COVER STORY

4 PILLARS OF STRENGTH

The earthquake-resistant buildings of Japan today borrow numerous technologies from the distant and recent past. This month’s Cover Story zooms in on some of these technologies and the reasons for their continued use and dissemination both in Japan and around the world.

6 A Whole Lot Less Shaking Going On

Introducing the world’s first super-active seismic base isolation system, developed by Obayashi Corporation.

8 Shikkui Renaissance

Age-old shikkui plaster for walls is finding new popularity today in the shape of Limix, in which the all-natural material is innovatively formed into multi-use panels.

10 Conserving the “White Heron”

Repair work is underway on World Heritage Site Himeji Castle, a major project which ironically enables visitors to take a closer look at the historic structure than ever before.

12 Blending Tradition with the Modern in Architectural Design

New York-born Geoffrey P. Moussas, a Kyoto-based rennovator of traditional buildings, talks about his work.

14 Training in Earthquake Resistance

Introducing a Japan International Cooperation Agency (JICA) program through which close to 7,000 Chinese people have so far been trained in a range of disaster prevention and response technologies.

16 Paper Pipes Provide Lifeline

Shigeru Ban is one of the world’s most famous architects. His innovative paper structures continue to house people displaced by disasters around the world, earning him the sobriquet an “architect without borders.”

18 Architecture after the Quake

Following the 24th World Congress of Architecture in Tokyo this fall, Organizing Board President Yoshiaki Ogura reviews proceedings and considers the role architects play in disaster control.
PM Flies the World for Summits

Summaries of Prime Minister Yoshihiko Noda’s recent appearances at the G20 Summit, APEC Economic Leaders’ Meeting, ASEAN-Japan Summit and East Asia Summit.

Fabrics to Dye For

The traditionally dyed fabrics of Futaba Inc. are winning new fans not just in Japan, but around the world.

Mikimoto Pearl Museum

Our reporter visits a pearl of a museum in Toba, Mie Prefecture.

Pioneering Accessibility

Accessible technology developed by Dr. Chieko Asakawa is opening new vistas for the world’s visually impaired people.

New Nose Cartilage Treatment at Clinical Study Stage

Implant-type tissue-engineered cartilage developed by Tsuyoshi Takato and Kazuto Hoshi at the University of Tokyo Hospital may soon find widespread use for patients with damaged or deformed nose cartilage.

Prime Minister Yoshihiko Noda shares his thoughts on issues of the day on “Prime Minister NODA’s BLOG”: http://nodasblog.kantei.go.jp/

A video message from Jackie Chan in support of Japan’s recovery following the Great East Japan Earthquake is available on the “recovery in Japan continues” website at http://www.recoveryinjapan.go.jp/eng/
Standing 634 meters tall, Tokyo Sky Tree was officially recognized by Guinness World Records in November as the world’s tallest tower.
In Japan, the traditional architectural technologies that have been passed down since ancient times still remain today. Meanwhile, new architectural technologies that utilize cutting-edge technologies are being developed one after another. This month’s Cover Story discusses the comfort and beauty of a structure created by combining these technologies, and the advanced disaster prevention functions that the Japanese people have developed in order to resist natural disasters such as earthquakes and typhoons.

On March 11, Tokyo Sky Tree, which is under construction in Sumida Ward in Tokyo, was shaken by the Great East Japan Earthquake. The peak section, with a height of over 600 meters, is estimated to have moved 4 to 6 meters sideways. However, Tokyo Sky Tree was not damaged in the earthquake.

One of the reasons why Tokyo Sky Tree withstood the enormous quake was the vibration suppression system, used for the first time ever, known as Shinbashira-seishin (Center Column Vibration Control). The core section of the main structure of Tokyo Sky Tree is a void measuring 10 meters in diameter, which extends up to a height of about 475 meters. A cylindrical column made of reinforced concrete measuring 8 meters in diameter and 375 meters in height, called the shinbashira (center column), has been installed through the void as if piercing Tokyo Sky Tree. Even though the shinbashira is structurally separated from the main tower structure, the two are joined by steel beams up to a height of 125 meters, and via devices called dampers that suppress vibrations by stretching and contracting in the sections above. The shinbashira is heavier than the main tower structure, which is made of steel, and barely vibrates. As such, the shinbashira and the main tower structure behave differently when shaken by an earthquake or storm. If the two move in opposite directions, the vibration is canceled. It is said that the Shinbashira-seishin system reduces seismic vibration by up to about 50%.

“Shinbashira” is the term signifying the column built at the core of traditional five-storied pagodas in Japan. There have been almost no reports of collapses of five-storied pagodas, of which the one at the World Heritage Site Horyu-ji temple in Ikaruga-cho, Nara Prefecture is a typical example. According to Nikken Sekkei, the company that designed Tokyo Sky Tree, a structure similar to that of the traditional five-storied pagodas resulted when they studied the latest vibration suppression systems. This was why they decided to use the name “shinbashira.”
One method of protecting buildings from earthquakes is “seismic isolation.” The seismic isolation method currently in general use in Japan entails the insertion of a seismic isolation device such as laminated rubber bearings between the substructure and framework of the building. The seismic isolation device absorbs the shaking, which reduces the shaking transmitted to the building.

In 2009, the leading construction group Obayashi Corporation was the first in the world to develop a method that improved on the existing technique, namely Laputa 2D.

The basic principle of this system is to immediately move buildings the same distance that the buildings were moved by earthquakes, in the opposite direction. If the ground moves to the right by 10 cm, the building is immediately moved to the left by 10 cm. As a result, the shaking is counteracted, and the building stops moving. In buildings that incorporate conventional seismic isolation devices, shaking is estimated at between 1/2 and 1/5 of the actual ground shaking, whereas in buildings where Laputa 2D is installed, shaking is substantially reduced to between 1/30 and 1/50 of the actual ground shaking.

The basis of Laputa 2D is the action of a device called an actuator, which uses oil pressure to push and pull the laminated rubber bearings that support the building in accordance with instructions from a newly developed high-performance computer. When an earthquake occurs, a sensor detects the shake of the ground and the shake of the building and immediately transmits the size and direction of the shake to a computer. The computer calculates in real time the distance the ground has moved, and issues an instruction to the actuator in units of 1/1000 second. 0.1 seconds after the shaking has occurred, the actuator operates to move the framework of the building in the opposite direction of the shaking.

