Emission Measurement Technologies

HORIBA India Private Limited

Kunal Soni- Deputy Segment Head, Process & Environmental Business

70th Anniversary

Corporate Overview

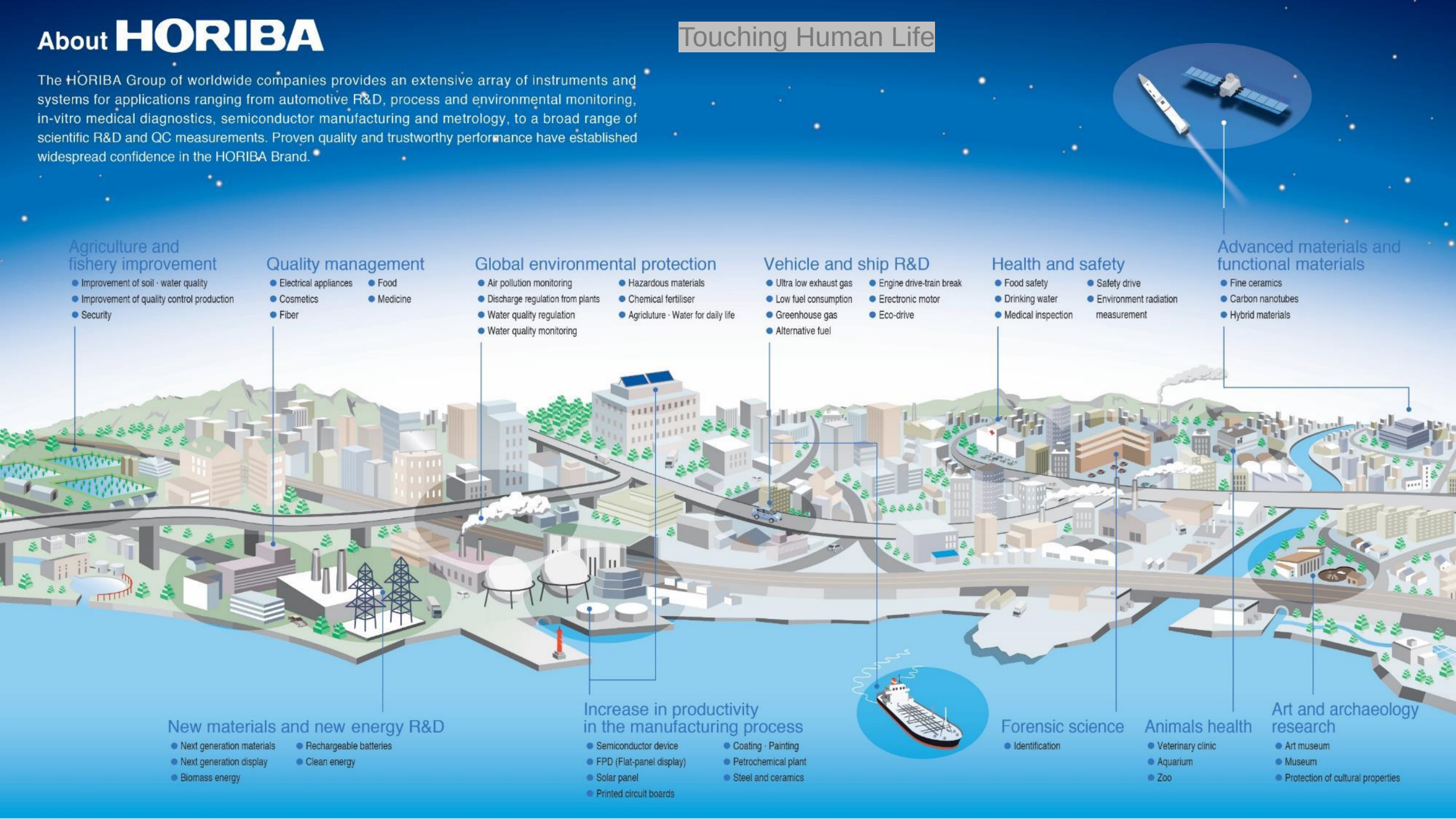
Line of Business	Manufacturing, Sales, Services of analysis and measurement equipment
Head Office	Kyoto, Japan
Founded	October 17, 1945
Incorporated	January 26, 1953
Net sales	224.3 BJPY (FY2021)
Number of Employees	8,205 (FY2021)
Chairman & Group CEO	Atsushi Horiba
Fiscal Year End	December 31

Atsushi Horiba
Chairman & Group CEO

About HORIBA

Touching Human Life

The HORIBA Group of worldwide companies provides an extensive array of instruments and systems for applications ranging from automotive R&D, process and environmental monitoring, in-vitro medical diagnostics, semiconductor manufacturing and metrology, to a broad range of scientific R&D and QC measurements. Proven quality and trustworthy performance have established widespread confidence in the HORIBA Brand.



