

Int'l Business Leaders

Examples of Successful Foreign Investment

Talk About Taiwan

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Preface

Investing in Taiwan, Creating New Growth

Taiwan, located strategically in the Asia-Pacific region, plays a pivotal role for multinational enterprises to explore the Asian markets and link up with global industries. Taiwan has a free and open environment for economic development, high-quality human resources, strong manufacturing base, innovative R&D capabilities, and comprehensive legal system. These have allowed Taiwan to develop comprehensive industry clusters, and further serve as a key role in the global ICT and high tech industry supply chain.

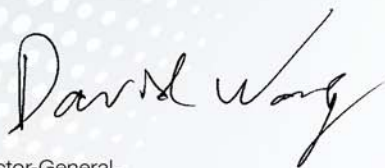
To take full advantage of Taiwan's competitive industries and drive next-stage economic growth, the government is undertaking three main strategic principles. They are "linking with local resources", "linking with the future", and "linking with global markets" to promote the emerging industries such as "Asian silicon valley", "smart machinery", "green energy", "biomedicine", "national defense", "circular economy", and "semiconductors". Our goal is to elevate Taiwan's industrial development, while also leveraging the advantages of different regions in Taiwan to build up an innovative research and development environment, thus connecting Taiwan and international industries. As Taiwan's innovative industries mature, businesses can use Taiwan as a base to tap into emerging markets such as Southeast Asia with systematic exports, then further contribute to Taiwan's economic and trade growth.

Attracting foreign businesses and investors is one of the main tasks of the Ministry of Economic Affairs. To strengthen our customized services for investors, the "InvesTaiwan Service Center" has been set up to provide one-stop services by having dedicated project managers, as well as a response within 24 hours for online inquiries. For investment projects that involve

other ministries or local governments, we are also working closely to strengthen cross-departmental efforts to eliminate obstructions and speed up the completion of the investment project.

Over the course of Taiwan's economic development, foreign enterprises have played a key role in Taiwan's economic growth and industry upgrades, and have benefited alongside Taiwan's industrial expansion. As the global economy shifts its focus to the Asia-Pacific region, and the investment environment in Taiwan enters the stage of knowledge-driven growth, the operations of foreign enterprises in Taiwan have shifted from manufacturing and sales to the high value-added functions such as overseas staff support, technological research and development, and key component procurement. On this basis, we interviewed high-level managers of fifteen benchmark foreign enterprises investing in Taiwan, to better understand their business strategies and company histories, in the hope that other enterprises will be able to learn from their experiences.

It is our hope that the publication of this book will motivate more foreign enterprises to make use of Taiwan's advantages and invest in Taiwan. I would also like to take this opportunity to thank our foreign enterprises for their contributions to Taiwan's economic growth.



Director-General,
Department of Investment Services, MOEA

Preface

Investing in Taiwan to Capture Business Opportunities Driven by Industrial Innovation

An examination of global trends in foreign investment in recent years shows that, according to data compiled by the United Nations Conference on Trade and Development (UNCTAD), global inward foreign direct investment (Inward FDI, or IFDI) in 2014 fell to US\$1.28 trillion (the lowest level in several years), mainly due to a slackening in the pace of the global economic recovery, a “wait and see” attitude among investors, and rising geopolitical risk. However, as a result of increased enthusiasm for foreign investment among the developed nations and a spike in international M&A activity, global IFDI rose by 38% in 2015 to US\$1.76 trillion, its highest level since the global financial crisis of 2008.

Foreign investment has for many years played a vital role in Taiwan’s industrial development process. Over the past few decades, foreign investment has had a far-reaching impact on Taiwan in terms of industrial technology upgrading and human talent cultivation, and even in social and cultural terms. Currently, the Taiwanese government is actively promoting a new economic development model that takes “Innovation, Employment and Distribution” as its core elements with the aim of allowing innovation to replace efficiency as the main driving force economic growth, thereby restructuring Taiwan’s economy and reinforcing its competitiveness. The “Industrial Innovation and R&D Plan,” targeting key industries such as the “Asian Silicon Valley” sector (the Internet of Things (IoT) and “smart” applications), smart machinery, green energy, biomedicine and national defense, will play a key role in the government’s promotion of this new economic development model; at the same time, the government anticipates that close collaboration between foreign companies and local Taiwanese companies in areas such as technology, supply chain development and system development will help to create new business opportunities through industrial innovation.

To help the general public develop a better understanding of the achievements of foreign companies operating in Taiwan and the contribution they have made to Taiwan's development, as well as their views on Taiwan's outlook for the future, our research team identified 15 leading multinational corporations operating in Taiwan in industries such as semiconductors, IoT, robotics, biotechnology, the chemical industry, and IT services, and conducted in-depth interviews with their managers. This work forms the backbone of this book, *Int'l Business Leaders Talk About Taiwan: Examples of Successful Foreign Investment*. It is clear from the interviews presented here that the foreign companies interviewed are all very interested in the content of Taiwan's new "Industrial Innovation and R&D Plan" and the way in which the plan is implemented, and that they are eager to seek out the business opportunities it offers. Some of the interviewed firms have already started to take concrete action in this regard, working to strengthen their collaborative partnerships with key Taiwanese customers and suppliers in areas such as technology R&D, new product development and the development of overseas markets. The implementation of the "Industrial Innovation and R&D Plan" is thus expected to bring about a gradual strengthening of the linkages between Taiwanese and international corporations.

Given the current high level of uncertainty in the political and economic outlook, both within the Asia-Pacific region and worldwide, multinational corporations and governments are facing challenges in setting business strategies and policy initiatives. Government agencies in Taiwan are strengthening its existing sources of competitive advantage in terms of R&D capabilities and human talent, striving to build an investment and living environment conducive to foreign investment, and providing comprehensive services to help foreign companies already investing here, thereby providing meaningful support for the deepening of partnerships between foreign companies and local firms in the areas of investment and supply chain development. We look forward to closer cooperation between these foreign and domestic companies in tapping into the emerging business opportunities driven by industrial innovation in Taiwan.



Project Organizer
Director, Regional Development Study Center
Chung-Hua Institution for Economic Research



Working to “Change the World” in areas relating to human health and wellbeing

Becton Dickinson Holdings Pte. Ltd. Taiwan Branch

Looking back over the launch of Taiwan’s National Health Insurance (NHI) system in 1995, the establishment of the Taiwanese Association of Diabetes Educators (TADE) in 1996, Taiwan’s handling of the SARS epidemic and the introduction of a new infection control system in 2003, and the passage of legislation to ensure safe syringe and needle use in 2012, these developments all reflect the efforts that Taiwan has made to strengthen its healthcare sector; they are themselves also reflected in the way that the Taiwan operations of Becton, Dickinson and Company (BD) have gradually evolved from basic product marketing to include the promotion of comprehensive medical concepts in areas such as Medication safety. A world leader in medical technology, BD has been expanding its collaborative efforts in Taiwan across the board; as Terry Lin, the General Manager of Becton Dickinson Holdings Pte. Ltd. Taiwan Branch puts it: “Everyone is working together to help enhance the quality of medical care provision in Taiwan and promote the development of the Taiwanese biomedical industry!”



Becton Dickinson Holdings Pte. Ltd. Taiwan Branch General Manager Terry Lin feels that every aspect of BD's development has been closely connected with human health and wellbeing (Photo courtesy of Becton Dickinson Holdings Pte. Ltd. Taiwan Branch)

All of the business areas in which BD is involved – including medical devices, Diagnostic instruments, and R&D aimed at finding ways to improve drug delivery and to enhance the effectiveness and speed of the techniques used to diagnose communicable diseases and cancers, as well as the development of new drugs and vaccines, etc. – are related to human health and wellbeing. However, because the fields in which BD is active are all highly specialized, and because the company's products are mostly used by specialist medical professionals, BD is not particularly well-known to the general public. Nevertheless, examination of the recent history of medicine shows how every step in BD's development has symbolized the company's commitment to “changing the world”; overall BD's impact has been very impressive.

BD's core competencies – “Better Delivery, Better Diagnostic, Better Discovery”

Syringes are one of the most familiar items to medical professionals





Safety needles have more comprehensive protective design features

working in hospitals. The external appearance of a syringe is misleadingly simple; it appears to consist of just a needle and a tube. In reality, however, manufacturing syringes involves some very specialized and advanced technology. In the past, shortages of syringes forced nursing staff to reuse syringes, which often led to the spread of infectious diseases.

“You shouldn’t underestimate the importance of a syringe, small though it is; any slight imperfection that is introduced at the cutting or polishing stage could cause a fatal incident” stresses Terry Lin, BD’s General Manager for Taiwan and Hong Kong, noting that this is especially true in the case of syringe needles, where the requirements are very exacting; syringe manufacturers can’t afford to make even the slightest error in the straightness of the pen-nib shape or in the angle of the tip.

Of course, technology is evolving all the time, and the production technology used for making syringes has long since progressed beyond the “bottleneck” problems of the early days. Today, the focus is on developing specialist technologies that can make syringes safer, simpler, and more efficient to use. As Terry Lin explains, BD has always upheld protection, simplicity and performance as its core values, and this is what has enabled the company to play a significant role in the history of medicine.

Becton, Dickinson and Company was founded in Franklin Lakes, New Jersey in September 1897. In 1924, BD began production of the world’s first syringe specifically designed for insulin injection, and the company subsequently went on to develop a system for drawing blood by vacuum. These developments, which seem simple today, were key factors in helping to enhance

the safety of nursing staff and safeguard the health of patients. Taking the vacuum blood-drawing system as an example, Terry Lin explains that, besides making it easier to collect blood samples and reducing the amount of time needed for nursing staff to complete this task, more importantly, it enhanced the precision of blood sampling, which in turn improved the quality of test reports.

"The Vacutainer® push-button blood collection set that we developed reduces the discomfort involved in having blood samples taken even more effectively, while also helping to protect nursing staff from accidental needle stick injuries." Terry Lin notes that, reflecting BD's vision of "Advancing the world of health," the safety of medical professionals and patients is an overriding consideration in all the products that BD develops.

Maintaining the company's core competitive advantages and building up impressive development capabilities

BD has maintained an unwavering commitment to the promotion of human health and wellbeing, as seen in the company's development of the world's first automated testing system for blood culture, and the BACTEC 460 (the world's first automated system for mycobacteria testing); in the U.S.A., the Clinical & Laboratory Standards Institute (CLSI) laboratory standards recommend the use of BD's mycobacterial culture and drug allergy testing systems. BD refuses to allow itself to become complacent in its efforts to contribute to human health and wellbeing. Terry Lin notes that BD has achieved global recognition for its achievements in all five of the company's main business areas: pharmaceutical drug delivery systems (including improvements in syringe technology);

testing (microbiological testing development and research); cell-related R&D (including flow cytometry and cell sorting); disease management (including diabetes management and women's health issues); and hospital infection control, etc.



BD's insulin injection pen needles feature superior protective design

Reflecting the efforts that BD has made, in 2016 the company was included in the Top 50 in Fortune magazine's "Change the World" list for the second consecutive year. Among world-leading medical technology companies, BD stands out because, in addition to its focus on the manufacturing and promotion

of medical devices, medical instruments and diagnostic agents, the company has also worked tirelessly to help combat those diseases that present the most urgent problems for the world as a whole, undertaking research in relevant fields and working to improve drug delivery and to enhance the quality and speed of diagnostic analysis for communicable diseases and cancers.

Currently, BD has extended to approximately 50 countries around the world, with a global workforce that exceeds 40,000 people. As part of the globalization of its operations, BD entered the Taiwan market in 1987. "In Taiwan, we are mainly focused on product sales; we attach particular importance to utilizing user education and training to share specialist concepts and accurate medical knowledge with our customers, thereby helping to enhance the overall quality of medical care." This simple comment by Terry Lin embodies BD's core values and sources of competitive advantage.

BD's main customers are hospitals, biotech researchers, clinical laboratories and pharmaceutical manufacturers; the only BD products aimed at the consumer market are alcohol swabs and insulin pen needles. As a result, although BD has been in Taiwan for nearly three decades, relatively few people in Taiwan are aware of the contribution that BD has made to the Taiwanese healthcare sector.

Currently BD produces a significant share of the following types of medical system and equipment that are used in Taiwan: drug delivery systems (including syringes, infusion needleless connector, catheters, insulin injection devices, safety needles, etc.), and testing and analysis systems (including microbiological testing, molecular diagnostics, and venous blood collection systems); BD is an especially important supplier of cell-related equipment in Taiwan. Terry Lee notes that "Particularly in relation to the utilization of flow cytometers and fluorescence-activated cell sorters (FACS), BD has collaborated with many hospitals and research institutes in Taiwan." Several hundred of BD's flow cytometers are in use by hospitals and research organizations in Taiwan, being used for applications which range from academic research at the Academia Sinica through to immunodiagnosis by clinical allergy, immunology and rheumatology departments, hematology and oncology departments, pediatric medicine departments, and medical centers including National Taiwan University Hospital, Chang Gung Memorial Hospital and Taipei Veterans General Hospital.

Leveraging the synergistic power of "one plus one is more than two" to develop immense new business opportunities

The field of disease management (including cervical cancer diagnosis and diabetes control etc.) is also an important aspect of BD's development of its business operations in Taiwan. This also includes infection control, covering areas such as

patient safety and nursing staff training, etc. "Actually, Taiwan is at the forefront of many trends in healthcare, including diabetes management, infection control, safe needle use, etc." Terry Lin notes that, 20 years ago, at a time when many countries did not emphasize diabetes prevention work, Taiwan had already established the Taiwanese Association of Diabetes Educators (TADE) and similar organizations, and diabetes Educator were being appointed in Taiwan's medical centers. These measures, combined with the establishment of a joint care network, have done a great deal to help diabetes sufferers in Taiwan.

"Today, medical professionals from many other countries come to Taiwan to learn from our experience." Terry Lin points out that Taiwan had already put its National Health Insurance (NHI) system in place by 1995, and that the Severe Acute Respiratory Syndrome (SARS) epidemic of 2003 helped Taiwan to accumulate a great deal of valuable experience in the area of infection control, so that today Taiwan is able to serve as a model for other countries in this field. The passage of legislation in 2012 aimed at ensuring safe syringe and needle use made Taiwan the first country in the Asia Pacific region to legalize it. All of this experience has helped Taiwan to build competitive advantage in the healthcare sector.



With one of BD's insulin injection pen needles, the head of the needle is only exposed when the injection is being given



Many of the medical devices currently used in Taiwan (particularly syringes) are made by BD



It is worth noting that Taiwan is also strong in the areas of biotechnology and vaccines. Terry Lin points out that “As Taiwanese biotech firms and pharmaceuticals manufacturers possess the technology needed to produce high-quality pre-filled drugs and vaccines, we are able to work together with these leading biomedical firms, collaborating with them on the development of overseas markets and making a joint effort to create new international business opportunities.” Mr. Lin stresses that this kind of collaboration between BD and Taiwanese firms is able to generate significant synergy, with “one plus one” adding up to more than just two.

“Through its collaboration with Taiwanese industry, BD is able to benefit from the influence and technology possessed by firms in relevant industries, while at the same time this type of collaboration also helps to drive the continued development of the Taiwanese biotech sector.” In today’s world, with the global efforts to develop “digital health,” expanding the level of integration between the Internet of Things (IoT) and the healthcare sector is a key part of BD’s global development strategy, and is also a major trend that can be expected to continue into the future; Taiwan has also been speeding up the pace of planning in regard to this area.



The 14th Asia-Pacific Federation for Clinical Biochemistry and Laboratory Medicine Congress, held in 2016 (Photo courtesy of Becton Dickinson Holdings Pte. Ltd. Taiwan Branch)



The BD booth at the Taiwanese Association of Diabetes Educators (TADe) 2016 Annual Meeting (Photo courtesy of Becton Dickinson Holdings Pte. Ltd. Taiwan Branch)

To meet its future development needs, BD is actively working to recruit more talents in Taiwan. Terry Lin notes that, because the users of BD's products are mainly medical laboratory scientists, nursing staff or researchers at academic institutions, the company does not enjoy the same level of brand recognition that manufacturers of consumer products can achieve, thus causing challenges for its recruitment.

"In the past, we have recruited mainly from other firms within the industry. Looking ahead to the future, however, we are hoping to recruit more graduates, so that we can cultivate the managerial and other talent needed to support our ongoing organizational development." Life sciences graduates in particular tend not to see a career in industry as their first choice. BD believes that, by combining the specialist knowledge that graduates have acquired with the training and career development that BD can provide, it should be possible to help graduates maximize their potential, while at the same time cultivating more biotech talent for Taiwan, so that Taiwan's biotech sector can continue to develop and to internationalize its operations.



CLARIANT
台灣科萊恩化學股份有限公司

Working to implement a sustainable development philosophy, and fulfilling its responsibilities as a global citizen

Clariant Plastics & Coatings (Taiwan) Co., Ltd.

Clariant is one of the world's leading producers of specialty chemicals. Clariant's masterbatches factory in Taoyuan, Taiwan has for many years now played a key role in supporting the growth of Taiwan's textile industry and consumer products industries, and has also been expanding its export business in line with the overseas expansion of Taiwanese companies. Recently, Clariant has established a ColorWorks division in Taiwan to introduce the latest international trends in color aesthetics and develop opportunities for collaboration with a wider range of industries. Clariant is also making efforts to contribute to the enhancement of food safety and environmental sustainability, in line with the Clariant Group's longstanding core value of emphasizing corporate social responsibility.



The Clariant Plastics & Coatings (Taiwan) masterbatches factory in Taoyuan (Photo courtesy of Clariant Plastics & Coatings (Taiwan) Co.,Ltd.)



Clariant Plastics & Coatings (Taiwan) Country Head Yu Shu-Fen (Photo courtesy of Clariant Plastics & Coatings (Taiwan) Co.,Ltd.)

Over the past few years, Taiwan has experienced a series of food safety incidents involving the adding of plasticizers to food products, as well as frequent reports of factories engaging in illegal effluent emissions. As a result the general public in Taiwan tends to view the chemical industry as having a negative impact on the environment. In point of fact, the flourishing of the chemical industry has provided major benefits in terms of enhancing humanity's quality of life. Many of today's leading international pharmaceuticals corporations started out as famous chemical manufacturers, which subsequently spun off their pharmaceuticals operations as separate businesses in line with operational needs. Clariant, which is one of the world's leading specialty chemical manufacturers, was originally the specialty chemical division of the Sandoz Group; in 1995, after years of steady growth, the specialty chemical division was spun off as an independent corporation.

In order to enhance its corporate competitiveness, in 1997 Clariant acquired the specialty chemical division of Germany's Hoechst; this was followed in 2000 by the acquisition of BTP plc, with the aim of boosting market name recognition and expanding the company's product line. The acquisition of Ciba's masterbatch business in 2006, of Rite Systems

and Ricoh Colors in 2008, and of Süd-Chemie in 2011, helped to strengthen Clariant's innovation and R&D capabilities, enabling the company to meet the needs of customers in a wide range of different industries. The scope of Clariant's business activities includes four main areas: Care Chemicals, Natural Resources, Catalysis, and Plastics & Coatings. In order to keep ahead of its competitors, Clariant attaches great importance to R&D, with R&D projects covering high-performance, reusable raw materials, zero-emission transportation equipment, and conservation of limited resources, etc. Currently, Clariant has business locations in over 100 countries around the world, with a total workforce of 17,213 as of 2015, of which around 120 were Taiwanese nationals.

Jennifer Yu, the Country Head of Clariant Plastics & Coatings (Taiwan), notes that Clariant Plastics & Coatings (Taiwan) can trace its origins back to 1968, when Hoechst established a subsidiary in Taiwan. Over the many years that have passed since then, the company has achieved impressive performance, and the high quality of its products has enabled it to build stable partnerships with many Taiwanese companies. Currently, the main business areas of Clariant Plastics & Coatings (Taiwan) include the production and sale of masterbatches, as well as the sale of other specialty chemical products



Clariant Plastics & Coatings (Taiwan) has advanced specialist spinning equipment, capable of meeting customers needs for a wide range of different product types (Photo courtesy of Clariant Plastics & Coatings (Taiwan) Co.,Ltd.)



Clariant Plastics & Coatings (Taiwan) possesses comprehensive product development capabilities and testing facilities, and is committed to supplying customers with high-end, high-quality products (Photo courtesy of Clariant Plastics & Coatings (Taiwan) Co.,Ltd.)

such as additives, colorings, catalysts, acid activated bleaching earth, etc.

Clariant has also established a ColorWorks color design center in Taiwan. This design center is able to provide branded vendors and product designers with designs and technical services in relation to the latest color trends, helping customers to rapidly develop the colors most appropriate for their products. Currently, Color Works' service scope is very broad, including packaging, consumer goods, office products, furniture, textiles, sporting goods, fashion goods, etc.; many companies insist on using ColorWorks when developing new products.

Clariant Plastics & Coatings (Taiwan) Head of Masterbatches Tony Wu notes that, in developing its Taiwan operations, Clariant has consistently emphasized locating both manufacturing and design in Taiwan, in order to be able to meet customers' needs in a timely manner. The Clariant Plastics & Coatings (Taiwan) masterbatches factory was established in 1989, and has annual production capacity in excess of 6,000 tons. The plant is capable of manufacturing over 1,000 different types of high-quality, customizable products to meet the needs of both Taiwanese and overseas customers. The outstanding quality of the masterbatches manufactured at the Taiwan plant has made this facility one of Clariant's most important production locations in the Asia region.



Clariant Plastics & Coatings (Taiwan) has for many years now been implementing the 5S efficiency methodology and meeting ISO requirements; the company's high standards are reflected in every aspect of laboratory operation, including personnel, the laboratory environment, and quality management

The high quality of Taiwan-made masterbatches has made Taiwan an important center of supply for the wider Asian region

Taking into account the fact that Clariant's customers in different regions have different needs, and the importance of maintaining proximity to the market and of reducing transportation costs, the business strategy adopted at Clariant Plastics & Coatings (Taiwan) emphasizes the provision of first-rate solutions using Taiwan-based manufacturing and Taiwan-based design for those products where short lead times, customization capability and localized production are important. Jennifer notes that Clariant Plastics & Coatings (Taiwan) has responsibility for Taiwan area business development and the provision of product and technical service consulting. With many Taiwanese industries having relocated production to China or Southeast Asia, the geographical scope of the company's service provision has expanded. In the case of product items where demand in the Taiwan market is relatively low, Clariant Plastics & Coatings (Taiwan) imports the products in question on customers' behalf where necessary.

