



# electronicsupdate

contents:

- 2 A Look Back at Electronics
- 3 Report from Electronics Europe
- 4 Check Out Our New E-Learning Center
- 4 First-ever Asia Silane Safety Seminar Held
- 4 Air Products Expands R&D Labs in Asia
- 5 Showa Denko Air Products Celebrates 10th Anniversary
- 6 Technical Papers
- 6 News of Interest



*Air Products is well positioned to serve its electronics customers in 2007 and beyond.*

## Quality, Reliability, Competitiveness, EH&S Driving the Global Electronics Organization

*(Editor's Note: Air Products announced leadership and organization changes to reflect the company's strategy and focus on growth. They include establishing four new business divisions—Electronics and Performance Materials; Energy, Process Industries and Equipment; Merchant Gases; and Healthcare. Mike Hilton, former vice president of Electronics Businesses, will head the Electronics and Performance Materials Division. Jerry Ermentrout, vice president and general manager of the Electronics Division, is retiring after 31 years at Air Products. Corning F. Painter, formerly head of Asia Electronics, succeeds Ermentrout. In the following interview, Hilton and Painter discuss the state of the Electronics Division. See the separate interview of Ermentrout in this issue of Update.)*

### Q. WHAT DO THESE RECENT ORGANIZATIONAL CHANGES MEAN?

**Hilton:** They are very consistent with the company's strategy for electronics. Naturally, Asia remains a focus because that is where most of the manufacturing is based. That's why Corning will remain in Taiwan. However, Air Products remains committed to its electronics customers across the globe, including North America and Europe.

**Painter:** The changes mean that we are serious about being close to our customers. The electronics industry is increasingly centered in Asia so it is a logical place for us. Assimilating the Asian cultural values of speed and cost consciousness will help us to serve our customers everywhere. The change also means that Air Products is serious about being a global company. It is good for us to have a major business lead from Asia. The Electronics Division should be a leader in diversity and in bringing perspectives from around the world into Air Products.

### Q. WHAT IS THE MARKET LIKE NOW?

**Hilton:** The market is very robust. We want to take advantage of the market when it is robust by especially focusing on critical customers and the product lines those customers need. Having the right offerings is key. We're listening to our customers... what they value and what they are willing to pay for. We continually update our portfolio to reflect that.

**Painter:** Yes, we stress giving our customers what they value most. Most recently, we've been told that being a one-stop supplier isn't as important as it once was. Customers are looking for the best values and they don't mind if they have to get that from more than a single supplier.

(cont. on page 5)

## Air Products Building New NF<sub>3</sub> Plant at Ulsan, Korea

Air Products will construct a nitrogen trifluoride (NF<sub>3</sub>) plant in Ulsan, Korea to support the fast-growing Asian semiconductor and liquid crystal display (LCD) markets. The new production facility will be operated by Air Products Korea Electronics and will be built at the company's existing specialty gas site in Ulsan. The first phase of the new plant will produce in excess of 500 metric tons per year and will be completed in late 2007. Upon completion, Air Products' global NF<sub>3</sub> capacity will be more than 2,500 metric tons per year.

This will be the company's second Electronic Specialty Material (ESM) investment at Ulsan since bringing on-stream an ultra-high purity ammonia plant in 2005. This facility complements other Korean ESM facilities in Shiwha, Banwol, Cheonan, and Pyeongtaek.



*A new NF<sub>3</sub> plant will be built adjacent to our ultra-high purity ammonia plant at Ulsan, Korea.*

NF<sub>3</sub> is used as a chamber cleaning gas in the manufacture of semiconductors, flat panel displays and other electronic devices. When compared with competing products, NF<sub>3</sub> offers customers significant reductions in emissions, throughput increases of up to 30 percent, longer chamber life, and faster clean rates. NF<sub>3</sub> is also stable and non-flammable, making it a safe gas to transport, store and deliver to customers around the world.

In addition, Air Products' bulk supply capabilities for NF<sub>3</sub> will be further enhanced for the delivery of product to large-volume flat panel and 300mm silicon semiconductor fabs.

