Features and Benefits at a Glance

Full-featured information platform for enterprise management and control

- Multi-master redundancy
- Up to 512,000 tags per server
- Up to 64 servers per system
- Up to 16 millions tags per systems (with redundancy)
- Process monitoring and supervision
- Alarm management
- Analog and digital trending
- Data historian and archiving
- Real-time/historical trending.
- SOE (Sequence of Events) support
- Parameter and event logging
- Excel® Report generation
- Web-enabled, thin client

Supported Industry Standards

- Windows® or Linux® based platform
- Client/server architecture.
- ActiveX® controls
- Context-sensitive aspect menus
- SMS integration
- OLE2/COM™ support
- TCP/IP, Ethernet protocols
- ODBC and OLEDB support
- OPC Server and OPC Client support
- HTML
- Unicode character encoding

High Performance Dynamic Color Graphics

- Standard symbols libraries
- Animation
- Scalable objects
- Graphic object import

Facilities

- System level diagnostic
- On-line documentation
- Multilevel security
- Scanner suite for ABB and foreign protocols interfacing
- User profile recognition
- Quad monitor support
- Wav file alarm annunciation
- Tool-tip support

Introduction

The information platform at the core of the Power Generation Portal is based on the field proven Tenore© technology. With a worldwide installed base of 8000 licenses (servers and clients) in 1300 systems (as of October 2007), Power Generation Portal can bring to the customer the reliability of a solid platform and the experience gained in the most diverse applications.

Thanks to its flexibility, Power Generation Portal has been successfully adopted in every business segment, from power plants to refineries, and in several application areas where it has been used as an operator interface, a SCADA control station, or a Plant Information Management System (PIMS).

Power Generation Portal also offers the possibility to grow and expand with the customer's needs. Its scalability will allow its introduction on a small plant and will follow the expansion into larger and larger applications, without any need to re-engineer configuration and applications, simply adding the options, nodes and functionality needed at any given time. The customer's investment is thus preserved throughout the lifetime of the system

Power Generation Portal operates smoothly with all the new products of the Industrial[IT] Product Strategy, preserving the customer investments in technology and experience.

(Ferrera Erbognone, Italy, courtesy of Enipower, SpA)

Architecture

Power Generation Portal combines the most advanced technology in a true client-server, distributed architecture (Figure 1), where the servers are responsible for data collection and storing, alarm and events management, while the clients only present the information in a graphical format.

All the clients can, at the same time, access information in all the servers in the system. Graphical pages can therefore display the status of plant areas supported by different servers, potentially in separate locations.

Redundancy

Given Power Generation Portal's inherent client/server architecture, redundancy for all client applications is built into the Power Generation Portal system. The principle behind Power Generation Portal redundancy is called multi-master. Simply stated, each server, at any level in the architecture, can be mirrored on as many redundant servers as deemed necessary.

Clients are configured with a server access list, which includes all the servers where they can access data. At any given time, each client is connected to one server, and will fail over to the next server in the list as soon as the communication with the primary server is lost.
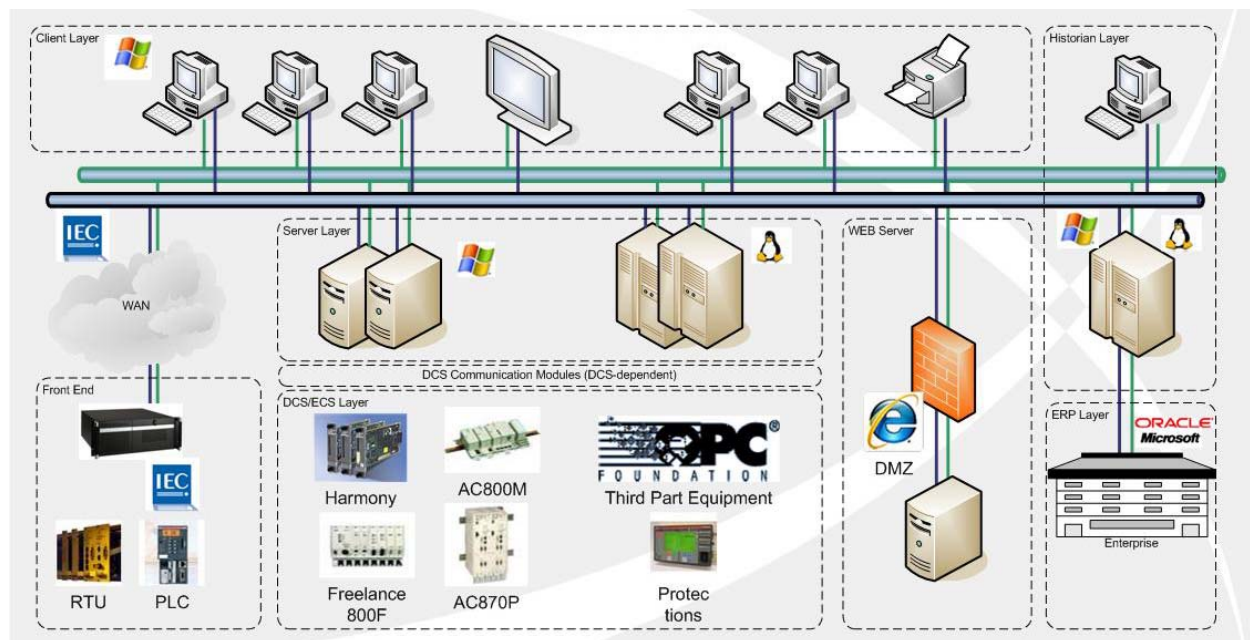

Figure 1 - PGP System Architecture

The server layer of the architecture can expand over multiple levels in a hierarchical structure, with lower-level servers collecting all the information and forwarding processed data to the higher-level ones. In this architecture, a store-and-forward function will prevent loss of data when problems occur at any level of the architecture.

To ensure the compatibility of the PGP architecture with ever more stringent security standards, the PGP inter-server protocol is layered on top of firewall-friendly TCP/IP sockets, a communication standards widely used in the distributed applications industry. This will enable Power Generation Portal servers to be securely distributed on a wide area network.

Each one of the servers in these clusters can collect data in parallel from the field or, if this is not supported by the field equipment, from another mirror server physically connected to the device.

When Power Generation Portal is used as an operator stations, one of the servers in the cluster will be designated as the command master, and will be responsible for sending operator commands to the field and for mirroring such commands on all other servers.

Mirror servers also support cluster synchronization through replication of configuration changes and back filling of data and configuration at start-up time. This will ensure that all servers in a cluster are always synchronized.

Real Time Database

The Real Time Database is the core of the Power Generation Portal technology, since it provides the basis for data integration and distribution.

In addition to managing, in a uniform way, the current values of all configured tags, it also supports the automatic storage of short-term history. The default is 240 hours, or 10 days, extensible at will depending only on the available storage space and required performance. This is a function available for all tags, without requiring any additional configuration.

Each server can be configured with up to 512,000 tags, half of which is reserved for Boolean points, while the rest is for all other supported tag types.

Calculated tags (soft points), whose values are provided by algorithms rather than being acquired from the field, are handled exactly as all other tags, and enjoy all the same services and features (display, trending, alarming, etc.).

Hard disk usage is optimized by sophisticated data compression algorithms (box-car/back-slope), and the level of compression is controlled by the user through simple parameters configuration.

The Real Time Database also supports an ODBC mirroring function, allowing the replication of real time values to an external, ODBC compliant commercial database.

Figure 2 - Tag Database List and Tag Properties

Data Acquisition

One of the primary functions of the Power Generation Portal is the collection of data from miscellaneous sources which can include DCS (ABB or third party), PLC, RTU, Protections and applications. The Power Generation Portal component responsible for data acquisition is the I/O Scanner (Fig. 4). This module provides a common infrastructure for plug-in drivers, each one capable of communicating with a specific protocol.

Each driver processes data to provide diagnostic checks (limits, open circuit, loss of power, rate of change, etc.), numeric filtering (smoothing), alarm checking (with the capability of alarm inhibition and variable alarm limits), and bad quality management.

