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Mandarin Garden

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Initiative for Nurturing Global Leaders:
Aiming to become a long-term partner
for customers worldwide

Special Feature

From Japan to the World

Using the Power of
Japanese Natto Food to
Purify Water!



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Using the Power of Japanese *Natto* Food to Purify Water!

The traditional Japanese food made from fermented soybeans called natto is rich in protein, recognized as a healthy food and popularly consumed by Japanese people. However, many foreigners shy away from natto due to the unfamiliarity of its slimy texture and peculiar odor. There is a small company in Japan that has developed a water purifying agent from the sticky, viscous constituent of natto and is making dramatic improvements in drinking water availability in developing nations.



Japanese Natto Food

Simply mixing in the powder immediately makes water clean

Nippon Poly-Glu Co., Ltd., is a company in Osaka, Japan, with 30-odd employees. Its mainstay product is a water purifying agent named PG α 21Ca. This product flocculates contaminants in water. Kanetoshi Oda, the developer of the product and chairman of Nippon Poly-Glu, produced a vessel containing turbid brown water collected from a pond in a park and said, "First, let me demonstrate." He added a very small amount of a white powder, PG α 21Ca, to the water and stirred it, then passed it through a filter. The result was unbelievably clear water. Mr. Oda drank the water with satisfaction.

The demonstration provided instant understanding of the immediate effect, safety, and ease of use of PG α 21Ca.

What motivated Mr. Oda to develop PG α 21Ca was the huge disaster caused by the Great Hanshin-Awaji Earthquake in 1995, which killed more than 6,000 people and injured over 43,000 people. In particular the urban infrastructure of Kobe City, Hyogo Prefecture, which was close to the seismic center, was severely devastated. Being a victim of the earthquake himself, Mr. Oda saw people washing dishes and eating utensils in ponds in parks as the water supply was completely cut off for many days. This raised a desire in Mr. Oda to develop a simple water purification technology.

Chairman and CEO
Nippon Poly-Glu Co., Ltd.

Kanetoshi Oda

Easy-to-use, safe water purifying agent



Add 0.1 g of PG α 21Ca to 1 L of water. Stir the water.



Contaminants flocculate in about 1 minute, depending on the water temperature. Most contaminants coagulate and form a single mass, then precipitate.



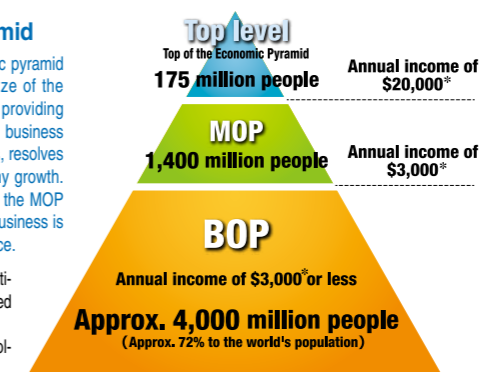
Filter the water through a towel or absorbent cotton to produce clear, colorless water.

The PG α 21Ca water purifying agent is made by adding seashell-derived calcium and other materials to polyglutamic acid, the sticky, viscous constituent of *natto*. The product is made from natural materials. PG α 21Ca purifies heavily contaminated water without using electricity or special equipment. Since it does not have a sterilizing effect, water after filtration is sterilized by chlorine or by boiling for human consumption. But immediately after the PG α 21Ca floc is removed, since small bacterial particles are also removed with the floc, in his demonstration Mr. Oda drank the water without sterilization.

World's economic population pyramid

BOP business is targeted at the base of the economic pyramid (BOP) representing low-income populations. The size of the BOP market is estimated to be about \$5 trillion. By providing products or services useful for BOP populations, BOP business contributes to the improvement of their living standards, resolves local social issues, and achieves sustainable company growth. As BOP populations are anticipated to rise in level to the MOP (middle of the economic pyramid) in the future, BOP business is expected to explore promising future markets in advance.

Source: THE NEXT 4 BILLION (2007 World Resource Institute, International Finance Corporation), illustration created by the Japanese Ministry of Economy, Trade and Industry
*The currency unit used in this diagram is international dollars converted at purchasing power parity (as of 2002).



gy. He remembered reading a report claiming polyglutamic acid, the sticky, viscous constituent of *natto*, adheres contaminants.

