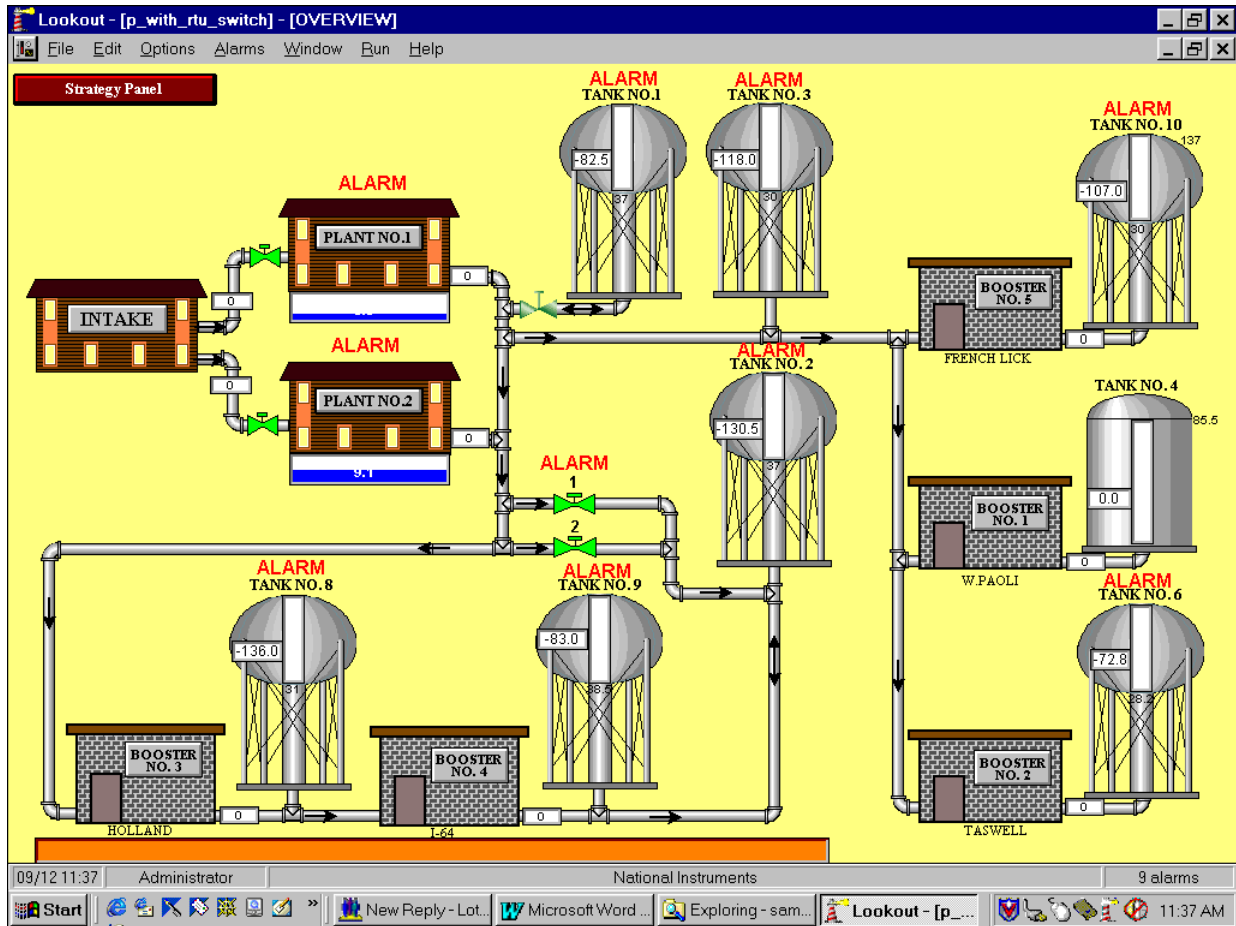


Lookout™

HMI/SCADA Software for Water and Wastewater Applications





National Instruments Lookout plays a major role at Patoka Lake Regional Water Plant, Indiana, which supplies water to eight counties. Lookout is used to monitor and control multiple plants, tanks, and booster stations in this application.

Process Control Needs of the Water and Wastewater Industry

In the water and wastewater industry, plant managers, operators, and engineers are constantly searching for ways to better serve cities, counties, and customers. Providing water or wastewater service to areas spread over several miles is very challenging, because water and wastewater plants must constantly monitor the quality and quantity of water that flows through the pipelines. Customers, of course, expect clean, pure drinking water as well as the proper treatment of wastewater that drains into rivers and oceans.

The water and wastewater industry are faced with numerous obstacles:

- Reducing water processing costs
- Having an accurate overview of plant operations
- Connecting to a variety of hardware in the field
- Complying with numerous federal regulations
- Providing enhanced service to customers

With PC-based HMI (Human Machine Interface)/SCADA (Supervisory Control and Data Acquisition) technology specifically created for the water/wastewater industry, all these obstacles are overcome. This paper discusses how Lookout HMI/SCADA software from National Instruments, developed for the water/wastewater industry, easily solves the industry's most harrowing problems.

The Solution – National Instruments Lookout

Lookout PC-based HMI/SCADA from National Instruments is the solution that the plant managers, engineers, and operators rely on for monitoring and controlling their plant operations, and providing the required service and product to their customers. The water and wastewater industry needs fundamental HMI/SCADA software technologies that include such capabilities as remote telemetry, hardware communications, report generation (particularly mandatory information for government agencies), trend charting, and should include the following functions:

- OPC (OLE for process control)
- Paging
- Wireless communication
- Object-based distributed architecture
- Monitoring and control over Internet

This paper explores how each of these key HMI/SCADA technologies in Lookout can effectively solve the challenges that face the water/wastewater industry.

Object-Based SCADA Software Gives Faster Returns on Your Investment

SCADA system architecture (the internal design of the software) differs greatly between vendors and profoundly affects the labor costs associated with system development, start-up, training, and maintenance. A variety of SCADA software architectures is available in the market. The most modern, efficient software architecture is based on connecting together software “objects.” True object-based software architecture makes application development and maintenance easier, resulting in reduced labor and capital costs. Some SCADA software is truly object based; other packages just claim to be object based. A few vendors have actually been delivering object-based software for several years.