Hideo Katsumata, deputy general manager of Obayashi Corporation’s Technical Research Institute, who led the development of Laputa 2D, says, “We were already thinking about the

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Obayashi Corporation, one of Japan’s leading construction groups, has developed the world’s first super-active seismic base isolation system. Called Laputa 2D, it reduces building shaking to 1/50 of actual ground shaking. Toshio Matsubara reports.
idea that led to the current Laputa 2D in 1988. But at that time, computers were not powerful enough. The key factors that enabled us to make Laputa 2D a reality were great advances in computing speed and accuracy and the fact that it became possible to keep actuator manufacturing costs low. The increase of social needs requiring further seismic isolation also supported realization of Laputa 2D.”

A major contributing factor to reducing the cost of manufacturing actuators was advances in laminated rubber bearing technology. Research and development resulted in laminated rubber bearings that are six times as soft as they were twenty years ago and yet are still able to support buildings. If the rubber is soft, the actuator does not need a large volume of power to move it. With the rubber now six times as soft, the volume of power needed is only 1/6, resulting in large cost reductions.

Obayashi Corporation’s Technical Research Institute is the first building in the world to use the technology, with a total of four actuators and sixteen laminated rubber bearings. Since any increase in the weight of a building can be addressed by adding actuators and laminated rubber bearings, this system can basically be introduced into buildings of any size.

The Great East Japan Earthquake that occurred on March 11 provided the company with an assurance of the safety of this system, as well as showing the company the areas for improvement. Since the earthquake caused the Technical Research Center to shake more violently than the size initially set, the safety mechanism kicked in and stopped the actuators from operating. During the course of that day the maximum set point for shaking changed, and as a result, the actuators operated immediately for all the aftershocks that followed. The shaking experienced at that time was a very slight movement in a vertical direction only, with no horizontal shaking.

“One of the aims of developing Laputa 2D was to stop the numerous wheeled devices and appliances in hospitals from moving in an earthquake. Existing seismic isolation buildings cannot possibly fulfill this requirement,” says Katsumata. There are a large number of facilities that have a need for Laputa 2D, including hospitals, art galleries, and museums, as well as manufacturing premises for precision measuring equipment. The challenge now is to come up with initiatives for further cost reduction so that it can be widely used.

“Currently too, partial seismic isolation is being implemented. This involves the creation of a new floor with a built-in seismic isolation system, not in the building as a whole but only in the part of the building where shaking needs to be reduced, thereby minimizing costs,” says Katsumata.

Toshio Matsubara is a freelance writer.
“Development of Limix began when one of our clients, a house manufacturer, asked us if we could make shikkui panels that could be easily used as a wall material,” says President Nobuyoshi Yukihira of Tagawa Sangyo, who has led the development of Limix since 1992. “It is never easy to make thin panels that have sufficient durability to withstand use as a wall material. The development was a series of trials and errors.”

At that time, sick building syndrome caused by the spread of building materials containing chemical substances, such as vinyl wall covering, had become a societal problem. Shikkui was chosen because it contains no harmful substances and is even effective at adsorbing them.

Shikkui comes in powder form and is mixed with water and kneaded to be plastered on walls. It gradually hardens by drying and absorbing carbon dioxide in the air. Great numbers of microscopic pores form inside, inevitably making the material brittle. This is fine when plastered on walls, but for use as panels its strength needed to be improved to develop a panel-type building material that meets specifications. To accomplish this, the basic method of using shikkui mixed with water had to be revised.

Yukihira’s solution was super high-pressure vacuum forming. In this manufacturing method, a proprietary mixture of crushed limestone, fully matured shikkui, pigments and natural auxiliary materials is pressure formed in one burst using an ultra high-pressure press, while deaerated into a vacuum state. This technology uses absolutely no water, heat or resin.

The final product, called Limix, was commercialized in 2003, and has strength that ex-
ceeds even marble, in addition to offering the four characteristic shikkui functions of fire-resistance, moisture absorption and release, adsorption of odor, and a natural anti-bacterial property. This enables it to be used not only for walls but also for flooring. The product is supplied as 40 x 40 cm tiles meeting basic specifications; a 60 x 60 cm commercial version will soon be available as well.

The unique manufacturing method brings even greater advantages to Limix. If an object, such as paper or glass, is laid inside metal molds, concave-convex patterns and other textures can be accurately reproduced on the surface, greatly increasing the degree of freedom in design. Cutting and drilling are also possible after forming. Also notable is that since Limix is produced without firing, there is 80% less carbon dioxide emission during manufacturing as compared with fired tiles. Also noteworthy is that the product is made completely from natural materials. With Limix and several other products, Tagawa Sangyo is currently the only company in Japan to receive the prestigious environmental Cradle to Cradle certification, awarded to materials that can be safely returned to nature.

“By coating Limix with photocatalyst that reacts to light and decomposes odorous substances, the intrinsic odor-adsorbing function of shikkui becomes almost permanent when the product is exposed to sunlight,” Yukihiro says.

This creation of new materials with remarkable benefits has been highly regarded and Limix has received numerous awards including the Japan Prime Minister’s award of the Monodzukuri Nippon Grand Award in 2007. The company has already made inroads into the United States, Singapore, China, South Korea and other countries.

Tagawa Sangyo, which was founded in 1924 and has grown into one of Japan’s largest lime plaster manufacturers, is aiming to make even further advances with the Limix product.

“Unique and top-ranking technology is essential for a medium-sized company like us to make our leap into the world,” Yukihiro asserts about the company’s future development. “We hope to disseminate not only Limix but also Japan’s inimitable and flawlessly beautiful shikkui to other countries by offering products that suit their market. We hope to establish the world’s top shikkui brand. That is our primary target.”

Toshio Matsubara is a freelance writer.
Himeji-jo, or Himeji Castle, was originally built as a fort by a powerful family in the fourteenth century. Enlarged over the years, the castle has come to be known as Hakuro-jo, meaning “white heron castle,” because its white plaster walls are thought to have the appearance of a white heron in flight.

With five levels standing approximately 31 meters off the ground, the main keep which is now undergoing reconstruction was built by the owner of the castle, then the ruler of the local area, at the start of the seventeenth century, as part of a castle expansion project. The keep was the largest structure on the castle’s site and served as Himeji’s last defensive stronghold.

With a history dating back over 400 years, the main keep actually underwent major repair work during the eight-year period from 1956 to 1964, when it was dismantled and fully restored. As the main keep’s roof and walls had fallen into disrepair during the intervening half-century however, a new five-year preservation and repair project has been underway since 2009.

