Carlos Marcos
ABB Spain Country Manager

Martin Gross
BU Plant Automation Manager

ABB – group introduction

ABB – emission reducing solutions
Introducing ABB Spain

Carlos Marcos
ABB Spain Country Manager
Facts about ABB

- Headquarters: Zurich, Switzerland
- About 115,000 employees in around 100 countries
- Orders in 2003: US$ 18.7 billion
- Revenues in 2003: US$ 18.8 billion
- Listed on stock exchanges in Zurich/London, Stockholm, Frankfurt and New York

- A leading power and automation technology company with strong market positions in its core businesses
- Two core divisions: Power Technologies, Automation Technologies
- Oil, Gas and Petrochemicals division, Building Systems, being divested
Automation Technologies division

**Our offering**
- Products, services and solutions include
  - Low voltage products
  - Electrical motors and drives
  - Controls and instrumentation
  - Robotics and peripherals
  - Automation software

**Our markets**
- Industry and utility segments include
  - Chemicals and life sciences
  - Automotive and manufacturing
  - Metals and minerals
  - Pulp and paper
  - Energy: utilities, oil and gas
  - Independent channel partners

**Our resources**
- 150 manufacturing, software and application centers
- 55,300 employees
Power Technologies division

**Our offering**

Comprehensive portfolio of products, systems and services

Global presence:
- 39,000 employees
- ~150 focused factories, engineering and service centers
- In more than 70 countries

**Our markets**

- Electric, gas and water utilities
- Industry
- Channel Partners:
  - Engineering, procurement and construction firms (EPCs)
  - Original equipment manufacturers (OEMs)
  - Wholesalers, distributors
ABB Spain – Engineering & production centers

Galindo - Valle de Trapaga
- Power transformers
- HV capacitors
- Power Services

Sant Quirze del Valles
- Motors, Drives
- LV capacitors
- Robotics
- Industrial Systems

Vizcaya
- Galindo
- Oyarzun

Guipuzcoa
- Oyarzun

Barcelona
- LV equipment
- St. Quirze del Valles

Zaragoza
- Distribution transformers

Madrid
- Consulting & Engineering
- Power Systems incl. substations
- Power automation
- Instrumentation and control
- Turbochargers

Getafe
- LV equipment

Murcia
- Water Automation

Cordoba
- Power transformers
- HV switchgear
- Power Services

ABB in Spain 2003:
- Revenues: 610 MEUR
- Employees: 2,542
ABB Spain – Local offices
ABB – leader in energizing power plants

HV- SUBSTATION

STEP UP TRANSFORMER

MV & LV SWITCHGEAR

AUXILIARY SYSTEMS

AC & DC AUXILIARY SYSTEMS

HV SYSTEM

STATION

SWITCHGEAR

MV & LV

TRANSFORMER

EXCITATION SYSTEM

EXCITATION

ROOM

CONTROL

ROOM

CONTROL

SYSTEMS

STATIC STARTER

SYNCHRONOUS GENERATOR

Synchronization

TURBINE GOVERNOR

GENERATOR BREAKER

BOILER

HRSG

SYNCHRONOUS

TURBINE

STAR POINT CUBICLE

PT's
CT's
SA's

ABB
ABB’s Emission Reducing Solutions

Martin Gross
BU Plant Automation Manager
Main Factor driving EU Emissions Reductions

Europe’s willingness to adhere to the Kyoto Protocol emission targets, thus reducing the amount of greenhouse gases by 8% in the period between 2008-2012, based on the 1990 levels.

How? Through an Emission Trading Scheme (ETS)

Roughly 12’000 – 15’000 plants within the EU will be required to participate in the ETS. Including:

- Power plants/combustion installations (>20 MW)
- Mineral oil refineries and coke ovens
- Production and processing of ferrous metals
- Pulp, paper and board production
- Mineral industries (cement, glass and ceramic production)
<table>
<thead>
<tr>
<th>Year</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>EU Regulation&lt;br&gt;EU produced guidance on monitoring, reporting and registries for ETS</td>
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<tr>
<td>2004</td>
<td>Speculative initial trading&lt;br&gt;Development of emissions trading strategy &amp; risk management processes / systems&lt;br&gt;Operators began to apply for operation permits&lt;br&gt;31-May NAP’s submitted by EU member states and accession states&lt;br&gt;30-Aug EU NAP approval or rejection&lt;br&gt;30-Sept EU Finalizes NAP’s&lt;br&gt;Issue of permits begins&lt;br&gt;Submit, review and approve emission NAP’s (National Allocation Plans)</td>
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<tr>
<td>2005</td>
<td>Phase 1&lt;br&gt;1 Jan 2005&lt;br&gt;Trial Phase concentrating on the reduction of CO₂</td>
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<tr>
<td>2008</td>
<td>Phase 2&lt;br&gt;1 Jan 2008&lt;br&gt;Fulfillment of Kyoto Protocol and possibly expanding emission limits to other greenhouse gases</td>
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ABB solutions help reduce emissions

Combustion Management
- Optimize combustion process, monitor and control ignitors, coal flow and carbon in ash content, detection of flame including flame scanning

Resource Scheduling
- Scheduling of the most economical operation of units within a power plant or multiple plants within a utility portfolio reducing fuel consumption and emissions

Power Plant Management
- Monitor plant performance, handle information management improving the efficiency of plants reducing fuel consumption and resulting emissions

Asset Management
- Optimize turbine, boiler and plant lifecycles, improving overall efficiency, include plant maintenance management solutions
Combustion Management - Solutions

