CitectSCADA

HMI/SCADA

scalable >>> flexible >>> reliable

Technical Overview

Contents

> "Citect is one of the most technically competent and innovative Microsoft Solution Developers in Asia Pacific and dominates its market segment in this region."
>
> *Microsoft Australia, 1998.*

Citect Profile

Independent International Innovative Resourceful

Citect is a world leader in industrial automation software. The company has offices in Australia, Africa, Europe, China, the USA and distributors in over 40 countries.

Citect's goal is to provide 'best value for money' products and services. The organization is focused on delivering value through technological excellence and exceptional customer service and committed to selective hiring, extensive training and building a culture that encourages innovation, excellence and service.

CitectSCADA, Citect's leading process software is renowned for its superior scalability, reliability and flexibility in applications across a broad range of process industries.

Since its launch in 1992, CitectSCADA has been successfully applied in a number of interesting projects. Some of the more visible projects include Western Mining Corporation's Olympic Dam Project, the world's largest PC-based plant monitoring system, and monitoring of the facilities operation at NASA's John F. Kennedy Space Centre. There are currently over 60,000 licenses installed worldwide and users include industry leaders such as BHP, BMW, Nestle, Baoshan Steel, Roche, Samsung, Pratt and Whitney, Alcoa, and Shell.

Citect's Industrial Information Management (IIM) solutions enable manufacturers to dramatically improve the performance of their production systems by targeting uptime, quality, throughput and other initiatives. By leveraging the CitectSCADA infrastructure, much of the business information needed to make informed decisions is collected automatically, and seamlessly integrated with the company's business systems.

CitectIIM also provides Key Performance Indicators to business managers in real-time, allowing fast, accurate decision-making to continuously improve efficiency and effectiveness.

Citect's integrated solutions enable manufacturers to transcend traditional information sharing boundaries to dramatically enhance the quality of their plant management systems.

> "By presenting plant information in useful and insightful formats that allow companies to make well informed decisions, our products deliver a high degree of value to a broad range of industries worldwide."
>
> *Colin Yamey, previously Strategic Development Director, Citect Pty Ltd.*

CitectSCADA Profile

Quality *Flexible Scalable Reliable Open Fast*

CitectSCADA is a leading industrial automation software system that enables users to reduce costs by optimizing plant operations. Based on true client server architecture, CitectSCADA provides maximum flexibility, proven reliability, quick installation and easy to manage functionality.

Unique features like true DCS style redundancy, scalability and valuable packaging policies differentiate CitectSCADA from its competitors. CitectSCADA systems are only sold one way – complete and ready to go. All the features, protocols and drivers are included, and because it's sold as one comprehensive package, it is tightly integrated and built to perform.

Unlike other PC-Based industrial control systems, CitectSCADA was designed from its beginning to handle all the needs of large and complex enterprises in a single, integrated system while maintaining high performance and reliability.

The first CitectSCADA, installed in 1992, established a new benchmark in PC based SCADA systems that few vendors offer even today – 33,000 digital points, 16,000 analog, 4,000 historical trends, 50 operator stations, DCS style redundancy, single global database, configuration at any PC and a display update of under 2 seconds. Citect clients enjoy the confidence that whether their system is small or large, CitectSCADA will do the job.

By leveraging Microsoft's talent, vision and marketing leadership, Citect continues to lower the cost of acquiring, deploying and managing large-scale industrial control systems. It enables plant managers to seamlessly link plant level information to business planning systems and, through the Internet, to remote users, devices and suppliers.

Profiles

Industries

Aerospace, Agriculture, Aluminum, Automotive and Aviation

Beverage, Bio-Technology, Building Management (HVAC), Building Materials and Security

Cement, Chemical and Coal

Dairy and Defence

Education

Food

Glass

Iron and Steel

Manufacturing, Marine, Mineral Processing and Mining

Nuclear

Oil and Gas

Packaging, Petrochemicals, Pharmaceuticals, Pipelines, Plastics

Power Distribution, Generation and Transmission

Pulp and Paper

Ship Loading

Telecommunications, Textiles, Traffic Management, Transport

Utilities

Waste Water, Water and Wood

True Client-Server Architecture

Quality Flexible Scalable Reliable Open Fast

Designed – from the start – for true client-server architecture, CitectSCADA is the real-time system that ensures high performance response and integrity of data.

To take full advantage of a client-server architecture, it must be utilized at the task level. Each task works as a distinct client and/or server module, performing its own role, and interfacing with the other tasks through the client-server relationship. CitectSCADA has five fundamental tasks which handle: communications with I/O Devices; monitoring of alarm conditions; report type output; trending; and user display.
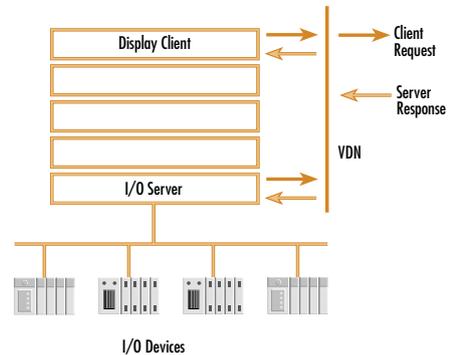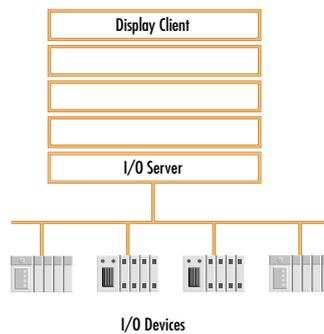
The **I/O** task is responsible for all communications with the I/O Devices on behalf of the other tasks. The I/O task functions as a server to the other tasks (which are its clients).

If a display is shown, the **Display** task (client) requests the specific data from the I/O task (server). The I/O Server gathers and sorts the raw data and responds to the Display Client with **only** the requested data.
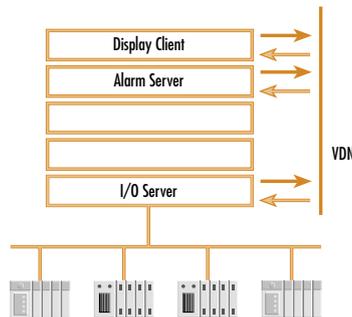
The **Alarms** Server gathers and sorts the raw alarm data requested from the I/O Server. If an alarm list is shown, the Display Client requests the specific alarm data from the Alarms Server.
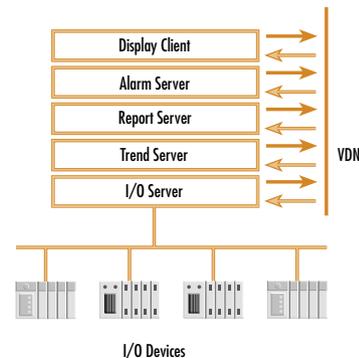
The **Trends** and **Reports** servers work in the same way as the I/O Server and Alarms Server, providing processed data to their clients.

The Reports Server is actually a client to the Trends and Alarms Servers when trend and alarm data is included in a report. When a report runs the Reports Client requests the necessary data from the appropriate server.

LAN

Display Client		Display Client
Alarm Server		
Report Server		
Trend Server	VDN	VDN
I/O Server		

I/O Devices
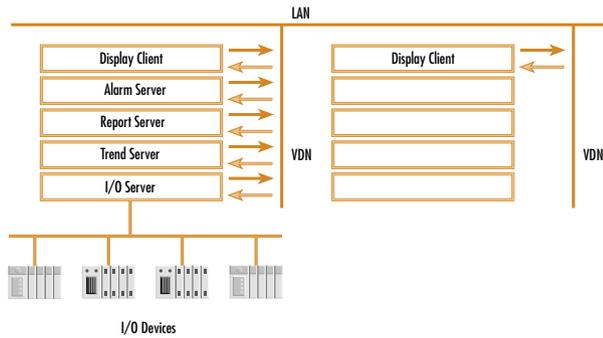
Because servers are designed to support **multiple clients**, adding a new Display Client is simply a few mouse clicks on the new PC – without interfering with the existing system. Both Display Clients get their information from the same I/O Server. The VDN is now effectively extended across the LAN – with no loss of functionality.

At a Glance…

- ☐ *Client-Server/ distributed processing*
- ☐ *Data integrity*
- ☐ *High efficiency*
- ☐ *Functional (task-based) architecture*
- ☐ *Network-transparent architecture.*

If **secondary servers** are available, the architecture supports redundancy. For example, if we add a redundant Alarms Server, the standby is ready to fill in for the primary server if it fails.

LAN

Display Client		Display Client
Alarm Server		Alarm Server
Report Server		
Trend Server	VDN	VDN
I/O Server		

I/O Devices

Redundant Server
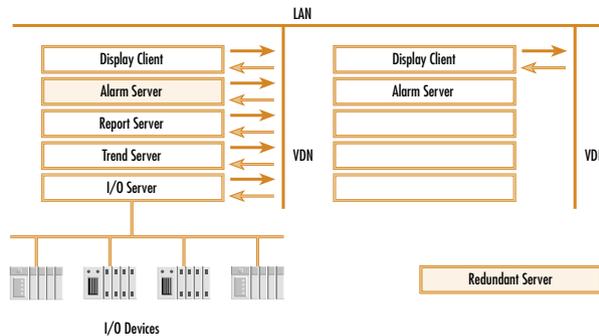
Even if all tasks are divided into separate PCs connected by a LAN, the client-server relationship remains the same – **true client-server architecture**.
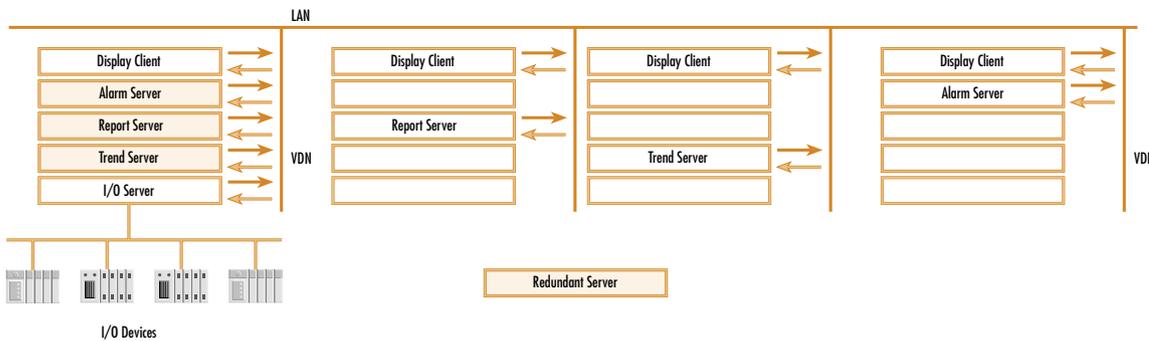
LAN

Display Client		Display Client		Display Client		Display Client
Alarm Server						Alarm Server
Report Server		Report Server				
Trend Server	VDN			Trend Server		VDN
I/O Server						

I/O Devices

Redundant Server

System Architecture

Quality Flexible Scalable Reliable Open Fast

Your SCADA system has unique requirements that change with time, so how can you choose the best architecture? CitectSCADA gives you the ultimate system architecture: flexible and scalable.

Flexible Architecture

Flexibility is the power to arrange your system architecture in a variety of ways. Rather than locking you into one method, CitectSCADA allows to choose your own system architecture – giving you the best features of both centralized and distributed processing.

Designed from the start for client-server architecture, CitectSCADA is functionally divided into five separate tasks:

I/O	Manages, and optimizes all communications.
Alarms	Monitors all alarm conditions: analog, digital, and SPC.
Reports	Controls, schedules, and executes report operations.
Trends	Collects, records, and manages trend and SPC data.
Display	The Human Machine Interface (HMI). It interfaces with the other tasks to maintain the display – refreshing screen data, and executing commands.

Each of these tasks is independent, performing its own processing. Due to this unique architecture, you have control over which computers in your system perform which tasks. For example, you can nominate one computer to perform the display, and report tasks, while your second computer performs display, I/O, and trends.

CitectSCADA encourages you to use a **centralized database** when using networked systems. Having one global database is obviously beneficial, since you only make changes at one location – which are then updated everywhere. Of course, if you want to use separate configurations on each computer, you can do that too. You can even have a mixture of both.

While CitectSCADA has a reputation for installations involving networks and large amounts of data, many users have single CitectSCADA installations. Using CitectSCADA, **your system can start out as simple as you like, and grow as large as required**.
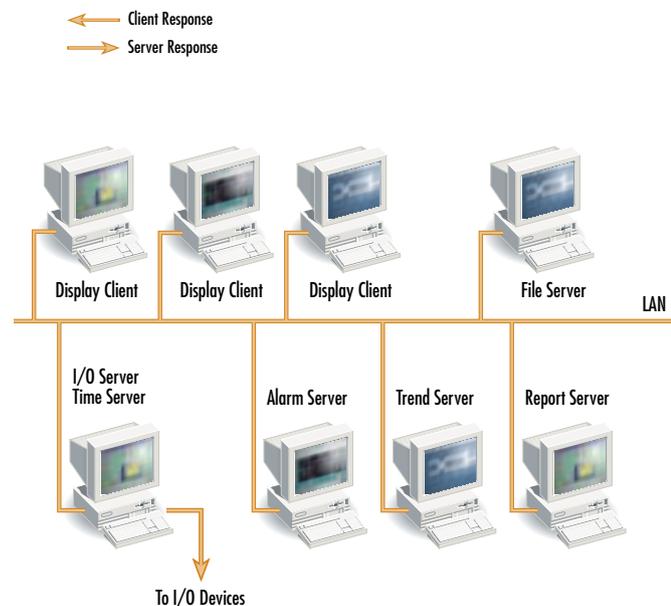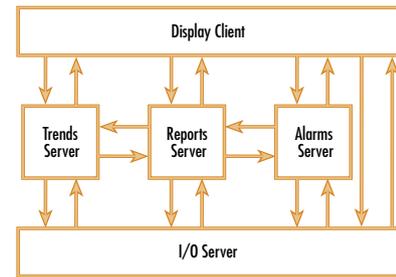
Scalable Architecture

Scalability is the power to resize your system – up or down – without having to modify any of the existing system hardware or software. CitectSCADA's innovative Scalable Architecture allows your system's architecture to grow with your requirements, while preserving your initial investment.

CitectSCADA makes the most of its task oriented client-server design, allowing you to re-allocate tasks as you add more CitectSCADA computers. For example, if you require a second HMI, just add a LAN and a new computer, and nominate it as a Display Client. The new computer can share the same configuration, and will receive I/O from the first CitectSCADA.

A secondary benefit of doing this is that you can also distribute the processing load. For example, if you think your first CitectSCADA computer is too busy, you can simply nominate the second to take care of the alarms by becoming the Alarms Server.

Put simply, some users want simple HMI, while others want a complete SCADA system. With CitectSCADA, you can do both. **Start small…**

Display, Report, Trend, Alarm, I/O

Display Client

Display Client

Display Client

Display Client

Display Client

Display Client

LAN

Citect Server (Reports, Trends, Alarms, I/O)
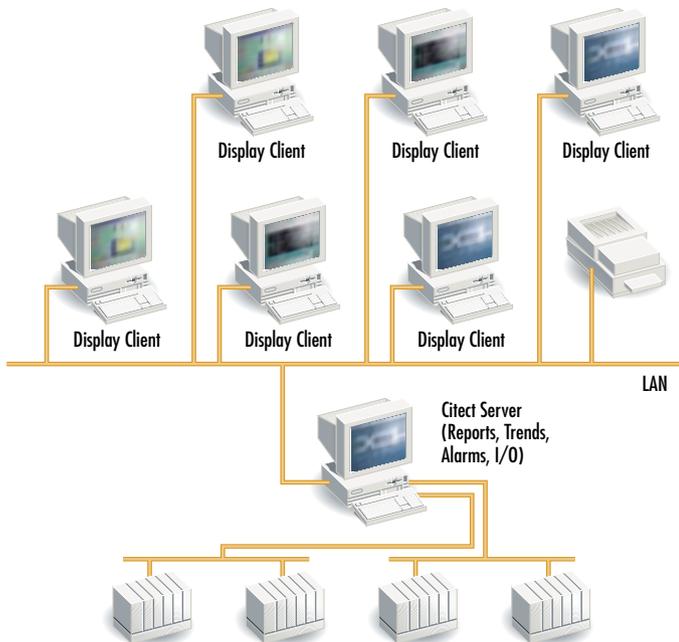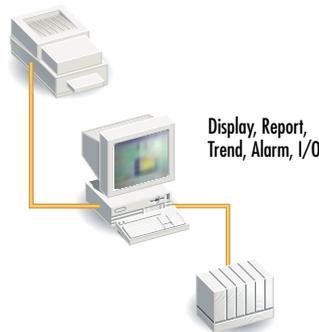
…and grow bigger – without changing the configuration. To add new stations, just install the new computer, and nominate the task (or tasks) it should perform.

At a Glance…
- *Flexible*
- *Scalable (resizable) without shutting down*
- *Centralized and/or Distributed*

The developers of CitectSCADA understand that "A chain is only as strong as its weakest link". For that reason, the redundancy features of CitectSCADA are truly comprehensive, guarding all areas where failure may occur.

CitectSCADA's redundancy features are tightly integrated into the alarm system. When a failure occurs, CitectSCADA will notify the operator which piece of equipment has failed and which redundant equipment has taken over.

Redundancy

*Quality Flexible Scalable **Reliable** Open Fast*

In factory automation and other mission critical applications, hardware failure leads to production loss, and can result in potentially hazardous situations. CitectSCADA's redundancy will tolerate failure anywhere in your system, with no loss of functionality, or performance.

CitectSCADA supports full hot standby configurations, providing complete **I/O Device redundancy**. By nominating one device as primary, and the other as standby, CitectSCADA will automatically switch from one to the other in the event of failure. Using CitectSCADA's ability to write setpoint changes to both primary and standby I/O Devices, even I/O Devices that were not designed for redundancy can be used in a redundant configuration.

A broken communication cable and unpredictable electrical noise are common communication problems. In response, CitectSCADA allows the use of two separate communication cables (run separately) for each I/O Device. By using **data path redundancy**, you minimize the chance of communication loss affecting your operation.

When communicating with an I/O Device, many systems demand redundant I/O Server configurations. To avoid conflict of data, and to maximize communication bandwidth, only the primary I/O Server communicates with the I/O Device.

Many SCADA systems use LANs to connect the elements, but something as simple as a faulty network card can destroy communication. CitectSCADA's built-in multiple network support provides **Full LAN Redundancy**. All you have to do is install two networks (or more if you like). If the primary LAN fails, CitectSCADA will automatically try to connect on the other available LANs – no configuration required.