As a result of the high quality of the masterbatches produced by Clariant Plastics & Coatings (Taiwan), and the company's first-class technical service capabilities, besides serving customers in Taiwan, Clariant Plastics & Coatings (Taiwan) also exports a significant percentage of its output to other countries in the Asia region. The Clariant Group has also built on the outstanding technical capabilities of the Clariant Plastics & Coatings (Taiwan) production lines by establishing two large-scale dedicated competence centers for textile masterbatches and additive masterbatches; these competence centers focus on the development of high quality masterbatches to meet the needs of customers both in Taiwan and overseas. The Clariant Group plans to continue allocating more resources to these two competence centers so as to further enhance their service provision capabilities and competitiveness.

Masterbatches have a wide range of applications and can help reduce environmental pollution

Masterbatches are a type of plastic coloring agent that contains a high ratio of color pigment and additives combined with thermoplastic resin. They have a high level of compatibility with the material being colored, and so have been widely used in the manufacturing of a wide range of products for many years now. Besides enhancing product texture and "feel," the use of masterbatches also reduces the generation of unnecessary effluent which could affect the environment. Taking the textile industry as an example, traditional fabric manufacturing processes inevitably involved dyeing. With dyeing processes, color adhesion was poor, and any



Above: The ColorWorks color design center provides inspiration for a rich variety of color materials, offering designers, marketing professionals and brand managers an outstanding environment for innovation-related collaboration



Below: Every year, ColorForward (Clariant's annual color trends forecasting guide) offers a range of new color concepts that utilize color, materials, functionality and special effects to help transform abstract design concepts into actual products

carelessness in the production process could cause products to suffer from color fading. Dyeing processes also tend to generate large quantities of effluent. As a result, many textile firms that attach high importance to both product quality and environmental protection have switched over to using masterbatches instead of dyeing; the use of masterbatches can also help firms to comply with environmental regulations.

Tony points out that one of the main reasons why Clariant chose to establish a masterbatches factory in Taiwan was the fact that the Taiwanese textile industry was already emphasizing the development of high-end markets. As far back as the late 1980s, Taiwanese textile manufacturers had already begun using masterbatches to replace traditional dyeing

processes, and consequently demand for masterbatches in Taiwan was very high. Masterbatches are also widely used in various high-tech industries. Over the past decade or so, manufacturers of consumer electronics products have begun to give their products colorful exteriors instead of the black or white color schemes that were common in the past, with the aim of making the products more attractive to consumers. As a result, demand for masterbatches in the Asia region has grown steadily higher, throwing into high relief the important role played by Clariant Plastics & Coatings (Taiwan).

Starting from 2012, the Clariant Group began rolling out the new Clariant Production System worldwide. Clariant Plastics & Coatings (Taiwan) is

participating actively in the implementation of this upgrading programme, aiming to achieve a further enhancement of production efficiency that will help the company to grow sustainably and maintain market competitiveness.

The ColorWorks design center plays an important behind-the-scenes role in bridging the gap between design and volume production

The steady improvement in the business performance of the Clariant Group is attributable partly to the way Clariant's masterbatches business has been able to maintain a lead over its competitors, with high product quality and the ability to provide customized technical service, but also to the establishment of the Clariant Plastics & Coatings (Taiwan) ColorWorks design center, which is able to provide customers with color technology and design services, helping to reduce product lead times and indirectly helping to drive the rapid growth of the company's masterbatches business.

Jennifer further explains that production processes for most products involve a great many different steps; in the past, when developing new products, many companies failed to take into account the potential for a lack of coordination between design and production, which often resulted in a situation where, when volume production began, the product colors did not live up to expectations. To help solve this problem Clariant's ColorWorks design center is able to participate in the development of new products in accordance with customers' needs across a wide range of industries. Besides providing color matching suggestions in line with market trends, ColorWorks can also help to ensure that colors will be correct once volume production begins, thereby helping customer firms to gain maximum benefit from their investment in new product development.

Jessie Lin, a designer at the Clariant Plastics & Coatings (Taiwan) ColorWorks design center, notes that the impact of color on product sales volume is growing steadily larger; for many products, as long as the color scheme matches consumers' preferences, the vendor can expect to enjoy impressive sales performance. This is why the ColorWorks design center attaches so much importance to global color trends. Besides holding annual brainstorming activities, ColorWorks also publishes a color trends yearbook, which its partner companies can use as a reference when developing new products.

If Taiwan can speed up the process of negotiating FTAs with other countries, this would help to strengthen Taiwan's export competitiveness

Having been active in the Taiwan market for many years, Clariant Plastics & Coatings (Taiwan) believes that the biggest source of competitive advantage for Taiwan's business enterprises is their willingness to innovate and embrace change, along with the technological capabilities and experience that Taiwanese firms have



The ColorWorks color design center has been publishing the ColorForward annual color trends forecasting guide for ten consecutive years now, providing the latest information about global social and market trends, and helping designers working on the frontline to develop more perceptive approaches to design (Photo courtesy of Clariant Plastics & Coatings (Taiwan) Co., Ltd.)

built up over the years, and the diversified range of industry clusters that Taiwan has cultivated, all of which makes it easy for branded vendors to find the products and solutions they need in Taiwan. Reflecting the abundance of high-quality human talent available in Taiwan, even when Taiwan companies are forced by cost pressures to relocate production lines overseas, they generally still keep their R&D centers in Taiwan, where they can provide vital support for the growth of the company's brand.

Jennifer notes that the supply of upstream raw materials such as pigments, dyes etc. is closely linked to the size of the local market. The limited size of the Taiwanese domestic market makes it challenging for foreign companies to set up production facilities in Taiwan (or expand existing facilities). Currently, the government is working actively to secure opportunities

to negotiate FTAs with other countries; this could help to reduce the trade barriers that affect Taiwan's exports, and expand the potential market for Taiwan's manufactured products and semi-finished products, while at the same time the increase in shipment volume could help the raw materials sector to reduce prices, thereby enhancing the competitiveness of industry as a whole.

According to the long-term plans formulated by Clariant Plastics & Coatings (Taiwan), in the future the company will continue to spread awareness of the importance of product safety, particularly in terms of food safety and ensuring environmental sustainability. For example, the company will be educating customers about product safety concepts and will be providing them with safer alternatives to lead-containing pigments, toxic solvents, PCB pigments, etc. Clariant Plastics & Coatings (Taiwan) will also be working to develop more environmentally-friendly products, promoting a philosophy based around sustainable development, and endeavoring to fulfil its responsibilities as a global corporate citizen.



Combining the strengths of DEKRA and iST to develop the business opportunities in the automotive electronics market

DEKRA iST Reliability Services Inc.

DEKRA is one of the world's leading testing and certification companies, while Integrated Service Technology, Inc. (iST) possesses unique technology in the electronics testing and analysis field. By joining forces to establish joint venture company DEKRA iST Reliability Services Inc., the two companies will be able to integrate their respective strengths and technologies to provide comprehensive reliability testing and fault analysis services for supply chains in the automotive, LED, medical, networking and communications and consumer electronics industries, working together to develop the testing and analysis market, which offers immense business opportunities.



LED life expectancy testing. (Photo courtesy of DEKRA iST)



DEKRA IST CEO Lee Chun-Yi

With the rapid pace of evolution in semiconductor production processes, many electronic components have shrunk dramatically in size, and as a result the Internet of Things (IoT), which had been developing slowly for many years, has entered a period of explosive growth. Many things that previously were only seen in Hollywood's vision of the future now exist in real life, including smart homes and smart cities, etc. The "Internet of Vehicles," in which vehicles are able to communicate automatically, is also expected to become reality within a few years. New developments in the automotive industry are no longer confined to refinements of engine technology; by taking advantage of the miniaturization of electronic components, it is possible to incorporate a wide range of innovative new technologies into motor vehicles, including dynamic stabilization systems, automatic braking systems, anti-skid systems, etc., in line with the safety regulations that governments around the world have been introducing to improve driving safety.

Recognizing the opportunities presented by the combination of steady growth in global vehicle sales and the growing complexity of automotive electronic components, many international corporations are competing to develop this market, and a significant number of them have chosen to collaborate with Taiwan's hi-tech sector, with the aim of leveraging Taiwanese firms' experience to strengthen their own competitiveness in the automotive electronic components business. One example of such collaboration is DEKRA iST Reliability Services Inc., which was founded in 2015 as a joint venture between Taiwan's Integrated Service Technology, Inc. (iST), holding a 49% share, and European company DEKRA, holding a 51% share. The vision behind the establishment of DEKRA iST Reliability Services is to combine the two companies' respective strengths in the automotive, LED and medical electronics sectors to provide "one-stop" LED, PCB, PCBA and system reliability testing and analysis services that can help to reduce time-to-market for new products.

DEKRA iST CEO Lee Chun-Yi explains that "DEKRA's area of specialist expertise is certification services, while iST has a wealth of experience, and strong technical capabilities, in the area of electronics testing. By establishing DEKRA iST as a joint venture, the two companies can draw on their respective strengths to provide one-stop service that includes both front-end electronic component testing and back-end finished product certification, thereby helping customers to get their products into the marketplace more quickly."

Already enjoying a strong position in the certification and verification market, DEKRA was eager to expand into electronics testing

Founded in 1925, DEKRA is the world's largest automotive safety assessment and testing organization. As of 2015, DEKRA had annual sales revenue of around NT\$100 billion; the company provides quality verification services for approximately 26 million vehicles every year. Besides providing testing services for leading automotive manufacturers in Continental Europe, over the past few years DEKRA has been expanding the scope of its business activities to provide testing services to automotive brands in over 50 countries around the world, including the U.S.A., the U.K. and various Asian countries. In addition, DEKRA is authorized to issue the CE Marks that are needed to export products to countries in the European Union, and it plays a key role in ensuring the quality of medical devices, lighting fixtures and consumer products imported into the EU. In the lighting and medical electronics testing markets, DEKRA holds the highest and third highest global market share, respectively.

In order to further strengthen its competitiveness, DEKRA acquired Taiwanese company QuieTek in early 2015. QuieTek's areas of expertise include wireless technology and electromagnetic compatibility (EMC) testing services, and the



Joint sports meeting held by iST and DEKRA in October 2015 (Photo courtesy of DEKRA iST)



Party held to celebrate the first anniversary of the founding of DEKRA iST (Photo courtesy of DEKRA iST)

company has provided testing services for products including notebook PCs, automotive electronics and mobile phone handsets etc. to many different companies all over the world; DEKRA anticipated that this acquisition would help them to grow their testing and certification business in the electronic appliance and components sector. In early 2016, DEKRA held IoT-related seminars in Taipei, Taiwan and in China, taking the opportunity to strengthen its customers' familiarity with the IoT, and using presentations and analysis of IoT security challenges, certification standards and solutions to help DEKRA customers market their products in global markets more smoothly and more rapidly.

Lee Chun-Yi points out that DEKRA is one of Europe's best-known testing and certification companies, and has a close relationship with many European automotive manufacturers. If a product cannot pass product verification, then the automotive manufacturer needs to undertake more detailed testing to identify the possible cause of the quality issues. With the number of electronic components used in new vehicles growing ever higher, the quality problems are no longer confined to the production line; they may result from interference between electronic components. This is why, in addition to its existing testing and certification services, DEKRA wanted to expand rapidly into the electronics testing field, so as to be able to provide customers with comprehensive "one-stop" service.

Impressed by iST's specialist technical capabilities, DEKRA began exploring the possibility of collaborating with iST

The reason why DEKRA was so eager to collaborate with iST was that iST possesses semiconductor testing capabilities that are unmatched by any other company in the world. Founded in 1994, iST has dedicated itself to the provision of first-class integrated circuit (IC) testing services, with service items that include Focused Ion Beam (FIB) IC circuit modification failure analysis, reliability test, materials analysis, signal integrity, chemical analysis, etc. As of the end of 2015, failure analysis accounted for 46% of iST's total annual sales revenue, with reliability test accounting for 38%, analog IC testing for 13%, and all other services combined accounting for 3%. With the continued growth of its business, iST had been expanding from semiconductor testing into the wider IT sector (including optoelectronics) and into the automotive industry, aiming to provide testing, verification and analysis services for every stage in the product lifecycle. Responding to the growth of cloudified smart handheld devices, the IoT, the Internet of Vehicles, etc., iST had established new LED testing platforms and automotive electronics testing platforms, in order to meet the testing needs of different customer segments.

With the growth of the IoT, iST found that its customer base was expanding from Taiwanese automotive electronics IC design firms to include international manufacturers of discrete components, passive components, and automotive modules. iST has also set up a signal analysis division, which provides HDMI/MHL wired signal testing, Over-the-Air (OTA) testing and wireless communications testing services, in order to meet changing needs in the era of the IoT.

Lee Chun-Yi notes that, when it comes to electronic components, different industries have different needs. For example, military-specification products which are designed for use in a military environment need to be capable of operating in adverse climatic conditions, such as in deserts or snowy regions; there may be a requirement for them to be able to operate normally at temperatures of minus 20 degrees or at over 100 degrees. The problem is that it is simply not practicable to take electronic components for long-term testing in these types of challenging environment; the best that can be done is to simulate these environmental conditions in the laboratory, to verify the stability and reliability of the electronic components in question. iST is one of only a handful of companies in the world that possess the necessary testing capabilities.





top: Noise testing (Photo courtesy of DEKRA IST)

left: Drop testing (Photo courtesy of DEKRA IST)

right: Vibration testing (Photo courtesy of DEKRA IST)

iST's reluctance to merge with DEKRA led to the birth of joint venture DEKRA iST

DEKRA first got in touch with iST in 2013, expressing an interest in a merger between the two companies so that DEKRA could take over the entirety of iST's testing business. However, iST's founder already had his own plans for the company's long-term development, and was not prepared to agree to a merger. As a result, proposals for collaboration between the two companies were put on hold.

As iST is a world leader in electronic component testing technology, after extensive evaluation, in late 2014 DEKRA began to discuss other possible avenues for collaboration with iST. Finally, iST agreed to spin off its LED, PCB, PCBA and system reliability analysis businesses to form a joint venture company with DEKRA; the new joint venture company, DEKRA iST Reliability Services Inc., is focused on the automotive, LED and medical electronics markets, which offer almost unlimited business opportunities.

Lee Chun-Yi is confident that the collaboration between iST and DEKRA will lead to a win-win situation for both firms. DEKRA, which has many leading automotive manufacturers among its customers, can now provide specialist electronics testing services through DEKRA iST, in addition to its existing testing and certification services. iST can make use of the collaboration with DEKRA to expand into the global automotive industry market, providing a major boost to both the scope of iST's markets and its global name recognition. At the same time, global automotive supply chains will benefit from the fast, direct service provision that DEKRA iST offers.

With the dramatic fall in the price of consumer electronics components, and the rapid emergence of new supply chains in China, many firms in Taiwan's hi-tech manufacturing sector have gradually moved away from the old "bigger is better" philosophy, and have begun to refocus their attention on the automotive sector, which offers the potential for slow but steady sales growth; they believe that, by focusing on the automotive electronics market (where electronic component quality requirements are very exacting) they can build a solid foundation for continued growth. DEKRA iST is confident that Taiwan's hi-tech manufacturers can secure a place





Engineer performing testing (Photo courtesy of DEKRA IST)



LED life expectancy testing laboratory (Photo courtesy of DEKRA IST)

for themselves within the automotive sector; however, they will need to step up their investment in innovation and R&D if they are to compete successfully against the leading European, U.S. and Japanese companies.

Lee Chun-Yi notes that the efforts being made by Taiwanese hi-tech manufacturers to transform themselves are now readily apparent, and that many such firms have already succeeded in establishing themselves within the supply chains of the leading European, U.S. and Japanese automotive manufacturers. From DEKRA iST's perspective as a specialist electronics testing firm, it obviously applauds the efforts being made by Taiwan's hi-tech manufacturers to transform themselves; nevertheless, the current situation is that many key technologies are still controlled by the big European, U.S. and Japanese companies, so in the future Taiwanese firms will need to invest more in R&D if they are to succeed in further upgrading their operations and reducing the technology gap between themselves and their overseas competitors.

Strengthening collaboration with Taiwan and building international competitiveness

General Electric (GE), Inc.

U.S. company General Electric (GE) was founded over a century ago. During the last 70 years and more that GE has been operating in Taiwan, GE has developed a keen awareness of Taiwan's outstanding industrial competitiveness. GE has recently been collaborating with Taiwanese companies Evergreen Aviation Technologies (EGAT) and AIDC, and in the future GE is hoping to deepen its collaboration with Taiwanese firms across a wide range of industries, with the aim of speeding up the commercialization of new technologies and working together with Taiwanese partner companies to secure new business opportunities in the Asia Pacific region and in other international markets.



Jacky Liu, GE Asia Vice President of Trading & Offset

As we look back on how electric power and electric lighting have changed the course of human civilization, we cannot ignore the contribution of U.S. corporation General Electric Company (GE), this famous, century-old multinational corporation. Tracing its origins back to the Edison Lamp Company which was founded over 130 years ago in 1886, as of 2016 GE ranked 26th in the “Fortune Global 500” list of the 500 largest companies in the world; GE is also the only one of the original companies listed on the Dow Jones Industrial Average index when the index was first created and still remains today. As GE’s business operations have grown, the company has expanded into new products and services, making GE synonymous with household appliances. However, in response to the rapid pace of change in the business environment, starting from 2015 GE has shifted to refocus on specific business areas, and implement a restructuring which covers on three main areas: Energy, Aviation, and Healthcare.



Left: General Electric Company has more than 300,000 employees serving customers in 175 countries (Photo courtesy of General Electric (GE),Inc.)

Right: GE Power Turbine Generator (Photo courtesy of General Electric (GE),Inc.)

Impressed by the business opportunities that are emerging in the Internet of Things (IoT) sector, in 2014 GE established a new division, GE Digital, to focus on the development of industrial IoT solutions based around the core concept of "Mind Plus Machine." By installing large numbers of sensor components in machinery, and by establishing mechanisms for automated data exchange, it is possible for equipment such as aircraft engines to perform automated fault detection; the equipment automatically transmits messages to Predix Cloud, so that technicians can perform remote troubleshooting, or identify in advance components that could cause a fault and replace them, thereby reducing maintenance and management costs.

GE Vice President Jacky Liu notes that, in 2015, the annual sales revenue totals for GE's core divisions were US\$50 billion for GE Energy, US\$22 billion for GE Aviation, US\$20 for GE Healthcare, and US\$6 for GE Digital. He explains that, while GE Digital's annual sales are currently still relatively low, given the steady growth in the IoT market, GE has set a target of 10-fold growth for GE Digital by 2020, and it anticipates that GE Digital will be a major driver of growth for the company in the future.

GE has operated in Taiwan for over 70 years, and has played an important role in supporting technology development and industrial upgrading in Taiwan

GE's presence in Taiwan can be traced back to the 1950, when GE began supplying aircraft engines and related services for the R.O.C. Air Force. In the 1960, GE started collaborating with Taiwan Power, supplying Taiwan Power with the



generator units needed for large-scale power plants, and thereby helping to lay the foundations for the industrialization of the Taiwanese economy. When Taiwan was implementing the “Ten Major Construction Projects,” GE was involved in major infrastructure and industrial projects such as the building of the Sun Yat-sen Freeway, the construction of large-scale steelmaking plants, the electrification of Taiwan’s railways, and the building of Taiwan’s nuclear power plants; GE provided Taiwanese industry with both the products it needed and the related technical services. In response to the steady expansion in the scope of GE’s activities in Taiwan, in 1970 GE established a Taiwan Branch of General Electric International Inc. By collaborating on industrial technology with Taiwanese companies in various different industries, GE helped these companies to upgrade their operations; GE played an important behind-the-scenes role in Taiwan’s economic development.

Transforming from a maintenance and repair center to a production site - Working together with Taiwan to create a bright future for the Taiwanese aerospace industry

Taking the aerospace industry as an example, thanks to Taiwanese government policy – which in the past sought to foster domestic production of aircraft for use by the Taiwanese Air Force – and the enthusiasm shown by Taiwanese companies in recent years for moving into the civil aviation maintenance and manufacturing sector, Taiwan’s aerospace industry has gradually built up a solid track record of achievement, and Taiwanese firms have established



GE Digital System (Photo courtesy of General Electric (GE), Inc.)



themselves within the global supply chains of the leading international aerospace manufacturers. According to statistics compiled by Taiwan's Committee for Aviation Industry Development, Ministry of Economic Affairs, in 2015 the Taiwanese aviation industry posted annual production value of NT\$91.5 billion, and in 2016 this figure rose to over NT\$100 billion; the aviation industry has thus been one of relatively few industries to achieve continued growth despite the unfavorable global economic environment. As one of the world's leading aircraft engine manufacturers, GE recognized the potential of the Taiwanese aviation industry at an early stage, and established a collaborative partnership with Evergreen Aviation Technologies (EGAT) and AIDC, thus playing a key role in the development of the Taiwanese aerospace sector.

Jacky Liu points out that aviation safety has always been the first priority and consequently the most of airlines all implement aircraft maintenance carefully according to the manuals provided by the equipment manufacturers; in the case of aircraft engines, which are the most complex part of equipment in an aircraft, the engines have to undergo periodic check at a maintenance service provider certified by the original manufacturer. Taiwan's EVA Air Corporation operates a large number of passenger aircraft. With the aim of reducing the cycle time needed to complete aircraft maintenance, the Evergreen Group (which owns EVA Air) established back in 1989, and in 1998 Evergreen Aviation Technologies signed an MoU with GE whereby Evergreen Aviation Technologies is certified to perform maintenance on Boeing and Airbus aircraft fuselages and on GE and IAE aircraft engines; Evergreen Aviation Technologies thus became one of only a handful of manufacturer-certified maintenance service providers in the Asia region.

Responding to the steady increase in the size of the Asian aviation market, in 2015 GE joined with Evergreen Aviation Technologies to establish GE Evergreen Engine Services, a new joint venture company that is the only GE-certified engine overhaul facility in the Asia Pacific region. GE Evergreen Engine Services will perform maintenance on GE's GEnx aircraft engine system; in the future, it will also play an important role in the maintenance of other new aircraft systems in the Asia Pacific region.

Since 1997, GE has been outsourcing the manufacturing of some aircraft engine components to Taiwanese company AIDC; today, GE and AIDC work together on the development of new-generation engine components. In October 2016, GE Aviation and AIDC signed a new agreement to increase production of components for the LEAP aircraft engine; AIDC has also secured new contracts to manufacture components for the new LEAP engine and for the LM9000 engine, contracts which will remain in effect until 2017 and 2022 respectively.



GE provides 25% of the world electricity (Photo courtesy of General Electric (GE),Inc.)

Keeping pace with new global trends in electric power supply, and developing new “blue ocean” markets in Asia

Due to the impact of the La Niña effect, in 2016 Taiwan began experiencing high summer temperatures much earlier in the year than is usual, and had record numbers of consecutive days with very high temperatures. As a consequence, the electric power supply in Taiwan, which is normally adequate, was only barely able to meet demand. In point of fact, this problem is not confined to Taiwan; countries throughout the world are faced with the challenges posed by increasingly extreme climatic conditions, leading to new trends in electric power supply provision.

