ULVAC

ULVAC Power Book

ULVAC, Inc.

www.ulvac.co.jp/en

ULVAC

ULVAC, Inc.

2500 Hagisono, Chigasaki, Kanagawa, Japan 253-8543

TEL: +81-467-89-2033 FAX: +81-467-89-2250

ULVAC sees its vacuum technologies-based "energy and environmental businesses" as the main business of its overall business operations.

Specifically, it aims to be a company that helps society "generate," "store" and "efficiently use" energy. To this end, ULVAC offers not only various types of production equipment used in the manufacture of eco-friendly cars, digital home electronic products, pharmaceuticals and food products, solar cells, fuel cells and rechargeable batteries, but everything from the components and materials for these items, to maintenance services, and it offers all of these to a wide range of customers around the world!

ULVAC Solutions

Supporting Industries and People's Daily Lives with Vacuum Technologies

ULVAC seeks to make significant contributions to the development of industry and science by leveraging its vacuum technologies and related know-how in a comprehensive manner. To accomplish this, ULVAC and ULVAC Group companies are fully utilizing their unique technologies to promote "ULVAC solutions" while making great achievements in a variety of industrial sectors.

FPDs

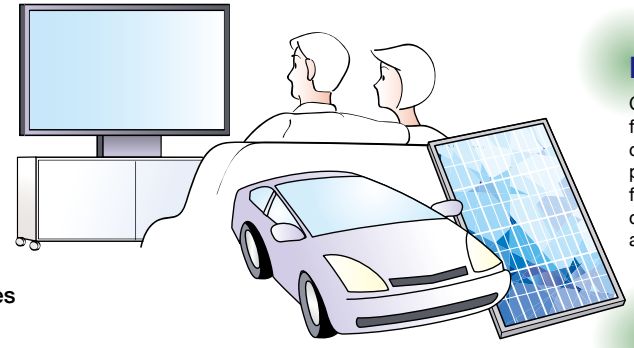
Contributing to the production of all types of FPDs, including LCDs, PDPs, OLED and FEDs

Pharmaceuticals and Food

Contributing to the production of pharmaceuticals and food products, including antibiotics, interferon, dried foods, instant coffee, cup noodle ingredients and bouillon cubes

Highly Performance Electronic Components

Contributing to the production of highly performance electronic components of digital products such as optical telecommunication products, telecommunication media, DVDs and Blu-ray Discs



Energy and the Environment

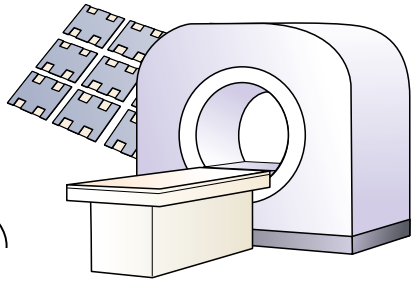
Contributing to general industry fields involving eco-friendly car and fuel cell vehicle components, general car components, solar cells, rechargeable batteries, food products, and pharmaceuticals while promoting the high functionality of various components through renewal cleaning and surface treatments and performing relevant analysis and assessment processes

Semiconductor Devices

Contributing to semiconductor production involving ultra-thin wafers, ferroelectric random access memory (FeRAM), compound semiconductors, semiconductor circuit aluminum and copper wiring and high-density mounting

Next Generation Technology Support

Providing support for cutting-edge technology fields including biotechnology and fields involving highly functional components and materials such as nanotechnology, MEMS (Micro Electro Mechanical Systems), life science and sensors



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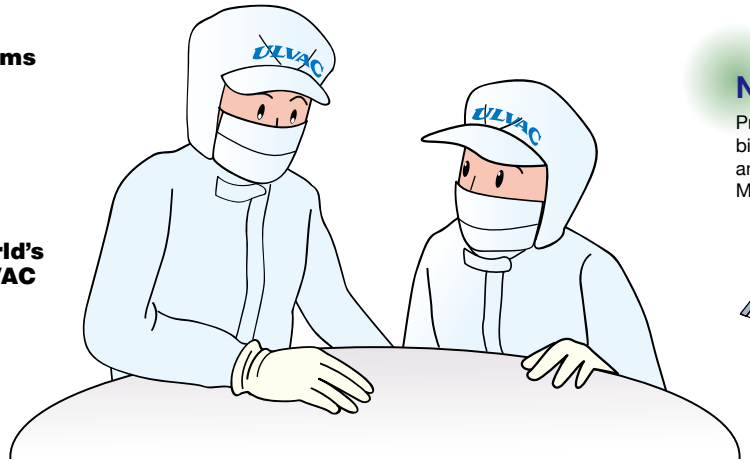
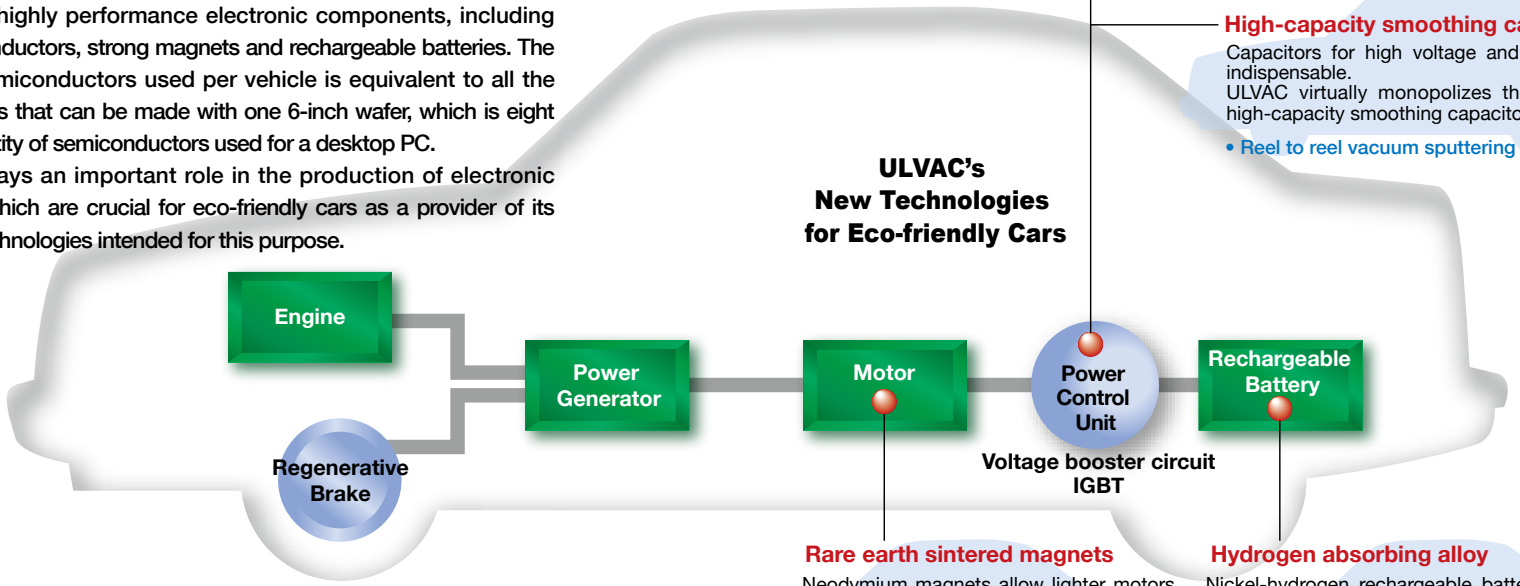


Eco-friendly Cars

ULVAC's Vacuum Equipment Products Support the Production of Electronic Components for Eco-friendly Cars

A variety of electronic technologies are applied to car production to ensure high performance, safety and reliability. In particular, the production of eco-friendly cars, the current focus of the world's attention, requires the automobile manufacturer to use a significant quantity of leading-edge highly performance electronic components, including power semiconductors, strong magnets and rechargeable batteries. The quantity of semiconductors used per vehicle is equivalent to all the semiconductors that can be made with one 6-inch wafer, which is eight times the quantity of semiconductors used for a desktop PC.