Primary I/O Server

Primary Data Path   Standby Data Path

Primary I/O Device   Standby I/O Device

I/O Server

Primary Data Path

Standby Data Path

I/O Device

Display Client   Display Client   Display Client   Display Client   LAN 1

LAN 2

Primary Server   Standby Server

- I/O Server
- Alarm Server
- Trend Server
- Report Server

At a Glance…

- *Data path redundancy*
- *I/O Device redundancy*
- *Task redundancy – I/O, reports, alarms, trends and display*
- *LAN redundancy*
- *PC Redundancy*

The fallibility of file servers is often forgotten. CitectSCADA supports **redundant file locations**, so that even if your file server fails, your SCADA system will continue unaffected.

The redundancy features of CitectSCADA are integrated and **easy to configure** – in fact, LAN redundancy requires no setup, and task redundancy setup is configured in a few seconds using a simple wizard. And, of course, all the redundancy features of CitectSCADA can be used together, providing you with maximum protection.

Because of CitectSCADA's task based architecture, you get an unrivalled level of SCADA/HMI redundancy. Each of the tasks in CitectSCADA (I/O, Trends, Alarms, Reports, Display) can be shared by other computers in your system. This allows you to allocate a server task to two computers at one time – one as the primary and the other as the standby.

If a primary server fails, the standby will automatically assume its role – without loss of data. When the primary is absent, the clients will automatically access the standby server. When the primary server is brought back online, it will be re-synchronized automatically, ensuring no gaps in your history files. Since all tasks are different in nature, CitectSCADA allows you a separate redundancy strategy for each.

Reports Servers

| Display Client | Display Client | File Server 1 | File Server 2 | Primary | Standby |

LAN 1

Primary I/O Server   Standby I/O Server   Primary   Primary

Standby   Standby

Trend Servers   Alarm Servers

Note 1

Each CitectSCADA Server can also be a Display Client. File Servers do not require a CitectSCADA license unless you are running a CitectSCADA Server or Display Client on that PC.

- *450,000 Real-time CitectSCADA variables*
- *64,000 Digital Alarms*
- *20,000 Historical Trends*
- *Observed response time 0.5 seconds*
- *Network utilization ~ 2%*
- *Global database*
- *Control the plant from any PC*

Large Systems

Quality Flexible Scalable Reliable **Open** *Fast*

Traditionally the domain of a proprietary DCS, CitectSCADA provides a truly open alternative which significantly reduces cost of ownership.

In 1992, the Argyle Diamond Mine commissioned the first CitectSCADA for Windows system. This fully automated 24 hour/365 day operation produces 32% of the world's diamonds and since commissioning there has never been any production down time due to the CitectSCADA system.

Since this first system, numerous other large systems have been commissioned. CitectSCADA continues to expand the boundaries and recently commissioned the world's largest PC-based control system for Western Mining Corporation's Olympic Dam Operation.

CitectSCADA's distributed processing and network optimization give you excellent network performance, even when you have over 450,000 I/O and 60 CitectSCADA computer stations:

- 33 PLCs
- 33,000 Digital I/O points
- 16,000 Analog I/O points
- 11,500 Alarms
- 4,000 Historical trends
- 50 PCs on Ethernet LAN
- Common (global) database
- Configuration at any PC
- DCS style redundancy
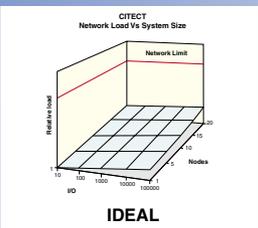
❝…There has never been any production down time due to the CitectSCADA System.❞

Senior Process Control Engineer, Argyle Diamond Mines, 20/07/00

System Performance

Quality Flexible Scalable Reliable Open **Fast**

Getting information quickly and reliably to and from the plant floor is the primary role of any SCADA and HMI system. A system where data transfer is slow because of bottlenecks, runs the risk of losing information. CitectSCADA however, automatically uses dynamic optimization and pre-emptive multi-tasking to maximize system performance.

Each type of I/O Device uses a unique protocol to communicate with higher level equipment such as CitectSCADA. The speed with which data can be transferred depends on, and is limited by, the I/O Device and the protocol design. The limitation comes from the fact that I/O Devices do not r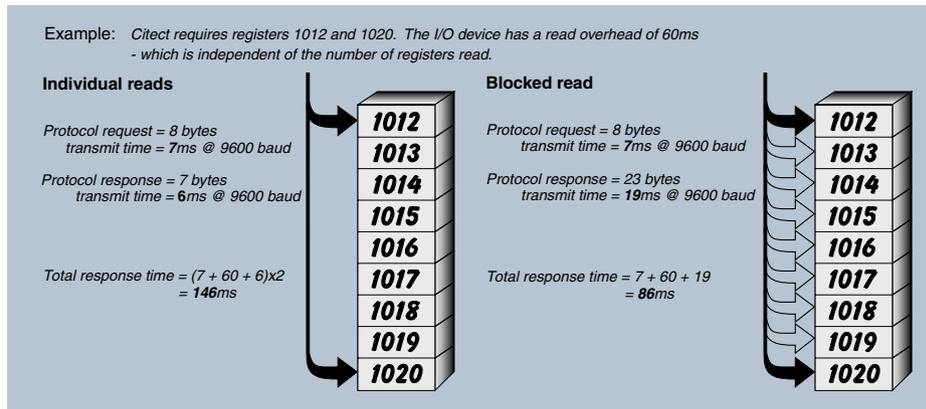espond immediately to requests for data, and many protocols are inefficient. The following strategies allow CitectSCADA to maximize data transfer.

CitectSCADA's communication is **demand based** – reading only those points which are requested by the clients. More importantly, the I/O Server rationalizes requests from clients, for example, combining them into one request where possible. This reduces needless communication, giving screen update times up to eight times faster (than without).

Only a restricted volume of data can be returned in one request. If all requested data is grouped together, then fewer requests are required, and the response is faster. But what happens when two required registers are separated? CitectSCADA uses a **blocking** constant to calculate whether it is quicker to read them separately, or in the same 'block'. By compiling a list of the registers that must be read in one scan, CitectSCADA automatically calculates the most efficient way of reading the data.

Example: Citect requires registers 1012 and 1020. The I/O device has a read overhead of 60ms - which is independent of the number of registers read.

Individual reads

Protocol request = 8 bytes
transmit time = **7**ms @ 9600 baud

Protocol response = 7 bytes
transmit time = **6**ms @ 9600 baud

Total response time = (7 + 60 + 6)x2
= **146**ms

Blocked read

Protocol request = 8 bytes
transmit time = **7**ms @ 9600 baud

Protocol response = 23 bytes
transmit time = **19**ms @ 9600 baud

Total response time = 7 + 60 + 19
= **86**ms

The client-server processing of CitectSCADA allows further performance increases, through the use of a **cache** on the I/O Server. When an I/O Server reads registers, their values are retained in its memory for a user defined period (typically 300ms). If a client requests data that is stored in the cache, the data is provided without the register being re-read. In a typical two client system, this will occur 30% of the time. The potential performance increase is therefore 30%. CitectSCADA also uses read ahead caching, updating the cache if it gets accessed – predicting that the same information will be requested again!
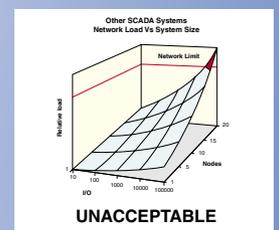
Moved

Loaded

and Touched

Benefits of RAD

Graphics

- ☐ *Complete flexibility*
- ☐ *Intuitive graphics reduce operator error*
- ☐ *Minimize operator keystrokes*
- ☐ *Increase learnability through clarity*
- ☐ *Blend control and display functionality into one object*
- ☐ *Efficient use of screen space*

RAD Graphics

The graphics capabilities of your SCADA system are a critical factor in the overall usability. The Rapid Application Development (RAD) Graphics of CitectSCADA ensure an intuitive, consistent user interface.

CitectSCADA's RAD Graphics are based on a simple set of objects, namely rectangles, ellipses, bitmaps, straight lines, freelines, polylines, text, symbols, and pipes. Associated with all these objects is a common set of object properties. These properties allow an **object's behavior to be directly linked to your plant variables.** The movement, rotation, size, color, fill, visibility, etc. of any object can be used to realistically mimic plant floor conditions, and commands and touch properties can be assigned so that the object can accept a variety of operator inputs.

This approach quickly delivers impressive results – for even the most demanding applications. **All objects are interactive,** so your operator interface will be simple, intuitive, and flexible, and because RAD graphics were developed with optimization in mind, you can expect excellent runtime performance.

The flexibility of RAD graphics objects is demonstrated in this table.	Freeline	Polyline	Line	Rectangle	Ellipses/Pie Slices	Text	3D Pipe	Bitmap	Symbol Set
Horizontal Movement	✔	✔	✔	✔	✔	✔	✔	✔	✔
Vertical Movement	✔	✔	✔	✔	✔	✔	✔	✔	✔
Rotation	✔	✔	✔	✔	✔	✔	✔	✔	✔
Vertical Size	✔	✔	✔	✔	✔	✔	✔	✔	✔
Horizontal Size	✔	✔	✔	✔	✔	✔	✔	✔	✔
Color Level Fill	✔	✔	✔	✔	✔	✔	✔	✔	✔
Color change [Note 1]	✔	✔	✔	✔	✔	✔	✔	✔	✔
Touch - Up/Down/Repeat	✔	✔	✔	✔	✔	✔	✔	✔	✔
Keyboard Commands	✔	✔	✔	✔	✔	✔	✔	✔	✔
Horizontal Slider	✔	✔	✔	✔	✔	✔	✔	✔	✔
Vertical Slider	✔	✔	✔	✔	✔	✔	✔	✔	✔
Rotational Slider	✔	✔	✔	✔	✔	✔	✔	✔	✔
Visibility	✔	✔	✔	✔	✔	✔	✔	✔	✔
Disable	✔	✔	✔	✔	✔	✔	✔	✔	✔
Access Control	✔	✔	✔	✔	✔	✔	✔	✔	✔
Grouping	✔	✔	✔	✔	✔	✔	✔	✔	✔
Node Edit	✔	✔	✔			✔			

Note 1

As color change provides information that is quickly understood, CitectSCADA offers a wide range of options to cover many possibilities:

On-Off: On Color and Off Color changes based on the result of an expression.

Multi-State: Definable color display for each possible boolean result of up to five conditions producing up to 255 different color results.

Integer: Definable color display for each different integer value. Up to 255 different colors can be defined.

Gradient: Color changes through the spectrum according to the value of an analog variable, simply by defining a starting and ending color.

CitectSCADA utilizes screen resolutions from 640x480 up to 4096x4096, which you can choose to suit the application. With these resolution capabilities, you can even use high quality images (scanned photos etc.) to provide instant recognition of plant equipment.

CitectSCADA comes with rich **Symbol libraries,** loaded with commonly used graphics – like pumps, tanks, valves, and motors.
These graphics will instantly add consistency and functionality to your screens.

In addition to the Symbol libraries that come standard with CitectSCADA, you can obtain more from the CitectSCADA website.

ActiveX objects can be used to add custom features onto your CitectSCADA graphic.

Your system may contain a bitmap of a tank that can be...

Filled

Heated

Rotated

Just by using RAD graphics, you will find yourself developing new ideas for your interface.

Internet Clients

CitectSCADA provides the flexibility to access remote plants, mobile laptop users, and suppliers via the Internet.

Internet Clients add flexibility and convenience to managing plant operations.

Current CitectSCADA users can now monitor the operation from any Internet/Intranet supported location.

It is economical to add access for all users (maintenance, quality assurance, etc) because server based licensing means you only pay for concurrent users.
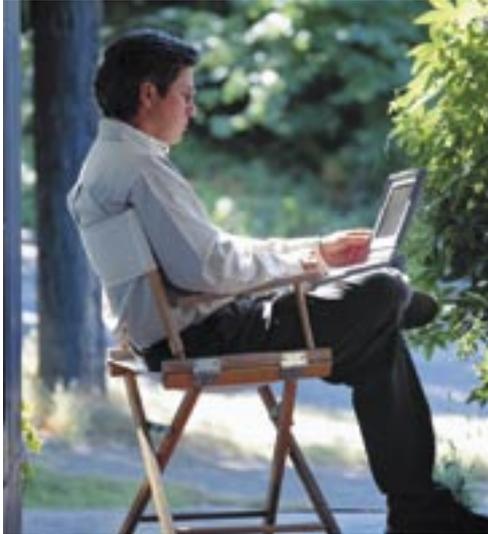
Applications are numerous:

- ☐ *Mobile users*
- ☐ *Remote users*
- ☐ *Suppliers*
- ☐ *Remote plants*
- ☐ *Special users*

Regardless of network limitations, CitectSCADA can be extended to users over the Internet.

CitectSCADA's Internet Clients provide full system functionality over the Internet. It's a powerful and easy way to access CitectSCADA from remote locations either as a Display Client or a Manager Client. With full functionality, you can display real-time data, change set points… even acknowledge alarms off-site.

The Internet Client has been designed for real-time operation. Screen update times vary between 1-5 seconds using standard modems and are even faster with high-speed connections.

The small footprint downloads over the Internet, updates quickly, and caches pages intelligently. Using a standard browser, remote users simply point at the CitectSCADA Server, click, and the program self-installs. Full remote functionality is never more than a few mouse clicks away.

Security

The Internet Server uses advanced firewall and encrypted password protection technology to ensure secure operation over the Internet. Access will be denied to Internet Clients without password authorization or when the number of Internet Clients using the server exceeds the CitectSCADA Server license.

Operation

Connect to the Internet, start up the Internet Client, and connect to your CitectSCADA Server along with your security password. Now you are live on the system. The Internet Client will download and cache pages as they are requested.

Unlike HTML applications, CitectSCADA Internet Clients cache real project graphics from the server and deliver full functionality. Depending on your application, it may take a little longer to cache your graphic, but neither your functionality nor graphic quality are compromised. Once the page is cached, the client uses TCP/IP and the Internet/Intranet to update information.

Automatic Synchronization

CitectSCADA automatically compares file dates in the cache with those on the server. If the server's files have changed, the new files are automatically downloaded to the Client.
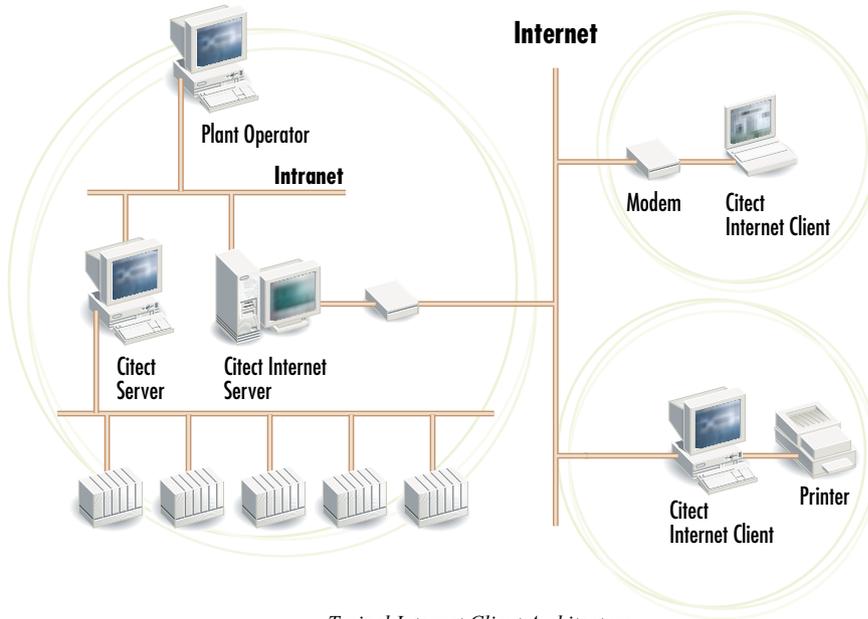
Typical Internet Client Architecture

Licenses

Internet Clients are available as Manager and Display Clients. The Display Client provides full functionality. The Manager Client is granted "view only" access. The CitectSCADA Internet Server monitors license usage and, depending on the number of purchased licenses, allocates licenses to Clients as requested.

There is no technical restriction on the number of Internet Clients. CitectSCADA's licensing is calculated on the number of CitectSCADA clients connected to the server, not on the number of computers with CitectSCADA installed. The server based licensing makes Internet Clients an easy and convenient way to extend access to a wide range of remote users.

"**The Internet Display Client saves money, is easy to set-up, and works like a dream. Rather than buying keys that will not be used or putting keys on computers that do not need them, we can now use IDC displays for various users and operators. We had update times somewhere between 1 to 2 seconds. This is downright amazing... and on a laptop too! It's a great product, plain and simple.**"

Richard Parker, Project Director
Software Programming & Computer Support,
National Chemical

Multi-Language Projects

A single CitectSCADA project can be run in any number of languages. This means you can accommodate the languages of your customers without configuring multiple projects, so both your customers and your productivity will benefit.

At a Glance…

- *One project – Multiple languages*
- *Runtime switching*
- *No language limit*
- *Single and double byte characters*
- *Different languages on each Client*

No matter where your project is bound, or who is going to use it, you only need to configure it once. **Speakers of all languages can just run the same project.** This is particularly useful for anyone distributing or implementing control systems internationally (OEMs etc.). All countries receive the same project. All you have to do is choose the language it will run in.

You can even switch languages at runtime!
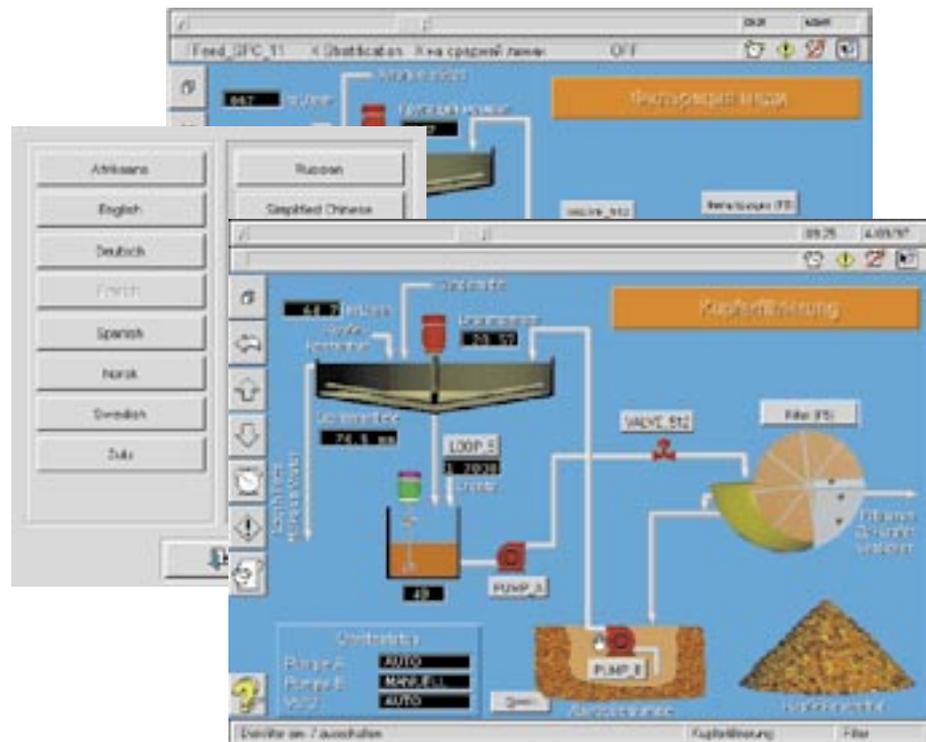
For instance, at any point in time, one Display Client could switch the running project from Chinese to English, while another is running it in French, another in German, and so on. The important thing to note is that each Display Client is running exactly the same project.