Figure 3 - Scanner monitor

The following communication protocols are currently supported and available as standard options:

- Harmony, Infi90, Infi90Open, Network90 (through semAPI)
- Control^{IT} AC800F, Freelance 800F, Freelance 2000 (through OPC)
- Control^{IT} AC800M (through OPC)
- Control^{IT} AC870P (through OPC)
- DCI System Six (through OPC)
- Siemens Teleperm (through the XU device)
- General Electric Mark V and Mark VI (through GSM protocol)
- Modbus, Modbus RTU, Modbus TCP
- OPC DA and AE (client side)
- ODBC (client side)
- SPABUS
- IEC 870-5-101/103/104
- DNP 3.0 (through OPC)
- ASCII text

Specific protocols can be developed on request.

Data Presentation

The Power Generation Portal client, called PGP Explorer, provides an interactive human-system interface through which operations or management personnel can easily and efficiently access plant data.

Multiple operator stations can be deployed in different locations in the plant, each equipped with QWERTY keyboard, functional keyboard and mouse/trackball. Each one can access and combine, on a single page, data from multiple servers. Printers can be added to complement the CRT's functionality.

Figure 4 - Example of PGP graphics
(Ferrera Erbognone, Italy, courtesy of Enipower, SpA)

Each client can display up to 16 windows concurrently, and a browser panel supporting hierarchical page structures facilitates navigation.

Power Generation Portal provides a complete full-graphic color information system based on Windows®. Displays may include real time data, such as process variables, digital inputs and outputs, as well as historical data and information from user generated files.
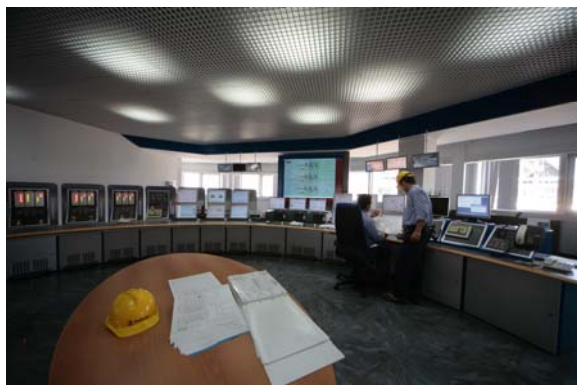
Figure 5 – PGP Control Room
(Ferrera Erbognone, Italy, courtesy of Enipower, SpA)
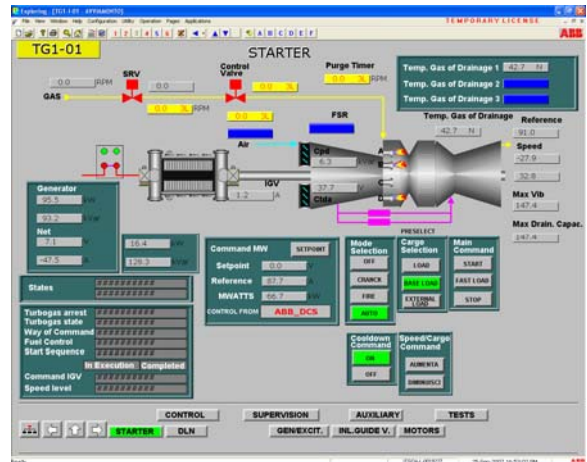
Figure 6 – Example of turbine control integration

The information may be presented using different formats such as alphanumeric, text string, bar charts, dynamic symbols and trends, all according to user requirements. Color, shape and blink can be associated to tag quality flags (e.g. acknowledged / unacknowledged alarms, etc.).

The dynamic process data is refreshed at a rate of once per second. The entire system is optimized to produce fast display retrieval and use minimal resources for data refreshing. Call-up times of 1 second are guaranteed for standard pages. Up to 10.000 displays can be configured for each client.
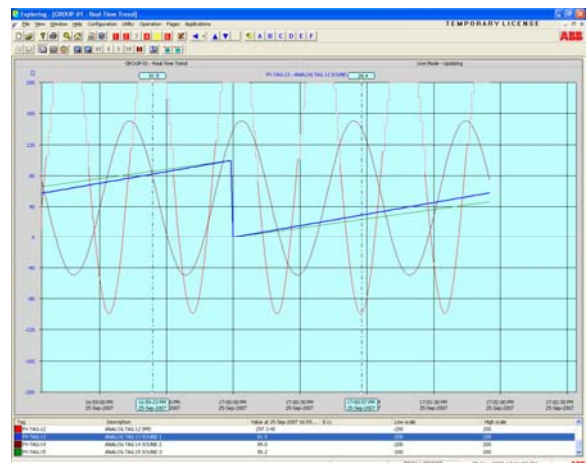
Figure 7 – Example of PGP trend page

Power Generation Portal uses English as its default language. Thanks to its native support of Unicode, translations can be provided by ABB local organizations into virtually any language and alphabet. Customized versions are already available in Italian, French, Chinese, Hebrew, Spanish and Russian.

Trends and X-Y Plots

The trend display feature provides the ability to graphically display both current and historical data on a single trend page. Any tag can be trended as real time data without being defined for historical storage. The trend presentation can be arranged in different formats and can be presented as an object inside other displays.

If needed, the Real Time presentation automatically accesses the historical archive in order to present older data.

The operator can dynamically define tracks and display attributes. The fields that may be entered by the operator include process variable identification, scaling, start time, time span and color.

All trend displays support pan and zoom functions, while a cursor will drive the display of point values on the trend curves. Statistical average, maximum and minimum is provided on demand for trended curves.

It is possible to display multiple tracks with different time basis, to support comparisons between similar tags over different periods of time.

X-Y plots are supported for intuitive and immediate correlation between two variables.
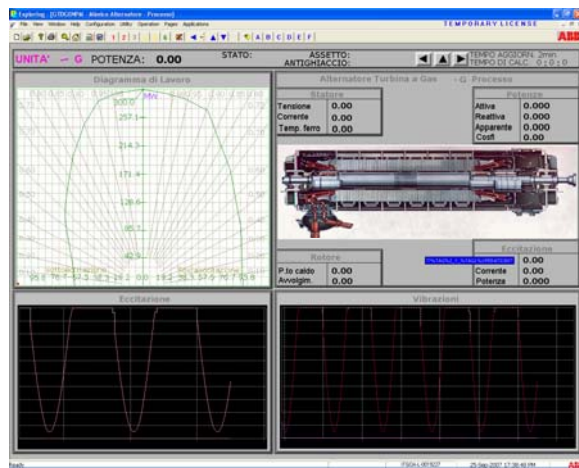
Figure 8 - Examples of trends and X-Y plots

Access to trend pages is made easy and immediate thanks to object menus, linking each object to its own properties with a simple mouse click.

Alarm Management

Multiple alarm limits can be associated with any tag, regardless of the source (plant I/O, calculation, applications). Alarms can be acknowledged individually or by page.

Alarm conditions can be visualized both in a chronological summary format and dynamically on the process displays. Furthermore, a general overview of the plant conditions is continuously displayed on the icon toolbar by means of an alarm summary panel representing the status (normal or alarm condition) of plant sections or areas as defined in the configuration. A mouse click on one of the alarm buttons in the panel will immediately bring up the chronological alarm page for the corresponding area. Alarms can be grouped according to user-defined criteria, such as area, plant unit, equipment, and so on.
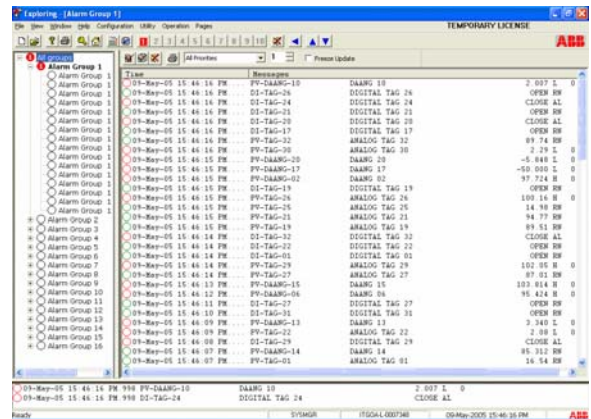
Figure 9 - Alarm list

It is possible to decide, on a tag-by-tag basis, whether alarm and event are to be logged, displayed on operator stations, recorded in history files (archives) or used to trigger custom applications. It is also possible to report alarms to off-site plant personnel by means of SMS messages sent directly to their mobile phones.

Each alarm can be associated with one of 16 different priorities, corresponding to different colors on the display. Each variable is also associated to a particular plant area or equipment. The alarm summaries may be sorted chronologically or according to priority, area or any combination of the above.