ULVAC plays an important role in the production of electronic components which are crucial for eco-friendly cars as a provider of its unique new technologies intended for this purpose.



Power ICs (ultra-thin wafer)

A type of power IC equipped with complex functions, based on ultra-thin wafers of 0.05 millimeters in thickness. ULVAC contributes to the production process through its thin film equipment dedicated to ultra-thin wafers as its equipment is free from high heat, cracking and distortion issues.

- Sputtering system
- Ion implantation system

High-capacity smoothing capacitors

Capacitors for high voltage and high output are indispensable.
ULVAC virtually monopolizes the equipment for high-capacity smoothing capacitors.

- Reel to reel vacuum sputtering apparatus

Rare earth sintered magnets

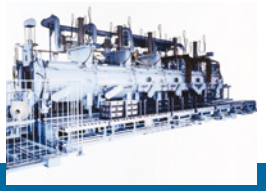
Neodymium magnets allow lighter motors to be made with higher output. ULVAC's product line includes a series of production equipment for such products.

- Vacuum melting furnace
- Continuous vacuum hydrogen treatment
- Vacuum sintering furnace
- Aging furnace

Hydrogen absorbing alloy

Nickel-hydrogen rechargeable batteries have a high energy density as well as high voltage and high output. ULVAC offers equipment for hydrogen absorbing alloys used for the anode of nickel-hydrogen rechargeable batteries.

- Vacuum melting furnace
- Vacuum heat treatment furnace


Vacuum sintering furnace


Hydrogen absorbing alloy melting furnace


Sputtering system


Reel to reel vacuum evaporation apparatus

Solar Cells

ULVAC's Solar Cell Solutions Serve the Needs of Various Cell Formats

Solar power generation is attracting the world's attention at a time when it is striving hard to achieve a low carbon society. This is because solar power generation is extremely friendly to the global environment. Unlike conventional oil- or LNG-based thermal power generation, solar power generates electricity by simply converting the unlimited supply of sunlight that shines down on us every day into electricity for consumption.

As a nation not endowed with fossil fuel resources, Japan has stepped up its efforts to develop solar cells, prompted by the oil shock that hit the country in the 1970s. This resulted in the nation becoming one of the world's top players in terms of solar cell technology.

Currently, based on its diverse knowledge of substrates, ULVAC is continuing to develop vacuum equipment and assessment equipment that serve the needs of all cell formats using silicon material-based monocrystalline solar cells, polycrystalline solar cells, thin-film solar cells, as well as non-silicon-based compound solar cells.

Energy Efficient IT Hardware and Home Electronic Products

Silicon deep etching system

ULVAC's MEMS Technology That Helps Achieve Light Weight, Small Size and Thinness as well as High Functionality

IT hardware, home electronic products, and game equipment have been becoming increasingly energy efficient and functional. The case in point is mobile phones, a product category that fully incorporates such technological progress.

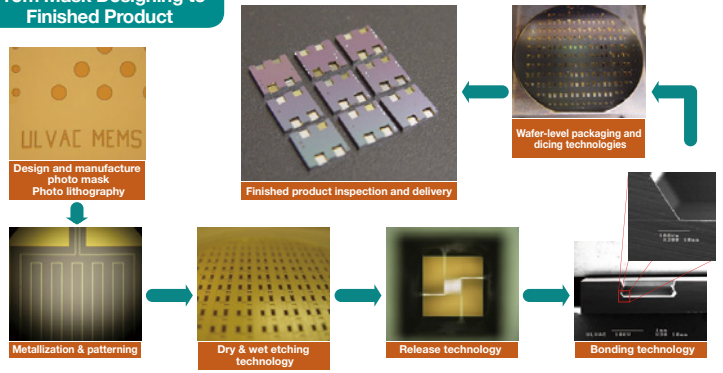
Although being light, small and thin, mobile phones continue to evolve. Among their seemingly endless functional improvements are the shift to a larger screen and higher pixel density cameras as well as the introduction of online music downloading, One Seg broadcast tuners and electronic payment functions. Nowadays, mobile phones also take the form of smartphones. Smartphones can automatically rotate the screen to the correct orientation when the phone is being moved around freely, and they can be operated just by touching the screen.

Various types of electronic components and sensors provide the support behind the progress of such mobile devices. These types of electronic components are used in a wide range of product fields such as eco-friendly cars, energy hardware and medical equipment. Vacuum sputtering technology is employed for most of these electronic component categories with fine processing technology called MEMS (Micro Electro Mechanical Systems is also called described above "Micro Machines") in wide use in recent years. ULVAC's products cater to customer needs relating to any of the above-mentioned technologies.

■ ULVAC's MEMS Foundry Flow from MEMS Processing Customer Consultation to Trial Production to Product Delivery

Determine Specifications and Propose Process (even for a single substrate) ▶▶ **Deliver the Product with a Short Lead Times and at a Low Price**

From Mask Designing to Finished Product



Batch type high vacuum evaporation system

Memory

Support for Society's Cloud Computing Progress Through Smartphones, Tablet PCs, Digital Cameras and Many Other Devices

Memory is a type of semiconductor that is an essential component of the devices we use in our daily lives like mobile phones, digital cameras, audio players and USB memory sticks, all products that use a lot of memory.

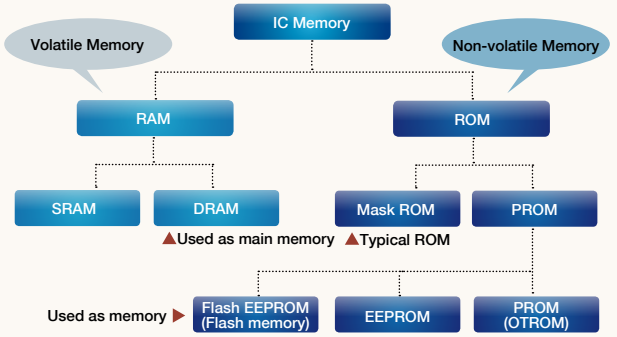
In particular, with various types of IT devices rapidly populated society, experts now expect an increasing number of electronic devices to access cloud computing services in the coming years, causing the volume of online information to expand at a fast pace.

The growing volume of online information will require industry players to have servers and datacenters equipped with memories capable of reading and writing at greater performance levels and improved electricity consumption. The existing quantity of flash memories available in the world will likely not be enough to serve market needs going forward. In this respect, semiconductor companies have been developing new types of storage memory products designed to fulfill the rigorous requirements of being compact enough and yet having superior power consumption characteristics.

Currently, ULVAC is supporting the evolution of a cloud computing-based society by developing and delivering new technologies designed to be used for the commercialization of next-generation memories such as ReRAM and FeRAM, not to mention flash memory, the currently predominant semiconductor category in this market segment.

Multi-chamber Sputtering System
ENTRON-EX and EX2

Memory Type



What is memory?
LSIs that store computer data and information.

What is non-volatile memory?
A type of semiconductor memory whose written data does not disappear even when it is not powered.