Lookout is truly object-based software. Using Lookout, you just connect objects to develop applications; you do not need to know any programming or scripting. Examples of how object-based technology can be used in the water and wastewater industry include:

- A PID (proportional-integral-derivative) object is easily configured to provide loop-controlled operation of variable-speed chemical feed pumps.
- An Alternator object is used to configure the operation of a run/standby pump system. All you need to do is to define parameters such as the number of pumps in the system, run time for each pump and so on.
- A Neutralzone object is used to automatically operate valves or pumps based on the level of water in the water tower. The pump can be configured to turn on or off when the level goes above or below a user-defined set point.
- Multiple objects such as these are interconnected in one computer or across several computers across a network to develop more complex applications.
- Several Lookout process files with objects are created within one instance of Lookout or multiple instances of Lookout. This feature facilitates easy distribution of application development load and reuse of process files for the same types of applications.

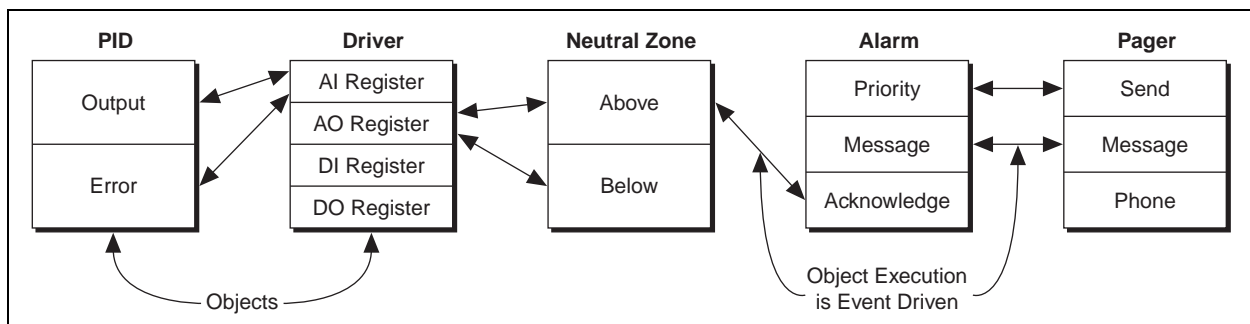


Figure 1. This diagram shows a variety of Lookout objects. To create an application, just connect the data members of the objects. No program or script writing is necessary.

TCP/IP-Based Software Offers Multiserver, Multiclient Connectivity across Ethernet

Real-time information gathering is a key for responsiveness. To collect information and to connect various hardware and software pieces, Ethernet is becoming a *de facto* standard. Using existing Ethernet cable networks for industrial connectivity is very inexpensive. A vast group of IT professionals are trained to maintain Ethernet networks for office environments. Their knowledge easily can be tapped for water and wastewater applications.

Because Ethernet-based hardware is becoming the industry standard, software that uses TCP/IP-based network sharing technology minimizes integration problems. Lookout networking, based on TCP/IP technology, is easy to integrate with Ethernet networks and connect to multiple servers and clients across a network. Lookout works seamlessly in an Ethernet network and requires no setup if the network is already enabled. This multiple-client, multiple-server capability is very useful in developing distributed applications. A server typically is connected to the hardware and does not execute control logic. Clients, which have a user interface screen or control logic to control the process, are connected to the servers.

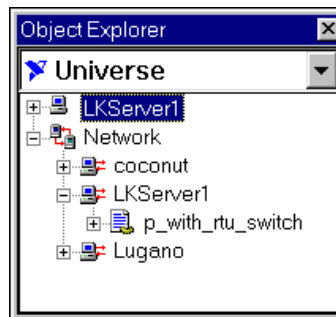


Figure 2. Within Lookout, you can browse all the computers on your network. To look at real-time data from any computer on the network, select the computer, select the process, and drag and drop the I/O registers on the control panel.

Users Can Monitor and Control from Anywhere

Lookout Web clients take advantage of the power of Internet. With Internet Explorer, you can log in from anywhere in the world, and monitor and control your Lookout process. Lookout makes this a two-step process; you don't have to know HTML or XML programming.

This Web technology can be used as an easy monitoring and reporting tool. To monitor a process and create a report, you can log in from anywhere in the world and look at the level of reservoir, the flow rates of the pumps, and other system information. For example, if Water District 2 purchases water from Water District 1, Water District 2 can access information at any time on the amount of water available for its usage through the Web interface. If needed, Water District 2 could control valves to get enough water into its storage systems to satisfy internal requirements. All this can be done with minimal training because the Internet is such widespread technology.

Lookout Web clients can also be used as a troubleshooting tool. Equipment such as pumps or valves can be connected to the Lookout SCADA software and equipment characteristics can be logged. In case of machine problems, operators and employees can log in from anywhere, check the status, and even control the pumps and valves. If the problem is so severe that machine manufacturers have to be contacted, they can log in on the Internet and help troubleshoot the problem without having to travel to the site. Thanks to this instantaneous connectivity, plants can quickly diagnose and repair the faulty equipment, with very little downtime of the distribution lines, thereby increasing productivity. Security is implemented so only certain users have control and monitoring access to specific panels and switches in the Lookout process file.

Data recorded over a period of time can also be used as a tool for preventive maintenance, showing plant operators when to perform maintenance operations. A maintenance operator equipped with a laptop computer can go to any pumping station and connect via the Internet to the central station to operate and test the valves and pumps. Lookout makes all these options possible.

