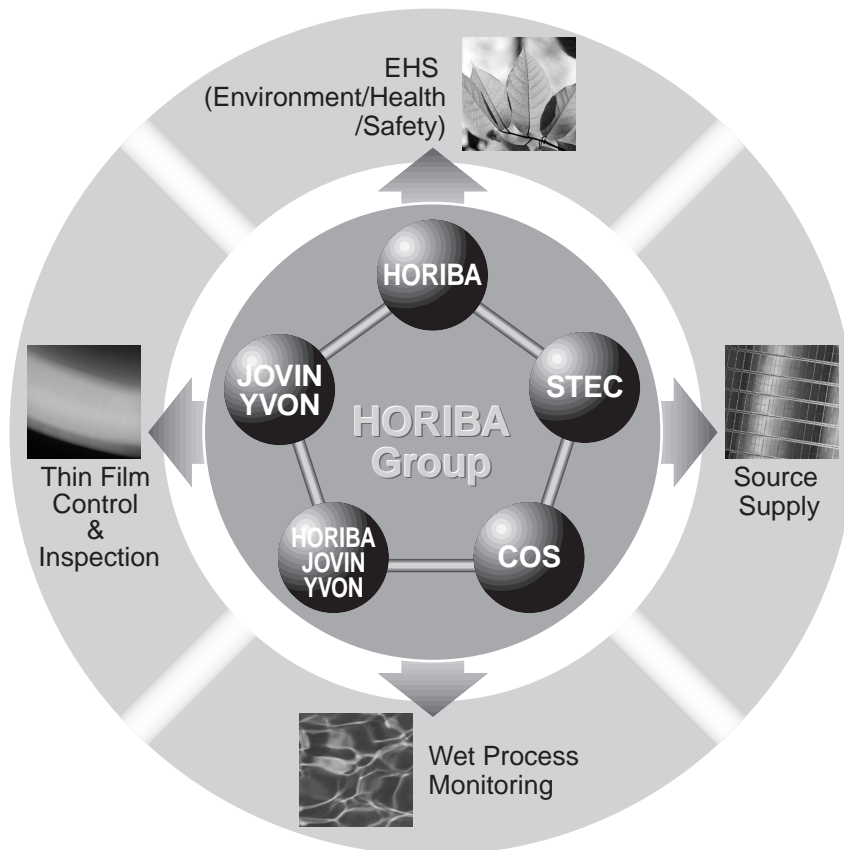


DISCUSSION

What Aspects of HORIBA Group's Products or Technology will Contribute in the Semiconductor Industry?



Competitiveness in strategic industries—such as automobiles and telecommunications—depends on the semiconductor, flat panel display equipment, and materials industries. It is not an exaggeration to say that these industries are supported by their measuring equipment's. HORIBA Semiconductor Measurement Group, HORIBA, Ltd., STEC Inc., JOBIN YVON S.A.S., and HORIBA JOBIN YVON Co. Ltd. are developing applications and products that meet the market's need. Recently, four leaders of these companies discussed HORIBA's future role and their technical potential. Each of these semiconductor-related firms focus on the four application fields; Wet Process Monitoring, Thin Film Control & Inspection, Source Supply, and EHS(Environment/Health/Safety). Through far-ranging debate they will introduce some of the major products that the HORIBA Group has actively developed, and reaffirm the importance of working together to develop solutions based on the needs of the market.

Panelists



Katsuya Tsuji
HORIBA, Ltd.



Ramdane Benferhat
JOBIN YVON S.A.S.



Kiyooki Hara
STEC Inc.



Seiichi Hirakawa
HORIBA JOBIN YVON
Co., Ltd.

Report from Each Group Company

Tsuji There has been a flood of new acronyms like IT and EC in recent years, but all of the systems these acronyms refer to run on excellent inexpensive semiconductor devices. A solid support of this semiconductor industry is measuring technology, and we're proud to be a manufacturer of that kind of equipment.