Additionally, each alarm on the list can be associated to a graphical page, which will be displayed by double-clicking on that alarm. It is also possible to have a dedicated alarm display, and automatically display the mimic of the plant area with the most recent alarm.

Access Security

Plant information is one of the most valuable assets of the enterprise. The Power Generation Portal security system will ensure that it is only accessible to plant personnel with the proper authorization.

A security profile is associated to each user, characterized by user identification and password. Password aging policies can be activated, so that passwords will need to be changed periodically.

A new operator login will change the current security profile according to the new user, without necessarily changing the active context. On the other hand, each user may have a home page, which will be displayed each time he/she logs into the system.

The security profile will define what type of actions every user can perform on which areas of the plant and from which workplace. Actions include function keys, display viewing, tag configuration changes, alarm acknowledge, etc.
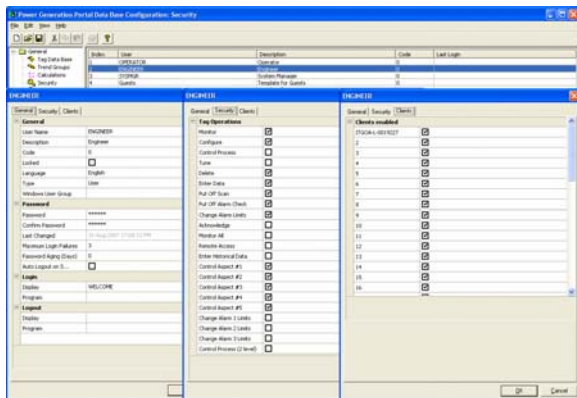
Figure 10 - Users and security profiles

System Configuration

The configuration of a Power Generation Portal platform is a very simple process, and includes the following tasks:

- Configuration of the tag database

- Configuration of the Human Machine Interface

In addition to the tasks above, it may be necessary, depending on the specific use, to configure calculations, reports, historical trends and other application components. Each configuration process, however, is consistent in terms of look & feel, and a great effort has been made to ensure the user friendliness.
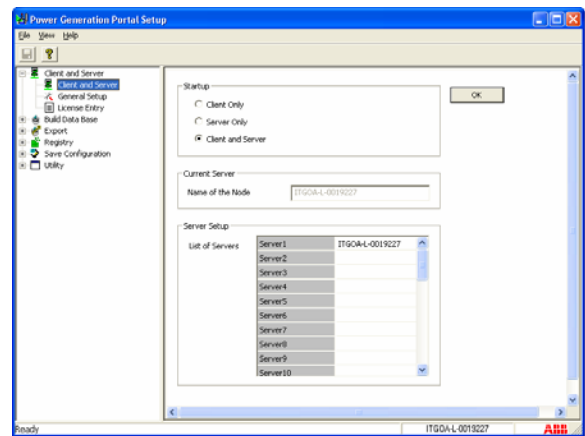
Figure 11 - System Management Console

Power Generation Portal supports both online and offline configuration for tags and graphics:

- Offline configuration provides an efficient way of handling large volumes of data, and is suggested for the initial commissioning of a system

- Online configuration allows any change to individual tags and graphics while the system is running, and does not require any server or client restart

In a redundant configuration, all configuration changes are synchronized in a redundant server cluster.

Tag Database Configuration

Every object in a Power Generation Portal system corresponds to a tag. Objects can be I/O points, controller-specific function blocks (for Harmony, Freelance 800F, AC800M, AC870P and Procontrol P13), calculated tags, but also system nodes and printers. Users can also define custom tags by aggregating individual signals into complex objects.

The off-line configuration process starts from one or more Excel® spreadsheets or XML files, listing all the parameters and attributes of a tag. The spreadsheets constitute the input of the Database Builder, which creates the on-line version of the database.

Changes, addition and deletions can easily be performed on-line using the tab dialog box shown in Figure 12. Changes are effective immediately after clicking on the Apply or OK button. The tabs are dependent on the tag type, so that only the relevant information is presented to the user.

Configurable information include, for all tags:

- General information
- Processing information
- Alarm information
- Applications
- Network information

Additional, type-dependent tabs will be presented in accordance with the selected tag type.

Figure 12 - Examples of tag configuration properties

Display Builder

The state-of-the-art Display Builder, provided as part of the standard Power Generation Portal license, facilitates the task of creating attractive and effective graphical pages for the presentation and management of plant information.

The construction of a graphical page is supported by a set of toolboxes for basic operations on shapes, and can take advantage of symbol libraries, which include pictures of the most common plant components.

For every object selected from a library and dropped on the working page, a dialog box is opened prompting the user to create the association of the object with a tag for animation purposes.
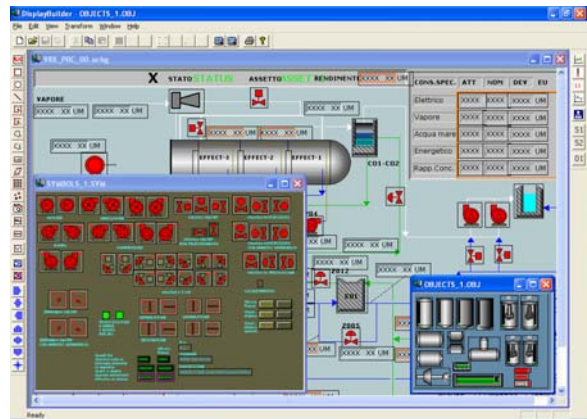
Figure 13 - Graphic Display Builder

Power Generation Portal preserves the link between objects from a library and the pages where they have been used. This enables the automatic update of the pages where a symbol or object has been used, when this has been changed in the library.

Furthermore, Power Generation Portal can automatically distribute changes to mimics to multiple workplaces, so that a single master copy can be maintained and instances created on demand.

In addition to basic shapes and library symbols and objects, pages can include static images in GIF and JPG format.

It is also possible to integrate external ActiveX components in a graphical page, augmenting the capabilities of the Display Builder with an extensive choice of third party, commercial controls.

Diagnostic and System Management

In order to increase the system availability and reduce the total cost of ownership, Power Generation Portal provides a set of easy to use diagnostic and system management tools, giving a system administrator within the customer's organization full and complete access to all the aspects of a Power Generation Portal system.

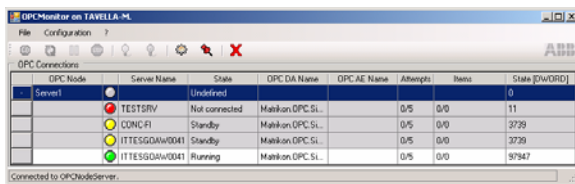Access to the tools is based on a visual system explorer, with a look & feel compliant with the Windows™ style.

Figure 14 - PGP OPC Monitor

Through these tools it is possible to monitor the client-server configuration, view and update the environment registry, perform all the data base management functions, import and export configuration data, manage the system backup and restore, monitor the network status and monitor the scanner status (Figure 14).

It is also possible to build custom diagnostic pages using special system tags (Figure 15).
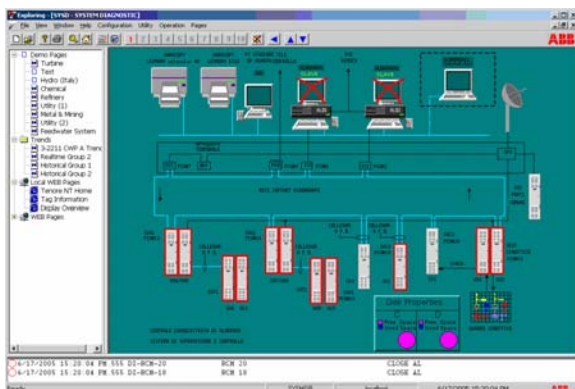
Figure 15 - Custom Diagnostic Page

Effective, Intuitive and Safe Plant Operations

While the Power Generation Portal technology foundation can be applied to data collected from a multiplicity of control systems, effective process control must take into account the specific aspects of the underlying DCS, to ensure that plant personnel is in full control of the whole plant from a single workplace.