(cont. on page 3)





## A Look Back at Electronics

*(Editor's Note: Jerry Ermentrout, who has served as general manager of the Electronics Division since 1992 and who was appointed vice president in 1996, is retiring after a 31-year career with Air Products. During a recent interview, he talked about the electronics industry and highlights of his career, which included being honored with SEMI's Akira Inoue Award.)*

### Q. HOW DID AIR PRODUCTS GET INTO ELECTRONICS?

**Jerry Ermentrout:** It was the late 1960s in Silicon Valley through our Mountain View, California office. It wasn't a big industry and no one was really paying much attention to it. We recognized an opportunity. We signed early contracts, then we built a plant and a pipeline at Santa Clara. In the same time frame, we built a plant at East Fishkill, N.Y.

### Q. WAS THAT SUCCESSFUL?

**JE:** Yes. The Silicon Valley and the semiconductor industry started taking off. Next, we moved into Phoenix where we built another pipeline and started adding other big fabs in Arizona. In the beginning, we were selling bulk and tonnage gases to electronics customers. Plus, the excess capacity we had from the plants we built for them allowed us to serve other industries.

### Q. WHEN DID YOU GET INVOLVED?

**JE:** I joined the company in 1975. In fact, my first job was as a product manager in specialty gases, which was just a very small product line. Electronics was just a market segment in our Industrial Gases Division. I helped to sell to electronics customers for a few years. One year I spent 40 out of 52 weeks in California. For a long time, electronics was more of an Applied R&D activity and based in Arizona and I wasn't involved with it from 1982 to 1992. In 1990, electronics became much more important to us when we reorganized the Industrial Gas Division into three groups—liquid bulk gases, packaged gases and electronics.

### Q. WHAT PROMPTED THE CHANGE?

**JE:** Up until 1987, the business continued to grow, but we were still just a supplier to semiconductor manufacturers. We delivered product to them based on their specs. In 1987, we signed our first MEGASYS® contract, which meant that we would provide on-site technicians to help them manage and use their gases. It was a concept that Air Products introduced. This dramatically changed the role of the gas supplier to the semiconductor industry. We moved from the traditional, "You give us the specifications, we'll drop the product off to your tank or we'll give you product out of our pipe, and then you take it from there." This is the first time we really got invited in to the customer's fab.

### Q. HOW SIGNIFICANT WAS THE MEGASYS PROGRAM?

**JE:** Very significant. Really, what they were now asking from the supplier was for the supplier to give them the purity they needed on the wafer. Not just at the tank. We needed to make sure that when the materials get to the wafer, we've got the proper purity. We struggled at first with that whole concept. I don't know how we are going to do that Mr. Customer because you're going to put in a piping system and these gases are going to have to go through that piping system and we have nothing to say about that. And they said fine, "You can design the piping system." Then we need to supervise the installation. Now we're going to gas cabinets. And when you change out cylinders there is a chance of introducing impurities. And they said, "OK, do that too."

### Q. WHAT WAS IT LIKE WHEN YOU RETURNED TO THE BUSINESS IN 1992?

**JE:** The most amazing thing for me was how the customers interacted with the gas supplier. As I mentioned, when I was first involved, it was pretty much customers saying we'll tell you what we want. When I returned, I was at a meeting about a business opportunity and someone from the customer said, "You're the supplier; it's your business; you tell us what we should do." It was a huge change from what it was 10 years before. Also, in the early 1990s the electronics business started to escalate. By this time, the company realized this was going to be a significant growth opportunity. We began to talk about growth platforms. By then, we had an extremely strong position in North America.

### Q. WAS BUSINESS LIMITED TO NORTH AMERICA?

**JE:** For the most part. But we had some electronics business in Europe and we were in business in Asia. We had been there since the 1980s and involved in a number of joint ventures, but really not much in electronics. We weren't in Japan, which at that time was the most important Asian country for electronics. So we bought a 15 percent interest in Daido Sanso. We were exporting a little NF<sub>3</sub> to Asia. Korea had not developed and there were no flat panel makers. The foundry business didn't exist. Around this time, another significant development occurred in our business. We started following the U.S.-based manufacturers throughout North America and overseas.