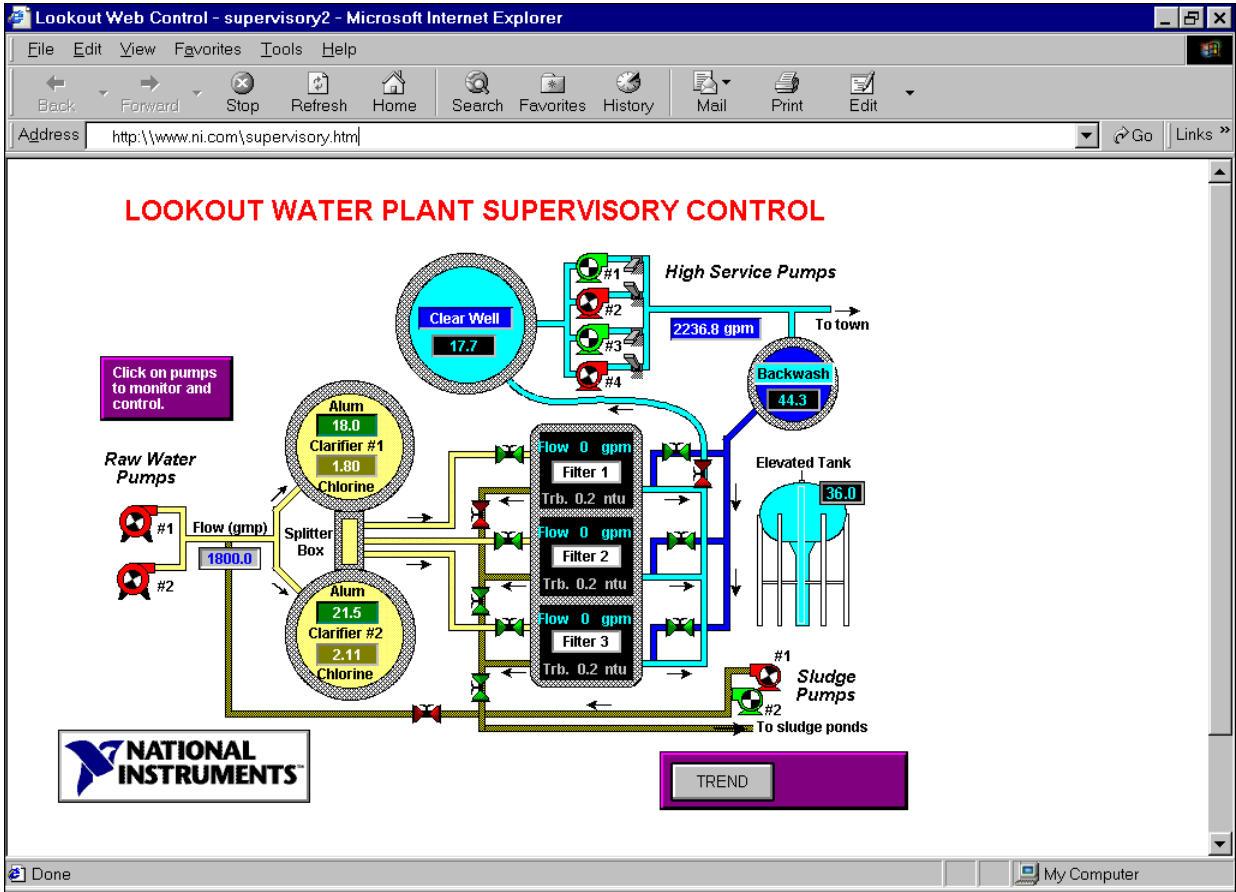


Figure 3. A plant supervisory control system can be run inside a Web browser. With Lookout, exporting a process to the Web is only a two-step configuration process. Using a Web browser, you can monitor various conditions of the plant, and also control motors, pumps, valves, etc.

Reports for Clean Water Act Compliance

To ensure that drinking water is safe, the Safe Drinking Water Act (SDWA) sets up multiple barriers against pollution. These barriers include source water protection, treatment, distribution system integrity, and public information requirements. State agencies require water and wastewater facilities to provide reports on various plant parameters. Many water suppliers are also required to prepare annual reports for their customers. Lookout, which can archive vast amounts of historical information, can also easily generate effective reports to satisfy government regulations and to provide good information on system performance. Lookout reports include a header with plant name, operator name, pump or motor data, the start and end date/time, various level readings, turbidity values, reservoir levels, pressure levels, and pump run times. This information can be used to increase the efficiency of the system by using off-peak hours to run the pumps to take advantage of the lower electricity costs, and by obtaining water usage information so maintenance can be scheduled during slack time periods.

MONTHLY REPORT OF WATER TREATMENT PLANT OPERATION
DENVER, CO

Report For **Austin Heights Water District** DATE **May 31, 2000**
Public Water Supply ID **14290C - A00** Population **33,000**
District Manager **Michael Johnson** Certification Number **CO-A1998**

YYYY-MM-DD HH:MM	PLANT		TURBIDITY		ALKALINITY		pH		HARDNESS		IRON		MANGANESE		PHOSPHATE		FLUORIDE		CHLORINE		TURBIDITY	
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2000-06-07 10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000-06-07 11:30	-9.21	36.39	11.31	-53.26	-9.21	36.39	11.31	-53.26	-9.21	36.39	11.31	-53.26	-9.21	36.39	11.31	-53.26	11.31	-53.26	-9.21	36.39	11.31	-53.26
2000-06-07 12:15	-9.21	36.39	11.31	-53.26	-9.21	36.39	11.31	-53.26	-9.21	36.39	11.31	-53.26	-9.21	36.39	11.31	-53.26	11.31	-53.26	-9.21	36.39	11.31	-53.26
2000-06-07 13:00	-9.21	36.39	11.31	-53.26	-9.21	36.39	11.31	-53.26	-9.21	36.39	11.31	-53.26	-9.21	36.39	11.31	-53.26	11.31	-53.26	-9.21	36.39	11.31	-53.26
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2000-06-07 16:00	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-07 16:45	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
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2000-06-07 22:00	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-07 22:45	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-07 23:30	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-08 00:15	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-08 01:00	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-08 01:45	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-08 02:30	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-08 03:15	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-08 04:00	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-08 04:45	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-08 05:30	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-08 06:15	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
2000-06-08 07:00	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	14.4	-33.57	55.22	-53.26	55.22	-53.26	14.4	-33.57	55.22	-53.26
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Print Schedule dialog box options:
 Year
 Month
 Week
 Day (00:00:15 delay, 11:22:06 to next printing, 08/01/00 00:00:15 to next printing, 07/31/00 11:37:53 to last printing)
 Hour

Figure 4. In Lookout, a report can easily be created and printed based on set criteria.

Remote Telemetry and COM Port Sharing Reduces Communication Costs

Water and wastewater plants use devices like RTUs (remote terminal units) and PLCs (programmable logic controllers) to monitor and control sensors, actuators, and other controllers. These devices measure water tank levels, gauge total water flow through the pipe, measure pipeline pressures and temperatures, test voltages and currents on a transmission system, and so on. You can obtain the signal values using a leased telephone line and a modem. But the cost of using telephone lines is a huge factor in selecting these types of hardware, especially if the distances are long and the data needs to be monitored continuously. A less expensive option is using a wireless mode of communication between the hardware and the water plant using RTUs, which are easier to program and integrate into a wireless system than PLCs.