"Immediately I purchased expensive polyglutamic acid from a food maker, and put a spoonful of the substance in turbid water. As I expected, a flocculation reaction occurred. Come to think about it, the reaction occurring in the first try was against all odds. Then, I began culturing bacillus subtilis *natto* for mass production of polyglutamic acid and continued research on improving the contaminant flocculating property and sedimentation characteristic," says Mr. Oda.

Three years later, PG α 21Ca was finally completed, but it did not sell at all. The tide turned after the 2004 Sumatra earthquake occurred in the Indian Ocean. Upon receiving a request for assistance for securing drinking water from the royal family in Thailand, Mr. Oda went to the disaster site with student volunteers.

Mr. Oda recalls his experience. "In the disaster-stricken area, water purification equipment costing several tens of millions of yen was set up, but local people were unable to use that advanced machinery properly, so it was just sitting there gathering dust. We made simple water purification equipment using a tank that had washed ashore, and put PG α 21Ca in the tank. About one hour later, we were able to supply a large amount of drinking water without using any electricity, and received loud cheers from residents. I was happy to see that our water purification equipment brought smiles to the faces of residents against the devastated landscape."

Continuous effort for developing a sustainable business system to maximize the potential of water purification equipment

The news of the successful use of PG α 21Ca spread across the world, and requests for assistance started pouring in from areas suffering shortages of drinking water. In response, Mr. Oda traveled to each site and supplied PG α 21Ca free of charge. Those voluntary activities were greatly appreciated. When Mr. Oda was feeling fulfillment from conducting those philanthropic activities, a shocking reality struck him. When he revisited Bangladesh three months after setting up water purification equipment in an area struck by a cyclone, he saw the equipment in disuse. All the faucets had been stolen. He also learned that PG α 21Ca left in the hands of the clergy had found its way onto the black market.

Analyzing this situation, Mr. Oda concluded as follows:

- (1) If the management of water purification equipment relies on the goodwill of an individual, there is a possibility that the equipment may stop operating due to financial reasons or others.
- (2) PG α 21Ca may find its way onto the black market and be sold at high prices.
- (3) If PG α 21Ca is used improperly without a supervisor, unsafe drinking water may be consumed by people.

"Our company had limited funds for continuously providing a free supply of PG α 21Ca. If we went beyond our limits, our company would be in serious financial trouble. People in the areas where we supplied PG α 21Ca

were drinking unsanitary water even before the disasters, so they wanted to continue drinking clean water for free. They requested us to supply PG α 21Ca free of charge. But, in reality it was difficult. So, I sought a way to solve those three problems and create a feasible business model."

Mr. Oda's decision was that Nippon Poly-Glu would be the seller of water. A survey was conducted on the amount of money local residents could pay in order to determine an appropriate price for water. Based on the survey results, the price was set at \$1.00 per month for a supply of 10 liters of water per day, or \$2.00 per month for 20 liters per day. "The price was determined in negotiation on an equal footing so that the price would make the business feasible and also enable local residents to be self-supporting. The basic principle of business that appropriate technology and service should be provided at an appropriate price is also valid in developing countries."

Mr. Oda reviewed the systems for all processes ranging from installation of water purification equipment to its management and supply of water. Male employees took charge of equipment production, water purification, water quality testing and delivery of water. Female employees were responsible for conducting activities for raising the awareness of safety of water and providing information on the function of PG α 21Ca, as well as collecting money. Local employees performed these tasks, maintaining the water purification equipment in order, while the payments from the customers enabled sustainable business operation.

The business model created by Nippon Poly-Glu has attracted a great deal of attention as an advanced BOP business case. Presently Nippon Poly-Glu is conducting business in India, Myanmar, Rwanda, and Tanzania. In Somalia where the unstable political situation created many refugees, water purification machines were set up at 53 locations to supply water to 700,000 people with the aid of the Japanese government. Some 700 local employees are engaged in the business. The water purifying agent whose development was inspired by Japanese food presented an ideal business model that brings benefits to the seller, the buyer, and the local community.