### Q. HOW DID THAT WORK?

**JE:** We simply followed manufacturers wherever they built new factories. They would develop a process here and duplicate it exactly in another location. Obviously, it was very important that we be able to follow them. This was our basic industry philosophy for the '90s. Our business became more and more global. For example, we supplied new fabs in Ireland and Israel built by one of the world's leading semiconductor companies and we began following other customers into China.

### Q. WAS THAT CHALLENGING FOR THE ELECTRONICS DIVISION?

**JE:** Yes. We were very successful in the U.S. because we had learned how to be comfortable with our customers. We were a bit nervous about going overseas, especially with the cultural and regulatory issues, like safety. But we persevered. In Ireland, we were asked to expand our MEGASYS management to include chemicals. This was a significant demand on us because we were not heavily involved in chemicals then, though we had acquired Schumacher. But we did it. Operating in China was another challenge we met successfully.

### Q. WHERE WAS THE BUSINESS IN THE LATE 1990S?

**JE:** The late 1990s were boom times. The semiconductor industry was very strong. Not only was Air Products following customers around the globe, but also we were trying to establish bases in Asia and Europe. We became concerned that we might be too dependent on too few customers, that we were too much in microprocessors, and we needed to diversify, especially into memory devices that were mostly being made outside of North America. It was then that we decided to target customers that could really broaden our base. We won a contract to build a major on-site plant in Korea and then agreed to work on a joint development program that included building a specialty gases lab at Shihwa. By that time, specialty gases had become very important to us. We were selling a lot of NF<sub>3</sub>, for example. Soon after we



## Report from Electronics Europe

Air Products has been serving European electronics customers for many years and, today, is one of the leading suppliers to customers in the U.K., on the Continent and in other countries. Here is some recent news about Electronics Europe.

### NEW DRESDEN TECHNICAL CENTER

Air Products technical services gives customers the option of outsourcing all aspects of gas and chemical management, including a wide range of engineering, sub-fab and tool services. The technical center model has been very successful in North America as an effective regional service provider and Air Products has extended this concept to fit European and Asian requirements.

The latest addition to this coverage in Europe is the new Dresden Technical Center, inaugurated to offer local service support to the electronics industry in that region.

The Dresden service team offers a variety of services:

- Gas and chemical distribution systems (e.g. Chemguard<sup>®</sup> equipment, Absolute<sup>™</sup> Temperature Control systems, VMDOT<sup>™</sup>, GASGUARD<sup>®</sup> equipment)
- Turnkey offering
- Preventive Maintenance and repair (spare parts warehouse)
- Troubleshooting
- 24/7 service availability
- On-site and remote monitoring
- MEGASYS<sup>®</sup> Total Gas and Chemical Management

### CHILLER SERVICE ADDED

Like the Dresden Technical Center, also under the umbrella of Electronics Europe services is the newly added chiller service program. It's being handled out of the Nijmegen Technical Center in the Netherlands to serve all European electronics customers. It is a comprehensive service that includes preventative maintenance, refurbishment, and repair of chillers and heat exchangers.

Many major semiconductor manufacturers already use our chiller and heat exchanger service. A key advantage for them is that we can match the offerings of equipment manufacturers and exceed those of smaller shops. Equipment exchanges and our broad inventory of spares mean our repair cycles are often shorter. Air Products is also equipped to provide emergency service (24 to 48 hours) to respond to equipment breakdowns.

Air Products also has a U.S.-based chiller service program operating out of the Electronics Technical Center at Gilbert, Ariz.

### SULPHURIC ACID PARTNERSHIP

Air Products and PVS Chemicals Belgium NV have signed an agreement for the supply of high-purity sulphuric acid to the European electronics market.

