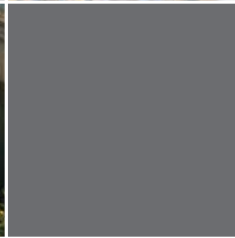
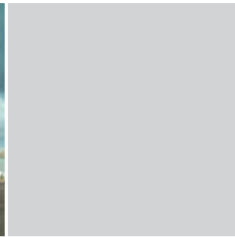


# System 1<sup>®</sup>

Optimization and Diagnostic Platform



## System 1\* Overview

### An asset optimization and diagnostic platform

System 1 is GE Energy's patented software platform for real-time optimization of equipment and selected processes, condition monitoring, and event diagnostics. Similar in concept to a process control system which allows users to understand, diagnose, and control their process conditions in real time, the System 1 platform provides this capability for the assets that drive your process. System 1 can also be applied to selected processes not normally addressed by a process control system, such as fuel management, combustion optimization, and many others.

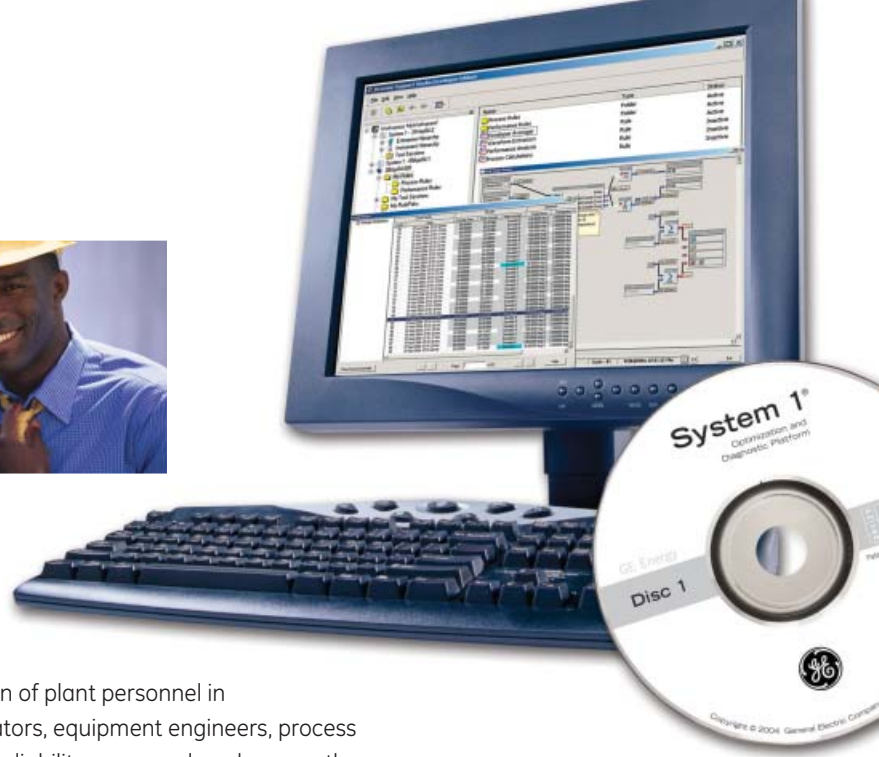
### Faster, better decisions

Asset-related decisions in many companies today are made with insufficient information and intense time constraints that simply don't provide the luxury of hours, let alone days, to deliberate and gather more detail. Poor decisions cost time. Time costs money. System 1 is designed to save money by addressing both. It quickly delivers the information your people need to make informed, high-confidence decisions. When do the extra costs incurred by degrading efficiency eclipse the costs to restore efficiency? *System 1 can tell you.* An asset is giving signs of severe stress but it is imperative that it run at 100% – or even more – for the next two weeks if at all possible. Can it? *System 1 can tell you.* What about that planned maintenance – can it be safely deferred for another year? *System 1 can tell you.*

### Turning data into Actionable Information\*

System 1 is designed to receive inputs from an extremely broad range of sources including permanent and portable condition monitoring hardware/software, process control and automation hardware/software, process historians, maintenance management and reliability software, spreadsheets, operator logs, and many others. It continually monitors these inputs and when situations requiring attention emerge, System 1 detects these and then alerts appropriate plant personnel with Actionable Information advisories that provide recommended corrective actions. Through a variety of notification mechanisms such as pager, cell phone, e-mail, pop-up window, or even integration with the plant control system's user interface, these Actionable Information advisories can be consistently delivered to the people responsible for making decisions and taking necessary actions, allowing them to respond in ways that optimize the business impact. The proactive practices enabled by System 1 result in increased equipment availability, reliability, and safety while simultaneously reducing maintenance, fuel, and operating costs as a percentage of plant output.