To quickly meet rapidly growing, diversifying, and ever more sophisticated market needs, semiconductor device manufacturers are working hard day-in and day-out to innovate their production processes, their biggest concern being to improve production efficiency. Because of this, in addition to improving yield, production lines are being greatly upgraded with, for example, the introduction of large 300mm silicon wafers. The second biggest concern of semiconductor device manufacturers is to develop and increase production of high performance devices such as small liquid crystal displays and flash memory chips, whose demand has grown because of the explosive diffusion of the cell phone. The third biggest concern is to build a flexible production line that can quickly adapt to produce LSIs, ASICs and other devices, in order to enhance added-value. As this kind of innovation continues in the semiconductor world, today, we are going to talk about how HORIBA's products and technologies are currently being used, if they are proving useful or not, and what kind of future exists for them. In doing this, I would like us to explore the future aspects and directions of measuring equipment for semiconductor processes. We will begin with a report on the situation at STEC Inc. from Dr. Hara.

Hara STEC Inc. began in 1974 as Standard Technologies Co. Ltd. The company was created to manufacture and sell standard gases for pollution monitoring equipment. HORIBA, Ltd. had developed a production technique that would enable gas standardization. A big turning point for the company came with the mass flow controller (MFC) that we started making and selling to the semiconductor industry; it proved to be a source of strong long-term performance.

As products for the semiconductor market, we have first a mass flow controller for gas which covers a wide flow rate range and provides support for ultra-clean gases. We have a full lineup from high temperature types to Safety Delivery System (SDS) types. The second includes liquid flow controllers and vaporizers that are designed for TEOS, liquid organic metals and others. The third is a liquid delivery system that is used in conjunction with a liquid vaporization system. We also have pressure controllers. These are STEC's core products for the semiconductor industry.

Tsuji Next, we will hear from Dr. Benferhat. He is going to introduce JOBIN YVON S. A. S.

Benferhat JOBIN YVON S.A.S. (JY) is an optical equipment manufacturer that was founded in 1819 by Jean-Baptiste Soleil. Since its creation, JY continuously collaborate with renown scientists and research institution. At present, JY is the top manufacturer of Holographic-Type Gratings, Monochromators, Raman spectrometer and emission spectroscopy analyzers.



Katsuya Tsuji

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Since joining the HORIBA group in 1997, a lot of energy was spent to address the semiconductor field. The Thin Film Division, that I am in charge of, is jointly developing Ultra-Thin film metrology tools, in-situ process monitors and End-point detection system with big manufacturers of semiconductor devices and semiconductor manufacturing equipment.

All these products are based on JY's expertise in optics, Spectroscopic Ellipsometry, Plasma Emission spectroscopy and Imaging interferometry.

Tsuji We will now hear about HORIBA JOBIN YVON Co., Ltd. from Mr. Hirakawa.

Hirakawa Our company was founded in 1928 as ATAGO BUSSAN. After a number of changes, we became the Japanese distributor for JOBIN YVON (JY), thereby importing and selling JY's gratings, spectrosopes, and spectroscopic analyzers. In 1997, JY became a part of the HORIBA Group and then ATAGO BUSSAN did also the following year.

At 2002, we changed our name to HORIBA JOBIN YVON, Co., Ltd. (HJC) and are now developing business by organically linking JY's original technology and HORIBA's production engineering with our application engineering strengths. I myself am in charge of everything from product planning to sales of thin film ellipsometers and Raman spectrometers for semiconductor applications.

Tsuji Thank you. Now for myself, I will give a brief review of the HORIBA Group centered around HORIBA Seisakusho. HORIBA, Ltd was founded in 1953 and has since launched a number of products. One particular product is the MEXA series automobile emissions gas analyzer, which is recognized as the top brand in the world. Over the past few years, we have put a lot of effort into the semiconductor field in particular and are developing business in the following four fields of semiconductor and liquid crystal measurement.

