

Information Systems

Electronics

Power Systems

Industrial Systems

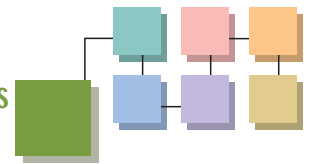
Healthcare Systems/Biotechnology

Consumer Products

Research & Development

- Industrial Systems
- Environment
- Steel and Chemical Plants
- Public Facilities
- Automotive Systems
- Transportation
- Building Systems
- Materials

Industrial Systems

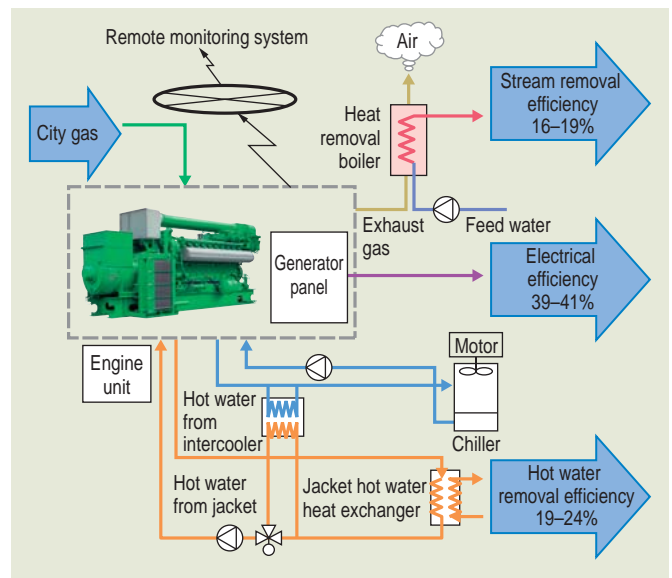


Gas Engine Generator System

To prevent global warming, air pollution, and acid rain, which are becoming serious environmental problems, people, governments, and organizations all over the world are calling for the reduction of CO₂ and NO_x emissions. Because of this, high-efficiency gas engine cogeneration systems, which take advantage of their own exhaust gas heat to generate steam and hot water and to power air-conditioning systems, are rapidly becoming more common in metropolitan areas.

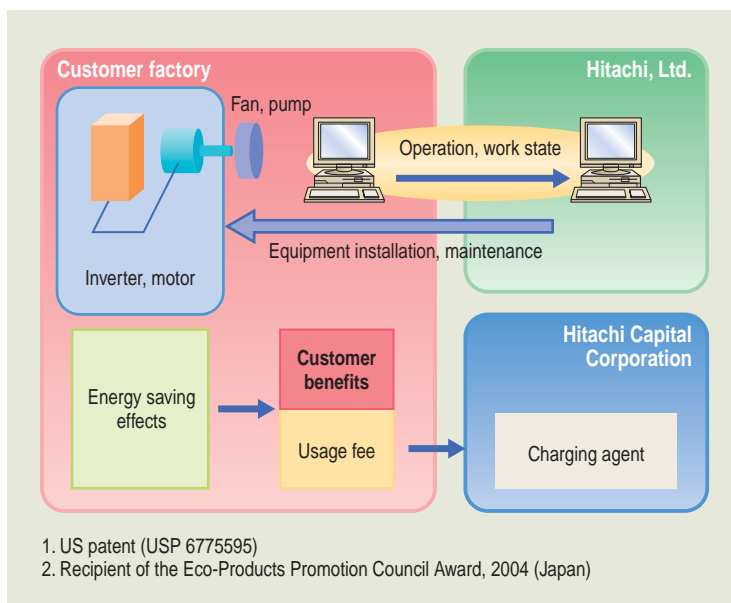
To meet the need for these systems, Hitachi using GE Jenbacher gas engines started selling packaged gas engine generator systems with electric efficiencies of over 40% and total efficiencies of 80%. (GE Jenbacher is one of the world's leading manufacturers of gas engines and has installed over 4,000 units in the world.)

GE Jenbacher engines can run on not only city gas and natural gas, but also on a variety of other gases such as biogas. In the future, Hitachi will take advantage of applications of power generation using biogas produced in the food and chemical industries.



Example configuration of gas engine cogeneration system (500–1,000-kW class)

Motor Drive Energy Saving Service “HDRIVE”



Schematic of the HDRIVE service

HDRIVE is a service in which Hitachi provides its highly efficient induction motors, high-voltage inverters, fans, pumps, and other equipment to customers free of charge, and the customer pays HDRIVE usage fees based on a fixed percentage of the energy savings generated by the energy-saving equipment. The HDRIVE service was launched in May 2001, and currently more than 50 types of plants and equipment—petrochemical, oil refining, steel manufacturing, and so on—are covered by the service.

[Main features]

- (1) Energy-saving risks due to variations in the equipment utilization rate and work hours are minimized.
- (2) Because the service usage fees are paid out of the operating energy saving effects, the customer only benefits and there is no cash-flow disadvantage.
- (3) Assuming standard capacity motors (less than 900 kW), customers can exercise a risk aversion option anytime during the ten-year contract.

Industrial Desktop PCs

Hitachi has now released two new machines in its desktop PC series envisioned for offices and factories. These two models deliver excellent reliability and performance in factory automation, transportation, communications, embedded in semiconductor manufacturing equipment, and other industrial production applications.

[Main features]

- (1) Designed for high reliability, these machines will last seven to ten years when left on 24 hours a day.
- (2) Long-term service and support for at least three years after the models first go on sale.
- (3) Will ship with Pentium®M Processor (1.6 GHz), and up to 2 Gbytes of DDR SDRAM on ECC (error check and correction) DIMMs.
- (4) USB 2.0 × 3 channels, integrated on-board graphics, sound, and LAN support all come standard.
- (5) Full RAS capability based on a dedicated LSI.
- (6) Preinstalled with Windows 2000/Windows XP.
- (7) Fully compliant with the international standards: UL, CSA, CE, FCC, CCC.

* See "Trademarks" on page 86.



Industrial desktop PC

Inkjet Printers for Industrial Marking: Continuous Inkjet Printer PX Series and PB Model

Hitachi has launched its industrial inkjet printer PX Series and PB model on the world market for customers in industries such as food, beverage, electronics, and steel. Hitachi has fully complied with world regulations and international protections, thereby making the PX series and PB model usable worldwide.

