A SCADA System Assessment

By Randy Dennison

A SCADA System Assessment by Randy Dennison

A Pre−SCADA System Assessment

By Randy Dennison

Introduction
Supervisory Control and Data Acquisition (SCADA) is a process control system that enables a site operator to monitor and control processes distributed among various remote sites. Such systems can be used to monitor and control land, air or water pollution control equipment, or just about any manufacturing process.

A properly designed SCADA system saves time and money by eliminating the need for service personnel to visit each site for inspection, data collection/logging or make adjustments. Real−time monitoring, system modifications, troubleshooting, increased equipment life and automatic report generating are just a few of the benefits that come with today's SCADA systems.

As technology continues to advance, such systems will be the operating standard for process control. But from hundreds of system providers available today, which one will a facility choose to partner with and why?

Choosing a system provider that will design a system applicable to an operator's needs can be an overwhelming, confusing task. With little or no knowledge of SCADA and telemetry systems and an incomplete pre−system assessment, decisions can include costly mistakes. Too often the decisions are based upon:

Price:
The quality of system components and workmanship may suffer when vendors low−bid to win the contract. The vendor may then indiscriminately cut costs to make a profit.
Proprietary equipment - If proprietary, closed−protocol equipment is installed in the system, the customer can be forced to pay inflated prices and face the possibility of future equipment integration

problems due to obsolete or irreplaceable components, company shutdowns and a lack of support when it comes time for repair.

Excessively complex or customized equipment:
If the SCADA system is too complex to understand, operate and support, the only recourse is to purchase expensive training and/or service contracts, which do not always guarantee prompt and professional service.

Years of experience or knowledgeable expertise:
There are a host of reputable SCADA providers, with years of experience and knowledgeable expertise, who have designed systems that are too broad or expensive. Experience and knowledge are important but only as a starting point when selecting a vendor.

Sales people and/or flashy marketing:
Effective sales and marketing strategies are meant to produce top−of−mind results. Avoid being lured or pressured into a purchase. Be equipped and make a sound decision based on all factors that affect optimum system performance.

These and other costly mistakes can be avoided through knowledge, understanding and careful assessment. Some will only need to consider Tables A and B of this article. Others, with little or no SCADA knowledge, will need to familiarize themselves with more background information.

A Brief History
SCADA began in the early 1960s as an electronic system operating as input/output transmissions between a master station and a remote station. The master station would receive data through a telemetry network and then store the data on mainframe computers.

In the early 1970s, distributed control systems (DCS) were developed to control separate remote subsystems and in the 1980s, with the development of the microcomputer, process control could be distributed among remote sites. Further development enabled DCS to use programmable logic controllers (PLC), which have the ability to control sites without taking direction from a master.

In the late 1990s, SCADA systems were built with DCS capabilities and systems were customized based on certain proprietary control features built in by the designer. Now, with the Internet being utilized more as a communication tool, SCADA and telemetry systems are using automated software with certain portals to download information or control a process.

Engineered SCADA systems today not only control processes but are also used for measuring, forecasting, billing, analyzing and planning. Today's SCADA system must meet a whole new level of control automation while interfacing with yesterday's obsolete equipment yet remain flexible enough to adapt to tomorrow's developments.

Whether the requirement is a new system or upgrading an older one, it is important to know the system components before deciding on who to talk with and what equipment is needed for a particular application.

System Components
The four major SCADA system components include the Master Terminal Unit (MTU), the Remote Terminal Unit (RTU), communication equipment and SCADA software.

The MTU is located at the operator's central control facility and provides a man−machine software interface, two−way data communication and monitoring/control of remote field devices.

