Report

A Report on the Masao Horiba Award

Introduction

HORIBA Ltd. established the "Masao Horiba Award," named after the founder, on the fiftieth anniversary of the incorporation of the company. Selection theme of the Masao Horiba Award for 2007 was "Measurement of Bioparticles", and the selection theme for 2008 was "Measurement of Internal Combustion". Of the various outstanding applicants, three winners were selected in 2007 and four in 2008. This report outlines the purpose of the Masao Horiba Award, application and selection process, and the award ceremony.

Purpose, Candidates and Selection Themes

HORIBA Ltd. established the Masao Horiba Award in 2003, on the fiftieth anniversary of incorporation, targeting young researchers from outside the company working in the field of measurement and analysis technology. The purpose of the award is to encourage researchers and engineers in Japan and abroad who are involved in research and development and have the potential to produce groundbreaking analysis and measurement technology that will further enhance the status of measurement technology within science and technology.

HORIBA Ltd. is a pioneer of student-run entrepreneurial ventures founded by Masao Horiba, the current Supreme Counsel. From developing Japan's first glass electrode pH meter to its rise as a global manufacturer of analysis and measurement equipment, HORIBA has consistently maintained a close working relationship with universities and research institutes throughout its corporate history; it is not an exaggeration to say that this relationship supports the current HORIBA.

In establishing the award, Masao Horiba stated that, "Identifying the substance, nature, and behaviour of an unknown material is extremely important for both scientists and engineers. Solving these problems require analysis equipment of the highest scientific and technological calibre. However, analysis equipment was largely unrecognized by society as well as academia relative to the sophisticated technology required in producing such apparatus. I established this award with the hope that it will be a form of encouragement, however small, to researchers working to strengthen the basis of analysis technology." With this statement, Masao Horiba sends out a strong message on the importance of analysis and measurement technology, a field devoid of glamour, and offers his words of encouragement to researchers and engineers involved in the daily grind of basic research.

Each year, a theme is chosen from technological fields related to HORIBA. In 2007, the selection theme was "Measurement of Bioparticles", and in 2008

the theme was “Measurement of Internal Combustion”. For 30 years, HORIBA has sold haematology analyzers as a part of its medical equipment portfolio. Particle measurement technology is an important elemental technology deployed not only within the field of medicine but also in physical and chemical sciences, from the measurement of electrical resistivity of blood cell counters used in haematology analysis during clinical tests to the light-scattering particle analyzers used in industrial particle characterization. Also, HORIBA took the lead in automotive test systems by unveiling the country’s first emission analysis systems in 1964, and has since supplied many automotive emission analysis systems meeting industry requirements such as emissions regulations and new engine development. Our emission analysis systems portfolio continues to be one of HORIBA’s leading products. The company continues to actively develop products compliant with latest innovations and requirements, such as a particulate number measurement system compliant with future European emission regulations.

Details of the Award

In addition to the award testimonials, award recipients will receive prize money of ¥500,000 at the award ceremony, and ¥500,000 each year for the next two years as a research grant without limitations regarding usage, to provide an opportunity for the winners to gain wider recognition for their research achievements through continuous support.

Awards Committee

Awards committee was comprised of ten members including Honorary Chairman Masao Horiba, Chairman Atsushi Horiba, five external researchers and three HORIBA engineers in 2007, and nine members including five external researchers and two HORIBA engineers in 2008 (see Table 1).

Application and Selection

In 2007, the committee received a total of 29 applications and in 2008 it received a total of 18 applications from both Japan and abroad, confirming the high level of interest in analysis and measurement technology. Rise in the number of overseas applicants appears to suggest a growing international acceptance of the ethos of the award. Selection involves deliberation by the committee members based on the results of evaluations of each application as well as past research achievements, taking into consideration the purpose of the award, to support young researchers with the potential to make future contributions. Following confirmation by the Board of Directors, the committee selected three winners in 2007 including one overseas winner and three winners in 2008 including two overseas winners. There was one honourable mention in addition to the winners in 2008 (Table 2).