(1) Character sizes (small: 1-3 mm, standard: 2-10 mm, and large: 3-15 mm) can be selected in the PX-D model to print a variety of character sizes on anything from small electronic parts to large corrugated boxes.

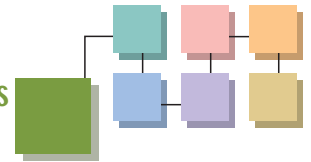
(2) The PX-P model can print on black and dark surfaces with a new white pigment ink, JP-W73. The PX-P model is used in the same way as a dyestuff inkjet printer, and the JP-W73 ink has good whiteness and strength of adhesion.

(3) For simple printing such as "Use by," "MFG No.," and "Lot No.," the PB model inkjet printer can replace thermal printers, contact coding machines, etc.

(Hitachi Industrial Equipment Systems Co., Ltd.)



Inkjet printers for industrial marking: PX series and PB model line-up



Compact Inverter: SJ200 and L200 Series

The usage of general-purpose inverters are expanding not just in factory equipment and air conditioning fans, but also in the drives of leisure equipment. The compact size 2 series were developed and released as general-purpose inverters.

(1) SJ200 series

This series has a high starting torque of 200% at 1 Hz, and its new high-speed current limit function delivers stable and powerful motor speed control.

This series is suitable for processing, lift, and extruder machine drives that need high torque at low speeds.

(2) L200 series

Models in this series have input logic selection switches. Sink/source logic and run command/frequency source are easy to select using a dip switch. These models are suitable for energy saving for fan/pump and light load conveyors.

(3) Power range

3-phase 200-V class: 0.2 to 7.5 kW

3-phase 400-V class: 0.4 to 7.5 kW

Single- and 3-phase 200-V class: 0.2 to 2.2 kW

(Hitachi Industrial Equipment Systems Co., Ltd.)



SJ200 and L200 inverter series

High-efficiency Permanent Magnet Motor without Position Sensor



High-efficiency permanent magnet motor (left) and controller

Hitachi's high-efficiency permanent magnet motor saves more energy and is more efficient than the previous model. The motor has a new sensorless magnetic pole position control that enables quick starts by detecting the initial magnetic pole position.

[Main features]

(1) The motor is user-friendly because it operates without a sensor cable by using sensorless magnetic pole position control.

(2) It starts quickly: time of initial magnetic pole position is 0.1 s.

(3) Compared to conventional standard induction motors, the volume is reduced by 50%, and the mass is reduced by 35%.

Hitachi's new sensorless control achieves operation as user-friendly as a standard induction motor by including frequency drive, higher efficiency, and a low noise drive system.

(Hitachi Industrial Equipment Systems Co., Ltd.)

Low-voltage Insulation Monitoring System

Constantly monitoring leakage current allows the monitoring of cable insulation for deterioration and enables preventing and quickly managing it through analysis of the insulation status, including equipment (e.g. electric components).

One unit can measure the fundamental wave leakage current of up to 14 circuits.

The system can also measure the effective (resistance) leakage current of circuits other than star circuits.

(Hitachi Industrial Equipment Systems Co., Ltd.)



Low-voltage insulation monitoring system

Large Oil Flooded Rotary Screw Compressor: HISCREW 2000 Series, 150-kW Dual Model

Hitachi's new oil flooded rotary screw compressor, the 150-kW dual model of the HISCREW 2000 Series, has two built-in modules that has the air ends of the new ECOPROFILE rotor and

motor. It has the Dual Control System, which integrates and controls the two modules depending on compressed air consumption.

Although the air capacity is the same as the large single air end model (which uses the single-stage air compression method), the 150-kW dual model saves energy by stopping one module when the load is low.

Besides satisfying the market for large compressors in high demand countries such as China and Southeast Asian nations, the 150-kW dual model also satisfies the need of the domestic market to save energy because one module is controlled by an inverter.

[Main features]

(1) Two large monitoring displays

Displays indicate the operating conditions of the compressor in characters, so the conditions of both module can be checked at a glance.

(2) Low starting current

The rush current of the two built-in motors, started up sequentially, is less than that of one large motor.

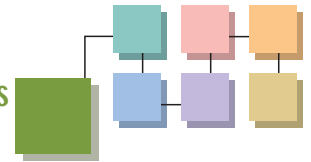
(3) Single module operation function

Even if one module shuts down, the other module can be operated independently.

(Hitachi Industrial Equipment Systems Co., Ltd.)



HISCREW 2000 Series 150-kW dual model



Hitachi Centrifugal Compressors for Gas Pipeline Booster Service

To reducing emissions into the environment, worldwide attention has turned to natural gas. Therefore, the demand for natural gas is now increasing rapidly, and natural gas pipeline networks are expanding. To meet the market requirements, Hitachi has recently developed a new model of pipeline compressor with new high-efficiency 3D impellers/diffusers and a wide operating range.

The impeller/diffuser gas flows were thoroughly investigated using 3D viscometric analysis, and the impeller/diffuser configurations were optimized by minimizing the internal losses of the gas flow. The operating range was improved by optimizing the blade load distribution in the impeller.

By using such technology, the new pipeline compressors have 3% higher efficiency and an 18% wider operating range to the surge point than conventional pipeline compressors. Furthermore, to accommodate the shorter design and manufacturing periods requested by customers, the new pipeline compressors have been standardized into 3 frames and 7 rotors.

Hitachi shipped two pipeline booster compressors for Sakhalin Energy's OPF Project with this concept and their high performance was verified in a shop test. These booster compressors are

each driven by a 21-MW variable-speed electric motor and will be used at the OPF plant in the north of Sakhalin Island to transmit natural gas to an LNG plant approximately 600 km to the south. (Hitachi Industries Co., Ltd.)



Pipeline booster compressor for Sakhalin-2 Project

Advanced Continuous Pickling Cold Rolling Electrical Equipment Installed at Maanshan Iron & Steel Co., Ltd., China



Central operation room

Maanshan Iron & Steel Co., Ltd.'s advanced continuous pickling cold rolling electrical equipment "MGC" in Anhui Province, China is now in commercial operation and running smoothly.

There is growing domestic demand in China for cold rolled steel sheets as building material and to manufacture cars. Now with the deployment of a four-stand rolling mill, a six-high UC (universal crown) mill, and the latest electrical control technology from Hitachi, Maanshan Iron & Steel is able to produce a full range of steel sheets from 0.3-mm thin sheets to medium-thickness, top-grade steel sheets for car bodies. And combining high-response multi-functional 10-MVA high-voltage IGBT (insulated gate bipolar transistor) drive equipment with plate-thickness control system based on optimum control theory, the company can produce high-precision and uniform-quality steel sheets over their entire length.