Mandarin Garden



A large-scale multipurpose building complex called Mandarin Garden has recently been completed in the Vietnamese capital, Hanoi. Designed and constructed to achieve advanced facility quality and provide high levels of safety, convenience, and comfort, the project has successfully achieved integrated management of all facility equipment by installing Japanese-quality equipment, devices, and systems, as well as an integrated management system. Among facilities of its type in Vietnam, Mandarin Garden is regarded as one of the most advanced in its functions.

“Japanese quality” was sought for facility safety, security, convenience, and comfort

Occupying the eastern part of the peninsula of Indochina, the Socialist Republic of Vietnam is a long narrow country, measuring approximately 600 km in width in the east-west direction and stretching for about 1,650 km in the north-south direction. Although Vietnam is a socialist state, in 1986 it initiated its Doi Moi (‘reform’) Policy with the aim of creating a market economy and opening its markets to the world. Since then, the country has been energetically promoting structural reforms for the purpose of attracting foreign investment capital. Consequently, Vietnam has been enjoying continuously high economic growth since 2000.

The Hoa Phat Group is a leading corporate group in Vietnam that conducts a variety of business activities, including steel production and manufacture of furniture and construction materials. In 2001 the Group launched a real estate business and now owns many commer-

cial facilities and industrial parks used by foreign companies.

Mandarin Garden, which was constructed by the Hoa Phat Group, is a multipurpose building complex located on Hoang Minh Giam Street in the central western part of Vietnam’s capital of Hanoi. The total area of Mandarin Garden is 25,886 m². There are 9 high-rise buildings on the premises, each with 2 basement levels and from 21 to 29 above-ground levels. Located in these buildings are residential units, schools, commercial establishments, athletic facilities, and others.

“In constructing Mandarin Garden, we aimed to achieve advanced facility quality and provide high levels of safety, convenience, and comfort that will be appreciated by residents and tenants,” says Mr. Nguyen Viet Thang, Deputy General Director of Hoa Phat Group. To select a contractor for the system that would provide integrated management of facility equipment, in early 2012 Hoa Phat Group asked vendors to submit

proposals. After an extensive examination of the submissions, the Group chose Azbil Vietnam Co., Ltd. Hoa Phat’s head office building is equipped with Azbil Corporation’s building management system, savic-net™FX, which Hoa Phat rates highly for its management of equipment and energy. This was undoubtedly taken into account in opting for Azbil Vietnam. “I have used numerous Japanese products and always appreciated their high quality. Azbil has a long track record of over 100 years in the Japanese market. Azbil Vietnam’s proposal based on that extensive experience stimulated our expectations for ‘Japanese quality’, not only in terms of superior products and systems, but also for training of operators,” explains Mr. Nguyen Viet Thang.



Mandarin Garden has a kindergarten and a fitness club to serve community needs.



Centralized monitoring of facility equipment is provided by savic-net FX.



The support provided by Azbil Vietnam’s staff, including equipment operation training, gives a great sense of assurance to the operators at Mandarin Garden.

Integrated management of equipment for high operational efficiency

Equipment installation work at Mandarin Garden started in October 2012, and was completed in December 2013 as scheduled.

The equipment and systems installed by Azbil Vietnam range widely and include a building management system (BMS), video door phones for residential units, access control for security car parking system for the tenants and exits of premises, public-address systems, surveillance cameras (CCTV: closed circuit television), and communications infrastructure for telephones and internet network. The BMS installed in Mandarin Garden is savic-net FX, the same product used successfully in the Hoa Phat Group’s headquarters. For building operation, it provides significant benefits. In addition to controlling the air intake and exhaust for parking areas, the air conditioning, the lighting, and the water supply and drainage for common areas, savic-net FX obtains information on equipment like elevators and power generators manufactured and installed by other companies for integrated management and monitoring.