Agriculture and fishery improvement

- Improvement of soil · water quality
- Improvement of quality control production
- Security

Quality management

- Electrical appliances
- Cosmetics
- Fiber
- Food
- Medicine

Global environmental protection

- Air pollution monitoring
- Discharge regulation from plants
- Water quality regulation
- Water quality monitoring
- Hazardous materials
- Chemical fertiliser
- Agricluture · Water for daily life

Vehicle and ship R&D

- Ultra low exhaust gas
- Low fuel consumption
- Greenhouse gas
- Alternative fuel
- Engine drive-train break
- Erectronic motor
- Eco-drive

Health and safety

- Food safety
- Drinking water
- Medical inspection
- Safety drive
- Environment radiation measurement

Advanced materials and functional materials

- Fine ceramics
- Carbon nanotubes
- Hybrid materials

New materials and new energy R&D

- Next generation materials
- Next generation display
- Biomass energy
- Rechargeable batteries
- Clean energy

Increase in productivity in the manufacturing process

- Semiconductor device
- FPD (Flat-panel display)
- Solar panel
- Printed circuit boards
- Coating · Painting
- Petrochemical plant
- Steel and ceramics

Forensic science

- Identification

Animals health

- Veterinary clinic
- Aquarium
- Zoo

Art and archaeology research

- Art museum
- Museum
- Protection of cultural properties

Five Business Segments & Major Products

Figures are the sales composition ratio for FY 2021

Automotive (27%)

Emission Measurement Systems

Process & Environmental (9%)

Stack Gas Analyzers

Medical (12%)

Automatic Blood Cell Counters plus CRP

Semiconductor (39%)

Mass Flow Controllers

Scientific (13%)

Raman Imaging Device

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Energy & Environment

Bio & Healthcare

Materials & Semiconductor

Major R&D/Production Sites

49 Companies in 27 Countries

Nuneaton, UK
(Automotive)

Oberursel, Darmstadt, Germany (Automotive, Process & Environment, Semiconductor, Scientific)

Northampton, UK
(Automotive, Process & Environment, Semiconductor, Scientific)

Montpellier, France
(Medical)

Saclay, France
(Semiconductor, Scientific)

Longjumeau, France
(Semiconductor, Scientific)

Olomouc, Czech
(Automotive)

Shanghai, China
(Automotive, Process & Environment, Medical, Semiconductor, Scientific)

Gyeonggi-do, Korea
(Semiconductor)

Haridwar, India
(Medical)

Pune, India
(Automotive, Process & Environment, Medical, Scientific)

Hsinchu, Taiwan
(Semiconductor)

Aso, Japan
(Automotive, Process & Environment, Medical, Semiconductor, Scientific)

Shiga,Japan/HORIBA BIWAKO E-HARBOR
(Automotive, Process & Environment, Medical, Semiconductor, Scientific)

Kyoto, Japan
(Automotive, Process & Environment, Medical, Semiconductor, Scientific)

Irvine CA, USA
(Automotive, Process & Environment, Medical, Semiconductor, Scientific)

Sunnyvale CA, USA
(Semiconductor)

Ann Arbor MI, USA
(Automotive)

Edison NJ, USA
(Scientific)

Houston TX, USA
(Process & Environment)

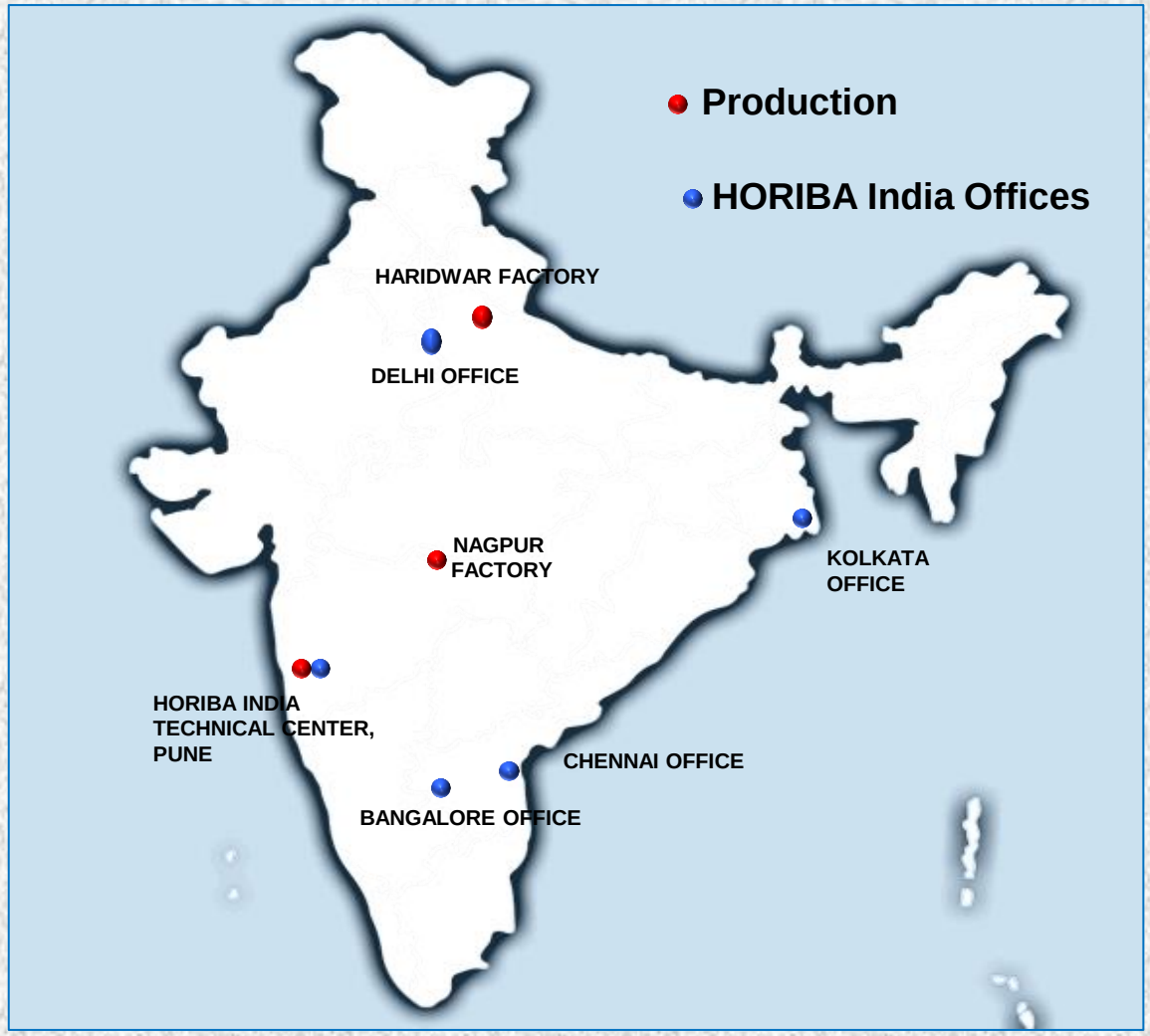
Sao Paulo, Brazil
(Process & Environment, Medical, Scientific)