Finally, by reproducing past operating screens based on historical data, "play-back virtual rolling functions" for plant analysis support, and other advanced IT (information technology), the plant personnel will be able to greatly improve their control system maintenance work after the plant is up and running.

New Electrical Systems for the Finland's Outokumpu Hot Rolling Mill

The Outokumpu steel company in Finland upgraded its hot rolling mill and electrical equipment to improve the company's production capacity. Outokumpu is a combined Steckel and tandem stainless steel rolling plant, and in addition to improvements to its existing Steckel rolling mill, the expansion includes three additional mill stands and loopers. Hitachi's role in the project was to provide additional and improved electrical controllers, control for the new equipment, and improvements upstream from the new equipment. Completion of the expansion increased the capacity of the mill from 1 million tons to 1.7 million tons per year.

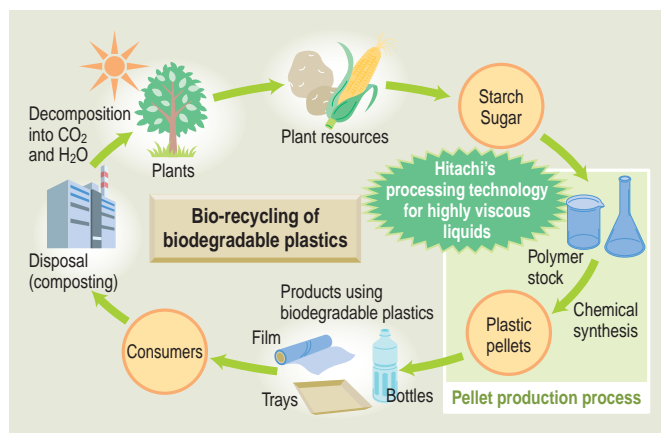
Hitachi also contributed many new capabilities that substantially improved the quality including a setup function to correct variations in temperature of the steel, a function to eliminate sheet thickness offsets at the entrance to tandem rolling mills, better shape control, and controls to prevent edge difference scratches at the down-coiler.



Finland's Outokumpu hot rolling mill electrical equipment (above) and operating room in action (below)

PLA Continuous Plant for Toyota Motor Corporation

Since biodegradable plastics resolve into water and carbon dioxide in the soil, these materials are interesting to those with environmental concerns. Attention is focusing on biodegradable plastics made from plants such as sugarcane because they are "carbon neutral," i.e. do not increase carbon dioxide in the environment.



Bio-recycling mechanism for biodegradable plastics (left) and PLA continuous plant for Toyota Motor Corporation (right)

Toyota Motor Corp. has developed PLA (polylactide) made from plants and uses it in floor mats and other parts of passenger cars. Because PLA is a plastic that has a light environmental impact, the demand for it is increasing for use in automobiles, food containers, wrapping films, etc. Hitachi received an order from Toyota for a continuous plant that can produce 1,000 tons of PLA per year and completed the construction in September 2004. This is the first plant in Japan that produces biodegradable plastics from lactic acid. Hitachi combined Toyota's basic process for producing PLA

with Hitachi's technological know-how accumulated by years of making highly viscous polymerizers, polyester production plants, etc. Hitachi predicts that in 2015, 5% of plastics used in the world will be biodegradable.

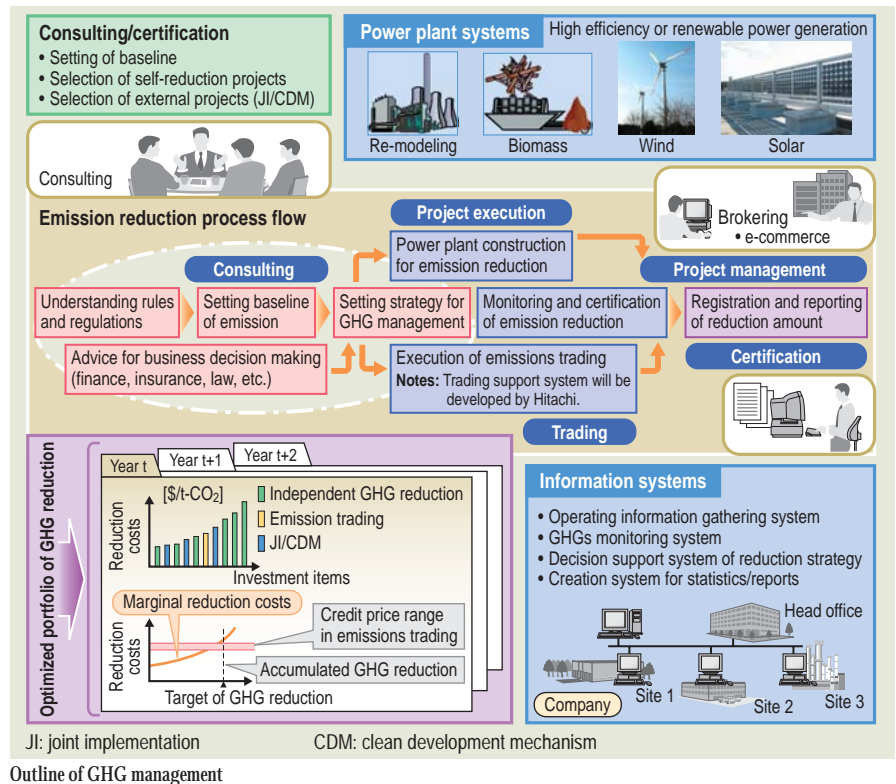


Solutions for Global Warming Effects

Because the Kyoto Protocol was ratified in Feb. 2005, Japan has to reduce its average national GHG (green house gas) emissions by 6%, with 1990 levels as the baseline, during the first crediting period (2008-2012).

To attain this target, GHG management has become more important for corporations in manufacturing industries, especially electric power and steel. Kyoto mechanisms are essential to ensure the continued success of these corporations. These mechanisms include emissions trading and overseas GHG emission reduction projects like the clean development mechanism in developing countries and joint implementation in designated countries.

Because these environmental issues, Hitachi will provide more environmentally friendly products and services to companies, municipalities, and government ministries. For example, Hitachi can provide various solutions from the project design to the plant system operation using Hitachi Group technologies.