Lookout offers adjustable RTS/CTS (ready to send/clear to send) timers for maximum control in communicating with RTUs. A plant may install hardware from multiple vendors over time, so the SCADA software should be able to communicate with a variety of RTUs. Because Lookout can talk to several protocols using the same COM (communications) port and a modem, minimum costs are realized. You do not need additional hardware to communicate to the devices and can avert software and hardware integration problems.

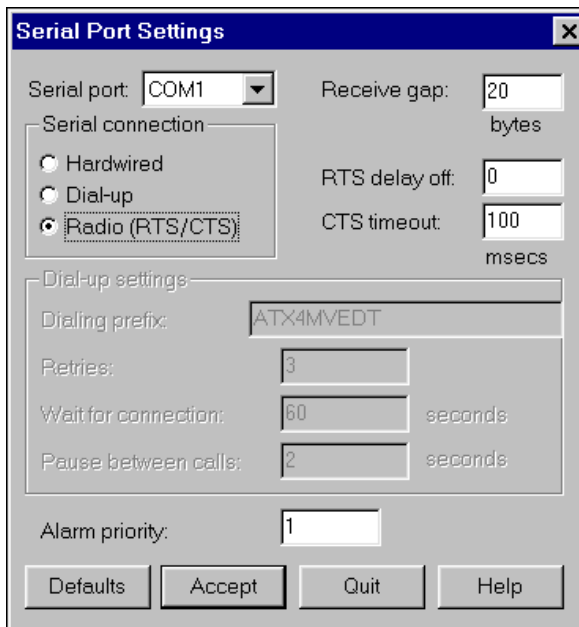


Figure 5. To connect Lookout to RTUs using a wireless communication method, simply select the COM port and set the RTS/CTS time outs.

OPC and Device Connectivity

OPC, an industry standard created by Microsoft and a consortium of worldwide automation hardware and software vendors, enables greater connectivity between business systems, control systems, and devices. OPC, an industry variant of ActiveX, is based on COM (Component Object Modeling) and distributed COM (DCOM). These common industry standards enable real-time control information servers, such as PLCs, field devices, and PC-based I/O, to communicate to standard COM/DCOM clients. With OPC, automation systems developers overcome one of their biggest obstacles – the connectivity required to link HMI/SCADA software like Lookout to the many types of field devices that exist.

In addition, OPC provides a new level of interoperability between automation software and hardware, removing the obstacles created by proprietary industrial device interfaces and drivers. It solves multivendor connectivity problems and facilitates equipment reuse, thereby reducing equipment outlay for upgrades. Because Lookout is both an OPC client and an OPC server, connecting to the driver is seamless and the developer needs to focus only on software development and system integration.

For hardware without an OPC driver, you can use any of the drivers from the extensive set of protocol drivers available free in Lookout to communicate with a wide variety of industrial hardware.

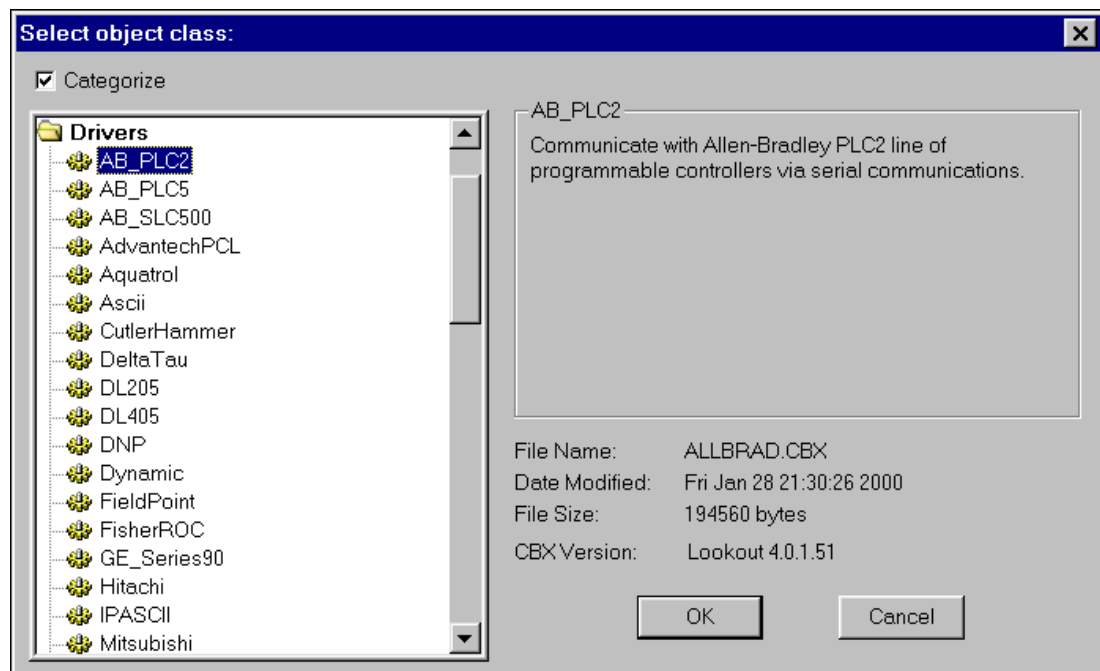


Figure 6. Lookout connects to a large set of industrial devices. More than 100 device-specific drivers are available, and more are frequently added to the list. Obtain an updated list of drivers at ni.com/lookout/drivers.htm

Datalogging Provides Useful Information, Adheres to Federal Regulations

The plant can use historical information in a variety of ways to perform activities such as preventive maintenance, performance analysis, and reporting. For example, you can use the accumulated operating time and speed of a pump to determine when to perform the next preventive maintenance. Performance of the plant such as real output versus required output, and system uptime and downtime information can be used to increase plant efficiency. The Lookout built-in Citadel database is industry-standard ODBC compliant and SQL compatible. Any software that can do SQL queries or is ODBC compliant can get data from Lookout.