Production

R&D

HORIBA India Corporate

HORIBA India Offices



HIN Delhi (Head Office):
Warehouse, Administrative Office

HIN Haridwar:
Medical Reagent Production Facility

HORIBA India Technical Center, Pune:
Automotive Testing Facility, Automotive Production, P&E Production, Semiconductor Lab

HIN Nagpur:
Medical Reagent & Instrument Factory
Medical Refurbishment
Centralized Warehouse
International Training Center
HORIBA India Technical Institute (HITI)
HORIBA Experience Zone (HEZ)

HORIBA Reach in India

One Company !

Great Place To Work. Certified INDIA

600+

Employees across cities with the same motto& thought process

HORIBA India Technical Center (HITC) Pune

Vehicle Emission Test Cell

Certification and Accreditation for Engine Testing, Vehicle Testing, Automotive Test Systems Design & Manufacturing

"Inaugurated in 2016"

Engine Test Bench

Water Products Localization

ISO9001:2015 for QMS

ISO14001:2015 for EMS

ISO 45001:2018 for OASMS

NABL ISO IEC 17025:2005

CEMS/ Ambient Localization

Make-In-India: New Facility Inauguration

Products → Solution Provider

MAAQMS Projects

EQMS Water Quality System

CEMS Turnkey Projects

Nagpur Facility

Warehouse

Certification and Accreditation consistently meet customer and applicable regulatory requirements

Certification and Accreditations:
ISO 13485-2016
CE - Marking

Production Area

Medical Refurbishment

Training Centre

Strengthening the Industry-Academy Partnership

HORIBA-IIT Delhi Technical Center

HORIBA-IISc Technical Center

Angadi Institute of Technology and Management

Business Explanation- Environment

Combustion

Ambient

Water

Process & Environmental

HORIBA Contributes to provide better technology to monitor AIR QUALITY.
HORIBA provides total solutions for measurements in global environment conservation and industrial processes, ensuring safety and security and supporting health and life.

◎ Major Products and Service

Stack Gas Analyzer

Portable Multi-Gas Analyzer

AAQMS- Fixed Type

Continuous Particulate Monitor with X-ray Fluorescence

Water Quality Checker U-50

◎ Major Customers

Electric power companies

Government agencies

Industry

◎ Product Applications

Measurement in manufacturing processes, waste water and
exhaust gas measurement, investigation of environmental
pollutants

Govt. Trends on Emission

- CPCB has published a list of 17 Industries which are under Gross Polluting Industries (GPI) in Feb, 2014.

- CPCB has issued directions under section of the Water and Air Acts to the State Pollution Control Boards and Pollution Control Committees for directing the 17 categories (such as Power Plants, Iron & Steel, Cement, Oil Refineries, Fertilizer, Petrochemicals .
- A revised guidelines is published by CPCB for Continuous Emission Monitoring System in August 2018. In this guidelines all the efforts has been made to include all available monitoring technologies/instrumentation in the document .
- The directions envisage:

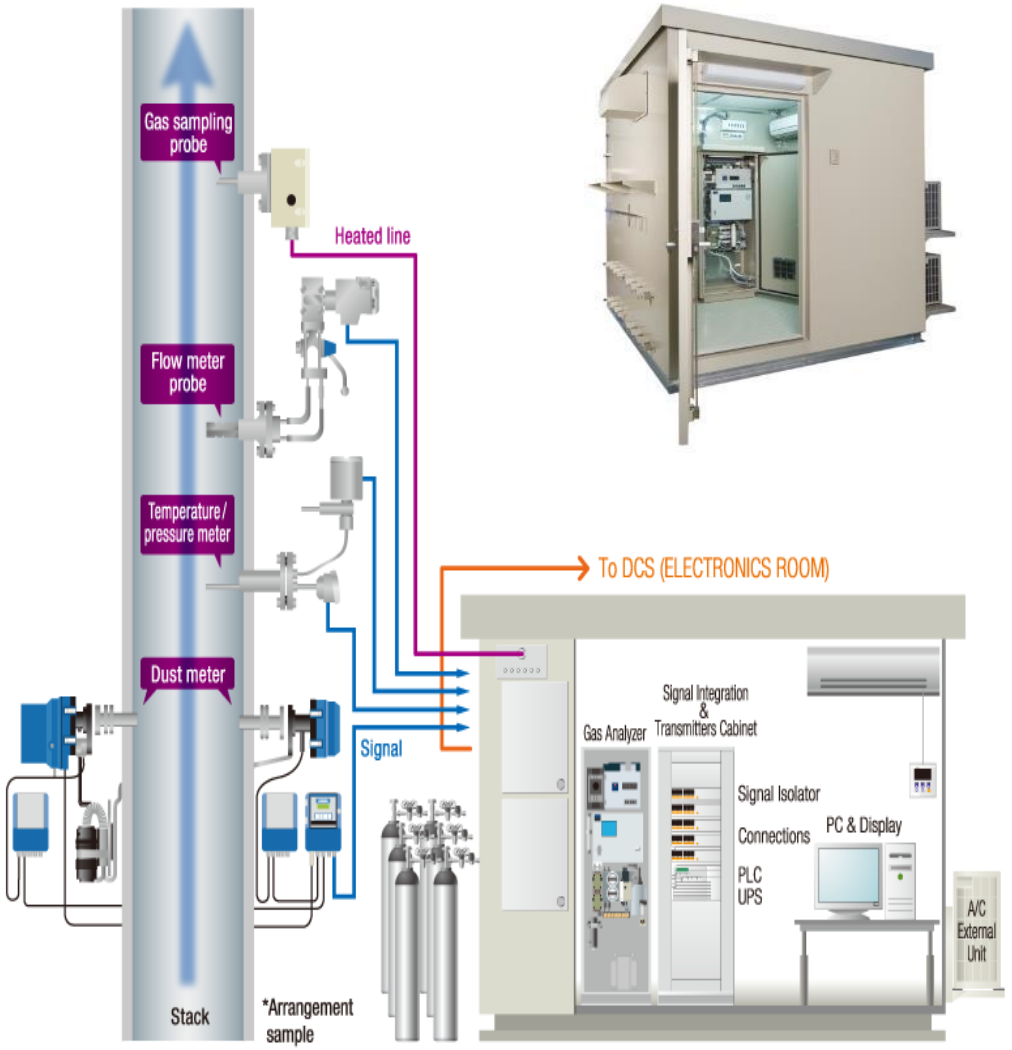
a) Installation of online emission quality monitoring system in 17 categories of highly polluting industries and in **Common Hazardous waste and Biomedical waste incinerators for measurement of the parameters such as , Particulate Matter, NH_3 (Ammonia), SO_2 (Sulphur Dioxide), NO_X (Oxides of Nitrogen)** and other sector specific parameters