In the words of Property Manager Mr. Doan Tuan Hai, “Since the status and alarms related to a variety of equipment within the buildings can be monitored and managed with a single monitoring system, the onsite workload is signifi-



Security guards constantly watch images from surveillance cameras installed in the common areas on the premises of Mandarin Garden.

cantly reduced. We can now use the time saved by this high-efficiency system for doing other work. And even after the installation of the equipment and systems, Azbil Vietnam continues to provide thorough operator training and support to make sure that the equipment and systems operate smoothly on a daily basis, so we can rest assured.”

The equipment and systems installed by Azbil Vietnam have realized high levels of safety, convenience, and comfort at Mandarin Garden, as expected by the Hoa Phat Group.

A model for multipurpose building complexes with advanced functions in Vietnam

Even after the completion of the facility, efforts to reduce energy consumption are ongoing at Mandarin Garden. “We can already recognize energy-saving effects,” says Mr. Doan Tuan Hai. “Thanks to automatic control, especially by savic-net FX, Mandarin Garden has reduced its manual workload and energy consumption while maintaining high levels of environmental quality through the management of operating times and settings of air conditioners and ON/OFF of wide-area lighting systems and air intake/exhaust fans. We plan to expand the scope of automatic control towards further enhancement of efficiency and energy-saving performance.”

The project owner, the Hoa Phat Group,



In the courtyard, sprinklers for trees and plants and lighting equipment are also controlled by savic-net FX.

intends to use Mandarin Garden as a model for advanced multipurpose building complexes and apply the same concept to other projects in Vietnam. “We will strive to make further improvements in both equipment and management through the daily operation and management of Mandarin Garden,” says Mr. Nguyen Viet Thang. “We would like to introduce the initiatives we implemented for Mandarin Garden as a ‘living example’ for other real estate companies in Vietnam. With regard to Azbil he adds, “We count on Azbil Vietnam’s problem-solving abilities, and we hope to extend our association with them beyond the real estate field, and work closely in other business areas.”

*savic-net is a trademark of Azbil Corporation.

Hoa Phat Group	
	
Location	39 Nguyen Dinh Chieu Street, Hai Ba Trung District, Hanoi, Vietnam
Establishment	August 1992
Business lines	Steel production, manufacturing of furniture and construction materials, real estate, etc.
	Mr. Nguyen Viet Thang Deputy General Director
	Mr. Doan Tuan Hai Property Manager

Initiative for Nurturing Global Leaders: Aiming to become a long-term partner for customers worldwide

In 2012 Azbil Corporation established the Azbil Academy, an institution for fostering human resources, which integrated the planning of human resources training that had previously been handled individually by the Human Resources Department, in-house companies, and other departments. In April 2014, Azbil Academy started the First azbil Globalization Seminar (FaGS), a global training program targeting employees of Azbil in Japan and employees of overseas affiliates. The objective of this program is to strengthen the development of leader-level human resources who will lead the azbil Group's global expansion.

Azbil Academy integrates the planning of in-house human resources training

In April 2012, Azbil Corporation changed its name from Yamatake Corporation, and made a fresh start under a new management team. At the same time, the company began implementing its three key initiatives: 1) become a long-term partner for both the customer and the community by offering solutions based on azbil technologies and products; 2) implement global initiatives aimed at expansion into new regions and a qualitative change of focus; and 3) promote organizational reforms to become a "corporate organization that never stops learning" so that it can respond to change in the business environment.

In developing business under these

initiatives, the fostering of human resources is of particular importance; thus Azbil established the Azbil Academy in November 2012. Azbil Academy integrated the planning of all in-house human resources training, including training for new employees and mid-level employees by the Human Resources Department, and ability-based training and product and engineering training provided separately by Azbil's Building Systems Company (BSC) and Advanced Automation Company (AAC). We are further improving the organization so as to develop human resources capable of flexibly responding to change in the business environment and to dynamically allocate human resources in growth fields.

New program aimed at the development of human resources who will be the driving force for overseas business

In April 2014, Azbil Academy started the First azbil Globalization Seminar (FaGS), a training program for employees of the azbil Group's overseas affiliates as well as Azbil employees in Japan, aimed at developing human resources for promotion of global expansion. Azbil's previous initiative for global expansion focused on foreign language training for Japanese employees and the aggressive deploy-

ment of Japan-based employees to overseas assignments. Local employees of overseas affiliates received product and engineering training provided by Azbil's in-house companies. The objective of FaGS is to strengthen the development of leader-level human resources who will lead the azbil Group's global expansion.