A seismic survey of the main tower conducted by Himeji City in 2005 found that Himeji Castle was surprisingly strong, thanks to the restoration work of fifty years earlier. The survey concluded that additional reinforcements in twenty-four locations would be sufficient for the castle to withstand a tremor on the same scale as the Great East Japan Earthquake. As part of the ongoing repair work, steel plates will therefore be fitted to the floor in selected areas, where they will be as inconspicuous as possible, to reinforce the flooring and prevent it from becoming distorted. The upper parts of the main keep’s pillars, which have already been fitted with steel reinforcements and bearing plates during previous restoration work, will also be selectively reinforced with steel plates.

While work is ongoing, roofed scaffolding has been erected over the entire main keep, to
As World Heritage status extends to the grounds surrounding the castle as well as the buildings themselves, the scaffolding could not be attached directly to the roof or walls, and the builders were not permitted to drive stakes into the ground. Steps also had to be taken to prevent the weight of the roofed scaffolding from distorting the ground in any way. The solution came in the form of a steel frame truss structure designed to be as lightweight as possible.

The processes of replastering the walls of Himeji Castle and replacing its roof tiles involve techniques that have been passed down unchanged for around 400 years, since the castle was first completed.

The walls on the upper fourth and fifth levels have been completely stripped back and refinished from the clay outwards, while the walls on the lower three floors are being replastered on the surface but left the same underneath. The type and thickness of plaster varies depending on its location within the tower. It is a technique that requires great skill, taking into consideration seasonal fluctuations in temperature and humidity to determine whether to apply the next layer when the plaster has fully dried or while there is still some moisture in the previous layer.

All of the roof tiles, which number approximately 80,000, are being removed so that they can be individually scrutinized and cleaned. Any damaged or worn tiles are replaced with new ones.

Carrying out repairs with such a commitment to traditional techniques also helps to preserve these invaluable skills for future generations.

**Visiting Himeji Today**

While it may not be possible to see the main keep from the outside at the moment, there are nonetheless facilities for visitors inside the roofed scaffolding so that they can see the repair work in progress. Visitors can take the elevator to the uppermost eighth floor and take a look at ongoing repairs to the roof of the top floor of the tower for themselves, or go down to the seventh floor to see repairs to the walls through viewing windows. With such unique views on offer exclusively while repairs are ongoing, the castle is still attracting crowds of visitors every day.

A woman in her twenties from Australia commented, “I am so happy I came while all this is going on. Usually, you only get to see the castle from a distance, but now you can see each individual curve in the roof and the stripped clay walls up close. I’ve been to see other Japanese castles, but Himeji is definitely the best. This experience has been a real privilege.”

_Toshio Matsubara is a freelance writer._
We understand you have been working in Japan now for nearly two decades, but how did you happen to come to Japan?

Geoffrey Moussas: Born and raised near New York City, after graduating high school, I entered a university in northern New York State and majored in engineering. Becoming more interested in architecture, I entered the Graduate School of Architecture at the Massachusetts Institute of Technology in 1989. When I was a student there, Japan was garnering much attention from around the world in the field of technology including architecture; I therefore decided to go to Tokyo after graduation. I first worked for the renowned Japanese architect Fumihiko Maki, and gradually after four to five years, I found myself attracted to the long history of architecture and of design, not to mention the culture to be found in Kyoto. After working in Tokyo for about five years, I moved to Kyoto. In Kyoto, I became involved in reviving old structures like machiya (townhouses), kura (storehouses), as well as designing many modern structures.

Now I work not only in Kyoto but also in other regions of Japan as well as in the United States and around the globe. For example, I am currently involved in the renovation of a 400-year-old Buddhist temple in Aichi Prefecture. The renovation will improve accessibility by reducing marked gradations within the temple complex, including Universal Design toilets that can accommodate handicapped and elderly visitors.

What do Japanese traditional dwellings look like? What do you find attractive about them?
Japanese traditional dwellings were commonly built until the 1960s, consisting of a roof laden with tiles, wooden floors and pillars, walls made of wood and soil, and glass pane for the window [before the Meiji period (1868–1912) it was paper screen.]

I am attracted to the continuous development of Japanese architecture, especially the machiya, which has continued for over 1,200 years and has carried over to this day and to life in general throughout Japan. For example, traditional houses in Japan oftentimes utilize the “indirect approach” of reflecting light entering from windows near the floor, this being an approach I have adopted. I would highly recommend an essay written by Jun-ichiro Tanizaki entitled “In praise of shadows” (In Ei Rai San) for those interested in the profundity of Japanese architecture and Japanese culture in general.

**How do you renovate traditional Japanese structures?**

In Japan, especially Kyoto, most traditional buildings did not have built-in kitchens or baths, and if they are to be found they tend to be clustered to one side of the room. With regards to heating, I have found floor heating to be the most effective method of dealing with cold rooms, as the radiant heat resulting from floor heating enters the walls, floor, ceiling and so on, and could help to counteract any drafts. For additional light, removing some roof tiles to be replaced by glass tiles enables outside light to be brought in.

**Could you expound upon lighting in these houses?**

Recently, many Japanese traditional houses have adopted fluorescent lights due to lower power consumption. I find such fixtures are not conducive to living in Japanese houses as these structures seem to benefit from the warm glowing light such as incandescent lamps or, these days, certain types of LEDs. A prime example of this would be Kappo Bar Doi, in Gion near the Yasui-Higashiyama intersection, where I was able to use incandescent lighting fixtures in many different ways. I believe in retaining traditional aspects of Japanese culture while incorporating innovations in technology to suit our present lifestyle.
Training in Earthquake Resistance

Researchers have developed a number of technologies to improve building safety in earthquake-prone Japan, which is now supplying those technologies to many countries overseas. Osamu Sawaji of the Japan Journal reports on one such case led by the Japan International Cooperation Agency (JICA) in China.

The 7.9-magnitude Great Sichuan Earthquake, which struck in Sichuan Province, China, in May 2008, caused serious damage, leaving about 87,000 people dead or missing.

In the wake of this massive disaster, the Japanese government held talks with its Chinese counterpart to discuss reconstruction support. Based on these discussions, the government adopted a policy of offering specific assistance in five key areas: “health and welfare,” covering demand such as mental healthcare for the affected people and support for building a disaster medical care system; “society and culture,” dealing with issues such as school and hospital restoration and support for disaster mitigation training; “industry and employment,” focusing on areas such as reconstruction support for affected industries; “disaster prevention,” which encompassed areas such as cooperation in earthquake disaster prevention studies and support for dyke reconstruction; and “community development,” to address needs such as lifeline restoration support and assistance for new city development.