A new language can be added while the system is still running, and you can switch to it immediately – without shutting down.

Reports

CitectSCADA's Reports System is a fully integrated part of the product. When you invest in CitectSCADA, you automatically receive the tools needed to create and run attractive, informative reports.

A CitectSCADA report is a statement or account of plant-floor conditions that you can run periodically, on request, or only when an event occurs (such as a change of state in a bit address, when CitectSCADA starts up, or at a specified time of day).

Reports can be generated in any format you want. They can include formatted text, current and historical data, and even the results of calculations. They can also contain operating instructions – to change operations or variables within your plant, download instructions, perform diagnostics, change recipes etc.

Reports can be displayed on a page at runtime, printed when the report runs, or saved on disk for printing or display at a later date. You can use a text editor or word processor to view, edit, or print these reports. Reports can also be automatically sent to SQL databases and any ODBC-compatible databases. Alternatively, your reports can be saved in HTML format, so that they can be viewed over the Internet, using a standard web browser.

Remember, **CitectSCADA supports Reports Server redundancy**, so reporting is assured. When the Primary and Standby Reports Servers are both running, the scheduled reports only run on the Primary. If the Primary Reports Server fails, the scheduled reports run on the Standby. You can also configure the Standby Reports Server so that it also runs the scheduled reports – in parallel with the Primary Reports Server.

Shift Report

Monday, 12 January 1998

Total milk in:	336150	L
Total starter in:	3080	L
Total Milk and Starter in:	339230	L
Production Time Forward:	656	mins
Production Time in Divert:	10	mins
Total Production Time:	666	mins
Number of Diverts:	8	diverts
Number of Vats:	22	vats
Total Cheese Weight:	23441.92	Kg
Total Number of Blocks:	1272	blocks
Yeild:	***0.069***	***Kg/L***

Grower Status

Date: Friday, Jan 9, 1998

Run No.	Batch No.	Merchant	Processed Modules	AV Turnout
66	13	ADF	8	36.52%
66	13	ADF	2	39.77%
67	14	ADF	6	37.28%
67	14	ADF	2	38.41%
68	15	BBF	10	39.60%
68	15	BBF	4	36.88%

Runtime

CitectSCADA reports are designed on a "What you see is what you need" basis (using a word processor such as Microsoft Word, WordPad, Write, etc.). It is very easy to build sophisticated reports because you have at your disposal all the fonts, colors, paragraph styles, and other rich text formatting features that come with your word processor. This means that reports can now be both functional and easy on the eye.

At a Glance…

- ☐ *Integrated reporting*
- ☐ *Rich Text Formatting*
- ☐ *Log to ODBC/SQL devices*
- ☐ *HTML formats*
- ☐ *Log to printer or file*
- ☐ *Client-server architecture*
- ☐ *Redundancy*

Trends

CitectSCADA's distributed trending system handles large numbers of variables without compromising performance or data integrity. Choose from a selection of pre-configured trend pages that provide clear data representation with customizable views.

Any plant-floor variable can be logged and trended. A trend builds a picture over time of how the variable (product output, level, temperature, etc.) is changing or how a device or process is performing. CitectSCADA trends are created from a selection of sample values. The sample values are plotted against time, and the resultant graph gives you an indication of process behavior. Trend samples can be taken periodically, or when specific events occur in your system. Sampling rates can be as low as **10 milliseconds**, and as high as 24 hours.

As the values of variables change over time (or as events occur), the graph moves across the page – **the latest values are always displayed**.

Change the resolution and span time of the graph while it is running.

Select an area of the graph, and press the **Zoom** button to magnify it.

CitectSCADA comes with a host of ready-made trend templates, allowing you to quickly create trend graphs complete with navigation tools and dynamic readouts from the plant floor. You can display trends in single, double, or pop-up windows, but if you feel that you want something specific to your system, you can easily configure it yourself, with your own functions and trend pens.

At a Glance…

- □ *Real-time/Historical totally transparent*
- □ *Runtime variable (pen) selection*
- □ *Runtime timebase (period) selection*
- □ *Display Mode (stretch/ condensed) selection*
- □ *Millisecond resolution*
- □ *Concise trend plotting*
- □ *No limit on trend variables*
- □ *Multiple pens per graph per page*
- □ *DBF, CSV and ASCII data formats*
- □ *Client-server architecture*
- □ *Data can be stored as Scaled (2 byte) or Floating Point (8 byte) format*
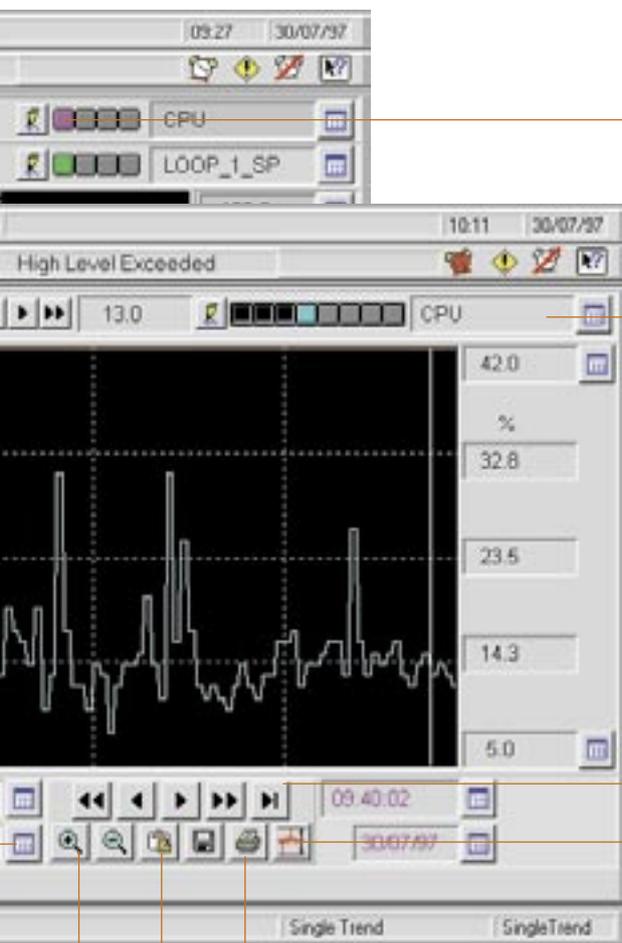
The Compare Trend allows you to overlay two trends, and assign different time frames to the pens of each. **eg:** Compare the temperature trend of the master batch with today's batch.

CitectSCADA trends give you the flexibility to define your trend pens while the project is running.

Scroll through the trend to view past (left) and present (right) details.

Click the Trend statistics button to display Minimum, Maximum, Average, and Standard Deviation for any selected portion of the trend.

Print the trend data in intuitive color or black & white plots. You can also integrate trend plots into reports.

Copy trend data to the clipboard, ready for pasting into third party applications (in table format), such as Excel, Word, etc.

Alarms

An efficient alarm system allows you to quickly isolate and identify faults, reducing the amount of downtime. The CitectSCADA alarm system is fast and reliable, providing you with detailed alarm information in formats that are clear and legible.

All alarms are processed and managed by a **CitectSCADA Alarms Server**. Any CitectSCADA Display Client can display alarms and acknowledge alarms, requesting and writing the data as needed. This eliminates duplicated processing (and synchronization errors), ensures that alarms are acknowledged system wide, and provides for server based security checking.

Configurable Alarms report fault conditions in your plant. Variables, groups of variables, expressions, calculation results etc. can all be monitored by the CitectSCADA alarm system. For example, you might like CitectSCADA to display an alarm when a tank level is too high or when a motor overheats.

Working in conjunction with the I/O Device, CitectSCADA's alarms are time stamped, with precision to 1 millisecond. This can be essential when differentiating between alarms that occur in rapid succession. **Millisecond precision** allows you to determine cause-effect relationships between alarms – an exercise that would otherwise be impossible.

Quick recognition and identification of alarms is important. CitectSCADA displays alarms on dedicated alarm pages, but the most recent alarms are always visible on every page. Alarms can be organized by color, font, and order, according to **priority, category, or time** of occurrence. For an account of all alarms that have occurred on your system, the alarm summary page provides a complete history.

The alarm summary page, shows the details for each alarm occurrence on a single line so that users do not need to scroll through history to determine the on time, off time and duration.
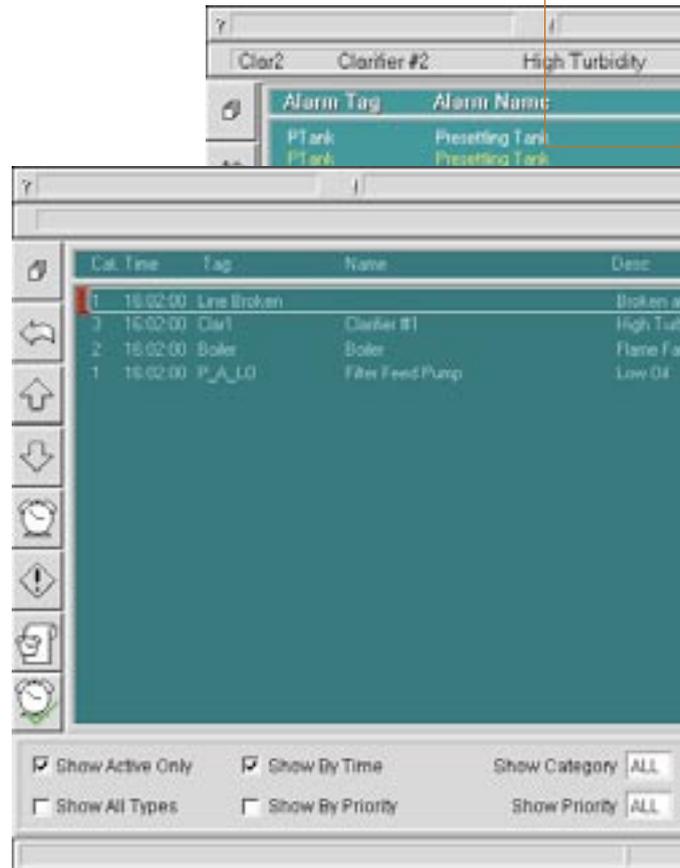
A good alarm system should not overwhelm operators with excessive alarm information. With CitectSCADA you decide which Alarm information to display. Operators can easily switch between different display formats while the system is running, or even have CitectSCADA automatically change the display format depending on who is logged into the system (manager, operator, etc.).

Flexible alarm formatting permits display of any related variable when the alarm is triggered.

Alarm Information Display Fields

Alarm Tag, Alarm Name, Alarm Description

Alarm Category, Help Page, Area, Privilege

Alarm Type or Condition:
Disabled, Acknowledged, Unacknowledged

Time/Date when Alarm changed state or was acknowledged:
On Time, Off Time, On Date, Off Date, Delta Time,
Acknowledged Time/Date

Operator Definable Comment

Trip point settings and Alarm State for High High, High,
Low, Low Low, Rate, Deviation

Value of the variable and the alarm deadband (hysteresis)

Error Description, User Name, User Description

CitectSCADA also continually runs **diagnostic routines** to check both its own operation and all peripheral equipment, such as I/O Devices. All faults are reported automatically to the operator. This facility is fully integrated within CitectSCADA, and no configuration is necessary.

At a Glance…

- ☐ *Analog, digital, SPC, and custom alarms*
- ☐ *Integrated Hardware/ Diagnostic alarms*
- ☐ *No limit on configurable alarms*
- ☐ *Millisecond resolution*
- ☐ *Configurable display formats*
- ☐ *Summary/History logging*
- ☐ *Filter is customizable by category, area, time, and priority*
- ☐ *Acknowledge from any network computer*
- ☐ *ODBC, DBF, CSV and ASCII data formats*
- ☐ *Client-server architecture*
- ☐ *Redundancy*

At a Glance…

- ☐ *LAN/WAN technologies*
- ☐ *NetBIOS based*
- ☐ *Multiple sessions*
- ☐ *Remote access*

Networking

Networking is a key ingredient to centralized control of distributed applications, but no single type of network is suitable for all applications. CitectSCADA's networking technology gives you impressive performance over a large range of network types.

With CitectSCADA on a LAN/WAN, you can control and monitor autonomous areas within the plant separately, using any computer on the network. In addition, a network gives you more sophisticated solutions, such as **redundancy and distributed processing.**

CitectSCADA's primary networking tool is NetBIOS, providing CitectSCADA with a fundamental and standard instruction set. Session based NetBIOS is widely supported by networking protocols such as NetBEUI, IPX/SPX and TCP/IP. Although you can use CitectSCADA on a wide variety of network types, such as Novell Netware, Windows or LAN Manager, CitectSCADA doesn't use the host network file system for communication. CitectSCADA makes the best use of the network **directly through NetBIOS**.

NetBIOS has considerable support from Microsoft, so that you can use most Windows supported WAN or LAN technologies without concern – even satellite connection, ISDN, FDDI, and RAS. A good rule of thumb is **"If Windows can use it – so can CitectSCADA"**. For example, if you have an Internet connection, you can communicate with CitectSCADA over the Internet.

Display Client   Display Client   File Server

LAN 1

Server/Display
Client

To I/O Devices
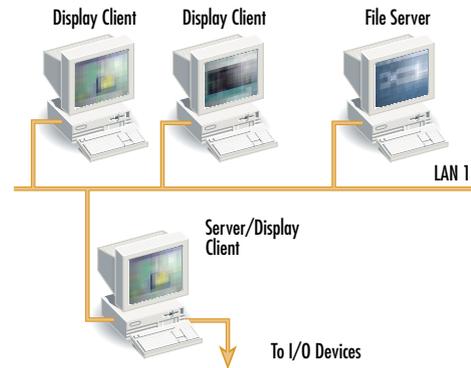
With Global Clients you can change the CitectSCADA NetBIOS sessions 'on the fly'. This allows you to have **display stations that can use more than one set of CitectSCADA servers**. For example, your display computer in one site can also be used to remotely view and control another site.

Many sites have networking standards to which SCADA systems must conform. One networking protocol that is widely adopted is TCP/IP. CitectSCADA effortlessly integrates into TCP/IP networks since TCP/IP encapsulates NetBIOS messages.

Security

Most applications have special operations that only qualified people should perform. Your HMI must provide some form of security, to prevent accidental or deliberate tampering – to protect personnel and your investment. CitectSCADA's comprehensive security features are integrated into all interface elements, ensuring a secure runtime system.
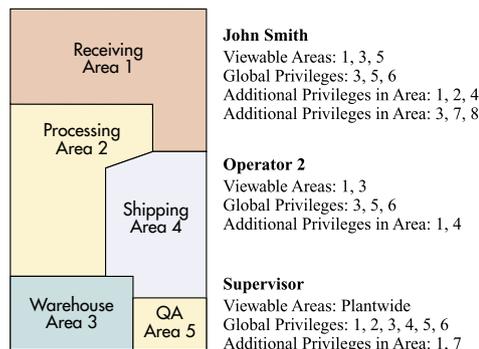
CitectSCADA's security system is user based, allowing you to define individual or group security details for the runtime system. Any user can be assigned a security login, forcing them to enter their user name and password to gain access to parts of the runtime system.

There is **no limit** to the number of users (or groups) that you can have configured in your system – you can even add and delete new ones at runtime.

Access is controlled by granting users the ability to view different areas of your system. If able to view an area, the user may also need to have the correct privilege level to perform actions, or view objects. For each graphical object, page, trend, report etc., you can define the area to which it belongs, and what privilege levels are required to make it visible or useable. Since users can use any CitectSCADA computer, **access is granted/denied by the server,** not by the client – giving added security for WAN applications.

In most applications, the operator should not be allowed to exit CitectSCADA. You can secure the CitectSCADA **runtime environment** itself, by stopping users from swapping to the Windows operating system or other Windows programs.

CitectSCADA Manager Clients are a cost effective way to provide view only access, with the additional protection of a hardware security lock that can reside on the CitectSCADA Server. Manager Clients can be shared amongst many users anywhere on the network, simply allow enough Manager Client Licenses to satisfy the maximum number of users logged in at any one time.

John Smith
Viewable Areas: 1, 3, 5
Global Privileges: 3, 5, 6
Additional Privileges in Area: 1, 2, 4
Additional Privileges in Area: 3, 7, 8

Operator 2
Viewable Areas: 1, 3
Global Privileges: 3, 5, 6
Additional Privileges in Area: 1, 4

Supervisor
Viewable Areas: Plantwide
Global Privileges: 1, 2, 3, 4, 5, 6
Additional Privileges in Area: 1, 7

To stop unknown people tampering with your plant when the operator station is unmanned, you can have CitectSCADA automatically log people out of the system (for example, if the mouse is idle for 5 minutes). Without an appropriate password, operators can do no harm.

At a Glance…

- ☐ *Fully integrated*
- ☐ *User based*
- ☐ *Groups*
- ☐ *Privileges*
- ☐ *Areas*
- ☐ *Server based*

Connect to other
computer systems:

- ☐ *DEC PDP/VAX/*
  ALPHA
- ☐ *IBM AS400*
- ☐ *UNIX*
- ☐ *SUN*

Interfacing

The primary role of your HMI is to provide you with an interface to your I/O Devices – and through it, your plant machinery. CitectSCADA provides reliable interfacing, not only with I/O Devices, but with other data sources, Windows applications, and external computer systems.

I/O Devices

CitectSCADA comes with over 120 I/O Device drivers included. These 32 bit drivers allow you to connect to over 300 different models of I/O Devices – PLCs, RTUs, micro controllers, loop controllers, DCS elements, weighers, bar code readers, scientific analyzers and more.

CitectSCADA gives you 100% data integrity. If the data represented on the screen isn't valid, CitectSCADA will mark it with a user definable hash or text message. Rather than display operator entered data immediately on screen, CitectSCADA can also be set to write to the I/O Device first, then display the read back value.

New drivers for CitectSCADA are constantly under development, but your application may require a custom made driver. A Driver Development Kit (DDK) is available so that you can write your own CitectSCADA device driver. If you don't want to go to that length, you can modify a configurable ASCII driver, or write a simpler driver in Cicode. Alternatively, you can have Citect customize a driver for your I/O Device. In any case, you can use the built-in protocol analyzer to monitor and debug your own driver.