The first is thin film measurement. The UT-300 is a fully automated measuring system that can accurately and swiftly measure thickness, refractive index, and optical constants such as attenuation coefficient, of laminated and ultrathin films. It was developed with JY's spectrometric technology, HORIBA's semiconductor mechatronics, software and quality control that was nurtured with the reticle/mask particle detection system, and analytical technology (application know-how) from HJC.



The second field is cleaning process monitoring. Our CS series of semiconductor liquid concentration monitors that allows inline measuring of concentration of chemicals such as RCA, applies a temperature-compensated technique of multiple variable analysis to spectral absorption data analysis, in order to deliver high stability, which is of prime importance in inline monitoring. After that, we have the PLCA series that uses laser diffusion to count the number of particles in ultrapure water and chemicals.

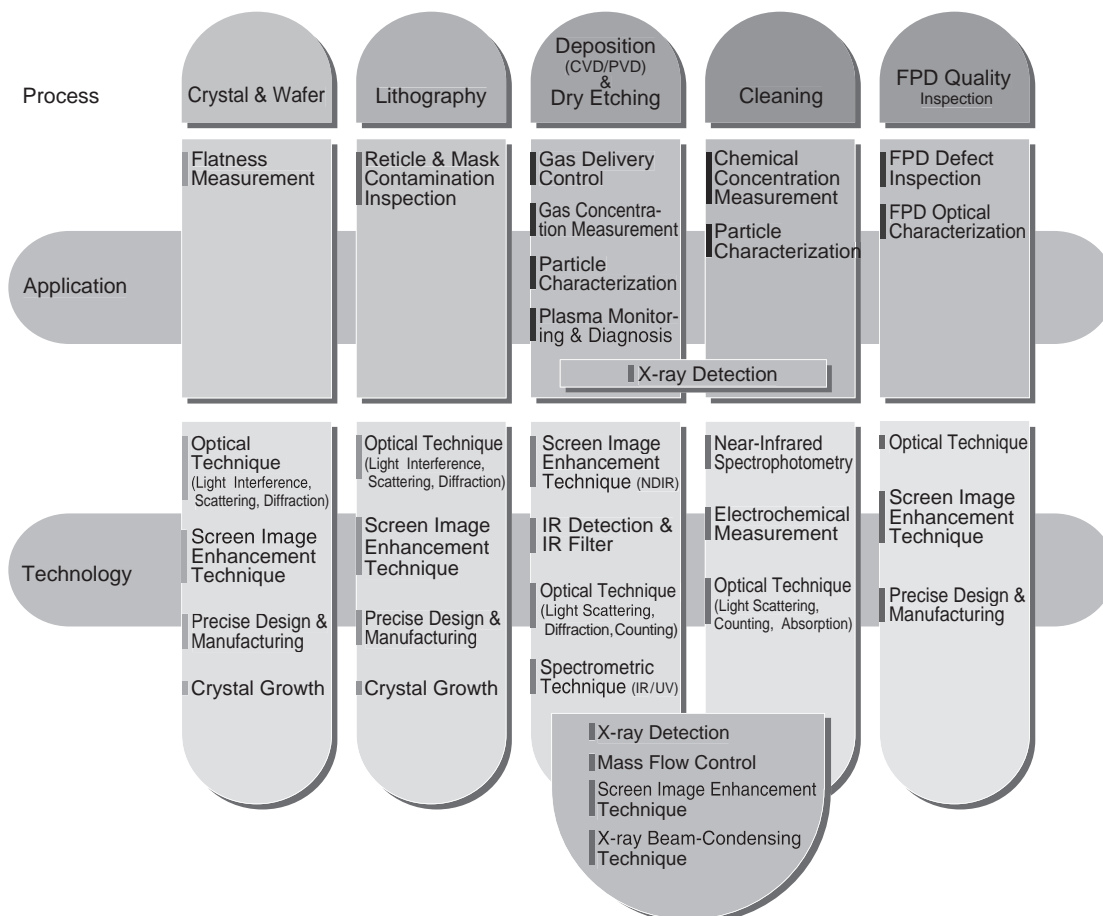
The third field is gas monitoring. On semiconductor production floors, we have the FG-100 gas analyzer. It is an FTIR-type—compact and highly accurate at measuring concentration of PFCs and other greenhouse gases contained in exhaust gas. In the future, we hope to develop it as an in-situ monitor for incorporation into dry process systems and next generation environmental monitors.