b) Transmission of 24 x 7 online data so generated should transmitted simultaneously to SPCB/PCC and CPCB as well.

c) Ensure regular maintenance and operation of the online system with tamper proof mechanism having facilities for online calibration (onsite/ offsite; Remote).

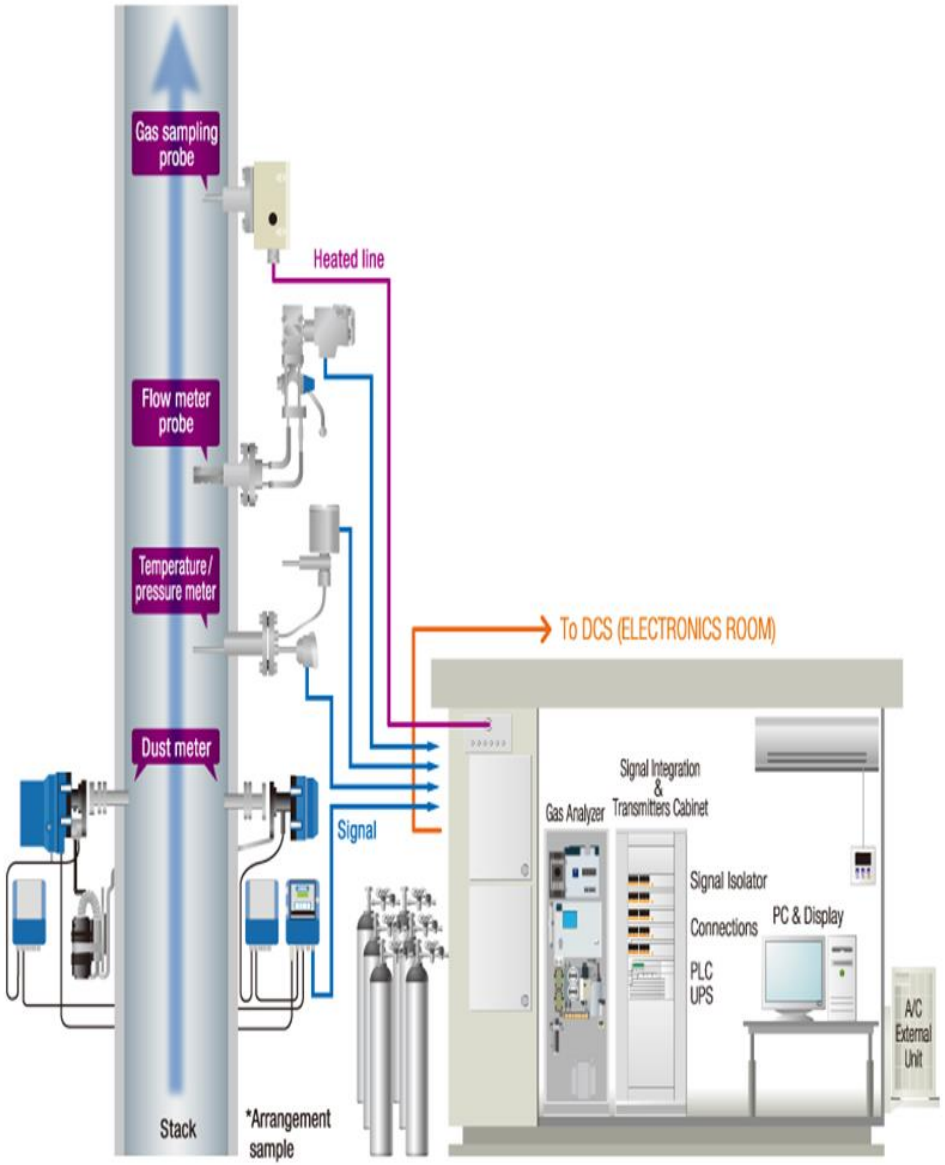
Stack Gas Monitoring

- ✓ A sampling probe mounted at the appropriate height on a stack
- ✓ A sample line to transport moisture-laden gas samples to the analysis station/Analyser. *(Sample Line can be heated or non heated depending upon the sample to be analysed)*
- ✓ A programmable logic controller (PLC) to manage the monitoring process. *(HMI)*
- ✓ A suitable data acquisition system (DAS) to generate data, reports and records. *(Software / Cloud based)*
- ✓ A shelter building erected and maintained to provide the proper operating environment for the analysis equipment. *(Customized requirement)*



