The case – creating stability for the Energy Revolution takes ability: ABB Ability™.

Measurement made easy

Introduction

ABB provides an extensive selection of proven measurement and analytical products and solutions for power generation industry applications.

Using ABB’s measurement products, power plant operators can maximize the efficiency of their assets and comply with local and international legislation. They receive access to data on many critical measurements needed, from combustion performance and water chemistry through to stack emissions.

Digital technologies are providing new opportunities to enhance processes and productivity. This case study highlights the smart devices used in a range of power plant applications and a number of innovative solutions that combine physical devices with software to help deal with known customer needs.

Focus areas

- Overview of Measurement & Analytics devices and digital solutions applicable for power plants
- More efficient surveying with ABB Ability mobile gas leak detection systems
- Dynamic QR codes helping to remote troubleshoot emission monitoring system problems
- Condition monitoring of emission monitoring systems enhancing plant availability
- Increased productivity through improved device commissioning time with ABB Ability Field Information Manager (FIM)
- Improved Instrumentation maintenance with ABB Ability Verification for measurement devices
- Wireless devices enabling cost-effective process optimization project
- Remote monitoring and secure data back-up of effluent discharge measurements
ABB Ability solutions for measurements

Our offering for power plants

- **Plant / enterprise solutions**
- **Automation systems**
- **Devices and sensors**

Verification for measurement devices

 DataManager Pro
advanced data review software

 Field Information Manager (FIM)

 Recorders, controllers

Actuators

Continuous gas analyzers

FTIR/FTNIR spectroscopy

Gas flow

Positioners

Pressure
Focus area 1
Mobile natural gas leak detection

Overview
Utilities, as well as gas transmission and distribution companies, face increased challenges with pipeline monitoring and compliance due to:

• aging infrastructure
• regulatory pressure to improve system integrity and safety
• desire to reduce greenhouse gas emissions
• reliance on time-consuming, error-prone paper-based monitoring systems – pressure to reduce cost
• need for data transparency

Customer situation/Industry need
Traditional leak detection processes do not meet today’s demands for fast, accurate and transparent data collection. Utilities typically employ third-party companies to survey neighborhoods and districts to check for pipeline leaks. The current surveying equipment has a short detection range, it must be operated at very low speeds, often on foot and the equipment is prone to detecting false positives. Additionally the surveyor uses a map and pencil to mark the location of any identified leaks.
ABB solution
ABB Ability Mobile Gas leak Detection finds leaks fast and shares data via the Cloud.

- improves pipeline integrity and public safety whilst surveying up to 25 x greater area compared with traditional techniques
- measure, map, share while driving enabling the operator to detect leaks hundreds of meters away, this flexible solution is compatible with cars, ATV, aircraft, drones
- ABB Ability mobile gas leak detection system uses ABB’s patented Off-Axis Integrated Cavity Output Spectroscopy (OA-ICOS) technique which has a sensitivity and precision more than 3000 times greater than legacy methods. This enables identification of leaks several hundred feet away from the source.

Outcomes/Results
Significant maintenance cost savings thanks to a major reduction in surveying time. Fast and accurate detection of gas pipeline leaks with digital results immediately available within the cloud allowing utility companies to act fast and efficiently.

Drone-based gas detection – 3D gas detection

Mobile platform – speeds up to 50 mph/automatic leak detection using high sensitivity MicroPortable methane analyzer
Focus area 2
Reducing risk of power plant shutdown

Overview
Emission monitoring systems are a critical plant component as loss of measurement data can have major consequences for the customer. Though the exact causes of problems aren’t always immediately evident, or easy to resolve, the indications of a problem are there for experts to recognize, often times far earlier than more overt evidence of a failure. Digitalization has made collecting and using such insights a tool for preventing system failure, and keeping systems online.

ABB Solution 1 | Dynamic QR code assistance for analyzers

Integration of dynamically generated QR Codes on analyzer display:
- **Static** information for system identification
- **Dynamic** information on system configuration and analyzer health status

The user loads the ABB application ‘my Installed Base’ (myIB), photographs the QR code and sends the data to ABB for remote troubleshooting.