Simon Earnshaw, general manager, Air Products Electronics Europe, said: "We are pleased to be partnering with PVS for the supply of high purity sulphuric acid. PVS brings 20 years experience in producing high-purity sulphuric acid for the semiconductor industry together with a new state of the art facility, located in Belgium. It will provide cost-effective supply chain solutions for both bulk and packaged materials."

He added: "Air Products' experience in handling and delivering products and services to the microelectronics industry combined with PVS's technical ability to produce high purity sulphuric acid will support customers' requirements in terms of quality, packaging solutions, delivery and cost of ownership."

PVS, building on its 20 years experience of high-purity sulphuric acid in the U.S., has begun production of ultra-pure sulphuric acid at its site in Gent, Belgium. The Belgian location is well positioned to serve customers throughout continental Europe. The new plant is supported by a new clean room laboratory that enables a full-service offering. The plant has the production capacity to meet a significant portion of the growing market demand.

PVS Chemicals is a privately held chemical manufacturer and distributor based in Detroit. PVS meets the needs of industrial and specialty customers with operations in Europe, Southeast Asia and the U.S. Founded in 1945, PVS serves a broad range of industries including food processing, pharmaceuticals, electronics, water treatment and fuel refining. PVS is a leading marketer of sulphuric acid, sulphur-based specialty chemicals, hydrochloric acid, iron chloride and chemical recycling.

### PHOTOVOLTAIC CONFERENCE IN DRESDEN

Air Products helped sponsor and also exhibited at the 21st European Photovoltaic Solar Energy Conference and Exhibition held in Dresden in September 2006.

This milestone event for the photovoltaic sector drew a record-breaking number of visitors and participants—2,700 scientists, industry representatives and politicians from 95 countries and around 3,600 others visited the trade exhibition to see the latest developments in solar energy generation.

The EU PVSEC has positioned itself as a platform for exchange between research and industrial applications. The figure of around 6,300 participants and specialist visitors from all over the world shows how far this transfer has expanded. The exhibition, with around 400 exhibitors in a show space of 16,000 sq. meters, is the world's largest of its kind.

The exhibitors came from all corners of the PV solar sector—makers of ingots, wafers, solar cells, PV modules, concentrators, and trackers; manufacturers and suppliers of equipment, distributors, integrators, assemblers; manufacturers of Inverters; and engineers and service providers.

Air Products portfolio for the PV solar sector includes specialty gases, specialty chemicals, high-purity process chemicals, nitrides, dopants, etch chamber cleaning products and equipment and service solutions.

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## Air Products Building New NF<sub>3</sub> Plant at Ulsan, Korea (cont. from page 1)

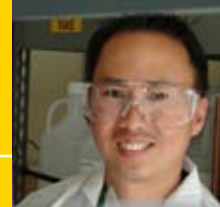
Air Products is the largest and most experienced supplier of Bulk Specialty Gas Systems (BSGS) and ISO modules, which transport NF<sub>3</sub> to locations throughout the world safely and efficiently. The company currently has over 300 electronics BSGS and 300 total ISO modules in service.

The latest BSGS innovation features pipelines that supply NF<sub>3</sub> directly to multiple semiconductor and flat panel display fabs from a single location, allowing for further savings while improving safety, quality, and reliability.

Air Products has safely manufactured and distributed NF<sub>3</sub> for over a quarter century from its ESM manufacturing facility in Hometown, Pa. The company will continue to operate its three existing NF<sub>3</sub> plants at that location ensuring reliable global NF<sub>3</sub> supply through the operation of multiple independent plants that continue to be optimized.

The company has built a solid global infrastructure to facilitate the movement of NF<sub>3</sub> and other specialty products through strategically placed transfills in Taiwan, Korea, Japan, and Belgium and distribution centers near customer locations.

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## Check Out Our New E-Learning Center

Want quick and comprehensive info about Air Products' offerings to the global electronics industry?

Log on to our Electronics E-Learning Center, which you can easily access from the division home page [www.airproducts.com/electronics](http://www.airproducts.com/electronics). Simply click on E-learning Center on the left side navigation bar.

The Electronics E-Learning Center is an easy way for us to share knowledge and your resource to our latest technical information.