Specifically, this program involves the entire azbil Group in the fostering of human resources who will be appointed as managers or managing directors of the azbil Group's overseas affiliates, regardless of whether they are Azbil employees in Japan or overseas.

The FaGS program will bring together 10 overseas affiliate employees selected by affiliate presidents and managing directors and 10 Japan-based Azbil employees recommended by the presidents of BSC and AAC. Participants will receive training for 3 days per month for 6 months. Training in a common environment will enable participants to share the skills required to lead the azbil Group's global expansion; it is also hoped that the opportunities to communicate will strengthen the bond among azbil Group employees across national boundaries. Another objective is to select persons who will in the future occupy important positions in the azbil Group.



Group discussion

Through group discussion, participants merge three themes into a single proposal.



Lecture

An external lecturer gives a detailed lecture on how to organize a presentation logically and on strengthening communication skills.



Individual Presentation

Participants divide into three teams, and each person makes an individual presentation. Afterwards the facilitator makes comments, other presenters ask questions, and the presenter's ideas are discussed by members of the presenter's team.

Building strong communication skills for global business success

The FaGS training course focuses on strengthening communication skills such as organizing and presenting one's ideas in a logical manner. As a main task, participants are given a topic on which to create and deliver a presentation. Participants construct their presentations both individually and through group discussion. The facilitator then provides guidance on improving the outline and logical development of the presentation. Next, participants will apply the facilitator's advice to restructure their presentations in time for the next meeting the following month. By repeating this process over the course of six months, participants will gain the capability to explore and summarize their thinking while learning how to present ideas logically. During the FaGS training, all communication, from administrative messages to class presentations, is conducted in English.

Through study and discussions with per-

sons of various nationalities, participants are exposed to a diversity of thoughts and perspectives. Furthermore, the experience of explaining one's ideas until the other person understands will enable participants to build strong communication skills for global business success.

In addition to communication skills training, participants will gain the basic knowledge necessary for developing business overseas as an azbil Group member. The course covers Azbil's history and management philosophy, finance (including corporate accounting), and corporate social responsibility (CSR) of Japanese companies, which is internationally at a high level.

As the final step of this 6-month training, participants will deliver their presentations to Azbil's management. Upon completing the course, participants with outstanding results will receive a completion certificate.

The first FaGS began on April 14, 2014. A total of 16 people, including 7 employees of overseas affiliates (each from a different country in the

ASEAN region) and 9 Azbil employees in Japan, are currently in training and engaged in lively discussions and presentation. Six FaGS training courses are scheduled to be held, twice a year for 3 years, until the end of fiscal year 2016, during which time over 100 employees will have taken part in this training.

For the azbil Group, the desirable qualities of the human resources to lead the Group's global expansion would be a mixture of fairness and toughness, based on logicalness. FaGS is designed with the purpose of imparting such principles; participants are also expected to achieve personal growth as well as play an active role in horizontally deploying the acquired knowledge in their respective departments. They will lead the next-generation of the azbil Group which, by delivering value to customers in global markets through the azbil Group's unique solutions based on market needs, is aiming to become a long-term partner for customers.

A series of phenomena in a flowing liquid including the formation of vapor bubbles due to decreased pressure, the implosion of those bubbles when pressure rises, and the return of the bubbles to liquid.

Shock waves and microjets generated by flowing liquid can cause the destruction of pipes and valves.

Cavitation refers to a series of phenomena in a flowing liquid, such as water or petroleum, including the formation of small bubbles (vapor bubbles), the implosion of those bubbles, and their return to liquid. When cavitation occurs, there is a shock wave or strong local jet of liquid that generates vibration and noise in the pipes or connecting valves. This gradually causes fatigue fracture (cavitation damage) of the liquid-contacting surfaces, which eventually becomes a serious problem.