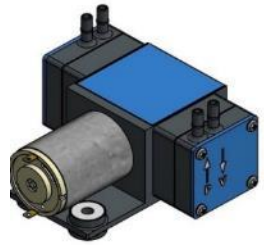
Challenges in Stack Gas Monitoring

Common Challenges- Sample Conditioning System



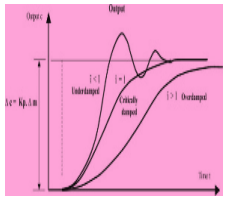
Cooler

Pump



Analyzer Sample Conditioning System

Drifts (Zero & Span)

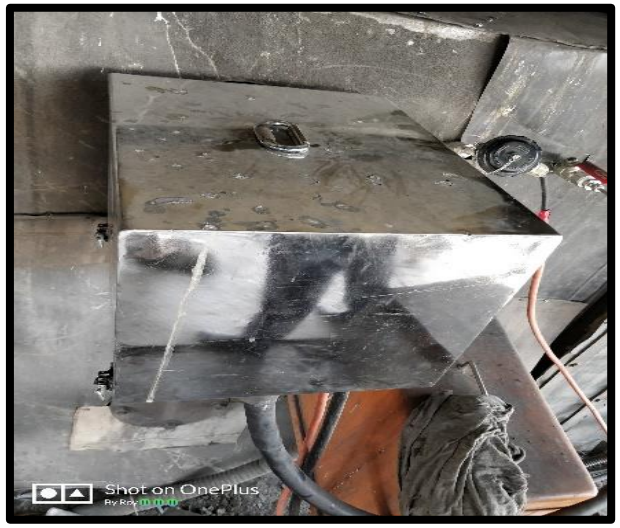


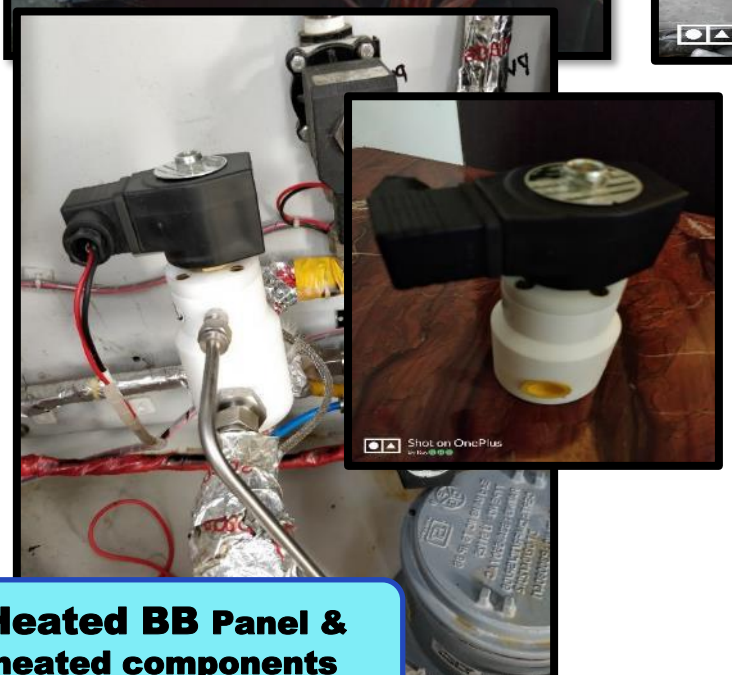
HORIBA Solution in Stack Gas Analysis

Well Engineered Solutions

Well Engineered Japanese Systems for CEMS Application.

Heated well design Probe

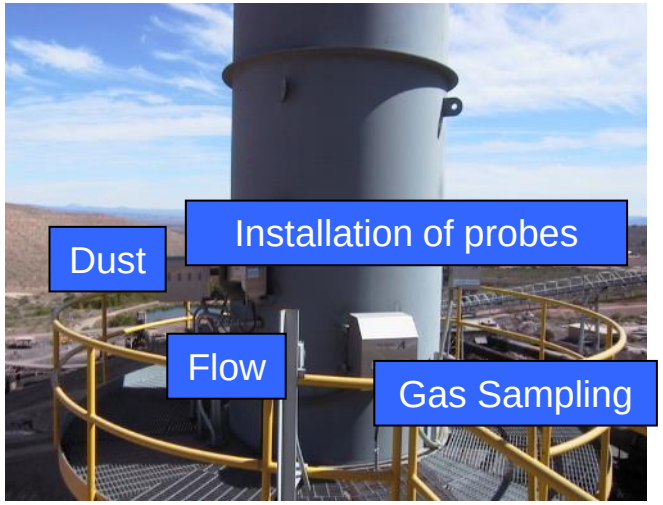




Heated BB Panel & heated components

- Blow back panel is very crucial & important module for Any Extractive Gas Analyser Systems.
- Design & Vetted by HORIBA –Japan.
- Teflon Based SOV's are used for Sample line to avoid in kind of choking where the moisture and SO2 is high.
- This is due to avoid cold spot and to avoid any kind of corrosion.
- All the components are heated.