Power Generation Portal has achieved such seamless integration with most ABB DCS platforms, by means of advanced connectivity packages which include:

- Support for DCS-specific tags, function blocks, control modules, etc. This includes support for block oriented communication, storing, access and indexing
- Support for import of DCS configuration
- A library of function block oriented faceplates and pegboards
- A library of DCS specific diagnostic displays and system management functions

PGP connectivity packages are available for:

- Network90, Infi90, Infi90Open, Harmony/INFI
- Freelance 2000, Control^{IT} AC800F, Freelance 800F
- Control^{IT} AC800M, 800xA AC800M
- Control^{IT} AC870P Limited Release
- Procontrol P13   Available Jan. 2008
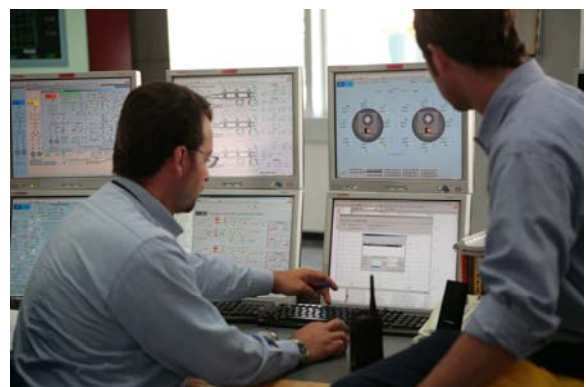
Figure 16 - Operations with PGP

(Ferrera Erbognone, Italy, courtesy of Enipower, SpA)

The single workplace experience provided by Power Generation Portal is further enhanced by additional connectivity packages for GE Mark V/VI and Siemens Teleperm turbine control system.

PGP for Harmony

Support for function codes

Following is a list of the Harmony/INFI supported function codes:

ANALOG	MSDD	ANGRPT
CLIF	N90STA	DIGRPT
DAANALG	RCM	LABANG
DADIG	RMCB	LABDIG
DADIGTL	RMSC	CALCANG
DANG	STATION	CALCDIG
DD	TEXT	APMSSTA
DEVSTAT	TEXTSTR	NODESTA
DIGITAL	UNDEF	BITMASK
INTANG	EXTANG	COMPOSITE
INTDIG	EXTDIG	INTEGER

Support for faceplates

Faceplates are provided for the following function codes:

DCS	Digital Control Stations
DD	Device Driver
MSDD	Multi-state Device Dr
PV	Analog Control Station
DI	Digital Input
RCM	Remote Control Memory
RMCB	Remote Motor Control Block
RMSC	Remote Manual Set Constant
TEXTSTR	Text Selector
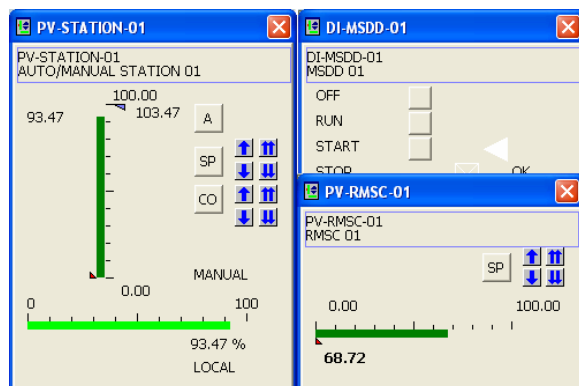
Figure 17 - Harmony faceplates

Diagnostic and Management functions

Following is a list of diagnostic and management functions available for Harmony/INFI DCS:

- Block Detail: provides access to any function block configured on the Infinet, including configuration specifications and problem reports. From this view it is also possible to modify the configuration parameters
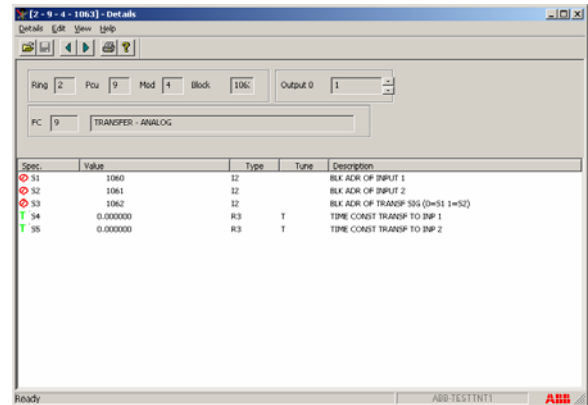
Figure 18 - Harmony Block Details

- Tune Block: combines in a single view all necessary information to perform loop-tuning operations. The view includes a trend pane, a control station faceplate and a list of configuration specifications
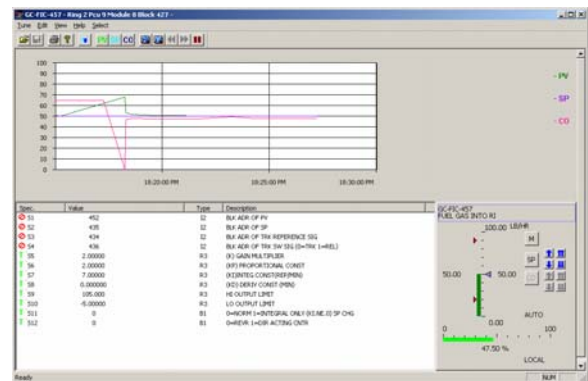
Figure 19 - Harmony Tune Block

Additional Harmony specific diagnostic and management functions include:

- Module status (system and module view)
- Point Quality Inspection (all quality bits)

Single point of entry for configuration information is enabled by the direct import of configuration files from the Harmony Composer workstation.

PGP for Freelance 800F

Support for function blocks

Following is a list of the Control^IT AC800F, Free-lance 800F and Freelance 2000 supported function blocks:

- Analog
    - C_ANA: Set Point Controller
    - CT_ANA: Counter With Analog Input
- Binary
    - M_BOUT: Binary Output
    - CT_P: Pulse Counter
    - CTUD: Up/Down Counter
    - TOUCH: Touch Button
    - MONOF: Monoflop
    - TONOF: Timer, switch-on/switch-off delay
    - TON: Timer, switch-on delay
    - TOF: Timer, switch-off delay
    - TS: Time Scheduler
    - CTT: Timer Counter
    - CT_LT: Operating Time Counter
- Controller
    - C_CU: Continuous Controller, Universal
    - C_CR: Continuous Controller, Ratio
    - C_CS: Continuous Standard Controller
    - C_SS: Standard Step Controller
    - C_SU: Step Controlled Universal
    - C_SR: Ratio Step Controlled
- Monitoring
    - M_ANA: Analog Monitoring
    - M_BIN: Binary Monitoring
    - M_BAV: Binary Monitoring of Antivalence
    - M_GEN: General Monitoring
    - EVENT: Event Message
- Open Loop Control
    - IDF_1: IDF for unidirectional units
    - IDF_2: IDF for bi-directional units
    - IDF_A: IDF for actuators
- Constant
    - CSTRE: Real Constant
    - CSTBO: Input of False or True
    - CSTDI: Input of double integer word with sign
- Macro (require Energy Library)
    - Breakers control
    - Sequence control
    - Group Control

Support for faceplates

Each supported function block is accompanied by a dedicated faceplate
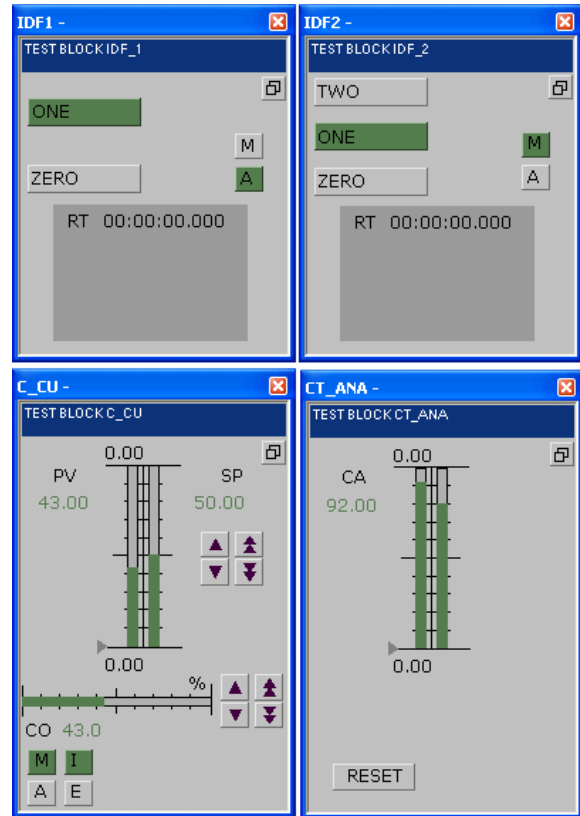
Figure 20 - Freelance 800F faceplates