## Your industry, your people

System 1\* is designed for use by a broad cross-section of plant personnel in virtually any industry – including management, operators, equipment engineers, process engineers, instrument technicians, maintenance and reliability personnel, and many others.

## Customizable Decision Support\* – the System 1 difference

While its diagnostic tools can be used for manually assessing conditions and to “dig deeper” when an event requires in-depth analysis, what truly distinguishes the System 1 platform is its ability to provide sophisticated Decision Support information. System 1 can *automatically* analyze its collected data and transform this into Actionable Information\* advisories for optimization or diagnostics. It does this through two complementary methods. The first is with pre-engineered RulePaks that are designed and built by our domain experts, and can be embedded into the system for a specific application. The second is with a flexible and highly intuitive rule-building utility, allowing users to embed their unique optimization and diagnostic knowledge of equipment and processes into a powerful and fully customized knowledge base reflecting the specific needs of each asset, process, and plant. Not only can its diagnostic capabilities be customized and augmented, but users can also embed their unique responses to conditions. Who is notified, how they are notified, and what they are told to do in response to an event is all completely configurable, allowing you to optimize your plant *your way*.

## Open, industry-standard technologies

The System 1 platform from GE Energy features a powerful client/server architecture, utilizing today’s generation of robust Microsoft® Windows® operating systems and server technologies, while supporting both standard web browser and purpose-built display clients. The System 1 database uses Microsoft® SQL technology, optimized for extremely fast data storage and event capture, high-resolution trending and alarming, powerful exception reporting and user notification features, and comprehensive equipment properties and configuration information. An extensive variety of capabilities exist for importing and exporting data between System 1 and process control and automation systems, supplementary condition monitoring technologies, CMMS and EAM systems, reliability software, ERP and other business systems, engineering software, spreadsheets, word processors, and many others.

## Flexibility and scalability for broadest applicability

The System 1 platform has been specifically designed for maximum scalability and flexibility, allowing users to easily configure the system to reflect their unique assets, processes, and operating practices. Whether hosting a single portable data collection instrument as part of a Predictive Maintenance program at a single plant, or addressing hundreds of thousands of assets across a global enterprise, the System 1 platform is designed to fit your requirements today and tomorrow.



## Outstanding ROI ...

Payback from a System 1\* installation is typically achieved in less than one year – some customers have even seen their system pay for itself in as little as one week! How? Through numerous important benefits that all impact the bottom line:

- **Increased safety**

A single “miss” on safety or the environment can be disastrous. Proactive capabilities mean fewer, less severe mechanical failures that could impact people and the environment.

- **Improved reliability and availability**

Healthy assets are assets you can depend on when they are needed. Problems can be identified and dealt with early in the progression of symptoms – before they translate to expensive downtime.

- **Optimized maintenance costs**

System 1 helps you plan maintenance by allowing you to base decisions on actual condition – so you can fix only what really needs fixing and address problems when they are small and less expensive.

- **Lower energy costs**

Energy costs are often a plant’s single largest operating expense. System 1 helps assess and correct the conditions that waste energy.

- **Fewer forced outages, less lost production**

Even the most expensive repair and maintenance costs are often eclipsed by the enormous costs of lost or reduced production. System 1 can generally save one or more days of lost production due to mechanical failures in the first year alone, often paying for the entire system in a single “event.”

- **Increased thermal efficiency/optimized heat rate**

System 1 can provide the information you need to understand and correct degradations in these important parameters, and optimize the balance between energy costs, maintenance costs, and production revenues – often translating to significant financial benefits.



## ... and Increased Profit Potential

Time is money. System 1\* reduces the time it takes to make informed, proactive decisions, meaning reduced costs in numerous ways:

- **Increased employee productivity**  
In today's "lean" environment, people are already spread too thin. Instead of using people to hunt for problems, System 1 allows your people to work on identified problems, armed with relevant information on the identified symptoms and root causes.
- **Move data, not people**  
With its remote access capabilities, System 1 can reduce travel costs, minimizing the need for people to move from place to place collecting data, and leaving them extra time for completing more meaningful activities. Data can not only be collected remotely, it can be analyzed remotely, allowing users to more easily manage assets from various locations – whether across an entire globally dispersed enterprise, or simply another process unit elsewhere in the plant.
- **Easier collaboration**  
Key information can easily be shared between all relevant parties – employees, contractors, suppliers, or consultants – in real time. Enhanced collaboration means more relevant expertise can be applied to problems for faster, better resolution.
- **Faster response, reduced human variance**  
Abnormal situations can be stressful, making it difficult for people to respond both quickly *and* properly. System 1 delivers Actionable Information\* advisories that tell your people exactly how to respond to events – you decide in advance and embed these details right in the software. Instead of *deciding* how to respond, personnel can respond with predetermined actions – and at the speed your business demands.