Pharmaceuticals and Freeze-dried Food Products


Vacuum freeze drying equipment


Centrifugal Thin-film Evaporator

ULVAC's Vacuum Freeze Drying Technology That Contributes to the Health and Well-being of Consumers

ULVAC is an important player in product fields associated with consumers' daily lives, including pharmaceuticals and freeze-dried convenience food products. ULVAC's products in such fields are based on its vacuum freeze drying and vacuum distillation technologies. The following outlines how they work.

ULVAC's vacuum freeze drying technology utilizes sublimation (the phenomenon in which a substance transitions directly from the solid phase to the gas phase). An ordinary substance changes from the solid phase to the liquid phase and then to the gas phase according the temperature in a given environment. For example, water turns into ice at temperatures below zero degrees Celsius (the solid phase) and ice turns into liquid water at temperatures above zero degrees Celsius, then at 100 degrees Celsius it boils as it turns into a gas. Yet, lowering the air pressure to a level equivalent to that of outer space like when the Space Shuttle is in orbit (creating a vacuum) greatly reduces the boiling point. This results in water at an ordinary temperature suddenly evaporating (turning into a gas) and as the temperature continues to fall, the liquid water turns into ice and the ice evaporates, turning directly into a gas. In other words, liquid is gasified in a vacuum, which is itself the drying process.

Vacuum freeze drying and vacuum distillation are technologies that are indispensable to the production of pharmaceuticals sensitive to heat such as vitamin pills, hormone pills, serums and vaccines. These technologies are well known as those used for instant coffee, instant noodles, soups and soup ingredients as well as dried fruit/vegetable products.

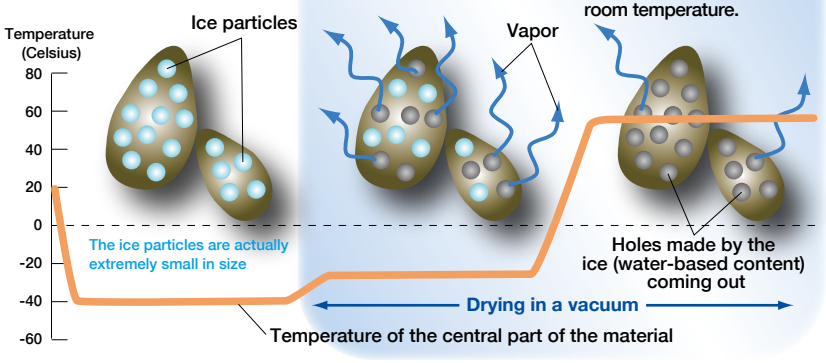
Process of Vacuum Freeze Drying

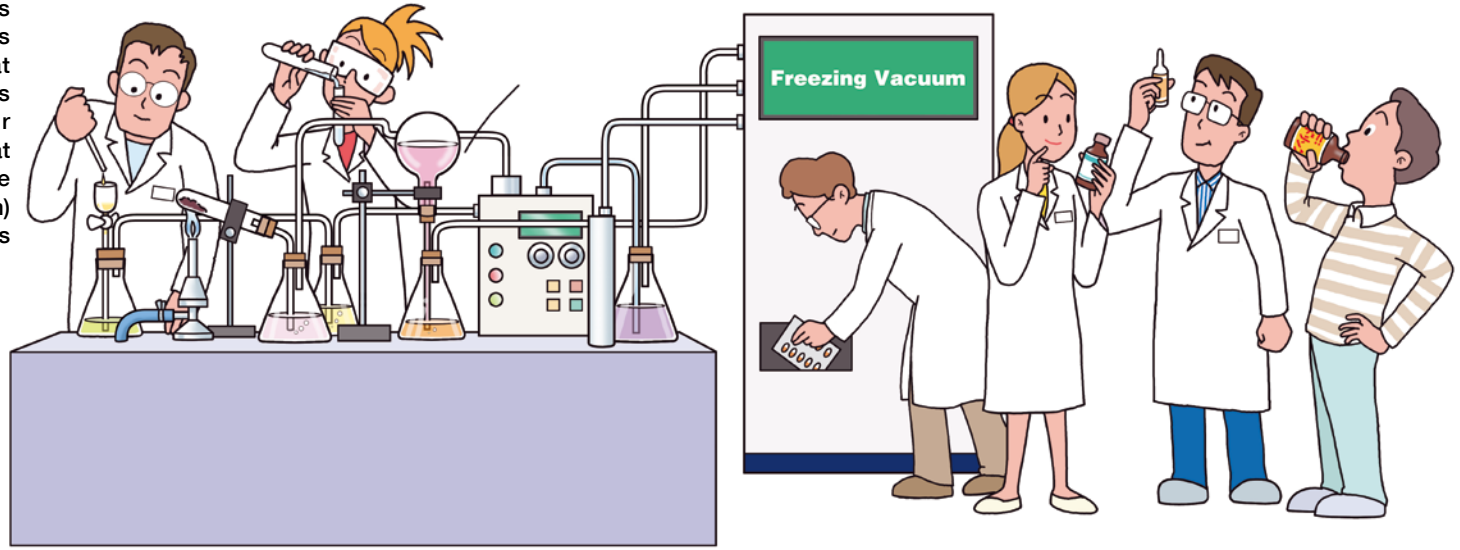
1. Freezing → **2. Constant-rate Drying** → **3. Falling-rate Drying**

Freeze the material by lowering the temperature to –40 degrees Celsius or so, freezing its water-based content.

Creating a vacuum causes sublimation to occur. With the air pressure being so low, heating does not cause the frozen material' s temperature to rise. Thus, the material becomes dried while remaining frozen.

The frozen material loses most of its water-based content with its temperature rising to a level close to that of the heating temperature. The drying of heat-sensitive pharmaceuticals is completed at a level close to room temperature.



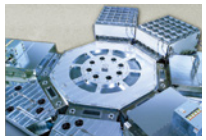


Flat Panel LCD TVs

The Advanced Technologies for TFT LCD TVs That Control 2,070,000 Pixels

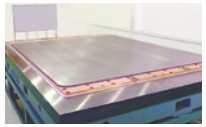
ULVAC's sputtering system, etc. used for the production of flat panel LCD TVs

TFT electrode deposition system
Sputtering system



Multi-chamber type TFT insulator deposition system
Plasma CVD system

Transparent conductive film deposition system
In-line sputtering system



LCD sputtering target

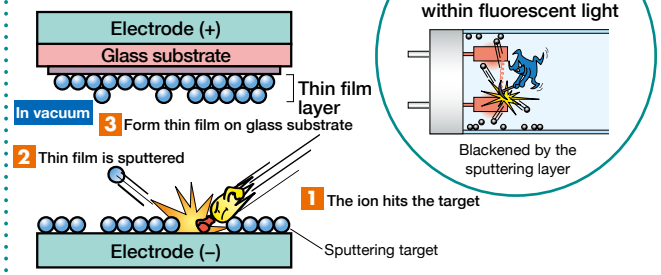
FPD ITO target

ULVAC is an industry player that has been delivering equipment used for the production of both types of flat panel display screens that are used for TV screens, namely, PDP and LCD. The following highlights the TFT method, a format serving the most important function for displaying images on screen.