Diagnostic and Management functions

HMI Functions for AC800F/Freelance include two types of diagnostic functions:

- Process station components diagnostics, provided by the following function blocks:

    o AC800FR
    o EI803FR
    o FI803FR
    o SA801FR

- Profibus diagnostics, provided by the following function blocks:

    o PROFI_S_DEV: Profibus Slave Object
    o PROFI_M_DEV: Profibus Master Object

Each diagnostic function block is accompanied by a dedicated faceplate, where the diagnostic codes are presented to the operator in a human readable, easy-to-understand form.
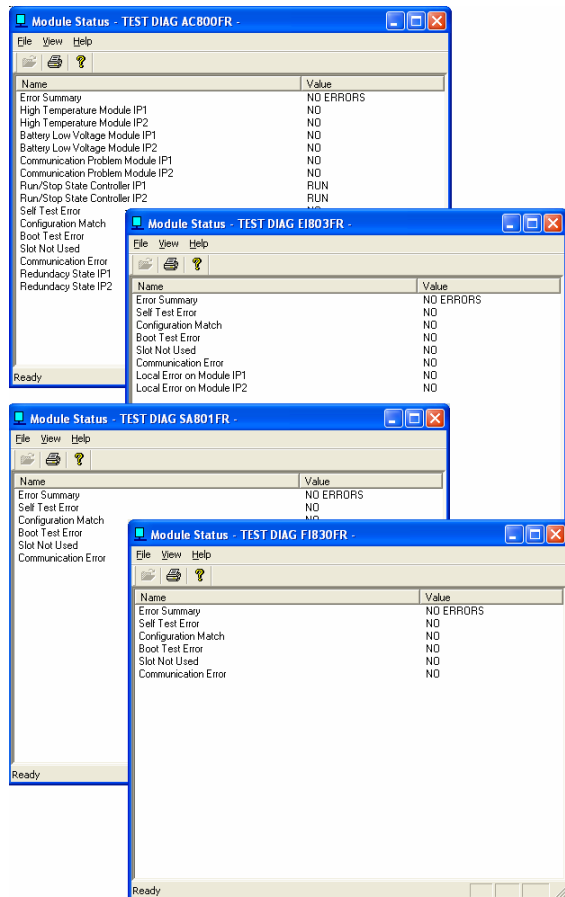
Figure 21 - Freelance 800F module status

Integration with Control Builder F

Configuration of Power Generation Portal, when used as an HMI for AC800F and Freelance, is greatly facilitated by the ability to directly import configuration data of each process station.
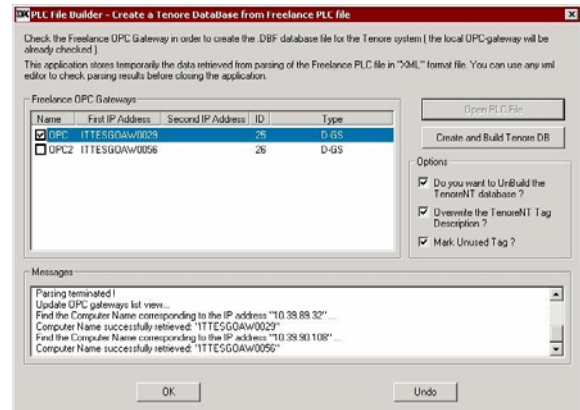
Figure 22 - AC800FBuilder console

The process station configuration is stored by the Control Builder in a standard IEC-1131 file (called .plc file). Power Generation Portal provides a tool which scans a .plc file to extract all the necessary information to create or update tags in its configuration database.

It is possible to perform partial import for corrections or system extensions.

In addition to the database configuration, the import tool collects all the information necessary to configure the OPC client used to communicate with the Process Stations.

PGP for 800xA AC800M

Support for controller objects

The new ABB controllers of the AC800M family revolutionize the traditional control logic concept based on predefined, packaged software modules, often included in the controller firmware.

With AC800M, users can use the basic set of functions included in the controller firmware to create their own function blocks, taking advantage of the user-friendly Control Builder tool. Additionally, ABB has developed industry libraries of control objects which make it easier and faster to implement new control applications.
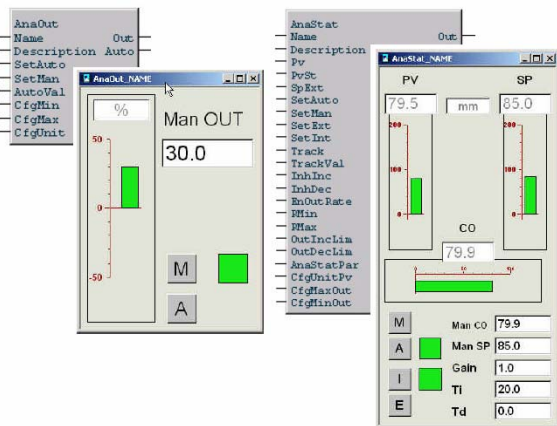
Figure 23 - Examples of AC800M function blocks

The connectivity solution provided by PGP for the AC800M controller takes into account the extreme flexibility of its configuration, and is designed to function with any configuration, regardless of the specific, custom library used on the project.
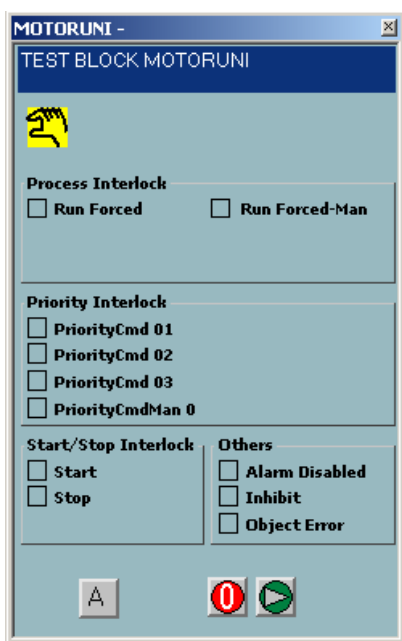
Figure 24 - Examples of AC800M faceplate

Support for the following system libraries (and related types) is included in the standard AC800M connectivity package for the Power Generation Portal:

AlarmEventLib	BasicLib
BatchLib	COMLICommLib
CommunicationLib	ControlAdvancedLib
ControlBasicLib	ControlExtendedLib
ControlFuzzyLib	ControlSimpleLib
ControlStandardLib	ControlSupportLib
FFH1CommLib	FFHSECommLib
FireGasLib	GraphicTemplateLib
GroupStartLib	IconLib
INSUMCommLib	MB300CommLib
MMSCommLib	ModBusCommLib
ModemCommLib	ProcessObjBasicLib
ProcessObjDriveLib	ProcessObjExtLib
ProcessObjInsumLib	S3964CommLib
SattBusCommLib	SeqStartLib
SerialCommLib	SerialLib
SignalAllocation	SignalLib
SupervisionLib	SupportLib
System	VMTLib

Support for faceplates

Support for the following faceplates is included in the standard AC800M connectivity package for the Power Generation Portal:

PidLoop (ControlBasicLib library)
PidLoop3P (ControlBasicLib library)
Uni (ProcessObjExtLib library)
Bi (ProcessObjExtLib library)
ValveUni (ProcessObjExtLib library)
MotorUni (ProcessObjExtLib library)
MotorBi (ProcessObjExtLib library)
SignalInReal (SignalLib library)
SignalReal (SignalLib library)
SignalInBool (SignalLib library)
SignalBool (SignalLib library)

Figure 24 shows an example of AC800M faceplate.

Loop Tuning Display

This facility combines in a single view all necessary information to perform loop-tuning operations. The view includes a trend pane and a control station faceplate.
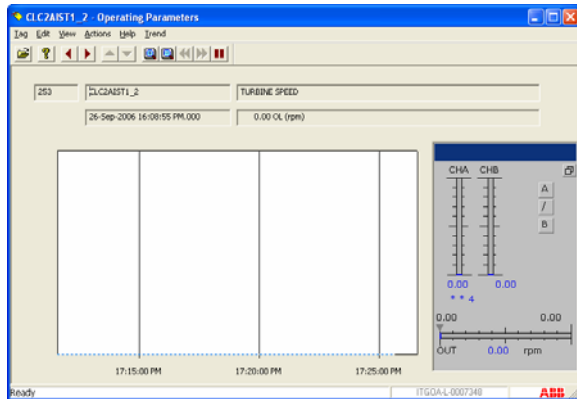

Figure 25 - AC800M Loop Tuning Display

Integration with Control Builder M

Configuration of Power Generation Portal, when used as an HMI for 800xA AC800M, is greatly facilitated by the ability to directly import configuration information from the Control Builder M tool.