Project Developments for Clean Development Mechanism and Joint Implementation

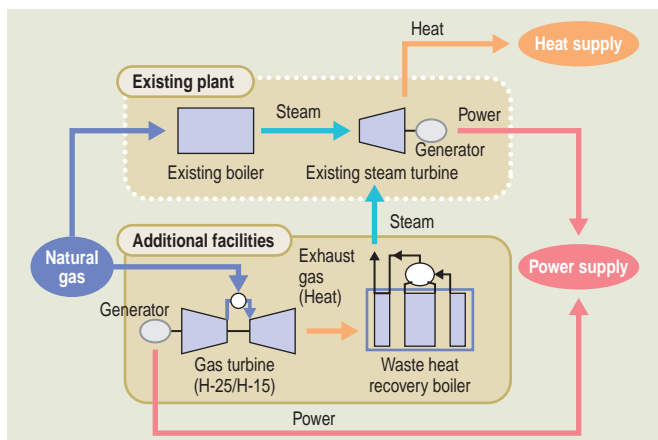


Diagram of Kazakhstan-Japan JI Project
The first JI project in Kazakhstan is implemented by NEDO (New Energy and Industrial Technology Development Organization) and the Tohoku Electric Power Co., Inc. utilizing Hitachi H-25 gas turbine.

Several "Kyoto Protocol" ratifying countries, including Japan, the United Kingdom and the Netherlands, are promoting the exploration of overseas GHG emissions reduction projects, such as CDM and JI.

Hitachi promotes these overseas projects, which are leading to increased environmental protection and responsible economic growth, based on a high degree of supply experience in each field, and Hitachi proposes to use such advanced technologies for these overseas projects.

For example, (1) fuel shift to natural gas using high efficiency gas turbine : H-25, (2) high heat energy recovery boiler for paper sludge from paper works and the emission gases and liquids from chemical plants, (3) PFC (perfluorocarbon) decomposition apparatus for semiconductor, liquid crystal plants, and aluminum plants, etc., (4) hybrid renewable power generation systems, selected suitable combinations of these generation methods (solar, wind, mini or micro hydro and biomass).

Central Monitoring and Control System Deployed at Niwakubo Water Purification Plants in Osaka Waterworks Department

A decentralized control / centralized monitoring type central monitoring and control system was delivered to the Niwakubo Water Treatment Plants, the oldest water purification plants in the Osaka Waterworks Department with a capacity of 203,000 m³ of water a day. While the system is up and running at the Niwakubo plants, eventually it will provide integrated monitoring and control at three water treatment plants: the Niwakubo plants, the Mishima plants, and the Oba plants.

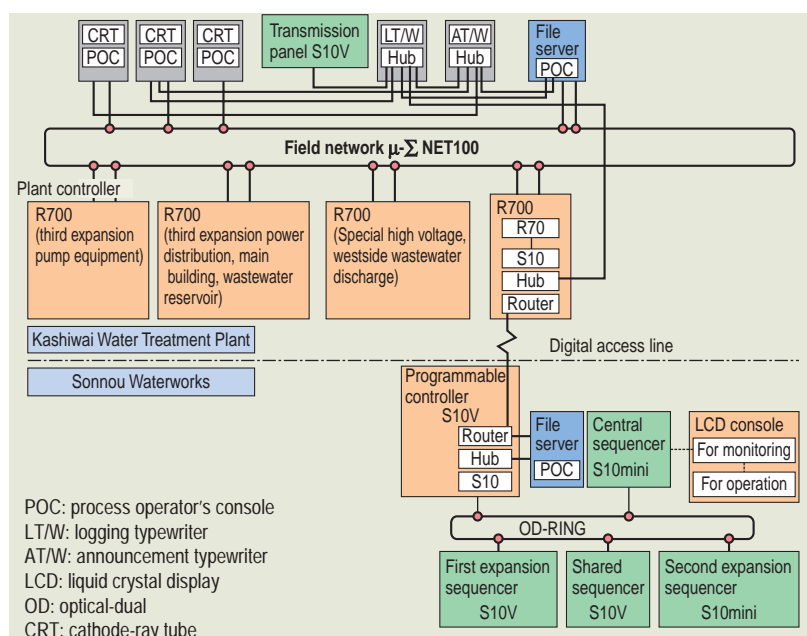
[Main features]

- (1) The system supports interaction between large-screen displays, CRTs, and mini graphic panels, and features a user-friendly human interface with backup capability.
- (2) It provides a seamless integrated operating environment with no apparent distinction between systems in each purification plant.
- (3) All the information sent to the central monitoring and control system are also delivered one-to-one to each equipment over an optical remote link, so operability and maintainability are significantly improved because all equipment can be monitored and controlled separately.



Central monitoring and control system at Niwakubo Water Treatment Plant, Osaka Waterworks Department

Central Monitoring and Control System at Kashiwai Water Treatment Plant in Chiba Prefectural Waterworks Bureau



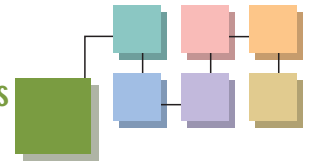
System configuration of Kashiwai Water Treatment Plant central monitoring and control system

The Kashiwai Water Treatment Plant began operation in 1968, and now has the capacity to supply 530,000 m³ of water a day to Chiba and five other municipalities in Chiba Prefecture. The new central monitoring and control system that was installed in March 2004 interconnects the Sonnou Waterworks, the Westside Pumping Station, and the Main Power Station.

[Main enhancement provided by the new system]

- (1) No loss of data when the remote monitoring transmission is cut off.
- (2) Consistent data by sending to and receiving from other systems.
- (3) Improved operability and visibility through software implementation of existing hardware control functions.
- (4) Centralized management by interconnecting legacy equipment with the new monitoring and control system.

