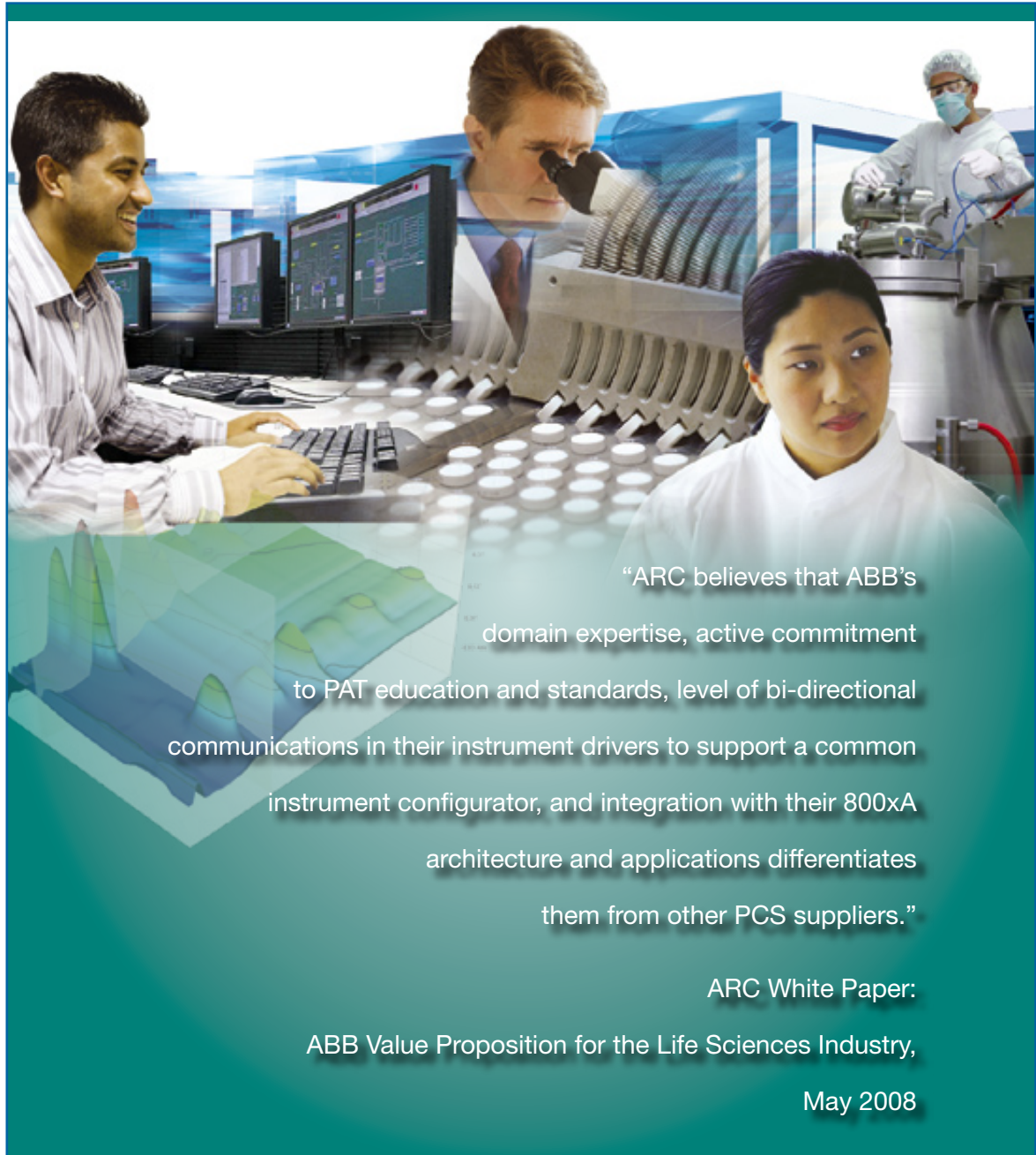


ABB in Process Analytical Technology

Executive Summary for the Life Sciences Industry



“ARC believes that ABB’s domain expertise, active commitment to PAT education and standards, level of bi-directional communications in their instrument drivers to support a common instrument configurator, and integration with their 800xA architecture and applications differentiates them from other PCS suppliers.”