The configuration database is project-oriented, and includes Libraries (base and custom), Applications (control logics) and Architectures (controllers).

PGP includes a tool, called AC800MBuilder, capable of interpreting all three categories of information in a project and of creating the corresponding tag database.
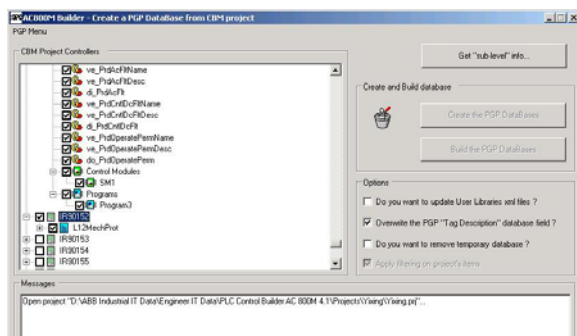
Figure 26 - AC800MBuilder Console

Tags will be created for:

- Basic controller objects
- Custom libraries objects
- User defined objects
- System objects (controllers)

It is possible to perform partial import for corrections or system extensions.

PGP for AC870P Limited Release

Support for controller objects

Following is a list of the AC870P supported automation classes:

- Analog Monitoring
    - *Melody Analog*
    - *Melody AnMon*

- Analog Output
    - *Melody AnOut*

- Loop Control
    - *Melody APID controller*

- Block Flag
    - *Melody BFlagB*
    - *Melody BFlagC*
    - *Melody BFlagD*
    - *Melody BFlagI*
    - *Melody BFlagL*
    - *Melody BflagP*
    - *Melody BflagR*

- Single Flag
    - *Melody SFlagB*
    - *Melody SFlagC*
    - *Melody SFlagD*
    - *Melody SFlagI*
    - *Melody SFlagL*
    - *Melody SFlagP*
    - *Melody SFlagR*

- Binary
    - *Melody Binary*
    - *Melody OPA (binary memory)*
    - *Melody SEL (preselection)*

- Controllers
    - *Melody CLC*
    - *Melody CLCD*
    - *Melody CLCM*
    - *Melody IDF (individual control)*
    - *Melody DOS (dosing circuit)*
    - *Melody COA (change-over auto)*

- Counters
    - *Melody Count*
    - *Melody Tcount (time&pulse)*
    - *Melody Total (quantity value)*

- Sequential Function Chart
    - *Melody SFC*

- Calendar and Timing
    - *Melody SwClock*

Support for faceplates

Each supported function block is accompanied by a dedicated faceplate.
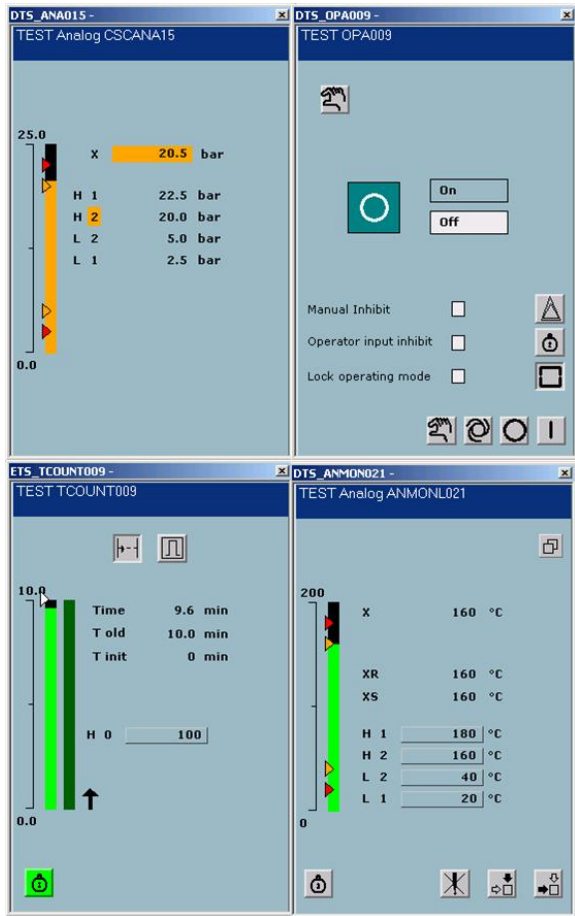

Figure 27 - Examples of AC870 faceplates in PGP

Integration with AC870P Composer

Configuration of Power Generation Portal, when used as an HMI for AC870P, is greatly facilitated by the ability to directly import configuration data of each controller.

The import process is automatically controlled by a software component, called AC870P Synchronizer and included in the base AC870P connectivity package, responsible for the alignment of the PGP and AC870P configuration. The synchronization is accomplished both at system startup and during normal runtime operation.
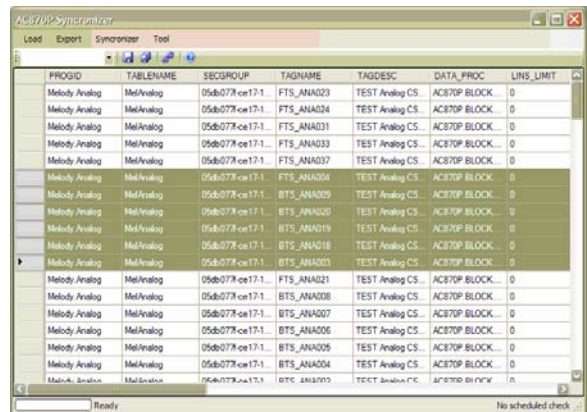
Figure 28 - AC870P Synchronizer Console

The AC870 Synchronizer executes the following tasks, either automatically, manually or periodically:

o   extract configuration changes

o   convert changes into XML

o   validate the changes with the OPC server

o   store changes in the PGP database

o   actualize changes on the target servers

Results of the synchronization process are always available in the log system of PGP.

PGP for Fieldbus Management

By combining PGP with products and components from the extensive Industrial[IT] portfolio in a unified and integrated solution, ABB brings to the market a complete and technologically advanced support for the most common fieldbus standards, like HART, Profibus and Fieldbus Foundation.

Fieldbus support in PGP is structured around three layers of service:

- device configuration and management
- real-time operation
- asset management

Device configuration and management takes advantage of the advanced functionality of Industrial[IT] Device Management to:

- Manage (add, move, remove, or copy) fieldbus devices
- Plan the fieldbus topology
- Call up and view DTM
- Compare field device on- and off-line data
- Upload, download and commission
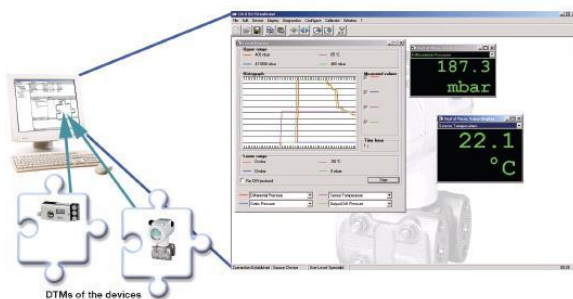
Figure 29 – Configuration of Fieldbus devices

Real-time operation of fieldbus devices is perfectly integrated in the core PGP platform, and enables plant personnel to view device status information and to record device alarms into the PGP alarm management.

Asset management of fieldbus devices is provided by integrating Industrial[IT] Asset Optimization software. Thanks to this advanced product, fieldbus devices are constantly monitored and diagnostic information are made available to plant personnel in an intuitive and easy-to-use form.

PGP for Integrated Turbine Control

Thanks to its ability to exchange information with heterogeneous systems, Power Generation Portal is an excellent choice as the common operator station for turbine control systems (both steam and gas) and balance of plant DCS.
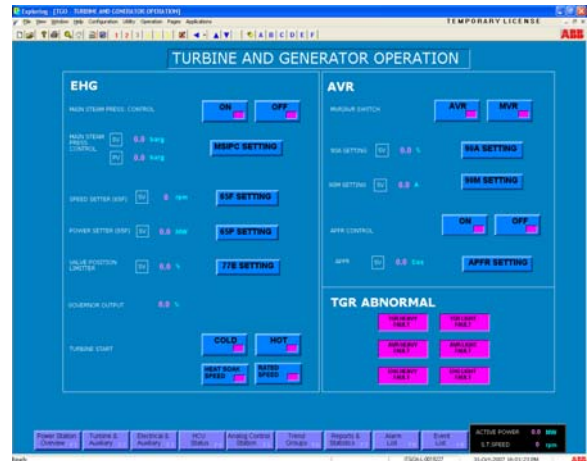

Figure 30 - Turbine overview display

By selecting Power Generation Portal for the control room, operators will have the ability to monitor and control all equipment in the plant for day-to-day operations.