Jacky Liu explains that the traditional electric power supply model involved the use of large, centralized power plants, which were linked up to the distribution network to transmit electric power to each individual district. Recently, however, with the emergence of “renewable energy” technologies such as photovoltaics and wind power, it has become possible to develop distributed power supply networks made up of large numbers of small generating units; this new model avoids the significant power loss that occurs when transmitting electric power over long distances. A shift has gradually moved the previous centralized to current distributed power networks; GE has already established itself as a leading supplier of mobile power supply equipment.

Many people in Taiwan may not be familiar with the concept of mobile electricity generation and power supply, but in other countries this is a widespread model. In some countries that include outlying islands with limited

land area and small populations, large-sized mobile generators have replaced traditional power plants, as they are more cost-effective. In other countries, mobile generator units are used extensively in large-scale construction projects to overcome the problem of securing an adequate power supply if the construction site is situated in a remote area.

In November 2016, GE announced that it would be collaborating with Taiwan's AIDC on supplying GE's TM2500 mobile fast power system to the Asian market, particularly countries such as the Philippines and Indonesia that have large numbers of inhabited islands. AIDC has more than 20 years of experience in gas turbine generator system integration and power plant establishment, and is one of GE's main suppliers; AIDC has for some years now enjoyed a high level of international recognition for its R&D and technical capabilities.

Jacky Liu notes that "the TM2500 mobile generator system uses mature aviation engine technology; more than 2,100 of these generator units have been running around the world, and they have clocked up total operating time of around 75 million hours. They provide rapid response, and can be started up and switched off many times over the course of a single day; the TM2500 is an ideal choice for peak load applications, and for the stable generation of power using renewable energy. We have been collaborating with AIDC for many years now, and we know just how high AIDC's technical capabilities are, so we are looking forward to working with them on developing the business opportunities in the ASEAN countries."

With its advanced offshore wind power technology, GE is participating actively in the development of innovative new industries in Taiwan

In recent years, both the government and the private sector in Taiwan have been working actively to develop renewable energy.



The first offshore wind power plant in the US, with the capacity of 30 MW (Photo courtesy of General Electric (GE), Inc.)

Taiwan has several first-class wind farm sites, which will facilitate the establishment of a comprehensive wind power generating system, and also reduce Taiwan's dependence on nuclear power and fossil fuels. As a result of its acquisition of French company Alstom, GE (which is a world leader in energy technology) already has a large-scale wind power pilot project facility in France, and GE also recently secured qualification to participate in an offshore wind power project in Taiwan; by linking together multiple 6MW wind turbines, GE anticipates being able to create over 1GW of generating capacity. In addition to its collaboration with Taiwanese companies in the aviation and wind power sectors, GE is also collaborating with Taiwanese hi-tech manufacturers in the healthcare sector on the development of key production processes and special materials for use in digital X-ray and other imaging applications.

Besides its contribution to Taiwan in the form of industrial technology, GE has for many years also been helping to cultivate the leadership and strategic management capabilities of senior managers in Taiwan through Industrial Collaboration Program (ICP); this has had a significant positive impact in helping Taiwanese companies to overhaul their leadership development and enhance their competitiveness.

In the more than 70 years that it has been in Taiwan, GE has not only provided long-term support for major infrastructure projects and for the development of innovative-new industries in the "Green Energy", Aviation, Smart Manufacture and Healthcare Fields, it has also built close partnership relationships with Taiwanese companies. In the future, GE looks forward to further strengthening its collaboration with Taiwanese counterparts in many different industries, and working together with them to develop the rapidly-growing Asia Pacific market and other international markets.





Integrating the strengths of Taiwanese industry to develop innovative applications

Heraeus Materials Technology Taiwan Ltd.

The Heraeus photovoltaics (PV) silver paste laboratory located in the NanKan district of Taoyuan City, Taiwan, is one of only a handful of Heraeus Group PV R&D service centers around the world; the facility provides technical support and services to Heraeus' partner companies in the Taiwanese PV industry. Taiwan's abundance of high-quality human talent and its protection for intellectual property rights have led the Heraeus Group to continue expanding the scale of its investment in Taiwan.



The Heraeus Group's global headquarters in Hanau, Germany



Alex Lee, General Manager of Heraeus Materials Technology Taiwan Ltd.

Focused on innovative technology R&D, Heraeus holds over 5,200 patents

Being a company that was founded in 1851, Germany's Heraeus Group has headquartered in Hanau, Germany. Heraeus is a classic family-owned German business enterprise; its main business areas include precious metals, special metals, dental materials, medical technology, quartz glass, sensors and specialty light sources, and its products are widely used in industries such as iron and steel, electronics, the chemical industry, automotive manufacturing, and communications. The scale of Heraeus' business operations has expanded steadily, and the Heraeus Group now has over 100 subsidiaries and affiliates in 38 countries around the world, with a total workforce of approximately 12,500 employees. To maintain its competitiveness in the world markets, Heraeus has for many years now been heavily focused on innovative technology R&D; it has employed more than 600 R&D personnel working at 25 R&D centers throughout the world, and holds more than 5,200 patents.

Heraeus' core capabilities include its ability to combine specialist materials expertise with cutting-edge scientific technology to develop high-quality solutions for Heraeus' customers. Heraeus provides a comprehensive range of products and services, from components through to system integration, and its products are used in many different industries; in 2015, the Heraeus Group reported total annual sales revenue of 12.9 billion Euros.

Planting firm roots in the Taiwan market, and establishing a PV silver paste laboratory

The Heraeus Group's expansion into overseas markets began many years ago; Heraeus established its first overseas sales offices in France and Italy in the 1960s, and subsequently also expanded into the U.S., British and Japanese markets, among others. It also established overseas production locations in South Korea and the Philippines, which have become the foundations for Heraeus' development of the Asia region market as a whole. Responding to the rapid growth of the semiconductor, display and photovoltaics industries in Taiwan, the Heraeus Group established its Taiwan operational headquarters in the Neihu District of Taipei City in 2002, while also establishing a Southern Taiwan office in Kaohsiung to serve customers and partner companies in Southern Taiwan from close at hand. In order to meet Taiwan's industrial development needs, in 2012 Heraeus established a sputtering target plant, and a PV silver paste plant and laboratory at NanKan in Taoyuan City. The PV silver paste



One of Heraeus' specialty light source products (Photo courtesy of Heraeus Materials Technology Taiwan Ltd.)



A conductive polymer material (Photo courtesy of Heraeus Materials Technology Taiwan Ltd.)



laboratory forms part of Heraeus' global network of R&D services centers, and currently employees around 62 Taiwanese staff.

Currently, the main products sold by Heraeus Materials Technology Taiwan include precious metals materials, electronics materials, infrared heaters, ultraviolet light tubes, and specialty chemical products, etc. The company supplies precious metal materials – including semiconductor packaging materials, sputtering target materials, PV silver paste, conductive polymers, catalyst materials, lithium ion battery additives, etc. – to Taiwan's LCD panel, semiconductor, photovoltaics and LED industries.

Alex Lee, General Manager of Heraeus Materials Technology Taiwan Ltd., explains that while Heraeus' global headquarters in Germany is responsible for core technology development, in order to effectively monitor the changes taking place in each individual market and the business opportunities emerging in relation to new applications, Heraeus also needs support from its global network of offices and facilities; these are areas where, by working closely together, Heraeus Materials Technology Taiwan and Heraeus' global headquarters can create significant synergy. Currently, Heraeus Materials Technology Taiwan is mainly engaged in the sale of standard-specification materials. However, there are often slight differences in the specifications of the sputtering target materials or silver paste required by individual customers, so the Heraeus Materials Technology Taiwan sputtering target factory is responsible for sputtering target bonding and for making slight adjustments to the materials to meet customers' needs, while the PV silver paste R&D laboratory in Taoyuan can help customers to identify the optimal silver paste formula to meet the specific requirements of that particular customer; this optimizing process can substantially improve the storage efficiency of PV solar cells. Taiwan works closely with Heraeus' R&D headquarter in Philadelphia, providing mutual support and striving to give customers the most comprehensive services as possible.

Helping to strengthen the competitiveness of Taiwanese industry through collaboration with ITRI

The Heraeus Group is one of the world's leading suppliers of intrinsically conducting polymers (ICPs). In order to strengthen its competitiveness in the marketplace, in the fourth quarter of 2013, Heraeus began collaborating with Taiwan's Industrial Technology Research Institute (ITRI), working on the development of production process technology for new ICPs such as

Clevios™ PEDOT, and successfully integrating various different technologies including sensor circuits, silver paste printing, flexible printed circuit (FPC) connection, and touch-screen sensor film lamination, etc. By the end of 2015, impressive results had been achieved through this collaboration. At the Touch Taiwan 2016 exhibition, Heraeus demonstrated a new type of 7-inch glass-film-film (GFF) touchscreen panel made using the dry-film resist (DFR) photolithography process, which is ideally suited for flexible touch displays; this new touchscreen panel production process makes use of patterning of Clevios™ conductive polymer films.

According to data released by Heraeus, the new DFR photolithography process was the result of a joint research conducted by Heraeus and ITRI. Using Clevios™ conductive polymer film patterning technology, it is already possible to achieve line widths of 50-micron resolution or even lower; in the future, Heraeus will be working to improve the resolution still further. Today, Heraeus' Clevios™ films and sensors can withstand more than 300,000 bendings at bending radii of lower than 1mm without degradation, making it possible to provide enhanced functionality for touchscreen display products; Heraeus' technology is ideally suited for use with flexible displays, curved displays, three-dimensional displays and wearable devices.

Alex Lee explains that, in order to strengthen its competitiveness in the world markets, Heraeus launches different R&D projects to meet the needs of different national markets. The current collaboration between Heraeus and ITRI is extended from a related project in Japan, with the aim of using ITRI's technology capabilities to help meet the future application needs of industry. With the explosive growth in business opportunities in the Internet of Things (IoT) sector that began in 2015, many companies have been launching new wearable device products, and the results of the collaborative R&D project between Heraeus and ITRI have been warmly welcomed by the market, reflecting Heraeus' unique and effective approach towards monitoring

market trends.

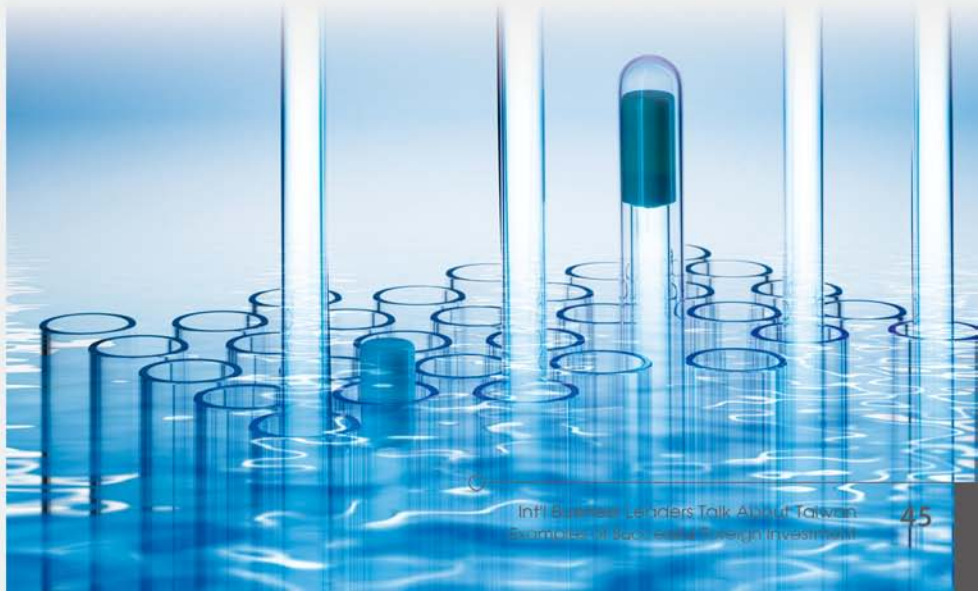


A Heraeus temperature sensor (Photo courtesy of Heraeus Materials Technology Taiwan Ltd.)

Taiwan's protection for intellectual property rights is an additional factor that has encouraged Heraeus to step up its investment in Taiwan

Heraeus holds more than 5,000 patents in various countries around the world, and in the PV sector in particular the company possesses many unique technologies; Heraeus has experienced problems with intellectual property rights infringements in many different countries, although fortunately it has a comprehensive system in place for safeguarding its intellectual property, and has repeatedly been successful in lawsuits brought in response to IP infringements. For example, in 2016 the results of arbitration at Taiwan's Intellectual Property Court confirmed the validity of Taiwanese patent I432539 held by Heraeus, a patent which is very beneficial with respect to enhancing the efficiency with which PV cells can be manufactured, and which embodies technology that will play a vital role in the development of solar power generation in the future.

Alex Lee notes that "We have been very impressed by the efforts that Taiwan has made to ensure effective protection of intellectual property rights. Taiwan also has high-quality human resources, a comfortable living environment, convenient transportation for traveling between Taiwan and China, and comprehensive industry clusters that are all located within two hours' drive of one another; for a materials supplier like our company, the launch of a new material requires coordination between every segment of the supply chain, so this is a very important advantage. If Taiwan can achieve a further strengthening of the internationalization of its workforce – in terms of language skills etc. – then I am sure that it would be possible to attract even more foreign companies to invest in Taiwan. The Heraeus Group possesses



a comprehensive range of technological capabilities; if Taiwanese companies can leverage their industrial know-how to undertake cutting-edge technology application R&D and integrate the results in the form of system modules and related know-how, thereby enhancing their competitiveness in international markets, then there is a high potential for even more opportunities for Taiwanese firms to collaborate with and undertake joint investment with the Heraeus Group."

Regarding Heraeus Materials Technology Taiwan's future development strategy, Alex Lee believes that the biggest opportunities lie in integrating Heraeus' operations with the strengths of Taiwanese industries to develop new cutting-edge technology applications, and possibly building on this to expand into the manufacturing of key modules, so that Heraeus can serve as a pathfinder and materials supplier supporting the development of emerging applications throughout the world.

Taiwan's development strategy for the future should not be focused on striving for an ever larger scale of operation in mass production. In the future, with support from the Heraeus Group's global headquarters in Germany, Heraeus Materials Technology Taiwan will be continuing to undertake joint R&D on advanced production process technologies with its collaborative partners in the company's core business areas of semiconductor and display technology, while also looking to collaborate with leading companies in various Taiwanese industries to develop new applications (such as the development of modules for the storage of solar power at high voltages) so as to secure business opportunities in emerging industries.

In addition, with 3D printing technology gradually reaching maturity, Heraeus is also hoping to collaborate with Taiwan's internationally renowned medical industry, to undertake development of new materials for dental models, orthopedic materials and other materials relating to personalized medicine, which would represent a deepening





Heraeus' bonding wire material



Heraeus' molten metal transducer/sensor device

and intensification of the collaborative relationship between Taiwan and Germany. At the same time, Heraeus hopes that the authorities concerned can implement the necessary supportive measures, such as more comprehensive certification systems, etc., so as to create an environment more conducive to a continued successful industrial development.





Making effective use of Taiwan's ICT talent to secure business opportunities in the IoT sector

Infineon Technologies Taiwan Co., Ltd.

Recognizing the need for Taiwan to develop the business opportunities that are emerging in the Internet of Things (IoT) sector, Taiwan's Executive Yuan has launched the "Asian Silicon Valley" initiative, the aim of which is to build Taiwan into an R&D and testing center for advanced IoT applications. As Europe's largest semiconductor company, Infineon is planning to take advantage of the "Asian Silicon Valley" project to collaborate with its Taiwanese partner companies on developing the opportunities presented by this innovation-oriented emerging market sector.



Infineon's booth at AutoTronics Taipei in 2016 (photo courtesy of Infineon Technologies Taiwan Co.,Ltd.)



Deyoung Chan, Vice President & Managing Director of Infineon Technologies Taiwan (photo courtesy of Infineon Technologies Taiwan Co.,Ltd.)

Over the past few years, the steady fall in the price of sensor components and the continued progress in cloud computing technology have led to growing interest in the fields of “smart cities,” “smart homes,” the “Internet of Vehicles” (IoV), remote care services, etc.; the trend for more and more kinds of devices to be connected to the Internet has started to make itself felt in people’s daily lives. A report compiled by market research firm Gartner suggests that, by 2020, the number of Internet-connected devices worldwide will have grown to over 26 billion, while research undertaken by IDC indicates that the scale of IoT-related business opportunities could exceed US\$1 trillion, and that the IoT will become a major driver of growth for the global economy as a whole.

To help Taiwanese industry build on its existing strengths in information and communications technology (ICT) to regain a leading position in the global economy in this new economic era that is now dawning, Taiwan’s Executive Yuan is planning to establish pilot projects



Left: Infineon technical seminar in Taipei (photo courtesy of Infineon Technologies Taiwan Co.,Ltd.)

Middle : At Infineon, we make the world easier, safer and greener. We create solutions for the world of today and tomorrow (photo courtesy of Infineon Technologies Taiwan Co.,Ltd.)

Right: Infineon's headquarter in Munich, Germany (photo courtesy of Infineon Technologies Taiwan Co.,Ltd.)

for a wide range of “smart” technologies throughout Taiwan, with Taoyuan City as the main IoT “testbed,” focusing on the development of new IoT-related applications to drive the growth of emerging industries including healthcare, human-centric transportation systems and food safety, etc., thereby helping to establish a solid foundation for Taiwan’s continued economic development in the future. When this “Asian Silicon Valley” plan was announced, it immediately attracted the interest of the world’s leading semiconductor companies, including Infineon, which has recently been working actively to develop the IoT sector to seize the business opportunities presented by the IoT market.

Deyoung Chan, Managing Director of Infineon Technologies Taiwan Co., Ltd., notes that there is a clear global trend towards the development of the IoT, “smart cities,” cloud computing, artificial intelligence (AI), robotics, electric vehicles, etc., and that this has led to rapidly growing demand for electrical components that combine small size with high power density; this demand has been an important driver for Infineon’s continued sales growth, and Infineon’s strength in this area has enabled it to increase its competitive lead over rival firms. Mr. Chan points out that, as a medium-sized country with comprehensive infrastructure, Taiwan is an ideal location for testing innovative new applications, and is well-suited for the development of IoT-related industries; he anticipates that, in the future, Infineon will be able to leverage its strengths to undertake joint development of innovative new applications in collaboration with Taiwanese companies.



Adjusting the main focus of the company's operations to concentrate on those areas where it enjoys significant competitive advantage

Infineon, which has its headquarters in Munich, Germany, evolved out of the Siemens Group's semiconductor division, having been spun off as a separate entity because of its fast growing in sales. Infineon is mainly engaged in the provision of semiconductor and systems solutions, helping companies in many different industries to overcome challenges that require high efficiency, mobility, safety, etc. Infineon has responded to the continuing changes in the global business environment by adjusting the main focus of its operations on an ongoing basis. For example, Infineon recently sold off its wireless networking business to Intel, aiming to concentrate its R&D resources on areas where the firm enjoys a high level of competitive advantage. Infineon currently has four main business areas: Automotive Electronics, Industrial Power Control, Power Management & Multimarket, and Chip Car & Security; these four divisions account for 41%, 17%, 31% and 11% of the Infineon Group's total annual sales revenue respectively. Infineon is the global market leader in the power management segment, and ranks second in the world in the automotive electronics and chip card segments.

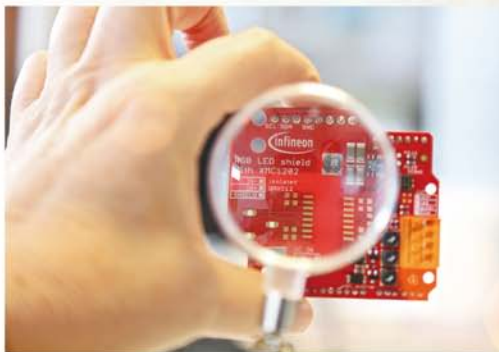
The key factor that has enabled Infineon to maintain its status as Europe's largest semiconductor company despite the intense competition in the industry is the company's focus on innovation and R&D. Besides its global R&D headquarters in Munich, Infineon also has 34 R&D centers around the world, including locations in San Jose (California), Seoul, Beijing, and Singapore, along with 19 manufacturing facilities. Annual R&D expenditure amounts to approximately 12% of the company's total annual sales revenue. Infineon has continued to keep an eye on potential new investment areas; by keeping its finger on the pulse of change in the marketplace and making effective use of

M&A activity, Infineon has succeeded in maintaining its competitiveness within the global semiconductor industry. For example, the acquisition of International Rectifier in 2014 enabled Infineon to successfully break into the U.S. commercial and agricultural vehicle IC market, thereby helping Infineon to reinforce its dominant position within the U.S. automotive electronics sector.

With Asia's emergence as the center of global economic development, many international business groups have been stepping up their investment in Asian markets. Infineon too has been gradually expanding the scope of its business operations beyond Europe into the Asia Pacific region, and currently has around 17,000 employees in the region, compared to only 15,000 in Europe and 3,600 in the U.S.A.; the Asia Pacific is now an important center for Infineon's R&D, manufacturing and operations. Deyoung Chan notes that, currently, Infineon has its Asia region headquarters in Singapore, with Malaysia as the main manufacturing location (with nearly 10,000 employees in these locations); Infineon's main R&D centers in the Asia Pacific region are located in India, Singapore, China and South Korea. Infineon's Taiwan operations are mainly focused on marketing and technical support provision, while also assisting with Asia Pacific region business development. Infineon currently has around 170 employees in Taiwan.

Working together with Infineon's Taiwanese partner companies to jointly develop security chip applications

As the IoT environment has gradually taken shape, demand for timely, frequent and safe digital data transmission has grown, which in turn has led



Infineon is famous for its tiny and high-performance semiconductor products (photo courtesy of Infineon Technologies Taiwan Co.,Ltd.)



Industry 4.0 changes the working world. Infineon has been preparing and training its employees for the changes triggered by Work 4.0 since 2011 (photo courtesy of Infineon Technologies Taiwan Co.,Ltd.)

to increased demand for security chips. Infineon is a world leader in security chips; the Infineon-developed Integrity Guard technology has been heralded as the world's most advanced security chip technology. Being able to provide high-level, long-term security protection has made Integrity Guard the first-choice technology in many countries throughout the world. Not only has Infineon supplied security chips for 25 million National Health Insurance IC cards in Taiwan, in 2011 it supplied several tens of millions of security chips for use by Germany's public health insurance corporation, and in 2013 it was chosen as the security chip supplier for Taiwan's new "e-passport" system. This gives some idea of the extent to which Infineon is trusted as a provider of security chip technology.