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Table 1 Awards Committee

<2007 Awards Committee Members>

Honorary Chairman	: Masao Horiba, Supreme Counsel, HORIBA Ltd.
Chairman	: Atsushi Horiba, President, HORIBA Ltd.
Vice Chairman	: Satoshi Ichiyama, professor, Kyoto University Graduate School
Committee Members	: Hidetoshi Kotera, professor, Kyoto University Graduate School
	: Yutaka Yatomi, professor, University of Tokyo Graduate School
	: Nobuo Shimamoto, National Institute of Genetics, professor, the Graduate University for Advanced Studies
	: Dr. Brian Herman (Vice President for Research, Professor, Cellular and Structural Biology University of Texas Health Science Center)
	: Narihiro Oku, Manager, R&D Dept., Medical Electronic Systems Division, HORIBA Ltd.
	: Tatsuo Igushi, Manager, Analytical Technology R & D Dept., Scientific Instruments & Systems Division, HORIBA Ltd.
	: Dr. Philippe Nerin (Head of IVD Instruments, Research Department, HORIBA ABX)

<2008 Awards Committee Members>

Honorary Chairman	: Masao Horiba, Supreme Counsel, HORIBA Ltd.
Chairman	: Atsushi Horiba, President, HORIBA Ltd.
Vice Chairman	: Takeyuki Kamimoto, Professor Emeritus, Tokyo Institute of Technology
Committee Members	: Hajime Fujimoto, Professor, Doshisha University
	: Yasuhiro Daisho, Professor, Waseda University Graduate School
	: Atsumu Tezaki, Professor, University of Toyama Graduate School
	: Dr. David E. Foster, Phil and Jean Myers Professor of Mechanical Engineering, Engine Research Center, University of Wisconsin Madison)
	: Dr. Masayuki Adachi, President, Horiba International Corp.
	: Nobutaka Kihara, Manager, Automotive Analytical R&D Dept., HORIBA Ltd.

* Organizations cited were as of the day of the award in 2007 and 2008.

Table 2 Award Winners

<2007 Award Winners and Research Topics>

- Dr. Yasuhiro AWATSUJI
  Associate Professor, Graduate School of Science and Technology, Kyoto Institute of Technology
  Topic: Development of a method and device for three-dimensional dynamic image measurement of cells with parallel digital holographic microscopy
- Dr. Fumiyoshi ABE
  Group Leader, Extremobiosphere Research Center, Japan Agency for Marine-Earth Science and Technology
  Topic: Pressure physiologically based research on dynamics of biomembrane and membrane proteins
- Dr. Christopher CULBERTSON
  Associate Professor, Kansas State University
  Topic: Rapid Analysis of Individual T-Lymphocyte Cells on Microfluidic Devices

<2008 Award Winners and Research Topics>

- Dr. Tetsuya AIZAWA
  Tenured Lecturer, Meiji University
  Topic: Laser Diagnostics of Soot Formation Processes in Diesel Spray Flame
- Dr. Jason OLFERT
  Assistant Professor, Brookhaven National Laboratory
  Topic: A new instrument to measure the mass of nano-particles from an internal combustion engine
- Dr. David ROTHAMER
  Assistant Professor, University of Wisconsin-Madison
  Topic: Simultaneous Imaging of Exhaust Gas Residuals and Temperature During HCCI Combustion

<2008 Honourable Mention and Research Topics>

- Dr. Nobuyuki KAWAHARA
  Assistant Professor, Okayama University
  Topic: Development of In-Situ Fuel/ Residual Gas Concentration Measurement near Spark Plug

* Organizations cited were as of the day of the award in 2007 and 2008.

Award Seminar and Ceremony

In 2007, the award ceremony and seminar was held on October 17, the day Masao Horiba founded HORIBA Radio Laboratory. In 2008, the award ceremony was held on October 14. On the day of the ceremony, an internal awards ceremony was held at HORIBA Ltd., then an award seminar and poster session with invited guests from outside HORIBA was held at Kyoto University's Shibaran Kaikan, followed by the official awards ceremony and reception party. Figure 1 shows photographs from the 2007 and 2008 ceremonies.

The seminar, attended by leading authorities on the selection theme for the year, comprised of a lecture and a poster session with the intention of providing a platform for the winners to communicate and discuss with the attendees their research topics in detail. A pamphlet and a panel containing the history of bioparticle measuring technology and internal combustion engine measurement including practical applications of these technologies were made available on the day (See Figure 2 and 3).