ARC White Paper:
ABB Value Proposition for the Life Sciences Industry,

May 2008



Why ABB?

A Quality by Design (QbD) approach using Process Analytical Technology (PAT) requires more than a collection of analyzers and models. It requires people who understand the life sciences industry in order to gain tangible benefits from the data and the right products to allow data to be captured, processed and stored in a regulatory compliant manner – plus lifecycle support to enhance the benefits of the capital invested.

Address Your Business Needs:

- Identify key ROI opportunities
- Reduce time to market
- Decrease production costs
- Reduce Capital Expenditure (CapEx) costs
- Increase production flexibility
- Enable real-time product release

Comprehensive and Extendable Solutions:

- Seamless scalability from development to manufacturing
- Data management, visualization and advanced control
- Industry standard analyzer interfaces
- Enterprise connectivity and productivity tools

Global Support:

- 24 hour “Hot-Line” support
- Local Service support around the world
- Global Logistics (parts) centers
- SolutionsBank
- Software Maintenance

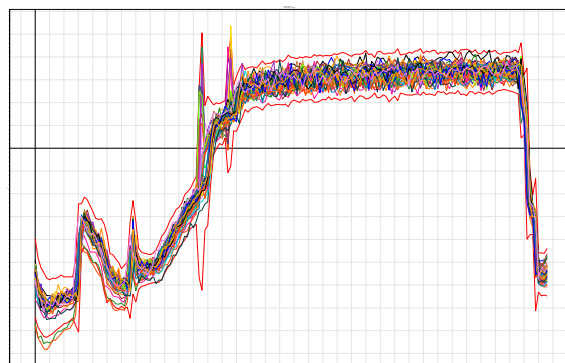
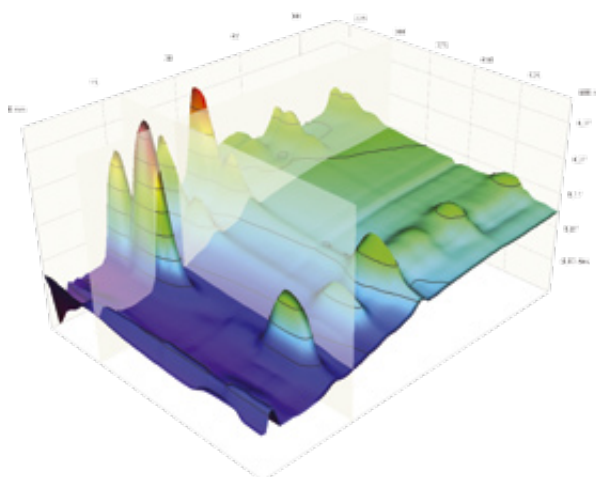
- Implementation / engineering services
- Calibration services
- Consulting services

Know Your Process - Measure It:

- Comprehensive analyzer coverage
- Low drift for highly repeatable measurements
- Reproducible analyzers allow calibration transfer
- Over 50 years of multi-industry analyzer experience

Solution Capabilities and Applications:

- Affordable, Comprehensive Solutions
- Application Knowledge and Expertise
- Regulatory Validation Expertise



Address Your Business Needs

“An independent evaluation convinced us that the ABB 800xA is the most advanced and versatile control system in the market today. This system integrates process control, manufacturing automation, and data management into an intuitive and facile common platform.”

- Biomanufacturing Training and Education Center, Raleigh, North Carolina

With a proven track record throughout the life science industry, ABB has the solutions and expertise to address your needs. Automation and manufacturing solutions have been shown to improve plant productivity, product quality and process throughput, while reducing overall operating costs. By promoting more agile manufacturing, ABB provides you with a competitive edge in the global marketplace.