The "Asian Silicon Valley" project launched by Taiwan's Executive Yuan is focused on current trends in global demand, seeking to use Taiwan's existing strengths and sources of competitive advantage to develop innovative applications in areas such as smart logistics, future vehicles, healthcare, smart robotics, smart



One microcontroller platform. Countless solutions (photo courtesy of Infineon Technologies Taiwan Co., Ltd.)

cities, etc., thereby helping to solve common problems in the areas of long-term care, medicine, food safety, etc. The “Asian Silicon Valley” initiative is closely tailored to current global trends, and so Infineon will not only be keeping a close eye on how project implementation develops, it will also be actively seeking to participate in the project and benefit from the related business opportunities.

Deyoung Chan points out that all of the application fields noted above require support from security chips to be able to secure data transmission and exchange, and that different industries have different needs when it comes to security chips; the provision of Taiwan’s testbeds can assist Infineon and its collaborative partners to develop adequate application functions that will be a great help for them to secure a leading position within this highly competitive marketplace. Infineon can make good use of this opportunity to establish a solid foundation for the company’s continued future development, and to maintain its status as a world leader in smart IC cards.

Leveraging Infineon’s technological strengths to help Taiwan achieve sustainable development

Although Infineon’s Taiwan-based operations are currently mainly focused on marketing and technical support provision, Infineon has never stopped investing in Taiwan. For example, in response to the growing global trend towards the incorporation of payment functions into “smart” wearable devices, in 2013 Infineon collaborated with Taiwan’s Welltrend Semiconductor, Inc. on the launch of a series of boosted Near Field Communication (NFC) security modules, which have found applications in the financial and transportation sectors, as well as being adopted by a “smart bracelet” manufacturer. In the future, it is anticipated that these modules may be incorporated into iPASS cards, credit cards etc., thereby helping to create a safer and more convenient payment environment for Taiwan’s citizens. At the same time, in response to the growing demand for a wider range of services in the cloud computing sector that stimulated by the growth of IoT applications, Infineon has announced that it will be collaborating with Lenovo on the establishment of a joint laboratory in Taiwan, integrating Taiwanese, Chinese and German R&D capabilities to achieve rapid development of new products, reducing time-to-market and securing more of the enormous business opportunities that the cloud computing sector offers.

Deyoung Chan notes that, besides the joint laboratory being established with Lenovo, the strong global demand for communications solutions has led Infineon to consider establishing a radio frequency (RF) R&D center in Taiwan, which would be responsible for transforming the advanced communications technology developed at Infineon’s headquarters in Germany into commercial solutions that meet actual market needs. Taiwan possesses outstanding technology, and Taiwanese companies are among the world’s leading suppliers of communications solutions; Infineon anticipates that, through collaboration with Taiwanese private-sector companies and public-sector



Annual company trip which organized by EWC of Infineon Technologies Taiwan (photo courtesy of Infineon Technologies Taiwan Co.,Ltd.)

organizations, it can speed up the development of its R&D activities in Taiwan. Infineon also hopes that Taiwan will be actively involved in the formulation of 5G communications standards, so that, with the continued trend towards the growth of the IoT and towards “smart cities,” the necessary infrastructure and bandwidth can be put in place to support the development of yet more innovative application services, while also stimulating the development of related industries.

In addition, given the active development of electric vehicles that is taking place all round the world, Infineon believes that this is the ideal moment for Taiwan to start developing its automotive sector again. In the past, because the key combustion engine technologies were largely controlled by the leading European, U.S. and Japanese automotive manufacturers, although a considerable number of Taiwanese firms did succeed in establishing themselves within the automotive industry supply chain, their activities were largely confined to the supply of non-core components such as LCD panel, etc. If Taiwan can take advantage of the new opportunities to develop electric vehicle technology, there is the potential for Taiwanese firms to establish themselves within core areas of automotive technology, in which case Taiwan will be able to play an important role within the global automotive industry.

Looking to the future, Infineon will continue to make IOT and the related technologies smarter, safer, and more energy efficient, and provide solutions for the automotive electronics, energy and security markets to support the sustainable and long-term development of Taiwan in the relevant fields.

A photograph of the Microsoft Taiwan office interior. The space is modern and bright, featuring a large wooden wall with the Microsoft logo. A white reception desk is in the foreground, and a large window in the background offers a view of a city skyline. The floor is light-colored, and there are several armchairs and a small table in the seating area. The overall atmosphere is clean and professional.

Working together with Taiwanese companies to develop the business opportunities in the Internet of Things (IoT) sector

Microsoft Taiwan Corporation

Impressed by Taiwan's extensive R&D and manufacturing capabilities, in 2016, Microsoft established the Microsoft IoT Innovation Center in Taiwan. The Microsoft IoT Innovation Center will be working together with its Taiwanese partner companies in different fields to undertake joint development of innovative new technologies, taking the Asia region (with its rapid economic growth) as the starting point for collaborative development of the almost unlimited business opportunities presented by the global Internet of Things (IoT) market.



The new offices that Microsoft Taiwan relocated to in 2016 feature bright, streamlined interior office space and an overall design that reflects the principles that Microsoft's global headquarters is seeking to promote (Photo courtesy of Microsoft Taiwan Corporation)



Vincent Shih (Assistant General Counsel, Microsoft and General Manager of Corporate, External and Legal Affairs at Microsoft Taiwan) explains that the IoT will be a major driver of growth for the global economy in the near future, and represents an important industry sector that Microsoft cannot afford to ignore

With cloud-based services having now reached a high level of maturity, and with keen price competition in the mobile device market, the main focus of interest in the information and communications technology (ICT) sector has begun to shift towards Internet of Things (IoT) technology, which has a very wide range of applications. According to a research report published by leading market research firm IDC, given the steadily increasing buzz in the “smart city,” “smart medicine” and “Internet of Vehicles” (IoV) markets, total business opportunities in the IoT sector as a whole are expected to rise to over US\$1.7 trillion. Taiwan’s strengths in ICT-related R&D and manufacturing have encouraged many leading international corporations to explore opportunities for collaboration with Taiwanese firms.

One sign of this trend is the holding of the first Microsoft IoT Expo in Taipei on October 13, 2016. This event brought together representatives of 393 companies from 17 countries, with 33 IoT applications being showcased; the keynote speeches focused on the role of the IoT in the four key areas of “smart cities,” retailing, manufacturing, and daily life. Besides presenting a global perspective, the Microsoft IoT Expo also

provided opportunities for technology exchange and business matching between Taiwanese firms and international partner companies. In addition, Microsoft Taiwan announced the establishment of the Microsoft IoT Innovation Center in Taiwan; the new Center will be undertaking IoT technology R&D, with the aim of forging collaboration between Microsoft's cloud computing platforms and Taiwan's IoT industry and startups in related industries to take the Asia region (with its rapid economic growth) as the starting point for working together to develop the almost unlimited business opportunities presented by the global IoT market.

Vincent Shih (Assistant General Counsel, Microsoft and General Manager of Corporate, External and Legal Affairs at Microsoft Taiwan) explains that the IoT will be a major driver of growth for the global economy in the near future, and as such, it is an industry that Microsoft cannot afford to ignore; the key factor that influenced Microsoft's decision to locate its new Microsoft IoT Innovation Center in Taiwan was the desire to benefit from the impressive capabilities that Taiwan's hi-tech industries have built up over the years, and from Taiwan's strengths in R&D and manufacturing, so as to speed up Microsoft's development of the global IoT market.

Adjusting its business strategy in line with current trends, Microsoft is entering the “Microsoft 3.0” era

Founded in 1975 by Bill Gates and Paul Allen, initially Microsoft was mainly focused on the development and sale of operating systems and word processing software for PCs. Today, Microsoft's headquarters are located in Redmond, Washington State; the company has subsidiaries or Branch offices in over 190 countries around the world, with a global workforce in excess of 100,000.

Vincent Shih points out that when Microsoft was first established, the term “computer” was associated with large, expensive mainframe computers; however, Microsoft cofounder Bill Gates could have foreseen that computing power represented a revolutionary new technology that would rapidly transform people's lives and, in fact, the whole world. In order to promote the dissemination of information technology and the democratization of computing power, Bill Gates formulated a corporate vision for Microsoft that aimed to put “A Computer on Every Desktop and In Every Home” . With the rapid development of the global IT industry (including Taiwan's emergence as a “PC manufacturing kingdom”), this vision had effectively been realized in many countries by the late 1990s. The dawning of this new hi-tech era was followed by the emergence of another revolutionary new technology – the Internet – which gradually attracted more and more users; not only did the Internet bring



about a new wave of change in the global IT sector, it also changed the way of life of most people on Earth. Responding to the new hi-tech era and the transformations taking place in society, in 1999 Microsoft entered its own new “Microsoft 2.0” era. The company began to move aggressively into the development of Internet-related technologies and products, with the goal of making it possible for people to easily access the information they needed by connecting with the Internet any time, anywhere, on any device.

Today, the steady rise in mobile device shipment volumes has helped to stimulate the growth of social networking around the world, while at the same time large numbers of consumers have become reliant on smartphones, tablet PCs and other mobile devices to access and use cloud-based services. Microsoft has played an industry-leading role in the development of cloud-based services. Since stepping up as Microsoft CEO in 2014, Satya Nadella has introduced a new vision for Microsoft’s “digital transformation.” In the contemporary “mobile first, cloud first” world, the “Microsoft 3.0” mission is to “Empower every person and every organization on the planet to achieve more.”

Vincent Shih explains that the “Microsoft 3.0” concept embodies the idea that Microsoft’s continued development will no longer be product-centric; instead, it will be human-centric, emphasizing open platforms. Microsoft’s corporate organization is being overhauled, with the creation of four main engineering groups: the Applications and Services Engineering Group, Clouds and Enterprises Engineering Group, Windows and Devices Group, and Technology and Research Group. Microsoft will build best-in-class platforms and productivity services for a mobile-first, cloud-first world.

Microsoft recently announced its financial results for the first quarter of FY2017. Benefitting from the outstanding performance of the Azure cloud computing platform, revenue totaled US\$20.5 billion, with net income of US\$4.7 billion. Microsoft’s share price rose to over US\$60, the highest level since 1999, closing the gap on the company’s



Left: Microsoft Taiwan’s newly-designed innovative executive briefing center gives visitors to the Microsoft Taiwan offices the opportunity to view the latest developments in information technology from all over the world (Photo courtesy of Microsoft Taiwan Corporation)



Right: Employees at Microsoft Taiwan do not have fixed desk positions; employees can use their laptops to work at any vacant space within the company’s offices (Photo courtesy of Microsoft Taiwan Corporation)



competitors. Overall, Microsoft's "digital transformation" seems to be proceeding smoothly.

Microsoft is collaborating with its Taiwanese partners on the joint development of IoT technology

Back in the late 1980s, Taiwan's IT industry benefited from IBM's relaxation of restrictions on the use of the patents relating to its x86 instruction set architecture, and Taiwanese IT manufacturers gradually began to play an important role in the global PC market. In line with its corporate vision of fostering the wide dissemination of computing power, in 1989 Microsoft established Microsoft Taiwan Corporation. Besides working to maintain a close collaborative relationship with its partner companies in the Taiwanese IT industry, Microsoft also strove to help its Taiwanese OEM/ODM manufacturing partners to strengthen their innovation capabilities and competitiveness so that they could expand into global markets.

In this new era in which cloud computing and mobile computing are dominant, by 2015 Microsoft had already signed an MoU with Taiwan's Ministry of Economic Affairs (MOEA) in regard to IoT industry development; Microsoft and the MOEA agreed to collaborate on the creation of an IoT industry development center in Taiwan, with the aim of bringing together leading partners in the IoT industry ecosystem (both globally and in Taiwan) to speed up the development of IoT solutions for industry sectors including "smart manufacturing," healthcare, transportation, retailing, etc. Microsoft's plan is for the support provided by the IoT industry development center (including the utilization of Microsoft's software technology, cloud-based services, advanced data analysis and data center technology) to be combined with Taiwan's world-leading IT hardware innovation capabilities to jointly develop next-generation IoT devices, thereby creating innovative new business opportunities for Microsoft and its Taiwanese partner companies.

In a very short period of just over a year in 2015 – 2016, Microsoft launched a number of IoT-related industrial collaboration and talent cultivation plans in Taiwan. For example, in April 2016 during DevDays Asia 2016 (the first DevDays Asia event), Microsoft dispatched a group of more than 10 data scientists and architecture engineers to help Taiwanese development teams resolve their technical problems. In July 2016, IoT solutions developed by Taiwanese companies were showcased at Microsoft's Worldwide Partner Conference (WPC), which has over 10,000 attendees every year; the Taiwanese IoT solutions attracted attention from Microsoft partner companies from all over the world, many of whom were interested in exploring opportunities for collaboration. In October 2016, Microsoft held the first ever Microsoft IoT Expo, which attracted 1,100 participants from 17 countries. The business matching opportunities at the Expo helped to foster in-depth exchange and collaboration; the holding of the Expo also marked the formal commencement of



Left: On the day of grand opening of the company's new office, Microsoft Taiwan followed Taiwanese custom by arranging for a traditional lion dance performance, which helped to create a joyful atmosphere (Photo courtesy of Microsoft Taiwan Corporation)
Right: Microsoft Taiwan staff explain to visiting reporters the design concepts behind their new office, and the various types of technical support that Microsoft provides to partner companies (Photo courtesy of Microsoft Taiwan Corporation)

operations by the Microsoft IoT Innovation Center in Taiwan.

The recently-established Microsoft IoT Innovation Center is based on the “federated lab” concept, involving collaboration with partner companies that are leaders in their respective fields of “smart manufacturing,” transportation, retailing, and activities relating to daily life, as well as working together with incubation centers and leading universities and research institutes to establish innovative laboratories for collaborative R&D. The aim is to use technology transfer, education and training, facilities sharing, middleware development and collaborative projects to develop the software, hardware and services needed for IoT solutions.

Vincent Shih points out that Microsoft Taiwan currently has around 500 employees, and that it plays an important role within Microsoft's global team. The results achieved by Microsoft Taiwan's R&D teams have been particularly impressive, contributing to the development of approximately 88 new patented technologies. With the changes in the way the Microsoft Group is organized and in its development strategy, Microsoft Taiwan has also seen changes, and not only in its organizational structure; has even the layout of the firm's offices been transformed, in line with the shift towards mobile computing and cloud-based computing. Microsoft Taiwan moved into new premises in September 2016; the new offices incorporate elements from Taiwanese culture and Taiwan's natural beauties into their design, and the overall design concept emphasizes diversity, tolerance, human-centeredness, “smart” design, and linkage. Employees do not have fixed desk positions; instead, they work in a collaboratively working environment based around cloud-based services and mobile platforms. This new approach improves work efficiency, and permits



Microsoft Taiwan plays an important role within Microsoft's global operation; Microsoft Taiwan has been instrumental in the development of around 88 new and patented technologies (Photo courtesy of Microsoft Taiwan Corporation)

more efficient use of office space.

Microsoft is displaying its commitment to the Taiwan market through a multi-faceted strategy that emphasizes R&D and start-up cultivation

Reflecting its commitment to the Taiwan market, Microsoft Taiwan not only works together with its Taiwanese partner companies on technology development projects, it has also been actively involved for many years in the cultivation of human talent and new business start-ups. For example, to help cultivate first-class human talent for society, and to enhance the competitiveness of Taiwanese students once they enter the workplace, since 2003 Microsoft Taiwan has been implementing a "Future Career Internship Program." The core element of this program is a whole year-long workplace internship activity; what makes Microsoft Taiwan's program special is that there are no pre-conditions attached, such as top tier universities, limiting to ICT related majors plus no requirement for high gradings. With over 100 students taking part in this program every year, in more than a decade that has elapsed since the program was first launched, it has cultivated more than 1,000 first-class young talents for Taiwan.

Microsoft Taiwan has also been collaborating with U.S. non-profit organization Code.org on the holding of “Hour of Code” coding experience activities. In 2015, a special effort was made to encourage participation in these activities by elementary school students, children from families where one parent is a recent immigrant, university students, women, and senior citizens, so that people in a wide range of groups within society have the opportunity to learn coding through simple games using graphical presentation methods; in this way, coding education can be spread into every corner of Taiwanese society. Microsoft Taiwan has also provided a wide range of resources to help Taiwanese teams participate in Microsoft's Imagine Cup, an event held by Microsoft to encourage students to come up with imaginative ways of tackling the various problems affecting society today. Since 2003, Taiwanese teams have won the Imagine Cup three times; one of the Taiwanese teams went on to successfully establish itself as a new business (HEX Inc.), which has since earned an impressive commercial reputation.

To provide support for business start-up in Taiwan, Microsoft Taiwan has introduced Microsoft's global BizSpark program into Taiwan. Under the BizSpark program, a wide range of start-up support resources are made available to new start-ups that have been in existence for less than five years and which have annual sales revenue of less than US\$1 million. Companies that take advantage of this scheme can receive BizSpark benefits provided via Microsoft's incubator partners, and they are also given priority for participation in technology seminars, courses and other activities organized by Microsoft, as well as being eligible to interview for places in Microsoft's start-up accelerator program. BizSpark thus has a great deal to offer for Taiwanese start-ups.

Looking ahead to the future, since the “digital economy” industries (such as the IoT and “smart machinery” manufacturing) is one of the areas that the Taiwanese government is keen to promote, given that Microsoft is already involved in the development of key technologies relating to cloud computing, Cognitive services, big data analysis, artificial intelligence and natural user interface technology, etc., Microsoft surely will be able to support software/hardware supply chain integration, and will be able to collaborate on the development of new platforms and solutions with Taiwanese companies, by using innovative business models. At the same time, Microsoft will continue to be a good corporate citizen, continuing with the implementation of its local young talent cultivation programs (which have already been underway for over a decade), working to promote coding education, and providing support for business start-up, etc. Since Microsoft has long moved beyond being merely a provider of computer software, it will play a key role in supporting the realization of “innovation-driven digital transformation” by Taiwanese industry.



Launching successful “smart building” projects, and collaborating with Taiwanese firms to exploring the ASEAN market

PanaHome Taiwan Co., Ltd.

Impressed by the success achieved by Taiwanese construction firms in the Southeast Asian market, PanaHome is hoping to integrate the strengths that Taiwan possesses in related industries to promote “smart home” and “smart residential building” projects, using the establishment of Taiwan-Japan collaboration mechanisms and coordinated export mechanisms to make it possible for Taiwanese firms to work together with PanaHome on developing the rapidly-growing ASEAN market, with its almost limitless business opportunities.



The Chang Jung VIP apartment building in Luzhou District, New Taipei City (photo courtesy of PanaHome Taiwan Co., Ltd.)



PanaHome Taiwan General Manager Yasuhiro Hara (photo courtesy of PanaHome Taiwan Co., Ltd.)

The birth rate in Taiwan has fallen steadily in recent years, Taiwan's Bureau of Health Promotion under the Ministry of Health and Welfare forecasts that, by 2026, Taiwan will have become a hyper-aged society, with more than 20% of the population aged 65 or over. Recognizing the sizeable business opportunities that the senior citizen market offers, many companies in Taiwan have been launching new products and services that specifically target the elderly, and some Taiwanese firms have opted to collaborate with Japanese companies, which have considerable experience in this area. For example, Taiwan's SAMPO Group has announced that it will be collaborating with PanaHome Taiwan Co., Ltd., a member of Japan's Panasonic Group. The two firms plan to build a senior citizens residential building – carefully designed to meet the special needs of the elderly – in Tucheng District, New Taipei City; they will be introducing Japanese-style care services, and providing “smart” appliances that are designed to be user-friendly for older people. They will also be collaborating with the Chang Gung hospital group to establish a medical services facility, so that senior citizens can enjoy the best possible

healthcare services.

Yasuhiro Hara, General Manager of PanaHome Taiwan, notes that “Our two companies’ planning for this project takes into account the fact that Taiwanese people prefer to live with or near their elderly relatives; besides having living spaces specially designed for senior citizens, the project will also incorporate homes designed for ordinary families. In this way, the senior citizens who live there will be able to spend more time with their children, while at the same time enjoying a convenient lifestyle; we feel that this design more fit with Taiwanese culture than conventional senior citizen residences in other countries.”

Japan's Panasonic Group is making full use of the value of the “Panasonic” brand to develop the Taiwan market

When they hear the name “Panasonic,” most Taiwanese consumers would tend to associate it with home appliances; in particular, with the dawning of the “smart home” era, there has been a steady stream of Panasonic TV commercials advertising the company’s “smart appliances.” However, in Japan, the Panasonic Group also has a very large construction division, reflecting Panasonic founder Konosuke Matsushita’s vision that Panasonic should do more than just provide convenient electrical appliances; it should also try to create user-friendly homes that can bring happiness to people.

PanaHome was formally established as a member company of the Panasonic Group in 1963. Working closely with other companies in the Group to provide a wide range of residential “total solutions,” PanaHome has built up a great deal of experience and some impressive achievements in the housing sector. For example, the Fujisawa Sustainable Smart Town (Fujisawa SST) project that was launched in 2014 in Fujisawa City, Kanagawa Prefecture, Japan makes use of a wide range of “smart facilities” and related software services to create a “smart community development architecture” with five key features: energy management, security and peace of mind, convenient transportation services, healthcare provision, and effective community management. It is fair to say that Fujisawa SST is one of the finest examples of a “smart community” to have been created anywhere in the world.

PanaHome currently has around 6,000 employees, and in FY2015 the company posted annual sales revenue of 353 billion Yen. The company has three main business areas: residential building and detached house design and construction work, residential property leasing and land management, and the operation of nursing homes and care facilities. Within the last five years, PanaHome has built over 60,000 homes in Japan. There has been no incident reported ever since, even during the serious Kobe Earthquake of 1995. With the aim of spreading its high-quality construction concepts overseas, in 2008 the Panasonic Group began evaluating the



PanaHome's Universal Design (UD) showroom (photo courtesy of PanaHome Taiwan Co.,Ltd.)

potential for PanaHome to develop overseas markets; of all the countries in the Asia region, Taiwan was the first choice for overseas expansion.

Yaushiro Hara notes that, during the one-year process of evaluating potential overseas markets, Panasonic realized that the Panasonic brand already enjoyed a high level of brand recognition in Taiwan, and that Taiwanese consumers were very receptive to Japanese products and services, reducing the need for Panasonic to spend heavily on brand promotion. A further point was that the Panasonic Group already had a significant presence in Taiwan, and so would be able to provide the various types of support needed by PanaHome in getting its Taiwan-based

operations off the ground, significantly reducing the challenges faced by the company in the early stages. For these reasons, Panasonic decided to establish PanaHome Taiwan, which represented PanaHome's first foray into overseas markets.