Conclusion

This report introduced the purpose and administration of the Masao Horiba Award. Inheriting these past experiences, we set the selection theme for 2009 Masao Horiba Award as, "Ultrasensitive and Nondestructive Detection of Surface Contamination on Semiconductor and related Materials".

We hope that the Masao Horiba Award will continue to become a great uniting force for HORIBA's core technology and measurement applications.

Figure 1 Photo of Winners (a) 2007 (b) 2008

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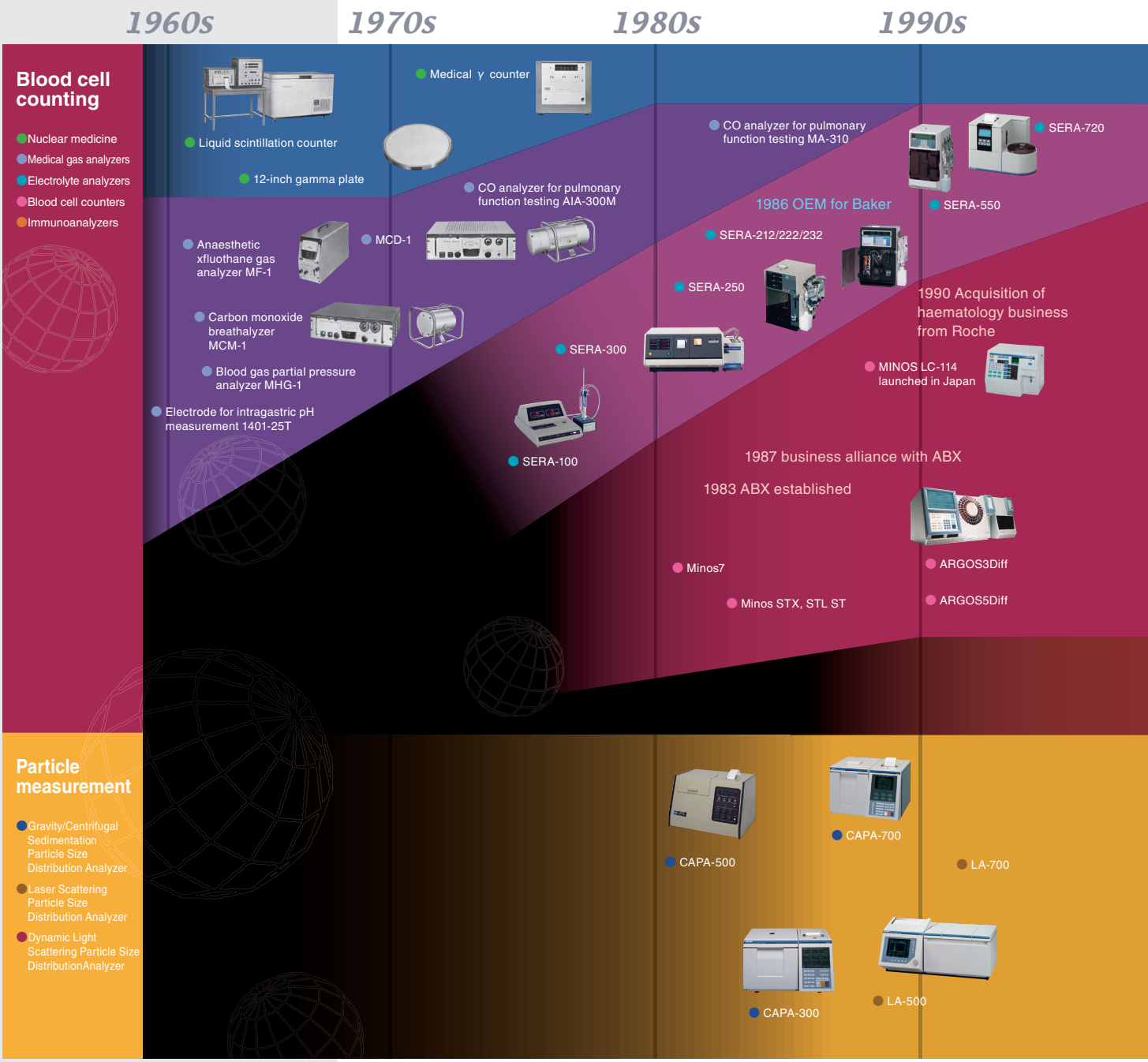
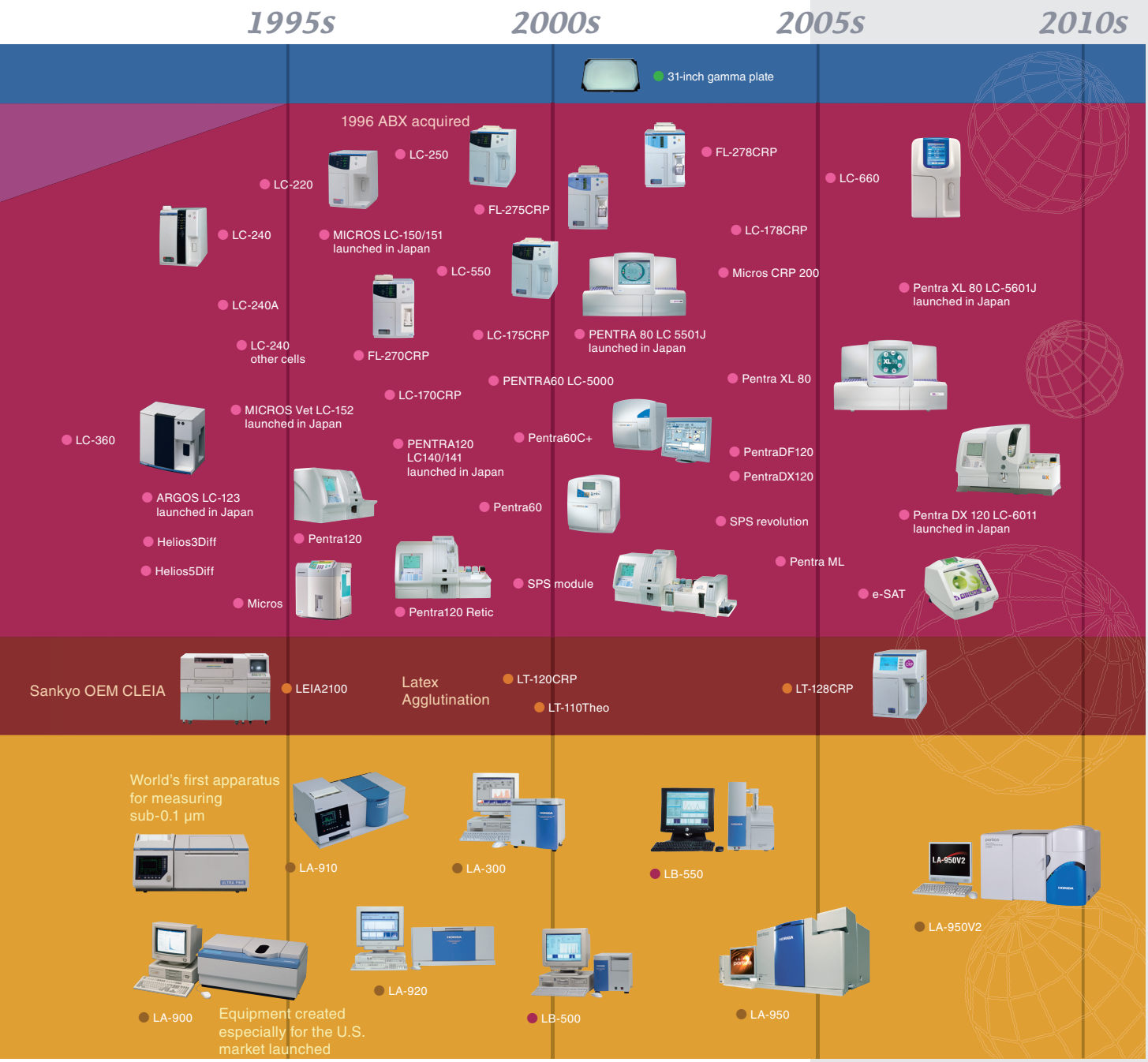


