

General Physics
Corporation

EtaPRO™

Performance Monitoring and
Optimization System



Leading the World to Better Performance

“Performance monitoring is more than calculations and flashy graphics – GP knows this. What sets them apart is their experience and expertise not only to provide a good software package, but also to help us interpret the results we see in the plant. Their technical support has been nothing short of outstanding...”

-Kyle Nelson,
Sunflower Electric
Power Corporation

Leading the World to Better Performance

Energy-intensive facilities seeking to maximize plant performance and profitability recognize the critical importance of performance monitoring and optimization to their survival in a competitive world. Competing in today's global economy demands that companies do more with less by increasing capacity and lowering costs. This means getting more out of your machinery and facilities. Whether in the power plant, on the pipeline, or in the oil field, machine condition monitoring can help you get the most out of your assets by continuously assessing equipment performance and its impact on the bottom line. Accurate and timely data collected, manipulated, and presented to management in support of decision-making is the cornerstone of any information system. GP's EtaPRO™ is a time-proven, world-class monitoring and optimization system that *turns process data into performance information*, and puts that information, both real-time and historical, on the PC desktop.

Power and Flexibility

EtaPRO™ is a state-of-the-art client/server application utilizing DCOM and compression software technologies to minimize data transfer over local and wide area networks. EtaPRO™ performs a number of key tasks:

Combined Cycle Power Plants use EtaPRO™ to:

- Monitor, normalize, and trend GT performance
- Model alternative operating scenarios
- Optimize part load operation
- Manage contract performance variables (bonus/penalty)
- Schedule compressor washes
- Monitor and trend BOP performance
- Automate reporting of plant operating data
- Track equivalent operating hours

Conventional Thermal Power Plants use EtaPRO™ to:

- Minimize controllable losses
- Model alternative operating scenarios
- Minimize low load heat rate
- Support cost benefit analysis for maintenance activities and capital improvements
- Raise control room awareness of plant performance goals
- Enhance thermo-economic characteristics for unit dispatching
- Automate reporting of plant operating data

Process Plants use EtaPRO™ to monitor, normalize, and trend:

- Large gas compressors
- Fixed boilers and heaters
- Mechanical drive turbines (gas and steam)
- Power-generating equipment
- Large process pumps
- Heat exchangers
- Cooling towers

Features and Capabilities

EtaPRO™ is a full-capability performance monitoring system with extensive features that provide value over the life of the system. EtaPRO™ includes the following:

Comprehensive Performance Library

EtaPRO™ has the most comprehensive library of performance calculations in the industry, with more being added every day. Calculations are based on application of sound engineering principles and accepted codes and standards. These calculations are available for gas turbines, compressors, feedwater heaters, condensers, cooling towers, boilers, heat recovery steam generators (HRSGs), pumps, fans, generators, and turbo expanders. Physical properties are available for steam, water, and air, as well as a variety of gases. SI and English engineering units are supported.

A Technological Edge

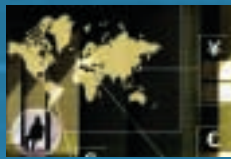
GP has been providing customized performance monitoring/management software solutions to our customers since 1984 – *longer than any of our competitors*. Performance monitoring is a core business of GP, not a sideline. We maintain a professional staff of specialists with expertise in plant maintenance, engineering, and operations, as well as information technology application and development. Our Performance Engineering personnel specialize in assisting electric-generating and process facilities in achieving their goals for performance, reliability, capacity, and environmental compliance.

With over 250 units installed or pending throughout the world, and with “best-in-class” capabilities and reliability, EtaPRO™ sets the standard in plant performance monitoring and optimization.

- A comprehensive performance calculation library of nearly 500 proven engineering calculations for assessing all types of equipment and machinery, including gas and steam turbines, boilers, air heaters, HRSGs, pumps, fans, compressors, condensers, and feedwater heaters.
- The ability to filter, trend, and analyze key performance variables over time with *years* of data available on-line via user-friendly interfaces suitable for operations, engineering, and management personnel.
- Client/server architecture using DCOM technology for optimized LAN/WAN communications and high-speed access to distributed EtaPRO™ servers.
- The ability to acquire data through industry standard OPC or direct connection to OSI's PI Data Archive™.
- Automatic “validity” checking of critical process values used in performance calculations and options substituting “smart” defaults to replace bad inputs.
- Electronic Operator Log for plant and equipment status text entries that can be instantly cross-referenced with numerical process trends.
- Microsoft® Excel-based report generator (EPReporter™) capable of sending reports automatically or on-demand to a printer, file, screen display, or e-mail address.
- A state-of-the-art historical database (OSI's PI Data Archive™) for storing *years* of high-fidelity on-line data plus trending tools to easily display data in numerous formats, including X-Y plots of one parameter against another as well as up to 12 time-based plots simultaneously.
- Integrated PI Tag Manager for creating PI tags and editing their attributes.
- Thermodynamic properties of steam and water using 1967 or 1997 ASME Steam Property formulations.
- Physical properties of gases and gas mixtures using one of five Equations of State (EOS), including Peng-Robinson, Benedict-Webb-Rubin (BWR), the Starling modification of BWR, and the Soave modification of the Redlich-Kwong.
- On-line “smart” diagnostics for assisting operations personnel in attaining target values for all controllable parameters.
- A flexible and powerful screen builder that allows for development of new screens as well as customization of all “delivered” screens to add/delete process variables, labels, graphs, and numerous user functions.
- A comprehensive training program for all levels of system users. Training can be provided not only in the area of software use and maintenance, but also for process improvements. GP presents plant performance seminars to all levels of power plant personnel throughout the world.
- On-line help and documentation at the client level (available to all users).

