partnership is desirable. Presently, robots closest to our daily lives are "pet robots" such as dogs, cats, insects and birds. These robots include those for showing appreciation, programmable robots and robots that can "learn" through being reared. These robots communicate through words and expressions. They are not just entertainment robots but actually partners to humans in the manner of actual pets.

Robo Cup

The ultimate goal of the Robo Cup is to have robots play a soccer game against the winner of the World Cup soccer tournament in 2050, under the official rules of FIFA (Federation Internationale de Football Association), to decide the best team in the world. Robo Cup was first proposed in

Karakuri Puppet (mechanical dolls)

***Karakuri* (mechanical) puppet of a child with bow and arrow originally created by Hisashige Tanaka. The puppet shoots arrows at the target.**

"*Karakuri* puppets" are an early form of robot "made of wood" that are globally unique and have been in existence for over 200 years. The "motor" is installed inside and its mobile forces include elastic springs (steel, brass, whale whiskers, bamboo, cedar bark, etc.), water, sand and wind. Some are operated using mercury and others use human power or waterpower to manipulate the threads and sticks. *Karakuri* puppets originated from the "Western culture" that entered Japan in the middle of the 16th century. The particularly large impact of mechanical clocks produced in Europe is obvious when examining the inside of a *Karakuri* puppet. Christian missionaries such as Francisco Xavier introduced these clocks to Japan. An automatically moving puppet called an "automata" was created in Europe at almost the same time. This Western automatically moving puppet was made with the intention of expressing human motion as precisely as possible, while the Japanese *Karakuri* puppet was made to express more symbolic motion. This was a result of the influence of traditional Japanese stage drama *Noh*, and this is also evident in the applications of *Noh* mask-making technology in crafting the heads of the *karakuri* puppets.

Karakuri puppets are broadly classified into "*zashiki karakuri*," which were produced for individuals, and "*dashi karakuri*," which were made for solemn festivals and feasts. The "*cha-hakobi* (tea serving)" puppet is representative of "*zashiki karakuri*" and was a luxury toy of feudal lords and successful merchants in the Edo Period (1603 - 1867). This puppet automatically starts moving when a cup of tea is placed on a saucer held by the puppet's hands, stops when the cup is removed, and turns around and returns to its initial spot when the cup is returned. Furthermore, "*dashi karakuri*" are still preserved primarily in Aichi and Gifu Prefectures, which have historically developed the mechanical culture. Today, they appear mounted on floats during festivals held every year.

"*Karakuri* puppets" were completed by fully applying the technical skills of various craftsmen centering on woodwork including the making of *Noh* masks, carving skills and joinery; machining technology, costume art and such. It is amazing that one puppet craftsman conducted almost all of the complicated work. *Karakuri* puppet craftsmen were not just workers, but also needed the ability to draw skills from various areas and integrate such knowledge and technology. Renowned *karakuri* puppet craftsmen include Hisashige Tanaka (called *Karakuri Giemon*), founder of Shibaura Engineering Works, a forerunner of present day "Toshiba" and Sakichi Toyota, founder of "Toyota Motor Corporation."

***Dangaeri* (tumbling) puppet - a kind of *karakuri* puppet believed to have been invented in the 1730s that tumbles down the steps.**

(Photos courtesy of Toyota Collection)

1992 and the first contest was held in Nagoya in 1997. Since then, the contest has been held each year with the sixth one to be jointly held in Fukuoka and Busan in 2002.

The Robo Cup idea originated primarily from discussions among Japanese researchers. It was proposed as a landmark project for integrating and developing robotics and artificial intelligence. The proposal was made as a means to focus on the ripple effects from pursuing the technology.

Robo Cup encompasses both education and entertainment as researchers are able to enjoy contact with ordinary people outside of their laboratories while dealing with cutting-edge science and technology. The main purpose does not lie in producing robots to form a soccer team strong enough to exceed human ability, but in further promoting studies that include robotics, artificial intelligence, and various new materials and devices.