For example, you can download podcasts, featuring conversations about some of our key product offerings. Or you can pick a topic and listen to a narrated Powerpoint presentation, or download recently published articles and technical papers. We welcome your feedback and suggestions!

The E-Learning Center is organized into three categories and updated regularly.

### Narrated PowerPoint Presentations

- BSGS Solutions: From People to Pipeline
- BSGS Multiple Choice for Maximum Flexibility
- BSGS: Improving Market Leader Offerings
- PDEMS Low-k Solutions
- Bulk NH<sub>3</sub> Supply: Plant, Purity and Package
- N<sub>2</sub>O ISO Bulk Specialty Gas
- What's New in Silane BSGS

### Video Segments

- Ammonia
- Nitrogen Trifluoride (NF<sub>3</sub>)
- Semiconductor Equipment Manufacturing Center (SEMC)
- Electronics R&D Center
- Carlsbad, Calif. Specialty Materials Facility

### Audio Interviews

- Ammonia BSGS Capabilities
- BSGS 101
- BSGS NF<sub>3</sub>
- CVD Chamber Cleaning Overview
- Low-k PDEMS
- Product Devel. for Low-k Materials
- Analytical Trace Impurities
- Ammonia ISO Modules and BSGS
- BSGS Supply for Silane
- Low-k Overview
- New Materials for Micro Electronics

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## Air Products Expands R&D Labs in Asia

Air Products has recently expanded its R&D capabilities at its Taiwan and Korea labs to support its fast-growing electronics business in Asia. The two R&D labs, equipped with the latest analytical, defect inspection, formulation and cleaning tools, will enable Air Products to better support the development of the advanced integrated circuit (IC) industry to meet customers' needs.

"Asia is our largest and fastest growing region for electronics, and it has an attractive pool of R&D talent. We have been expanding our capabilities in Asia to draw on local expertise and market knowledge to provide improved time-to-market solutions for our customers in Asia," said Corning Painter, vice president and general manager of Global Electronics Division for Air Products.

"Our goal is to provide our customers with integrated solutions from materials to processes to services. We will work closely with our OEM partners to provide localized platforms and solutions for our customers across the Asian region and the world," said Dr Chimin Sheu, technology director of Electronics Division Asia for Air Products. "We will continue to build more local capabilities, each with a well-defined mission and a clear business and technology focus. Our aim is to build a distributed Asian R&D cluster in which each capability will complement the others."

## First-ever Asia Silane Safety Seminar Held

Air Products recently chaired the first Silane Safety Seminar in Asia to share expertise and experience with the industry on the safe handling of silane, a specialty gas used extensively in the making of semiconductors and flat panel displays that requires particular care due to its hazardous properties.

Held in Taiwan, the seminar drew a full-house of more than 450 participants from major gas companies, industry associations, risk management specialists, material suppliers, end-users, and Air Products' customers.

Air Products has been actively spearheading an industry effort to promote the importance of silane safety for years.

"As a world leader in the electronics industry, Air Products is committed to product and process safety," said Eugene Ngai, director of Emergency Response and Disposal Technology at Air Products Asia, and the seminar's chairman. "Safety and reliability are the core tenets of our supply commitment to customers. Silane has unique properties that are critical to understand."

The seminar was jointly organized by Asia Industrial Gases Association (AIGA), Taiwan's Council of Labor Affairs Executive Yuan, Industry Development Bureau in Taiwan's Ministry of Economic Affairs and the Taiwan High Pressure Gas Industrial Association. A number of other safety organizations such as SEMI, Compressed Gas Association, Industrial Technology Research Institute (IRTS) and Taiwan Semiconductor Industry Association (TSIA) and ERIC supported the event.

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Air Products' Taiwan R&D lab, located in Chu-Pei County, is close to the renowned Hsinchu Science-based Industrial Park. Since 2001 the lab has focused on electronics formulated products (EFP) applications and is equipped with various wafer cleaning and analysis tools. The recent expansion includes a new general chemical lab to conduct chemical screening and process tuning and extra office space to accommodate increased numbers of R&D staff.