(Commenced operation in March 2005)



Monitoring and Control System for Araki Water Purification Plants, Water Supply Authority of Southern Fukuoka Prefecture

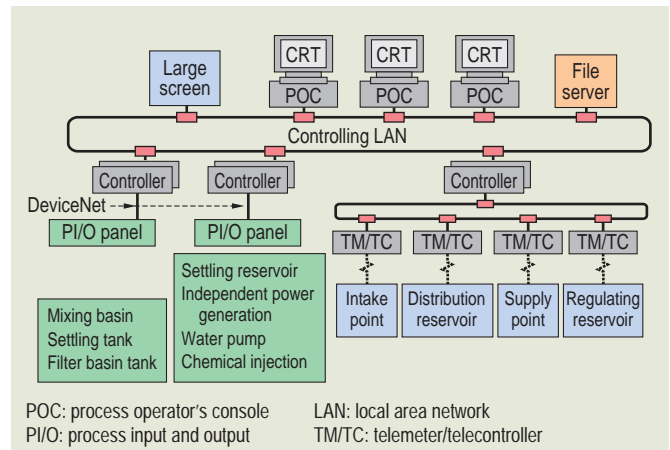
Water Supply Authority of Southern Fukuoka Pref. was established in 1971 to ensure a safe and stable water supply for the southern part of Fukuoka Prefecture. Recently, a fail-safe distributed monitoring and control system was installed on the central processing equipment in the main facility at the Araki Plant.

[Main features]

(1) Planned amounts of intake and delivery of water are automatically calculated based on the water demand derived by statistical methods. The change in the actual water demand is monitored, and the planned amount can be automatically corrected.

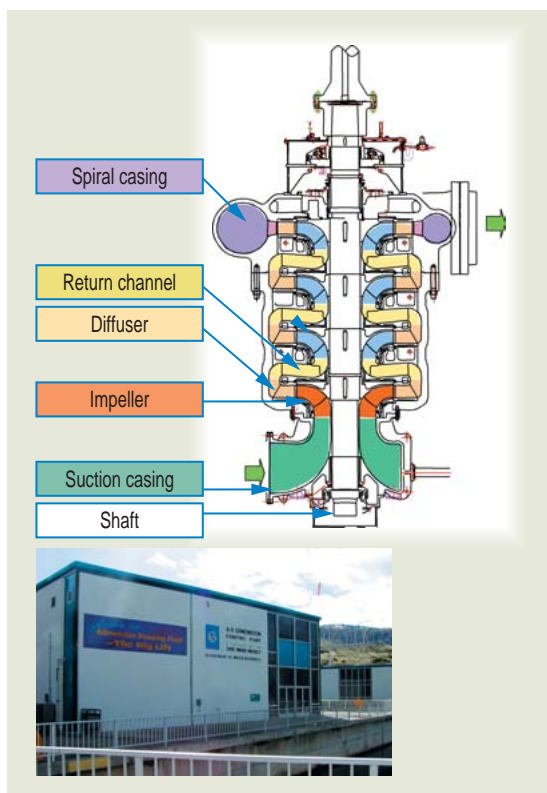
(2) Control and monitoring functions have been decentralized by installing a remote PI/O system on site at the plant, a smart functionality duplex controller, which are interconnected by an optical DeviceNet*.

* See "Trademarks" on page 86.



Configuration of the new monitoring and control system at the Araki Water Purification Plants

Development of High Efficiency 60,000-kW High Head Pump for State of California with Expected Pump Efficiency over 92%



A. D. Edmonston Pumping Plant: high efficiency model for 60,000-kW high head pump

In June 2003, Hitachi, Ltd. received an order to replace four pumps (vertical shaft, four-stage, centrifugal, discharge volute pumps) out of 14 in the A. D. Edmonston Pumping Plant, California, USA. The plant, which is operated by the Department of Water Resources of the State of California, plays a central role in delivering water to Southern California. It is the largest pumping plant in the State Water Project of California and at almost 600 m, is one of the highest water lifts in the world.

Each pump is a four-stage centrifugal pump with a specific speed of approximately 325 rpm. The pumps have the highest efficiency level (92%) in the world for similarly rated flow and specific speed pumps.

Hitachi has developed a high efficiency model for these pumps by using the latest simulation technique to optimize the hydraulic passages including an impeller. In addition, this model achieved no cavitation at a suction specific speed of 900 rpm proving that its characteristics are excellent for preventing cavitation phenomena. The model uses pre-rotation suction casing to remarkably improve pump performance and cavitation characteristics over conventional models.

[Main specifications]

- (1) Vertical four-stage turbine pump ($N_s = 325$ rpm)
- (2) Rated flow = 8.92 m³/s
- (3) Rated head = 600.5 m
- (4) Rated speed = 600 rpm
- (5) Motor output = 59,656 kW
- (6) Discharge inner diameter = 1,920 mm

Hitachi is currently manufacturing the first pump for commercial operation in April 2007. After the first pump is successfully operating, Hitachi will deliver the other three pumps.

Heightened Interest in Explosive Detection Products Due to Increasing Security Awareness

Hitachi has released a new explosive trace detection system, the DS-120E, in addition to the Model DS-100E released in March 2002. The DS-120E is more capable of detecting small amounts of explosive traces and has good usability.

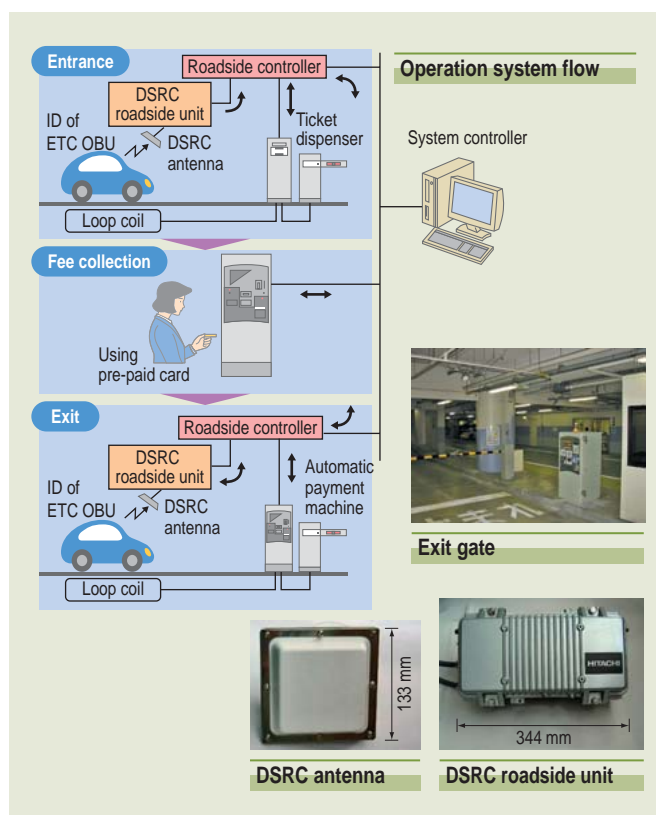
[Main features]

- (1) The DS-120E satisfies both sensitivity and analysis time by using Hitachi's innovative counterflow atmospheric pressure chemical ionization method.
- (2) The DS-120E has attained better identification capability by using mass spectrometry for analysis. This contributes to reducing the false-alarm rate.
- (3) The DS-120E does not require a special license for operation. This system is easier to operate and maintain than the existing models on the market.
- (4) By changing the detection database, the DS-120 series can be used to detect hazardous chemical substances.