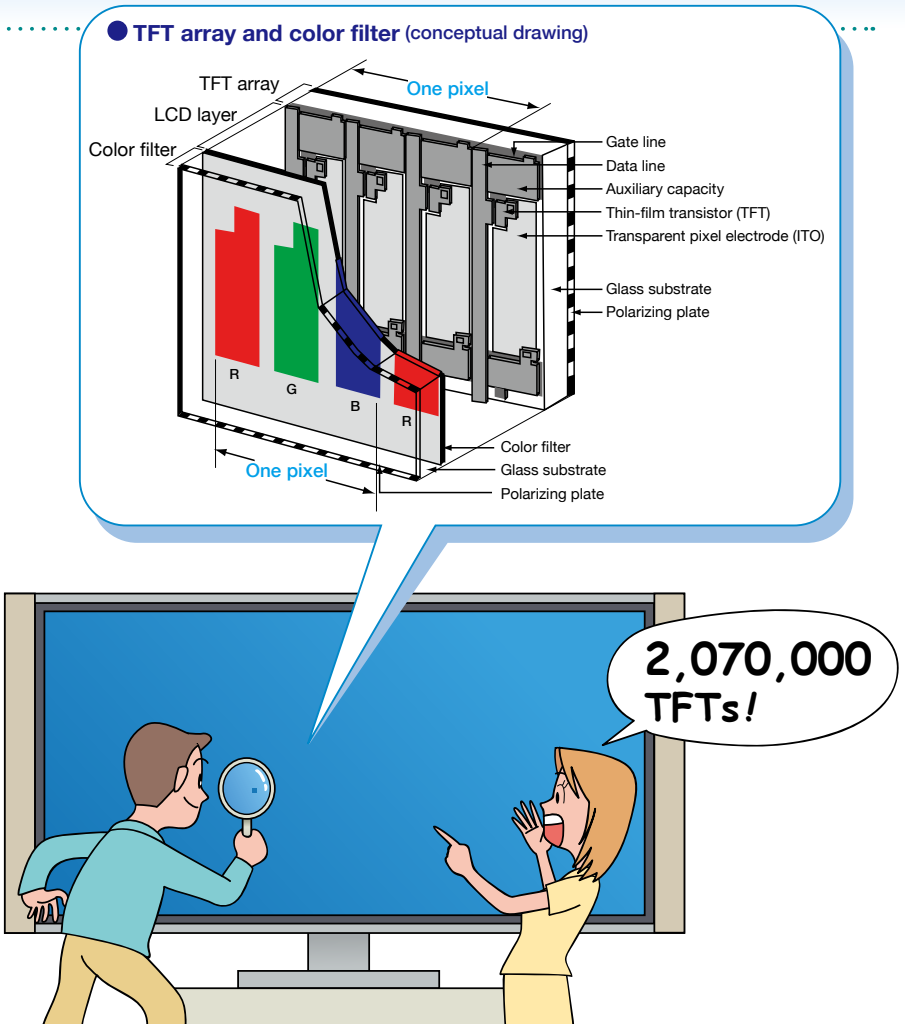
An LCD panel is composed of two glass substrates, a TFT array glass substrate and a color filter glass substrate. The former is superimposed on the latter, sandwiching liquid crystals within a gap that is approx. 5 m (0.005 millimeters) thick. A TFT array serves the function of controlling the voltage sent to individual pixels, which alters the direction of the liquid crystals. The amount of light being blocked and transmitted is adjusted by the direction of the liquid crystals. The light going through the substrate containing pixels of the three primary colors, R (red), G (green), and B (blue), which are in the color filter, becomes the color of the filter it passed through, resulting in an image being displayed on the screen.

"TFT" stands for "Thin Film Transistor." With the TFT format, three primary color pixels, red, green, and blue, are used as a single pixel, and transistors, transparent conductive films and wiring are made using a thin film for each pixel. Thus, light emission from individual pixels becomes controlled in a reliable manner. For reference, the total number of pixels available in wide-screen HD TV is 2,070,000. Given that a single pixel is composed of three primary color pixels, a total of over 6 million tiny TFT elements are formed on the glass substrates. Their production process is highly complicated, creating an environment in which ULVAC's vacuum equipment makes an important contribution to the process.

■ What is the Sputtering Method?



* This drawing is intended to illustrate the concept of the sputtering method, and does not correctly represent the actual structure and size of each material.



While thin films, a material that makes excellent functions possible, are made in a vacuum, the method of making them can be broken down roughly into the evaporation method, ion plating (IP) method, sputtering method, and chemical vapor deposition (CVD) method. To date, ULVAC has had a pioneering role for these four methods as well. In particular, one phenomenon equivalent to that of the predominant sputtering method that one can find in their daily life is the blackening at the ends of an old fluorescent lamp. This is the result of the phenomenon in which electric discharge occurs within the fluorescent lamp creating ions, which sputters the electrode materials placed at both ends of the fluorescent lamp, giving rise to a black sputtering film on the glass surface in the process. Although sputtering is an unfortunate side effect in fluorescent lamps, this phenomenon came to be recognized by experts as a highly useful technological method for making thin films.

Create, Measure and Examine Vacuums

Vacuum Pump | Vacuum Gauge | Vacuum Evaluator and Analyzer

Role of Components Indispensable to Vacuum Equipment

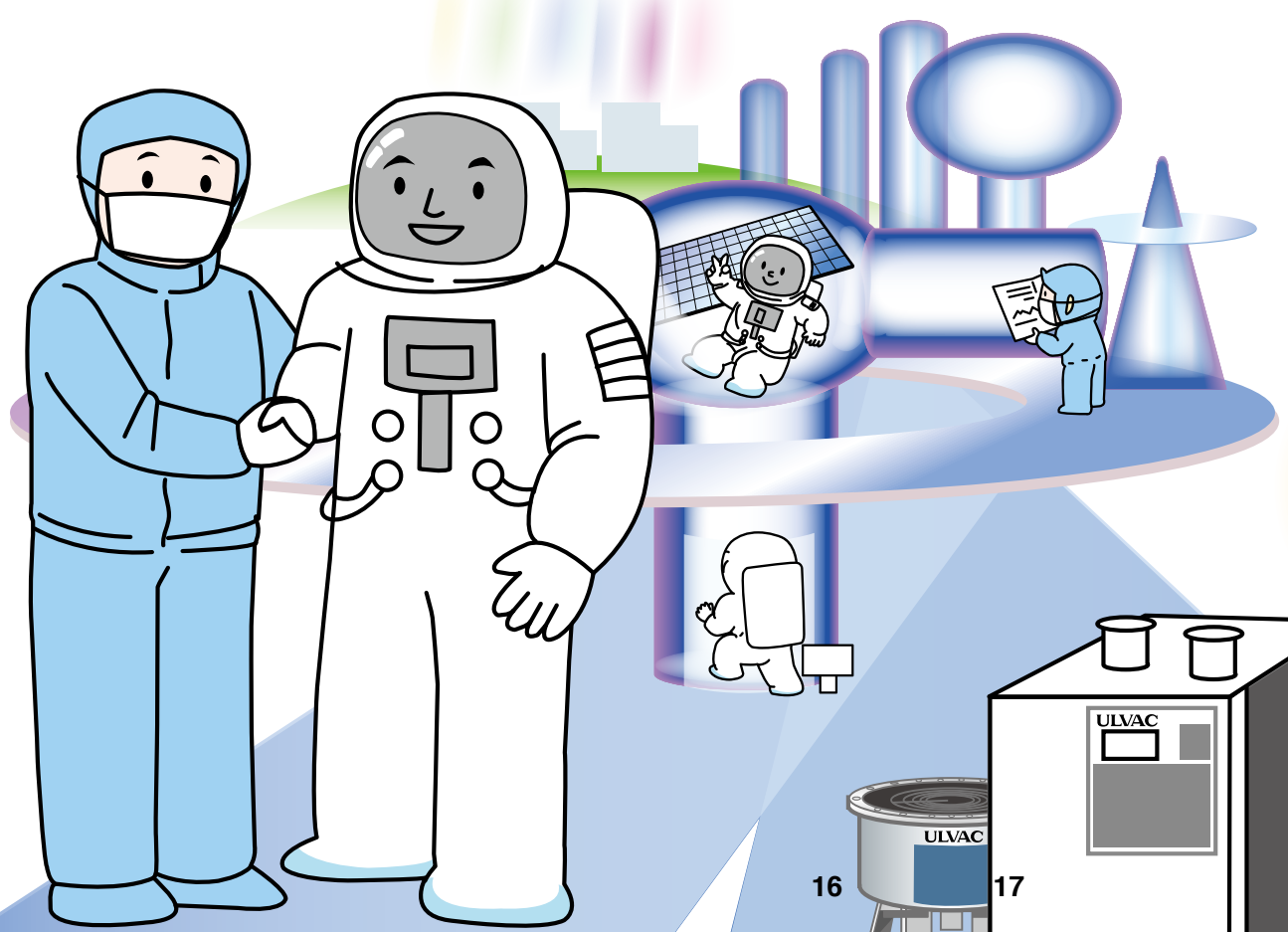
—— Making a Vacuum Environment that is Ideal for Vacuum Equipment