PanaHome's insistence on maintaining Japanese-style high construction standards has won the company high praise in the construction sector in Taiwan

PanaHome Taiwan was formally established in October 2011, with a main focus on providing Taiwanese customers with residential housing construction and "town-building" services as well as medical and care services. The aim was to introduce into Taiwan the emphasis on comfortable living spaces that characterizes Japanese architecture, as well as expert Japanese construction techniques, in order to provide Taiwanese customers with a superior living environment. Taking into account the fact that, initially, the new company had relatively limited manpower resources, and that Taiwan's population is heavily concentrated in Northern Taiwan, PanaHome Taiwan decided that initially its business operations would focus mainly on Taipei City and New Taipei City in Northern Taiwan, where consumer spending power is higher. However, because housing in Northern Taiwan consists mainly of apartment blocks, PanaHome Taiwan was forced to make adjustments



Installing hot/cold air heat exchangers indoors can help to reduce unnecessary energy costs, while also making a contributing towards protecting the global environment



The thermal insulation layer that characterizes many Japanese buildings is an ideal way of reducing electric power consumption



Although having a raised floor slightly reduces the effective ceiling height, it has the advantage of easier maintenance of piping and cables, thanks to the skeleton-infill construction technique

to its business strategy.

Yasuhiro Hara points out that, whereas PanaHome's main area of expertise was in construction techniques for building single-family detached houses and villas, the main focus of the construction market in the Greater Taipei area is on modernizing older apartment buildings; as a result, initially, PanaHome Taiwan found that it was unable to secure many contracts for detached house projects. In response, the company decided to switch its focus to concentrate mainly on large apartment buildings. Fortunately, because of the strong brand recognition that Panasonic enjoys, PanaHome was able to build strong collaborative relationships with Taiwanese partner companies very rapidly, establishing solid foundations for continued development of the Taiwan market in the future.

The Taiwanese construction sector is already characterized by high construction technology standards, and by intense competition. To successfully develop this market, PanaHome needs to adopt a radically different business strategy. PanaHome's single biggest source of competitive advantage is its wealth of experience, which enables it to provide a wide range of expert advice to architects. PanaHome Taiwan also insists on using the same high-quality construction methods as in Japan; not only does this facilitate interior decoration after the building construction has been completed, it also gives PanaHome a competitive beyond the reach of other construction firms. As a consequence, although PanaHome's construction costs are slightly higher than those of other firms, because PanaHome's methods help to enhance the overall quality of the building, they have still found many Taiwanese construction companies who are eager to collaborate with them.

Mr. Hara notes that, although PanaHome has adopted the traditional reinforced concrete (RC) construction method in line with customers' preferences in the Taiwan market, PanaHome has still worked to promote the concept of keeping the utility piping and wiring separate from the main body of the building, to facilitate future maintenance work and reduce maintenance costs. Bearing in mind that a concrete building usually has a lifespan of at least 60 years, whereas PVC pipes normally need replacing after 20 – 30 years, it is clear that the traditional method of laying PVC pipes between the floors is bound to result in maintenance problems eventually.

To ensure that construction quality standards are maintained, PanaHome Taiwan has adopted a method of sending its Japanese civil engineering technician advisors to visit contractors' building sites three times a week to inspect the work; the advisors work together with the contractors

to identify any possible bottlenecks or problems. In addition, to enhance the quality of the construction work performed by its contractors, PanaHome holds regular joint study sessions with contractors, at which they discuss strategies for further improving both construction work and interior design, and where PanaHome introduces contractors to the latest market trends and new methods. In this way, PanaHome is able to enhance the overall technical capabilities of the construction team as a whole.

Working together to explore the ASEAN market with a Taiwan-Japan collaborative export mechanism

In the past, PanaHome had two different subsidiaries responsible for its construction operations and its interior decoration operations in Taiwan. Subsequently, however, in order to more effectively develop its Taiwan business, the Panasonic Group decided that PanaHome Taiwan Residence would be merged into PanaHome Taiwan, so as to ensure smooth integration of construction work and interior decoration work, and make sure that customers' needs can be met in a timely manner in today's fast-changing marketplace. To stimulate the growth of its personalized interior design business, in 2016 PanaHome Taiwan opened its "PanaHome UD Dreamer" PanaHome experience showroom in Xinzhuang District, New Taipei City. This new facility showcases the combined capabilities of the Panasonic Group, unraveling how PanaHome is able to create "Universal Design Homes" with open and free spaces for people of all ages. The UD Dreamer showroom demonstrates to consumers how PanaHome combines construction, interior decoration and home appliance capabilities, and how PanaHome is able to provide consumers with comprehensive, all-round service.

Yasuhiro Hara explains that the factors that make PanaHome so special include its emphasis on universal design (reflected in the use of specially-made ramps and barrier-free movement between levels), packing a lot of storage space into small areas (for example by the use of revolving shoe-stands and storage areas concealed in the ceilings), mood-creation systems (including lighting controls and electric window blinds), and utilization of the Skeleton/Infill (SI) construction method. The SI method, a unique method developed in Japan, is ideally suited to regions like the Greater Taipei area that have high population density and a shortage of usable land; PanaHome's expertise at maximizing storage space in small living spaces also makes a big contribution towards creating the optimal living environment.

Responding to the ongoing progress being made in Internet of Things (IoT) technology and to the global trend towards energy conservation and reduction of carbon dioxide emissions, PanaHome Taiwan has positioned "Smart," "Eco-system" and "Silver-hair" (i.e. residences specially designed for senior citizens) as its three key development strategies. In Northern Taiwan, PanaHome Taiwan will continue to focus



The thermal insulation layer built into the ceiling prevents hot air outside from affecting the temperature indoors, thereby reducing expenditure on electric power for air conditioning

mainly on apartment building projects, but will be also incorporating interior design services into new projects. In Central and Southern Taiwan, PanaHome will be developing the private villa market, and has also begun collaborating with Taiwanese construction firms on the planning of new-generation “smart” residential communities; PanaHome will be working to introduce into Taiwan even more of the successful “smart home” concepts that have been adopted in Japan.

In the future, PanaHome hopes to be able to collaborate with Taiwanese building contractors, construction firms, design firms, ICT service providers, electronics manufacturers etc. on jointly developing the smart home and smart building market in Taiwan. Once a track record of successful projects has been established, it should then be possible to extend this collaboration into joint development of the rapidly-growing Southeast Asian market, using a Taiwan-Japan joint system integration and export mechanism to secure new business opportunities there.



A market trendsetter that is making power management more intelligent

Raritan International B.V.

When competition in industry is no longer regional in scope, besides exploring a diversified range of business models to meet customers' needs, it is even more important for business enterprises to be able to keep pace with future trends and establish themselves as leaders of their respective industries. With its unique technologies, services and innovation and R&D capabilities, Raritan has been able to maintain consistently strong performance in the face of intense global competition. Its ability to provide small-volume production of a wide range of product items and its customized services are supported by Taiwan's first-rate information and communications (ICT) infrastructure and by flexible technology-enabled services. It is significant that Taiwan accounts for more than half of the R&D staff in Raritan's R&D teams in the U.S., Germany and Taiwan.



Established in 1985, Raritan has grown steadily and its products are now found all over the world



Howard Hsieh, President of Raritan International B.V. Taiwan Branch, is full of confidence in the Taiwan market's potential

Raritan (which has its global headquarters in Somerset, New Jersey), was originally positioned as a manufacturer of computer equipment. From KVM (Keyboard, Video, Mouse) switches to PDUs (Power Distribution Units), Raritan's unique technologies and services have enabled the company to implement its own "blue ocean" strategy in the face of fierce, globalized competition; the strong brand that Raritan has created has enabled the firm to establish itself within international supply chains, securing business opportunities and establishing the foundations for continued success.

Keeping pace with new trends, and developing new business opportunities through the creation of the KVM business

"Our strategy has always been to focus on niche markets" says Howard Hsieh, President of Raritan International B.V. Taiwan Branch. Mr. Hsieh is actually being modest; since the company's foundation in 1985,

Raritan's products have been successfully marketed all over the world, to customers that range from leading global corporations to home-office users. Raritan products are used in approximately 50,000 corporate data centers in 76 different countries around the world, with major customers that include IBM, Intel, JP Morgan Chase, Microsoft, the United States Postal Service, and NASA.

When competition in industry is no longer regional in scope, besides exploring a diversified range of business models to meet customers' needs, it is even more important for business enterprises to be able to keep pace with future trends and establish themselves as leaders in the development of their respective industries. Of course, business models are changing all the time too, and maintaining flexibility is also a key to business success.

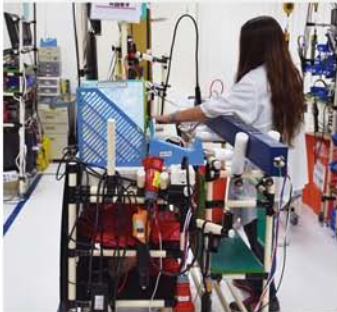
Examination of how Raritan has developed over time shows that being able to spot new business opportunities and move rapidly into those areas has been the key to Raritan's success. "In the early days, when PCs were taking off, we were basically doing the same things as all the other companies in the business, right up until 1990 when profit margins started to fall." Howard Hsieh notes that, at that time, PC-related industries were where all the market action was at, but that to achieve sustainable, long-term operation a business enterprise needs to be able to look ahead into the future, and Raritan was one of the first firms to realize how the industry was starting to change.

In computer manufacturing, the burn-in test is a very important process. To ensure product reliability, burn-in testing is usually performed in a heated laboratory, which is so hot that the operatives performing the testing used to feel very uncomfortable. Raritan developed a computer control system that eliminated the need for the operatives to be inside the laboratory room where testing took place; they could now control the testing and view the test data for the computer being tested from out-side the test room. Developing this system helped Raritan to become a pioneer in KVM switch manufacturing.

At around the time that Raritan realized that profit margins in the PC business were falling, the PC control system that the company had developed was gradually evolving into a "prototype" of the KVM switch. Having seen and been impressed by one of these devices at a technology trade show, Intel decided to start using them, and as a result Raritan formally entered the KVM switch era. "I think it is probably fair to say that we were the first company to start developing KVM switch products." The term "KVM switch" may not be all that familiar to the general public, but for a data center in a large corporation which needs to manage hundreds of PCs, servers and networking devices, the KVM switch is a vital piece of equipment in their management processes, enabling them to implement effective management that can reduce hardware requirements, reduce energy consumption, facilitate more effective use of



At Raritan, modularized working methods have been established for every production process



The Lego-like modularized work units can implement production independently, but they can also be put together in different ways to create larger-scale production units

space, improve safety and contribute to better human resources management, etc. With the steady pace of development in technology, and with so many tasks being computerized, even slight improvements can provide significant cost savings.

Raritan's KVM technology enables business enterprises to access, control and manage their PCs, servers and other devices at all times, while reducing the amount of time that devices are out of service, and substantially enhancing productivity. The strengths of Raritan's KVM switch products have made Raritan a leading player in the KVM switch market.

"Every company uses different computers, and there are always differences in the exact specifications of the equipment used. So there are always compatibility issues." Howard Hsieh explains that the PCs connected to a KVM switch may have been manufactured by different PC vendors, and that a lot of detailed analysis is required when it comes to ensuring that KVM switches can recognize different types of PC and deal with compatibility and connection issues; Raritan needs to have an in-depth understanding of the differences between

different brands and different types of equipment. The technological requirements are particularly high when it comes to supplying KVM switches to large corporations which may need to have several hundred or even several thousand computers operating at the same time. Being able to stay focused, fully understand customers' needs, and provide the right solutions, is no easy task.

Thanks to the many years of experience that the firm has accumulated in the KVM switch business, the KVM switches that Raritan manufactures have become the preferred choice for many leading international corporations when deciding which equipment to adopt for their data centers. At the same time, Raritan has speeded up the pace of its business development efforts, making a big push into the Rack PDU (for data centers) business, and building on its existing strengths in ICT management to develop brand-new types of "smart" PDU.

Making “smart” PDUs the foundation for building “green” data centers

“Providing new types of service in familiar markets” – Howard Hsieh explains that, by incorporating computer microprocessors in conventional PDUs, it is possible to create “smart” PDUs that enable data centers to accurately and precisely monitor the electric power usage and environmental conditions of every node and every item of equipment in their racks; “smart” PDUs also help large-scale data centers to implement more efficient allocation of electric power and resources, thereby achieving more efficient operation.

In today’s world, when energy is in increasingly short supply, and when energy shortages can be expected to continue to worsen for the foreseeable future, the question of how to save energy is becoming steadily more urgent. This is particularly true because of the dramatic increase in the quantities of data being created and processed; developments such as the emergence of cloud computing and Big Data are closely related to energy usage. Mr. Hsieh provides an example: “Assume that a given kWh of electricity is currently enough to meet the needs of one person; what if, through more efficient utilization, you can allow more than one person to use that same kWh?”

Since 2007, Raritan has launched intelligent rack PDUs, environmental monitoring sensors and energy management systems for large-scale data centers, helping data centers to establish key performance indicators for power supply, energy conservation and emissions reduction, etc. In 2009, Raritan introduced a new data center infrastructure management system; using the integration of software and hardware systems and high-precision data capture and data-mining technology, this new system provides comprehensive optimization of control room and data center power supply management and environmental management.

“Generally speaking, in data center management, data centers are often kept at excessively cold temperatures year after year in order to ensure that the equipment keeps functioning properly” points out Howard Hsieh. Raritan’s technology-enabled services and precision data analysis can make data center management “smarter,” precisely identifying the “hot-spots” within data center facilities and ensuring effective separation of hot aisles and cold aisles, thereby reducing the amount of energy expended on cooling.

Another key point is that surveys have shown that most faults in data centers are caused not by problems with the equipment itself, but by human error. Through careful monitoring and management of server racks and other equipment, intelligent PDUs can compile precise statistics on equipment power consumption; data center

maintenance staff can use intelligent PDUs to switch the power supply on or off and reboot equipment as needed, repairing faults and ensuring smooth, continuous system operation without even needing to enter the server rooms. In addition, unused PDU sockets can be turned off to reduce the risk of faults caused by human error or by energizing units at the wrong time.

Raritan's PDUs and KVM switch products are already widely used in data centers in industries such as broadcasting, transportation, finance, telecommunications, electric power generation, energy management, etc. "Statistics show that some of our customers, such as Cisco, have achieved a 10% reduction in electricity consumption since they started using intelligent PDUs.

Howard Hsieh points out that, based on accurate measurement of data center hot spots and other aspects of the data center environment, raising the average temperature inside a data center by one degree centigrade (while making sure that the normal operation of the equipment is not negatively impacted) can reduce electric power consumption by 3%; the spare power that is obtained in this way can then be allocated for use in other, more efficient ways. In line with its commitment to strengthening awareness of "green" concepts and environmental protection, Raritan is a member of the Green Grid alliance, the



Raritan organizes and attend exhibitions both in Taiwan and around the world, showcasing the latest industry trends and technologies, and promoting the effective use of power management to build the green data centers and control rooms of the future, which will be characterized by energy saving and carbon reduction



Left: By monitoring and managing the power consumption of server racks and other equipment, smart PDUs are able to provide accurate statistical information regarding equipment power usage

Right: Raritan produces more than 2,400 different smart PDU models



Left: Thanks to Taiwan's high-quality manpower, the likelihood of errors occurring is reduced, ensuring a higher level of stability in production operations

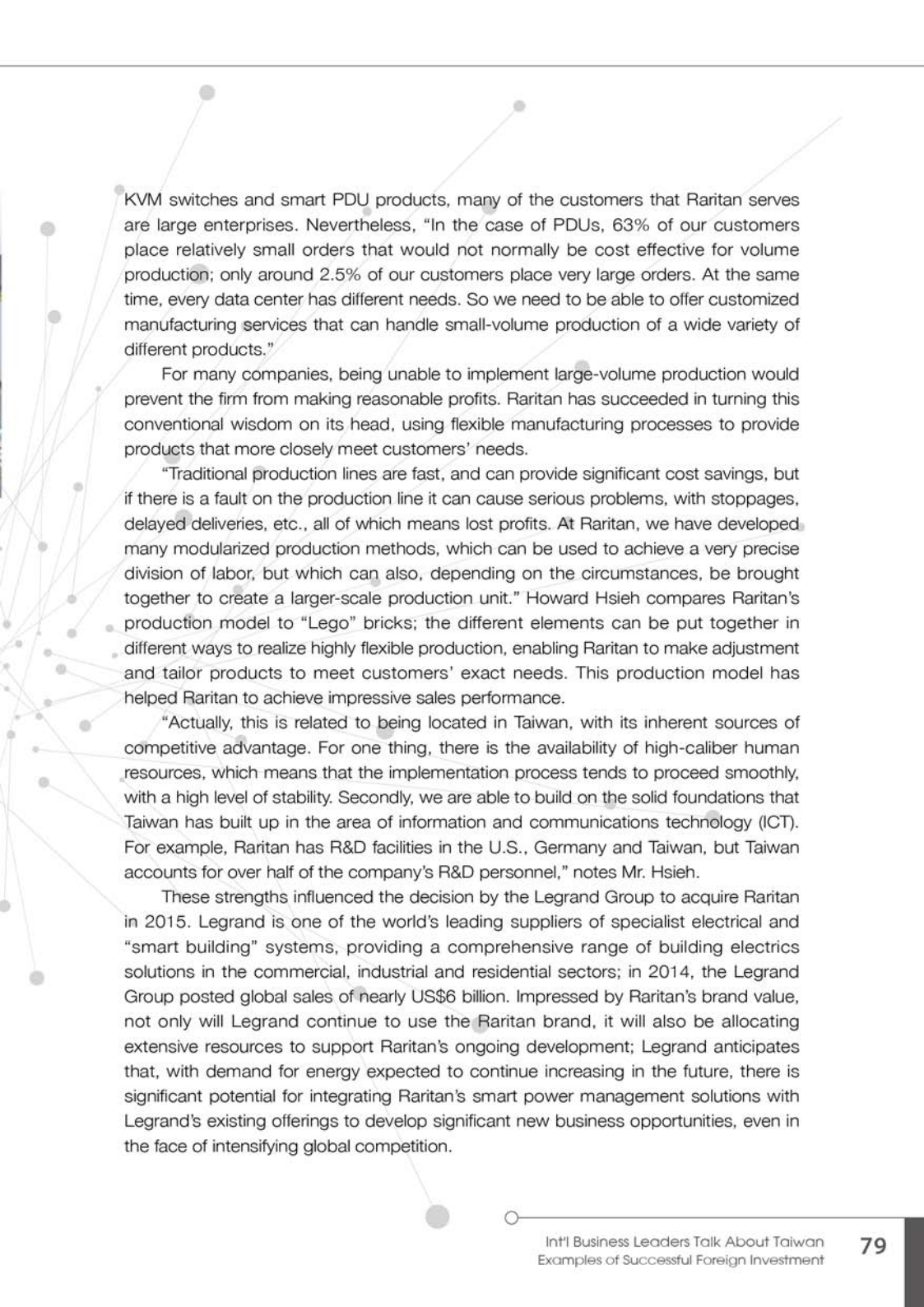
Climate Savers Computing Initiative, and the Leadership in Energy and Environmental Design alliance; the company has also received an award from the Environmental Protection Agency (EPA) in the U.S.A. in recognition of its contribution to an EPA data center project.

"We strongly encourage our suppliers to use recyclable, environmentally friendly products!" notes Howard Hsieh, who points out a detailed document affixed to the company's bulletin board, which explains that Raritan implements traceability for all products, equipment and production processes. Smiling, Mr. Hsieh points out that the data (which is made public) shows that "Neither Raritan nor our suppliers use conflict minerals!"

Providing customized services, with the ability to undertake small-volume production of a wide range of different products

Raritan's hard work and its ability to identify new trends have enabled the company to successfully grasp new business opportunities in the KVM switch and PDU business. One of the key factors behind Raritan's success has been the company's customized production model, with the ability to implement small-volume production of a wide range of different product types.

The main source of competitive advantage for Raritan over the course of its development has been the company's success in staying at the forefront of market trends. Howard Hsieh believes that Raritan's customized manufacturing services capability, with the ability to provide customers with small-lot production of multiple different product types, has been an important core capability for the firm. For both



KVM switches and smart PDU products, many of the customers that Raritan serves are large enterprises. Nevertheless, “In the case of PDUs, 63% of our customers place relatively small orders that would not normally be cost effective for volume production; only around 2.5% of our customers place very large orders. At the same time, every data center has different needs. So we need to be able to offer customized manufacturing services that can handle small-volume production of a wide variety of different products.”

For many companies, being unable to implement large-volume production would prevent the firm from making reasonable profits. Raritan has succeeded in turning this conventional wisdom on its head, using flexible manufacturing processes to provide products that more closely meet customers’ needs.

“Traditional production lines are fast, and can provide significant cost savings, but if there is a fault on the production line it can cause serious problems, with stoppages, delayed deliveries, etc., all of which means lost profits. At Raritan, we have developed many modularized production methods, which can be used to achieve a very precise division of labor, but which can also, depending on the circumstances, be brought together to create a larger-scale production unit.” Howard Hsieh compares Raritan’s production model to “Lego” bricks; the different elements can be put together in different ways to realize highly flexible production, enabling Raritan to make adjustment and tailor products to meet customers’ exact needs. This production model has helped Raritan to achieve impressive sales performance.

“Actually, this is related to being located in Taiwan, with its inherent sources of competitive advantage. For one thing, there is the availability of high-caliber human resources, which means that the implementation process tends to proceed smoothly, with a high level of stability. Secondly, we are able to build on the solid foundations that Taiwan has built up in the area of information and communications technology (ICT). For example, Raritan has R&D facilities in the U.S., Germany and Taiwan, but Taiwan accounts for over half of the company’s R&D personnel,” notes Mr. Hsieh.

These strengths influenced the decision by the Legrand Group to acquire Raritan in 2015. Legrand is one of the world’s leading suppliers of specialist electrical and “smart building” systems, providing a comprehensive range of building electrics solutions in the commercial, industrial and residential sectors; in 2014, the Legrand Group posted global sales of nearly US\$6 billion. Impressed by Raritan’s brand value, not only will Legrand continue to use the Raritan brand, it will also be allocating extensive resources to support Raritan’s ongoing development; Legrand anticipates that, with demand for energy expected to continue increasing in the future, there is significant potential for integrating Raritan’s smart power management solutions with Legrand’s existing offerings to develop significant new business opportunities, even in the face of intensifying global competition.



**The world leader in business software,
SAP's solutions help customers to make
maximum use of their time**

SAP Taiwan Co., Ltd.

In today's world of intense globalized competition, with the emergence of Big Data and the Internet of Things (IoT), increasingly widespread adoption of cloud computing applications, and competition that extends across national borders, Taiwanese industry – which is dominated by small and medium-sized enterprises (SMEs) – is faced with unprecedented challenges. How can technology be utilized effectively to enable business enterprises to maximize their competitive advantage? SAP Taiwan Co., Ltd., the Taiwan subsidiary of SAP SE (the world's leading provider of enterprise software and software-related services), is taking practical steps to answer this question, and is demonstrating a high level of confidence in its ability to achieve great things in the Taiwan market.