Combustion Optimization with neural net
Increased plant efficiency reducing CO₂ over the entire operating range

Flame Monitoring and Scanning
Improves combustion efficiency and safety by flame quality measurement

Coal Flow Monitoring
- Fuel / Air mixtures determined per burner
- Reducing NOₓ and CO

Optimized Combustion Control

Target

Boiler Model

Optimizer

Set values

Flame Monitoring

E-Filter

- CO
- CO₂

Reduction of unburned carbons
- Known fly ash carbon content

© ABB - 13 - PowerGen Europe 2004
26-May-2004
Resource Scheduling - Solutions

Features

- Support maximizing profits of individual units within a single plant or multiple plants in a generation portfolio
- Optimize generated and purchased power to satisfy load demands posed by customers.
- Computation of the most economical, thus favorable load profile for the power facility

Customer and environmental benefits

- Calculation of generation and marginal costs on the basis of optimized production data
- ABB’s solutions select suitable spot market offers and deliver the criteria for optimum pricing
- Optimum plant operation reduces unnecessary fuel consumption and emissions
Power Plant Management - Emission Prediction

Features

- Decision-support with special emphasis on emission violation
- Empirical algorithms, easy to maintain
- Detection of faulty measurements, or drifting sensors.

Customer & Environmental Benefits

- Cost reduction by avoiding emission violations
- “What-if” load simulations improve predictability of future emission levels
- Projection of the emission trend into the future, predicting emission alarms
Asset Management - Lifecycle Optimization

Features
- Decision-support with special emphasis on emission constraints
- Optimization of operating schedule as function of spot prices and asset values
- Trade-off emission credits against income from energy sales and lifecycle costs

Customer and environmental benefits
- Optimal dispatch of generating capacity considering emission costs & revenues
- “What-if” simulation for scheduling component maintenance
- Decision-tool for asset managers and traders buying/selling energy
IndustrialIT Coal Flow, Monitoring and Control

Features
- Continuous Measurement of PF (pulverized flow)
- Absolute PF Velocity
- PF Distribution or ‘Split’
- Relative PF Loading
- Mass flow rate (with external total mass input)
- Process Temperature

Customer and environmental benefits
- Allows precise stoichiometry at each individual burner, permitting an optimal combustion environment
- Reduces NO\textsubscript{x} and CO emissions
Optimization with model predictive controller

Real Time Optimizer with Neural Model

Model

Optimizer

Goals

Boiler model

controlled entities

optimized values

Iteration

Sum of weighted goals

! = minimum

optimized set points
IndustrialIT Carbon in Ash, Monitor and Control

**On-line microwave sensor features**
- Continuous, reliable, non-extractive, real-time monitoring of fly ash carbon content
- Enhanced operating efficiency through continuous control of coal combustion
- Enhanced control of fly ash quality by continuous reduction of unburned carbon

**Customer and environmental benefits**
- Continuous process input available for advanced emission control strategies
- Improved fuel utilization means lower operating costs, improved heat rate, and lower NOx & CO emissions
- Fly ash, normally a costly waste, becomes a marketable by-product which significantly reduces the generation of harmful greenhouse gasses
Measure\textsuperscript{IT} UVISOR Flame Scanner

Features

- Detects individual flame presence, and provides flame quality figure
- Provides continuous data to any plant control system via Modbus and 4-20 mA isolated outputs with no additional hardware required
- Provides individual flame raw signal for flame analysis and burner diagnosis

Customer and environmental benefits

- Isolates individual burners as specific contributors to emission creation
- Improve safety and reliability
- True “Two-Systems-in-One” reduces installation cost
Factories in Spain

Division Power Technologies

**Córdoba**
- Compact EDT Modules

**Córdoba & Bilbao**
- Power Transformers

**Zaragoza**
- Dry Transformers

**Compact EDT Modules - Córdoba Factory**
- Factory pre-assembled and tested modules to minimize commissioning time
- Minimized production (common production line)
- Flexible, safe and reliable operation, with local or remote control

**Power Transformers - Córdoba & Bilbao Factories**
- Advanced factories manufacturing large and medium size power transformers
- Production for domestic and export markets
- Cordoba only ABB’s plant manufacturing shell type transformers

**Dry Transformers - Zaragoza Factory**
- ABB selected Zaragoza as its exclusive European manufacturing site for vacuum cast coil – types
- Large Cast Coil (LCC) types also transferred to Zaragoza
- Highest quality levels achieved for these product types
Factories and Engineering in Spain

Division Automation Technologies

- **Sant Quirze (Barcelona)**
  - Electric Motors
- **Oyarzun (Guipuzcoa)**
  - LV wiring materials

**Electric Motors – Sant Quirze (Barcelona)**
- Very modern, automated factory
- Sizes IEC 90 – 250.
- World responsibility for manufacturing sizes 90 y 100
- **World Excellence Center for**: Brake motors, Smoke Venting (400º - 2 h.), Pad mounting

**Wiring and installation materials – Oyarzun (Guipúzcoa)**
- Well introduced brand (ABB Niessen) distributed through the country. Exports to Europe and Latin America being initiated
- Several lines: Arco, Olas, Tacto, Stylo, Over, aiming medium to high end market
- Marketed jointly with the wide range of ABB Low Voltage protection and control equipment

**Robotics in Sant Quirze**
- Center of Excellence for Press Tending application
- More than 100 installations performed, worldwide