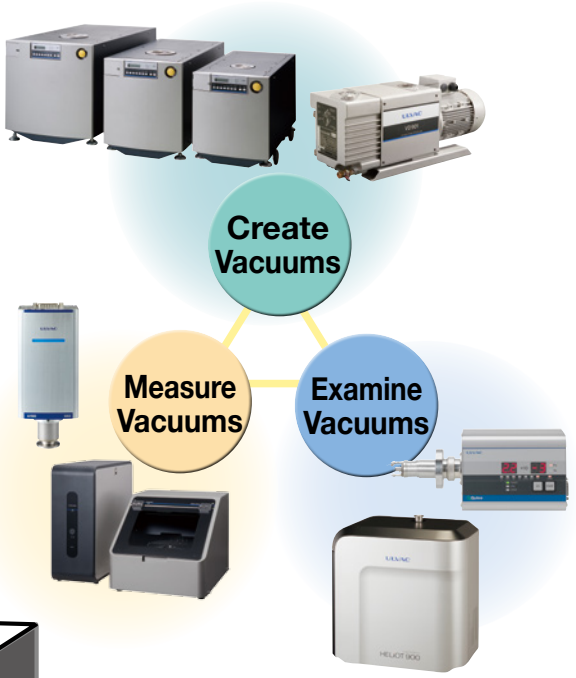
The vacuum equipment made by ULVAC has been using vacuums to do what is not doable in the atmosphere, thus contributing to various industrial sectors.

In particular, since its foundation as an integrated vacuum technology-based manufacturer, ULVAC has been striving to develop not only vacuum pump products designed to create vacuums, but also vacuum technology-related hardware components such as vacuum gauges intended to measure vacuums, and evaluators and analyzers to examine vacuums.

Vacuum pumps by ULVAC, the product designed to create vacuums, are capable of making a wide range of vacuum environments available from a low vacuum environment equivalent to the earth's atmosphere to an ultra-high vacuum environment equivalent to outer space. Within the vacuum equipment, vacuum pumps create an ultra-high vacuum environment identical to a point in outer space 10,000 kilometers away from the earth's surface, which is approximately the distance at which stationary satellites orbit. You can probably imagine the huge difference in vacuum levels between these two extremes.

The performance levels of ULVAC's innovative and progressive vacuum equipment products are supported by the above-mentioned components designed for the Company to pursue cutting-edge vacuum technologies.





ULVAC History Episode

Six Angels and ULVAC

Personal investors who nurture venture businesses by making investments and providing advice and instructions are generally called “angels.” ULVAC was founded thanks to support from six great angels.

The six angels were Konosuke Matsushita, who was the founder of the Matsushita Electric Industry (Panasonic Corporation) and was called the God of Management, Gen Hirose (President, Nippon Life Insurance Co.), Yoshio Osawa (Chairman of the board, J.Osawa Group Co., Ltd.), Tamesaburo Yamamoto (President, Asahi Breweries, Ltd.), Aiichiro Fujiyama (Chairman, the Japan Chamber of Commerce and Industry), and Yoshijiro Ishikawa, who was the President of Keifuku Electric Railroad Co., Ltd. and our first President.

The six angels were deeply impressed with the enthusiasm of the young researchers, who came together with the aim of “founding vacuum technology in Japan and contributing to Japan’s industries,” and each of the angels invested their pocket money, one million yen, in the activities of the young researchers. Thus, ULVAC (then Japan Vacuum Engineering Co., Ltd.) was born. Jin Imachi (our second President, 40 years old at that time), Chikara Hayashi (our third President, 29 years old at that time), Hideo Shibata (our former Vice President, 30 years old at that time) were among the researchers.

In 1952, when ULVAC was founded, Japan was about to start its postwar rehabilitation and was still far from vacuum technology contributing to its industries. In those days, nobody could imagine that vacuums would be used in business. The six supporters were literally encouraging “angels” for ULVAC.

The central founding figures of ULVAC


Jin Imachi


Kozo Ishikawa


Chikara Hayashi


Hideo Shibata


Mr. Chikara Hayashi (right figure), our President at the time, expressing gratitude to Mr. Konosuke Matsushita (left figure), chairman of formerly Matsushita Electric Industrial Co., Ltd. (Panasonic Corporation), for his years of support for ULVAC (the photograph was taken in 1984).