Cavitation is triggered by the pressure changes in the flowing liquid, which occur at various places inside the pipe. A change in pressure causes the formation of vapor bubbles because it reduces the boiling point of the liquid. Under normal atmospheric pressure, water boils at 100 °C and produces vigorous bubbles. The boiling temperature of water is the boundary temperature at which liquid water changes rapidly to vapor, forming vapor bubbles.

In the case of factories and power generating plants, liquids in pipes are under pressures of several tens to several hundreds of atmospheres in order to efficiently transport the liquids and to drive turbines at high speeds using high differential pressures. Consequently, liquids in the pipes of factories and power generating plants tend to experience sudden changes in pressure.

In particular, valves that are used to adjust the pressure or flow rate of liquids in pipes constrict the area through which the liquid passes. This increases the flow speed of the liquid in the pipe and creates conditions prone to cavitation. According to the energy law governing liquids, an increase in flow velocity decreases the pressure, and therefore the boiling point is lowered, causing vaporization of the liquid and the formation of vapor bubbles. Bubbles formed by cavitation can sometimes have high energy* in spite of their small size, and can completely destroy even the hard stainless steel plug in a valve in about 10 hours in some cases.

Methods for preventing cavitation damage and technologies for detecting signs of cavitation

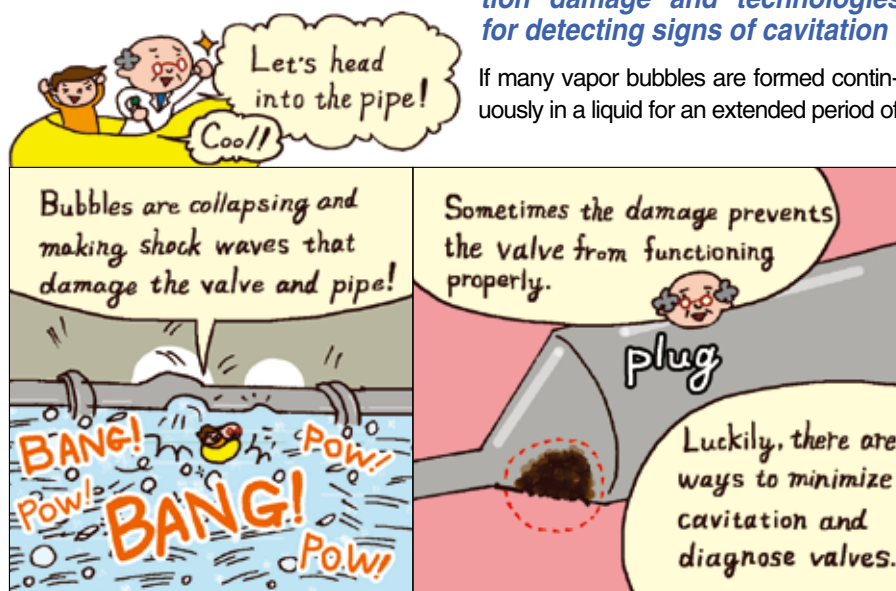
If many vapor bubbles are formed continuously in a liquid for an extended period of

time, cavitation damage can progress in the valve, eventually preventing accurate regulation of the liquid pressure or flow rate. In the case of a manufacturing factory, this results in quality problems in the product. Before long, the valve becomes unable to close properly to stop the flow of the liquid, or the pipe ruptures when it is no longer able to withstand the pressure.

There are countermeasures to the problems caused by cavitation. Cavitation damage can be prevented by using a plug made of a material that is hard to break, or by using valves that incorporate a specially designed internal structure to minimize internal pressure changes.

In order to detect cavitation damage occurring inside of valves and pipes, installation of a maintenance support system enables maintenance engineers not only to monitor the condition of the valve but also to determine the appropriate replacement period for the valve by means of a valve positioner equipped with diagnostic functions.

*Theoretical calculations show that a bubble of 1 μm (1 micrometer = 0.001 mm) in size can generate a local pressure of 90 atmospheres and a high temperature of about 570 °C when it collapses.



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Control valves supplied by the azbil Group are widely used for process control applications requiring high reliability. Innovative diagnostic technologies in new smart valve positioners contribute to realizing predictive maintenance of control valves.



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Yamatake Corporation changed its name to Azbil Corporation on April 1, 2012.

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