ABB's Industrial IT solutions for PAT and automation are applicable to the complete product lifecycle - from development, through scale up to manufacturing. Through the use of Aspect Object™ technology, ABB provides an integrated environment for ease of engineering, data and process visualization, data management, multivariate advanced statistical process control and enterprise connectivity. Interoperability with analyzers is assured by a common configurator and industry standard analyzer interfaces based on OPC UA technology. These technologies together enable better process understanding, leading to increased innovation during manufacturing and optimization.

ABB can help customers navigate the latest trends in the marketplace:

External Change Drivers

- Advances in science and technology
- End of patent protection on several blockbuster drugs
- Increasing competition
- Counterfeiting & product security
- Regulatory pressures
- Medicare and prescription drug plan price and delivery pressures

New Manufacturing Environment

- Continuous capacity planning, make to order
- 100's of products and recipes with multiple batch sizes
- Modular, PAT-enabled process & packaging equipment
- Inventory and product lifecycle
- Real-time product release





Comprehensive & Extendable Solutions

Seamless scalability from development to manufacturing

The ABB Solution for PAT integrates analytical and automation products in a flexible and scalable platform. It provides a single configuration for multi-vendor analytical instrumentation, data acquisition and central storage of all analyzer and process related data.

Data Management, visualization and advanced control

The PAT data management and control platform allows users to manage analyzer control parameters, store analyzer data and perform multivariate data analysis for process monitoring and process control.

Industry standard analyzer interfaces

Analyzer integration for PAT presents a unique set of challenges. There is a large variety of analyzers, provided by multiple vendors, which provide many different types of critical data. The best way to accomplish the level of analyzer integration required for PAT is through broadly-adopted open standards.

ABB actively supports the adoption of the OPC-ADI (Analyzer Device Integration) standard and has announced plans to release products against the specification.

Enterprise Connectivity and Productivity Tools

ABB's Industrial IT cpmPlus Enterprise Connectivity (ECS) bridges the vertical integration gap between Business and Manufacturing systems, delivering significant new opportunities to increase productivity.

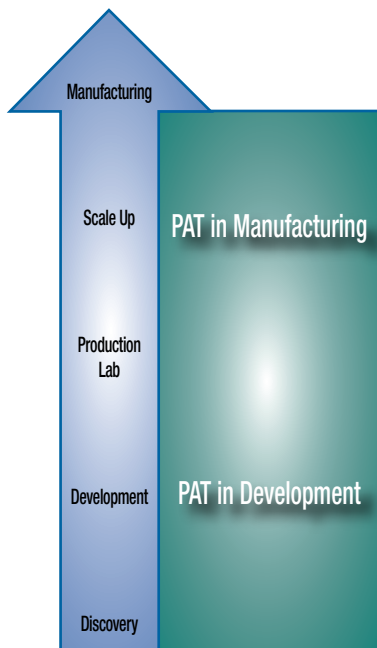
ABB's SmartClient provides intelligent data access and viewing functions to assist all levels of personnel in making quick, informed decisions and taking the appropriate action, thereby improving performance.

ABB's Real-Time Production Intelligence (Real-TPI), is a real-time performance measurement and analysis software program that improves plant productivity by identifying ways to increase OEE (Overall Equipment Effectiveness).

ECS and SmartClient reduce the Total Cost of Ownership (TCO) for integration of ERP and Plant systems by using a standard product for all vertical integrations, rather than a custom developed, point-to-point solution.

“ABB's unique approach to PAT systems and solutions puts them in an excellent position to meet the future business and regulatory needs of this industry while driving down the Total Cost of Ownership (TCO).”