Based on these five pillars, the Japan International Cooperation Agency (JICA), the organization in charge of implementing Japan’s official development assistance (ODA), is offering support in a broad array of fields, including the restoration of forests destroyed in the earthquake, improvement in post-quake first-aid support technologies, and training for mental healthcare experts for victims.

The Human Resources Development Project for Seismic Engineering and Construction of Buildings, which JICA launched in 2009, is one such support operation. “The aim of this project is to train people who can help to improve the earthquake-resistance of buildings, such as structural engineers for buildings and administrative officials in charge of buildings,” says Shinji

In July 2011, as part of their training under JICA in Japan, participants from China visited temporary houses in Miyako City, Iwate Prefecture for the victims of the Great East Japan Earthquake of March 11.
Asami, the project leader.

In this project, JICA is inviting participants from China to Japan, to teach them how to test the quake resistance of reinforced concrete buildings and how to strengthen such structures. Participants visit the Building Research Institute in Tsukuba City, Ibaraki Prefecture, and receive other forms of training. At the same time, JICA is dispatching earthquake-resistance design, disaster prevention planning, and other experts to China to provide direct instructions in the field.

Among Japanese technologies for increasing building safety, China is taking a particularly strong interest in (1) seismic isolation, which inhibits the travel distance of the jolts from earthquakes with the installation of devices such as laminated rubber bearings between the ground and buildings, (2) vibration control, which absorbs shaking with the installation of devices such as dampers inside buildings, and (3) seismic reinforcement, using steel braces (diagonal beams) installed on the inside of building frames (such as sections between pillars) and on the outside (wall surface).

In the project, JICA is making active use of Chinese trained in Japan as instructors in China. For example, a system called “emergency safety assessment” has been established in Japan. In this system, experts put stickers, such as “Caution” and “Danger,” on buildings damaged in an earthquake, depending on the degree of damage. Aftershocks destroyed buildings and caused additional deaths and injuries following the Great Sichuan Earthquake. Learning from that experience, JICA offered training on the emergency safety assessment system through this project. Chinese who had taken part in JICA training in Japan served as instructors for this training in China.

The project also reflects the experience of the Great East Japan Earthquake that struck on March 11, 2011. Visits to the affected parts of the Tohoku region were worked into a training program. Through three programs conducted in Japan by November 2011, fifty-eight Chinese participants visited parts of Iwate Prefecture damaged by the tsunami, such as the cities of Rikuzentakata, Kamaishi and Miyako.

“The scale of damage caused by the tsunami had a great impact on participants,” says Asami. “At the same time, however, they were very impressed by the fact that building damage from the earthquake itself was not so serious. They also expressed their impression that lifelines such as waterworks and roads were being restored at a quick pace.”

JICA has trained about 230 Chinese people through its programs in Japan. Participants in the Agency’s training programs in China have totaled approximately 6,500. In the remaining part of the project, which is due to conclude in 2013, JICA plans to focus its support operations on areas such as training for instructors, preparing teaching materials, and revising quake-resistance standards, so that people in China can distribute earthquake-resistant technologies themselves.

“We want to build a system that lets us train people in a broad range of fields in a sustained manner,” says Seki Matsutaro, who is taking part in the project as an expert in seismic construction. “Nothing makes me happier than seeing the next generation of Chinese engineers absorb my knowledge and apply it to reducing earthquake damage in China.”
Shigeru Ban is an “architect without borders.” He has set up offices in Tokyo, Paris and New York, and designed architecture in diverse countries, including a library for a university in Tokyo, a golf clubhouse in South Korea, an annex building for the Pompidou Center Museum in the city of Metz, France, and the New Aspen Museum in the U.S. state of Colorado. However, Ban is referred to as an architect without borders not just for his numerous designs around the world but also because he has sought to build houses for those who have lost them and to reconstruct other destroyed buildings in his volunteer work in parts of the world affected by earthquakes, tsunamis, hurricanes, and other natural disasters, functioning in a way similar to Doctors without Borders.

Though Ban has often expressed the warmth of wood in his designs, since the 1980s he has been interested in paper as an architectural material to replace wood. He has studied and experimented with paper pipes, first using them in support efforts for people affected by the Great Hanshin-Awaji Earthquake which struck in January 1995. Ban frequently

Paper Pipes Provide Lifeline

Architect Shigeru Ban has gained high recognition worldwide for his use of structures made of paper pipes in efforts to provide support for people affected by disasters. Here we introduce his architectural works and activities.

The community center (Paper Church) in Kobe was built by church volunteers whose house of worship was destroyed by the Great Hanshin-Awaji Earthquake in 1995. Materials were donated by a number of companies, and construction was completed in only five weeks by the 160 volunteers.
visited Kobe after the earthquake and built a community hall (commonly known as the Paper Church), which contains fifty-eight five-meter paper pipes supporting a roof made of cloth on the site of a church that burned down. (The Paper Church was transferred to a village damaged by the large-scale earthquake that hit Taiwan in 1999, where it is now used as a community hall.)

Paper pipes are lightweight, low-cost, and can be obtained relatively easily in any country. Another advantage is that no heavy machinery is needed for their construction. They are made of corrugated cardboard, newspaper, magazines and other waste paper. Because of this, they can easily be disposed of, incinerated, or recycled after temporary houses are dismantled.

Ban has engaged in numerous support efforts using paper pipes in times of disaster, including the shelter that the United Nations High Commissioner for Refugees offered to Rwandan refugees in 1999, temporary houses for those affected by the earthquakes in Turkey in 1999 and India in 2000, and temporary school buildings for elementary schools destroyed in the Great Sichuan Earthquake in 2008.

Ban has actively taken part in support activities following the Great East Japan Earthquake as well. He installed partitions made of paper pipes at evacuation centers, which allow people there to maintain a level of privacy. He also helped to build three-storied temporary housing made by combining existing cargo containers.

In recognition of these activities, Ban was awarded the Auguste Perret Prize on September 27 at UIA 2011 in Tokyo (see pp. 18–19). The jury’s review stated, “Shigeru Ban carries international respect for applying his ability in technology in architecture to not only serving the more affluent users of architecture but also to a creative exploration of shelter using paper tubes and membranes for disaster relief. He achieves this without compromising functionality or aesthetics.”

Ban explained why he actively takes part in disaster relief activities: “People die in natural disasters mostly from manmade causes. People die in earthquakes because buildings collapse. For this reason, I believe we architects are heavily responsible for helping those affected by disasters.”
What was discussed at UIA 2011 Tokyo, taking place as it did just half a year after the Great East Japan Earthquake?