Air Products' Korea R&D lab, located in Giheung, is close to the company's major customers in Korea. The lab is equipped with various state-of-the-art analytical tools and a new atomic layer deposition (ALD) system to conduct various high-k dielectrics and barrier precursor and chamber clean studies to meet the request of local customers.

The expansion of Korea and Taiwan labs is part of Air Products' continuing commitment to strengthen its product leadership through innovative solutions and value-added offerings to support the fast-growing business in Asia.

Additionally, the company has also significantly upgraded its Performance Materials technical capabilities in China and Japan. The China lab is currently being expanded to accommodate broader R&D work.

## EH&S Driving the Global Electronics Organization (cont. from page 1)

**Q.** WHAT DOES AIR PRODUCTS BRING TO THE GLOBAL MARKETPLACE?

**Hilton:** Our offering is a two-value proposition. First, we want to provide reliable products with the right quality level at the lowest cost. Second, we want to offer products with the right kind of performance, where cost is important, but not as critical as performance. This would include our leading-edge technology offerings such as CMP slurries, post-CMP cleaning products, ACT performance materials, photo-resist ancillaries and leading-edge dielectric products. Generally, these are formulations rather than single-molecule products. We want this differentiated business and we feel we are in a good position to capture and serve more of this performance-based business by being the best at everything that surrounds the technical sale.

**Q.** WHAT DIFFERENTIATES AIR PRODUCTS?

**Painter:** Customers tell us that they appreciate our quality, reliability, competitiveness, and innovative products. So that's what we are providing. We primarily manufacture the materials we sell vs. being a trading company. This gives us two innate advantages: consistency from a quality control perspective and control of our supply chain. This, combined with excellent global logistics and a network of facilities, allows us to provide a high level of reliability. Similarly, we manufacture the equipment we provide to customers. It is continuously upgraded to meet the changing demands of our customers. We manufacture equipment at Air Products' facilities in Asia, North America, and Europe and we can flex demand from one site to another.

For years we have been enhancing our competitiveness by building infrastructure where it can best serve our customers. For example, we recently opened a facility for making air separation units (ASUs) in China. We are able to capture Chinese economics while building to our global standards. Another example is the new  $NF_3$  plant we are building at Ulsan, Korea.

**Hilton:** We are working, too, to improve our cost position across our portfolio. We are doing that by improving our integrated supply chain and by building more cost-effective new facilities, for example, gas production and equipment delivery systems for gases and chemicals.

**Painter:** We continue to introduce innovative products such as pDEMS for low-k applications, TMAL for high-k applications, safe arsine delivery systems, a variety of ACT strippers, and the CP series of wafer cleans.

**Q.** WHAT IS ELECTRONICS DOING TO STRENGTHEN ITS CAPABILITIES?

**Hilton:** In general, we want to enhance our capabilities across our portfolio and better integrate the products and services that support it, for example, deposition materials. Globally, we are in a very good position with critical customers and key products. We grow with the market. A question for us is, how do we accelerate that growth?

I see two main categories where we have opportunity. The first is in products that we are not involved in, but ones that serve our market and that we need to get involved in. That will come through internal R&D or acquisition. Second, there are markets that we need to get more involved in. That includes an expanded role in logic and



Mike Hilton, Corning Painter

memory, which is a global market; advanced packaging for semiconductors occurring mostly in Asia; and photovoltaics that involve mostly government-sponsored applications in Japan, Germany, and the U.S.

Another question for us, and I think for every supplier, is how do we bring new products to market faster and how do we realize a more successful hit rate with new products?

Finally, we want to leverage the capability we have in Performance Materials and expand our electronics positions, for example: in display and printed electronics.

**Painter:** I agree. We need to become faster. That includes quicker responses to our customers, shorter lead times, and greater speed in bringing innovative solutions to the marketplace.