Founded in 1972, SAP SE now has a service network that covers almost the entire globe in the enterprise software and software-related services business. SAP has customers in 190 countries around the world, and nearly 90% of the companies on the Forbes Global 2000 list are SAP customers.

Providing localized service and achieving a comprehensive global network and globalized services simultaneously

Faced with a constantly changing market environment, SAP has never stopped innovating. When the company was first established in Weinheim, Germany in 1972 by its five founders – Dietmar Hopp, Hans-Werner Hector, Hasso Plattner, Klaus Tschira and Claus Wellenreuther – SAP was named “System Analysis and Program Development”; the company name was subsequently abbreviated to “SAP” (standing for its core business areas of “Systems, Applications and Products in data processing”). In 1977, SAP relocated its corporate headquarters to Walldorf, Germany.



SAP Taiwan General Manager Tony Hsieh (Photo courtesy of SAP Taiwan Co.,Ltd.)



The comfortable environment in the SAP Taiwan offices provide SAP staff with a good place to hold discussions



SAP holds a SAP Forum every year in Taiwan, showcasing the latest solutions from the global market as a whole (Photo courtesy of SAP Taiwan Co.,Ltd.)

Following its acquisitions of business intelligence software firm BusinessObjects and commercial software development firm, Sybase, the scope of SAP's business activities has expanded considerably. With the launch of the SAP HANA in-memory computing platform and SAP S/4HANA digital core, combined with the steady expansion of SAP's global network, SAP is now able to offer total solutions that cover not only corporate procurement, CRM services and human resources management, but also

emerging technologies and applications such as cloud computing, Big Data, the IoT, etc.

With the rapid technological innovation, the main source of competitive advantage for business enterprises today is being able to respond rapidly to changes in market needs and to grasp new business opportunities as they emerge. As part of its globalized development strategy, apart from working actively to develop new business opportunities, SAP bases the division of labor within its own global organization on the location its customers' global headquarters are based. In other words, if a customer's global headquarters is situated in Taiwan, then SAP Taiwan Co., Ltd. will be responsible for overseeing the services provided to that customer; if a customer has special requirements, then SAP will coordinate mutual support between different companies within the SAP Group to meet that customer's needs. The key to this approach is combining localized service provision that also supports global development.

Thanks to SAP's comprehensive range of services and its ability to help them overcome the barriers of space and time, business enterprises that use SAP's solutions can respond rapidly to changes in market needs through prompt decision-making. By utilizing SAP's three major cloud-based application services – the SAP SuccessFactors human resources management solution, the SAP Ariba procurement operations platform, and the SAP Cloud for Customer sales solution – SAP's corporate clients have achieved impressive improvements in their operational performance. "For example, business enterprises located in Taiwan can use our platform services to undertake purchasing anywhere in the world; they are no longer limited to purchasing from a specific small group of regions because of information and manpower constraints, as they were in the past," explains SAP Taiwan General Manager Tony Hsieh.

Today's constantly changing competitive landscape means that business enterprises need to make every second count. Firms need to be capable of responding to change even faster and more flexibly than in the past, in order to keep pace with changing global circumstances with "zero time lag" and thereby build strong competitive advantage. Tony Hsieh says confidently that "With our services, business enterprises can achieve real globalization!"

A set of systems that can enhance the managerial efficiency of enterprise operation

Over the course of SAP's development, it is fair to say that ERP software has been an important foundation for the company's success. Companies in traditional industries often experience problems with regard to data collation and statistical



The plants inside SAP Taiwan's offices create a sense of greenery and also help to reduce energy consumption and carbon dioxide emissions

analysis in relation to their production and marketing processes, etc., because of the limitations imposed by their own corporate development experience and the manpower and other resources available to them; performing these tasks can be very time-consuming and the resulting delays often lead to firms missing out on business opportunities.

SAP established a representative office in Taiwan in 1995, followed by the formal establishment of a Taiwan subsidiary in 1997. At that time, Taiwan was starting to experience the effects of the new trend towards price-based competition in the electronics industry, with the big international PC vendors starting to compete viciously with one another on cost. In response, starting from 1999 the Taiwanese government formulated a number of new strategies, including the "Information Industry Supply Chain Plan B," the aim of which was to strengthen the information links between Taiwan's electronics firms and their customers, so as to trim inventory and raise productivity. SAP's ERP systems were exactly what was needed to help Taiwan's leading contract manufacturers during this period.

"SAP's ERP services can substantially improve a firm's operational management efficiency. For example, in the past, for any given production

line it was usually only possible to know the total amount of output; with SAP's solutions, you can monitor which segments of the production line have higher production efficiency and which have lower efficiency, thereby making it possible to implement more effective planning and capacity utilization" notes Tony Hsieh. Particularly in recent years, with the rapid technological changes, competition in industry has become intensified; in Taiwan, where the number of SMEs is particularly high, one of the main areas that SAP has been focusing on is helping firms to use ERP to become more effective at boosting their enterprise management efficiency, cutting costs, and implementing corporate transformation and internationalization.

In regard to the "New Southbound Policy" introduced by the Taiwanese government (to encourage Taiwanese investment in Southeast and South Asia), SAP has already been noticing the changes in corporate strategies, and has been helping Taiwanese firms in the machine tool industry, textile industry etc. to expand into Southeast Asian nations; SAP has been able to help them to formulate the management strategies they need to be able to respond to changes in the market, and has been able to provide them with the most effective solutions to meet their information management needs in these new markets.

A key point is that so many of the world's leading companies – including Apple, BMW and Nike, etc. – are already using SAP systems, which in many cases has led their suppliers to adopt SAP' services, so as to facilitate the integration of their systems with their customers' systems. This has helped to bring about even more widespread adoption of SAP applications, and in some cases has even contributed to the formation of new industry value chains. For Taiwanese business enterprises, which urgently need to transform and upgrade themselves, the potential benefits from adopting SAP's solutions are even greater.

A diversified range of services to create even higher service value

Despite the achievements outlined above, SAP refuses to allow itself to become complacent in the face of the constantly changing competitive environment in industry today. "In the process of providing services to our customers, we don't just liaise with their IT departments; we also seek to communicate with their senior managers, to explain the importance of investing in information systems and the benefits that it can provide."

Tony Hsieh points out that, besides providing comprehensive information systems and business strategy consulting services to help customers review and adjust their internal processes so as to realize enhanced managerial efficiency, another key aspect of the services that SAP provides is helping customers to anticipate future trends and develop new business opportunities, reflecting the fact that manufacturing

industry now needs to be oriented towards responding to market demand and towards developing those aspects of the value chain that relate to maintenance and other after-sales services. Even more importantly, SAP can help customers to make useful adjustments to all of their management systems, including production process management, brand management, distribution management, financial management, etc.

Put simply, while SAP is providing customers with services using its wealth of system resources and its extensive practical experience and know-how to meet customers' needs, it is also seeking to guide customers towards business model innovation that can transform challenges into sources of competitive advantage. Tony Hsieh reiterates that "by providing a diversified range of services, we help business enterprises to create higher levels of value-added."

One point worth noting is that, by helping customers develop their global networks in regard to investment environment information, SAP has for some years now been including information about the legal and regulatory framework in individual countries in its information systems, and it updates this information regularly. "For companies that are investing overseas, this can really be a big help!" Tony Hsieh goes on to point out that traditional quality management systems such as ISO are heavily focused on documentation, and the consultants that help firms adopt these systems tend to emphasize certain specific management concepts; Mr. Hsieh notes that, by contrast, SAP provides service in an ongoing, evolving manner based on customers' actual operational processes, and that it also meets customer needs in regard to the world market.

"SAP really can help business enterprises to transform and upgrade themselves." Even more importantly, over the past few years SAP has been responding to the emergence of new technologies and applications such as cloud computing, Big Data and the IoT by proactively implementing globalized, intensive planning (under the supervision of SAP's global headquarters) to ensure that SAP remains at the forefront of new global trends and is able to take the lead in identifying and developing new business opportunities. Taking into account the special characteristics of Taiwanese industry, and in particular the information system requirements of Taiwan's SMEs as they undertake the process of transformation and internationalization, SAP has been working actively to develop collaboration with customers in many different Taiwanese industries, including the manufacturing sector, insurance, telecommunications, etc., to achieve innovation and the development of new applications.

At the same time, SAP has been moving away from its past focus on providing service to individual customers, and is now working actively to develop the

integrated industry value chain concept. For example, by collaborating with leading companies in the aerospace sector, SAP is able to help these companies' suppliers to obtain high-level international certification, which in turn helps them to develop global markets. "We recognize that Taiwan is currently working actively to promote new strategies such as the 'Asian Silicon Valley' initiative, and we at SAP will continue to provide information system platforms and services to meet customers' needs. At the same time, we look forward to participating in our customers' efforts to develop new market opportunities." In fact, SAP has for many years now been collaborating with leading Taiwanese colleges and universities on human resources cultivation projects. For example, SAP's collaboration with National Central University (NCU) led to the establishment of the SAP Next-Gen Lab at NCU in 2016, which will be integrating practical, real-world issues with academic instruction to help students cultivate digital technology capabilities and guide the development of a new-generation of talent with the potential to lead the transformation of Taiwanese industry.

With its globalized approach to market development, SAP now has around

335,000 customers in 190 countries. Whether in Taiwan or elsewhere in the world, SAP has always worked to develop international business opportunities by positioning itself at the forefront of new trends, demonstrating the company's ambition and resolve.



SAP Taiwan's location in the heart of Taipei City helps Taiwanese enterprises to keep their finger on the pulse of new market trends and keep pace with global developments



SCANTEAK
詩肯柚木

Thinking outside the box: Using Taiwan as a base for exploring global brands

SCAN-D Corporation

In today's world of intense, globalized competition in industry and constant change in business models and strategies, SCAN-D, which combines a Scandinavian aesthetic with streamlined design and practicality, has been steadily expanding its network of outlets in Taiwan, while at the same time the company's brands – which include SCANTEAK, SCAN LIVING and SCAN KOMFORT – have inspired new trends in the wooden furniture business in Taiwan. This Singaporean company, which was included in the 2012 Forbes magazine "Asia's Best 200 Under a Billion" list of outstanding Asian SMEs, plans to further expand its presence in Taiwan in the future, while at the same time working actively to develop furniture-related business opportunities in the wider global market.

▲
SCANTEAK's operational and logistics headquarters, located in the Guishan Industrial Park, Taoyuan City (photo courtesy of SCAN-D Corporation)



Radiating confidence in his firm, SCAN-D Corporation Chairman P.C. Lim explains how SCANTEAK has put down firm roots in Taiwan over the years

In 1993, SCANTEAK established its first business location in Taiwan, sparking a vogue for Scandinavian-style furniture in the Taiwanese furniture industry. In 2010, SCAN-D Corporation became the first, and so far the only, furniture retailer to be listed on Taiwan's OTC exchange. The company's success has had the effect of encouraging other Singaporean firms to invest in Taiwan and to list on Taiwan's OTC exchange. SCAN-D's business model – which combines Singapore-based design with Indonesia-based production, assembled and sold in Taiwan to reach the Taiwanese human talent – has enabled the company to build an integrated, multi-faceted competitive advantage and to successfully expand into global market.

Taiwan has hardworking, responsible workers, and a business environment well-suited to new business start-up

When entering SCANTEAK's operational and logistics headquarters, which opened in the Guishan Industrial Park, Taoyuan City in August



Left: An office inside SCANTEAK's operational and logistics headquarters
 Right: SCANTEAK's operational headquarters also serves as the logistics center

2015, the visitor is struck by the neatly arranged products on the storage racks awaiting shipment. Closer inspection reveals that every row bears a carefully written notice specifying which employee is responsible for that particular row.

While showing visitors round the facility, SCAN-D Chairman P.C. Lim explains how the company has grown its Taiwan-based operations. Mr. Lim notes proudly that "Taiwanese workers are responsible and hardworking; if our Taiwanese employees are handling something, then I know that it is in good hands." In the inspection area next-door, every bay contains products that have just been unpacked after importation from Indonesia, which are awaiting careful inspection by the inspection staff, who ensure that all of these furniture products are free from imperfections.

SCANTEAK is a Singaporean brand. Taking advantage of the linguistic and cultural similarities between Singapore and Taiwan, and having noted that wooden furniture was very popular in the Taiwan market, SCANTEAK founder P.C. Lim entered the Taiwan market in 1993. At that time, the furniture manufacturers located in the Wugu Industrial District were thriving, and competition was intense. Nevertheless, thanks to its unique business model and strategies, SCANTEAK was able to achieve rapid growth, and today the company has more than 300 employees and 106 outlets throughout Taiwan.

Pointing to the company's current operational headquarters building, which has a floor-area of several thousand square meters, Mr. Lim notes that "When we first launched our Taiwan business, there were only four people in the company, including me, and the warehouse had to serve as our office. Often, when we were particularly



busy, all of us ended up sleeping in the office. It was really tough!"

However, all of these difficult old days that he experienced are replaced with a smile as Mr. Lim notes his satisfaction with how the company has developed in Taiwan since then. He points out that the many policies adopted by the Taiwanese government to support Taiwan's continued economic development have included comprehensive measures to help SME-sized firms secure funding. When SCANTEAK was first getting off the ground, it benefited from a loan provided by Taiwan Business Bank. "At that time, our company was still very small, nothing like what it is today." Laughing, Mr. Lim notes that, although two decades have elapsed, he still remembers that the grant NT\$2 million loan just like yesterday.

Mr. Lim stresses that "For a business that is still growing, having access to financing is vitally important. This is one thing that Taiwan has done very well."

This is far from being the only thing that Mr. Lim appreciates about Taiwan. Taiwanese people's diligence, responsibility, and human touch were also key factors that influenced his decision to establish deeper roots in Taiwan; while SCANTEAK has continued to expand its operations all over the world, our strong association with Singapore and Taiwan is still an important part of the company's business development strategy. "Today, when SCANTEAK is expanding overseas, we always tell people in other countries that we have a huge presence in Taiwan; Mr. Lim says that this is seen as a guarantee of the quality of SCANTEAK's products.

Using communication to strengthen brand cohesiveness

After establishing the Hawaii Furnishing interior design firm in Singapore in 1974, P.C. Lim traveled all over the world to investigate potential new markets for his steadily growing furniture sales business. By identifying the areas in which furniture design in different countries was particularly strong, he was able to build up a solid foundation for the development of his own brand; this was the key to his business strategy.

"I spent over a month in Denmark on one occasion, and was able to develop an understanding of the local ethos. I was very impressed with the Danish design style, which combined simplicity with practicality, and this inspired me to establish the SCANTEAK brand." The decision to use teak for SCANTEAK furniture was influenced partly by the fact that teak wood is a first-class material for furniture manufacturing, and partly by the homelike sense of warmth that teak exudes, which perfectly matched SCANTEAK's brand positioning. As a result, P.C. Lim has visited Indonesia – the world's main source of teak wood – so often that he hardly can remember how many visits.

As wooden furniture produced in Indonesia tended to be of rather low quality, Mr. Lim spent a lot of time and effort on strengthening collaboration with Indonesian factories, helping them to create better-quality furniture. He has always insisted on high standards, and has consequently had to spend a lot of time communicating and building consensus.

"I sincerely believe that good products derive from a good company, a good boss, and good employees." Mr. Lim emphasizes that, when searching for furniture factories in Indonesia to collaborate with, his first step is to examine how the factory's boss and its employees get along with one another. He firmly believes that having a harmonious, inclusive corporate culture is a prerequisite for creating good products. In the same way, ever since SCANTEAK was first established, the brand's value has been based on providing first-rate products and excellent customer service.

Every year, SCANTEAK allocates funds to bring the owners and managers of SCANTEAK's Indonesian contract manufacturers over to Taiwan so that they develop a better understanding of the marketing model used to sell SCANTEAK products. "When they see how much consumers appreciate the tables, chairs etc. that they have made, and how valued the SCANTEAK brand is, that encourages them to expend even more care and attention on the production of every single piece of furniture."

Similarly, SCANTEAK's Taiwanese staff members are sent to Indonesia for "hands-on" learning on a regular basis. P.C. Lim notes that "Seeing how much painstaking effort goes into the creation of the furniture encourages them to provide even better service." At the same time, SCANTEAK has been using its salary and bonus system to position Taiwan as the main center for the development of the company's marketing and brand management operations, and continues to actively expand overseas.

Following the establishment of its first Taiwan business location in the Wugu Industrial District in 1993, SCANTEAK achieved steady sales growth. In 2010, SCAN-D was listed on Taiwan's OTC exchange, and in August 2015 the company opened its new operational headquarters and logistics center (with several thousand square meters of floor area) in the Guishan Industrial Park, Taoyuan City; SCANTEAK also has distribution warehouses in Taichung and Tainan. Currently, SCAN-D has a total of 106 retail outlets in Taiwan, including 84 SCANTEAK outlets, 21 SCAN LIVING outlets, and 1 SCAN KOMFORT outlet.





Left: Every area within the facility has a dedicated staff member in charge of it
Right: The Taiwanese operatives unpack and carefully inspect every single product that has been shipped to Taiwan from Indonesia



While guiding visitors round the facility, P.C. Lim discusses how SCANTEAK's overseas expansion is progressing

Drawing on local strengths has been the foundation for successful brand development

P.C. Lim notes that, although the performance of the furniture industry as a whole in 2016 was affected by falling house prices in Taiwan, "A crisis is the best time to be looking for new business opportunities." He emphasizes that, besides the SCANTEAK brand, SCAN-D will also continue to operate the SCAN LIVING brand (with a pricing strategy that emphasizes providing good quality at reasonable prices), giving consumers more choice; in addition, SCAN-D plans to open more Branches of SCAN KOMFORT (which is the exclusive agent for the allergy-prevention mattresses and other high-quality mattresses made by Germany's f.a.n. Frankenstolz) in 2017, "giving consumers more opportunities to experience these products for themselves."

SCAN-D has also been implementing a new business strategy characterized by a higher level of diversification. For example, in 2015 the company opened a new outlet in Hualien which is the biggest in Taiwan, bringing the SCANTEAK and SCAN LIVING brands together under the same roof, and also featuring Taiwan's first Scan Café. "In the future, we may be introducing even more new outlet concepts." P.C. Lim is full of confidence regarding SCAN-D's innovative integration of different business and services in the Taiwan market.

Having been operating in Taiwan for many years now, not only has SCAN-D positioned Taiwan as its main operational base, the company also greatly appreciates the outstanding working performance of its Taiwanese employees, particularly their loyalty and

high ethical standards. “Our current division of labor involves locating our design, R&D and quality assurance center in Singapore, sourcing teak in Indonesia and having local companies there make our products as contract manufacturers, and having orders processed in Taiwan, Our Taiwan headquarters also provides area training and operational management functions.

To make effective use of local strengths and transform them into sources of competitive advantage to support the company’s continued development has been the key to SCAN-D’s success ever since the company was first established. The special characteristics of Singapore have enabled the company to recruit Italian, Spanish and other international designers to undertake product development, while in Taiwan, after products have been shipped from Indonesia to Taiwan, SCAN-D’s outstanding Taiwanese employees perform final inspection, verification and finished product QA before the products are shipped. In this way, SCAN-D has been able to maintain the high quality standards of its products and expand steadily into global market.

Currently, SCANTEAK has outlets in Germany, Singapore, Brunei, Japan, Canada and the U.S.A. In the future, while continuing to develop the Taiwanese furniture market and add new overseas business locations, SCANTEAK will also be working to develop the e-commerce sector. “More importantly, we want to encourage consumers to come to our stores to experience things for



The interior of the SCANTEAK operational and logistics headquarters



themselves, so that we can provide face-to-face service and advice; that's the only way to really get consumers to appreciate what makes the SCANTEAK brand so special."

Having been operating in Taiwan for many years now, P.C. Lim stresses that he feels the Taiwanese furniture market still offers considerable room for development. Besides the original SCANTEAK brand, the company will also continue to open new outlets in Taiwan for the high-quality, SCAN LIVING brand and for the SCAN KOMFORT brand. P.C. Lim has developed a strong attachment to Taiwan over the years. "I would like to forge a collaborative partnership with a Taiwanese design school or design department, so that SCANTEAK can leverage the capabilities it has developed to give something back to Taiwan; by helping to cultivate more outstanding local design talent, this kind of collaboration could help to open up new avenues of innovation for the Taiwanese furniture industry as a whole."

Faced with the challenging conditions in the global economy, SCANTEAK is keeping firm roots in Taiwan. Not only is the company still full of confidence regarding the outlook for the Taiwanese furniture sector, it is also continuing to steadily expand its business operations through a strategy that effectively integrates local and trans-national strengths.



Constantly striving to secure first-mover advantage within the industry, and maintaining a leading position in key technologies

SCREEN SPE Taiwan Co., Ltd.

Of the many nodes that make up the semiconductor industry supply chain in Taiwan, SCREEN SPE Taiwan Co., Ltd. may not be the best-known, but its sales accounted for one-third of the overall annual sales of its parent company – Japan’s SCREEN Semiconductor Solutions Co., Ltd. – in 2015, more than SCREEN’s U.S., European or Chinese operations. While SCREEN’s core technology capabilities and willingness to adjust its business model to meet operational needs have played a significant part in SCREEN SPE Taiwan’s success, nevertheless, as SCREEN SPE Taiwan Chairman and CEO Nishida Keiji explains, Taiwan is the main center for the continued development of the global semiconductor industry; in this constantly changing industry, being located in Taiwan has enabled SCREEN SPE Taiwan to grow together with its customers, while at the same time the company is always aware that it is operating in a country located at the leading edge of global semiconductor development.



SCREEN Semiconductor Solutions' global headquarters in Kyoto, Japan
(Photo courtesy of SCREEN SPE Taiwan Co., Ltd.)

In Taiwan, semiconductor manufacturing (which represents the most upstream segment within the electronics sector) has played a key role in enhancing the strength of the Taiwanese economy. The key factor behind Taiwan's leading role in the global semiconductor industry is the niche capabilities that Taiwan-based firms possess in every segment of the semiconductor value chain that has developed over the years. SCREEN SPE Taiwan is the Taiwan subsidiary of leading Japanese company SCREEN Semiconductor Solutions Co., Ltd. Since its founding in 1943, SCREEN Semiconductor Solutions has developed world-leading products in the semiconductor production equipment, flat-panel display production equipment and industrial printing equipment segments, and enjoys significant global market share in all of these markets. SCREEN Semiconductor Solutions has several dozen business locations throughout the world, including Taiwan, the U.S., Europe, China, South Korea, and Singapore.




SCREEN SPE Taiwan Chairman Nishida Keiji (Photo courtesy of SCREEN SPE Taiwan Co.,Ltd.)