Solutions are available for:

- General Electric Speedtronic Mark V/VI, via GSM protocol (GE Standard Messages), over Ethernet TCP/IP
- Siemens Teleperm, via the XU interface and Siemens proprietary protocol over Ethernet TCP/IP
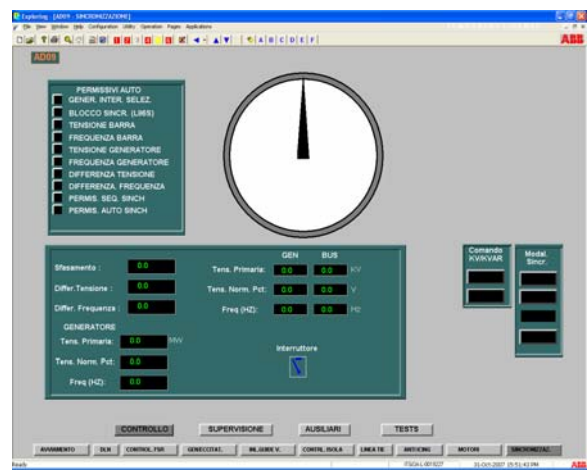- ABB Turboreg (Ansaldo turbines), via PGP InterServer protocol

Figure 31 - Turbine synchronization display

Plant Information Management

The Power Generation Portal provides, as a standard feature, the archiving of the values for all configured tags for short term history (10 days be default, extensible by the user). No historical database is needed for this timeframe, as the short-term archival is provided as a standard extension of the real-time database. State-of-the-art, highly efficient data compression, based on the boxcar/back-slope algorithm, is applied to all analog values.

For longer-term storage, the Power Generation Portal integrates a historical database, with no preset time limit. Values are transferred from the real-time to the historical database according to specific history policies, which can be selected for individual tags:
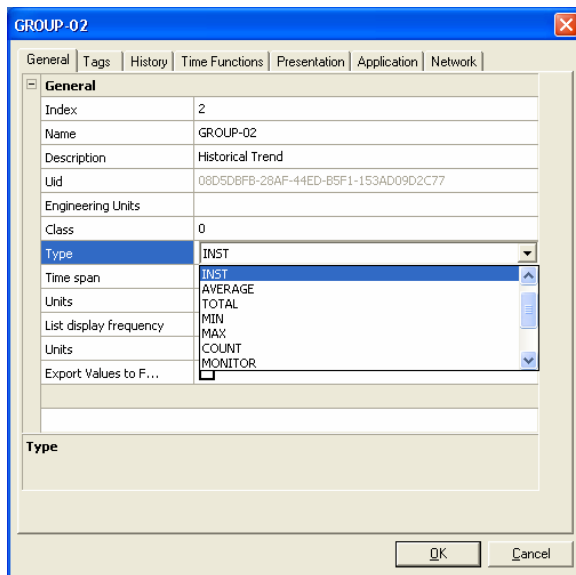
Figure 32 - History Group configuration

Access to the data is independent from the physical location of the desired values. Trends, reports and, in general, all data access functions will look for data in the real-time database and, if it cannot be found there, it will switch to the historical database.

Both real-time and historical database are kept on the server hard-drive, for easy access to the information. Backup/Restore facilities are provided to download the archives to offline media such as tapes, optical disks, and in general every type of offline device supported by the operating system.

Interfaces for application development and integration

One of the main functions of a PIMS is to be the platform for advanced applications, both commercial and ABB proprietary. To this purpose, Power Generation Portal provides a set of standard interfaces:

- OPC Server and Client
  - DA
  - AE
  - HDA (server only)
- OLEDB
- ODBC Server and Client (Tested with MS SQL Server and Oracle)
- ODBC Mirroring (creates a real-time replica of the database on an external, ODBC-compliant database)
- Public API
  - Standard "C"
  - Dual COM (Visual C++ and Visual Basic)

By taking advantage of the compliance with all these standards, the integration of Power Generation Portal with commercial Enterprise Resource Planning (ERP) systems can be accomplished in real time.
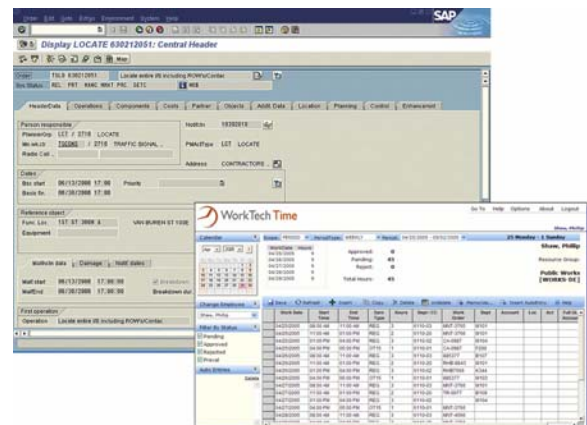

Figure 33 – Integration with CMMS software

Maintenance Counters

Maintenance counters can be associated to Boolean tags to record maintenance information related to devices like motors, pumps, breakers, etc. These counters collect the number of activations (i.e. the changes from a stand by to an operational condition), the operating time (total time in the operational condition) and the total time elapsed from the last service performed on the associated device. The counter value can be compared to operational limits defined by the service personnel, and an alarm can be generated when these limits are reached. These alarms can also be forwarded to an external Computerized Maintenance Management System (CMMS) using one of the supported interfaces.
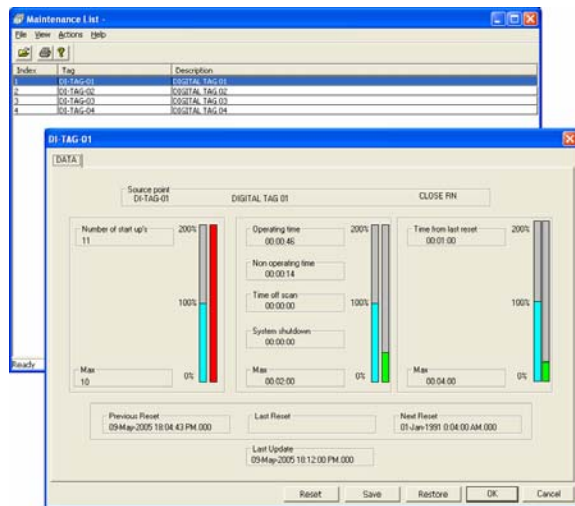

Figure 34 - Maintenance counter

Tags can also be associated to numeric accumulators, or "meters". These will integrate the tag values over selectable periods of time. Examples of application are software energy meters, applied to a power measurement.

The totalized value can be checked for alarm limits, and can be reset both manually and automatically. These functions are useful if there is a need, for example, to integrate measurements like flow rate.

Integrated Sequence of Events

Power Generation Portal is designed as a gateway between plant personnel and plant information, regardless of its source. Once plant data has been processed by the Scanner and is stored in the PGP database, it is accessible to users and applications in a uniform way.

The same principle is applied to process and system events. Power Generation Portal will preserve any time stamp provided by the source, and will provide the server time in all cases where this is not provided.

Once a proper time synchronization procedure is applied to all devices supplying events (DCS, protections, ESD, etc.), PGP offers standard facilities to create Sequence of Events report and post-trip logs, sorted by time regardless of the order in which they have been physically received.
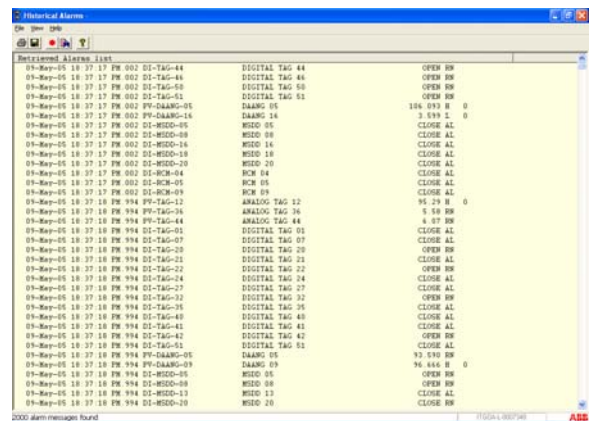

Figure 35 – Example of Sequence of Event log

In this respect, Power Generation Portal can be used as a global SER (Sequence of Events Recorder) for the whole plant.