Stored data can be used to prepare reports for state agencies and customers. To maximize the efficiency of stored data, Lookout can specify a band of data for logging. The reason for setting this band is that changes in actual field conditions cause random variations in signals – every insignificant change is not necessarily worth logging. A bandwidth can be set based on sensitivity of the hardware devices to ensure the database does not get filled with unnecessary data.

Lookout stores large amounts of data with minimal disk space. Some state agencies require plants to store data for up to 37 months, which could mean buying computers with vast amounts of storage space. To reflect what is going on in the field without wasting disk space, Lookout stores data only when a value changes. For example, if the water tank level remains at the same level for one hour, there is no need to save data once every minute; data is saved only when the water level changes. If values are queried at 10 second intervals, Lookout's unique data retrieving mechanism shows the same value every 10 seconds until the value changes. Lookout goes even further by using advanced methods to compress data so minimal disk space is used, thereby reducing costs related to extra storage media.

Another consideration when evaluating software is to measure how fast data can be retrieved from the system. You can use the unique data indexing mechanism of Lookout to retrieve data logged a year ago as fast as data logged yesterday. With some software in the market, older data takes longer to find.

The ability to save information on events provides an excellent information tool to check which actions were performed within the plant systems and when. This information can be used for troubleshooting if problems arise.

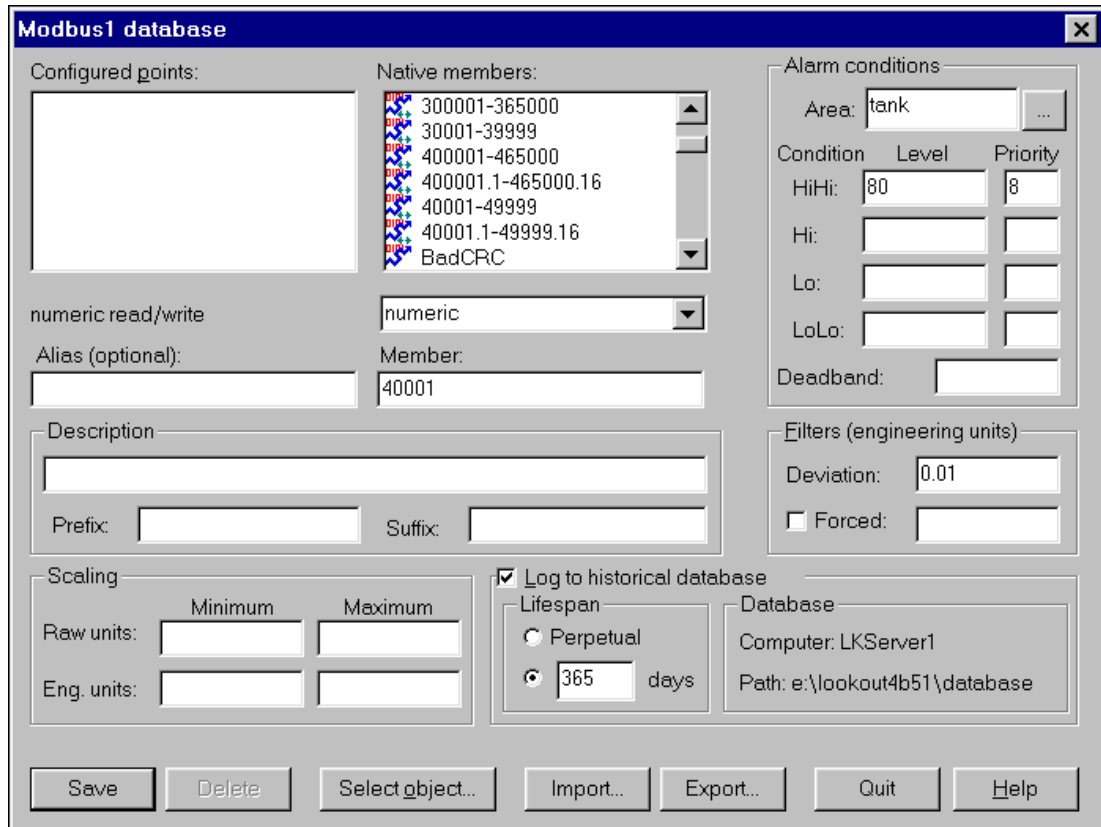


Figure 7. Using a single dialog box, you can set up all of your logging parameters – log to historical database, deviation, dead band, alarm limits, alarm area, alarm priority, raw and engineering units, and alias names.

Mechanical recorders and strip charts, which are common in an electromechanical system, require regular maintenance. Because Lookout stores information electronically, you have the flexibility to customize the information presented very easily. Trend charts can be used to plot real-time information. Some SCADA software on the market has limitations on the number of lines that can be trended; Lookout does not. Using Lookout saves hardware costs and improves flexibility.

Creating trends in Lookout is far easier than creating historical and real-time trends in other software packages. You simply select the HyperTrend object, identify the tags you wish to trend, and drag and drop the object on the control panel. You don't have to run separate trending programs, define scroll buttons, or write scripts. HyperTrend graphs may have a time span of anywhere from milliseconds to years, adjustable on the fly. You can add, modify, or delete any number of trend lines to and from the trend graph. These trend lines typically represent points or values that are being logged to the Citadel database. However, they can also be logical and numeric expressions (math statements) entered directly into the trend line definition field.

When a user displays a HyperTrend, the graph immediately fills with real-time and historical data retrieved from the Citadel database. HyperTrends instantly retrieve time-stamped values for the specified trend period and connect them to form trend lines. These trend lines are called “threads” or lines because a thread is a comprehensive population of time-stamped values representing every change made by the point.

HyperTrend trend lines are extremely accurate and reflect the actual behavior of each trended point. If a data thread is broken because a user disables logging or there is unexpected interruption, the HyperTrend plots the thread as a continuous line with void sections or gaps to represent missing data. HyperTrend objects automatically convert time-stamps from universal to local time before displaying a data history. Therefore, users do not need to compensate when comparing data. Search parameters can be specified to look for maximum, minimum, or break points in a trend line.



Figure 8. HyperTrends are used in this British Columbia transit water application in Canada. The HyperTrends are used to see real-time and historical data from the various pump flows in the application.