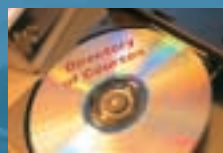
Performance focused on availability, capacity, and efficiency is key to maximizing profit in today's competitive power generation environment. Our products and services are time-proven, and we stand behind them to ensure complete satisfaction. Representative clients include:

AES
ALLIANT ENERGY
CALPINE
COLORADO SPRINGS UTILITIES
CONECTIV
EME
ENERGY
FIRSTENERGY
ILLINOIS POWER COMPANY
INTERGEN
KUWAIT OIL COMPANY
NEW YORK POWER AUTHORITY
NRG
PACIFICORP
PETRONAS GAS BERHAD
PG&E GENERATING
PREMIER POWER
PT BADAK NGL COMPANY
OKLAHOMA GAS & ELECTRIC
RELIANT
SAUDI ARAMCO
SERENE
SIERRA PACIFIC
SITHE
SUNFLOWER ELECTRIC
TEXAS NEW MEXICO



“EtaPRO™’s flexibility and GP’s performance expertise led Entergy to select both for our Operations and Information System. GP’s installed based also played a part in our decision. We found that people use their EtaPRO™ Systems.”

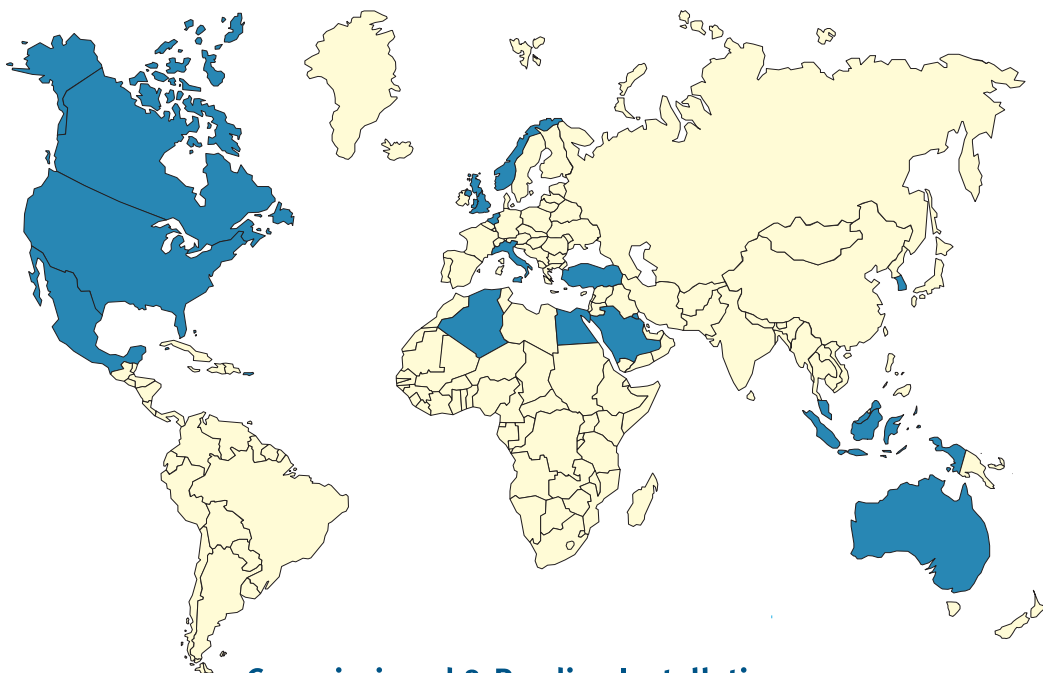
-Walt Irwin,
Entergy



www.gpworldwide.com

EtaPRO™ INSTALLATIONS

Leading the World to Better Performance



Commissioned & Pending Installations:

North America

Canada - NLH/Holyrood
- TransAlta Utilities/Keephills
- TransAlta Utilities/Sundance
- TransAlta Utilities/Wabamun

Mexico - InterGen/Bajio
Puerto Rico - AES Puerto Rico
United States - 160+ Installations

Australia

InterGen - Millmerran

Africa

Algeria - Sonelgas
Egypt - InterGen/Sidi Krir

Middle East

Kuwait - Kuwait Oil Company
Saudi Arabia - Al Jubail Petrochemical
- Saudi Aramco/Ras Tanura
- Saudi Aramco/Uthmaniyah

Turkey - InterGen/Adapaza
- InterGen/Gebze
- InterGen/Izmir

United Arab Emirates - ADNOC

Europe

UK - Calpine/Saltend
- Entergy UK/Damhead Creek
- InterGen/Coryton
- Premier Power/Ballylumford (2)

Italy - Serene/Melfi
Netherlands - EPON/Eemshaven
Norway - Statoil Karsto Utbyggingst

Far East

Indonesia - P.T. Badak NGL Company
Malaysia - Kerith Gas Processing Plant
Singapore - EXXON Chemical/Jurong Island
South Korea - KEPCO

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