The Analytical Instrument Role

Simon Senior
PerkinElmer
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Agenda.

- Who is PerkinElmer Inc?
  - Mission
  - At a glance
  - Customer Market Segment Focus
- What is an Analytical Instrument?
- Examples of Analytical Instruments (from PerkinElmer)
- What is PAT?
- Hearing the customer voice . . . and responding to it.
- What’s next?
PerkinElmer Overview
Our mission...

We are taking action to improve the health and safety of people and the environment.
PerkinElmer at a glance

Operations in more than 150 countries

Over 3,300 Patents

Approximately 7,000 Employees Worldwide

49% Americas

31% Europe

20% Asia-Pacific

49% Americas

33% Europe

18% Asia-Pacific
Leveraging knowledge and customer insights….

TURNING KNOWLEDGE INTO ACTION TO MEET AND ANTICIPATE CUSTOMER NEEDS

HIGH QUALITY PRODUCTS
CUSTOMIZED SOLUTIONS
APPLICATIONS & TECHNICAL KNOWLEDGE
QUALITY SERVICE
BETTER INNOVATIONS

...into innovation
The way we do business...

<table>
<thead>
<tr>
<th>COMMUNITY</th>
<th>ENVIRONMENTAL HEALTH &amp; SAFETY</th>
<th>PRODUCT STEWARDSHIP</th>
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<tbody>
<tr>
<td>We are committed to making a difference in our communities via strategic philanthropy, partnerships, and employee volunteerism.</td>
<td>We seek to operate our facilities in a manner that ensures the health and safety of our employees, the public, and the environment.</td>
<td>We seek to design, develop, and manufacture our products in a manner that minimizes the health and environmental impacts throughout the product life cycle.</td>
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CORPORATE SOCIAL RESPONSIBILITY

...is as meaningful as the solutions we provide
We’re taking action to accelerate personalized health

MAKE PEOPLE HEALTHY

Environmental Health*

Human Health*

50%

ENSURE THE QUALITY OF THE ENVIRONMENT

50%

*Human Health and Environmental Health breakdown based on approximate values
Helping diagnose and treat disease earlier…

- **Family Health**
  - Provides an array of clinical lab testing services
  - Screened over 4.5 million babies for disorders to date
- **ViaCord**
  - A world leader in cord blood banking
- **Professional & Patient Services**
- **Medical Imaging**
  - Leading global supplier of digital x-ray flat panel detectors used in real-time systems for radiotherapy and radiosurgery oncology treatment

Diagnostics

… for more effective therapies
Helping find disease pathways better…

- **Life Science Research & Discovery**
  - Bridging the gap from *in-vitro* to *in-vivo* imaging
  - Leading GCPR and kinase portfolio
  - Delivers on cell-based, biochemical, radiochemical or blotting needs to move research and drug discovery forward
  - Turning results into knowledge through next generation sequencing and analysis
    - Sample process & tracking, automation, exome capture, and sequencing & analysis

- **Pharmaceutical Development & Manufacturing**
  - Robust portfolio of automation and detection instruments with proven application solutions

…to deliver drugs and therapies faster
Helping detect environmental contaminants…

- **Environmental Monitoring**
  - A leading environmental solutions provider, delivering systems and services required to monitor the quality of water, air, soil, and hazardous waste

- **Renewable Energy Development**
  - Contributes to the development and testing of biofuels, solar cells, and wind turbine technology

…and ensuring safety and compliance
Helping assure food and product safety…

Food, Quality, Nutrition & Safety
- Ensures testing for many aspects of quality such as freshness, taste and nutritional content
- Enables customers to efficiently meet food and beverage testing requirements

Consumer Goods Safety
- Helps to detect the presence of potentially dangerous materials in toys and other consumer products such as lead and cadmium

Food and Consumer Safety

…with accurate solutions and services
Helping provide analytical techniques...

- **Non-Destructive Testing**
  - Our flat panel detectors help detect inconsistencies through part and infrastructure inspection

- **Chemicals**
  - Our portfolio of analytical solutions is designed to give you the highest accuracy, sensitivity and ease of use to examine plastics and polymers with confidence.

...to deliver reliable manufacturing and testing performance
Providing customers with critical insights enterprise-wide…

INFORMATICS

- Knowledge sharing platforms to power innovation
- Unlocking the value of information throughout our customers’ R&D organizations
- Electronic Laboratory Notebooks for discovery through validation of new drugs
- ChemOffice WebServer for development and deployment of information applications

…..to harness data for more informed scientific decisions
OneSource delivers asset management...

A comprehensive, yet flexible and customized program that optimizes operations, ensures compliance, and controls costs for any size laboratory.