Databases

Most applications don't demand rigid or complex database structures. CitectSCADA has native dBASEIII file support, allowing very high speed record based operations. Use this integrated database functionality to maintain custom data structures, such as recipes and production information. CitectSCADA can read, write, and maintain dBASEIII files.

You can use the Structured Query Language (SQL) tools, to maintain and query ODBC databases. CitectSCADA has integrated ODBC functionality, meaning it can function as an **ODBC server,** or even log reports and alarms directly to ODBC devices.
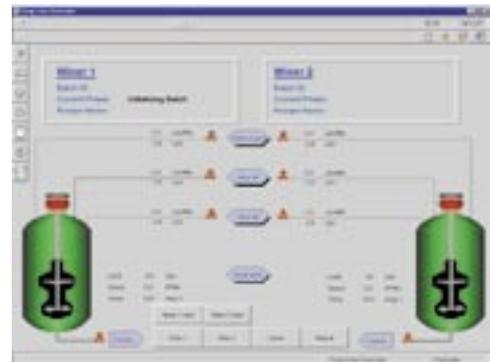
Applications

The ability to share data between applications is a powerful feature of Windows, and CitectSCADA gives you a number of different choices. The simplest method of sharing data is by using a **shared file.** With CitectSCADA, you can choose between several common file formats for temporary data storage: ASCII, CSV, dBASEIII, RTF etc.

Many applications provide OPC compatibility as a method of data sharing. CitectSCADA can function as a OPC server, loading plant variables into memory, for access by other Windows applications. CitectSCADA can also function as an OPC Client allowing data exchange with other OPC Servers.

For a structured approach to data sharing, you may want to use CitectSCADA as an ODBC server. This is an integrated feature and requires no configuration in CitectSCADA to allow 3rd party client applications to obtain data via ODBC.

The CitectSCADA API gives you the most flexibility, and the best performance, providing a direct interface into CitectSCADA. It consists of a set of functions designed for use with C, Visual Basic, or Delphi, which allow you to (directly) read and write I/O and control Cicode. You can use the API to write powerful custom applications for data transfer. All of the above features are included as standard in CitectSCADA.

Citect Plant2Business

Citect Plant2Business is a SCADA reporting product from Citect which allows you to visualize and analyze plant floor information anywhere throughout the enterprise. In addition it allows you to transfer information to Microsoft SQL Server or Oracle without making any changes to a running CitectSCADA system.
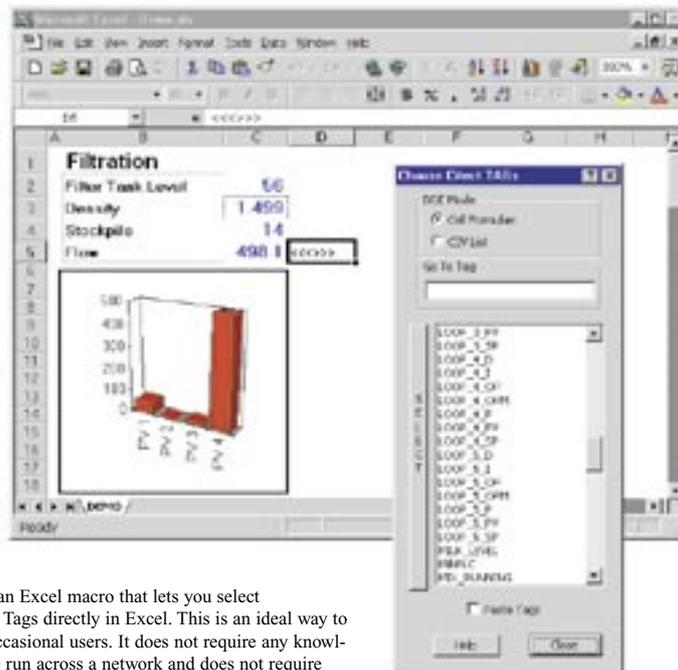
Included with CitectSCADA is an Excel macro that lets you select CitectSCADA Variable & Trend Tags directly in Excel. This is an ideal way to obtain ad hoc information for occasional users. It does not require any knowledge of CitectSCADA; it can be run across a network and does not require CitectSCADA to be installed on the local PC.

Remote I/O Device Monitoring

Using standard modems, Remote I/O Device Monitoring provides an effective method to communicate with devices at remote sites for a fraction of traditional operating costs.
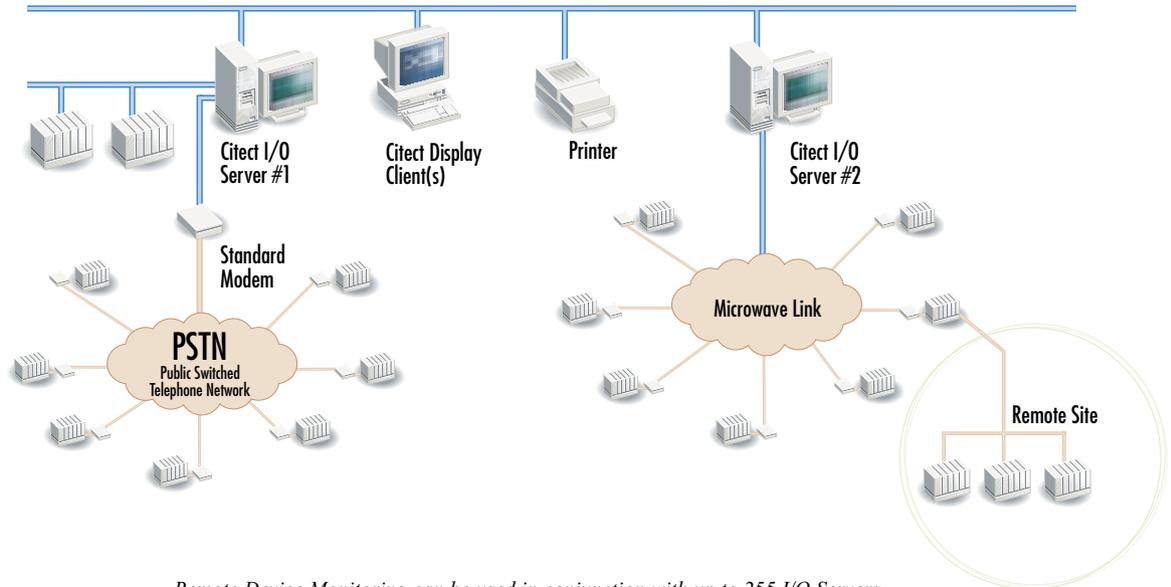
CitectSCADA's Remote Device Monitoring supports scheduled Dial-Out and unsolicited Dial-In, making it easy and economical for CitectSCADA to monitor devices and sites over the Public Switched Telephone Network.

This feature has been employed in a wide range of applications.

☐ *Cellular Networks*
☐ *Rail Systems*
☐ *Water Supply*
☐ *Power Transmission*
☐ *Pipelines*

Remote Device Monitoring can be used in conjunction with up to 255 I/O Servers to support applications with hundreds of thousands of points.

CitectSCADA can schedule connections to remote I/O devices (for example, via modems or microwave links). To minimize data communication costs, CitectSCADA can call up the I/O device as per the user defined schedule (or when needed) exchange data, and automatically disconnect.

By working with most serial protocols provided with CitectSCADA, Remote I/O Device Monitoring provides the user with flexibility in selecting a wide range of PLCs or RTUs.

CitectSCADA's comprehensive features for managing remote devices are built-in.

☐ Easy to use Express Communications Wizard.

☐ A single modem can be used to communicate with multiple I/O devices.

☐ CitectSCADA can use a modem pool to simultaneously connect to multiple devices.

☐ Dial-In feature for remote devices. If remote alarms occur outside of scheduled dial-out times, the devices can dial-in to CitectSCADA and transfer the alarm information.

☐ Dial-Out I/O has full redundancy support. If the primary server fails, the standby server will dial the remote devices. The non-volatile data cache is replicated automatically between servers, so the latest data is always maintained on the standby and is available to the primary on restart. CitectSCADA keeps a local record of the last values read from each device.*

☐ If CitectSCADA cannot connect to the remote device after user defined number of retries, that I/O device will be flagged as off-line and the values marked accordingly.

☐ Each modem can be configured to define its purpose Dial-Out, Dial-In, or both, and it can be dedicated for CitectSCADA only if desired.*

☐ CitectSCADA supports connection to devices which communicate using different data frames.*

*Version 5.30 onwards

Easy to Configure and Use

Based on a user-selected schedule, CitectSCADA's Remote I/O Device Monitoring feature can automatically connect to remote devices to retrieve data. Conversely it can accept unsolicited connections and data uploads from remote devices. Remote I/O is more than a remote monitoring feature, it can also be used to implement Cicode functions on connection or disconnection.

The Express Communications Wizard includes telephone number and call schedule fields. Set it up and let CitectSCADA look after the call schedules, data transfers and disconnections. It's automatic!

Implementing the Dial-In feature requires a remote device or modem that is capable of sending an identification string (ID String). CitectSCADA uses the ID String to identify the remote caller along with the appropriate communications protocol. If the device cannot support ID string (for example, the serial port may be limited to a native protocol), industrial modems produced by Sixnet and others can provide a suitable interface.
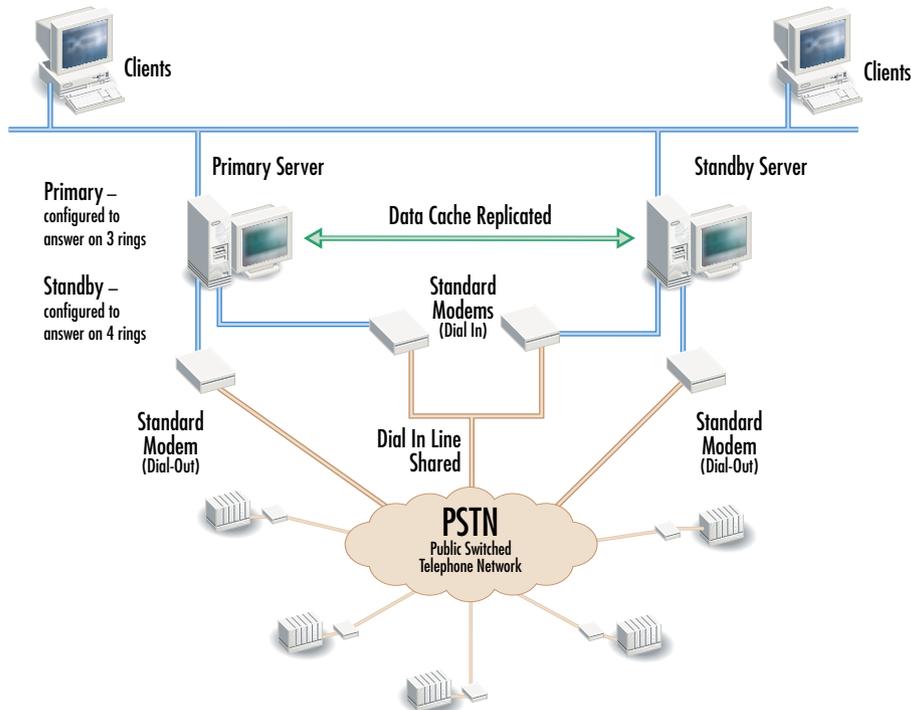
Example of Remote I/O Device Monitoring configured for both redundant Dial-Out and Dial-Back for secure monitoring of remote sites and devices.

At a Glance…

Log to:

❑ *printer*
❑ *disk*
❑ *ODBC devices*
❑ *another computer*

Data Logging

Often the primary purpose of a monitoring system is to collect and store data, either for record keeping, or for analysis. CitectSCADA encourages you to log a variety of information types, without restricting the output type or location. This ensures that you can get the data you need, in the format you want.

Most data logging involves recording selected analog and digital data from your plant or process. CitectSCADA puts no restrictions on the type of data that you can log, by giving you a large selection of triggering events:

❑ Events that occur within your plant or factory can be **logged as they happen.** For example, alarms, sequence steps, or high level indication.

❑ Record what the operators do by logging their **actions,** like manual starting of a process, emergency stop, or changing a setpoint.

❑ Keep track of errors or events that have occurred in your control system by **logging hardware alarms, communication performance, or network errors.**

Data can be logged to a variety of locations, including database files, ODBC sources, text files (including CSV and RTF), and printers. All of these types are ready to use, without any special configuration. When an event is logged it can be accompanied by the time and date, and user definable fields or text.

X,Y Plots

Nothing conveys information more readily than a picture, and CitectSCADA's X,Y plots are ideal for recording performance and production details. You can display sophisticated graphs for any type of data.

The X,Y plot feature is very flexible, allowing you a very high level of customization. You can display your plots on screen or printed out – using the full color palette.

Example of a CitectSCADA plot used in underground mining which shows whether the air is explosive, potentially explosive, or safe. A plot point inside the dynamically calculated triangle indicates an explosive condition and the mine is evacuated.
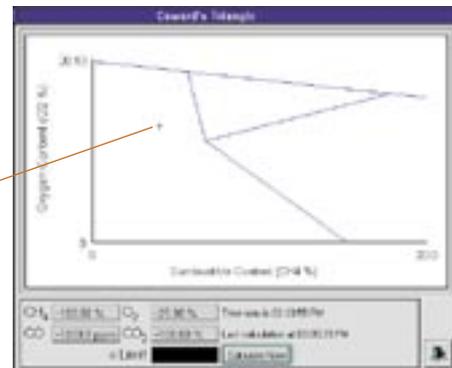
SPC

For an easy to understand graphical indication on product quality, you can use SPC charts. Prevent out of limit deviations before they happen, with CitectSCADA's easy to understand SPC charts.
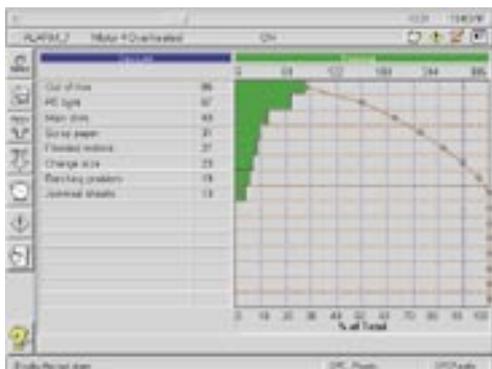
Statistical Process Control (SPC) is a method of analyzing and controlling the quality of materials, manufactured products, services, etc. CitectSCADA provides the three types of charts most commonly used for statistical analysis.

The charts below are supplied as standard templates ready for use 'as is', or to be customized to more specialized functionality.
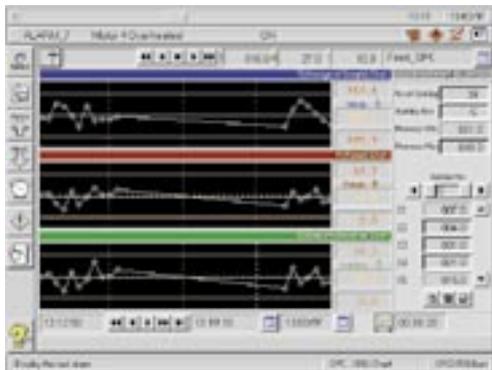
Control (XRS) charts allow you to analyze the variations in plant data. You can configure charts to individually display the mean, range, or standard deviation, or all of the above.
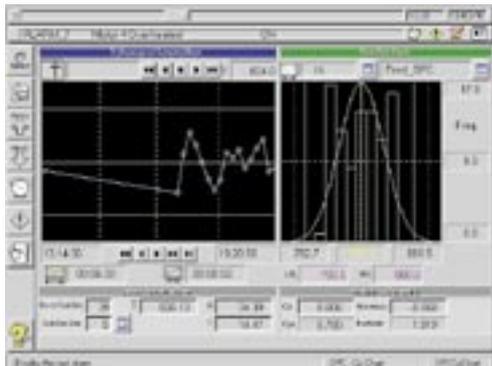
You can use **capability charts** to determine whether your process is meeting your specifications. CitectSCADA is pre-configured to arrange the data and make all necessary calculations.

If you would like to analyze the frequency of faults and problems, use a **Pareto chart.** After you specify which values to watch, CitectSCADA will arrange the data and draw the graphs in runtime.

At a Glance…

- ☐ *Mean, Range, and Standard Deviation (XRS)*
- ☐ *Pre-configured calculation routines*
- ☐ *Template based pages (easy configuration)*
- ☐ *Capability charts*
- ☐ *Pareto charts*

You can assign privileges to all commands and controls, and send a message to the command log each time an operator issues a command.
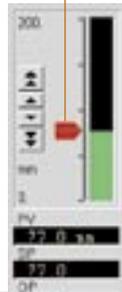
At a Glance…

☐ *Tool tips*

☐ *Sliders*

☐ *Keyboard commands*

☐ *Mouse touch commands*

☐ *Screen target regions*

Commands & Controls

CitectSCADA's commands and controls provide your operators with a user-friendly way to interact with the CitectSCADA runtime system.

Sliders

All graphics objects (rectangles, ellipses etc.) can be defined as sliders. Sliders allow operators to **change the value of analog variables** by changing the position of the slider object. For instance, a setpoint value might increase as you move a slider up, and decrease as you move it down. Sliders can move left to right, up and down, and they can even rotate. If runtime conditions change the value of the variable, the slider will automatically move to reflect the new value.

Screen Targets

Screen targets are a hot-spot region on the background screen which the operator can click on (like a button). These **invisible buttons** allow for greater flexibility in operator interface design.

Keyboard Commands

CitectSCADA offers three different types of keyboard commands:

Global (or system) keyboard commands can be issued from anywhere in the runtime system, e.g. for logging in or getting system information.

Page keyboard commands can be issued only from the page for which they are configured.

Object keyboard commands can only be issued when the mouse pointer is positioned over the object. You can attach helpful tool tips to object keyboard commands – if the operator pauses with the cursor over the object, the tool tip displays in a pop up window.

Touch Commands

Touch Commands can be assigned to any graphics object, including button objects. They are activated **when the operator clicks** on the object.

Separate commands can be activated when the mouse button is pressed (down), released (up), and held (repeat).

Accumulators

Accumulators are an easy way to keep track of incremental runtime data such as motor run hours, power consumption, and downtime.

You set a trigger (e.g. motor on) to increment three counters:

- The number of times the accumulator is **triggered** (e.g. start times for the motor).

- The **run time** in steps of 1 second.

- The **totalized value,** by a value you define (e.g. the current).

The accumulated data is stored as Variable Tags in an I/O Device (disk, memory or real). The Variable Tags are read at CitectSCADA startup, and are updated at regular intervals while the trigger is active, ie: CitectSCADA works together with the I/O device to ensure non volatility of data. You can monitor and display the accumulated data by animating, trending, alarming or logging the Variable Tags.

Events

Events can be set up so that they trigger actions when they occur. For instance, when a process is complete, an operator could be notified, and a series of instructions could be executed.