Yoshiaki Ogura: Before the earthquake, the main theme of the event had been determined as “DESIGN 2050.” This embodies our commitment to drawing up a picture of what the architecture and the city should be like in 2050 and to designing a sustainable architectural environment and quality of life. In the wake of the March earthquake, we added a subtitle of “Beyond Disasters, Through Solidarity, Towards Sustainability” to the main theme. The conference had many different discussions on the roles that architects have to play in today’s society, given the relatively frequent occurrence of disasters. Among others, the keynote speech of Jigmy Yoezer Thinley, prime minister of the Kingdom of Bhutan, called on architects to think about what they could do not for economic efficiency but for the pursuit of happiness. That left a strong impression on the audience.

In the past, the UIA focused more on architectural clients. Held after the Great East Japan Earthquake, the conference in Tokyo was different in the sense that it directed its attention to people living in tough conditions. When I saw Vassilis Sgoutas, a former president of the UIA, during the conference period, he told me that the Tokyo conference was a departure from the past trend of UIA conferences.

What activities for reconstruction have architects engaged in after the Great East Japan Earthquake?

At UIA 2011 Tokyo, Shigeru Ban [see pp. 16–17] won the Auguste Perret Prize, one of the UIA special prizes. In the wake of the Great East Japan Earthquake, he designed partitions made of paper tubes to protect privacy in the evacuation centers and engaged in construction of temporary houses. Before the quake, he had been working hard to provide assistance to disaster victims and to refugees outside Japan. Reflected in these activities, his stance...
is highly regarded around the world.

Another architect, Toyo Ito, designed a meeting facility called Minna no Ie, meaning “House for Everyone,” in a cluster of temporary houses in the city of Sendai in Miyagi Prefecture. In the past, temporary housing areas had nothing but shelters mainly made of steel plates for accommodating disaster victims. This aroused concern about their isolation. The meeting house adds a touch of the warmth of wood to the cluster and gives relief to the people there. Construction of this House for Everyone has breathed new life into the cluster of temporary houses.

What role should architects play in disaster control?

One example is to achieve a coexistence between landscape protection and disaster control. Construction of a huge seawall along the coastline for the purpose of protecting it from tsunamis has an adverse impact on the landscape. I think another duty of architects is to design something using the massive piles of rubble that resulted from the disaster in a way that does not ruin the landscape. Disaster control forests along the coast of the Tōhoku region that were planted in the Edo period (1603–1867) and the Shingen-zutsumi levee in Yamanashi Prefecture constructed over 400 years ago for the purpose of preventing river flooding are now part of the landscape in their respective locales.

In 2004, Japan put into force the Landscape Act, which stipulates that the landscape is a shared national asset. To take advantage of this law and to build a safe society, the skills of architects are required.

How can Japan contribute to global disaster control through architecture?

In Japan, the Building Standards Act came into effect in 1950, establishing building standards. It was amended after the 1968 Tokachi-oki Earthquake and again after the 1978 Miyagi-ken-Oki Earthquake, because in both cases powerful tremors caused serious damage to buildings. The two revisions considerably improved the quake resistance of buildings. I think that Japan can contribute to the legislative process of developing quake resistance.

In addition, Japan’s quake-proof technologies are the most advanced in the world. We not only have cutting-edge technologies but also technologies for bolstering quake resistance in a way that suits the buildings of different countries. For instance, in developing countries, an earthquake may destroy sun-dried brick houses and claim numerous human lives. A method of applying resin bands that are readily available locally onto the wall surface of sun-dried brick houses is being studied for the purpose of earthquake-proof reinforcement. Japan has also been providing Iran, Peru and other quake-prone countries with technical assistance to develop quake resistance tailored to local conditions though the Japan International Cooperation Agency.

With its experience of various disasters, Japan has been advancing its knowledge and technologies in the seismic resistance of buildings. We have an obligation to use our skills to contribute to the rest of world.
On November 3 and 4, 2011, Prime Minister Yoshihiko Noda attended the G20 Summit on Financial Markets and the World Economy and the G20 Cannes Summit held in Cannes, France.

At the Cannes Summit, the leaders of the G20 nations formulated the Cannes Action Plan for Growth and Jobs, which summarizes the measures to be adopted by each, on the shared recognition that in order for the world economy to attain solid, sustainable, and balanced growth, re-balancing (from external demands to internal demands, from public demands to civic demands) needs to be pursued in the medium to long term while addressing the current issues on a short-term basis, including the financial crisis in Europe. Prime Minister Noda praised the agreement reached by the European nations in October. However, he also stated that the agreement needs to be executed, and that Japan is willing to cooperate on the premise that the European nations remain united. The Prime Minister then commented that Japan is doing its utmost to recover from the damage caused by the earthquake and tsunami, but that there is a risk of an economic slowdown due to the historic rise of the yen, and that cooperation is needed to stabilize foreign exchange rates. He also noted Japan’s determination to achieve fiscal soundness, and explained the specific plan for unified reforms on social insurance and tax systems, including the stepped raising of consumption tax, and that necessary draft bills will be submitted by the end of fiscal 2011.

At the same time, the Prime Minister emphasized the fact that Japan will draw up strategies for reviving the country and promoting economic growth and the restoration of fiscal health as two wheels of a car. He also highlighted the need to utilize the loan systems of the International Monetary Fund (IMF) and implement measures through a regional framework to prevent the crisis from spreading to emerging economies.

The leaders of the G20 nations agreed that trade plays a decisive role in growth, and highlighted the importance of eradicating protectionism. With regard to the WTO Doha Round, instructions were issued to the effect that each nation should discuss new approaches for advancing negotiations at ministerial meetings. In addition, the leaders of the G20 nations agreed on the importance of food security. In this regard, the Prime Minister mentioned the following four points: making contributions for enhancing the transparency of the agricultural product markets through the ASEAN Food Security Information System (AFSIS); offering emergency aid amounting to 50,000 US dollars to Thailand through the ASEAN+3 emergency rice reserve agreement; cooperating in enforc-
ing the bonds between ASEAN nations; and hosting the Fifth Tokyo International Conference on African Development (TICAD) in 2013.