Yoshijiro Ishikawa


Yoshio Osawa


Konosuke Matsushita

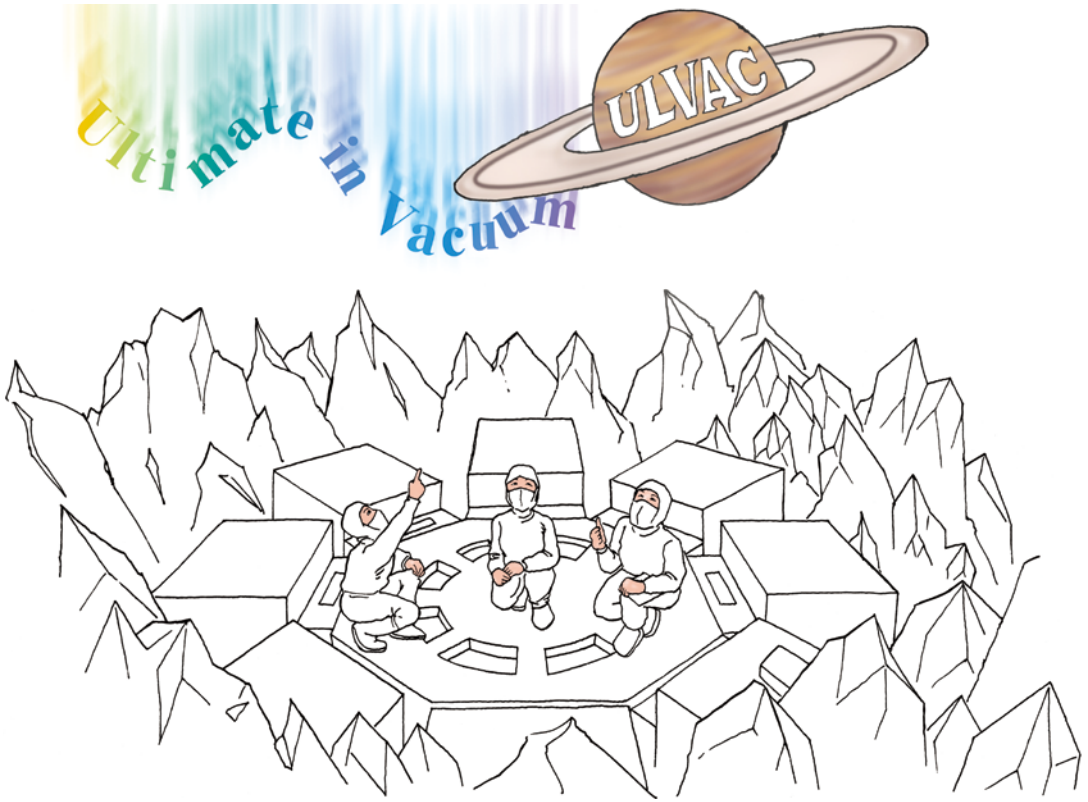

Aiichiro Fujiyama


Tamesaburo Yamamoto


Gen Hirose

Six angels (investors) supporting the dream of young researchers

The History of the "ULVAC" Mark



"ULVAC," striving to be a comprehensive manufacturer of vacuum equipment

ULVAC does not only pursue advanced technologies. The company also provides various devices and services: vacuum pumps for producing vacuum states, vacuum gauges for checking and measuring vacuum states, vacuum equipment for manufacturing products for industries and daily life with the aid of vacuum states, parts used in vacuum equipment, materials used in processes implemented with vacuum equipment, and maintenance services. ULVAC delivers comprehensive power created by the ULVAC group.

Logo mark history

·The current logo mark, which was established on July 1, 2001

ULVAC

·The logo mark that was used in the latter half of the 1950s	·The logo mark that was established in August, 1963	·The logo mark that was established with minor changes in November, 1983

ULVAC used the corporate name Japan Vacuum Engineering Co., Ltd. for approximately 50 years from when it was founded in 1952. However, the trademark, ULVAC, was created a surprisingly long time ago in 1963, the eleventh year after the company's foundation. The year was an important turning point for ULVAC.

In the early stages after its foundation, ULVAC made sales-representative and technical contracts with the US company NRC (the world's first company to adopt vacuum technology as a business) and relied on imports of vacuum equipment from the company. Before long, ULVAC started developing its own vacuum equipment, and in the 1960s, products independently developed by ULVAC spread little by little into industries in Japan, contributing to their growth. At the same time, more and more advanced technologies were required for ULVAC's outstanding vacuum technology.

In order to clarify the critical missions that ULVAC had to fulfill via vacuum technology, the trademark, "ULVAC," was created in 1963. "ULVAC" is an abbreviation of "ULtimate in VACuum (striving to be the ultimate in vacuums)." Since then, the "ULVAC" mark has been attached to ULVAC's products.

In 1969, the corporate name "Japan Vacuum Engineering Co., Ltd." was changed to "ULVAC Corporation" (currently "ULVAC, Inc.") in order to start full-scale overseas expansion. Since then, "ULVAC" has been used as our corporate name in our overseas business. The Japanese corporate name was adopted on July 1, 2001, when the brand name of "ULVAC" had become well-known by many users. This episode suggests that ULVAC has inherited a corporate gene (DNA) that allows the company to always expand its business under corporate strategies formulated from a global perspective.

Newspaper advertisement for the change of the corporate name to "ULVAC" in 2001

Executive Director Chikara Hayashi, announcing the "ULVAC" mark when the trademark, "ULVAC," was established in 1963

The Electric Calculator War: The World's First Liquid Crystal Displays and ULVAC

The electric calculator is one of the great global hit products created by a Japanese company. The development of electric calculators contributed greatly to Japanese industry: their development led to the establishment of state-of-the-art technologies for producing semiconductor devices and liquid crystal displays.

At the beginning of the 1970s, various manufacturers engaged in a fierce competition for a share of the electric calculator market, and the competition was called the "electric calculator war." At that time, 28 manufacturers were producing electric calculators under 30 brand names in Japan, providing as many as 179 types of electric calculators in the fierce battle. The competition for top sales in the market heated up between Casio Computer Co., Ltd. and Sharp Corporation and is still talked about as a legend.

In 1973, Sharp Corporation decided to take measures to turn the tables on its rival company. Conventionally, number-indicating displays were composed of fluorescent tubes. Sharp Corporation had been conducting research on liquid crystal displays, which operate on lower power, and decided to replace the conventional displays with liquid crystal displays. Needless to say, this conversion would be a brilliant achievement—first in the world—if successful.

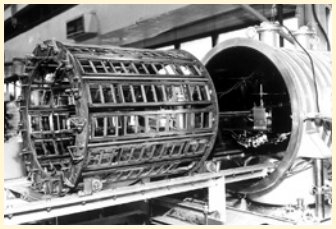
The key to the successful adoption of liquid crystal displays was in the process of manufacturing transparent conductive films. Sharp Corporation sounded out ULVAC for a trial production of transparent conductive films and equipment for producing the films. Everything from the trial production of liquid crystal displays to their manufacturing had to be completed in the unbelievably short period of three months. However, thanks to extremely active efforts from Sharp Corporation and ULVAC, the announcement of new products and their production were accomplished on schedule.

The LCD electric calculator, "ELSI MATE EL-805," was thus created and became a big hit. Thanks to this experience, ULVAC has the world's top share of the market of equipment for manufacturing display elements for LCD flat TVs.

* In order for readers to understand the past event correctly, this text contains the names of actual companies and products.

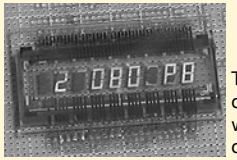
The project to develop liquid crystal displays for electric calculators was covered by the popular NHK TV program, "Project X - Challengers," on April 17, 2001. The contents of the TV program are contained in a DVD and a book titled "Project X Vol. 8" and are commercially available. The following is a passage excerpted from the book.

" ... (excerpted from the original text without modification) Three months later, a production line for liquid crystal displays was constructed in a corner of the electric calculator factory (of Sharp Corporation) in Yamato Koriyama, Nara. Japan Vacuum Engineering Co., Ltd. (current ULVAC), which had received the order, also delivered the production equipment on schedule. At the beginning of the actual production operation, the production line generated lots of defective articles. However, on-site engineers eliminated the problems one by one and improved the yield rate. Finally, in April, 1973, the first unit of the world's first LCD electric calculator was created. It was at the last moment just before the deadline..."
(Excerpt from Project X Vol. 8, NHK Publishing, Inc.)



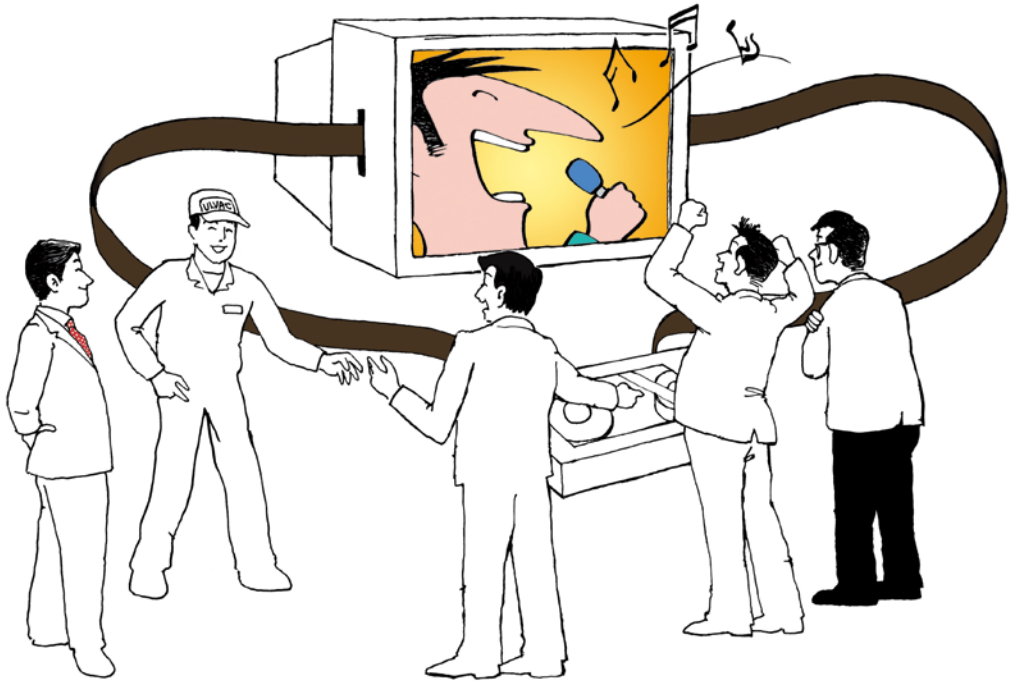
Transparent conductive film deposition equipment, which contributed to the development of liquid crystal displays. Its success led to subsequent big business developments by Sharp Corporation and ULVAC in the area of LCD film deposition equipment.