Event-Driven Systems Give High Performance

HMI/SCADA software is either loop driven or event driven. In loop-driven programming software, which is pervasive in the industry, a given section of code (rule) may execute millions of times before the result differs from the previous time. This process wastes computer time and delays responses to more frequent events or signals that originate from the hardware. The more rules you add to loop-based systems, the slower the hardware response time. And as you add more tag names to the central database, you notice degradation in speed and performance because the central database uses a passive notification system in which the rules in the loop-driven logic must scan an ever-larger database for their appropriate rule to find the data needed to resolve its function.

In event-driven software such as Lookout, the logic and control parameters are executed only when an event (a change in signal) occurs. If the signal does not change, the program remains totally quiescent, using no processor time. Event-driven software has two distinct advantages. First event-driven software has more capacity for growth without performance degradation. This fact extends your system life cycle, and enables a large number of I/O points to be polled in a shorter time period. This event-driven paradigm closely simulates the responsiveness of physical switches, push buttons, and relays. You can also take advantage of the free CPU time to increase poll rates on the devices. Event-driven software performs much better when polling a large number of I/O points. As an example, a Lookout system running on a Pentium II with 128 MB of RAM, communicating modbus protocol over a serial cable at 19,200 kb/s and talking to 14,000 I/O points (logging data, alarms, and events for all points) uses only 40 percent of the CPU. This example shows the scalability of Lookout and the reduced number of server nodes required for large applications.

Online Capability Increases Application Development Speed

Lookout can also configure applications online. With online configuration you can add, delete, and modify PLCs, field I/O, graphics, control logic, etc., without shutting down your process even for a second. It also significantly accelerates application development, thereby saving you time and money. With software that does not have this ability, you spend costly development effort going back and forth between development and runtime packages. The application needs to be recompiled before it can run on the runtime mode, sometimes taking hours. In Lookout, going from a development system to a runtime system is as fast and as easy as pressing control and the space bar. As objects are created, they immediately reflect field dynamics – even in edit mode. Operators and developers can change the parameters and see it reflected immediately on the field.

Security Setup Keeps Plant Operations Safe

In water or wastewater plants, it is necessary that controlling the pumps, valves, and other hardware in the system be restricted to personnel with the appropriate training. With Lookout, you accomplish this with an easy-to-use security setup. You can create operator accounts with different security levels; users can be organized into groups with security levels assigned to them. Additionally, you can use advanced security so that only certain users have read and write access to the folders, and only certain IP addresses can access the server computers. This software security ensures that only operators with valid security levels can log into the computer, and they can perform only operations required by the system. The user-defined security levels determine which display windows and controls a user can view and control. Other security features include the ability to start Lookout once a computer is turned on and to set options so that Lookout cannot be locked, closed, minimized, or exited by the operators.

To keep a plant safely running, security levels must be set up to monitor the plant. Setting this security monitors the activities of the person logging in, which can be saved and referred to later as an audit trail. Process files can be password protected so unauthorized users cannot change the process. Security needs to be set up on only one computer; it can be made available to all the computers on a network and even to remote Web clients.

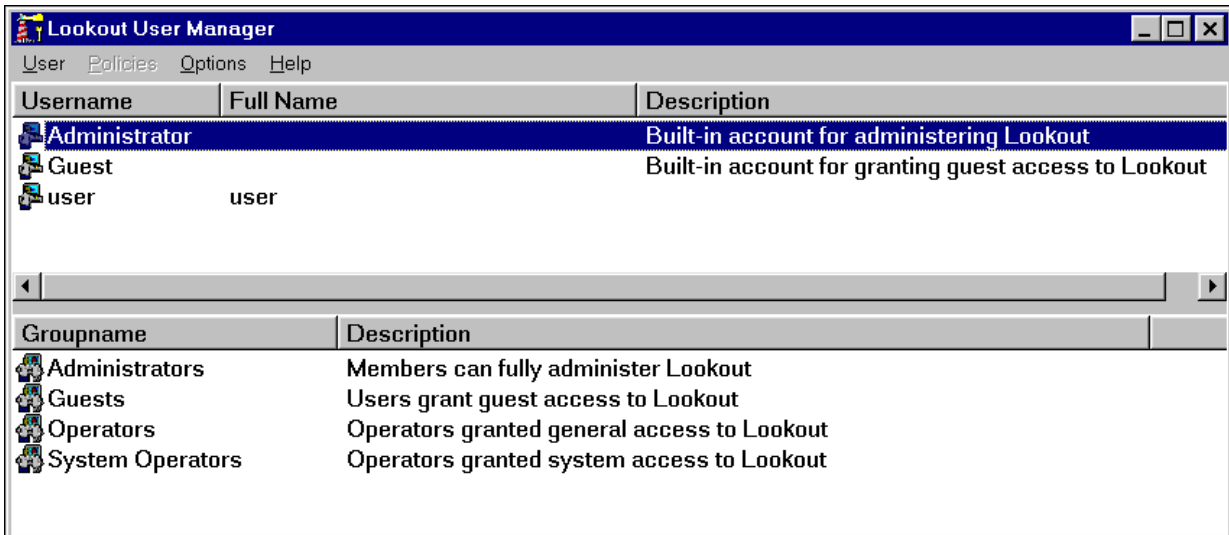


Figure 9. Security in Lookout can be set up for administrators, guests, operators, and system operators. Security setup in one computer is made available to all computers on a network and even to Web clients.

Alarms and Events for Equipment and Human Protection

Alarm systems are essential for water and wastewater plants. In case of pump or motor failures, or if a reservoir reaches critical levels, Lookout can automatically page key personnel through a pager or a cell phone. You can view and acknowledge alarm conditions from any computer on a network. You can remotely view alarm conditions using Lookout Web clients. Additionally, you can configure remote Lookout SCADA computers to operate independently and send out alarms in case of power failure at the central station. By storing alarm and event data in the Lookout Citadel database or in a spreadsheet file, you can refer to them for later analysis. Alarm conditions can be set up in one easy dialog box, as shown in Figure 7. Complex alarm conditions can be set up using the alarm object class.

Visualization (Human Machine Interface)

Lookout includes a rich set of animation tools and also a comprehensive graphics library to develop attractive and easy operator interfaces. You can import bitmap (.bmp) and Windows metafile (.wmf) file formats. You can also import AutoCAD drawings, digital photographs, maps, or other images in the above-mentioned file formats. The animation tools include an animator object to provide X-Y motion, resizing, visibility, dynamic coloring, and graphic sequencing. With the animation tools in Lookout, you can create project-specific customer graphics for individual applications.