Regarding the financial regulations, many leaders highlighted the importance of financial regulation reforms. The Prime Minister indicated his appreciation for the progress of the reforms, while highlighting the fact that diverse measures need to be implemented in addition to the strengthening of capital regulation, and that matters agreed previously need to be enforced steadily, including the regulations on over-the-counter derivatives. When Prime Minister Noda attended the G20 Summit on Financial Markets and the World Economy held prior to the G20 Summit, he spoke about the lessons learned from Japan’s experiences, and highlighted the need for financial regulation reforms that take into consideration the following four points, which were supported: (1) strengthening the financial sector in Europe; (2) measures for developing efficient liquidation procedures; (3) an appropriate balance between financial regulations and consideration for growth; and (4) the world economy. He thereby mentioned the four issues facing the financial sector.

Through these debates, the leaders of the G20 nations agreed on the Communiqué, the Cannes Action Plan for Growth and Jobs, and the Final Declaration.

**APEC**

On November 11 (local time), Prime Minister Noda visited Honolulu (USA) to attend the APEC Economic Leaders’ Meeting on November 12 and 13.

Hosted by U.S. President Barack Obama, discussion during the leaders’ meeting focused on growth and job creation, regulatory reform and competitiveness, and energy efficiency and energy security.

On the subject of growth and job creation, the Prime Minister announced that Japan had decided to enter into consultation toward participating in the Trans-Pacific Partnership (TPP) negotiations with the countries concerned, and outlined his views and potential measures on the world economy, and described Japan’s economic growth strategy.

During the session on energy efficiency and energy security, as the keynote speaker, Prime Minister Noda illustrated (1) Japan’s commitment to achieving world-leading levels of energy efficiency through energy saving initiatives, (2) challenges facing Japan’s energy policy for the future, and (3) the potential for energy-related cooperation within the Asia-Pacific region.

At the press conference on November 13, the Prime Minister commented that the APEC meeting had made the following three achievements. He said, “Firstly, we agreed on the common rules for fostering innovation without distorting trade, as well as on efforts to spread Environmental Goods for “green growth” to bring about economic growth across the region.
“Secondly, we agreed on establishing targets for improving energy efficiency in the entire APEC region. Upon the request of the APEC chair, U.S. President Barack Obama, I led the discussion by explaining Japan’s past experiences and lessons learned thereof, as well as our future challenges.

“Thirdly, regarding the TPP, which is the only pathway toward the realization of a Free Trade Area of the Asia-Pacific (FTAAP) for which negotiation has been launched, I explained that Japan will enter into consultations toward participating in the TPP negotiations with the countries concerned, and several economies expressed their welcome.”

ASEAN-Japan Summit

On November 18 (local time), Prime Minister Noda attended the 14th ASEAN-Japan Summit Meeting, with the leaders of the ten ASEAN member countries, the 14th ASEAN+3 Summit Meeting with ten ASEAN member countries plus Japan, China and the Republic of Korea (ROK), and the 3rd Japan-Mekong Summit Meeting in Bali, Indonesia.

At the 14th ASEAN-Japan Summit Meeting, the Prime Minister expressed his deep sympathies to Thailand, Cambodia, Myanmar, Vietnam, Laos and Philippines for the damage caused by natural disasters and offered to extend as much assistance as possible. He also expressed his gratitude for support given by ASEAN member states in the aftermath of the Great East Japan Earthquake and stated that Japan would move ahead forcefully with its restoration work.

He also said Japan would actively support ASEAN in building an ASEAN community in 2015. At the same time, he explained that Japan is also dealing with the enhancement of ASEAN Connectivity at the ministerial level as a priority issue. In this connection, he assured that Japan would extend assistance focusing on improvements of the “Formation of the Vital Artery for East-West and Southern Economic Corridor” and “Maritime Economic Corridor,” as well as projects of software infrastructure, throughout the ASEAN region as its pillars.

As a means to strengthen cooperation in the area of disaster management, Prime Minister Noda said Japan would help the ASEAN Coordinating Center for Humanitarian Assistance on Disaster Management (AHA Center) to develop as a regional hub of disaster management. At the same time, he said Japan would launch efforts to implement a “Disaster Management Network for the ASEAN Region.”

The Prime Minister touched on youth exchange, saying the “Japan-East Asia Network of Exchange for Students and Youths” (JENESYS) program had made significant achievements, adding that youth exchanges constituting a basis for ASEAN-Japan relations remained important. He explained that Japan was considering the possibility of realizing exchanges among about 3,000...
young people in Japan and ASEAN during the period to the end of 2013.

At the conclusion of the Summit, Indonesian President Susilo Bambang Yudhoyono declared a new joint declaration and plan of action, adopted for the first time in eight years since the Tokyo Declaration and the ASEAN-Japan Plan of Action were adopted in 2003.

**East Asia Summit**

On November 19 (local time), Prime Minister Noda, in Bali in Indonesia, attended the East Asia Summit (EAS), which Russia and the United States were present for the first time this year.

Having welcomed the participation of the United States and Russia at the EAS, the Prime Minister stated Japan would like to develop the EAS as a Leader-led forum to affirm common vision in the region and basic rules, through existing practical cooperation and strengthening political and security efforts, and implement concrete cooperation.

Prime Minister Noda referred to the sea as a public good connecting the Asia-Pacific region together, and stated that he understands that the importance of basic rules relating to the seas, including the peaceful settlement of disputes, freedom of navigation and adherence to international law such as the UN Convention on the Law of the Sea (UNCLOS), is shared by all of the EAS member countries.

From trade and economic perspective, the Prime Minister said that he hoped to establish a new working group under both the East Asia Free Trade Agreement (EAFTA) and the Comprehensive Economic Partnership for East Asia (CEPEA) as soon as possible, and to accelerate discussions regarding liberalization of trade and investment in East Asia.

He also mentioned that he wants to establish low-carbon growth models through the “East-Asia Low Carbon Partnership” initiative and asked for support as JAPAN is going to host a dialogue meeting in Tokyo next April under the initiative.
What made you decide to go along the path of IT?

Dr. Chieko Asakawa: During my college years, I learned that some visually impaired people had started challenging for computer-related work. At the time, computers had not come into consumer use, and I had absolutely no idea what they were used for. But I thought it would be interesting to have a go at something I knew nothing about, so I began studying information processing out of curiosity. I learned about mainframe, computer programming and so forth, which was really tough in the beginning. But, for visually impaired people, there are not so many options to choose from. I had decided that what I had chosen from the few options, I would see through to the end, no matter what.

Please give us an example of accessible technology that you have developed.

We developed the IBM Home Page Reader, which was first introduced in Japan in 1997. The talking web browser, which converts text on web pages to speech, made it possible for visually impaired people to easily surf and obtain information from the Internet. After the launch in Japan, it was offered in eleven languages, and today, the technology has become widely used worldwide. We have received messages from people in various countries, saying, “Thank you for developing this truly wonderful software for me.” Thanks to this software, my own international network of friends has expanded.