## System 1\* Features

### Sophisticated alarm management

System 1 enables true “management by exception” with its sophisticated alarm handling capabilities for the entire enterprise, ensuring that only relevant events and alarms are delivered to your operations and other personnel. No more overwhelming alarm lists, nuisance alarms, and cryptic messaging with insufficient details – you control the level of attention given to each event, the type of notification, the people notified, and all other details.

### Powerful analytic and diagnostic capabilities

Data can be manipulated and presented using an extensive library of tools and functions – data can even be exported to spreadsheets and imported again for special calculations. Advanced plot management tools – such as plot grouping – make it easy to create, save, access, and duplicate plots of common interest. Users can quickly see what happened before and after an event using intuitive “zoom in/zoom out” capabilities on plot time ranges.

### Configurable data acquisition and storage resolution

Data capture can be individually configurable for each point and can be triggered by an event, by the state of another variable, by predetermined time intervals, or any combination of these parameters. “Dead band” capabilities ensure that data which is not changing within user-configurable limits for each point can be suppressed from storage – helping keep database sizes compact without missing important information and events or disrupting trend resolution.

### Anywhere, anytime access via web browser

In addition to our specialized display client software, selected System 1 data and information can be accessed using standard web browsers, making it easier than ever for all the people in your enterprise to tap into the power of System 1.

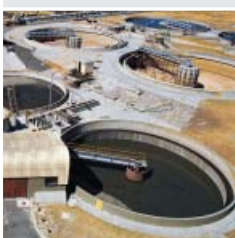
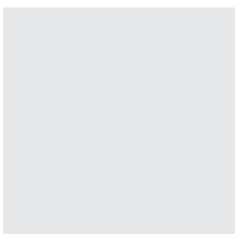
### Support for Virtual Private Network (VPN) technologies

VPN technologies are being increasingly used by many of our customers for accessing their corporate networks via a public Internet connection – without compromising security. System 1 fully supports this technology, providing the most convenient remote access capabilities we’ve ever been able to offer.

### Fully customizable displays

Just as you configure and personalize your Windows® desktop, System 1 users can individually configure their display capabilities, ensuring that only those assets and portions of the enterprise relevant to them are presented.





### **Enhanced IT management and support capabilities**

System 1\* has been designed for highly secure and robust operation without the need for extensive support from your company's Information Technology Department, while still providing powerful tools and capabilities for them to centrally manage the PCs across your enterprise.

### **One user interface**

System 1 accepts data from multiple sources but eliminates the need for learning and navigating multiple user interface environments – providing a consistent, intuitive look and feel for viewing data and information. When you need access to external systems and user interfaces, its built-in DocuView\* features provide consistent, easy-to-use access to supplementary programs, data, drawings, documents, web pages, and any other information that you can link to from your computer.

### **One database**

System 1 integrates numerous data sources into a single system, reducing the need for learning and maintaining multiple systems. Portable data collectors, online wired and wireless continuous and intermittent measurement systems, manually entered data and notes, and many other data sources – all are now brought together in a single system.

### **Highly scalable**

Your System 1 implementation can start small and build through an architecture and pricing structure that has been deliberately designed for scalability and affordability. Pay for what you need today, add what you need tomorrow.

### **Root cause analysis**

System 1 provides unrivaled root cause diagnostic capabilities by allowing users to “drill down” and examine the sequence of events leading up to a problem, analyze the data using powerful graphical and tabular presentation formats, and then document this learning, either by posting notes in the database or by generating new rules, capable of automatically analyzing future events with the same root cause.

### **Virtual measurements**

Measurements from actual sensors and data sources can be combined into calculated, “virtual” measurements. Virtual measurements can be treated just like any other data point – trended, alarmed, displayed, and used in the generation of rules.

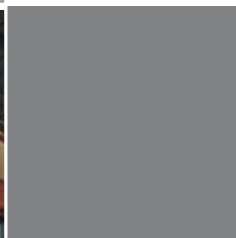
## System 1\* Application Packages and System Extender\* Modules

### Application Packages

Application Packages provide the specific plot types, data handling and viewing, interfaces, input capabilities, configuration details, and other system attributes relevant to a specific type of asset or application. The result is a series of ready-made packages that address many of our customers' most often-requested applications.