A scene from Robo Cup 2002, jointly held in Fukuoka and Busan

Teams from participating countries compete to be the Free Style Champion the Robo Cup 2002

Launching the Sale of "Robo Navigator"

—3D Visual Identification Industrial Robot Produced by Marubeni's Robot Business—

Marubeni will develop and sell "Robo Navigator," signifying the opening of the path to full-scale penetration of intellectual robots - that is robot's that can "see" and "think". The development was promoted through utilization of three-dimensional (3D) vision software manufactured by Braintech Inc. of Canada. Marubeni has exclusive rights in Asia to manufacture and distribute Robo Navigator solutions using this software. Applications for end-users will be integrated in cooperation with the Marubeni business partner Talk Eng. Co., Ltd. located in Gifu Prefecture. This project will be accomplished through the development of application software, installing periphery technology (lighting, control, etc.) and commercialization including support and aftercare services.

This robot compensates for object inclination and corrects its path using image-based technology

The ability to recognize the position/orientation of parts is limited since robots do not have the ability to see. However, Robo Navigator is unique because it is able to accurately locate the position of items in 3D space. Robo Navigator promises increased uptime, improved quality and reduced ergonomic injury claims, all resulting in reduced costs for manufacturers.

How It Works:

A single CCD camera is mounted on the end of the robot arm and a picture is taken of the item it is looking at. The image is sent to the computer and the software compares the position of the item with an ideal image and calculates the variation in about 0.5 second. A message is then sent to the robot and it is able to adjust its operating path so that it can accurately locate the specific item and perform any given task.

The following are unique characteristics of Robo Navigator:

1) Unlike conventional stereo-type robots that use two cameras, Robo Navigator is able to locate the position and alignment of items in 3D space using only a single camera
2) High speed processing times of 0.2 ~ 0.8 seconds
3) Position - determine location within ±0.5mm
4) Automatic Calibration can be performed in less than 10 seconds compared to manual calibration which is a lengthy process that requires intense training
5) High versatility - will work with any robot manufacturer or model
6) Possible to install onto existing robots (i.e., application not limited to new robots)
7) The standard operating system (eVF) is network compatible, which makes it easy to manage and transfer programs

Overseas

The Perth Office

Perth is the capital of Western Australia (WA) and is often referred to as the most isolated "capital" city in the world, but it is also renowned as being one of the most beautiful. WA is Australia's largest state, covering an area of 2.5 million square kilometers, which would engulf most of Western Europe. However, with a population of only 1.8 million, WA is very thinly spread out with almost 75% of its people living in Perth. Perth was founded in 1829 as a British penal colony, like with most other Australian capital cities. The WA's traditional business is agricultural-based, but today it is one of the world's leading mining and energy provinces, which helps WA to account for about 28% of Australia's exports.

Currently, Australia enjoys one of the highest growth rates in the western world at around plus 4%. With Perth's similar time zone and proximity to the world's biggest market of Southern Asia, as well as having political and legislative stability, it is Australia's prominent economic center for major resource companies.

The Perth Office is located along the foreshore of the picturesque Swan River. The Office was opened in 1965 under the umbrella of Marubeni Australia Limited, which was established in 1960. The Office boasts 12 staff, including 4 Japanese, and is headed by Koji Morihiro who took up his current post in April of this year.

I (Graham Earnshaw) joined the Perth Office in June 1996 as an assistant manager of the Energy and Steel Departments. My primary responsibility has been to continue our well established liquefied petroleum gas (LPG) business with the Wesfarmers Group. Wesfarmers is one of Australia's most successful diversified conglomerate companies, also involved with coal mining, chemicals, woodchips, hardware and rural services, with whom the Perth Office has formed a very close relationship in a multitude of businesses.