You can monitor events globally across the whole plant, or locally to each operator station. If you are using CitectSCADA on a network, you can have events processed on any CitectSCADA computer (or all computers) – simply make your choice when you set up your computers (or at any time afterwards) using the Computer Setup Wizard.

You can run an event:

- Automatically at a specified time and period,

- Automatically when a trigger condition becomes TRUE,

- Automatically when a trigger condition is TRUE at a specified time and period.

Runtime

At a Glance…
- *Custom storage location*
- *Timed or event triggered*
- *Total runtime*
- *Number of starts*
- *Totalizer with custom increments*

An Event is an occurrence which is of some importance to your system, such as the filling of a container, or the completion of a process.

At a Glance…
- *Custom events*
- *Network configuration*
- *Time based or occurrence based*

Cicode

Many applications have special requirements. To provide you with maximum flexibility and power, CitectSCADA comes with two programming languages – Cicode and CitectSCADA VBA. Cicode is designed specifically for plant monitoring and control applications, while CitectSCADA VBA is better suited to interacting with third party objects and applications.

Cicode is easy to use and offers the flexibility, reliability and performance required by plant monitoring systems. Cicode is a programming language written for the control environment, it is also compiled and offers full multi-tasking. These important features provide CitectSCADA users with unmatched flexibility for extending the functionality of their SCADA/HMI systems without compromising system performance.

At a Glance…

- *Pre-emptive*
- *Multi-tasking*
- *Integrated seamlessly as part of CitectSCADA*
- *Compiled for optimal performance – not interpreted or scripted*
- *Extends the functionality of CitectSCADA*
- *Proven, robust language*
- *Over 650 SCADA functions included*

With Cicode and CitectSCADA VBA you have access to, and control of, all the elements in your runtime system: real time data, historical data, operator displays, alarms, reports, trends, security etc. These programming languages also give you access to your computer system, including the operating system and communication ports. The applications for Cicode and CitectSCADAVBA are wide, from simple numerical calculations to performing fuzzy logic for advanced control, or even creating an expert system.

Cicode is an advanced language that is similar to other high level languages like 'C'. CitectSCADAVBA is a 100% compatible with Microsoft Visual Basic for Applications (VBA). CitectSCADA has over 650 SCADA/HMI specific functions included, reducing the need for complex or extensive code.

Although Cicode is easy to use, it is not just a macro or script language. Cicode is a **multitasking language,** so you can run multiple instances of Cicode simultaneously. Being **pre-emptive,** CitectSCADA will temporarily suspend a less important Cicode task, to execute a more important one. Because Cicode is compiled, and not interpreted, it executes as part of the CitectSCADA system – but without interfering with the performance of the lower level CitectSCADA tasks.
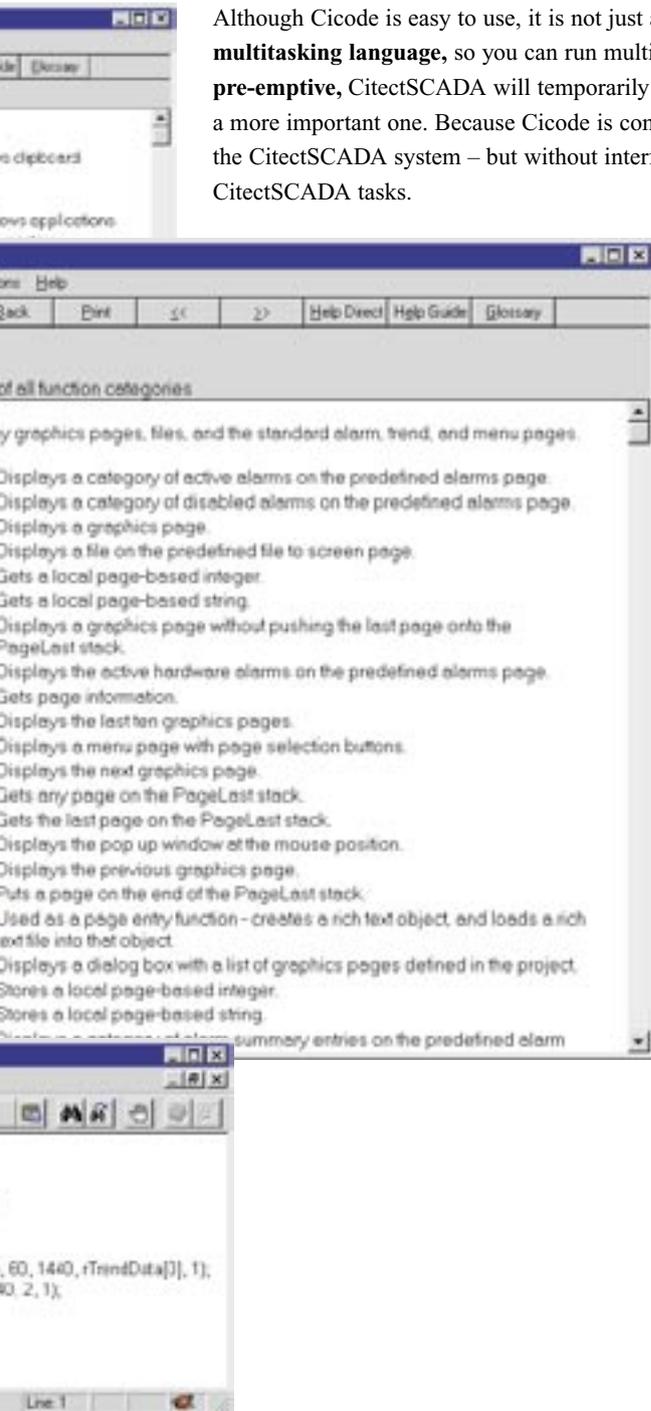
Because Cicode has high level functions for all common operations such as acknowledging an alarm or changing a page, there is **no need for low level programming.** All memory management and other 'nasty' stuff is handled by CitectSCADA, so you don't need to use 'pointers', or 'poke' things into memory.

CitectSCADA Explorer

CitectSCADA is conceptually divided into two distinct parts: The Runtime Environment, and the Configuration Environment. The Configuration Environment consists of a set of tools (applications) that are used to build the runtime system. It is centered around the CitectSCADA Explorer, which is used to create and manage projects.

CitectSCADA Explorer can be customized to suit special use and OEM appli-cations. Menus, toolbar buttons and features can be altered or removed.

Remote Configuration

You can make changes to the CitectSCADA project and graphics using standard modem connections and ISP's. If you will be making ongoing changes to graphics, you should use a high speed Internet connection.

Disorganized projects lead to maintenance problems. The CitectSCADA Explorer is the hub of the configuration process. It simplifies project management, allowing you to access and modify any part of any project.

Select the **Explorer Help** option to learn more about the CitectSCADA Explorer using the interactive click and learn facility.

Use the tool bar to switch to the other applications in the CitectSCADA Environment (Project Editor, Graphics Builder, Cicode Editor, Online Help).

The **File** menu contains commands for creating, removing, organizing, and running your projects. The global properties of a project are accessed through this menu.

The **Project List** area shows the file structure of your projects. Information is displayed in a folder tree arrangement, familiar to users of Windows 98 and 2000. Click on the + and – symbols to navigate through the tree. The information displayed in the Contents area changes as you move through the list.

Link or unlink to any existing CitectSCADA project on your network.

CitectSCADA provides one-step backup and
restore of all parts of a project. A project can be
backed up to floppy disk (with automatic multiple
disk span), your **local drive, or a network** drive.
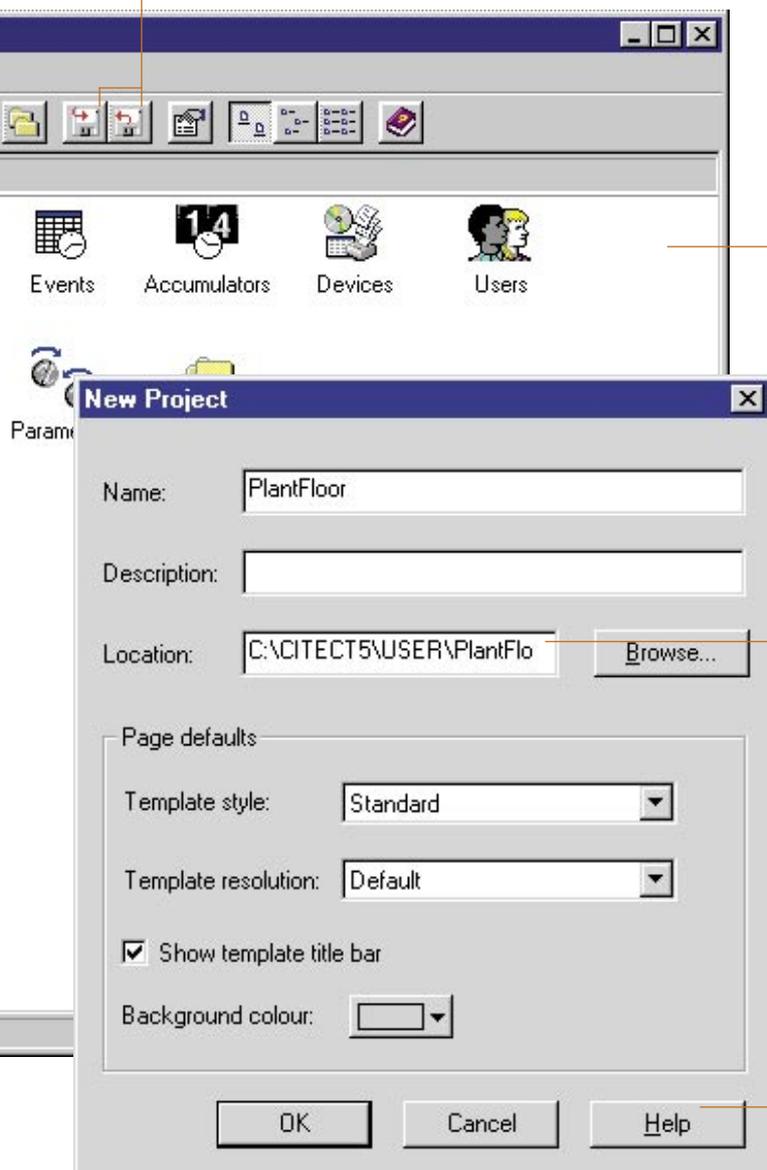
The **Contents area** of the
CitectSCADA Explorer tells
you what is contained within the
currently selected folder. Double
clicking on an item in this area
will automatically invoke the
appropriate editor.

When you create a project, you
do not need to specify a path.
CitectSCADA will create your
project in the default directory. If
you want your project to go in a
different location, however, you
can enter any local or network
drive. Throughout CitectSCADA
users can choose between drive
mapping as shown above or the
more portable UNC path definition.

All CitectSCADA forms and
dialogs have a Help button which
invokes context sensitive help.

Graphics Builder

The Graphics Builder allows you to quickly and easily design an intuitive operator interface for your CitectSCADA system.
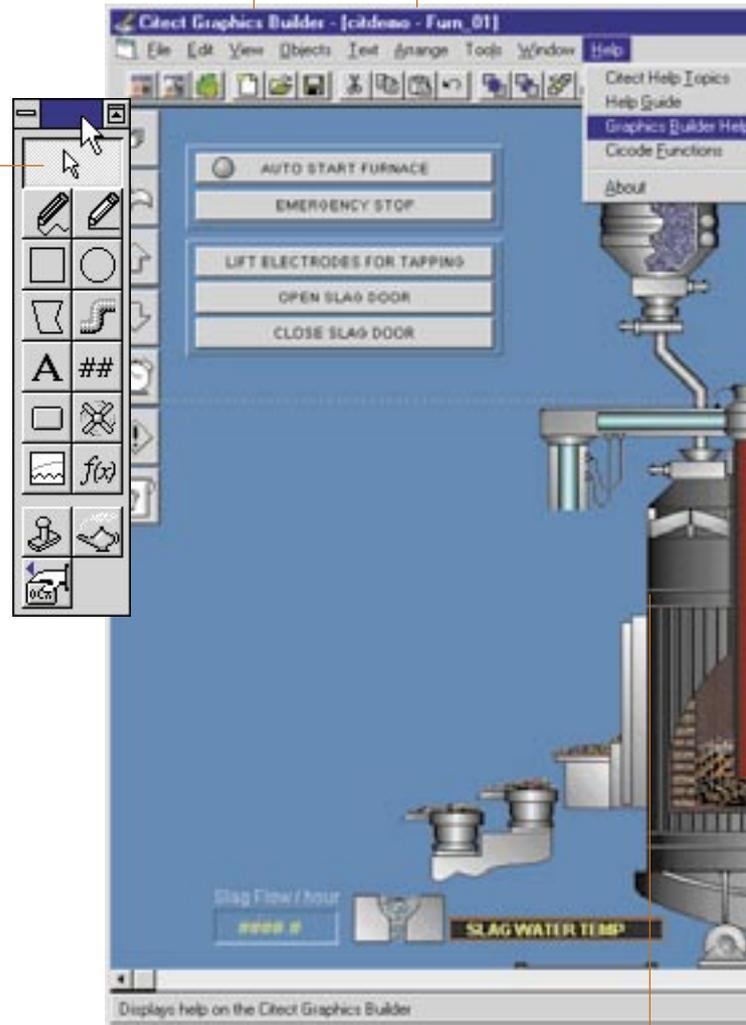
Because objects can be placed precisely using guidelines or the grid, your graphics pages will look professional and precise.

Objects can also be rotated, mirrored, grouped, ungrouped, aligned, etc.

The **Toolbox** has the drawing tools that you use to draw your graphics objects.

All the graphics tools have their own tool tips and each is fully explained in the Online Help.

The Toolbox can be moved to any part of your screen, allowing you to take full advantage of the entire drawing area. If the Toolbox is to go unused for a short period of time, you can "roll" it up (so that only its title bar displays), or actually hide it altogether.

Nodes of lines, polylines and pipes can be moved, added or deleted.*

*Version 5.30 onwards

Select the **Graphics Builder Help** option to learn more about the Graphics Builder using the interactive **click-and-learn** facility.
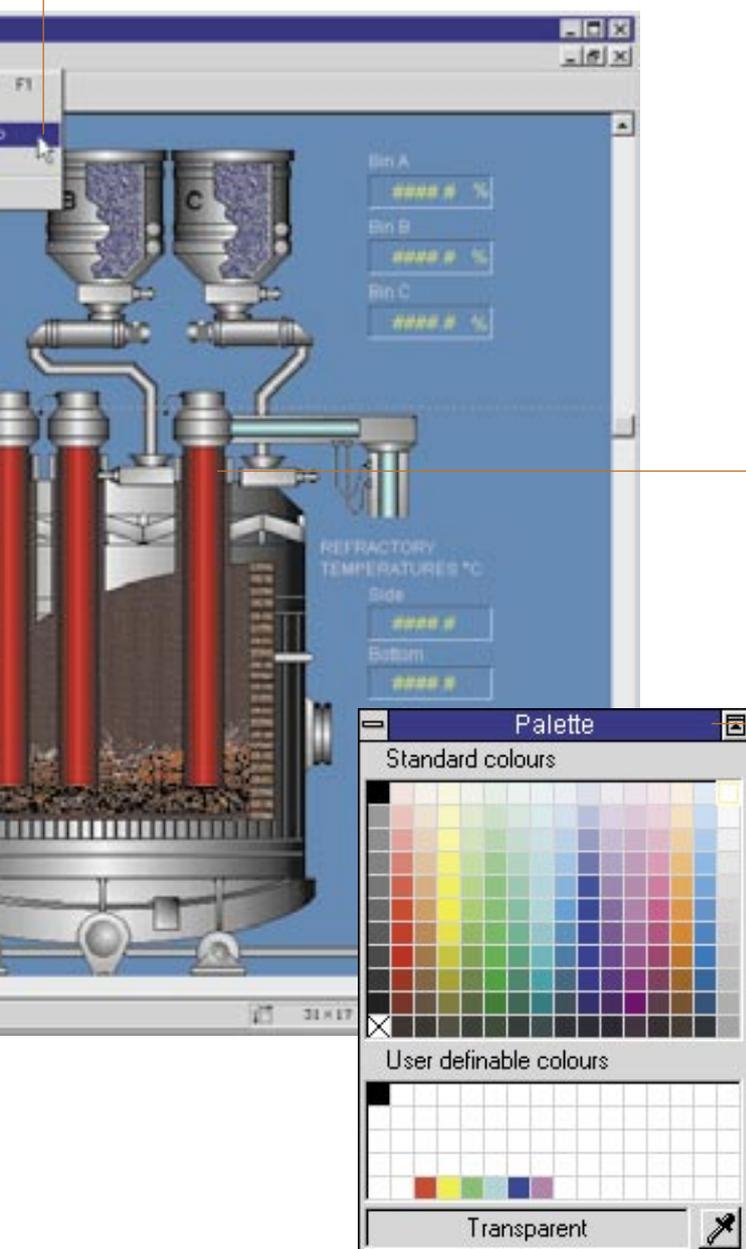
Objects can be locked onto a page so they cannot be accidentally moved or deleted.

The properties of any object are just a **double-click** away. The properties tabs are essentially the same for all objects.

To display the **palette,** click on the color swatch at the right-hand end of the Toolbar.

Debugging Cicode

The Cicode Editor is a fully functional debugger, able to analyze running Cicode/CitectSCADA VBA and find errors (Debugging can also be performed from a remote computer).

Breakpoints

To debug a function, you must first stop the code at a desirable point. The DebugBreak function, a manually inserted breakpoint, or a hardware error will halt a Cicode thread.

Stepping through Code

The position of a halted thread is marked with an arrow. You can step through the function, line by line, and watch what happens in the debug windows as the code executes.

The following tools are provided in the Cicode Editor to control stepping through functions:

- ☐ *Step Into;*
- ☐ *Step Over;*
- ☐ *Step Out; and*
- ☐ *Continue.*

Cicode/CitectSCADA VBA Editor/ Debugger

The Cicode Editor is a fully integrated programming environment, specifically designed for writing and debugging Cicode and CitectSCADA VBA.

Included in CitectSCADA's collection of **debug controls** are tools for starting and stopping debug mode, inserting and removing breakpoints, and stepping controls.

To learn more about the Cicode Editor use the interactive **click-and-learn** facility.

CitectSCADA provides help on all Cicode/ CitectSCADA VBA functions. As well as the normal Help menu options, you can display information on a function in the work area by right-clicking on it, and selecting Help.

The **work area** is where Cicode file windows are presented. You can have multiple Cicode files opened – from a number of different projects.