The time resolution of the time stamp is the millisecond. In combination with an adequate synchronization source, like GPS, Power Generation Portal can create reports with very high accuracy for the analysis and diagnosis of situations involving any device in the plant.

Reports

The Power Generation Portal reporting function is based on Microsoft Excel®. Users can define report templates taking advantage of the powerful Excel® features, and integrate these templates with real-time and historical values from the Power Generation Portal database by means of an ABB plug-in. Once the plug-in is installed, the Power Generation Portal functions can be used like all other Excel® functions, including support from the Excel® Function Wizard. Additionally, it is possible to drag and drop tags from a Power Generation Portal Explorer (the client environment) graphical page to the Excel® spreadsheet. As a result of the operation, the tag name will be inserted in the destination cell, saving configuration time to the management personnel.
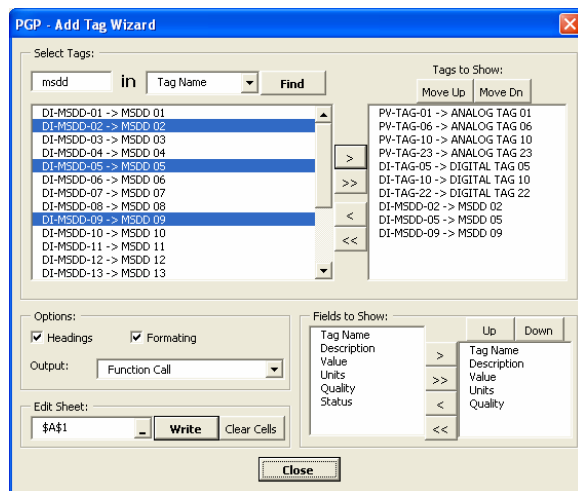

Figure 36 – Tag Explorer for Excel® reports

In addition to supporting the execution of one time reports, Power Generation Portal provides a powerful report scheduling facility, allowing users to use the templates produced in Excel® to generate reports on the basis of time intervals, events and manual requests.

When a report is automatically generated, due to the occurrence of an event or the expiration of a time interval, the resulting actualized spreadsheet is saved in a folder associated to the template, and is made available for consultation and distribution.

Calculation Engine

It often happens that information about the process are not completely provided by available field measurements, but need to be obtained by combinations of existing process values. To support this requirement, the Power Generation Portal provides an embedded calculation engine which, using a complete set of standard arithmetic and logical operators and extensive libraries of advanced functions enables management personnel to create "virtual" calculated tags. These tags are equivalent to actual tags, in the sense that they can be stored, archived, trended, and visualized like all other process values. The calculation of these tags can be scheduled based on time or events.

The language provided for the definition of the formulas supports, in a Basic-like format, the definition of complex control structures like conditional statements and loops.

The library functions are also accessible through Excel®, allowing the computation of virtual process values directly in a report.

The available operators include:

- Arithmetic operators (+, -, *, /, module, exponential)
- Logical operators (AND, OR, NOT)
- Relational Operators (<, >, =, >=, <=, !=)
- Mathematical Functions (trigonometric functions, logarithmic functions, and more)
- Tag access functions
- Time functions
- Data file functions
- Historical functions

Advanced technical calculation libraries are also available on demand:

- Steam tables according to the ASME standard
- Gas property library
- Sea water library
- Fuel combustion library
- Wet Air library

Power Generation Portal for migration projects

Power Generation Portal has been designed since the beginning with the objective of preserving the customer's investment in engineering and plant knowledge. For this reason, state of the art technology has been included in the product foundation to ensure a long operating life, but compatibility with legacy technology has also been considered and tools are provided for direct import of database and graphics.

Currently, Power Generation Portal is the natural migration target for all those legacy operator stations based on the Bailey SODG graphical engine (MCS, PCV, OIS). In all these cases, the existing graphical engineering work can be imported into PGP with very little effort, along with the tag database.

Power Generation Portal for SCADA

Thanks to the power of its Information Platform, and to the versatility of its architecture, Power Generation Portal can easily be employed as a Supervisory and Control Station in a SCADA system for the management of Power, Gas and Water Networks, as well as all of those applications requiring integration and control of geographically distributed systems and remote data acquisition.
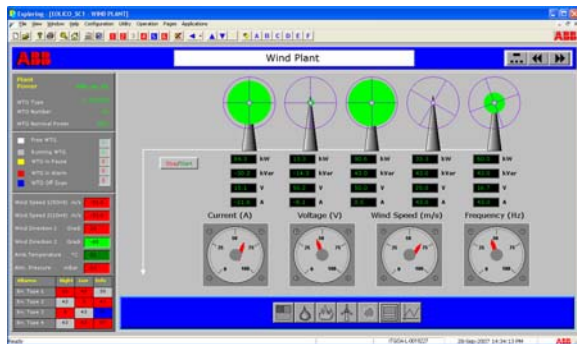

Figure 37 – Supervision of a Wind Farm

Power Generation Portal has been extended with a set of SCADA oriented features. The combination of these new features with the consolidated and powerful core technology can satisfy the most demanding requirements for distribute, remote and dependable control.

Power Generation Portal and the Internet

In today's business world, the possibility of accessing critical production information in real time from anywhere in the world has become a fundamental tool for decision makers.

The ever increasing pressure to reduce cost and increase productivity is pushing plant and maintenance managers toward technology solutions which give visibility and control on the plant from remote locations.

The Internet is now more than ever an enabling technology making the difference between a successful enterprise and a struggling one.
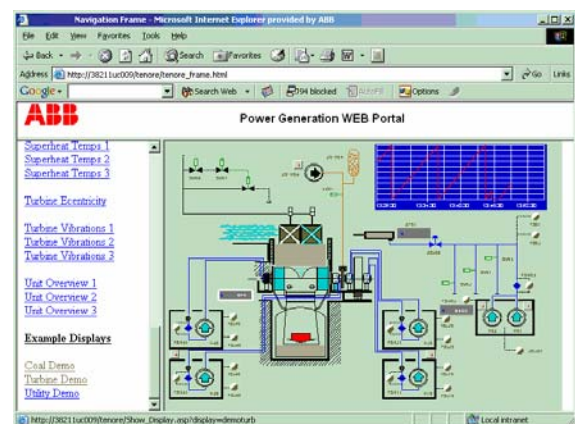

Figure 38 - Example of PGwP page in Internet Explorer

Power Generation Portal has fully embraced this technology, and offers two different solutions, targeted at both management and plant users:

- **Power Generation Web Portal** (PGwP): a pure thin client solution, based on a web server embedded in PGP. With this solution, plant information is presented to users within Internet Explorer® by dynamically creating web pages equivalent to the original Power Generation Portal pages, including the navigation tree

- **Power Generation Remote Portal** (PGrP): based on the industry-standard Microsoft Windows Terminal Server web technology. With this solution, plant information is made accessible with full PGP clients, which are executed locally on the PGrP server, but displayed remotely within Internet Explorer

Global Lifecycle – Service and Support

Lifecycle support

ABB service and support throughout the lifetime of a plant ensures continuous operational efficiency. Support begins with installation and commissioning. It continues through the supply of spare parts and repairs. ABB support also comes into play when you are considering migration to a new system. ABB ensures long-term and predictable lifecycle support of products and systems through our lifecycle policy (active, classic, limited and obsolete phases). Our plans offer support for a minimum of 10 years after the active phase.

Evolution through enhancement

New generations of software and system components provide increased operating efficiency, lower cost and extended system life. ABB offers low-risk migration and upgrade strategies for a broad range of products and systems.We can assure maximum return on your investment, while enhancing your equipment availability and performance. Our customized upgrade planning, implementation and follow-up services ensure long-term benefits, and continued asset effectiveness.

ABB Power Systems
Business Unit Power Generation
Via Hermada 6
16154 Genova
ITALY
Phone: +39 (0) 10 607.3274
Fax: +39 (0) 10 607.3533
E-mail: plant.management@it.abb.com
Internet: http://www.abb.com/powergeneration