ARC White Paper:
 ABB Value Proposition for the Life Sciences Industry
 May, 2008

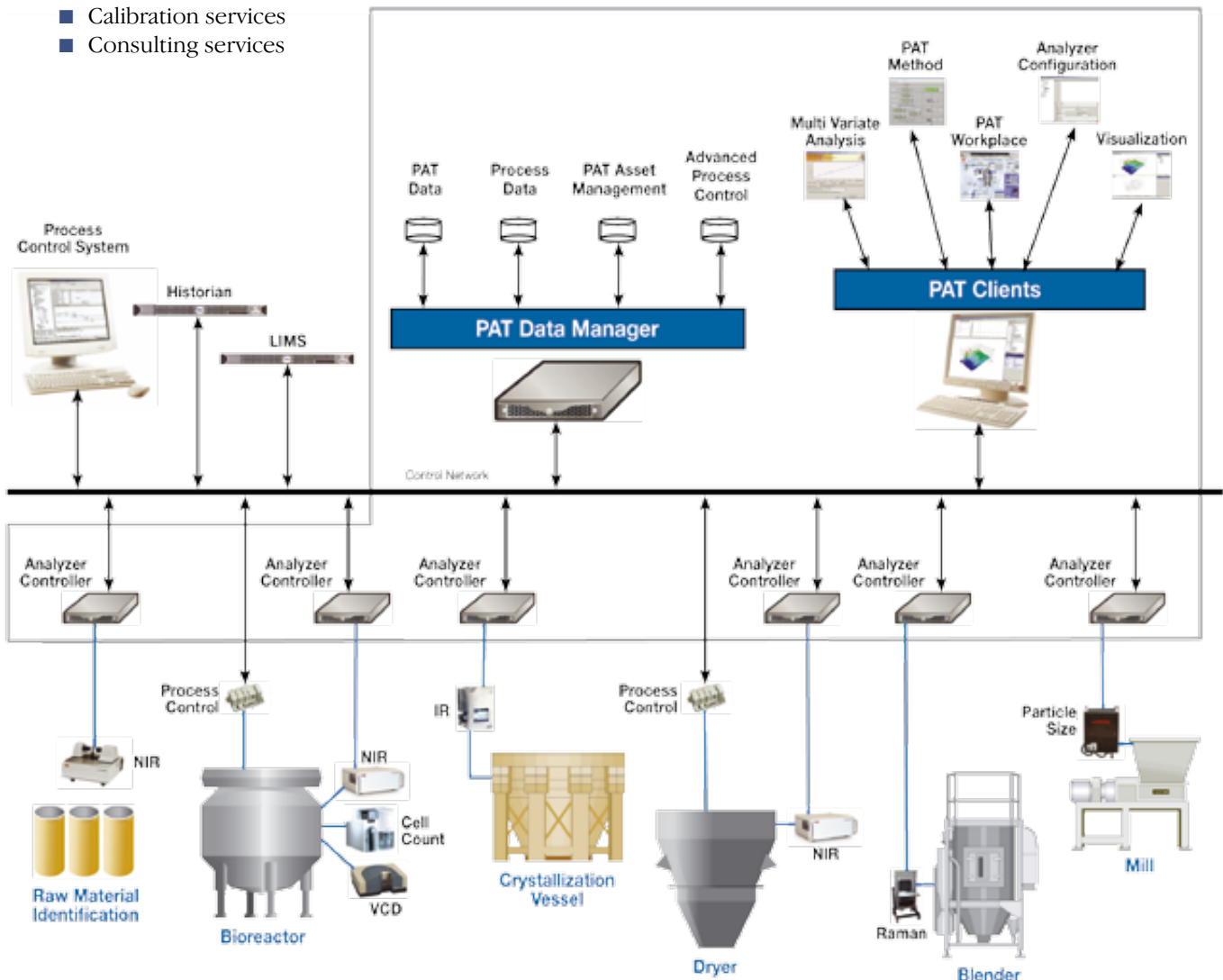


Scalable Solutions

Global Support

ABB has sales, service and support in 108 countries around the world. Local service combined with global support, helps contain project costs while providing concentrated engineering support, no matter where your manufacturing plant is located.