SCREEN was one of the first Japanese semiconductor manufacturing equipment firms to establish a presence in Taiwan, and appreciates the maturity of the industrial environment in Taiwan

SCREEN Semiconductor Solutions traces its ancestry back to the Ishida Kyokuzan Printing Works which was established in Japan in 1868. Since then, the company's core technologies and a flexible business model that is adjusted to meet operational needs have enabled SCREEN Semiconductor Solutions to maintain a high level of competitiveness, and have brought the firm to its current position as one of the world's leading production equipment development companies. Today, SCREEN Semiconductor Solutions enjoys impressive performance in all three of its main business areas – semiconductor production equipment, LCD panel production equipment, and printing equipment – with the semiconductor division's front-end-of-line (FEOL) production process equipment posting particularly strong results, and accounting for over half of the SCREEN Group's overall sales revenue.

The most important business strategy adopted by SCREEN to cope with the constantly changing industry environment is an emphasis on meeting customer needs and providing the best possible service. This approach was behind the establishment of SCREEN's first overseas subsidiary in the U.S. in 1967; in that same year, SCREEN also established its first Asian subsidiary in Taiwan. SCREEN SPE Taiwan Co., Ltd. was founded in Hsinchu, Taiwan in 1990, and has since established service locations in Linkou, Taichung and Tainan.





“Ten years ago, the U.S. was still the main center of the global semiconductor industry, but today Taiwan has taken over from the U.S., becoming the single most important center within the global semiconductor industry, whether viewed in terms of scale of production or volume of output; Taiwan also leads the world in terms of technology” comments Nishida Keiji.

Mr. Nishida, who previously served as CEO of SCREEN's subsidiary in Shanghai, and who spend the period 2007 – 2012 working in China, points out that, when one compares the development of the semiconductor industry in Taiwan and in China, it is readily apparent that Taiwan has more mature technology, particularly for front-end production processes, and also an impressive degree of innovation. In the area of factory management, Taiwanese plants benefit from reliable water and electric power supplies, and, more importantly, from higher levels of stability and safety. “The Taiwanese semiconductor industry has developed to a high level of maturity, and has for many years had a large number of outstanding engineers. For us, this is very important; at SCREEN SPE Taiwan, providing our customers with first-class after-sales services is a key aspect of our management philosophy.”

In 2013, a serious fire (the cause of which was not reported) occurred at the SK Hynix semiconductor factory in Wuxi, China. Besides bringing to naught much of the effort that had been put into building up the plant, the fire also had a serious negative impact on the overall business environment for the Chinese semiconductor industry. At the same time, problems with the quality of the available human resources have resulted in a situation where the production yield rate at semiconductor factories in China has remained stubbornly low.

Developing close communication with customers and responding to the rapid pace of change in the industry

With technology development and technology applications becoming ever more diverse, the emergence of cloud computing, big data analysis, virtual reality etc. and the resulting changes in industry mean that for the semiconductor industry (which plays a key role in the development of new technologies) it is not enough to maintain high overall growth; the pace of new technology development also needs to be kept high.

The evolution of semiconductor production process technology from 28nm technology to 20nm and now to 16nm, 10nm, and 7nm has led to fierce competition; the intensity of competition in the industry today means that managers are on call 24 hours a day. As a supplier of equipment to

Taiwan's leading semiconductor manufacturers, SCREEN SPE Taiwan cannot afford to become complacent. "Our motto is '724365,' which symbolizes the fact that we need to be able to provide service to our customers 7 days a week, 24 hours a day, 365 days a year" notes SCREEN SPE Taiwan Vice President Wayne Huang.

One of the secrets to SCREEN SPE Taiwan's success is the way the company has strengthened its relationships with customers and suppliers. "Besides providing them with equipment, we also collaborate with our customers on the development of innovative, advanced technology" notes SCREEN SPE Taiwan Chairman Nishida Keiji. As one of Taiwan's leading suppliers of production equipment to the semiconductor industry, SCREEN SPE Taiwan has a dedicated team able to provide tailor-made services to help customers cope with the rapid pace of change in the industry. Mr. Nishida points out that "One of our major customers, which is a leading player in the semiconductor industry, has been growing at a very rapid pace. Over the past few years, their R&D cycle has been growing steadily shorter, and we have had to speed up the pace of our own operations to keep up with them!"

Besides striving to maintain its competitive advantage by speeding up the development of advanced production process technology, so as to keep pace with changing market needs and customer requirements, SCREEN SPE Taiwan has also been meeting customers' needs for customized equipment that is able to cope with small-volume production of a wide variety of different products, while maintaining high product quality and service quality standards, thereby ensuring high levels of customer satisfaction. "To strengthen our competitiveness, we invest more than 5% of our revenue on R&D each year" notes Nishida Keiji.

SCREEN SPE Taiwan Vice President Wayne Huang points out that, in Taiwan, SCREEN SPE Taiwan is positioned mainly as a supplier of semiconductor production equipment, particularly front-end production process equipment such as wafer cleaning devices. Wafer cleaning devices constitute a major product for the SCREEN Group, and SCREEN holds the highest global market share in this product segment, at over 60%. Mr. Huang explains that "Because the level of precision that wafers embody is growing steadily higher, the requirements are becoming ever more stringent; besides the emphasis on miniaturization, another issue is that cleaning processes vary considerably, with different requirements in terms

of temperature, density, chemical composition, etc. Because the processes are so complex, we cannot afford to make even the slightest mistake.”

Adjusting the company's structure for direct decision-making

“Taiwan is the heart of the global semiconductor industry” notes Nishida Keiji. In the constantly changing semiconductor industry, delays are unacceptable. The fact of having grown together with its customers in Taiwan means that SCREEN SPE Taiwan is also standing on the leading edge of global semiconductor industry development.

Reflecting this situation, in October 2014 SCREEN SPE Taiwan was restructured as a holding company, SCREEN Holdings Co., Ltd. Put simply, this means that the company can now make its own decisions in line with changes in the market and customer needs, without needing to wait for approval from the Japanese parent company. As Wayne Huang notes, “The back-and-forth communication between Taiwan and Japan inevitably resulted in a lot of time being wasted.”

A further point is that the Japanese parent company is divided into three divisions: semiconductor production equipment, LCD panel production equipment, and printing equipment. When decisions are made jointly between all three divisions, SCREEN SPE Taiwan suffers because of the geographical distance between Taiwan and Japan and also because of the time wasted as a result; in addition, each of the Japanese parent company's directors has their own specialist background which influences their thinking. In order to speed up SCREEN SPE Taiwan's ability to keep pace with changes in the semiconductor market environment (bearing in mind a phrase commonly used by Nishida Keiji, which is that “In the semiconductor industry, if you stop for breath, you are out of the race”), the corporate restructuring of the company is a vital step towards maintaining its competitiveness.

One point worth noting is that Nishida Keiji, who formally took over as head of SCREEN SPE Taiwan in April 2016, is not only the Chairman and CEO of SCREEN SPE Taiwan, but also an Executive Director of SCREEN Semiconductor Solutions Co., Ltd. in Japan. In other words,



SCREEN SPE Taiwan Chairman Nishida Keiji and Vice President Wayne Huang

as a senior manager of the Japanese parent company, he is able to make decisions directly on his own authority. Wayne Huang adds that there are currently only eight directors at the Japanese parent company who are authorized to make decisions independently; Nishida Keiji is one of them, and is the only one based outside Japan.

"This shows how much importance our Japanese parent company attaches to the Taiwan market!" stresses Mr. Huang.

A world leader in both technology and human resources undertaking localization of overseas operations

Currently, besides its Hsinchu headquarters, SCREEN SPE Taiwan has three other business locations in Taiwan, in Linkou, Taichung and Tainan. Besides continuing to develop its operations in Taiwan, SCREEN SPE Taiwan also dispatches technical personnel to provide support in China, Singapore, etc. When one of the SCREEN Group's important U.S. customers built a factory in Dalian, China, personnel from SCREEN SPE Taiwan were sent over to provide technical support. There is also intensive and frequent technology exchange and personnel exchange between SCREEN SPE Taiwan and the Japanese parent company.

The highly-developed state of the Taiwanese semiconductor industry and its comprehensive supply chain are key factors behind SCREEN's commitment to maintaining its presence in Taiwan. "Localization" of the company's Taiwan operations is currently a major development goal for SCREEN SPE Taiwan. For example, in the wafer cleaning equipment segment, SCREEN SPE Taiwan has been experimenting with collaborating with local Taiwanese firms on certain components and technologies.



Company trip to Yilan organized by SCREEN SPE Taiwan for its employees (Photo courtesy of SCREEN SPE Taiwan Co.,Ltd.)



SCREEN Semiconductor Solutions' fabrication plant in Hikone, Japan (Photo courtesy of SCREEN SPE Taiwan Co., Ltd.)

SCREEN SPE Taiwan Materials Department Manager Jeff Tsai explains that "We produce one particular type of wafer cleaning system that uses ultrapure water; we have already been collaborating with a local Taiwanese firm for several years now on one of the consumables for this system."

SCREEN SPE Taiwan's goal is to continue its steady efforts towards localization of its Taiwan operations, through a step-by-step process of experimentation and collaboration. Nishida Keiji stresses that Taiwan is now, and will remain, the world's most important center for semiconductor industry development. "In 2015, Taiwan was the world's largest market for semiconductor production equipment, and I am confident that that will continue to be the case in 2016." From SCREEN SPE Taiwan's perspective, as they continue to develop each segment of the semiconductor production equipment market – including helping customers to install new, advanced production process equipment, providing machinery maintenance and repair services, and selling components and consumables, etc. – they need to maintain an aggressive, dynamic approach, striving to keep pace with their customers by maintaining a proactive attitude towards service provision.

Of course, with the steady pace of progress in the global semiconductor industry's production process technology, SCREEN SPE Taiwan remains committed to constantly launching new products and developing innovative new technologies as it responds to the rapid changes taking place in the semiconductor equipment market and strives to maintain its market-leading position.

The background image shows a large industrial facility, likely an air separation plant, with several tall white towers and cylindrical storage tanks. The facility is set against a clear blue sky with scattered white clouds. A prominent feature is a tall, narrow tower that has been partially replaced with a green, grassy texture, symbolizing environmental friendliness. The Air Products logo is visible on the side of one of the towers. In the foreground, there are various pipes, scaffolding, and smaller industrial structures. The overall scene is bright and clear, suggesting a clean and modern industrial environment.

Believing in the growth potential of Taiwanese industry, Air Products San Fu is continuing to introduce innovative technologies into Taiwan

Air Products San Fu Co., Ltd.

Air Products Inc. first established a presence in the Taiwan market in 1961. Since then, the company has continued to invest in Taiwan. In addition to establishing close collaborative relationships with various industry partners, the world-leading Industrial Gases company has also invested in manpower cultivation and in sustainable development on a long-term and ongoing basis. Through its subsidiary Air Products San Fu, the company looks forward to continuing to introduce advanced technologies into Taiwan in the future, to help Taiwan realize the vision of environmental sustainability and a low-carbon economy.

▲ the main entrance of Air Products San Fu's No. 7 Plant in the Tainan Science Park
(photo courtesy of Air Products San Fu Co.,Ltd.)



Air Products San Fu President Eugene Lu

With the steady improvements being made in semiconductor production technology, manufacturers have become even more dependent on industrial gases than in the past. However, due to the high complexity of the production of industrial gases, to meet both quality and safety objectives is very challenging and requires a high technological capacity. As part of its corporate social responsibility (CSR) efforts, Air Products San Fu Co., Ltd. (which holds high market share of the industrial gas market in Taiwan) has for many years now been committed to building and maintaining a high-quality, safe and hygienic working environment, aiming to safeguard the health and safety of the company's employees, its contractors, the workplace and the local community. Taking Air Products San Fu's plant in the Tainan Science Park as an example, over the period 2013 – 2015 this plant was rated as a "Workplace with Superior Safety and Hygiene Standards" by the Occupational Safety and Health Administration (OSHA), Ministry of Labor for three years in a row, and in 2015 the plant received a Five-star Award, Tainan City Government's highest award for plant health and safety. Air Products San Fu can thus be viewed as a model in the Taiwanese industrial gas industry in this respect.

Eugene Lu, President of Air Products San Fu, commented that for the company, the most important objective is not production, sales or profits, but rather the creation and maintenance of a safe working environment; this is the most important aspect of the company's business philosophy, and is also a goal to which the company has remained steadfastly committed over the years. After setting a record for the longest number of working hours with no occupational injuries, by December 31, 2015 Air Products San Fu's Tainan Science Park facility had gone even further, achieving a cumulative total of over 2.8 million occupational injury free working hours. This is more than just a source of pride; the plant will be sharing its experience with other facilities of Air Products to help them strengthen their performance in this regard.

Ranking among the US Fortune 500 largest companies in the US, Air Products has been active in the Taiwan market for 50 years

Air Products San Fu's parent company, Air Products was founded in 1940 and has thus been in existence for 76 years. Apart from providing atmospheric and process gases and related equipment to manufacturing markets, including refining and petrochemical, metals, electronics, and food and beverage, Air Products is also the world's leading supplier of liquefied natural gas process technology and equipment. Air Products has for many years been renowned for its ability to provide sustainable products and solutions, and for its outstanding technical service capabilities. The company also attaches considerable importance to technology innovation, and as a result has been able to maintain its leading role in the industry despite intense competition.

Air Products has operations in more than 50 countries around the world, with a global workforce of approximately 16,000 people. In FY2016, Air Products posted global sales of US\$7.5 billion in its continuing operations in 50 countries, and has a current market capitalization of approximately \$30 billion, putting it in 288th place in the US Fortune 500. Impressed by the potential of Taiwan's semiconductor industry, Air Products entered the Taiwan market in 1961, and in 1987 forged an alliance with Taiwanese company San Fu Gas Co., Ltd. to work together to develop production and sales operations in the Taiwan market, providing companies in different industries with the gases they need (including oxygen, nitrogen, argon, helium, hydrogen, specialty electronics gases, standard gases, environmental gases, welding gases, and gas mixtures) and with related production equipment, etc.

Eugene Lu explains that Air Products San Fu has a diverse range of customers, including companies in the electronics, iron and steel, glass, and petrochemicals industries, etc. The electronics industry constitutes a particularly important strategic market for the company; over a period of many years, Air Products San Fu has built up long-term collaborative relationships with many companies in the electronics sector, which has often involved the signing of long-term supply contracts. Taking into

account the need for ultra-high reliability and quality monitoring when supplying certain types of gases, Air Products San Fu has established gas production and distribution facilities near Taiwan's major science parks, so as to be able to supply its customers in the semiconductor, memory IC and thin-film LCD panel industries, etc., with the gases they need from close at hand.

Making effective use of global talent and investing in innovative technology R&D

According to the results of a survey compiled by Global Information, the dramatic expansion in investment in infrastructure in the emerging markets in the past few years has led to steady growth in demand in the global industrial gases market, while the ongoing evolution of technology has led to a continued increase in the range of applications for industrial gases. However, competition in the global industrial gas industry is intense. Air Products has continued to invest in the development of innovative new technologies to ensure the purity and quality of its gas supply; at the same time, the company has responded to the growing demand for environmentally sustainable development in Europe and North America by allocating considerable resources to the areas of safety and environmental protection, aiming not only to strengthen the firm's competitiveness but also to fulfill its responsibilities as a good global citizen.



Air Products makes effective use of the capabilities of R&D talent in various parts of the world to undertake R&D activity aimed at building technical barriers that maintains the company's competitiveness. For example, the U.K. business provides key technologies in the areas of production process equipment and specialty gases, with a particular focus on R&D in the areas of production machinery, air separation units, new materials applications, energy efficiency, etc. The use of medical gases for various applications is widespread in Europe, and Air Products has responded to this need by undertaking technology R&D to support the supply of specialty gases in small cylinders. In China, where coal gas is widely used for electricity generation, Air Products has been focusing its R&D efforts on techniques for converting coal to methane into methane, which can help to reduce air pollution and other negative environmental impacts.

Companies in different industries require different types of specialty gases, and there are often regulatory restrictions on how gases can be transported, which leads to high transportation costs. Air Products has therefore adopted a business model which emphasizes local production. The company's local subsidiaries are responsible for industrial gas production, sale and technical support in their areas. The biggest advantage of this approach is that Air Products' global headquarters can focus on the development of innovative new technologies, while its local subsidiaries are able to respond flexibly to the special needs of local customers by rapidly providing world-class, localized solutions that provide the maximum possible benefits in terms of safety, productivity, efficiency, quality and sustainability.



Group photo of the Air Products San Fu Southern Region Transportation Division staff (photo courtesy of Air Products San Fu Co.,Ltd.)



Left: Air Products San Fu receives a Five-Star Award for occupational safety from the Ministry of Labor (photo courtesy of Air Products San Fu Co.,Ltd.)

Right: Air Products San Fu President Eugene Lu receives the Five-Star Award for occupational safety from the Ministry of Labor (photo courtesy of Air Products San Fu Co.,Ltd.)

Eugene Lu notes that Air Products San Fu works together with Taiwanese businesses to promote economic growth for Taiwan, and that it is able to provide its Taiwanese customers with timely, high-quality, effective solutions. Air Products San Fu also assists its parent company with the accumulation of specialist know-how; the company's world-class safety standards and operational standards, combined with ongoing R&D activity, have enabled Air Products San Fu to secure and maintain a leading position within the Taiwanese industrial gases industry. Air Products San Fu was the first gas manufacturer in Taiwan to secure ISO 9002 and ISO 14000 certification, and in 2015 the company was also awarded ISO 14001 and OHSAS certification, reflecting its commitment to building a high-quality working environment and enhancing the overall level of performance of Taiwanese industry.

Air Products San Fu has established 18 production sites to meet the needs of Taiwanese industry

With the impact of globalization, Taiwan's electronics, semiconductor, TFT-LCD, panel and petrochemicals industries have found themselves faced with significant international competition. While Taiwanese companies have displayed impressive performance in international markets, in order to maintain their global competitiveness, besides focusing on new product R&D, they are also attaching more and more importance to the quality of the industrial gases that they use and the timeliness with which these are supplied, and they are seeking to establish close collaborative relationships with their gas suppliers. Air Products San Fu has for many years now been collaborating with



Left: Yunke plant technician M.H. Liao receives the Outstanding Health and Safety Employee Award from Yunlin County Magistrate C.F. Su (photo courtesy of Air Products San Fu Co.,Ltd.)



Right: On behalf of his plant, L.M. Chang receives a safety award presented by the Yunlin County Magistrate (photo courtesy of Air Products San Fu Co.,Ltd.)

companies throughout Taiwan, establishing technology and application laboratories, large-scale production facilities and highly-efficient warehousing systems in order to be able to rapidly supply customers with high-quality specialty gases. The company has also expanded the size of its technical service team in order to help customers solve problems affecting their production processes.

Eugene Lu notes that Taiwan is a world leader in the semiconductor, LED panel, memory IC and other manufacturing industries; at a time when the global semiconductor industry as a whole remains depressed, the Taiwanese semiconductor industry continues to post steady growth. Air Products San Fu thus has great confidence in the outlook for the Taiwanese electronics sector. Taiwan has always been an important strategic market for Air Products. The company has over 500 employees in Taiwan, with 18 production sites



The Director of the Labor Affairs Bureau, Tainan City Government presents the Tainan Science Park plant with a Five-Star Award for safety (photo courtesy of Air Products San Fu Co.,Ltd.)

providing a reliable supply of high-quality products to customers throughout Taiwan. This focus on building close collaboration with customers has enabled Air Products to achieve steady growth in its Taiwan business; Air Products San Fu is ranked among the 500 largest companies in Taiwan.

Providing sponsorship for the National Skills Competition and helping to cultivate technical talent for Taiwan

One of the key factors that has enabled Air Products to maintain its status as the world leader in the provision of specialty gases is the company's establishment of a trans-national information exchange platform that links together Air Products' global network of business locations. Not only are individual business sites able to share valuable experience and information with one another, factory production data can be transmitted to the global headquarters in the U.S. in real time. In this way, not only can Air Products ensure that its operations around the world conform to international safety standards, and the company development teams in different regions can make use of the specialist knowhow that has been accumulated around the world to respond rapidly to technical problems experienced by customers; when necessary, trans-national safety inspection teams can be organized to help Air Products San Fu resolve problems relating to production or transportation processes.

Eugene Lu notes that Air Products has continued to expand its investment in Taiwan ever since the company first moved into the Taiwan market in 1961. Besides recognizing the development potential of Taiwanese industries, Air Products has also been deeply impressed by the hard-working, professional attitude displayed by Taiwanese workers, and this has been reflected in the company's consistent emphasis on human talent cultivation. As Taiwan is an important production location for the semiconductor, LCD panel, memory IC and LED industries (along with various other electronics-related industries), Air Products San Fu has cultivated a considerable amount of human talent in Taiwan in areas relating to these fields, and has accumulated a wealth of specialist knowhow, which helps the company to provide its customers with overseas technical support. In addition, starting from 2014, Air Products San Fu has provided sponsorship for three years in a row for the annual National Skills Competition organized by Taiwan's Ministry of Labor, providing the winners of the welding competitions with the gas needed for training to take part in international vocational skills competitions. By providing support for the cultivation of specialist talent for Taiwanese industry, Air Products San Fu has demonstrated its commitment to the Taiwan market.

A photograph of the ULVAC TAIWAN Co., Ltd. building in Tainan, Taiwan. The building is a modern, multi-story structure with a glass facade. In the foreground, there is a large blue sign with the ULVAC logo. To the right, there is a small, circular structure with a glass window and the ULVAC logo on its side. The scene is set in a well-maintained area with greenery and a paved road.

Maintaining a strong commitment to the Taiwan market, and serving as a bridge for collaboration between Taiwanese and Japanese companies

ULVAC TAIWAN Co., Ltd.

With a growing number of Japanese firms showing interests in establishing locations in Taiwan and looking for collaborating with Taiwanese companies on developing business opportunities in the Chinese and Southeast Asian markets, in the future, besides continuing to develop its display and semiconductor production equipment businesses and expanding into power device and MEMS R&D and manufacturing, ULVAC TAIWAN is also hoping to act as a platform for collaboration and exchange between Taiwanese and Japanese firms, helping to strengthen the partnership between two sides.



A view of ULVAC Taiwan's Tainan Plant (Photo courtesy of ULVAC TAIWAN Co.,Ltd.)



ULVAC Taiwan CEO Tsal Yu-Jer (right) and Vice President Wu Tung-Jung (left) (Photo courtesy of ULVAC TAIWAN Co.,Ltd.)