An ABB expert can then troubleshoot the problem using specialist software called **ABB Ability Verification for measurement devices** and ideally, remotely explain to the customer how to perform the fix.

If it cannot be solved remotely via telephone support, a trained service technician with a clear understanding of the problem can be deployed and the right parts supplied to fix the problem as quickly as possible.

Customer situation/Industry need
When an Emission system fails or measurements are no longer accurate, it is a real emergency for the customer to return equipment to operation as fast as possible and at lowest possible cost. Forward-thinking companies are looking to understand root causes, predict future failures and make such events less frequent – and should they nonetheless occur, make their resolution less costly.
ABB Solution 1

Outcomes / Results
Rapid remote support returning the system to full operation as quickly as possible, reducing the risk of unplanned plant stoppages.

ABB Solution 2 | ABB Ability Condition Monitoring for measurement devices
The Condition Monitoring solution allows continuous monitoring of analytical systems for early fault detection, enabling predictive maintenance rather than preventive maintenance. Complemented by ABB service centers that can analyze and act on the data available to ensure customers' assets are operating at levels with industry leading levels of availability. In the event of an unexpected failure occurring, the fault can be analyzed remotely and acted upon in the most efficient manner to provide a solution.

Outcomes/Results
Improved reliability and availability of the emission monitoring system which ensures maximum uptime of the power plant with more predictable operation expenditure.

Plant components

<table>
<thead>
<tr>
<th>Measurement type</th>
<th>Emissions and process control solution (e.g., SOx, NOx, CO, CO2, VOC, O2)</th>
<th>Emissions and process control solution (e.g., SOx, NOx, CO, CO2, VOC, HC1, HF, NH3, O2, H2O)</th>
<th>Extractive gas analyzers (Uras, limas, Magnos, Caldos, Fidas, MultIFID)</th>
<th>Extractive gas analyzers (Uras, limas, Magnos, Caldos, Fidas)</th>
<th>Ex version of Uras, Magnos, Caldos</th>
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</thead>
<tbody>
<tr>
<td>Product series</td>
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<td>ACF</td>
<td>AO2000</td>
<td>EI3000</td>
<td>EI3060</td>
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<td><img src="image" alt="Fermenter" /></td>
<td><img src="image" alt="Boiler outlet" /></td>
<td><img src="image" alt="Generator" /></td>
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<tr>
<td></td>
<td><img src="image" alt="Turbo generator" /></td>
<td><img src="image" alt="Gas turbine outlet" /></td>
<td><img src="image" alt="Gas cleaning system" /></td>
<td><img src="image" alt="FGD" /></td>
<td><img src="image" alt="ESP or fabric filter" /></td>
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<tr>
<td></td>
<td><img src="image" alt="Residuals storage" /></td>
<td><img src="image" alt="Air preheater" /></td>
<td><img src="image" alt="Stack" /></td>
<td><img src="image" alt="Analyzer" /></td>
<td></td>
</tr>
</tbody>
</table>

...ABB Solution 1

Outcomes / Results
Rapid remote support returning the system to full operation as quickly as possible, reducing the risk of unplanned plant stoppages.

ABB apps
- ServIS
- Verification for measurement devices
- myABB customer portal
- Remote service center
- ABB corporate network
- Mobile app
- Analyzer

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- ServIS
- Verification for measurement devices
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- ABB corporate network
- Mobile app
- Analyzer
Focus area 3
Increase productivity by streamlining system commissioning

Customer situation/Industry need
Configuration and commissioning of new instrumentation can be a time-consuming stressful process. Available Asset management tools are often outdated, difficult to install, difficult to use and rely on a physical connection to the device to create the initial configuration.

During unplanned shutdowns when rapid commissioning can make the difference between profit and loss what is needed by customers is a simple, universal, clean software solution that can be used with any device type to prepare the configuration offline.