The fourth field is liquid crystals. We expect that a liquid crystal cell flaw detector that can automatically check for flaws in LCDs and display their location will greatly contribute to a reduction of labor in visual inspection processes. Also, we are hoping that liquid crystal substance detectors will help greatly improve yields in the future.



Ramdane Benferhat, Dr.

Managing Director
Thin Film Group
JOBIN YVON S.A.S.





Seiichi Hirakawa

Manager
Semiconductor Sales
Department
HORIBA JOBIN YVON Co.,
Ltd.

Today's Market Needs

Tsuji I'd like us to turn our thoughts now to what kind of measuring equipment the market needs and how we can respond to those needs.
Dr. Benferhat, what are your thoughts?

Benferhat Semiconductor manufacturers are roughly divided into two camps in attempt to survive. There are those dedicated to mass-production where a limited diversity of devices such as DRAM are produced, and those that producing specific devices so-called "customized devices".

Seen from the perspective of a measuring equipment manufacturer, the former demands smaller sizes and lower costs, while the latter wants flexible measuring equipment that allows them to be easily adapted to their current needs. Whereas they make one type of product today, tomorrow it's another kind. This permanent changes makes role of measuring equipment more important since reproducing process conditions are critical. Thus the measurement tool must combine R&D capabilities and routine manufacturing capabilities

Hara From our perspective as a parts manufacturer, we see high reliability, high performance, smaller sizes, lower prices, and digital support as big market demands. Let me introduce one approach we are taking at STEC.

A 39 square millimeter mass flow controller we recently developed is now the same small size as MFCs used with other gas components. It delivers high performance and can be used in semiconductor processes.

In terms of performance, we see as a future trend an MFC that supports any kind of gas with multiple range capabilities for measuring flow rate and "reading scale accuracy" rather than the full scale accuracy. Behind this demand lies the fact that high precision is needed to permit smaller inventories and quicker deliveries.

Also, as we wanted to further downsize the overall gas supply system, we are developing a pressure-insensitive mass flow controller or PI-MFC. It incorporates regulators, pressure sensors, and a filter in a conventional size MFC, so it greatly reduces the size of conventional gas supply systems for semiconductor processes. Using it greatly reduces the overall cost of semiconductor processing.

Another important point for us is that, as a parts manufacturer, we must constantly stay on top of the latest news on semiconductor processes.

Before, several predefined materials flowed at specified rate, therefore all we had to do was make parts to customer specifications and deliver them.

However, nowadays, we have to catch wind of the latest news on semiconductor processing and propose solutions to customers, if we are to survive.

Surviving by Distinguishing Oneself from Competitors

Tsuji Without a doubt, to work in the semiconductor field, time, cost, and the latest information are all absolutely necessary. But, I don't think that these elements alone will ensure us our survival against competitors. Therefore, winning or losing is a question of whether we can capitalize on aspects that other companies lack or, in other words, to distinguish ourselves against the competition.

Have you all taken this approach?

Benferhat I believe “performance and innovations makes the difference between winning and losing.” The UT-300 our fully automated thin film measuring system can accurately determine optical constants and thickness of ultra-thin films at the sub-nano order while tools from other manufacturers face difficulties. A unique capability, which allows us to lead the metrology in the forefront of today’s semiconductor development, where accurate characterization of Angstrom-level SiO₂, ONO stack layers, high-K and low K materials is needed. Due to our technology and expertise, we are receiving inquiries and orders for Spectroscopic Ellipsometers from the semiconductor field despite we entered this business field later than everyone else.