Screen images (left) and explosive detection equipment

DSRC Parking Management System



Configuration of DSRC parking management system

Various applications using DSRC (dedicated short range communications) have been actively studying. By 2007, car parks using DSRC with several different payment methods will be deployed in Japan.

Hitachi constructed a DSRC parking management system in Ozone National Road Car Park in Nagoya for the 11th ITS World Congress.

The system in Nagoya supports contract and pay-by-the-hour users.

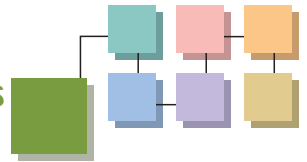
(1) For contract users:

After a user's ID is registered with the ID of the user's ETC OBU (on-board unit), the system recognizes the user's car and automatically opens the exit gate.

(2) For pay-by-the-hour users:

When a user buys a pre-paid card for pay-by-the-hour use, the ID of the pre-paid card and the ID of the user's ETC OBU are registered to the system. Before leaving the car park, the user pays the fee using the pre-paid card at a fee collection booth. When the car arrives at the exit gate, this system checks the ID of the OBU and payments. If there are no payment problems, the gate opens automatically.

Hitachi's new DSRC roadside unit is greatly downsized and has a much lower price than previous models. This system is expected to be used in car parks, gas stations, etc.



VRM Terminal and System

Hitachi has developed a VRM (vehicle relationship management) terminal and system that gather, process, and store vehicle information to provide VRM and CRM (customer relationship management) services such as remote diagnostics, emergency, and one-to-one marketing services using vehicle and driver information. The VRM terminal gathers data using interfaces to a GPS (global positioning system) and in-vehicle LAN. These data are processed, stored on a removable HDD (hard disk drive), and transferred to a central system or car dealer's system using wireless LAN, a cellular phone, or the removable HDD. Hitachi's agent technologies, vehicle and driving diagnostic technologies, and security technologies are used to gather, process, and store vehicle information. This system increases driver safety and security by continuously supervising the status of the vehicle in detail.



Prototype of VRM terminal with interfaces to GPS, HDD, PCMCIA (Personal Computer Memory Card International Association), wireless LAN, and in-vehicle LAN

Lightweight Electronic Throttle Body



Lightweight electronic throttle body

Most motor vehicles use an electric throttle control system for improved drivability and fuel consumption. This system optimizes throttle valve position according to a vehicle's driving conditions. An electronic throttle body is a main part of an electric throttle control system.

By improving parts and the structure, Hitachi has developed an electronic throttle body that is more compact and lightweight than the current electronic throttle body. A compact motor that was originally designed for Hitachi's electronic throttle body has been adopted. This body weighs 860 g and has a die-cast body, so the weight is about 75% of the current electronic throttle body. Moreover, this body has performance equivalent to that of the current body because of the control technology of the electronic throttle system.

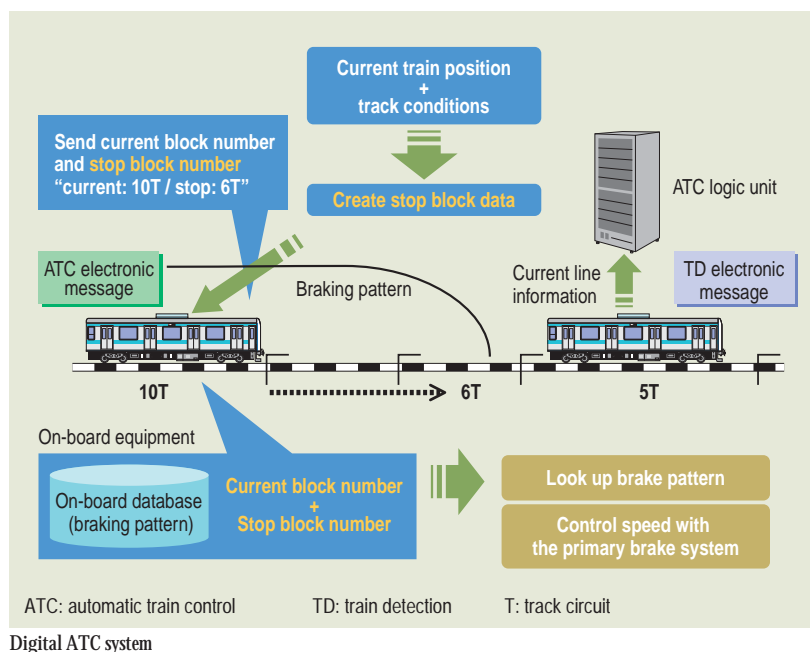
Semi-active Suspension System

In the pursuit of automotive suspension systems that provide optimal passenger comfort and unparalleled vehicle control, Hitachi, Ltd. has developed an electronically controlled semi-active suspension system. The figure illustrates some of the key components: a control unit, acceleration sensors, and an adjustable shock absorber with proportional solenoid spool valves. The variable shock absorber uses a unique reverse damping function in which the compression (bump) damping force is minimized during high rebound (extension) damping force events. Conversely, during high compression damping force events, the rebound damping force is minimized. This damping strategy makes vehicle vertical motion (skyhook) control possible by using only three vertical acceleration sensors without height sensor feedback. The existing steering sensor and vehicle speed sensors are also used as feed-forward and feedback controls for easy handling. The system has a wide damping force range with continuous and smooth transitions by using the proportional solenoid valves and pilot pressure mechanism. The reverse damping control strategy and proportional solenoid control allow both a high level of passenger comfort and easy handling.



