CONSIDERATIONS FOR SELECTING A HOST SYSTEM FOR UPSTREAM AND MIDSTREAM GAS OPERATIONS

Edward H. Smyth
Business Development Manager

ABB Totalflow
433 Northpark Central Drive, Suite 100
Houston, Texas 77073

Introduction

Operators of gas assets face a bewildering number of options when considering the installation of a central host system to monitor and control field operations. These options generally fall into two categories as described below.

Measurement systems, which come in two basic flavors:

- Systems provided by EFM vendors, such as Totalflow's WinCCU and NuFlo's ScanWin
- Larger scale third party measurement systems such as FlowCal and Quorum

SCADA systems, which also come in two basic flavors:

- Generic HMI development systems such as Wonderware's InTouch and GE's Intellution which are typically customized for gas operations by a system integrator
- True SCADA systems, especially those specifically developed for oil and gas such as SCADA Vision from ABB and Oasys from Telvent

Measurement Solutions

Selection of an appropriate solution by an upstream or midstream gas operator starts with a basic question: Will the system primarily be used to gather data from gas meters? If the answer is yes, a measurement system may be the best choice. These systems are typically much easier to configure, use and maintain than most SCADA systems. Some of the newer SCADA systems developed specifically for oil and gas, such as SCADA Vision from ABB, have greatly reduced the configuration and maintenance headaches previously associated with SCADA systems. Yet nothing can beat the simplicity of a measurement system, especially those provided by the EFM vendors. Most of these work right out of the box with no configuration required. For example, basic trends and reports for field management are preconfigured. If these "canned" features meet the user's needs, no configuration is necessary.

Many of the EFM vendors' measurement systems provide more than gas measurement functions. This is not surprising since almost all EFM devices themselves have additional control and monitoring functions in addition to flow measurement. For example, Totalflow's WinCCU provides the following additional features:

- Nomination/valve control – Operators can enter setpoints which are downloaded to the flow computer. The flow computer will control a valve to maintain the desired flow rate which is reported back to the operator so he can track where he is versus the nominated value.
- Plunger lift control – Similarly as above, screens are provided to enter initial control setpoints for plunger lift wells. Trends and reports are also provided to monitor and optimize the well's production.
- Support for general purpose RTU/data logger functions (configuration screens, trends and reports)
- Alarm subsystem – Voice, pager and email notification of alarms is provided. Voice call-in is also available. Control commands can also be sent from a telephone keypad.

One drawback to using an EFM vendor's system as the central host system is that, typically, each vendor's system only communicates with their own flow computers and RTU's. This can lead an operator to feel he is "locked in" to that vendor's field equipment. Alternatives do exist, however. In the case of Totalflow's WinCCU, it can import data from another vendor's system. The two measurement systems would operate independently, gathering data from their respective devices, with data ultimately consolidated in one database. See Figure 1.

A second alternative is to use a third party communications package as a front end to a measurement system. Totalflow's WinCCU can import data from packages such as Automation Solutions' Autosol Server. This package contains drivers (communications routines) to talk to most of the widely used flow computers and RTU's. See Figure 2.

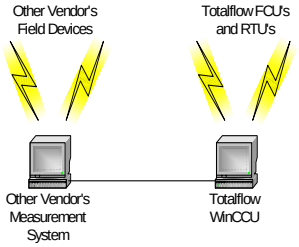


Fig. 1

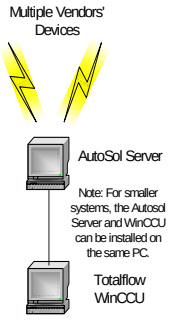


Fig. 2

A third alternative is to use a true SCADA system (more on this later). Unfortunately, this paper can't offer up a simple answer as to which is the best alternative for an operator with multiple vendors' field devices. The initial costs and ongoing maintenance costs of various alternatives, of which there could be many more than described herein, should be considered.

Where do the larger scale third party measurement systems like FlowCal fit in? These systems typically provide additional functionality such as the following:

- Data validation and enhanced exception handling capabilities
- Support for chart integration systems
- Robust balancing including line pack calculations
- Routines to handle accounting close and prior period adjustments

Users should consider whether this additional functionality is necessary to meet their requirements.