ABB solution
Introducing ABB Ability Field Information Manager (FIM), the universal tool that automatically searches for field devices, identifies suitable drivers and connects in less than 3 minutes. With the capability to connect to any HART™ device using an FDI package (or device driver) and perform offline configuration set-up.

FIM is a flexible solution that can access devices directly using a HART modem, remotely via System 800xA or even when in front of the device through the Infrared service port.

*HART is a registered trademark of the HART Communication Foundation.

## Plant components

<table>
<thead>
<tr>
<th>Measurement type</th>
<th>Pressure transmitter</th>
<th>Differential pressure transmitter</th>
<th>Temperature sensor</th>
<th>Temperature transmitter</th>
<th>Positioner</th>
<th>PositionMaster</th>
<th>Torbar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product series</td>
<td>26X</td>
<td>266</td>
<td>TSx</td>
<td>TTx</td>
<td>T2ID</td>
<td>EDP300</td>
<td>FPD</td>
</tr>
</tbody>
</table>

### Product image

- Fuel system
- Coal bin
- Coal mill
- Feed storage
- Fermenter
- Gas storage
- Solid dosage
- Water treatment
- Deaerator
- Boiler feed water
- Boiler drum
- Boiler outlet
- Steam line
- Cooling water system
- Generator
- Turbo generator
- Gas turbine outlet
- Condenser
- Gas cleaning system
- FGD
- ESP or fabric filter
- DeNOx
- Economizer outlet
- Residuals storage
- Air preheater
- Stack
Outcomes/Results
Saved configurations stored as a back-up ready for upload in a hurry when a replacement device is required. Rapid configuration and commissioning saving time and money. Operational efficiency enhancement through improved device management.
Focus area 4
Instrumentation verification ensuring processes continuously operate at their peak

Overview
Verification is the inspection and testing of a product to establish that it meets regulatory/technical requirements in terms of measurement performance. Industrial instrumentation is robust, very reliable and designed to operate for many years with minimal maintenance but as a critical part of the process it is best-practice to inspect and maintain these assets.

Customer situation/Industry need
Every customer is looking for ways to maximize profitability by enhancing process performance and availability, in addition stricter regulations require regular testing of instrument accuracy. Regular instrument verifications is one way to ensure processes continuously operate safely at their peak. As skilled instrument technicians grow more scarce customers are facing a real challenge to manage assets effectively.

ABB solution
ABB Ability Instrumentation verification software operated on industrial tablet

Outcomes/Results
Fast, efficient instrumentation testing ensuring processes and operations are functioning at their peak, maximizing revenues whilst improving profitability.

Features of the ABB Ability Verification for measurement devices platform

<table>
<thead>
<tr>
<th>Activity</th>
<th>Basic</th>
<th>Standard</th>
</tr>
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<tbody>
<tr>
<td>Simple connection to device</td>
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<td>•</td>
</tr>
<tr>
<td>Automated test procedure</td>
<td>•</td>
<td>•</td>
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<tr>
<td>Results displayed as tests are performed</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Universal test platform</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Health Status</td>
<td>•</td>
<td>•</td>
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<tr>
<td>Internal instrument diagnostic test</td>
<td>•</td>
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<tr>
<td>Detailed certificate printing for regulatory and quality system management</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Indication of measurement accuracy according to specified test conditions</td>
<td>•</td>
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<tr>
<td>Local database storage</td>
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</tr>
</tbody>
</table>

ABB Ability Instrumentation verification solution – reducing maintenance effort and enhancing process and operation performance
Plant components

*ABB Ability Verification for measurement devices* is a software platform that can be used with a range of ABB devices, the product lines and applications from a power perspective are as follows:

<table>
<thead>
<tr>
<th>Measurement type</th>
<th>ProcessMaster</th>
<th>WaterMaster</th>
<th>Vortex/Swirl</th>
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<tbody>
<tr>
<td>Product series</td>
<td>FEP</td>
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<tr>
<td>Fuel system</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Fermenter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas storage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boiler feed water</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Boiler outlet</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Steam line</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cooling water system</td>
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<td></td>
<td></td>
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<tr>
<td>Condenser</td>
<td></td>
<td></td>
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<tr>
<td>Gas cleaning system</td>
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<tr>
<td>FGD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air preheater</td>
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</tbody>
</table>

| Fuel system                       |               |             |              |
| Fermenter                         |               |             |              |
| Gas storage                       |               |             |              |
| Water treatment                   |               |             |              |
| Boiler feed water                 |               |             |              |
| Boiler outlet                     |               |             |              |
| Steam line                        |               |             |              |
| Cooling water system              |               |             |              |
| Condenser                         |               |             |              |
| Gas cleaning system               |               |             |              |
| FGD                               |               |             |              |
| Air preheater                     |               |             |              |
Focus area 5
Optimize processes by adding wireless measurements to your process

Customer situation/Industry need
When building a plant the available budget often dictates how many instruments are installed, it’s a balance between good control of the process and identifying areas to monitor for process optimization. Generally plants are fitted with wired communications between the control systems and the devices. A wired infrastructure makes it very difficult and costly to add additional measurement points in future, however once a process is operational it is often beneficial to add instrumentation as the process evolves and new requirements are established.

ABB solution
Wireless devices provide customers an opportunity to add measurement points without costly investments in wiring. ABB offer a range of Pressure, Temperature and Vibration devices plus WirelessHart adaptors for connection to any Hart device and Gateways to create a mesh network with up to 250 wireless products.

Outcomes/Results
Greater process knowledge leading to enhanced process efficiency. Reduced level of investment to run optimization projects. Solution that can be easily integrated into control system networks.
## Plant components

<table>
<thead>
<tr>
<th>Measurement type</th>
<th>Temperature transmitter</th>
<th>Differential pressure transmitter</th>
<th>Temperature sensor (with Energy Harvester)</th>
<th>Temperature sensor (without Energy Harvester)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product series</td>
<td>26X</td>
<td>266</td>
<td>TSx</td>
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<td><img src="image39.png" alt="Image" /></td>
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<td>Generator</td>
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Focus area 6
Remote monitoring of effluent discharges

Customer situation/Industry need
Environmental legislation often requires power plants to prove to the relevant authorities the chemical content and volume discharged from their site. If plant operators are unable to present their measurement data and prove to the authorities that they have firstly monitored their discharge and additionally that they were within the legal limits then large fines can be levied. A cost-effective system to back-up the data and allow remote monitoring is required to increase plant productivity and remove the risk of inadvertent data loss.

ABB solution
Figure 1 shows a typical arrangement of an effluent flow monitoring system which is recording pH measurements and flow data.

The use of an RVG200 paperless chart recorder is ideal for this application thanks to its Ethernet communications and integrated webserver, which enables a simple, secure, remote connection. Remote access can be either via the plant network or if no Ethernet connectivity is available then access can be provided via a GSM modem. The data coming from the recorder can then be imported into DataManager Pro, a data storage and review software used for reporting purposes – see Figure 2.

Outcomes/Results
Remote operation of the effluent flow monitoring system with secure back-up of data for peace of mind and security.

Figure 1  Typical arrangement of effluent flow monitoring system

Figure 2  Using DataManager Pro to remotely view and store data as a back-up
Plant components

ABB Recorders and Controllers can be used in a range of applications within a power plant:

<table>
<thead>
<tr>
<th>Measurement type</th>
<th>Panel-, field-mount recorders</th>
<th>Controllers and A/M stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product series</td>
<td>RVG200</td>
<td>ControlMaster</td>
</tr>
</tbody>
</table>

Product image

- Effluent discharge monitoring
- Fuel system
- Coal mill
- Water treatment
- Boiler feed water
- Boiler drum
- Boiler outlet
- Steam line
- Cooling water system
- Gas turbine outlet
- Condenser
- DeNOx
- Air preheater