- Managing over 400,000 assets
- Over 15 years of multi-vendor service experience

End-to-End Customer Relevance

Install
Maintain/Repair
Qualification & Validation
Multivendor
On Site Services
Asset Management & Disposition
Lab Relocation
Lab Lifecycle Management

...value through innovative, knowledge-based service solutions
“A **scientific instrument** can be any type of equipment, machine, apparatus or device as is specifically designed, constructed and often, through trial and error, ingeniously refined to apply utmost efficiency in the utilization of well proven physical principle, relationship or technology to facilitate or enable the pursuit, acquisition, transduction and storage of repeatable, verifiable data, usually consisting of sets numerical measurements made upon otherwise unknown, unproven quantities, properties, phenomena, materials, forces or etc., preferably as those characterized over time by an increasing degree of accuracy and precision and, typically, those initially derived as isolated or dependent variable results from, or empirical observations made during, the course of such experimental procedures as are firmly based upon the scientific method and long accepted tenants of experimental design”. ([www.wikipedia.com](http://www.wikipedia.com))

“Analytical instrumentation: a large class of instruments used to analyze materials and to establish the composition”. ([www.wiki.answers.com](http://www.wiki.answers.com))
A look back at our history
Addressing organic, inorganic and materials analysis

Our analytical instrument portfolio . . .
“PAT is a term used for describing a broader change in pharmaceutical manufacturing from static batch manufacturing to a more dynamic approach. It involves defining the Critical Process Parameters (CPPs) of the equipment used to make the product, which affect the Critical Quality Attributes (CQAs) of the product and then controlling these CPPs within defined limits. This allows manufacturers to produce products with consistent quality and also helps to reduce waste & overall costs”.

(www.wikipedia.com)

“Process analytical technology (PAT) has been defined by the United States Food and Drug Administration (FDA) as a mechanism to design, analyze, and control pharmaceutical manufacturing processes through the measurement of Critical Process Parameters (CPP) which affect Critical Quality Attributes (CQA)”.

(www.wiki.answers.com)
Hearing our customers.

- Make it smaller or portable
- Reduce my running costs
- I want more for less sample
- Make it run unattended
- Make it easier to use
- Make it link to other things
- Make it faster
- Make it more sensitive

... and listening to what they say!
“Make it smaller, more portable, not tethered to a bench” . . .

Spectrum RX

110cm wide x 54cm deep x 77cm high
54kg
438kwh

Spectrum Two

45cm wide x 24cm deep x 18cm high
11kg
104kwh

By Volume -90%
By Weight -79%
CO₂ -76%

So we did!
Portable, application specific modules.

- Pharmaceuticals
- Food Safety Analysis
- Traditional Chinese medicines / Nutraceuticals
- Fuels & Biofuels
- Used oils
- Oil in Water
HyperDSC™ expands DSC capabilities . .

- Improvements in power compensation technology allow one to run samples faster than before.
- Rates for heating & cooling of up to 750 °C/min.
- Greatly reduces testing time to allow process monitoring and increase throughput.
- At heating and cooling rates of 500 °C/min, over 250 samples/24 hrs.

Faster sample analysis, greater throughput.
Coupling of TGA to either IR or MS is needed to understand what is evolved.

Use of TGA with GCMS allows detection of small impurities.

Coupling TGA to IR and then MS or GCMS allows best understanding of material.

DSC coupled to Raman Spectroscopy allows very precise studies of the crystalline and polymorphic behavior of pharmaceuticals, foods like chocolate, starches, and fats and semi-crystalline polymers used in packaging.

Providing more data from less sample.
Oil Analysis by ICP Emission Spectroscopy & IR Spectroscopy.

- **Caterpillar** – Analysis of used engine oil for wear metals to identify early parts failure, leading to better engine designs.

- **Oil Companies** – Analysis of new oil for additive elements to meet oil blending specifications.

Avoid unplanned engine maintenance & reduce running costs.
PerkinElmer was working with the EPA to develop methods for testing ozone precursor hydrocarbons.

We helped TCEQ set up the first Photochemical Assessment Monitoring Stations (PAMS) — fixed monitoring stations that collect data hourly from numerous sites.

These stations utilized our TurboMatrix and Clarus® GC systems, which can perform dual-column analysis unmanned all day, every day, even under adverse conditions.
Monitoring ozone precursors... And various air toxics.
What is LimsLink?

- Software solution that acts as the “Information Wiring” or “Universal Translator” for the lab.

- Used to integrate instruments & instrumentation systems to a wide variety of Informatics Systems including ELN (E-Notebook), LIMS.

- Scalable application can be deployed as:
  - Workstation Applications on a single PC
  - Client /Server solution supporting centralized database, security and audit components
  - 21CFR Part11 compliant
Listening more to... At-line?

On-line?

In-line?

seek opportunities in PAT perhaps?