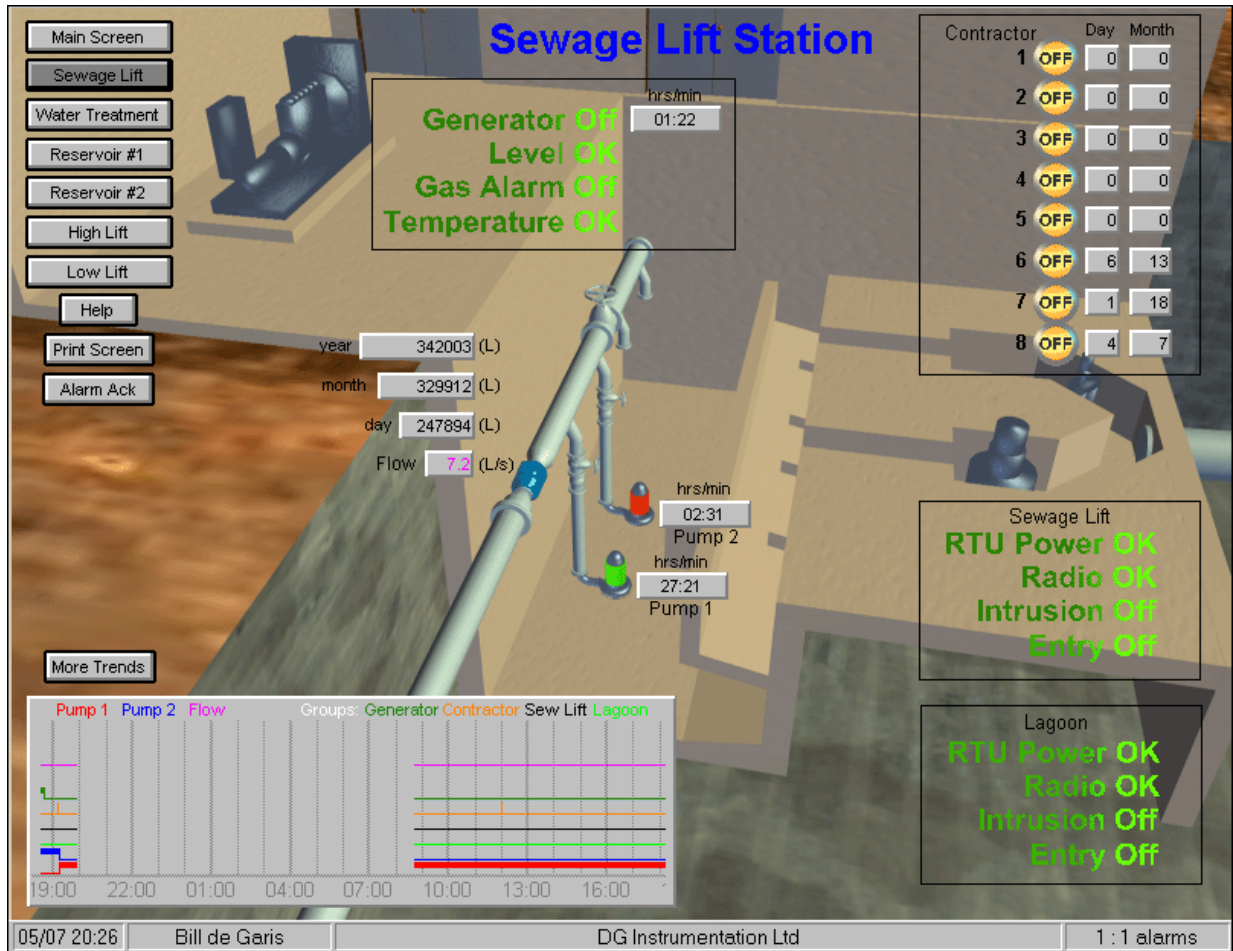


Figure 10. The district of Chetwynd Water and Wastewater treatment plant in Canada uses Lookout to control and monitor plant operations.