Key components of semi-active suspension system

East Japan Railway Company Adopts Digital ATC System

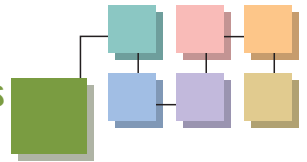


The ATC systems on East Japan Railway's Yamanote and Keihin-Tohoku Lines have been upgraded with new digital ATC systems, and the new system was also implemented on the Keihin-Tohoku Line between Minami-Urawa and Tsurumi in December 2003.

[Main features]

- (1) Using the Digital ATC system for the primary brake control permits shorter train headways, increased line capacity, faster arrival times, and a more comfortable ride.
- (2) The train brake control system can also be upgraded to improve operating performance without changing the ground equipment by merely updating the on-board equipment database.
- (3) The system provides both excellent reliability and cost performance by using general-purpose IT equipment and by switching over to a total equipment fault diagnosis + automated system.

Over the next few years Hitachi plans to deploy the new digital ATC system on additional Yamanote Line trains, remaining sections of the Keihin-Tohoku Line, and the Negishi Line.



Chongqing Urban Monorail

Chongqing city is dependent on road transportation such as buses and taxis, so traffic congestion and air pollution are conspicuous. Therefore, the city has an urgent need to develop urban transportation. Because of this need, Chongqing Monorail System has been planned as the first monorail in China.

Hitachi has supplied two trains (a total of eight cars) and electrical equipment for all trains. Changchun Railway Vehicles Co., Ltd. will manufacture the remaining 19 trains (a total of 76 cars) with technical cooperation from Hitachi. In addition to the monorail cars, Hitachi has supplied main track switches.

[Main features]

- (1) Large urban monorail cars
- (2) Exteriors of aluminum car bodies painted to protect against acid rain
- (3) Variable voltage, variable frequency traction inverter
- (4) Fiber-reinforced plastic seats and stanchion poles used inside cars



Chongqing urban monorail

Development of IT Condominiums in China

The current boom in the construction of middle- and high-class condominiums is continuing in China. More comfort and security are requested in large cities in China as consumers who want upscale living increase.

Hitachi, Ltd. and Guangzhou Hitachi Elevator Co., Ltd. are developing IT condominium system businesses in China that are expected to expand in the future, and have established showrooms and participated in exhibitions in China, as follows.

Establishment of showrooms:

- (1) Guangzhou (October 2003)
- (2) Shanghai (November 2004)

(3) Beijing (scheduled)

Participation in exhibitions:

- (1) China World Elevator Expo 2004 (April 15-18, 2004)
- (2) 2004 Exhibition of Beijing International Intelligent Community and Household Digital Products Symposium (July 22-24, 2004)
- (3) The 8th China International Fair for Investment and Trade (September 8-11, 2004)
- (4) 2004 Hitachi Exhibition Beijing (October 14-15, 2004)
- (5) 2004 Hitachi Exhibition Shanghai (October 26-27, 2004)
- (6) 2004 Hitachi Exhibition Guangzhou (November 16-17, 2004)



Hitachi booths at China World Elevator Expo 2004 (left) and 8th China International Fair for Investment and Trade (right)

MX Series Escalator Based on Universal Design

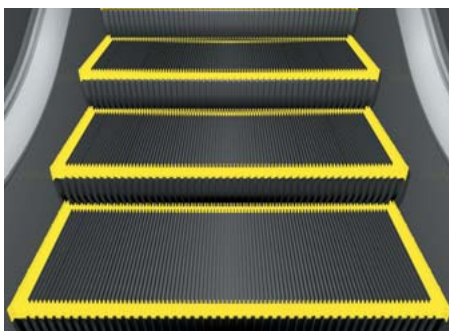
The “MX Series Escalator” has advanced function and design that were developed to ensure smoother motion. The standard models are the S600MX, S800MX, and S1000MX. The S1000MXS has an option of overall width reduction.

[Main features]

- (1) Full demarcation line to show steps clearly
- (2) New cover plate to improve coefficient of friction by about 20%

(compared with Hitachi’s conventional models) in damp conditions

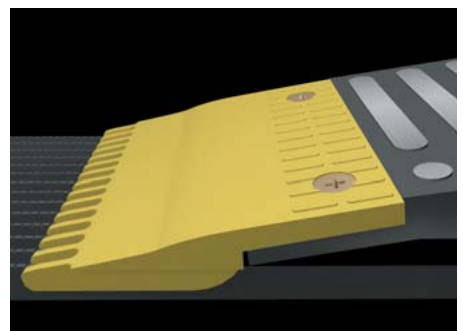
- (3) Approach lane to enable passengers to get on and off more easily
- (4) Inclined comb to enable passengers to get on and off more easily



Full demarcation line

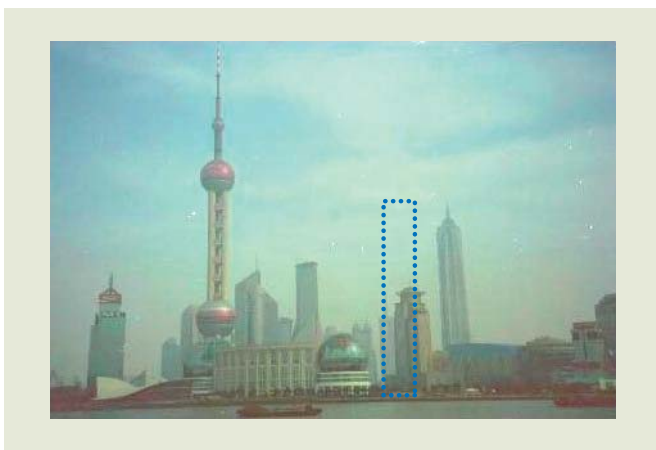


New cover plate design (approach lane)



Inclined comb

High-speed and Big-capacity Elevators for Shanghai World Financial Center



High-speed and big-capacity elevators for Shanghai World Financial Center

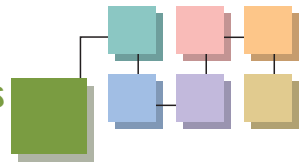
Hitachi has landed a contract to install high-speed and large-capacity elevators for Shanghai World Financial Center. This building is under construction in the Pudong area of Shanghai and will be the highest in the world, for which Hitachi will install 6 units of double-deck elevators as per the following specifications:

2 units: Speed—480 m/min, Load—2,175 kg × 2 (i.e. 4,350 kg/unit)

4 units: Speed—360 m/min, Load—2,000 kg × 2 (i.e. 4,000 kg/unit)

The units with a speed of 480 m/min speed elevators will be shuttle elevators to the observation floor to be located on the top floor of this building.