Covered by the popular NHK TV program, "Project X"



The liquid crystal display on the world's first electric calculator

Digital Video Tapes Providing the Highest Image Quality



In 1983, one of Japan's major household appliance manufacturers developed a high-performance 8-mm videotape. ULVAC's roll-to-roll vacuum evaporation equipment had a large impact on development. In 1978, five year before the development, the manufacturer had also developed a sound-recording micro cassette tape with the aid of the same ULVAC equipment. The manufacturer devised a unique production method and continued persevering, making great efforts. Needless to say, ULVAC also received many difficult requests related to development and satisfied the requirements with precision every time.

Videotape types changed from videotapes for the beta system and VHS system of the 1980s to those for the digital system of the 1990s. At present, videotapes for the VHS system have been replaced with disk-type media, DVDs, and the era of videotapes is nearly at its end.

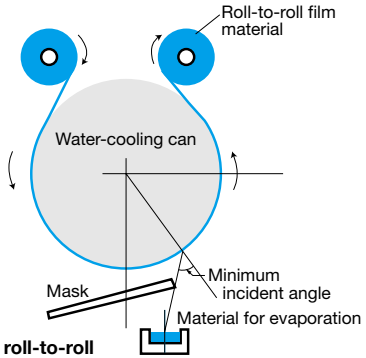
ULVAC's vacuum technology has also made contributions to the history of development of all recording media, namely videotapes, floppy disks, hard disks, magneto-optical disks, and card memories. Accordingly, ULVAC has contributed to the development of devices in a wide variety of areas including not only recording media but also peripheral devices, such as magnetic heads and optical reading sensors.

Roll-to-roll vacuum film deposition equipment for an increasingly wide range of applications, such as high-performance electronic parts

Inside of the roll-to-roll vacuum film deposition equipment

Roll coaters are used to produce various types of products, such as gold and silver threads, aluminum foil, and AV tapes for videocassette recorders.

The ULVAC's roll-to-roll vacuum film deposition equipment (RtR film deposition equipment) is one of the devices that have been evolving over the history of ULVAC. In the 1950s and 1960s, it was mainly used in production processes for decorative products including gold and silver threads, food packaging materials, and paper capacitors. Since then, its application area has widened with the times: transfer materials and large construction materials in the 1970s; evaporated tape and film capacitors in the 1980s; transparent food barrier films, wiring films, and transparent conductive films in the 1990s. RtR film deposition equipment is still one of the important vacuum technologies, making contributions to the production of various devices and materials, such as film capacitors that are required to have electrical characteristics suitable for inverters used in ecocars and household appliances, transparent conductive films for touch panels, back sheets for solar-cell panels, and optical films for FPDs. The RtR film deposition equipment will continue to be essential equipment mainly for producing high-performance electronic parts that will satisfy the needs of the times before anything else can.



Principle of operation of roll-to-roll vacuum evaporation equipment

August, 1952 ULVAC was founded with the aim of contributing to indu stries in Japan

ULVAC, Inc. was founded in August, 1952, with the corporate name Japan Vacuum Engineering Co., Ltd. in Minato-ku, Tokyo. It was created with investments (pocket money) from six famous business leaders including Konosuke Matsushita (then Chairman of the Matsushita Electric Industry). The six business leaders were deeply impressed with the enthusiasm of ULVAC's young founders (mainly vacuum technology researchers), who came together with the noble aim of "founding vacuum technology in Japan and contributing to Japan's industries" and chose to invest. In the early stages, ULVAC was mainly engaged in the import of equipment from a US vacuum equipment manufacturer and sales of the imported equipment.

The history of ULVAC started in this building (the head-office when the company was founded).

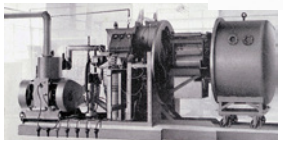
Handshake expressing gratitude for years of support
(Mr. Konosuke Matsushita (left figure), Chairman of the Matsushita Electric Industry (Panasonic Corporation), and Mr. Chikara Hayashi (right figure), our President at the time (the photograph was taken in 1984.)

From 1955 to 1958 The preparation stage for manufacturing domestic vacuu m equipment

In 1955, ULVAC built the Omori Plant (Ota-ku, Tokyo) with the aim of manufacturing domestic vacuum equipment. In 1956, ULVAC merged with the Toyo Seiki Vacuum Research Corporation, a vacuum equipment manufacturer in the Kansai region to create the Amagasaki Plant. Thus, ULVAC started to build itself up as Japan's only comprehensive manufacturer dealing with various types of equipment based on vacuum technology, such as equipment for vacuum metallurgy, equipment for vacuum chemistry, vacuum pumps, and measuring instruments for vacuum applications.

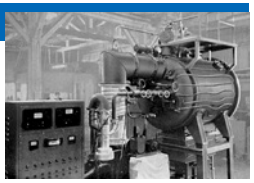
The Omori Plant and ULVAC staff members, who were taking the first step toward manufacturing domestic vacuum equipment

Roll-to-roll vacuum evaporation equipment



Pirani gauge

Mechanical booster pump



Uranium vacuum furnace, which was used later to produce high-performance materials, such as tantalum and titanium

From 1959 to 1967 Contributions to heavy industries as a comprehensive m anufacturer of vacuum equipment

During Japan's high economic growth era (around 1960), ULVAC moved to the Yokohama Plant (Minami-ku, Yokohama) in 1959 to handle the full-scale manufacturing of domestic vacuum equipment and the development of various types of large vacuum equipment, such as vacuum furnaces and vacuum distillation systems, to contribute to many heavy industries, one after another. In those days, ULVAC was actively exporting products to various countries including the Soviet Union (then) and China and strategically progressing joint ventures with overseas companies. At the same time, ULVAC started research on ultrahigh vacuum and high-performance materials. Thus, ULVAC was gradually recognized as an advanced research-and-development company and the leading company in vacuum industry.

15-ton vacuum arc furnace, which delivers its full performance in various areas, such as the production of refractory active metals used for producing special alloys and in the space industry

High-vacuum plasticizer distillation system, a large plant for purifying materials, such as concentrated juice and clear liquors

EBH-6, small evaporation equipment, with which ULVAC expanded its business into the semiconductor industry

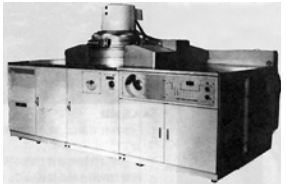
Entire view of the Yokohama Plant, which was created with the aim of becoming a comprehensive manufacturer of vacuum equipment

From 1968 to 1975 Provision of new technologies for advanced-technology industries, such as automobile and household appliance industries

In 1968, ULVAC's constructed the new Chigasaki Head Office / Plant, which is still in use today. In those days, various advanced-technology industries manufacturing products, such as automobiles, household appliances, medicine, and food, were starting to grow in addition to conventional heavy industries. In 1975, ULVAC successfully received an order for the world's first computer-controlled fully-automatic vacuum evaporation equipment from the US IBM Corporation. This transaction not only boosted the name recognition of ULVAC worldwide but also provided it with good opportunities to expand its business in the semiconductor and electronics industries.