The RTU, located at a remote site, gathers data from field devices (pumps, valves, alarms, etc.) into memory until the MTU initiates a send command. The central processing unit within the RTU receives a data stream via hardware equipment protocol. When the RTU sees its specific address embedded in the protocol, data is interpreted and the CPU directs the specified action to take. The protocol used can be open like Modbus, TCP/IP or a proprietary closed protocol. Some RTUs, called "smart PLCs" or remote access PLCs, provide remote programmable functionality while retaining the communications capability of an RTU. These devices are designed to perform control functions, check site conditions, re−program anytime from anywhere, and have any alarm or event trigger a call to a personal computer without any direction from the MTU.

The way the MTU/RTU transmission network or topology is set up can vary, but the system must feature uninterrupted, bi−directional communication in order to properly function. Methods to accomplish this include private medium, where the end user owns, operates, licenses and services the medium, and/or public medium, where the customer pays for a monthly, per time or volume use.

The first method for private media transmission includes wire lines or buried cable and modems, and is usually limited to low bandwidth. When it makes sense for a company to string or bury its own communication cable between sites, companies should consider staffing requirements necessary to support the technical/maintenance aspects of the system.

The second method to consider is wireless transmission and includes spread spectrum, microwave or VHF/UHF radios.

Spread Spectrum is license−free and available to the public in the 900 MHz and 5.8 GHz bands. Some spread spectrum radios have the ability to re−strengthen signals for the next radio in line. These repeater radios are used to span distances and generally have built−in error correction, encryption and other features, making them a reliable, secure and long−lasting solution for network communication.

Microwave radio transmits at high frequencies through parabolic dishes mounted on towers or on top of buildings. This media uses point−to−point, line−of−sight technology and communication may become interrupted at times due to misalignment and/or atmospheric conditions.

VHF/UHF radio (good for up to 30 miles) is an electromagnetic transmission with frequencies of 175 MHz−450 MGz−900 MHz received by special antennas. A license from the FCC must be obtained and coverage is limited to special geographical boundaries.

Public media transmission includes services offered by a local telephone or cable company, and in some systems and/or subsystems, it may provide a more suitable method for data transfer. The Public

Switch Telephone Network, Generally Switched Telephone network, and the Cellular network are dial−up services suitable for occasional use. If a 24−hour permanent connection for analog data transmission between two or more locations is needed, the Private Leased Line should be considered. The Digital Data Service with DSL and ISDN, systems recently popularized by broadband/cable Internet, should be considered for high speed/low error rate, computer−to−computer applications. WiFi equipment utilizes broadband as well, but on a time−share basis when it makes sense to use the infrastructure of another company. PCS/CDPD service, provided by cellular companies and Low Earth Orbit or geosynchronous satellites can also be used for continuous communication.

Finally, the employment of an easy−to−use SCADA software package, commonly know as the human machine interface (HMI), installed on PC hardware provides a reliable representation of the real system at work. An HMI allows the operator to view virtually all system alerts, warnings and functions as well as change set points and analyze, archive or present data trends.

Some common HMI software packages include Cimplicity (GE−Fanuc), RSView (Rockwell Automation), IFIX (Intellution) and InTouch (Wonderware). Most of these software packages use standard data manipulation/presentation tools for reporting and archiving and integrate well with Microsoft Excel, Access and Word. Collected data can also be sent to Web servers that dynamically generate HTML pages to be viewed on the operator's LAN or published to the Internet.

The Microprocessor Option

With this basic understanding of SCADA system components, a facility may want to consider utilizing a microprocessor and/or PLC−based SCADA system over a basic RTU or a proprietary system for the following reasons:

Microprocessors (MPs), like MTUs, can continuously collect, process and store data, operating independently from the MTU through "intelligent" programming. In addition, by utilizing a microprocessor−based level meter, a SCADA system provides both a master and local display that automatically gathers, processes and reports data necessary to comply with local, state and federal regulations in formats that integrate well will Microsoft Excel, Access and Word.

Microprocessors can provide security and monitoring of door switches, heat and motion detectors. Managers/operators can be informed 24 hours a day through automatic e−mail, paging and dial−up call features. Multiple users can easily be added and, if open architecture protocol is used, future equipment can easily be integrated. Since MPs have no moving parts, they are extremely reliable and can be designed to be repairable with components that any local electrical distributor supplies.