Category	Available Application Packages
Bently Nevada* Critical Machinery Condition Monitoring and Diagnostics	<ul style="list-style-type: none"><li>• Turbomachinery</li><li>• Hydro Turbines/Generators</li><li>• Wind Turbines</li><li>• Reciprocating Compressors</li></ul>
General-Purpose Machinery Condition Monitoring and Diagnostics	<ul style="list-style-type: none"><li>• Portable Data Collector</li><li>• Trendmaster* Pro</li></ul>
Fixed Equipment Condition Monitoring and Diagnostics	<ul style="list-style-type: none"><li>• Electrical Equipment</li></ul>
Thermodynamic Performance Monitoring and Diagnostics	<ul style="list-style-type: none"><li>• Machinery Performance</li></ul>
Data Archiving	<ul style="list-style-type: none"><li>• Data Historian</li></ul>

*...and others continually being developed*





## System Extender\* Modules

System Extender modules are designed to work in conjunction with one or more types of System 1\* applications, providing extended functionality applicable to a particular asset type, data collection method, or optimization task. Available System Extender modules include:

- **EAM/CMMS Interfaces**

Interfaces to many of today's most common maintenance management platforms including:

- SAP® R/3® plant maintenance module
- MAXIMO® system from MRO Software
- and others

- **Decision Support Studio**

Allows users to generate and maintain their own custom rules for use by System 1's standard decision support and notification capabilities

- **Electrical Equipment RulePaks**

Pre-configured rules for electrical diagnostics of induction motors and other equipment

- **Bently Nevada\* RulePaks**

Pre-configured rules that embed Bently Nevada mechanical diagnostic expertise for specific machinery types. Individual RulePaks are available for the following:

- Steam Turbines
- Reciprocating Compressors
- Industrial Gas Turbines
- Aero-derivative Gas Turbines
- Electric Motors
- and others

- **The Bearing Expert™**

A comprehensive library of fault frequencies and geometries for over one million rolling element bearing types, provided by International Source Index, Inc.

*...and others continually being developed*

Additional information on individual Application Packages, System Extender modules, and industry-specific System 1 capabilities is available. Your sales professional may have included this in the pocket on the last page of this brochure, or you can also visit us online to access this information – and view the most up-to-date listing of available packages, modules, and associated literature.

## System 1\* Service and Support

Whether System 1 software will be used as a simple host system for a portable data collector at a single site, or as an enterprise-wide system linking thousands of assets across multiple plants on multiple continents, we are always available to assist you with a variety of valuable service and support offerings.

### Opportunity/Risk Assessment

For those who are unsure where to apply System 1 for maximum effectiveness, we can assess your assets and maintenance practices, identifying the areas of highest business risk and maximum opportunity for financial return. For many, deployment of the System 1 platform starts with application to the most critical assets and extends over time to encompass other assets. We can help you “plan the journey” by prioritizing where – and how – System 1 can be best applied to your specific situation by performing a detailed financial and risk-based analysis of your plant(s).

### System Installation

Our comprehensive, global capabilities encompass every aspect of system installation – mechanical modifications to assets for installing transducers, field wiring, system documentation and planning, project management, software configuration, and integration of the System 1 platform with other control and automation systems.

### Training

We provide comprehensive training on using System 1 software as well as application-specific training for activities you can perform with System 1, such as diagnosing machinery malfunctions or performing corrective alignment and balancing.

### Remote Monitoring & Diagnostics

Some customers may prefer to outsource all or part of their condition monitoring and asset management activities – relying upon us to not just install and commission System 1 software, but to act as the primary users as well, on a 24/7/365 basis. On-demand as well as long-term contractual agreements can be established to assist customers with the day-to-day activities associated with asset management and condition monitoring using the System 1 platform.

### System Optimization

Configuring System 1 software for optimal performance encompasses many aspects – establishment of appropriate alarm levels, configuration of relevant rules for specific assets, verification of input device accuracies, and building intuitive display and summary screens for specific types of users to name just a few. We can assist in all of these areas, ensuring your installation is capable of providing maximum benefit by being optimally configured.

### Supporting Services

Because we designed and built System 1, we are also your best choice to maintain, support, and optimize your System 1 installation. A variety of Supporting Services Agreements exist in multi-year increments, ensuring that we'll stand behind the product for years to come. On-demand repair and maintenance services also exist via our global network of technical professionals in over 120 countries worldwide.

These service and support offerings can be purchased individually or grouped with others as part of a package. And, just as System 1 software is highly configurable, so are our service offerings. We'd be pleased to consult with you on customizing our service and support offerings to meet your specific applications and needs. Just ask!



For complete product specifications  
and ordering information:

- contact your local salesperson
- call 775-782-3611  
and ask for "System 1" at the prompt
- e-mail us at [system1info@ge.com](mailto:system1info@ge.com)
- visit our Web site at [www.gepower.com/system1](http://www.gepower.com/system1)

\* Actionable Information, Bently Nevada, GE, General Electric, the GE monogram design, Move Data Not People, System 1, Trendmaster, Decision Support, DocuView, and System Extender are marks or registered marks of the General Electric Company in the United States and other countries.

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R/3 and SAP are trademarks or registered trademarks of SAP AG in Germany and in several other countries.

The Bearing Expert is a mark of International Source Index, Inc.

The technology used in System 1 software is protected by U.S. patents 5,905,989 and 6,421,571.

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