Front view of the Chigasaki Head Office / Plant (at completion of construction)

The world's first aluminum-alloy ultrahigh-speed lightened-oil rotary vacuum pump



Fully-automatic "System 731" was delivered to the IBM Corporation, a global company, thereby increasing the regard for ULVAC's technologies worldwide.

The helium leak detector created through pioneering technologies (1970s, left), and the helium leak detector after substantial model changes (1990s, right)

Staff members celebrating the successful startup of System 731

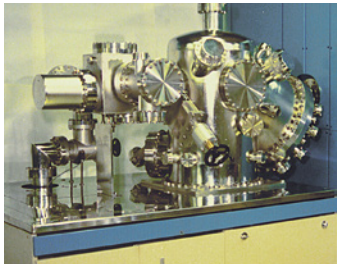
Aluminum vacuum brazing furnace that was developed for applications in the automobile and household appliance industries

Transparent conductive film deposition equipment, which contributed to the development of the world's first LCD display (for electric calculators)

From 1976 to 1981 The first expansion of overseas business and expansion of applic ation areas with the aid of independently-developed technologies

ULVAC's vacuum technology expanded its application areas more and more and played essential roles in developing and producing various types of electronic devices, such as VLSIs, and high-purity, high-performance materials. ULVAC developed pioneering vacuum equipment, such as sputtering systems and plasma CVD systems, one after another. One of them, the chip making equipment "MCH series," was highly regarded worldwide and adopted by various semiconductor device manufacturers in the 1980s. As a research-and-development company, ULVAC also participated in national projects, such as the "JT-60" critical plasma tester project and the ultrafine particle project.

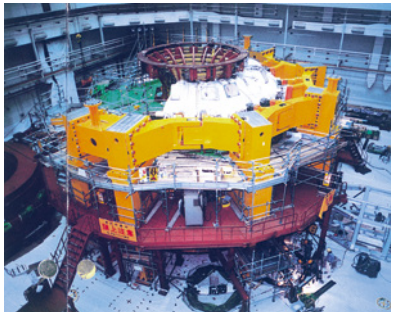
The Kennebunk Plant, ULVAC's first plant in the United States (Maine, top photograph), and UTECH, the current US subsidiary (Massachusetts, bottom photograph)

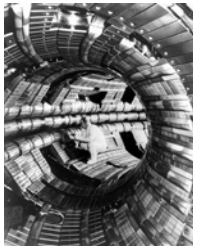


MBE system, which was used to create high-performance thin films

Photochemical smog chamber: vacuum technology applied to a wide range of applications.

MCH-9000, chip making equipment highly regarded worldwide





"JT-60" project, in which ULVAC participated under the slogan of "Bringing the sun to the ground!"

CPD-1000, a plasma CVD system that contributed to solar-cell development

From 1982 to 1990 The enhancement of production and service bases and contributions to the semiconductor and electronics industries

In the 1980s, Japan's semiconductor and electronics industries conquered the world's markets. Advancement of high-performance, resources-saving thin-film technologies played essential roles in creating new industries. The creation was realized through contributions of vacuum technology as a key technology. ULVAC contributed to the trend by providing chip making equipment and equipment for producing electronic devices, such as hard disks and solar cells. In addition, ULVAC established a service system early in the vacuum industry to boost customer satisfaction measure and expanded the operation of production bases at the same time.

The Fuji Susono Plant, a production base for chip making equipment with a clean environment

Hachinohe Plant, built in Hachinohe-shi, Aomori

Kagoshima Plant, the production base in Kyushu

MCH-9000, the world's first multi-chamber sputtering system

SDP-850
An in-line sputtering system for low-resistance ITO films, which ULVAC used to make a full-scale entry into the LCD market.

From 1991 to 2002 Advent of multifunction, hybrid vacuum equipment base d on low-cost, high-efficiency production technologies

Business expansion into the Asian region and contributions to production of high-quality, high-performance products

In the 1990s, ULVAC created multifunction, space-saving, resource-saving, and low-cost vacuum equipment. For example, “CERAUS” was developed for the semiconductor industry, and the “SMD series” was developed for the production of flat panel displays (FPD). The SMD series became so widespread that it could be called the world standard equipment for FPD production. Against the backdrop of the rise of various countries, such as South Korea, Taiwan, and China, in the world’s semiconductor and electronics industries, ULVAC also adopted a strategy of actively expanding its business into overseas markets.

SMD series, an LCD sputtering system, which contributed to the formation of the foundation of ULVAC’s FPD-related business

SDV series, a vacuum degreasing system that can clean parts without using flon

CERAUS ZX-1000, a multi-chamber sputtering system for chip wiring

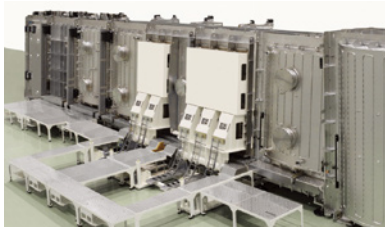
PDR-series dry vacuum pumps

Opening ceremony for the Pyeongtaek Plant, South Korea

Business expansion into China ahead of other companies ULVAC NINGBO Co., Ltd. (left) and a scene from its opening ceremony (above)

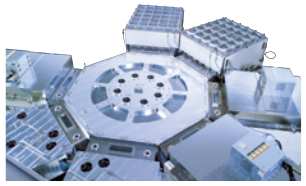
2003 onward (towards the future) Globalization and challenges in energy and envi ronmental areas

ULVAC is highly regarded as the world’s largest manufacturer of vacuum equipment for FPD (flat panel displays) production. ULVAC also manufactures integrated tandem type thin-film silicon solar cell manufacturing lines for solar cell production. In order to fulfill comprehensive and advanced requests, ULVAC provides a wide variety of customer services as “ULVAC solutions” on the basis of the technologies independently developed by the member companies of the ULVAC group. In addition, ULVAC focuses on energy and environmental businesses under a strategy of expanding global business in a spirit of mutual interest among emerging industrialized countries like China.



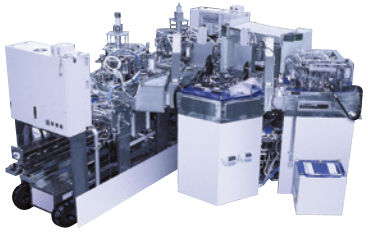
SDP-s series, a sputtering system for transparent conductive (ITO) films, which was awarded the 2007 ADY grand prix prize

The integrated thin-film silicon solar cell manufacturing line, which was awarded the grand prix prize and Nikkei Newspaper Award for the Nikkei Excellent Products and Services Award and the grand prix prize for the vacuum equipment category of the 9th Commendation by the Japan Vacuum Industry Association (FY2008)



CMD series, a PE-CVD system for TFT-LCDs

SMD-2400, the latest model of the sputtering system for TFT-LCD electrodes, which was awarded the 2006 ADY grand prix prize



ZELDA series, an organic EL film deposition equipment

MPEC-1300, a tandem type thin-film solar cell hybrid thin-film characteristics evaluation system