Each Cicode or CitectSCADA VBA file is a text document that you can type into directly.
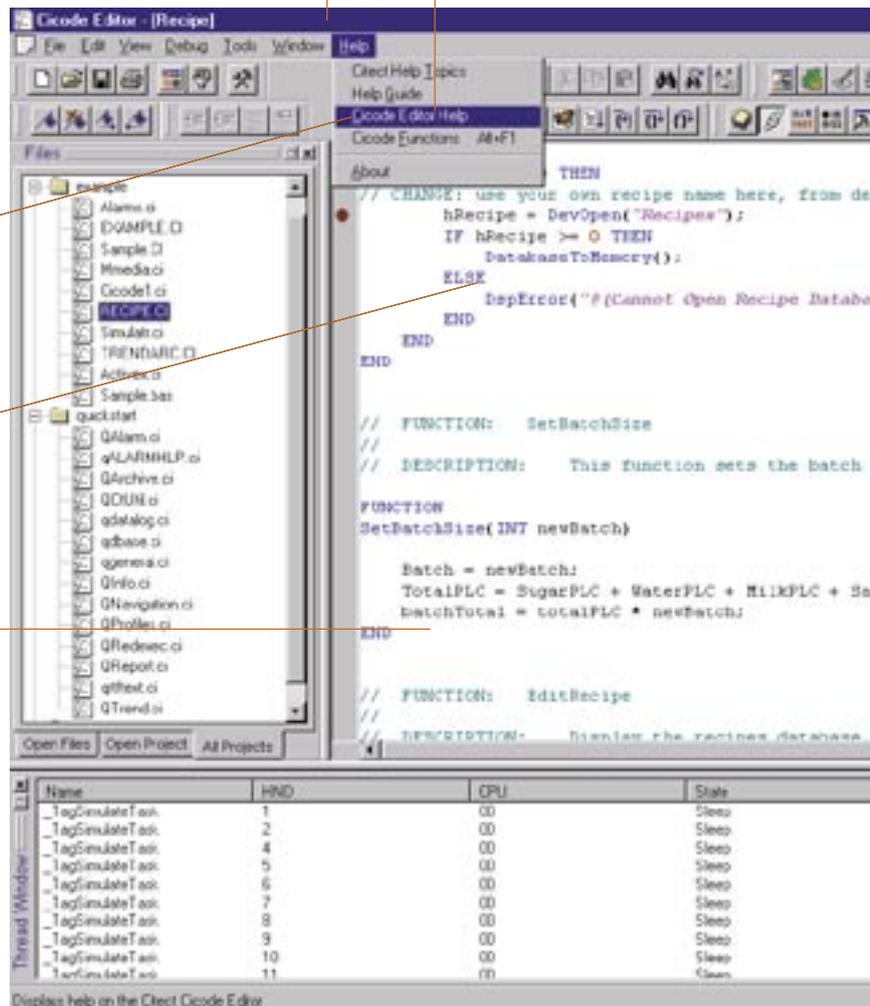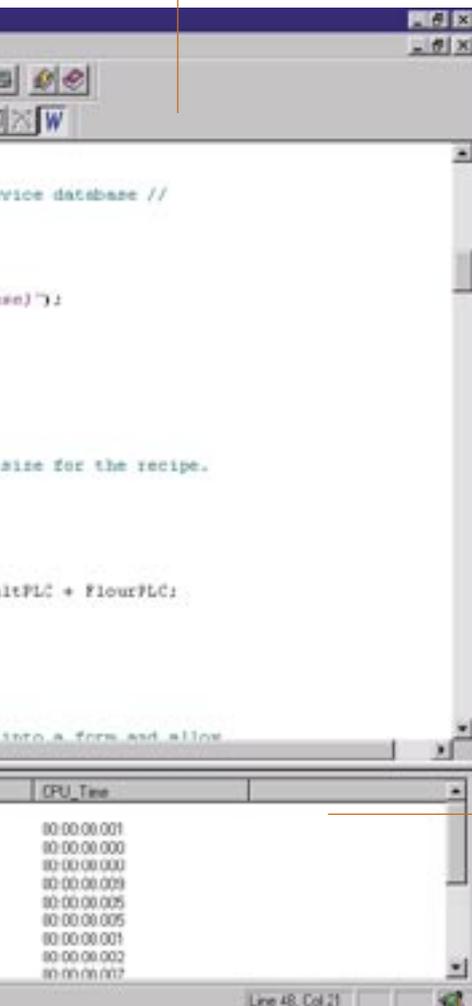
The Cicode Editor has a number of debug windows that you can use to display information about running Cicode:

□ *The **Stack Window** shows the stack values of the current thread. The stack consists of the functions called (including the arguments), any variables used in the functions, and return values.*

□ *The **Threads Window** lists all Cicode threads currently executing.*

□ *The **Breakpoint Window** shows the location of the breakpoints in all of the Cicode files you have opened.*

□ *The **Output Window** shows the informational messages sent by CitectSCADA during debugging.*

□ *The **Global Variable Window** shows you the current values of all global variables used so far in debugging.*

□ *No extra license fee required.*

If the project is not running when you switch the Editor to **Debug mode,** CitectSCADA will automatically compile and run it.

The Cicode Editor has a number of **debug windows** that you can use to display information about Cicode threads, functions, and variables. The window shown here is the **Thread Window.** It lists all Cicode/ CitectSCADA VBA threads currently executing.

The Cicode Editor Bug is red when editing and green when debugging.

CitectSCADA's Online Help is a comprehensive package in its own right. It contains all of the information found in the manuals – and more. It is accessible in a number of different ways, from any part of CitectSCADA.

All CitectSCADA dialogs have a Help button that invokes context sensitive help.

For more general information, you can use the Help menu. It gives you direct access to the Help Contents and the Help Guide, as well as application specific information, such as the click-and-learn facilities.

Of course, you can always just press the Help Topics button to the right of the toolbar, and display the Contents.

Citect Help Topics
Help Guide
Project Editor Help
Cicode Functions
About

Once the Help is open, you can perform index or keyword searches or browse the 'Help Direct' topics. No matter what kind of information you seek, the CitectSCADA Online Help provides the tools to find it.

Online Help

The Online Help caters to users of all levels of expertise. With over 4000 pages of information, the help is comprehensive, logically structured, easy to find, and easy to understand.

Contents and Index

The online **Help Contents** is structured like the printed manual.
To use the Contents, double click on a book, then on a topic title.
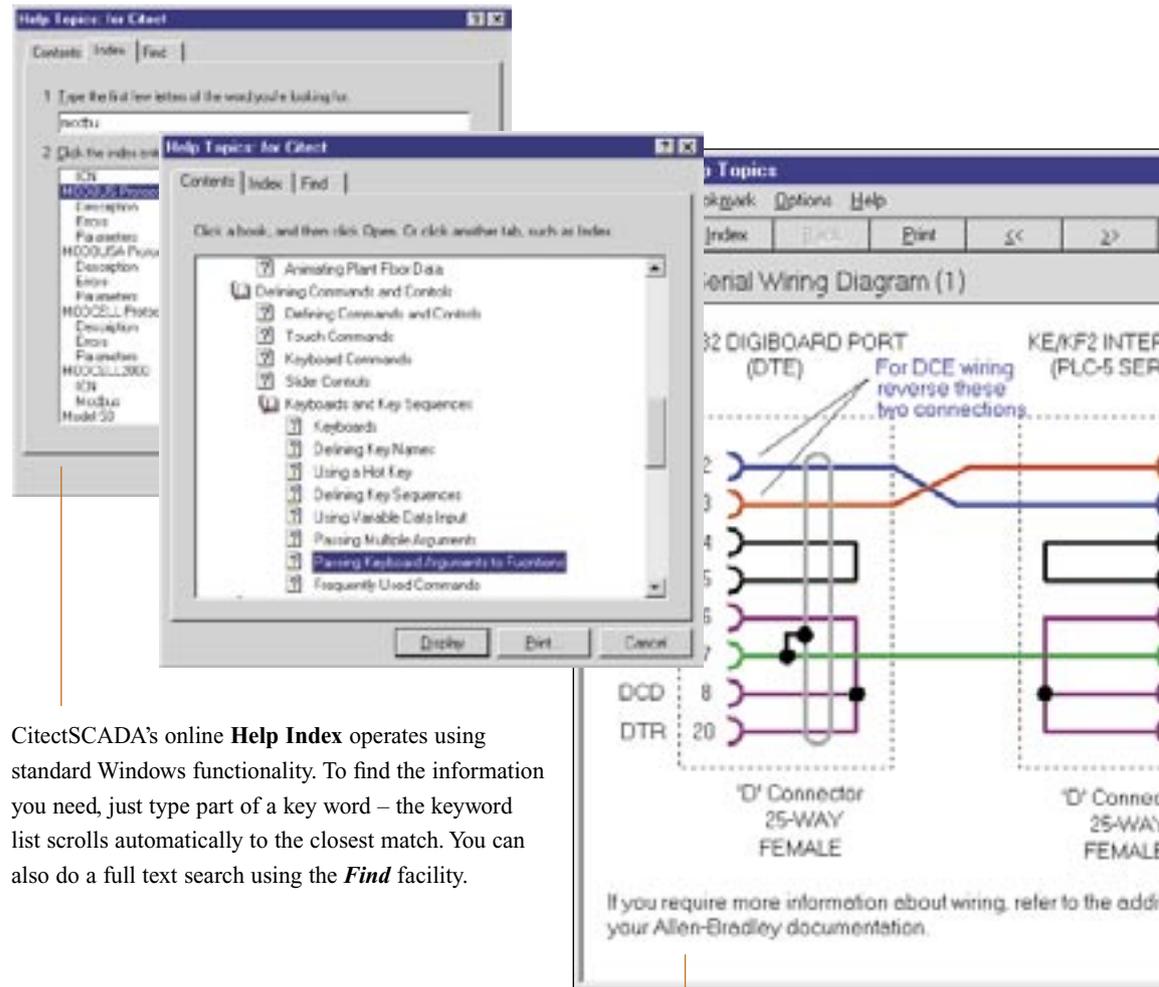
CitectSCADA's online **Help Index** operates using standard Windows functionality. To find the information you need, just type part of a key word – the keyword list scrolls automatically to the closest match. You can also do a full text search using the ***Find*** facility.

As well as supplying most popular I/O Device protocols, CitectSCADA comes with all the necessary **wiring diagrams,** to make communications setup as trouble-free as possible.

Help Topics

Finding your way through the Help is a simple task because each topic has a standard set of **navigation buttons.** You can jump to the Contents, the Index, the Help Guide, the Help Direct and the Glossary. You can also browse backwards and forwards through the topics – like pages in a book.
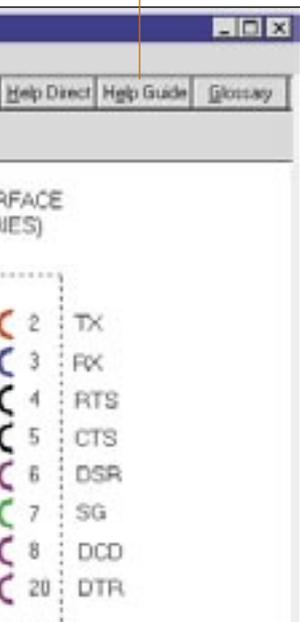
Help Guide

The CitectSCADA **Help Guide** gives you a user-friendly jump-start into the help. It provides simple subject area categorization to make finding the desired topic very easy.

Of course, users who are unfamiliar with online information can simply refer to the printed manuals. Between them, the User's Guide and the Cicode Reference manual contain the bulk of the information found in the Online Help, but they provide it in a more conventional book format.

The Online Help can be personalized by the addition of special notes (Annotations), and Bookmarks.

Help Direct

The Help Direct allows you to quickly display information on the **task of your choice.** This stay on top information can be displayed in any one of three formats:

☐ General topics in the main help window.

☐ Procedures in small stay-on-top windows which remain in the foreground of your screen at all times, even when you are actually configuring your project in CitectSCADA.

☐ A list of related commands. Click on any command in the list to display a full outline of its functionality.
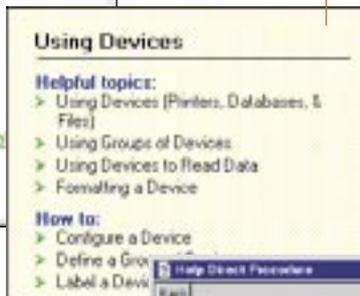
Example Project

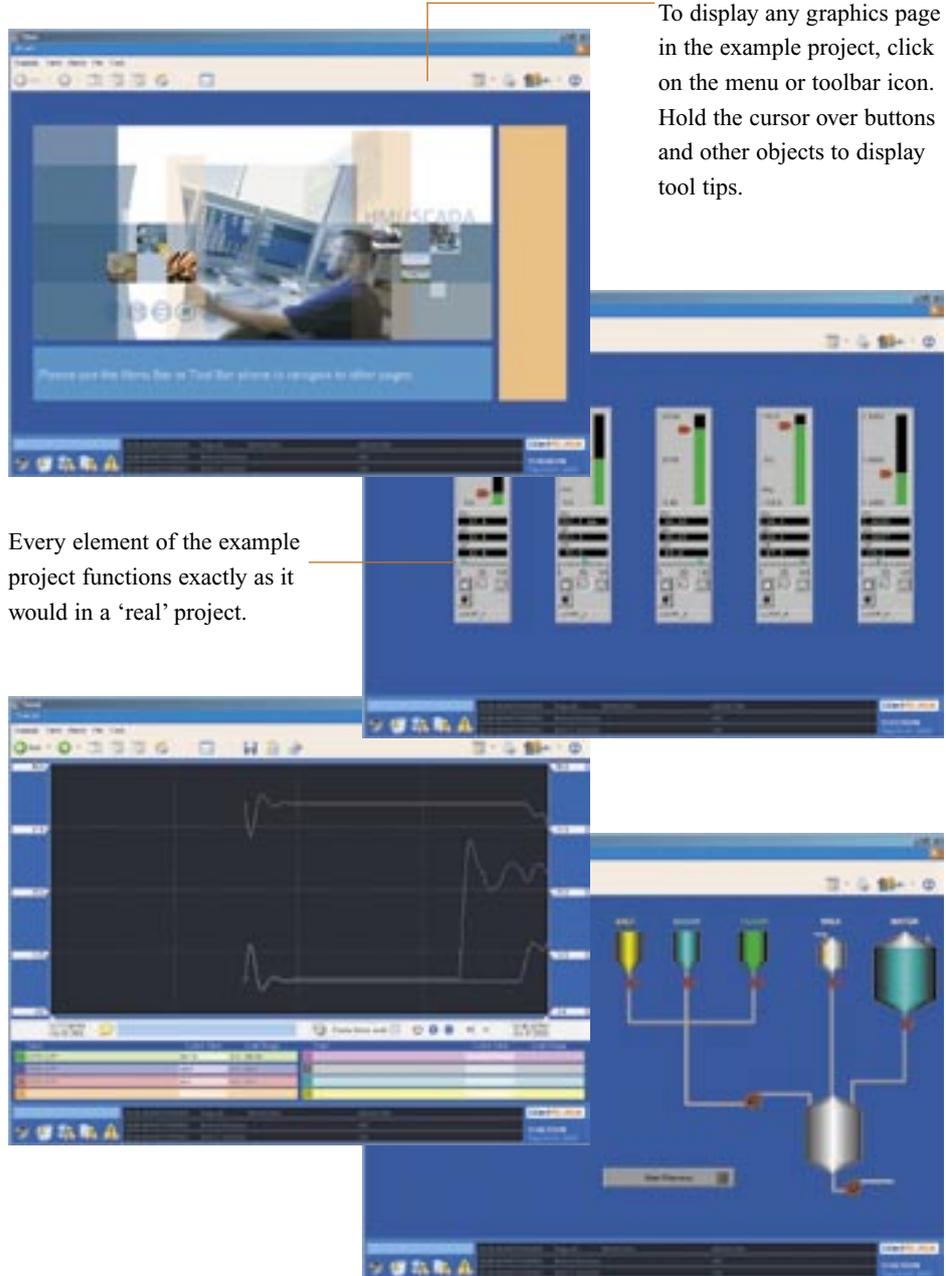*The Example Project is automatically installed when you install CitectSCADA.*

You can use the Example project when you want to experiment with something before including it in your own project. The test page is already set up to display directly from the menu page.

The Example Project is provided complete with the ability to switch on-line between the following languages:

- ☐ *Afrikaans*
- ☐ *Chinese*
- ☐ *English*
- ☐ *French*
- ☐ *German*
- ☐ *Norwegian*
- ☐ *Russian*
- ☐ *Spanish*
- ☐ *Swedish*

Two Example projects are supplied with CitectSCADA based on different templates. These are fully configured projects that are ready to run and can be used for ideas on how to configure your own project.

To display any graphics page in the example project, click on the menu or toolbar icon. Hold the cursor over buttons and other objects to display tool tips.

Every element of the example project functions exactly as it would in a 'real' project.

Computer Setup Wizard

The Computer Setup Wizard configures your computer to run with CitectSCADA. With just a couple of mouse-clicks, you can define exactly how a computer will function within your system.
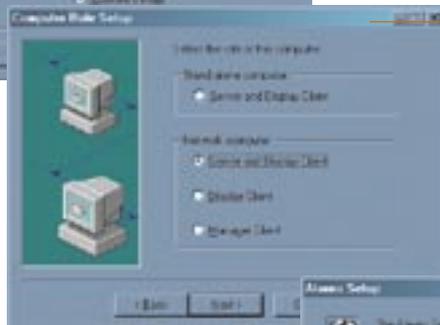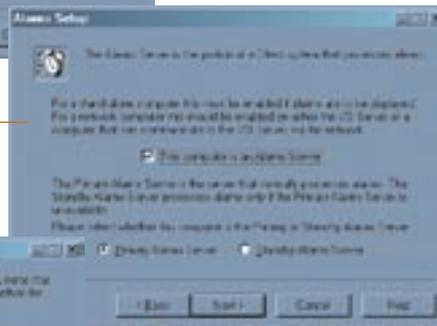
You can run the Wizard in Express mode for easier setup, or Custom mode for greater flexibility.

Use the Computer Setup Wizard to define what **role** your computer will play in your CitectSCADA system – Display Client only, Server and Display Client, or Manager Client.

Fully configure **sophisticated redundancy** in a matter of seconds.

Configure the **security** on your computer simply by selecting the features you want, from the list in the Wizard.

Of course, this is just a glimpse of the functionality of the Computer Setup Wizard. It also fast-tracks the setup of your servers (I/O, Reports, & Trends), your Network, and the synchronization of Time between your computers.