Continuous Emission Monitoring System <ENDA-5000 series>



Consulting services
to prepare proper SAMPLING SYSTEM
as per your sample gas condition

HORIBA Features

- Cross Flow Modulation NDIR for NOx, CO, CO2, SO2, MPA for O2
- Patent “Cross Flow Modulation“ enables long term high stability
- Experience with US EPA RATA, TUV
- In-house manufacturing of optical units and sampling scrubbers

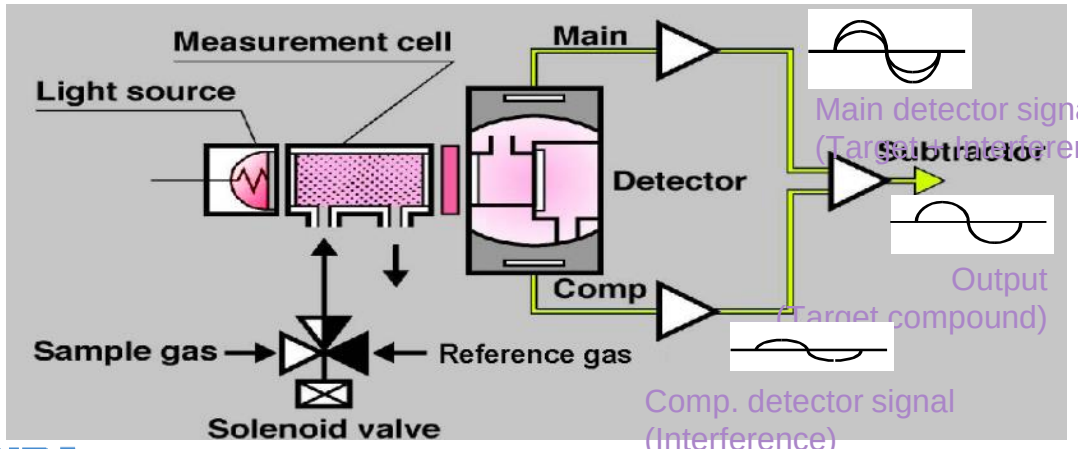
Applications

- Compliance Stack monitoring for Power, Steel, Cement, Chemical plant etc
- Process monitoring such as Flue Gas Desulfurization (FGD), De-NOx (SCR) process, Combustion efficiency Monitoring (CO, O2), etc…

HORIBA

Cross Flow Modulation advantages

	HORIBA NDIR CFM	Non CFM- NDIR
Optical adjustment	Not necessary	Necessary
Zero Drift	Stability is very good in long time	Stability is good
Measurement cell	Keeps the cell clean always	Cell cleaning is required



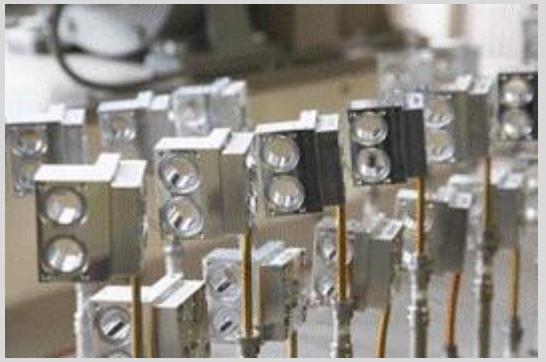
- NDIR (NOx, SO2, CO, CO2)
- CFM*1
- No zero drift
- No optical adjustment
- Automatic cell cleaning

*1 CO2 is not with CFM

In-house manufactured, NDIR Key Optical components

Optical Filter

Optical module



NDIR Detector

E-HARBOR

Unify R&D, design, Engineering, manufacturing for Gas measurement technology and product

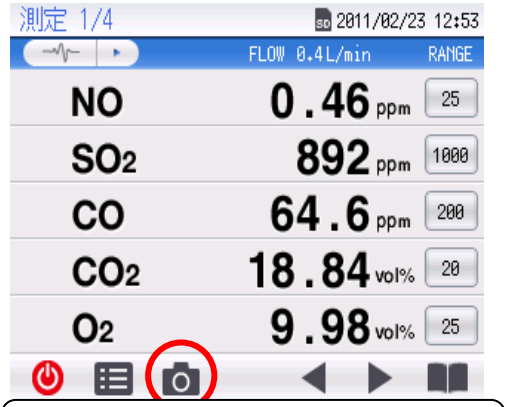
Portable Gas Analyzer, <PG-350 Series>

Special Features

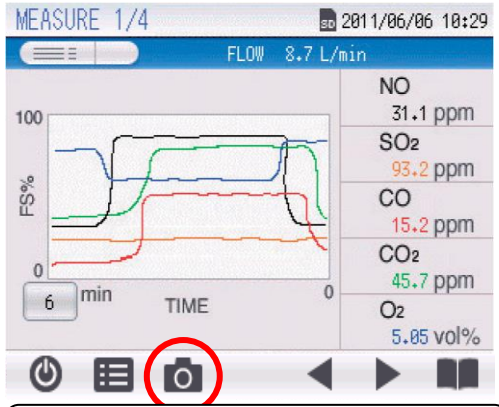
- CFM NDIR (CO, CO2, SO2, CH4), Selectable (Zr, Galvanic, PMA) O2, CFM CLD (NOx)
- Patent “Cross flow modulation technology “
- 5 parameter in one system
- All in one (Sampling included)
- Easy operation (Touch panel, Visual graph, Display capturing)
- 3-5 days continuous monitoring
- SD Memory, no need data logging system.