Clearly the needs of many gas producers and gas gatherers can be met by a measurement system, often with a low-cost and easy-to-use solution from one of the EFM vendors. Some gas gatherers may need the additional functionality from a higher end (and much higher cost) solution provided by one of the third party vendors.

SCADA Solutions

When should a SCADA system be considered? One situation has already been discussed, the scenario with multiple vendors' devices in the field. All of the major SCADA packages have drivers to communicate with the flow computers and RTU's commonly used in gas operations. The big benefit of using a SCADA system, as opposed to the first two alternatives described above, is the reduced configuration and ongoing maintenance requirements of a single SCADA package versus two (or more) separate packages. The upstream and midstream gas business is an extremely dynamic environment today. Mergers and acquisitions, drilling programs and abandonments often mean that the monitoring and control system must be reconfigured on what could be a daily basis. In coal bed methane, for example, it's not uncommon to drill 20 or more wells per month, and some of the wells decline so rapidly that they are abandoned in three months. This means flow computers and/or RTU's have to be installed, moved or decommissioned daily. This leads to almost constant reconfiguration of the host system. One SCADA system with multiple drivers is usually easier to reconfigure than two separate packages.

Probably the biggest consideration in selecting a SCADA system over a measurement system is the monitoring and control requirements. As mentioned above, some measurement systems can provide "light" monitoring and control capabilities. SCADA systems provide the Graphical User Interface (GUI), enhanced alarming, and other capabilities to handle "heavier" monitoring and control requirements such as the following:

- Field facilities such as compressors, separators, tank batteries, treatment facilities, dehy units, and even gas plants
- Wells produced through artificial lift methods such as electric submersible pumps, progressive cavity pumps, rod pumps, etc.
- Fields and gathering systems with requirements for area of responsibility, advanced alarm management, graphical navigation with maps, GIS displays, etc.
- Corporate data interface requirements (historians and data warehouses, reservoir models, production accounting systems, etc.)
- Advanced applications such as well and field optimization, abnormal situation management, maintenance management, etc.

It should be noted that even small systems with as few as 25 meters can benefit from the enhanced display and alarm capabilities in a SCADA system. Until recently, however, SCADA systems, because of their more complex nature and need for engineering and configuration often supplied by a third party integrator at additional cost, were difficult to justify for a small system with only 25 meters. ABB, for one, has dramatically lowered the price point for these systems with the introduction of their easy-to-configure SCADA Vision product.

SCADA Vision was developed as a joint venture between ABB and EnCana, one of North America's largest upstream and midstream gas companies. By the mid-1990's, EnCana had widely deployed SCADA systems across their operations. In the late 1990's, EnCana identified the need for a new generation of SCADA system. Specifically, the following key issues needed to be addressed as they moved forward with SCADA deployment:

- Avoid dependence on specialists – They didn't want to have to call on the specialists at their vendor or integrator for maintenance and ongoing support. Nor did they want to hire

and/or train internal SCADA specialists for each of their areas of operation across North America. They wanted a system that could be maintained by "the common man", i.e., anyone with a basic understanding of a PC and Windows.

- Reduce maintenance costs – Reducing or eliminating the need for specialists is just one way to lower maintenance costs. In addition, they saw a need for new tools to streamline the day-to-day maintenance of their SCADA systems: adding RTU's, building new graphics, adding new users, etc.
- Use modern "open" software standards – The systems that EnCana was using could be integrated with other applications, but only with a lot of work and cost. It wasn't uncommon for their vendor to charge $50,000 for a minor enhancement to their system. A system based on the latest Microsoft standards could be much more easily integrated from a much wider pool of capable people.

SCADA Vision was introduced in 2001 and over 50 systems are installed worldwide, including the following users:

- BP
- EnCana
- Husky Energy
- Marathon
- Pemex
- PetroVietnam
- Western Gas Resources
- Yates Petroleum

One of the chief advantages of SCADA Vision are the powerful Build Object Templates (BOT's) which greatly simplify adding and deleting flow computers and RTU's from the system. In order to understand the power of these BOT's, it helps to understand the steps that most SCADA users must go through to add an RTU (or flow computer) to their system:

1. Add the RTU to the communications tables.
2. Add the RTU points in the real-time and historical databases.
3. Build a new graphic display for the site and add the site to the system map or overview graphic.
4. Build the trends associated with the RTU.
5. Configure alarms and alarm callout functions.
6. Add the well or meter to the reports.