Hirakawa Another point is the high analytical performance, I believe. If ordinary analyses are done on film of Angstrom-order thickness, the results show deviation, but with the UT-300, a unique technique solves this problem. Of course, do not forget that this kind of high precision analysis is backed by highly accurate data measurement.

Hara In recent years, low conductance films, gate-oxidized films and high conductance films for capacitors have become very important as insulating films. These films are made with the latest liquid or solid materials. Vaporizing or sublimation temperature, and vapor pressure vary greatly with each material. We think it is important to understand material characteristics well and provide customers with modules that deliver the best vaporizing conditions and flow rate for the customer’s system, and so we are developing these modules. To do this, it is important to build the same system as the customer from exhaust to detoxification, and test it for reliability. Then, by developing the product in this kind of environment, the customer can easily incorporate the product into their process and use it.

Advantages of Each Group Companies	
HORIBA	
Infrastructure	IT network, CAD, PCB fab, ISO1400, Intellectual Properties Div, Analytical center.
Management	Global operation, Financial, Dr. Horiba wide social activities, SEMI Member and top diplomatic activities by Art Horiba.
Technologies	Top share of exhaust gas analyzer, a lot of technological seeds.
JY	
	Optics and related instrument based on grating technology, Thin film measurement, Good relation with academic lab. EC/US marketing.
HORIBA JY	
	Research area market in Japan with optical instruments.
STEC	
	MFC, Liquid flow controller /vaporizer and its application, D-Net technology, Worldwide Semiconductor business. Mass Production.

Moreover, future micro electro mechanical system (MEMS) or atomic layer deposition (ALD) will require an MFC of a response speed of a few tens of microseconds. Pressure control is the key. Development is underway on products to meet this demand. I touched on this a little while ago, but I think it important towards distinguishing ourselves that we develop modules and systems from components, and provide a product lineup that controls flow from supply to exhaust.

Tsuji I can see that the companies of the HORIBA Group are developing product strategies by applying each of their strong points. As a final topic, I'd like to ask your opinion on how our strengths can be used to better help the development of the semiconductor industry.

Hara In a nutshell, I think we need to "thoroughly utilize group resources." The HORIBA Group is not a giant-size group, but each company in the group has its own features and strengths. (See the slide "What are the strong aspects in each HORIBA-group company.")

There might not be another manufacturer with the same level of measuring and control equipment as us, that includes up-to-date infrastructure from a diversity of hardware and software and IT networks to analytical centers. By thoroughly utilizing these merits in a synergistic way, I think we can make ourselves stronger than other companies and, as a result, respond to customer needs.

Benferhat JY's thin film division is a very young division. Soon after joining the HORIBA Group, we developed the UT-300 through a Global Group Technology Alliance Program. Without this program, this project could have never been carried out. But alliances mustn't be restricted to the group only, we should build alliances with customers and research organizations. At present, JY is closely interacting with one of the most famous national research institutes in France, L'école Polytechnique, and constantly involved in European Project .

Tsuji Thank you one and all. As Dr. Hara and Dr. Benferhat pointed out, for the future development of the HORIBA Group, while moving ahead with alliances within the group, it is also essential that we build close alliances with leading outside organizations. On a base of these alliances, the future target of the HORIBA Group is to become a total supplier of solutions. And while technological development is being promoted on the one hand, it is absolutely essential to make efforts to establish better and more inexpensive production technology on the other. To provide measuring equipment that can support industry, we must carefully identify market needs and stay out in front of competitors. In other words, we can't move too fast, but being slow is out of the question. In short, "one step ahead" is our mission to becoming the number one company in the world, which means contributing to the semiconductor industry. With that, I would like to conclude the meeting.

Thank you for your time today.