Benefiting from strong industrial foundations and advanced chemical technology, Japan was the first country in Asia to successfully develop its own semiconductor industry; Japanese semiconductor companies have R&D capabilities that rival those of the leading European and U.S. firms, and many Japanese semiconductor firms possess world-leading technology. Established in 1952, Japan's ULVAC, Inc. has a wealth of experience in vacuum technology, and over the years the company has built up technology capabilities that rival firms find it very hard to compete with. Even today, when integrated circuit technology is dominant in the electronic equipment sector, the applications for vacuum technology are in fact even wider than in the past; vacuum technology is used in a very wide range of products, from computers through to LCD TVs and mobile phone handsets, etc. ULVAC has for many years now positioned vacuum technology as its core technology, working to develop production equipment, materials and components to meet the needs of firms in a wide range of hi-tech industries. Currently, not only does ULVAC enjoy a market-leading position in the global LCD panel manufacturing equipment



An ULVAC Taiwan employee at work (Photo courtesy of ULVAC TAIWAN Co.,Ltd.)



An ULVAC Taiwan employee at work (Photo courtesy of ULVAC TAIWAN Co.,Ltd.)

industry, it has also been posting impressive performance in the specialty electronics products segment, reflecting ULVAC's achievements in R&D and its success in keeping pace with changing market trends.

During the 1980s, when Taiwan started to develop its own semiconductor industry, ULVAC recognized that Taiwan was going to develop into one of the world's leading centers for hi-tech manufacturing. In 1981, ULVAC established ULVAC TAIWAN Co., Ltd., which initially was mainly responsible for the assembly, sale and provision of after-sales service etc. in the Taiwan market for vacuum equipment and optoelectronic semiconductor production equipment manufactured at ULVAC's production facilities in Japan, with the aim of providing prompt service and meeting Taiwanese customers' needs in a more timely manner. Thanks to the high reliability of ULVAC's products and the wealth of experience possessed by ULVAC's engineers and technicians, ULVAC equipment was widely adopted by Taiwanese manufacturers; more than 90% of the sputtering systems used on the LCD display production lines of leading Taiwanese panel manufacturers such as

AUO and Innolux are made by ULVAC, reflecting ULVAC's continued dominance as one of the world's leading manufacturers of these types of production equipment.

ULVAC TAIWAN CEO Tsai Yu-Jer explains that, in line with ULVAC's global development strategy, ULVAC TAIWAN's Chinese-language company name was changed in January 2002 (while retaining the same English-language name), and the company's role was repositioned with the aim of providing comprehensive solutions to meet customers' needs. At a time when Taiwanese industry is diversifying and

growing rapidly, ULVAC continues to maintain a down-to-earth business strategy that emphasizes stable, steady growth. The company has never posted a loss in any year since its establishment, and in recent years has grown to become one of the most important parts of the ULVAC Group's global network.

Thanks to technical support from the rest of the ULVAC Group, ULVAC TAIWAN has achieved first-rate performance in the semiconductor, display, LED and photovoltaic cells sectors. In the future, ULVAC TAIWAN will continue to bring advanced technology and advanced production equipment to Taiwan, and will continue to maintain a close collaborative relationship with other companies in the ULVAC Group (including UCPT and ULVAC Materials Taiwan), with the aim of providing the most comprehensive possible service to support the continued development of Taiwan's hi-tech industries.

ULVAC responds to the Taiwanese government's strategy of promoting the localization of semiconductor production equipment manufacturing by establishing a production facility in Tainan

A little over ten years ago, Taiwan's semiconductor and panel industries were leading the world, but their development was being held back by the inadequate developing of basic supporting industries which left manufacturers heavily reliant on imported production line equipment. While several Taiwanese companies did have plans to expand into production equipment manufacturing, lack of access to key technologies made it difficult for them to produce equipment that would satisfy the needs of Taiwanese industry. In an attempt to solve this problem, in early 2000



The ULVAC Taiwan production facility in the Tainan Science Park (Photo courtesy of ULVAC TAIWAN Co.,Ltd.)




Employees from different ULVAC Taiwan departments taking part in an activity fostering solidarity and emphasizing the commitment of ULVAC Taiwan to grow together with ULVAC, Inc. in Japan (Photo courtesy of ULVAC TAIWAN Co.,Ltd.)

the government launched a new policy to promote the “localization” of production equipment manufacturing; the aim was to use government policy support to encourage foreign production equipment manufacturers to set up production lines in Taiwan, thereby helping to support the development of the technology capabilities of related component suppliers and further the development of the industry as a whole.

To enhance the quality of service provided and step up the company's development of the Taiwan market, in December 2005 ULVAC TAIWAN established a large manufacturing facility in the Tainan Science Park. The aim was to avoid the complex procedures required when importing production equipment into Taiwan, facilitate the rapid provision of the technology and services that customers require, and strengthen ULVAC TAIWAN's partnerships with its customers. By moving away from the situation that had existed previously, where any technology problems that emerged during the process of helping customers install new, more advanced production process technology could only be solved by reporting the problem to ULVAC TAIWAN's parent company in Japan, ULVAC TAIWAN aimed to provide its customers with better, more comprehensive service.

ULVAC TAIWAN CEO Tsai Yu-Jer notes that, with the continuing evolution of LCD panel manufacturing technology from sixth-generation technology to seventh-generation, and subsequently to eighth-generation, the equipment used on panel production lines had become larger than ever. If equipment is imported from production facilities in Japan, then the transportation costs can be astronomical, and the equipment can also take a long time to deliver. Taiwan's panel manufacturers had been expressing the hope that ULVAC could establish a production line in Taiwan,



so as to reduce the time needed when adopting more advanced production processes, and provide service to customers from close at hand. After explaining to its parent company in Japan the many benefits that setting up a production line in Taiwan would provide, ULVAC TAIWAN eventually secured authorization from ULVAC, Inc. to set up such a production line.

The impact of the global financial crisis forces ULVAC TAIWAN to adjust its business strategy

At the time, the production capacity of Taiwan's LCD panel industry was growing rapidly, with new, large-scale factory expansion projects being announced almost every year. It seemed clear that setting up a production line in Taiwan would be cost-effective, and would benefit the ULVAC Group as a whole. However, following the completion of the Tainan plant, Taiwan experienced the impact of the global financial crisis of 2008. In 2009, the Taiwanese panel industry put all plans for the establishment of new production lines on hold, and ULVAC TAIWAN's expansion plans were adversely affected.

ULVAC TAIWAN Vice President Wu Tung-Jung explains that, fortunately, some of the technology used in LCD panel production equipment could also be applied to other sectors such as semiconductor, LED and photovoltaic cell manufacturing. ULVAC Taiwan therefore made adjustments to its operational strategy, moving actively into the industries listed above. As a result, the company was able to maintain the capacity utilization rate of its new production facility, and the overall scale of the firm's operations continued to grow.

In addition, now that the company possessed ample production capacity, ULVAC TAIWAN was also able to make effective use of its mature production technology. In conformity with the ULVAC Group's overall business strategy, ULVAC TAIWAN began to develop a contract manufacturing business. Overseas companies that were interested in establishing production operations in Taiwan could postpone the need to shoulder the expense of establishing a factory of their own by using ULVAC TAIWAN's contract manufacturing services instead, and wait until they had a clearer grasp of the situation in the Taiwan market before reconsidering the question of whether they needed to set up their own factory.

ULVAC TAIWAN CEO Tsai Yu-Jer explains that, when deciding whether to establish a new production line, there are a great many different factors that need to be considered. Besides factory size, personnel recruitment, equipment installation, etc., once the production line is in operation it needs to undergo a period of adjustment and tuning. For many companies, this represents a major challenge. ULVAC TAIWAN's has been able to maintain stable, reliable operation at

its production facility, which can help contract manufacturing customers to maintain smooth operation of their own businesses, giving them more time to devote to evaluating market conditions.

Identifying important industry trends and meeting the needs of Taiwanese industry

With mobile device shipment volumes continuing to rise steadily year after year, Taiwan's panel manufacturers recognized the strong demand that exists for small and medium-sized panel, and as early as 2012 they had begun to develop production of active-matrix organic LED (AMOLED) panel, which embodies more advanced technology and offers higher gross profit margins. ULVAC TAIWAN's AMOLED solutions have emerged as the ideal choice for Taiwanese panel manufacturers. When undertaking production of AMOLED panel, chemical vapor deposition technology is needed to ensure a smooth coating of light-emitting material, which in turn is required in order to provide products with high color saturation, wide viewing angle and high resolution, etc. However, conventional chemical vapor deposition equipment normally uses single-source vapor deposition technology, in which only around 5% of the light-emitting material is actually used. With 95% of the material being wasted, panel manufacturers are forced to shoulder higher production costs which reduce their competitiveness.

Linear-source chemical vapor deposition technology, which in recent years has become the new market mainstream, increases the percentage of material that is actually used, and also helps to ensure a more evenly-spread coating of light-emitting material on AMOLED panel, thereby providing superior color saturation. ULVAC TAIWAN's new "ZELDA" chemical vapor deposition technology utilizes advanced linear-source deposition technology; it dramatically increases the percentage of material that is used, and ensures that the organic light-emitting material is evenly spread over the surface of AMOLED panel, improving the yield rate for panel manufacturers' front-end production processes. Besides its incorporation of advanced linear-source deposition technology, ZELDA also allows panel manufacturers to combine pilot production with volume production; with ZELDA, ULVAC TAIWAN can provide its customers with greater flexibility in production capacity utilization, meeting their requirements for different substrate sizes.

Winning plaudits for technical service provision, and playing the role of a bridge for collaboration and exchange between Taiwan and Japan

Thanks to aggressive support by the Chinese government, the Chinese panel industry has grown rapidly to become the largest in the world. With China having



Left: CSR activity: ULVAC Taiwan employees participating enthusiastically in a blood donation activity. (Photo courtesy of ULVAC TAIWAN Co.,Ltd.)



right: CSR activity: ULVAC Taiwan has been a proactive and dedicated participant in the Tainan Science Park tree-planting project. (Photo courtesy of ULVAC TAIWAN Co.,Ltd.)

emerged as a leading global center for panel production, Taiwanese panel manufacturers' market share has been falling steadily, and many Taiwanese manufacturers have relocated their production lines to China to reduce manufacturing costs. As a result, although the scale of investment in new production facilities by the Taiwanese panel industry has been limited in recent years, this has not affected ULVAC TAIWAN's sales revenue. On the contrary, ULVAC TAIWAN has been able to expand the scope of its service provision to include the production lines of Taiwanese-invested companies operating overseas, leading to extensive collaboration with ULVAC's teams in China, South Korea and Japan.

ULVAC TAIWAN CEO Tsai Yu-Jer points out that ULVAC TAIWAN has first-class technical service capabilities, which have for many years been winning praise from Taiwanese panel manufacturers. Even though their production facilities may no longer be located in Taiwan, ULVAC TAIWAN's customers still want ULVAC TAIWAN to continue providing them with technology support. Looking ahead to the future, besides expanding into new business areas and continuing to meet the needs of Taiwanese industry, ULVAC TAIWAN also hopes to play the role of a platform for collaboration and exchange between Taiwanese and Japanese companies, providing support for Japanese firms interested in investing overseas, and working together with Taiwanese firms to develop the China and Southeast Asia markets.

**YASKAWA**

Lighting up a bright future for industry and building a global “robot kingdom”

Yaskawa Electric Taiwan Corporation

Although Yaskawa Electric Corporation’s Taiwan subsidiary was only established in 2001, Yaskawa had already been collaborating with Taiwan’s TECO Corp. for some years previously, working together with TECO to develop the industrial automation market both in Taiwan and Southeast Asia. Apart from the opportunities that Taiwan offers for the importation, sale and provision of maintenance services for servo drives and industrial robots, Taiwan’s highly developed electronics industry, information and communications technology (ICT) industry and machine tool industry were another factor that has encouraged Yaskawa to expand its presence in Taiwan. Maintaining a steady focus on its core business areas, and keeping greater attention to details, Yaskawa has never sought to achieve overnight success; instead, it has slowly but steadily built up its own global “robot kingdom.”



Yaskawa Electric Corporation’s Tokyo office (photo courtesy of Yaskawa Electric Taiwan Corporation)



Chi-Chang Huang notes that Yaskawa produces robots for a wider range of applications than any of its competitors

In science fiction movies, robots are everywhere. Many people are probably under an impression that robots are something you only see in films, but in reality, robots have been playing important roles in our lives for some time now. While the first robots were developed to help people handle heavy weights and to undertake dirty and dangerous tasks, robots now have a very wide range of applications. Japan's Yaskawa Electric Corporation ranks among the top four largest robot manufacturers in the world. Chi-Chang Huang, General Manager in charge of the robot division of Yaskawa's Taiwan subsidiary (Yaskawa Electric Taiwan Corporation), says confidently that, currently, Yaskawa offers robots in a wider range of fields, and a larger number of individual robot models, than any of its competitors: "We are capable of producing any kind of robot!"

This confidence is backed up by the strong foundations that Yaskawa has established thanks to steady development of its core business areas over the century that has elapsed since the company was first established.

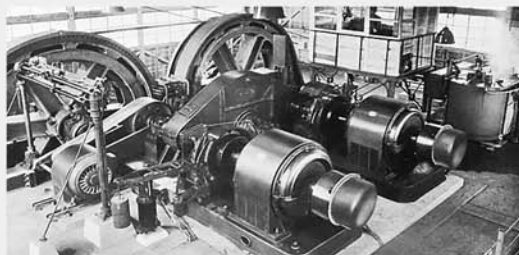
Focusing on its core business areas and developing key technologies and products

Back in 1915, when Yasukawa Daigoro, Yaskawa's founder, was starting up the business in Kita-Kyushu, Japan, he made the acquaintance of Dr. Sun Yat-sen, the founder of the Republic of China. To this day, a small plaque bearing the Chinese characters for "World Peace," written in traditional calligraphic style by Dr. Sun Yat-sen himself, still draws the attention of visitors passing through the entrance to the Taipei office of Yaskawa Electric Taiwan Corporation. Yaskawa still remains true to the philosophy that has underpinned the company's operations ever since its foundation: "Building safety and peace of mind is the key to sustainable, long-term social development."

Responding to the growth of the mining sector in the area around Kita-Kyushu, in the early years of its existence, Yaskawa was able to meet demand for coal transportation equipment in local coal mines, laying solid foundations for the company's subsequent growth and development. Building on the firm's successful development of DC servo motors and other electromechanical systems, in 1969, Yaskawa developed the concept of "Mechatronics" (the synergistic integration of mechanical engineering and electrical control systems), and subsequently the main emphasis of the company's business development was on the automation of machinery and on making machinery "smarter." Chi-Chang Huang points out that "Although Yaskawa is currently involved in a wide range of business areas, including the company's four main divisions – system engineering, motion control, robotics, and inverters – which may seem like a very broad range of business areas, in reality all of these applications have grown out of the firm's original focus on servo motors. The



A plaque bearing the Chinese characters for World Peace, written by Dr. Sun Yat-sen (the founder of the Republic of China), is hung in a prominent position at the entrance to the Taipei office of Yaskawa Electric Taiwan Corporation (photo courtesy of Yaskawa Electric Taiwan Corporation)



Electrical equipment made by Yaskawa for use in coal mines (photo courtesy of Yaskawa Electric Taiwan Corporation)

servo motors that Yaskawa produces still constitute key technology for the company even today, and they are what has made Yaskawa so distinguished in the industry.”

Focusing on its core business areas has led to Yaskawa to expand into new areas such as robotics that are related to electromechanical integration. Chi-Chang Huang stresses that Yaskawa knows its limitations, and doesn't attempt to do things that beyond its reach. Yaskawa recognizes that the key to sustainable, long-term development for a business enterprise is to lay solid foundations and then gradually build on those foundations to develop a successful business. In 2015, Yaskawa posted annual sales revenue of over 400 billion Yen; the company has derived especially large business opportunities from R&D work relating to its core technologies.

Reflecting the goals outlined above, in 2025 Yaskawa announced its corporate vision for 2025; this vision emphasizes the development of “Clean Power,” and the integration of Mechatronics with related technologies to enhance the welfare of humanity (what Yaskawa refers to as “Humantronics”). Yaskawa is also working actively to develop industries (such as care provision) that appear to have strong potential for growth in the future.

Of the Yaskawa Group's four main business areas, the motion control and inverters segment includes products items such as AC/DC servo drives, motion controllers, motor drives for electric vehicles, etc. In the AC servo drive and inverter markets, Yaskawa holds the highest market share in the world; these products account for around half of the Yaskawa Group's total annual sales revenue. Other product items that have been developed using these technologies – including high-voltage inverters, systems for use in iron & steel plants, wind power systems, water processing systems etc. account for a further 10% or so of total group revenue; the “Other business areas” category accounts for 9%, with the remainder of Yaskawa's annual sales deriving from robotics (which is widely viewed as one of the most important new industries of the future).



Single-arm, 7-joint and twin-arm, 15-joint robots developed by Yaskawa Electric (photo courtesy of Yaskawa Electric Taiwan Corporation)

Yaskawa's robots can do anything! The company is expanding into global markets in all segments of the robotics industry

In 2014, the robotics division accounted for 34% of the Yaskawa Group's total annual sales revenue. While most of this revenue derived from sales of industrial robots (used for arc welding, spot welding, spraying, transporting, etc.), Chi-Chang Huang emphasizes that, both now and in the future, "our product development strategy recognizes that robots need to have a wider range of capabilities, with enhanced flexibility and greater ease of coordination."

Currently, Yaskawa's robots have a share of around 20% of the global market, making Yaskawa the fourth largest robot manufacturer in the world. However, Yaskawa has not allowed itself to become complacent; making effective use of its core technologies, the company is slowly but steadily implementing a strategy to globalize its business operations.

Chi-Chang Huang points out that "With the exception of a handful of components such as gear reducers which we purchase from other Japanese manufacturers, all the rest of the components that Yaskawa uses are manufactured in-house. With our existing technology, we are already able to build single-arm industrial robots with seven joints and twin-arm industrial robots with 15 joints; this means that our robots are capable of performing almost any kind of action."

Since the unveiling of Yaskawa's first robot – Motoman – in 1977, the company has manufactured around 400,000 robots. In recent years, the share of robot sales accounted for by the Asia region (excluding Japan) has risen steadily to 49% of the total; the next biggest markets for Yaskawa's robots are the Japanese domestic market, the U.S.A., and Europe. Chi-Chang Huang stresses that "Yaskawa produces a wider variety of different robot types than our competitors, with an extremely broad range of types and applications in both the industrial robot and service robot categories."

With the growing trend towards "smart" industry, customers in different industries have widely varying requirements in terms of robot specifications and installation needs. Yaskawa is able to meet these diverse needs with its comprehensive robotics systems, which include the robot hardware and software, and also highly-developed remote control, remote status monitoring, preventive maintenance and information and communications technologies etc. Chi-Chang Huang emphasizes that "the core equipment, including the robot base units, the arms, etc., is capable of performing more or less any action!"

To build the company's "robot kingdom," Yaskawa has five robot manufacturing facilities worldwide. Besides the four facilities located in Japan (in Tokyo and Kyushu), Yaskawa also established its first (and so far only) overseas robot factory in Suzhou,



Yaskawa Electric's No. 1 Robot Production Line at the company's robot factory in Japan (photo courtesy of Yaskawa Electric Taiwan Corporation)

China in 2013, with the aim of being able to develop the Chinese market more effectively and serve customers in China from close at hand. Whereas in the past, Yaskawa tended to focus mainly on industrial robots, last year it launched a joint venture with leading Chinese home appliance group Midea to move into the development of robots for use in fields relating to daily life. Besides working to further automate the production of home appliances, the joint venture will also be involved in the production of robots for use in nursing, healthcare and rehabilitation, representing a significant expansion of the scope of applications for Yaskawa's robots.

Working to develop business opportunities in the healthcare sector; Yaskawa is impressed with Taiwan's potential as a robot manufacturing center

In 2001, Yaskawa established a subsidiary in Taiwan. By comparison with the other leading international robot manufacturers, Yaskawa was relatively late in setting up its Taiwan subsidiary; however, as far back as 1993, Yaskawa had collaborated with Taiwan's TECO Corp. on the establishment of YATEC Engineering Corporation to provide

system engineering services. Chi-Chiang Huang notes that “Today, our main customers in Taiwan include companies in the semiconductor, LCD panel, automotive and iron & steel industries.” In its collaboration with Taiwanese system integration firms, Yaskawa provides customers with robot base units, while Yaskawa’s system integrator partner companies handle the installation and set-up of peripheral components.

Looking ahead at the outlook for the development of “smart machinery” in Taiwan in the future, given that Taiwan has a comprehensive machine tool supply chain and highly-developed industry clusters, Yaskawa is very optimistic about Taiwan’s potential for developing into an important center for robot manufacturing. Yaskawa’s confidence in the Taiwan market is reflected in the company’s decision to establish a robot display center in the Tainan Science Park in 2015. With a floor area of over 330 square meters, the display center showcases not only traditional production line related robot functions such as welding and screwing in screws, but also service-oriented robots, which are arguably the most impressive items on display. With single-arm, 7-joint and twin-arm, 15-joint technology, Yaskawa’s robots are capable of performing a wide range of complex tasks (such as opening beverage cans) with great precision. Yaskawa is also planning to establish a technology service center and an additional robot display center in Taichung; these are expected to begin operation by the end of 2017.

“Taking into account the way the local market is developing and the special characteristics of Taiwanese industry, in the future we will be focusing on robot applications for three key industries: food products, cosmetics, and healthcare products.” Chi-Chiang Huang explains that, in Yaskawa’s development of the Taiwan market, besides continuing to introduce into Taiwan Yaskawa Group products such as traditional robots designed to perform arc welding spot welding, spraying and transportation functions, Yaskawa will also be expanding the range of the robots it markets in Taiwan to include products designed for the medical and care industries, such as robots for use in pharmaceuticals manufacturing, lower limb rehabilitation aids, mobility aids for people with spinal injuries, etc.

“Currently, Yaskawa’s healthcare-related robots are undergoing approval review by the relevant authorities; we are also collaborating with major hospitals on care aids and other equipment, focusing on helping people who have had limbs paralyzed in accidents etc. to recover their mobility.” Chi-Chiang Huang stresses that, whereas in the past robots have tended to be heavy and bulky, the trend now is towards the development of smaller, more lightweight robots. With regard to the coordination of activity between robots



LR2 leg rehabilitation robot. (Photo courtesy of Yaskawa Electric Taiwan Corporation)

and humans, Yaskawa follows the requirements set by ISO and other international organizations with respect to robot motor specifications, keeping robot motors within 80 watts or less so as to minimize the risk of injury to robot users while the robots are in operation.

In the century since it was first established, Yaskawa has maintained a consistent focus on its core business areas (in the global market as a whole, and also in Taiwan); the company's careful attention to details together with a continuous hard work has enabled it to gradually build up an impressive "robot kingdom."



Yaskawa dual-arm robot with vision system (Photo courtesy of Yaskawa Electric Taiwan Corporation)



Robot performing bioanalysis for new drug development (Photo courtesy of Yaskawa Electric Taiwan Corporation)

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