What is the Social Accessibility Project that your team has launched?

There is a lot of image information on web pages recently. Without alternative text which conveys the essential information about the image, visually impaired people will have a difficult time obtaining information from that web page. The Social Accessibility Project provides a social network site which connects visually impaired people who want to surf the Internet better and sighted users who want to help. Visually impaired users will address accessibility issues, and sighted users will respond by creating and publishing the requested accessibility metadata to help improve accessibility of Web pages for visually impaired people.
The origin of this project was the Braille Forum project in the late 1980s, which was my first job after joining IBM Japan. For this project, I developed software that enabled the text that I typed into my computer to be converted into Braille and printed out easily. Volunteers use this software to translate text into Braille, then share the translated data with everyone online. At the time, texts and books had to be translated individually by hand. Also, it was not possible to access books that volunteers had kindly translated into Braille in a timely fashion and simultaneously in other libraries. The Braille Forum allowed everyone to work together to resolve an issue, and also information could now be shared. This may be said to be the forerunner of what is now called “crowdsourcing.”

**What is the potential for accessible technology as a business?**

According to WHO (World Health Organization) statistics, it is estimated that there are about 1 billion people with disabilities, 500 million elderly and 700 million illiterate people worldwide today. The total is around one third of the world’s population. Also, mobile phones have had phenomenal penetration worldwide, and on a contract unit base, it is estimated that over half of the world’s population is using a mobile phone. With the advancement of the information society, information accessibility improvement has become an important element which will affect the success of all services and businesses. Accessibility research supports both makers of hardware products, software products and Web content, and users who utilize them. To allow IT to adapt to people, everyone to have equal access to information and to use information, accessibility research will play a more important role. For example, NTT DoCoMo’s mobile terminal Raku-Raku Phone can be used without stress not only by elderly persons but by visually impaired people, too. This is a good example of how support for people with disabilities and elderly persons led to a business opportunity.

**What do you think you can contribute to society in the future through the use of IT?**

Together with the University of Tokyo and NHK Science and Research Laboratories, we are jointly working on a research project called senior cloud to study an information and communication technology platform which will support social participation and working opportunity for elderly persons in the super aging society. For example, there are elderly neighbors who want to help parents raising their children, and parents who are raising children who want to help elderly people in the neighborhood who are living alone. We are studying to find ways to enable elderly people’s social participation by meeting societal needs through making use of networking and information sharing mechanisms.

When my own two children were still small, I often wondered if there might be someone in the neighborhood who could help out. We are hoping to respond to such societal needs through the research project by using IT to help share information. By enabling anyone to access information, or to put it another way, through the “democratization of information,” we, the people, may be able to help make our society a better place for all.
Tsuyoshi Takato and Kazuto Hoshi, respectively professor and associate professor at the University of Tokyo Hospital, are committed to developing technology for treating deformations and defects of cartilage in the ears, nose and other parts of the face. The two specialists have developed an implant-type tissue-engineered cartilage, which is made by cultured chondrocytes harvested from a small (5–10 mm) fragment of cartilage extracted from the patient’s ear within a special scaffold. This gave birth to a new treatment method in which the tissue-engineered cartilage is surgically implanted rather than being injected into the affected area.

“Unlike bone, cartilage has poor self-repairing ability and there is very limited availability of cartilage extractable from other areas of the patient’s body. This is why studies for tissue-engineered cartilage have been conducted around the world by culturing and increasing chondrocytes,” says Professor Takato, who is responsible for treating patients. “However, the currently available tissue-engineered cartilage is in a gel or liquid form and cannot be hardened or formed so that it is suitable for treatment of the ears or nose.”

In the past, implanting bone, rather than cartilage, was one of the common methods for treating patients with deformed nasal cartilage resulting from cleft lip palate or the like. The shortcoming of inflexible bone was susceptibility to fracture even with a small impact. Patients with this symptom reportedly struggled against numerous difficulties in such everyday activities as wearing glasses and blowing the nose.

To address these difficulties, Associate Professor Hoshi took the lead in development of tissue-engineered cartilage that is approximate-
ly 50 mm long, 6 mm wide and 3 mm thick. This is a design exclusively for nasal treatment. The new type of tissue-engineered cartilage is made by including extracorporally cultured chondrocytes into the scaffold made of specialized plastic and collagen, and can be safely absorbed in vivo. This is called an “implant-type” method since it involves surgically implanting the cartilage into the body.

“Most important in developing implant-type tissue-engineered cartilage was ensuring that it is as hard, flexible and large as the cartilage of the human nose. The scaffold material must hold cultured chondrocytes, be safely absorbed in the body and not cause an inflammatory reaction when absorbed. Successfully finding an optimal material for these requirements opened the way for the development.”

The treatment method developed by Professor Takato and his group is now in the clinical study stage. One patient who underwent surgery for implanting the tissue-engineered cartilage into the nose is reportedly in good condition. After transplantation, the chondrocytes begin to produce the substances specific for cartilage within the scaffold that mechanically protects the chondrocytes and gradually regain the properties of the original cartilage. As a result, the cartilage almost completely recovers both in terms of appearance and functionality. After that, the scaffold remaining in the affected area is slowly absorbed. Years later, only the cartilage of the patient is rooted in the affected area.

“Organ transplantation may involve the use of an organ from another person or animal, or an artificial organ,” Professor Takato says, as he explains the prospects of the implant-type tissue-engineered cartilage. “This inevitably entails the risk of a rejection reaction or exposure to unknown pathogens. Implanted with the use of the cells harvested from the patient, the tissue-engineered cartilage has a high level of safety and a substantial advantage in that it easily assimilates into the body. Treatment thus far has focused on the nose and ears. Continued efforts for development will even make it possible to treat complexly formed areas such as the trachea. Our goal is its application to heavily loaded cartilage, such as joint cartilage. This will lead to competition against artificial joints that have already been put into practical application.”

The group led by Professor Takato is continuing its clinical studies, aiming for commercialization in five years. Their efforts are drawing a great deal of attention in the field of regenerative medicine, where researchers around the world engage in heated competition.

Takashi Sasaki is a freelance writer.
Fabrics to Dye For

Futaba Inc. in Tokyo continues to produce fine dyed fabrics in the same time-honored fashion it always has. Gavin Blair visited the workshop and spoke with the company’s fourth-generation president, Motobumi Kobayashi.