- 24 hour “Hot-Line” support
- Local Service support around the world
- Global Logistics (parts) centers
- SolutionsBank
- Software Maintenance - Automation Sentinel
- Global implementation
- Global engineering services
- Calibration services
- Consulting services





Know Your Process – Measure It

“We will not release any new products unless they are using PAT.”

Global
Pharmaceutical
Company
IFPAC, 2008

Lord Kelvin, the great 19th-century physicist said, “When you can measure what you’re speaking about and express it in numbers, you know something about it; when you cannot measure it your knowledge is meager and unsatisfactory.”

This is still true today. ABB Analyzers measure what is happening *in situ*. ABB’s PAT solution helps you manage, interpret and act on the resulting data, turning it into actionable knowledge to enhance production and ultimately, the quality of your product.

Comprehensive analyzer coverage

ABB Analytical designs, manufactures and markets high performance, affordable FTIR and FTNIR spectrometers as well as turnkey analytical solutions and spectroradiometers for remote sensing. ABB Analytical capabilities encompass one of the largest portfolios in the world for laboratory, at-line and process FTIR analyzers. They perform real-time analysis of the chemical composition and/or physical properties of a process sample stream.

ABB Analytics also provides:

- Analyzers are low drift for highly repeatable measurements
- Reproducible analyzers allow calibration transfer
- Over 50 years of multi-industry analyzer experience



FTPA 2000 Process Analyzer



MB 3000 Analyzer

Process Applications

Raw Material ID
Blending
Drying
Extrusion
Compression
Coating
Packaging
Fermentation
Bioreaction
Crystallization
Lyophilization
Solvent Recovery

Solution Capabilities and Applications

Affordable, Comprehensive Solutions

ABB will partner with you to identify key ROI areas based on our vast, multi-application experience. Working with you, we focus on the areas of highest payback first, and provide justification for change, including capital expenditures.

We provide high level interfaces to analyzers to make acquisition parameters available through preconfigured solutions. Mathematical calculations are performed on data to generate value predictions. Results are trended locally; and alarms provided. All vector and scalar data is collected and can be published through a standard communication protocol.

ABB provides:

- Data management and control
- Consistent data format organized in a modular batch structure
- Data is time aligned
- Real-time communication for optimized control
- 21 CFR Part 11 compliant

We lower your lifecycle costs. As a single-source supplier, we make all your projects easier to manage. Our large R&D budget, resources and wealth of experience work to your advantage.

Application Knowledge and Expertise

- PAT Engineering team
- Technology expertise
- Application knowledge

Measurement Capabilities

API Concentration
Content Uniformity
Confirm Material ID
Coating Thickness
Biomass Measurement
Impurity Concentration
Out Gas Monitoring
Purity
Lubricant Uniformity
Moisture
Coating Coverage
Nutrient Concentration
Optical Density



Advance Optima Continuous Gas Analyzers



PGC5000 Series Process Gas Chromatograph





Summary

PAT offers tangible customer benefits:

- Cycle times reduced an average of 40%*
- Costs reduced an average of 30%*
- Reduce product quality variations
- Reduce inventory
- Reduce laboratory testing and associated paperwork by 50%
- Allow flexible, multi-product manufacturing
- Reduce regulatory overhead and compliance costs

ABB's PAT solution will help you:

- Address your business needs
- Identify key ROI opportunities
- Reduce time to market
- Decrease production costs
- Reduce capital expenditure (CapEx) costs
- Increase production flexibility, and optimization
- Enable real-time product release

ABB Technology Supports Your Needs

- Integrate ABB or 3rd party analyzers into common database
- Data is time-aligned for ease of analysis and control
- Integrate with ABB or any 3rd party control system
- Reduce variability of process by measurement CQA's (critical quality attributes) and by controlling CPP's (critical process parameters)
- PAT object Library reduces set-up and validation time and expense
- Documentation time and expense are reduced

*Industry study by Price Waterhouse Coopers (PWC)

For more information on ABB's Life Sciences products, solutions and services, contact your local ABB representative, visit www.abb.com/lifesciences or email us at: pharmaceutical.info@us.abb.com



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