Figure 2 History of Bioparticle Measurement Technology and Applications


1995s
2000s
2005s
2010s
31-inch gamma plate
1996 ABX acquired
LC-220
LC-250
FL-275CRP
FL-278CRP
LC-660
LC-240
MICROS LC-150/151 launched in Japan
LC-178CRP
LC-550
Micros CRP 200
LC-240A
Pentra XL 80 LC-5601J launched in Japan
LC-240 other cells
FL-270CRP
LC-175CRP
PENTRA 80 LC 5501J launched in Japan
PENTRA60 LC-5000
Pentra XL 80
LC-170CRP
MICROS Vet LC-152 launched in Japan
LC-360
Pentra60C+
PENTRA120 LC140/141 launched in Japan
PentraDF120
PentraDX120
ARGOS LC-123 launched in Japan
Pentra60
SPS revolution
Pentra DX 120 LC-6011 launched in Japan
Helios3Diff
Pentra120
Helios5Diff
Pentra ML
SPS module
e-SAT
Micros
Pentra120 Retic
Sankyo OEM CLEIA
LEIA2100
Latex Agglutination
LT-120CRP
LT-110Theo
LT-128CRP
World's first apparatus for measuring sub-0.1 μm
LA-910
LA-300
LB-550
LA-950V2
LA-920
LA-900
LB-500
LA-950
Equipment created especially for the U.S. market launched

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1964 **California enacts the world's first legislation on motor vehicle emissions control in 1960.**
HORIBA develops its first vehicle emissions measurement equipment in response to global trends on car emission controls.

1968 **MEXA becomes first vehicle emissions measurement equipment to be exported from Japan to the U.S. with the assistance of a company with very strong sales distribution network in the U.S.**

1975 **U.S. Environmental Protection Agency purchases MEXA for its Vehicle Emissions Test Laboratory. The move is an indication that the U.S government has acknowledged the superior quality of MEXA.**

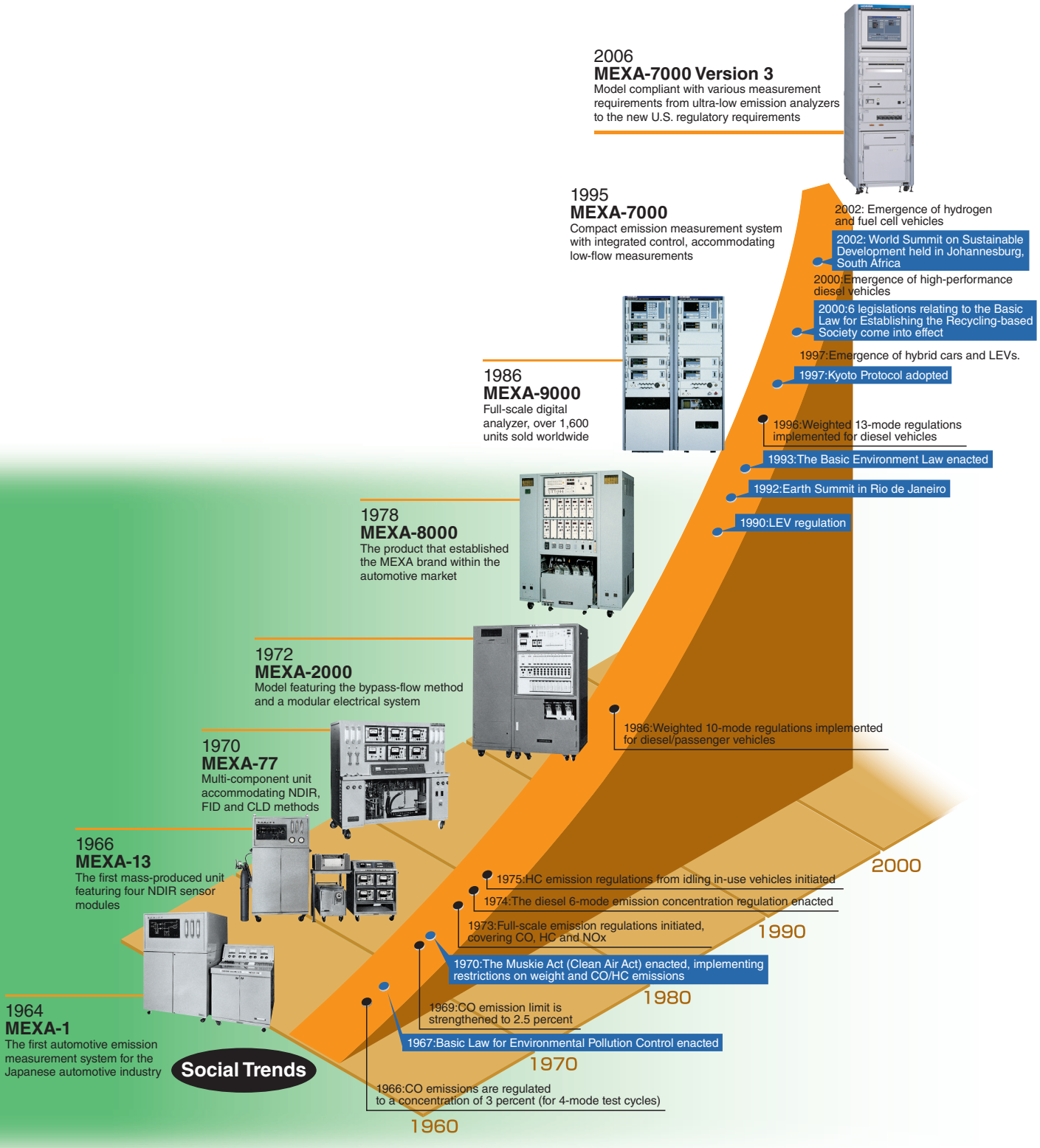
1978 **HORIBA develops MEXA-8000, the forerunner of the present series.**
With independent sampling, analysis, and control units, measurements of up to fourteen components become possible.