- **NEW: N2O, CH4, CO2, O2 for Green House Gas and Carbon Neutrality.**

N0 data logger required



5 parameter in one



Visual graphing mode

Applications

- Stack test, CD/RA, Biomass research

NEW: PLGA-1000

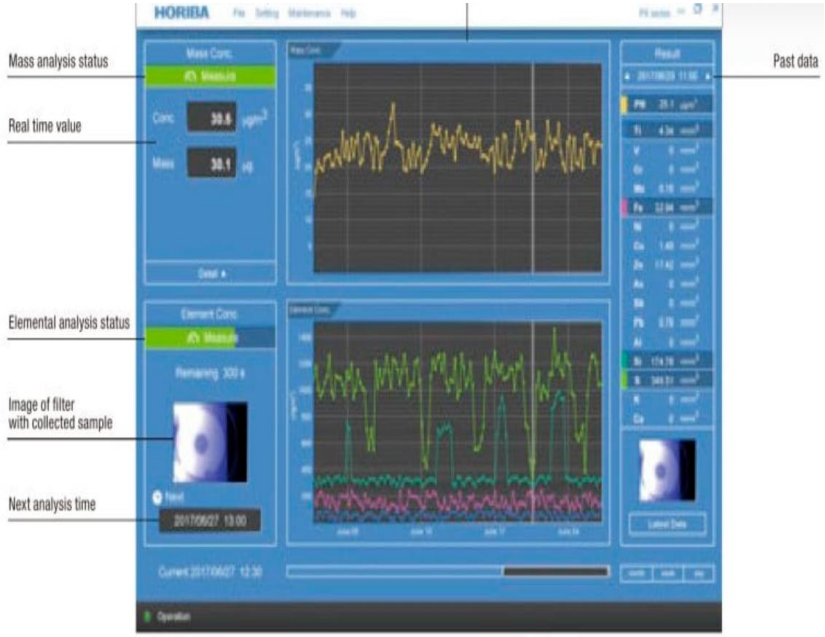
- Process gas analyzer to measure CH4, C2H6, C2H2, CO2

- Ultimate gas sensing ever;
  - Based on IRLAM technology
  - High Sensitivity in ppb-level
  - Fastest response, true-real-time measurement
  - Robust to install in any-conditions
  - Ultimate Total Cost Ownership
  - Up to 4 components
  - User-Friendly Interface Touch Panel

HORIBA Process & Environmental

Mobile AAQMS Project

Products → Solution Provider



- Provide Fixed and Mobile AAQMS Project.
- Includes SO2, NOx, CO, NH3, THC, O3 with PM2.5, PM10, Calibrator etc.
- PX Real time Elemental analysis system will help for source apportionment studies.
- Design, Engineering and execution by HIN with local SI for container.
- Data connectivity to local and Central servers.

HORIBA Process & Environmental

PX-375: PM with Elemental Monitoring

- Continuous monitor of mass and element concentration in particulate matter
- Extremely compact design
  - ✓ 19 inch design
- World proven technology
  - ✓ X-ray fluorescence & Beta-ray attenuation
- Enable to analyze trapped sample on the filter tape by other scientific instruments.

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	*1	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	*2	Rf	Ha	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Unt	Fl	Unp	Lv	Uus	Uno

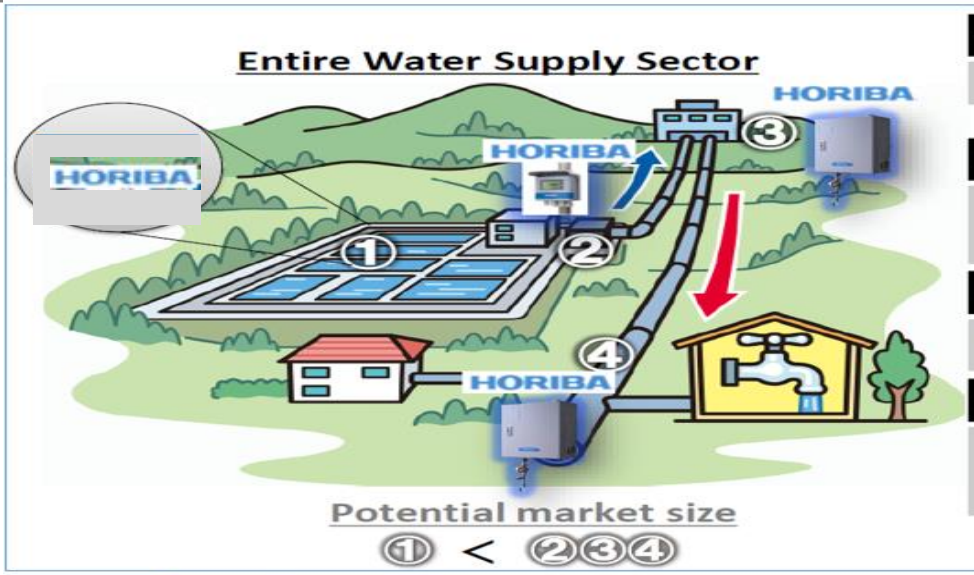
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

: Detectable Element

*1 Lanthanides

*2 Actinides

Water analyzer range



① Water Treatment plant "process"
- Process and O&M optimization

② Water Treatment plant "outlet"
- Conform to water quality regulation
- Reliable mean. data for Feedback Ctl.