The Perth Office located within the city

Panoramic view of central Perth

Marubeni has helped Wesfarmers grow its LPG business by handling 100% of their exports to Japan since 1988, supplying all their LPG imports to Darwin since 1994 and supplying the first shipment to their new Mongla terminal in July 2001. (I personally oversaw the shipment arrival at Mongla on behalf of the Marubeni Tokyo Head Office.) We are also working closely together to study other investment opportunities in Australasia (Australia and surrounding regional Asian countries).

Our relationship with Wesfarmers was further strengthened when Marubeni took over their WA forestry operations in August 2000, forming the WA Plantation Resources Pty. Ltd. Wesfarmers, like many other Australian companies, understands the merits of long-term business relationships, and this is something that the Perth Office endeavors to foster as much as possible in all our businesses.

More recently, I have headed the branch's General Merchandise II Department, which is primarily focused on marketing Bridgestone's engineered rubber products to WA's mining and oil & gas industries. Bridgestone has made a strong commitment to increase its share in the Australian market, thus Marubeni's close relationships with major companies in the resources industry are a strong asset to Bridgestone. This industry represents a strong growth industry for Marubeni, and we look forward to the challenge of nurturing this business.

– Graham Earnshaw

Established:
1965

Main Business and Products:
Iron ore, woodchips, chemical products, LPG, marine products, industrial rubber products and machinery

Employees:
12 (as of August, 2002)

Business Areas:
Australia, Japan and South East Asia

Voices from the World

Two Companies Working as One

Columbia Grain, Inc. and Columbia Grain International, Inc.

Address:
111 S.W. Columbia Street, Suite 1200, Portland, Oregon 97201 U.S.A.
Tel: 1-503-224-8624
Fax: 1-503-241-0296

Established:
June, 1978

Ownership:
Marubeni and Marubeni America Corporation 100%

Main Business:
Creating a superior source of western grain for domestic and export markets

Employees:
135 (as of June 2002)

Columbia Grain, Inc. (CGI) and Columbia Grain International, Inc. (CGII) are both based in Portland, the largest city in the state of Oregon. CGI owns an export grain elevator at Terminal No. 5 in Oregon, and multiple grain elevator facilities in the states of Washington, Idaho and Montana. All of these facilities are leased to CGII, which is involved with grain trading in both domestic and export markets. These two companies conduct different roles as mentioned above, but actually coexist as one company.

Portland and the adjoining Columbia River district account for 40% of all U.S. grain exports, of which the company accounts for 25 to 30%, and 10% of overall U.S. wheat exports.

In addition to the corporate office in Portland, CGII has two regional offices in Clarkston, Washington and Great Falls, Montana. Since its establishment in 1978, the company has doubled its capacity at its Terminal No. 5 export facility, located on the banks of the Willamette River in the industrial district of Portland, to its present 110,000 metric tons. In addition, major investments have been made in an improved wheat cleaning facility made to meet global demands for cleaner shipments and increased high-speed unloading capacity to handle the larger rail shipments demanded by U.S. railroads.

Twenty-seven country elevators are located in the states of Idaho, Washington and Montana and represent a total capacity of 625,000 metric tons. The locations include two river barge-loading facilities in Central Ferry and Wilma in Washington, and three high-speed railroad shuttle train facilities recently completed in Rudyard, Harlem and Whitetail in Montana. In addition to providing a bulk grain source for its export and domestic trading programs, the company also processes pulse and bean products for export and domestic usage in six different locations, along with certified seed processing and sales.

Recently, the company entered a joint venture with a large elevator company based in the state of North Dakota. It is the first time the company has entered the North Dakota marketplace as an operator and is an indication of its efforts for ongoing expansion. The newly established organization includes two state of the art high-speed shuttle elevators, one located on the Burlington Northern Santa Fe Railways and the other on the Canadian Pacific Railways. In addition to providing a source for its West Coast export program, it also provides access to the eastern and Gulf of Mexico markets that the company formerly had very little access to due to its pre-dominately western geographic locations. This new operation provides yet another interior access to its farmer and producer networks in a four-state area (Oregon, Washington, Montana and North Dakota).