Microprocessor−based SCADA systems can reduce the number of man−hours needed for on−site visual inspections, adjustments, data collection and logging. Continually monitoring and troubleshooting potential problems increases equipment life, reduces service calls, reduces customer complaints and increases system efficiency. Simply put, open−architecture, microprocessor−based SCADA systems are an excellent means for process control facilities to save time and money.

Review

The return on investment and benefits produced by a properly engineered microprocessor−based SCADA system far outweigh the initial investment if the right equipment is chosen and installed correctly. But from the hundreds of SCADA system providers to choose from, one poor decision may lead down the path to countless frustrations, inefficiencies and unnecessary expenses.

Hopefully, by conducting a pre−SCADA system assessment, facilities will be better equipped to avoid such problems . . .

This is an edited version of the company's Pre−SCADA Assessment white paper. For a full copy, visit www.epgco.com/scada−assessment.html or contact Randy Dennison at 800−443−7426

Randy Dennison is Marketing Manager for NBT, EPG Companies Inc. SCADA and telemetry division. NBT manufacturers SCADA and Telemetry equipment for the Water and Wastewater Industry as well as for landfills and remediation sites. For more information, call 800−443−7426 or go to www.nbtinc.com or www.epgco.com

How You Can Learn to be a Better Manager

By Chris Anderson

When you first take over a department, expectations are usually high but operations are sometimes in disarray. The staff is disorganized, goals aren't being met, and hours are spent on unproductive tasks. Just when you think the company would never get on track, the CFO recommends that you learn more about something called operations assessment.

Crucial Management Skills Help Avoid Mistakes

At first, you aren't sure how operational assessment skills would help you manage better, but you quickly see that the training makes all the difference. You learn that planning without assessment can be as ineffective as not planning at all. You also learn that goal−oriented checklists, frequent follow−ups, and asking the right questions at the right times can eliminate costly mistakes.

With Operations Assessment Training, You Will Be Able To: Articulate the advantages of an operations assessment in the maintenance and improvement of your management systems. Explain the Model of a Process−based Quality Management System, and the purpose and structure of ISO 9001. Plan and execute an operations assessment. Gather objective evidence through observation, interview and sampling of documents and records. Write factual assessment reports that drive improvements in your management system. Develop methods to verify the effectiveness of corrective actions.

Acquire Skills for Continuous Improvement

You can use the methodologies covered by the highly−respected ISO 9000 Quality Standard and its Internal Auditing Methods for continuous process improvement. You can also acquire the skills to conduct systematic business process assessments that drive improved planning, task management,

results reporting and remedial solutions.

Simple Lessons, Huge results

Now, your company's productivity has improved by leaps and bounds. Simple audits before and after handing out assignments ensure that your efforts match your objectives without being redundant.

What Operations Assessment Training Could Do For Your Business Speed project development time

Reduce the learning curve of new employees for new processes Lower costs by reducing rework

Enhance your ability to predict and achieve measurable results Improve your focus on the processes that are truly important

For you there has never been a better time to learn the critical expertise your organization needs. In no time, the skills you learn give you the tools for the kind of effective business management that gets noticed!

Chris Anderson has over 18 years of sales, marketing and business management experience working with business process design, software and systems engineering. He is also co−author of policies and procedures manual products, producing the layout, process design and implementation to increase performance. He is currently the Managing Director of Bizmanualz, Inc.

Visit:

How You Can Learn to be a Better Manager
Seattle Schools Participate In Washington Assessment Of Student Learning
The Value of the Sales Team Assessment to the Sales Executive©
Microsoft And Peru
Tax Assessment/Appraisal: How Do I Know What My Home is Worth?

Disaster Preparedness and Crime Protection Manual
Clickbank Automation System
Free List Pro
DOS Made Easy
Domain Alarm − Is your site working?