③ Pump station / Reservoir
- Remote monitoring & disinfect optimization

④ Distribution network
- Remote monitoring for secure water quality
- End point disinfection

Priority change "Water Quantity > Quality" ➡ "Quantity ≒ Quality & Hygiene"

7 Parameters

pH TURB COND PRESS RC COLOR TEMP

Water Distribution reservoir,

Application

Township, hospital, school etc

WTP/STP Pump Station

Solar Panel

Launch: Online TOC for Wastewater

Next Generation TOC Analyzer

- Predictive maintenance based on Industry 4.0 / IIoT
- Designed for Waster water application.
- Catalyst-free high temperature process at 1,200 °C with "Fast Change Technology“.
- Can measure upto 10,000 ppm (Optional upto 100,000 ppm).
- Only one maintenance per year
- Super fast cycle time
- End-user oriented design
- OPC UA, Profinet, Modbus, 0/4 – 20 mA
- Bluetooth, Ethernet, WLAN, GSM
- Convincing price / cost-of-ownership

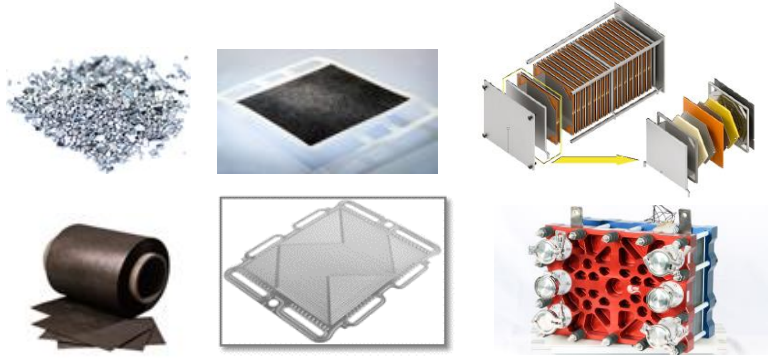
Model: T1 TOC

- Applications are:
  Sewage,
  Process water,
  Boiler feed water,
  Surface water,
  Sea water

HORIBA Process & Environmental

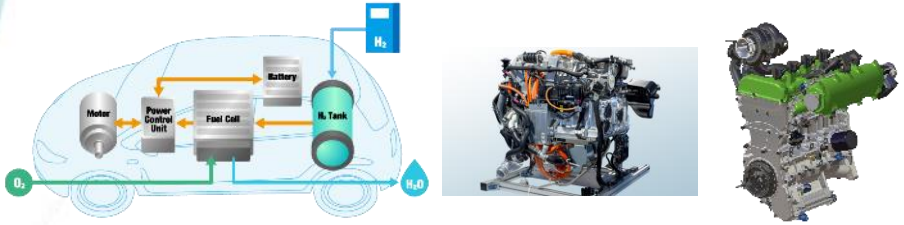
Solutions covering all hydrogen value chain

Research and Development on Materials

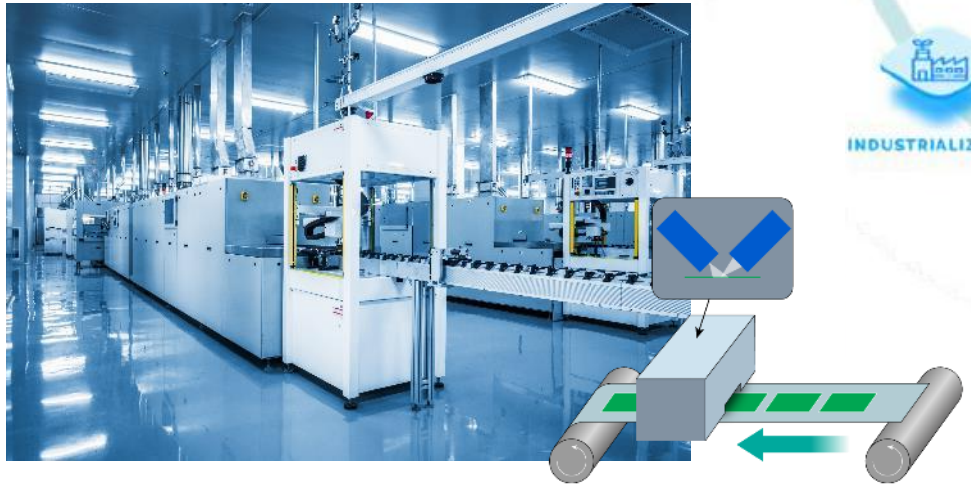


Gas Management

Solutions for Testing



Manufacturing Process Control



Engineering and Consultancy

Test Products Overview

Turnkey laboratory and testing environments

Fuel cells

- PEM, SOFC
- BoP components
- R&D + Durability

Electrolysers

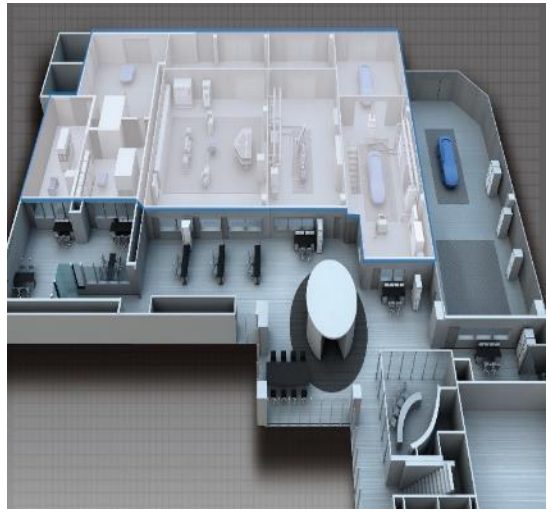
- AEM, PEM
- SOEC
- R&D + Durability

Batteries

- R&D
- Production
- End of Line

Turn-key Facilities

- Facility Design & Build
- Evaluator Equipment
- Safety Management



HORIBA Automotive

Confidential

Question & Answer

Contact for more information:-

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