The Pacific Northwest has wonderful weather during summer and autumn, and the rainy season lasts about six months from late autumn to early spring. As expressed by the famous words in the industry, "Rain makes gain," without the rainy season we cannot have good crops. The dry weather has brought a poor wheat crop this year for many places in the world, but the main objective of our company is to create a superior grain source under any condition.

– Bob McDonald,
Columbia Grain International, Inc.

Terminal 5 export facility in Portland, Oregon

Origination facility in Wilma, Washington

Downtown Portland with Mt.Hood in the background

Lake Billy in Cove Palisades State Park
(called "Akira-no-zeppeki" in the 1984 Japanese TV drama "From Oregon with Love")

Want Something Very Japanese?

Part XI: Paper as Gifts

In this day and age, it is normal to accept gifts wrapped in paper. However, over one thousand years ago there lived a woman in Japan who was overjoyed whenever she received gifts of paper.

1. Seishonagon (c. 966-1025), author of "*Makura no Soshi* (The Pillow Book)," a literary masterpiece written during the Heian Period (794-1185), said she found solace from all her problems and obstacles in her life whenever she obtained plain white paper of exclusive quality. There is an episode recorded in "*Makura no Soshi*" where Seishonagon, as a court attendant for Empress Teishi, had left the royal quarters and temporarily returned to her parents' home because she was dealing with some personal issues. The empress promptly sent her a gift of paper to persuade her immediate return. This gift is what is believed to have been the event that led Seishonagon to start writing the now renowned "*Makura no Soshi.*"

With her passionate penchant for paper, Seishonagon had a preference for paper that was made in Oshu, present-day Tohoku region. The paper, called *Michinokugami*, was very durable and waterproof, and was not limited for use as writing paper but also served several other purposes such as being used as scented handkerchiefs. Paper in this region of Japan has continued to preserve the traditions of *Michinokugami* making. During the Edo Period (1603-1868), the paper was treated as a "fabric" material and was used to make *Kamiko*, a type of clothing that provided protection against the cold weather and was popular among commoners. Clothing made of *Michinokugami* was also used in the summer by shoguns due to its durability and insulation qualities from the heat. This is one example of how paper has been incorporated into daily life.

The blooming of *mitsumata*, one of the materials used for making *washi* and used together with Manila hemp to make the paper for Japanese money bills

2. Paper techniques invented in China around 200 B.C. are believed to have been introduced to Japan around 400-500 A.D. The oldest paper to be found in Japan dates back to 702, stored in Shosoin Treasure House, and is made from *kozo* (paper mulberry). By the 7th century, a government owned paper mill, established for official use, was built near the rivers surrounding the then capital city. Nowadays, the world recognized Japanese *washi* paper is made from three types of plants; *kozo*, *mitsumata* (paper bush) and *gampi* (bark of clover-like bush). It is produced by a stream paper making method by adding *neri* (viscous mucilage) extracted from the roots of *tororoaoi* (hibiscus manihot). This *neri* toughens and intertwines the fibrous plant, which enables the *washi* to be uniformly and thinly combed. This led to the production of Japan's own durable and beauteous paper. The *neri* makes the fibers evenly distributed when placed in water, where in most cases normal paper fibers would sink. *Neri* has also been said to have led to an industrial revival by its introduction to a certain industrial process.

Traditional *washi* making processes have been preserved throughout Japan, including processes with over a thousand year history. With electronic technology paving the way to advancement in industrial paper manufacturing, *washi* is being reassessed as a material for restoring cultural remnants, paintings and murals around the world. *Washi* paper depicts a portrait of Japanese tradition as exhibited in stationary paper and paper sliding doors often seen inside traditional Japanese style households to brighten the room's interior while controlling the harsh rays of the sun. In addition, the paper sliding doors decorated with various designs are used, as still seen in some modern households, and also for lamp shades to block wind from flames and to extend the scope of light distribution inside the room.