Each CitectSCADA computer has exactly the same software installed. The Computer Setup Wizard defines the tasks that will be used by each:

- ❑ *Define the computer's role (a server and client, just a client, or a Manager Client).*

- ❑ *Specify the project to be run on this computer.*

- ❑ *Define the computer as a primary or standby server.*

- ❑ *Specify what tasks to run (i.e. Display, I/O, Reports, Trends, Alarms).*

- ❑ *Select options that will affect how the application appears at runtime (title bars, menu options, application switching, screen saver etc.).*

*The Express
Communications Wizard
configures your I/O
Devices quickly and easily,
getting your system up
and running in less than
60 seconds.*

*All communication
protocols are included
with your CitectSCADA
package.*

At a Glance…

☐ *Full communication in
under 60 seconds.*

☐ *Quick switch between
actual I/O and
Memory or Disk I/O.*

I/O Device Communication

***CitectSCADA's I/O Device Communication wizard will have you
communicating in less than 60 seconds.***
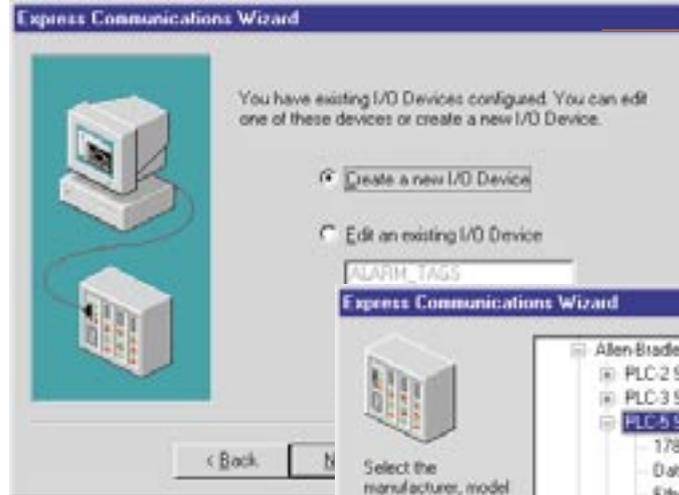
Select the type of I/O Device.
You can choose an External
I/O Device, a Memory I/O
Device or a Disk I/O Device.
You can also edit the name of
the I/O Device.

Select the manufacturer,
model, and communications
method specific to the I/O
Device.
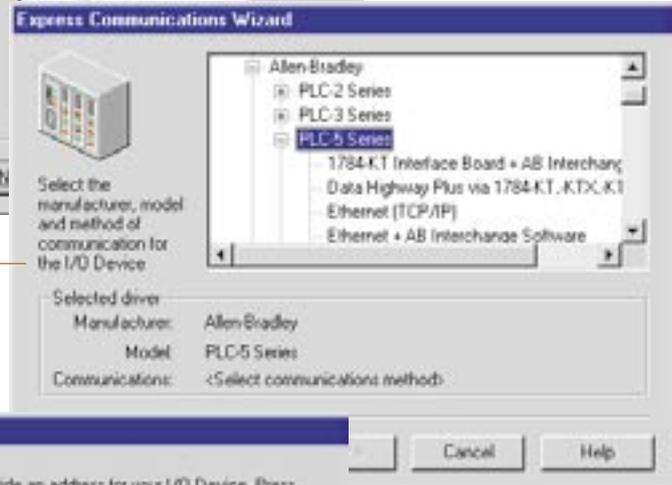
Enter the address
for the I/O Device.

It's that simple!

As you step through the
wizard, your choices
are displayed. Upon
completion, you can print
a summary screen with all
your setup details.

CitectSCADA allows you to develop and test your project without the need to physically
connect to the I/O Device. Simply define the I/O Device as Memory I/O (which is volatile) or
Disk I/O (which is non volatile) and CitectSCADA will behave as if it was communicating to a
real I/O Device. You can specify any protocol and CitectSCADA will use that device driver to
communicate, ensuring a very thorough test.

Using the Online Help, it's easy to find detailed help on both your I/O Devices and the protocols they use.

At a Glance…

☐ *Hardware setup details*

☐ *Wiring diagrams*

☐ *Communications information in Help Contents: TCP/IP and Serial*
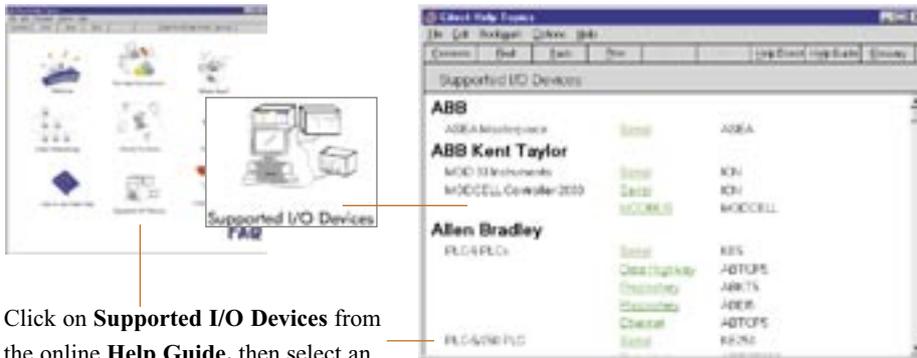
Click on **Supported I/O Devices** from the online **Help Guide,** then select an I/O Device type.

The online **Help Contents** is designed so that you can display help on an I/O Device, or on a Protocol.
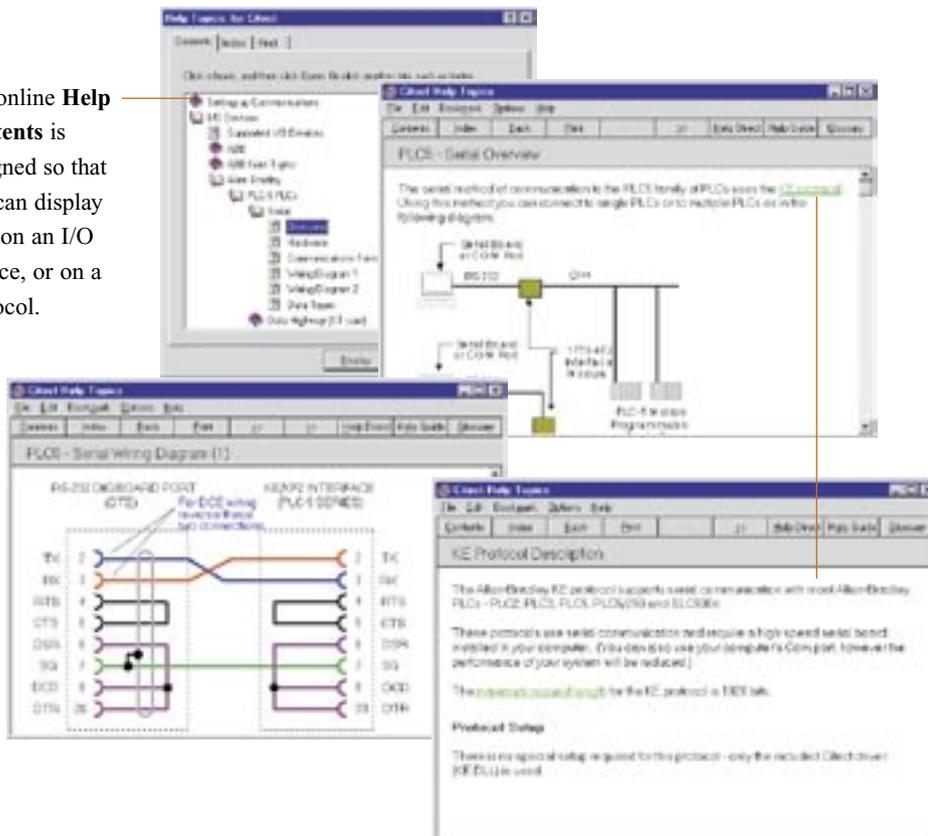
Page Templates

CitectSCADA provides templates for all common page types, so graphics pages are easy to create. Templates are tried and tested page designs, that you can adapt to your own environment.

CitectSCADA provides a comprehensive selection of templates, so there is one for every occasion. Specialty pages, such as Alarm, Trend, and SPC displays, come pre-built – all you have to do is add the relevant tag names etc. More unique pages can be based on generic templates, such as the Normal template. No matter what template you use, however, the basic elements (borders, status bars, navigation tools, etc.) are already configured.
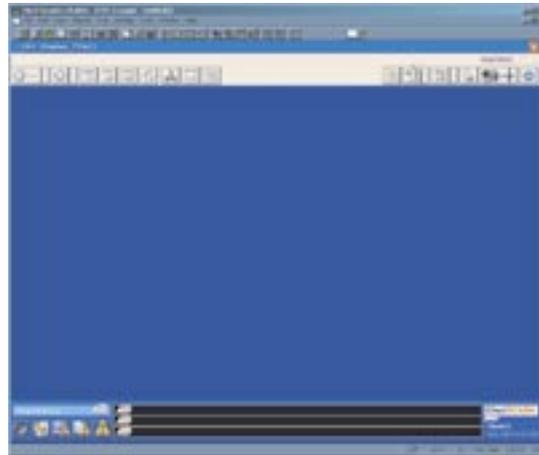
XP Style Template

The XP Style template was introduced with CitectSCADA v5.5. This template includes user defined menu structures, toolbars and native support for multi-monitor systems. The three most recent alarms are displayed on the bottom of each page.
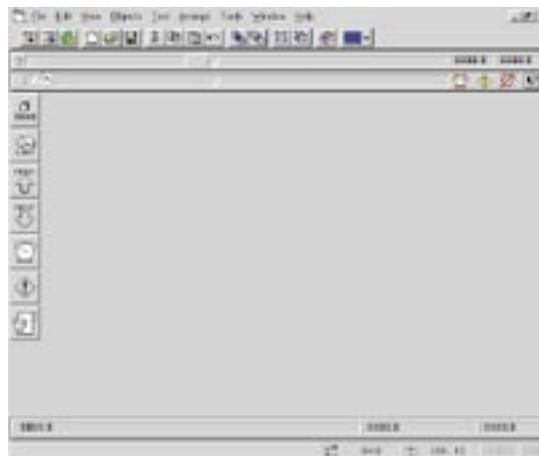
Normal Template

The Normal template is a **general purpose template.** Although it contains all the basic common elements (borders, navigation tools etc.), you would generally use it when you want to customize your own page. With its large drawing area, the normal template is ideal for plant layouts.
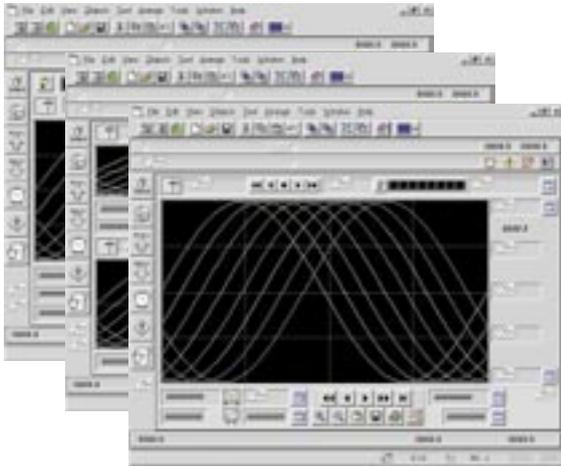
Trend Templates

Using trend templates, you can quickly configure trend graphs complete with navigation tools and dynamic plant floor readouts. CitectSCADA provides templates for:

□ Single Trends – one trend window with 8 pens;

□ Double Trends – two trend windows, with 8 pens each;

□ Popup Trends – trend displays in a smaller popup window;

□ Compare Trends – overlay two sections of the same trend pen another trend pen) and compare the difference; and

□ Zoom Trends – provide both a zoomed view and a complete view of a trend.
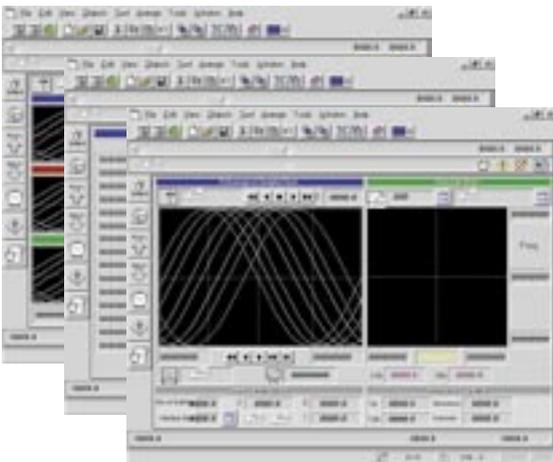
SPC Templates

Use SPC templates to configure mean, range, and standard deviation SPC (Statistical Process Control) charts. In addition to control charts with mean, range, and standard deviation windows, there are templates for process capability and Pareto charts.
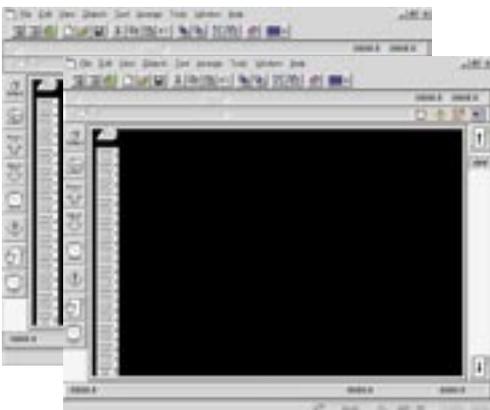
Alarms Templates

Use the alarms templates to create your alarm pages. The templates are set up to display alarm lists for configured alarms, hardware alarms, and an alarms summary.

You can create your own templates. If your project has pages that are similar, create a template that has all their common features. You can use an in-built template as a base for your template, or create your own template from a blank page.

If you want to display the status of groups of plant floor devices, base your page on the Group Status template. It comes with a ready-made table which clearly shows the status of each device, and provides pre-drawn control buttons.

RAD Graphics

Drawing the graphical elements of your graphics pages couldn't be simpler – just select a tool, then click and drag. Once drawn, objects can be moved, reshaped, copied, pasted, aligned, grouped, rotated…

The **Select** tool allows you to select objects on the graphics page by clicking on them with the left mouse button.

Draw a **line** just as you would with pen on paper. The line follows the movement of the mouse pointer.

Draw **rectangles** and **squares.**

Draw **multi-sided** shapes.

Type **text** at any point on the page.

Add a standard Windows-type **button** to the page, which executes a command when pressed at runtime.

Add a **trend** to the page, with up to 8 pens configured.

Paste a **symbol** onto the page. A symbol is a ready-drawn object, saved in a library.

Insert an ActiveX* object into the page. ActiveX properties can be linked to CitectSCADA Tags with a couple of mouse clicks.

*Version 5.30 onwards

Draw a **straight line.** The line will begin when you first press the left mouse button, and end when you release it. Lines can be constrained using the Ctrl key.

Draw **ellipses** and **circles.**

Draw **three dimensional pipes,** as simply as you would draw a line.

Represent a tag or expression as a **number.**

Use different symbols to represent different states, or define **real animations,** such as a moving auger.

Add a **Cicode command** to the page. The command is executed continually at runtime, whenever the page is displayed.

Paste a **Genie** onto the page.
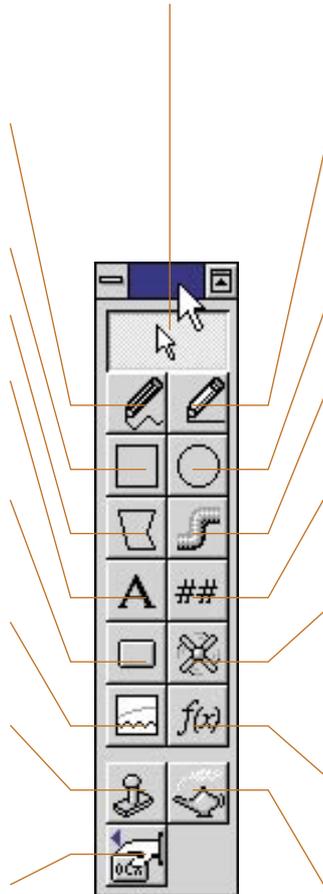
CitectSCADA's graphics tools are easy to identify and simple to use, and they all have their own tool tips.

Thanks to CitectSCADA's RAD Graphics, your graphics pages can contain text, simple shapes, and complex symbols that can all change automatically in response to changing runtime conditions.

Because all CitectSCADA's graphics objects are configured using **a standard set of properties,** the learning curve for new users is drastically reduced. Once you know how to define one object, you know how to define them all.

The Appearance tab defines the **static appearance** of the object, such as its line style and shadowing etc. You can also specify whether the object will be invisible to the operator (e.g. when DIGITAL_TAG is OFF).

Objects can be dynamically **moved, resized (scaled), and color-filled** at runtime, depending on the state of a tag, or the return of an expression.

You can set up your object so that a command is executed when an **operator clicks** on it at runtime, or you can assign it a keyboard command.
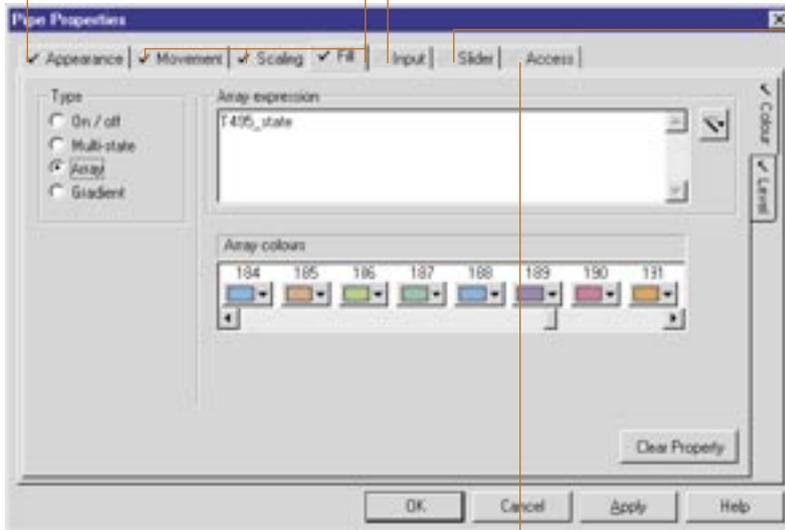
Objects can be used as **sliders.** When the operator moves the object (click and drag), the value of a variable will change.

You can **secure your objects** so that only specific operators can use them. For instance, you may not want all operators to be able to use your sliders, but you may still want them to be visible at all times.

Objects can also be disabled automatically under certain runtime conditions. You can choose to emboss, grey or hide disabled objects.