The kimono remains one of the iconic symbols of Japan, and the dyeing of the cloth used is one of the most integral processes in its creation. The dyers, from whom kimono shops order their material, are often family companies that have been in operation for generations. Futaba is one such business that is still located in the Ochiai district of Tokyo, where the dyers gathered around the river where the flowing water was used to prepare the cloth.

The dyers had been concentrated in Akihabara—long before that Tokyo district became globally famous for electronics and otaku culture—but migrated to Ochiai further upriver over a century ago. Futaba is still located in the same riverside spot, though it stopped using water from the river back in 1955, and now employs a large pool for dyeing.

“There were 300 hundred dyers and related businesses at their peak in this area, but now there are less than ten in the whole of Tokyo. There are still around eighty craftspeople around Ochiai though, many of them older people working out of their homes,” explains Motobumi Kobayashi, president of Futaba Inc. “But if something isn’t done to preserve their skills, then they may die out with the older artisans.”

The story of kimono in Tokyo, and the dark colors used for them there, is tied up with the history of the city before it became the capital in the mid-nineteenth century.

“When Edo [the old name for Tokyo] started
growing very quickly, business started thriving and even more people came to live there from all over the country. As the economy got stronger, the merchants became much wealthier than the samurai, even though they were supposed to be of lower status than the noble warrior class,” says Kobayashi. “In order to try and preserve the honor of the samurai, outward displays of luxury and extravagance were forbidden.”

“Rather than protesting or rioting, the people of Edo found ways to enjoy the rules. They used very colorful designs in hidden parts of their clothes and created numerous variations of the duller colors that they were permitted to use. There were said to be ‘48 browns and 100 grays’—an expression that survives to this day,” he continues.

This is the origin of the Edo Komon or Tokyo Dyed Komon style of dyeing kimono material that translated into a preference for conservative colors in fashion that exists even now in the capital.

“The rules against luxury weren’t really enforced in Osaka or Kyoto, and brighter colors predominated there. That taste for more flashy clothing can still be seen in fashion in the Kansai area of south-central Japan,” suggests Kobayashi. “And to tell the truth, even now our designs and cloth don’t sell very well in Osaka. If you go further south to Kyushu, they start selling again.”

However, not everything carries on as it always has, even in this most history-steeped world. Designs have become much more varied than they were for traditional kimonos, according to Kobayashi.

“The rules of kimono patterns have been thrown away by many people; they now want to express their individuality,” he says.

“And in recent years some people have again come to wear kimono for more casual occasions such as going out for dinner or going to the theater, not just for weddings and formal ceremonies,” says Kobayashi. Moreover, Futaba’s fabrics are enjoyed today by customers in twenty countries, mostly in Europe.

Despite the changes in taste and design, Futaba continues to dye—choosing from 1,200 color variations—and dry in the traditional way, largely unchanged in over a century.

The riverside workshop also features a café, a mini-museum and classes where visitors can try out dyeing for themselves.

A Futaba artisan applies fine dye details to a length of silk cloth. 

Gavin Blair is a freelance journalist living in Tokyo who writes for publications in the United Kingdom, United States and Asia.
Kiyoo Matsuzuki does not agree with the old adage about a girl's best friend. For him, the incomparable pearl is the most beautiful jewel that a woman could wear.

“Pearls are the only gem that is already perfect when we see them for the first time,” says Matsuzuki, the director and curator of the Pearl Museum, on Mikimoto Pearl Island in Mie Prefecture. “With diamonds, rubies or sapphires, they need to be cut and polished to get the most out of them. But a pearl is beautiful from the first moment that you see it.”

Matsuzuki oversees the large museum that is dedicated to the pearl on the small island that lies about 70 yards off the town of Toba where the “Pearl King” Kokichi Mikimoto succeeded in culturing the very first pearl oyster in 1893.

In the late 1920s, the island was opened only for a limited number of guests. That changed in 1951 and the 48 million visitors since have included queens, princes, heads of state and captains of industry, all attracted by these beautiful translucent spheres.

The ground floor of the museum has exhibits that detail how pearls are cultured. There are some 100,000 different varieties of oyster, although only six are suitable for culturing pearls. The pearlers of Japan generally use Akoya oysters, with the black-lipped oysters of Tahiti producing the black pearl and larger white-lipped oysters creating the large South Sea pearl.

To create a pearl, a wedge is inserted into the mouth of the shell and a mantle of clear membrane placed alongside the round nuclei, made of polished mussel shell, that will eventually be coated in mother-of-pearl.

The exhibition shows how a mere 5% of the oysters that are harvested have the best quality pearls, while as many as 50% die. Imperfect pearls are used in medical supplements and cosmetics.

The museum also shows how the pearls are selected to be strung onto lengths of silk thread, with
the stringers required to have a good eye to match pearls of similar luster, color and size. The downstairs area also has an extensive collection of photos related to the pearl industry from around the world, including images of the famous women ama divers of Mie Prefecture.

On the upper level of the museum, visitors can admire the works of art that pearls can become. Matsuzuki and his colleagues began gathering examples of fine jewelry that make use of pearls in 1985 and have built up a collection of around 250 items.

They include a 1 BC earring of gold with three pearls, Roman jewelry, blue pearls set into Byzantine earrings and an exquisite French pendant of circa 1600 of a cross with inlaid pearls. Another example, from around the same time but made in Spain, is of a golden lion with feet made of pearls. The collection also includes English lockets, brooches from Canada and Scotland, and an Iranian mat with pearls from the early nineteenth century.

The artisans of Mikimoto have also created a number of breathtaking larger works of art, including a scale replica of an ancient temple in Nara that has 12,760 pearls, a crown based on a Byzantine crown from the Middle Ages that took fourteen months to make and has 796 top-quality pearls and 17 diamonds, and a replica of the Liberty Bell that was displayed in New York and uses 12,250 pearls and 366 diamonds.

Elsewhere on the island is the Kokichi Memorial Hall, which tells visitors of the life and times of Mikimoto, who died in 1954 at the age of ninety-six. There is also a large statue to the founder of the company, a shop with an extensive selection of pearl products and a place where visitors can watch a demonstration by the ama women divers, dressed in the traditional white robes of the profession.

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“The first snow/The leaves of the narcissus/Are just bending.” So wrote the poet Matsuo Basho of the winter-blooming suisen, a dainty daffodil with a heady scent also known as seichiku, or midst-the-snow flower. A popular sweet called “suisen” also makes its appearance at this time of year, fashioned in the image of the flower from colored nerikiri dough, and filled with koshian red bean paste.