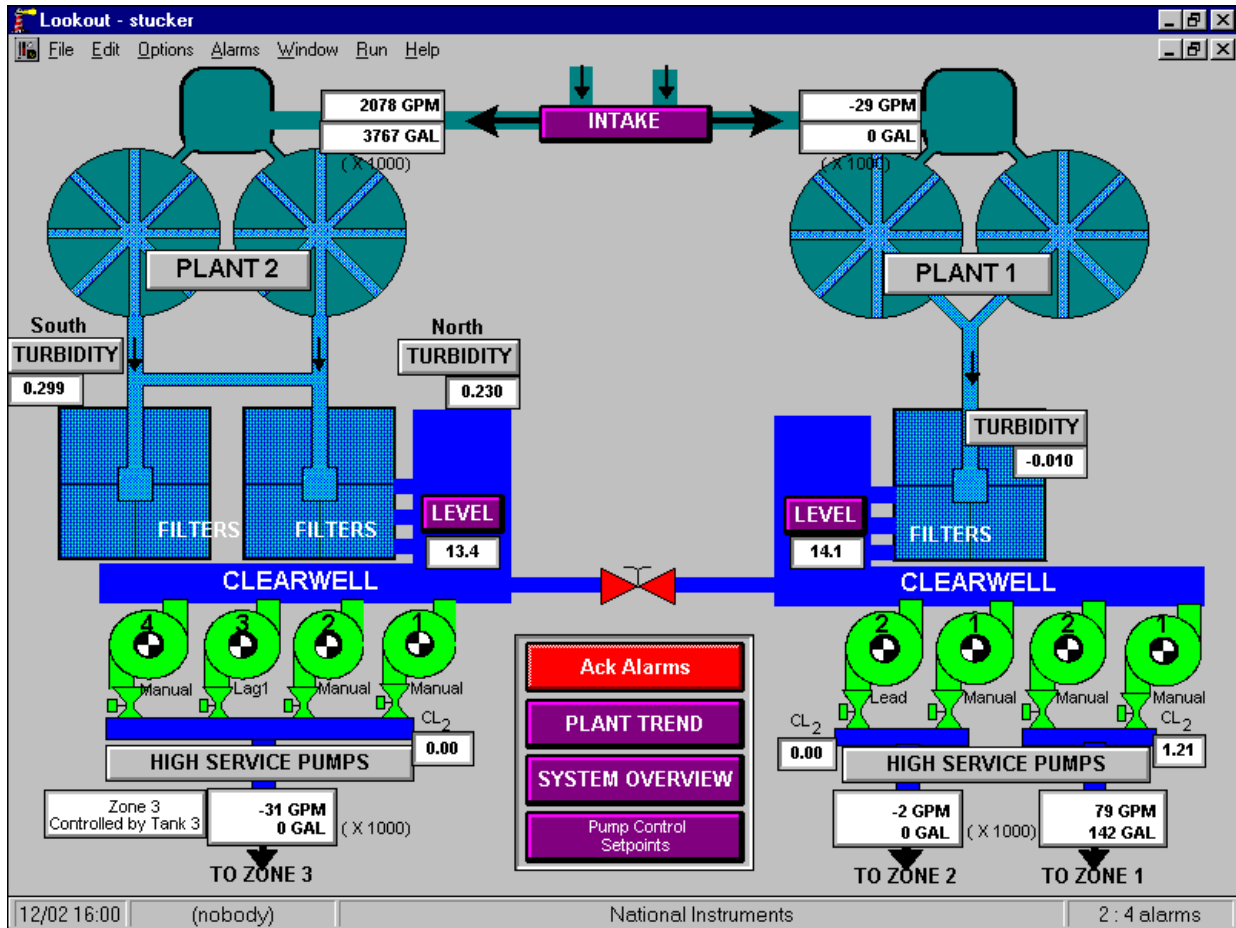


Figure 11. The Stucker Fork Water Plant uses Lookout to achieve reliable control for a water treatment and distribution facility that provides water for seven counties.

Lookout features include:

- A Citadel database that is ODBC-compliant. Lookout can connect to any database software that is ODBC compliant, and it can publish stored data with standard SQL queries.
- The ability to perform calculations and display SPC data from your process, as well as the capability to process capability charts, control charts, and Pareto charts.
- The ability to implement redundant systems in case of computer failures. A secondary computer can take control of the process if the primary computer fails, and data can be saved in the redundant computer if the primary computer fails.

Lookout also includes a large set of control objects. To test the capabilities, request a full working evaluation version of the software at ni.com/lookout

System Integrators

National Instruments Lookout offers unprecedented power, flexibility, and productivity to help you develop your own automation systems. However, if you have time constraints or limited in-house technical resources, you may prefer to employ consulting or systems integration services. In these cases, you can rely on the expertise available through our worldwide network of Alliance Program members. A listing of system integrators who are well experienced in Lookout can be obtained from ni.com/lookout

Satisfied Customers

Lookout software is deployed at hundreds of water and wastewater plants worldwide. Lookout customers have the following comments:

“Lookout makes our lives simple, and saves us significant time and money. With Lookout, I can now perform rudimentary programming. Before, I had to hire a systems integrator, which cost the city time and money. Plus, we are more productive because of the networking feature introduced in Lookout 4.0. This makes programming of client nodes much easier and less time consuming.”

– Dewayne Sutherland, Water Operations Supervisor, City of Sherman Water Plant, Sherman, TX

“After evaluating the major HMI/SCADA companies, we chose National Instruments Lookout for our new monitoring system because of its ease of setup and use, as well as its extensive graphics capabilities.”

– Chris Cunhna, SCADA Project Manager, City and County of Honolulu, HI

“We chose Lookout as the software of choice because of its ease of configuration and the speed at which it could poll the number of sites required, eventually targeted at 500.”

– Dik LeDoux, Integrator for Jefferson Parrish water/wastewater system, a suburb of New Orleans, LA

For more quotes and for details on how our customers have used Lookout in the Water and Wastewater industry, visit ni.com/lookout/lkbenefits.htm

Why Choose Lookout?

With Lookout, you stay on time and on budget, and decrease water-processing costs and capital equipment outlay while increasing water quality and extending equipment life cycles. Lookout HMI/SCADA software provides a regulatory and management edge for water and wastewater plants. Lookout solves your water and wastewater challenges:

- **Project Cost** – The object-oriented architecture of Lookout makes it easy to learn, develop, and maintain applications providing faster returns on investment.
- **Remote Telemetry** – Lookout communicates to multiple hardware protocols over the same COM port through a single modem, saving money on capital equipment.
- **Ethernet Connectivity** – Lookout networking is built on the same protocols used for Ethernet communication so multiple Lookout servers and clients seamlessly communicate over a network.
- **Report Generation** – Lookout has excellent report generation capabilities for complying with federal regulations.
- **Hardware Communication** – Lookout includes an extensive list of drivers. It is an OPC server and a client, enabling it connect to any hardware in the field to minimize connectivity problems.
- **Data Logging** – The database of Lookout is event-driven. It can efficiently store vast amounts of data and reduce the amount of disk space needed as well as the associated costs.
- **Scalability** – Lookout is event-driven; projects with large I/O counts can be handled with fewer server nodes, saving money by reducing the number of software copies purchased. You also gain the ability to utilize older, slower computers.
- **Charting** – The easy-to-use HyperTrend can chart real-time and historical values from any computer on a network.
- **Internet Connectivity** – By using a Web browser to monitor and control a process, you gain instantaneous information privileges from anywhere at any time.

Backed by the National Instruments Guarantee

More than a decade of development effort has been spent designing Lookout specifically for the water and wastewater industry. Because of the continuous focus of National Instruments engineers, Lookout continues to enable you to tackle numerous applications in small and large plants. With this vast experience, National Instruments has created well-informed, experienced R&D and sales teams, and a Lookout systems integrator channel that can help you with even your most difficult challenges. In fact, National Instruments guarantees your productivity. If you purchase Lookout and do not find it to be the easiest to use software for this market within 90 days, National Instruments will refund your money.

The challenges presented by the industry are many, and water and wastewater plant managers, operators, and engineers continue to seek ways to enhance both the quality and quantity of water, and ultimately to better serve its constituents. Lookout is the industry's easiest-to-use HMI/SCADA software. With it, you can deliver the quality products with lowest risk to your clients. Combined with technical product support from National Instruments, Lookout is your safest and most reliable choice.



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