Furthermore, *washi* is used for *origami* (paper folding), which flourished in the Edo Period. Over 2 million paper cranes in 8 different colors were folded with people's best wishes and showered from above at the closing ceremony of the 2002 World Cup held in Yokohama, signifying the finest paper performance ever.

Fibers are entwined by shaking the tray side to side, and up and down when making paper

Paper Gallery

Life Span of Paper

When considering the life span of paper, how many years does paper last? Paper is often recycled, but those which are cherished survive the test of time.

Ishiyamagire (Ise Series)

—Scripted by Fujiwara no Kinto, Cultural Heritage of the Heian Period (Photo courtesy of the Yuki Museum of Art)—

Tsugi-gami (paper patching) is, as seen here, a single sheet of paper made from many pieces of paper of various colors and designs that have been pasted together. This technique was introduced by the Imperial Court during the Heian Period.

"The Selected Poems of the 36 Immortal Poets (36 best *tanka* composers of the Heian Period)", which originally are 36 scrolls by each of the poets, is a highly regarded historical literary work scripted in beautiful calligraphy on very long scrolls made of exquisite paper. This is one piece of the *Ishiyamagire* (the *Ishiyama* cut) which is of itself one cut portion of the scroll composed by the female poet, Lady Ise.

With the passage of time, classical works of literature would be taken apart and distributed for display at various traditional tea ceremonies, and this long scroll itself was also divided and distributed to different places in 1929. Paper also enjoys a long life, and has been appreciated by many people in different ways over time.

Kamiko

—Battle overcoat worn by Kenshin Uesugi, Cultural Heritage of the Sengoku Period (Sixteenth century) (Photo courtesy of the Uesugi Shrine)—

Outfits made from paper did not require any stitching and were worn by priests in the 8th century. The thickly-filtered and durable *washi* was coated with glue made of *konnyaku* (devil's tongue root paste) and persimmon tannin juice, which acted as a water repellant. The "fabric" would then be left out to dry in the sun, and later be softened by kneading it by hand.

Since the material was light and water-resistant, it was also used together with silk floss for warmth to make battle coats worn over body-armor for some generals during the Sengoku Period. Commoners regularly used the material for insulation during the Edo Period, and professional "*kamiko*-vendors" offered many designs of color-dyed outfits. Nowadays, priests wear *kamiko* during the popular *Omizutori* (water-drawing ceremony) at Todaiji Nigatsudo Temple.

Mino Umbrella

As indicated on page 10, the oldest paper kept by the Shosoin Treasure House is that of an ancestral registries dating back to 702 A.D. One of the registries is perceived to be from Mino (currently Gifu Prefecture). *Kozo*, a raw material for *washi* production, was brought over as a tribute from Mino in the Heian Period. Mino *washi* boasts this proud history, and this area continues to be well known as the center for *washi* production. The Mino umbrella is a renowned traditional handicraft made from this type of *washi*. It is said that umbrellas that could be opened and closed spread among the common class in the Edo Period. It is also believed that Mino umbrellas were produced in the peaceful Edo Period by samurai warriors as their side businesses.

Washi umbrellas were replaced by Western-style umbrellas made of cloth and metal for practical reasons. However, at its peak in 1915, the local production provided employment to 90% of Kano town's residents, and 3.67 million umbrellas were produced and many were even exported to India.

shosha is published every three months by Marubeni Corporation. Address all inquiries to Corporate Communications & Investor Relations Dept., Tokyo Head Office, C.P.O. Box 595, Tokyo 100-8692, Japan.
Publisher: Kazuo Ogawa
Editor: Michio Miyajima

shosha can also be accessed on the Internet through the home page of Marubeni Corporation at **http://www.marubeni.com/**
Please e-mail any comments regarding *shosha* to **shosha@liaison-kikaku.co.jp**

ISSN 0912-7704
Printed on 100% recycled paper.
Printed in Japan