1986 **MEXA-9000 developed as a testing and evaluation system.**
MEXA and sampling total are controlled by a CPU and data processing can be conducted via a host computer.

1995 **MEXA-7000 launched**
Globalization of automobile manufacturing drives HORIBA to develop a unified standard for its equipment.
Engineers from overseas HORIBA group companies successfully participate in research collaboration.

2005 **HORIBA completes the acquisition of Schenck Development Test Systems from Carl Schenck.**
HORIBA adds test facilities for engines, brake systems and drivetrain systems to its existing portfolio of vehicle emissions measuring equipment that commands 80% of the market share in the world.
HORIBA aims to become a top Total Solution Partner in comprehensive vehicle testing systems.

Figure 3 Histories of Internal Combustion Measurement and Related Products


2006
MEXA-7000 Version 3
Model compliant with various measurement requirements from ultra-low emission analyzers to the new U.S. regulatory requirements
1995
MEXA-7000
Compact emission measurement system with integrated control, accommodating low-flow measurements
1986
MEXA-9000
Full-scale digital analyzer, over 1,600 units sold worldwide
1978
MEXA-8000
The product that established the MEXA brand within the automotive market
1972
MEXA-2000
Model featuring the bypass-flow method and a modular electrical system
1970
MEXA-77
Multi-component unit accommodating NDIR, FID and CLD methods
1966
MEXA-13
The first mass-produced unit featuring four NDIR sensor modules
1964
MEXA-1
The first automotive emission measurement system for the Japanese automotive industry
Social Trends
2002: Emergence of hydrogen and fuel cell vehicles
2002: World Summit on Sustainable Development held in Johannesburg, South Africa
2000:Emergence of high-performance diesel vehicles
2000:6 legislations relating to the Basic Law for Establishing the Recycling-based Society come into effect
1997:Emergence of hybrid cars and LEVs.
1997:Kyoto Protocol adopted
1996:Weighted 13-mode regulations implemented for diesel vehicles
1993:The Basic Environment Law enacted
1992:Earth Summit in Rio de Janeiro
1990:LEV regulation
1986:Weighted 10-mode regulations implemented for diesel/passenger vehicles
1975:HC emission regulations from idling in-use vehicles initiated
1974:The diesel 6-mode emission concentration regulation enacted
1973:Full-scale emission regulations initiated, covering CO, HC and NOx
1970:The Muskie Act (Clean Air Act) enacted, implementing restrictions on weight and CO/HC emissions
1969:CO emission limit is strengthened to 2.5 percent
1967:Basic Law for Environmental Pollution Control enacted
1966:CO emissions are regulated to a concentration of 3 percent (for 4-mode test cycles)
2000
1990
1980
1970
1960