**Q.** ARE YOU PLEASED WITH WHERE THE BUSINESS IS AND WHERE IT'S GOING?

**Hilton:** Yes. Jerry and his team have done a great job of bringing us to where we are. Air Products remains the No. 1 materials supplier to the global electronics industry and we want to maintain that role. I think we are well positioned to support our customers in 2007 and beyond. We work hard at being a supplier our customers can count on and we appreciate the fact that they recognize our quality, reliability, global infrastructure, local capabilities and technical knowledge. That is also reflected in the amount of new business we continue to win throughout the world.

## Showa Denko Air Products Celebrates 10th Anniversary



Showa Denko Air Products team at the recognition event.

Air Products and Showa Denko, one of Japan's leading multi-line chemical producers, held a recognition event to celebrate the 10th Anniversary of the successful Showa Denko Air Products production joint venture in June. Additionally, both parties have agreed to extend the original agreement.

Formed in December 1996, Showa Denko Air Products Co., Ltd. is a joint venture between Air Products Japan, Inc. and Showa Denko K.K. It draws upon Air Products' world-class capabilities in producing and handling fluorine compounds, and Showa Denko's technical and operating expertise in large-scale perfluorocarbon production facilities.

At the manufacturing facility located in Kawasaki, Japan, Showa Denko Air Products manufactures  $CF_4$  (tetrafluoromethane) and  $C_2F_6$  (hexafluoroethane). These are two important etch and chamber cleaning gases within the Electronic Specialty Materials portfolio serving the global electronics industry. The plant and partnership is based

on the successful integration of Showa Denko's refrigerant technology and Air Products fluorine technology.

During the past decade the plant has more than doubled the original capacity through three expansions. The unit cost has also dramatically reduced while the focused operating team has maintained benchmark industry performance in safety.

Specifically, Ted Lileck, Air Products Fluorine Operations Technology leader, was recognized by the Showa Denko Air Products' Board of Directors for his decade-long support to operational and safety performance.

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**“Particle Removal by Dense-phase Fluids Using Ultrasonics,”** W. T. McDermott, G. Parris, D.V. Roth, and C.J. Mammarella, published in *Particles on Surfaces—Detection, Adhesion, and Removal*, K.L. Mittal, Ed., Vol. 9, VSP, Leiden, 2006.

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## news of interest:

### Hanyang Technology Celebrates 20 Years

Hanyang Technology (HYT), a wholly-owned subsidiary of Air Products in Korea, recently celebrated its 20-year anniversary. HYT is part of Air Products' Electronics Equipment Solutions (EES) business unit, which is responsible for the design, engineering, and manufacture of ultra high purity (UHP) chemical and gas delivery systems and associated turnkey projects to the electronics industry.

HYT was founded in 1986 in Ansan, South Korea, just outside of Seoul. A technology transfer agreement between Air Products and HYT was initiated in 1994 and it became a wholly-owned company of Air Products in 2005.

As a sister plant to Air Products EES's Semiconductor Equipment Manufacturing Center (SEMC) in Allentown, Pa., HYT is critical to EES's Asia operations. HYT supplies Air Products GASGUARD® and CHEMGuard® equipment product lines globally and GASKEEPER locally in Korea, serving primarily Samsung, Hynix, LG Philips, and many other electronics companies. In addition to equipment, HYT also supplies turnkey piping and on-site MEGASYS operations.

HYT also works very closely with Korea Industrial Gases (KIG), another wholly owned subsidiary of Air Products in Korea. Together, these teams are instrumental to the success of the company in the region.

Mr. Y.S. Kwak, vice president of HYT and co-recipient of Air Products' 2005 Chairman's Award, said, "HYT is very excited and proud to be part of the Air Products and EES teams. As one of the oldest and most respected suppliers of UHP gas and chemical equipment in Asia, we are proud of our heritage and excited about our future. Together with our Allentown team, our vision is to lead the industry with cutting-edge UHP equipment and services, to meet the most demanding customer applications."

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### Company Wins Two More Supplier Awards

The Air Products Electronics Division has won two more supplier awards, one from the Taiwan Semiconductor Manufacturing Company (TSMC), Taiwan, and the other from Silterra Semiconductor in Malaysia.