Shanghai World Financial Center will be opened in December, 2007.



117 Sets of Elevators and Escalators for Dubai Festival City

Al-Futtaim Engineering, part of the Al-Futtaim Group's Electronics' Division in the UAE will be supplying 117 Hitachi elevators and escalators for the Group's Dubai Festival City project which will include residential units, hotels, a golf course, a retail park, automotive park and schools when it is completed by 2006.

Hitachi Asia Ltd., will be shipping the elevators and escalators between 2005-2006 for Dubai Festival City's zone 8 which is due to open middle of 2006.



Expected view of Dubai Festival City

Laser Drilling Machines for Printed Wiring Boards



Printed wiring board production is increasing due to the increasing demand for electronic products such as mobile phones, digital cameras, PCs, and digital audio-visual equipment. To meet these demands, Hitachi has developed two new laser drilling machines, one with a CO₂ laser (LC-2G212) and the other with a UV laser (LU-2G212).

[Main features]

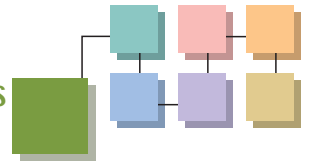
(1) A new high-speed galvanometer scanner has been fabricated to improve productivity. Applying its optimized design with a cutting-edge analysis technique to the rotor dynamics and the cooling system has enabled a 1,400-point/s scanning speed, which is 17% faster than that of the previous galvanometer scanner.

(2) An original high-quality laser drilling system uses two identical beams with equal energy. The new f θ lens design assures high quality throughout the scanning area.

(3) Two full-size (560×690 mm) panels for printed wiring boards can be mounted on the machining table at a time. The beams of the two-beam system thus drill panels simultaneously. Digital vibration suppression control enables quick and accurate positioning of the table.

(Hitachi Via Mechanics, Ltd.)

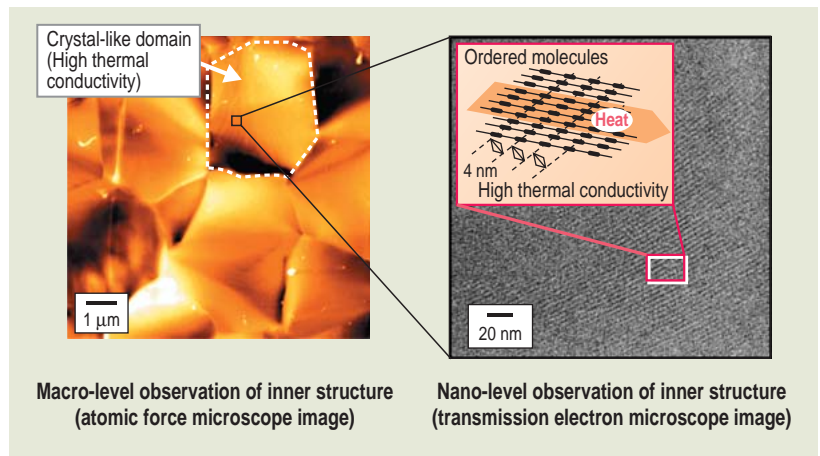
Multi-beam UV-laser drilling machine: LU-2G212 (top), and multi-beam CO₂-laser drilling machine: LC-2G212 (bottom), which can drill two panels simultaneously with high-speed galvanometer scanners



Highly Thermally Conductive Epoxy Composites

Hitachi has developed insulating composites that can improve heat dissipation. Next-generation electric and electronic devices and equipment can be made more compact and efficient by using this material. The key technology is a new epoxy resin that has controlled higher-order structures (that is, partially crystal-like structures) at both the nano- and macro-levels. This resin is an electrical insulator and a thermal conductor. The crystal-like structures were observed both on a macro-scale using a transmission electron microscope and on a nano-scale using an atomic force microscope. The controlled higher-order structure can improve the thermal conductivity. By mixing this resin with certain kinds of ceramic powders (fillers), composites have been obtained with thermal conductivities exceeding 10 W/m·K, which has not been reached using the conventional resin. The composites can be widely applied to portable, multi-layered printed circuit boards for automobiles, insu-

lating sheets for power devices, casting and molding compounds, insulated systems for rotating machines, etc.



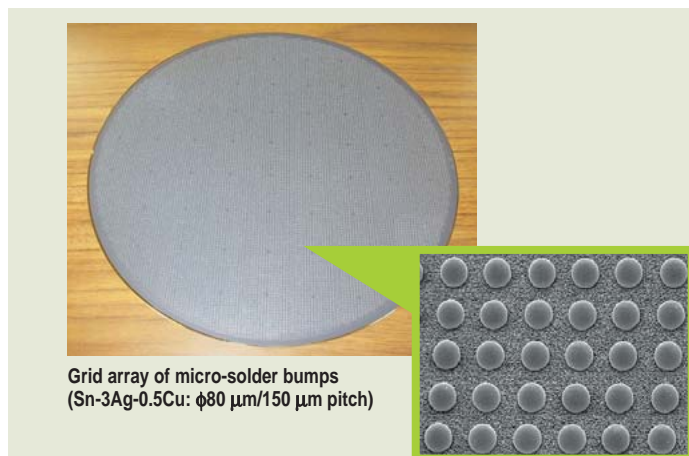
Inner structure of highly thermally conductive resin

New Mounter for Micro-solder Balls: HR-300

Semiconductor packages are changing to the flip-chip style, and interconnecting bumps formed with solder balls are better for use in these packages because of the selectivity of the metal composition, uniformity of the bump height, and the fact that the bumps are void-free. Therefore, Hitachi has developed a mounter using a unique metal mask and squeegee.

[Main features]

- (1) Minimizes excess balls on the wafer/substrate.
 - (2) Permits wafer/substrate warpage.
 - (3) Jig and tooling set costs are low.
 - (4) Can be applied to $\phi 300$ -mm wafer/ 300×300 -mm substrates.
 - (5) Can be applied to $\phi 80$ - μm balls at 150 - μm pitches.
- (Hitachi Metals, Ltd.)



Grid array of micro-solder bumps
(Sn-3Ag-0.5Cu: $\phi 80 \mu\text{m}/150 \mu\text{m}$ pitch)



New mounter: HR-300

Grid array of micro-solder bumps (left) and new mounter for micro-solder balls: HR-300 (right)