It is not uncommon for these tasks to take 8-16 hours with previous generation SCADA systems. Many operators have to dedicate specialists for these tasks, or they have to rely on their integrator or vendor. Not so with SCADA Vision because of the Build Object Templates. ABB developers have reduced the configuration time for adding a new RTU to ***fifteen minutes*** from 8-16 hours. All information for a new well, meter or other site is entered in one screen and the information is then exploded out through the system into the communications tables, the database, the GUI, the reports, etc.

The BOT also allows the operator to delete all of this information at the touch of a button (as opposed to 8-16 hours). After a few years of being in service, it is not uncommon for a typical SCADA system to be cluttered with thousands of extraneous entries after 5 years because users didn't want to take the time to delete the entries when the wells were abandoned or the RTU's moved to another location for some reason. Systems become "bogged down" and very slow, reports become cluttered with meaningless information and data flow from the SCADA system to IT (for example) becomes confusing. Not so with SCADA Vision because the information can be deleted in one click.

Integrated SCADA/Measurement Solutions

ABB has long been a leader in both SCADA and in gas measurement. ABB has installed over 1,000 SCADA systems worldwide, and ABB Totalflow has installed over 120,000 flow computers with gas measurement software such as WinCCU. ABB SCADA Vision and ABB Totalflow have joined forces to offer the world's leading combined SCADA and measurement solution.

Combined SCADA and measurement solutions often look like Figure 3, requiring three separate software packages for a total solution. The problem with this "hybrid" approach is, again, the ongoing operating and maintenance cost. Adding a well or a meter requires that the RTU or flow computer information must be entered in three separate databases. The interfaces must be reconfigured with each addition, as well. Contrast this typical approach with ABB's SCADA Vision with Gas Manager solution (see Figure 4). The Gas Manager is an API 21.1 compliant MS SQL Server database application seamlessly integrated with SCADA Vision. Later this year, the BOT will be extended to configure both SCADA Vision and the Gas Manager, saving hours in configuring the gas measurement database for each meter.

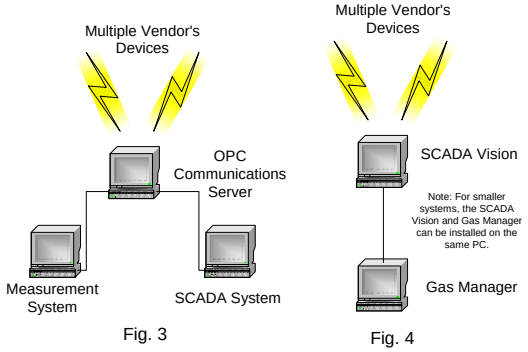


Fig. 3

Fig. 4

SCADA Vision Gas Manager provides the features previously found only in the high-end measurement systems:

- Data validation and exception handling

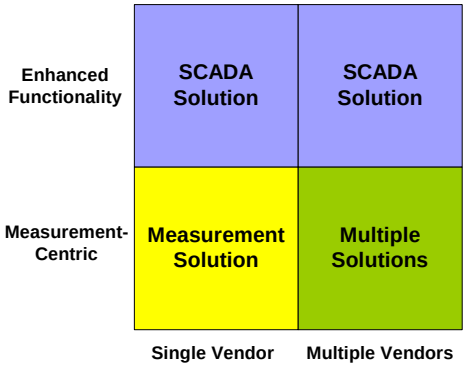
- Graphical editor
- Robust balancing with line pack
- Audit trail and extensive reporting capabilities

Summary

Two of the key considerations in selecting a host system are the following:

1. Are the system requirements primarily or exclusively measurement-centric, or is enhanced monitoring and control functionality required?
2. Is the field equipment from a single vendor or multiple vendors?

The following chart summarizes how these considerations can guide an appropriate solution:



In addition, close consideration should also be given to the ongoing cost of operating the system. The initial cost to install is but a fraction of the overall life cycle costs of the system. The "hybrid" solutions, particularly, look good on paper but are extremely labor intensive to maintain.