Air Products' subsidiary in Taiwan, Air Products San Fu Co. Ltd., was awarded the "Supplier Excellence Award" for the second consecutive year by TSMC, the largest semiconductor foundry in the world. This is the fourth award in the past five years as TSMC also gave this recognition to Air Products San Fu in 2002, 2003, and 2005.

TSMC surveys and ranks more than 300 material suppliers in the areas of quality, supply reliability, cost and services provided to the company. Awards are presented to material suppliers in four distinct categories; Air Products San Fu was recognized in the gas category.

The award was presented during TSMC's 2006 Supply Chain Management Forum held on Sept. 14, 2006, and attended by more than 350 people from the world's leading suppliers to the semiconductor manufacturing industry.

Air Products San Fu supplies all TSMC fabs at both the Hsin Chu and Tainan Science parks, and TSMC's other locations, with bulk and cylinder electronic specialty gases, MEGASYS™ services and GASGUARD® gas cabinets.

Silterra Semiconductor, located in the Kulim Hi-Tech Park, recognized the outstanding services of Air Products Electronics MEGASYS team by giving it their "Supplier of the Year" award for 2005.

Our Silterra MEGASYS team provides total gas management services for the specialty gases distribution systems and base gases systems in Silterra's Gas Farm. The team has 21 members and has been on-site since 2000.

"To receive the Supplier of the Year award from the pioneering wafer fab in Kulim is a great endorsement and recognition of Air Products' global brand. We say "Thank you" to Haida Rosli, the MEGASYS site manager and the team for 'Delivering the Difference,' "said Saw Choon Seong, managing director of Air Products Singapore and Malaysia.

"It took hard and sincere work by all our team members under strong leadership of Haida Rosli over the years to achieve this award, and it serves as the recognition from Silterra on the value proposition of our MEGASYS operations," added Ong Chin Teck, Tech Center manager, Air Products South-East Asia.

Silterra Semiconductor is a leading semiconductor manufacturer in Malaysia and one of our important customers in Kulim area. In addition to the MEGASYS team, Air Products also supplies ESG (Electronic Specialty Gases) products and pipeline gases to Silterra.

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## A Look Back at Electronics (cont. from page 2)

won the business in Korea, the customer announced it would build its first non-Korean fab at Austin. This was a big step for them to build outside of Korea. We won this business too. This was important because it was the first customer where we worked with them on both sides of the ocean as opposed to following them overseas. The key decision makers for the Austin plant were in Korea. From that point on, our relationship really took off.



### Q. WHAT WAS THE NEXT MAJOR DEVELOPMENT?

**JE:** That came in the early 2000s with the development of flat panels. During the same period, the foundry model was created. Through our San Fu JV in Taiwan, we had a working relationship with the foundries there. We've won four all-important supplier awards in the last five years. I believe the many other supplier awards we have won throughout the world are a measure of our success. We are extremely proud of every one. Then came the 300mm fabs.

### Q. WHAT ARE YOU PROUDEST OF AS HEAD OF THE ELECTRONICS DIVISION?

**JE:** The people I've worked with, my many Air Products' colleagues and customers. My professional associations are very important to me; winning the Akira Inoue Award was a tremendous honor. The growth of our electronics business is a testimonial to the hard work of so many. For example, in 1992, specialty gases was about a \$17 million business for us run by two or three people. Today, it's a \$500 million business with hundreds involved. The overall business has grown from about \$100 million to some \$1.5 billion in revenue in the last decade. We are the No. 1 supplier of many key products. We can all be proud of the innovation we have brought to the industry—MEGASYS Total Gas and Chemical Management, BSGS systems, environmental, health and safety best practices, etc. I was privileged to be a part of it all.

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### company information

Air Products serves customers in industrial, energy, technology and health-care markets worldwide with a unique portfolio of atmospheric gases, process and specialty gases, performance materials, and equipment and services. The company has annual revenues of \$9 billion, operations in over 40 countries, and over 20,000 employees around the globe.

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