*You only need to draw
an object once. You can
then save it to a library
(as a symbol), and use the
symbol many times on any
of your graphics pages.*

*When you change a
symbol, all occurrences
of the symbol are updated
automatically – on all
pages. (A symbol remains
linked to its library unless
you deliberately cut
the link).*

*By storing common
objects in a library, you
reduce the amount of
disk space required to
store your project, and
reduce the amount of
memory required by the
runtime system.*

At a Glance…

☐ *Pre-defined and
Custom libraries*

☐ *Ongoing library
development*

☐ *Changes to library
updated automatically
on all pages*

☐ *Over 500 symbols
included*

☐ *Hundreds more
symbols available from
our web site.*

Symbols

***If you often use a particular graphic, you can store it in a library – as a
symbol. Then, rather than constantly redrawing the graphic, you can just
paste the symbol, providing consistency for developer and user alike.***

For example, if you need the **same tank
graphic** on **multiple pages** (as a static
background picture):

Draw the tank, and copy it to the symbol
library (it is now a symbol)…

Paste the symbol
anywhere – on any
page – at the press
of a button…

(Of course, if the
symbol already exists
in a pre-defined
library, there's no
need to re-draw it
– just paste it straight
from the library).
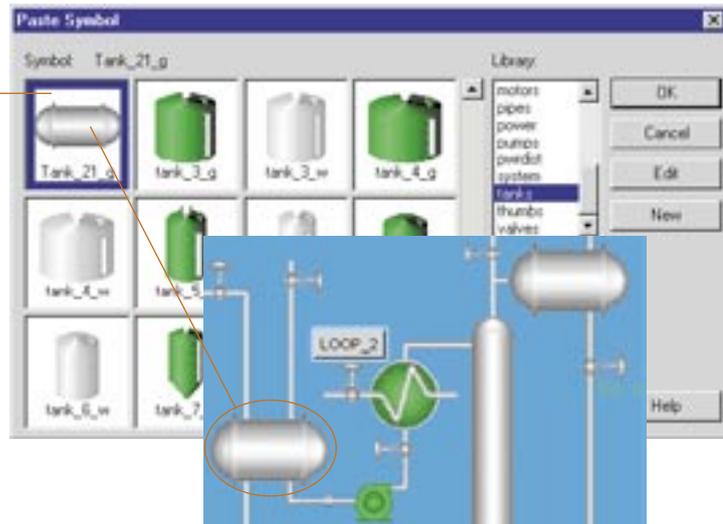
Symbols can also be used for **display graphics that change dynamically** (based on the state of
a device). For example, you could assign two pump symbols to a device…

one to display when the device is on: **and one when it is off:**

CitectSCADA comes with several **predefined symbol libraries**, and more libraries are
available from the CitectSCADA Toolbox, website and Bulletin Boards. Also supplied
standard with CitectSCADA are a range of pre-defined symbol sets which can be used as **real
animations.** When the individual symbols in the set are displayed in quick succession, a simple
animation is formed. Animations can be used at runtime to indicate moving equipment, active
processes etc.

Genies

If you have several devices of the same type, configuration of display graphics can be fast-tracked using Genies.

For devices of the same type (e.g. centrifugal pumps, displacement pumps, etc.), display graphics will behave in much the same way. Using Genies, you only have to configure common behavior once. The graphics can then be saved as a Genie and pasted once for each device. The only information you'll be prompted for each time is that which is unique to the device (variable tags etc.).

For example, all the centrifugal pumps in your system might require the same display graphics – a pump graphic, a button, a manual/auto status indicator, and an RPM readout. Instead of repeatedly drawing and configuring this group of graphics (once for each pump), you would configure it once and save it as a Genie. As a Genie, it can be pasted anywhere, and all you have to enter each time is the relevant device tag.

Super Genies

Individual pages (popup controllers, loop tune pages, etc.) are often used to control and monitor devices. By saving a page as a Super Genie, you can re-use it for all devices of the same type – and you don't have to re-configure it for each one.

Super Genies would, for instance, be used to configure a single page that can be used to control all devices that have the same functionality. If the control requirements are almost identical, you can just draw a single popup controller, configure the common information, and save it as a Super Genie. The runtime command that calls the controller specifies the device to be controlled, so a single controller can be used any number of times.

For example, you only need to configure a single popup to control all your centrifugal pumps…

Common Tag Database

By importing tags directly from PLC programming packages, CitectSCADA makes it easier to configure new systems. Drivers for several popular programming packages are included with CitectSCADA and others can be created.

Tag Import/Export

The tag import/export feature saves valuable configuration time because a group of tag definitions can be imported in one simple operation. Equally important is the elimination of typographical errors associated with transferring tag definitions. It is quick, convenient and accurate!

Current CitectSCADA drivers serve OPC Servers, Allen Bradley RS Logix, Schneider Concept, Mitsubishi MXChange and CSV (Microsoft Excel).

The import tags utility is accessed from the Tools menu in the CitectSCADA Explorer

Automatic Tag Synchronization

The automatic tag synchronization feature ensures that changes made to controller tag definitions at the PLC level are automatically updated in CitectSCADA. By permanently linking CitectSCADA tags to the PLC programming package, changes made at the controller are automatically updated in CitectSCADA.

To protect data integrity, the synchronization process is triggered on actions in CitectSCADA – such as "Insert Tag". These triggers cause CitectSCADA to check the controllers to see if changes have been made, and if needed, will update CitectSCADA's tag database.

To prevent changes being made in CitectSCADA and then overwritten on the next update, tags that are automatically refreshed have several fields set to read-only. For example, data fields are set to read-only while other fields, such as engineering units and display formats are defined in CitectSCADA. By modifying the ASCII format file for each tag import driver, users can define which fields are read-only.

ActiveX™ Extensions

CitectSCADA is an ActiveX* container allowing users to embed third party functionality like batch view clients, movies, C++, and Visual Basic interfaces.
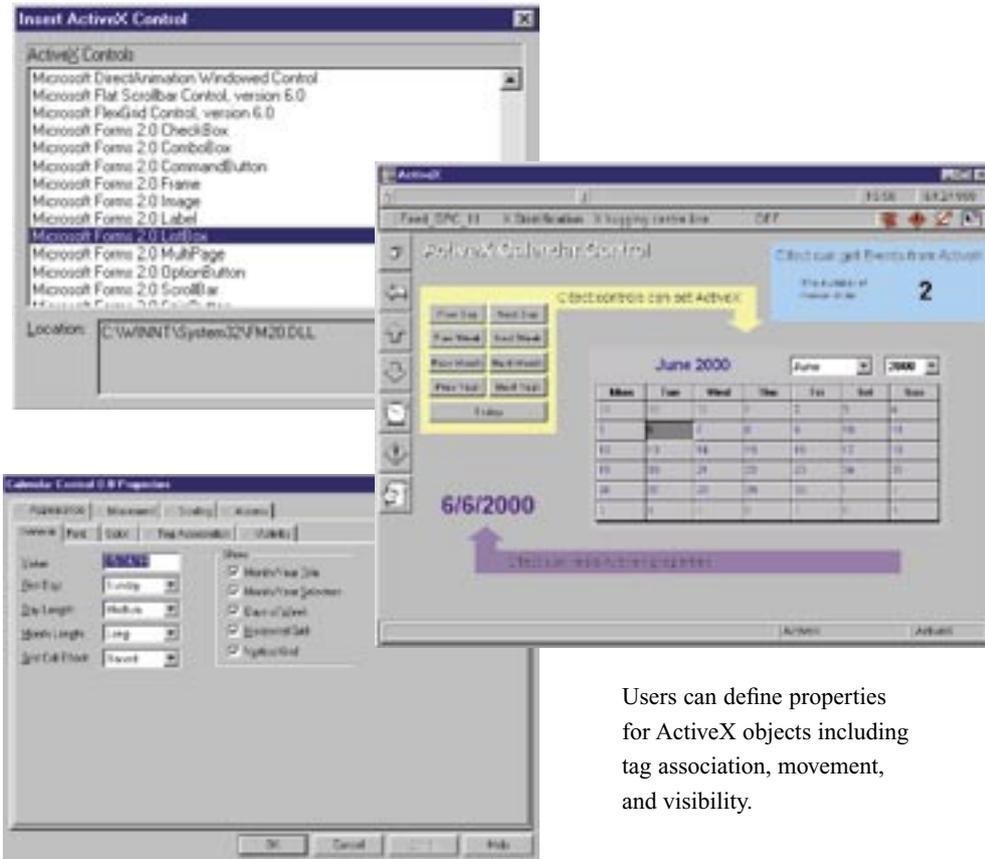
Users can define properties for ActiveX objects including tag association, movement, and visibility.

CitectSCADA uses ActiveX container technology to extend system functionality by allowing "objects" such as documents, videos, and analysis applications to be directly embedded. These objects, which include a range of applications, from custom to third party programs, can then be triggered according to selected events or dates.

ActiveX can be used to add custom features such as calendar controls, recipe managers, training programs, schedules, maintenance facilities, and videos. ActiveX associations and properties are configurable from the menu or toolbox in the Graphics Builder.

ActiveX objects are exceptionally flexible. Events can be triggered either by the object or CitectSCADA, and can be used by both. Objects may also run in the background and can be used without being embedded in a graphics page. For example, an ActiveX object can be used to continuously perform calculations regardless of what page is open. CitectSCADA and other objects can then use the result.

Data can also be exchanged with ActiveX objects using OPC, CitectSCADA API, and DDE.

At a Glance…

- ☐ *Easy transportation of project*
- ☐ *Very simple to use*
- ☐ *Automatic disk spanning*
- ☐ *Any media*
- ☐ *Automatic compression*

Project Backup & Restore

Backing up your project ensures that you do not lose any valuable data if the hard disk on your computer becomes damaged. CitectSCADA lets you back up a project to a local (floppy disk, hard drive) or network location, and restore it to any location, at any time.

You can use **data compression** when you are backing up a project, to preserve space on your floppy disk.

CitectSCADA can backup all data in any **sub-directories.**

You can **overwrite** the currently selected project, or you can add a completely **new project.**

If you restore over the current project, you can delete its contents first. This ensures that no residual files are left behind to interfere with the restored project.

If security is important, you can backup your project in an **encrypted** format. If you choose this option, CitectSCADA displays a dialog box requesting a password – before the project is backed up.

CitectSCADA writes the project to disk in a format that encodes the password, to ensure that the project is protected. The project can only be restored when the password is used.
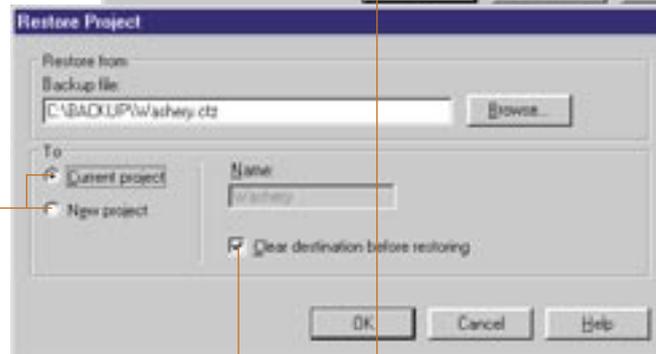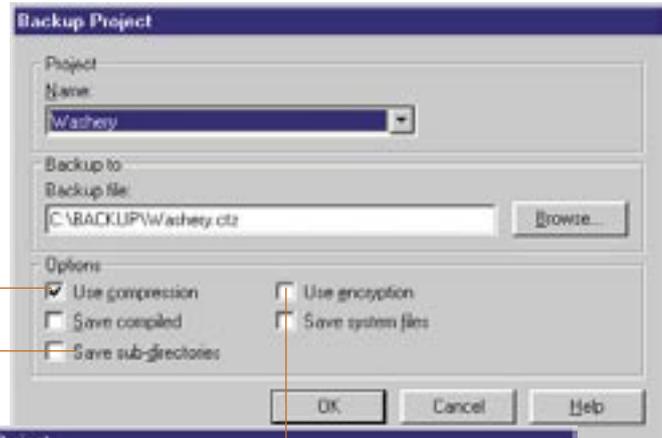
Localized Projects

CitectSCADA allows you to configure your project in your native language, and display it in any language at runtime.

Runtime text such as alarm descriptions, button text, keyboard/alarm logs, graphic text, Cicode strings etc. can be **configured in one language, and displayed in another**. For example, if your native language is English, you could enter an alarm description in English when you configure the project, but display it in the Chinese or German equivalent (or any other language) at runtime.

During project development, any text which is to be changed to another language at runtime must be marked with a language change indicator. When the project is run, any **native text will be automatically replaced** with the equivalent local text.

Language changes use a language database, which has a field for native text, and a field for the translated local text.

The database is created when the project is compiled. The Native text is automatically entered, and the local language field is left empty, ready for you to enter the translations, simply by using a database editor, such as Microsoft Excel.
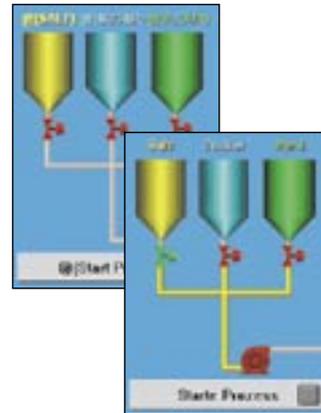
Localized CitectSCADA

The CitectSCADA configuration environment, On-line Help, and runtime environment are available in several local languages. In order to maintain a high level of quality, all local language translations are developed by the Citect team. English, Chinese, German, French, Japanese, Korean and Spanish versions are available.

German

French

Citect Customer Service

Citect aims to deliver superior service to our customers. Although CitectSCADA is extremely robust, we recognize that industrial automation environments are complex and that operational difficulties will occur. Citect has developed Customer Service systems designed, firstly, to eliminate potential difficulties and, secondly, to quickly resolve challenges that arise.

To ensure a successful installation and start-up of your CitectSCADA system, new system orders automatically come with a three month membership to Citect's premium Gold Membership program. When your three months free membership expires you will have two alternatives; you may purchase extended gold membership, or you may purchase updates and customer service as required.

A global strategy ensures CitectSCADA customers are serviced and supported in a variety of ways, not just by a help desk. The customer services offered by Citect include:

Pending final

October 2003 Batch 1
For Windows® 98
and Windows NT®/2000/XP

English, German, French v5.5r0,
Chinese v5.42, Japanese v5.41r0,
Korean and Spanish v5.31r0

CitectSCADA
Product Software

CitectSCADA is a registered trademark of Citect Pty Ltd.
© Copyright 2003, Citect Pty Ltd.
All rights reserved. Made in Australia.

Free CitectSCADA Software Updates

All Gold members will be entitled to the most recent updates. Upon a new release or update, Gold members will be automatically notified and, upon request, will receive a free copy of the latest release.

Customers benefit by using the latest version of CitectSCADA… it's always the best version. We are constantly striving to improve our product, to deliver more functionality, to improve performance and to make the software easier to use. During any two-year period, we release an average of four updates that result in measurable improvements to performance and functionality.

Phone, fax and email support

Your CitectSCADA vendor has been trained to be your primary contact for support and can be reached by phone, fax and email. Our technical support personnel have strong networking, communication, and application expertise relating to the configuration and operation of CitectSCADA. They have been trained to answer your questions and to provide useful advice for maximizing the benefits of CitectSCADA.

Citect maintains a worldwide-integrated support database to track and evaluate customer support issues. A full history of past and current issues related to each system is available to each technical support person to ensure customer calls are handled promptly and efficiently.

24 Hour Emergency Support Available

In partnership with our alliance of Vendors and Integrators, Citect offers 24 x 7 day Emergency Support for your mission-critical systems and provides a range of custom services covering hardware, software, network and application processes. These services are delivered to help ensure maximum system uptime. Please contact your local reseller for detailed information.

Knowledge Base

The CitectSCADA Knowledge Base is regularly updated to provide users with current and detailed support information. Originally intended to assist developers of complex systems, the Knowledge Base is now a supplement to the CitectSCADA Online Help and printed manuals. The Knowledge Base has become a useful tool for all users.

The Knowledge Base is available to Gold and Silver members and can be conveniently accessed from a private section of our website.

Toolbox

The CitectSCADA Toolbox contains many useful CitectSCADA and Windows utilities to assist you in configuring and operating your system. For easy access, it is available on our website.

Service and Driver Packs

The latest Service Packs are available to all customers by downloading from our website. Driver Packs are also available to Gold members via the website, www.citect.com/driverweb.

User list

The User List is a popular email forum for users to share solutions and learn from other members of the CitectSCADA community.

Newsletters

MyCitect News is available to all Citect customers and includes information on the industry, new services, product updates and technical hints.

Training Courses

The following courses are available Basic Configuration, Advanced Features, SPC (Statistical Process Control) and Cicode. Custom courses and on-site training are also available. Please refer to the training schedules posted on our website, www.CitectSCADA.com or contact your local vendor to select a course that is convenient for you.

Citect Plant2Business Solutions

Further extend your CitectSCADA system with Citect Plant2Business Solutions by allowing plant floor data to be accessed from anywhere, anytime in the enterprise, allowing business managers to make mission critical decisions based on timely, accurate, and relevant information.

Integrating plant and business information has never been easier. Plant information ranging from equipment statistics to plant performance criteria, production results to stock inventories and usages can now be viewed and analyzed quickly and effectively without disrupting plant operation.

Citect Plant2Business Server Manager

Citect Plant2Business is a gateway based on open, standard technologies and provides a flexible, easy to use solution that gathers data from your plant control system and makes it available to Citect Plant2Business clients either directly or via a database. Supported databases include SQL Server, Oracle and a native data store.

Citect Plant2Business benefits all users throughout the enterprise by providing them with the tools to quickly and effectively analyze plant data. A range of pre-built templates is available in both Excel and Crystal Reports to get you up and running fast.

Plant2NET

Using Plant2NET you can visualize and analyze plant information from your control systems over the intranet/Internet with simply a browser such as Internet Explorer.

By utilizing a range of pre-configured formats, Plant2NET allows users to configure their favorite views of plant floor data, including snapshots, alarms and time series data.
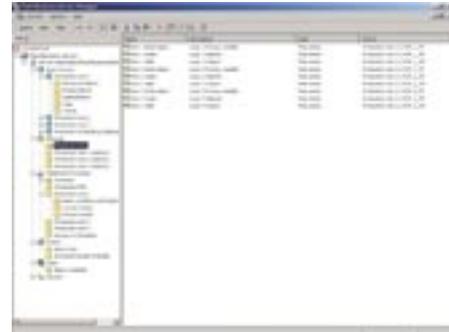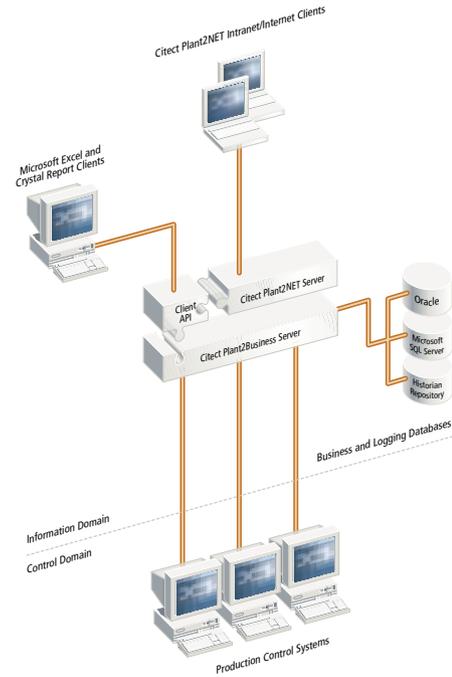
Top to bottom: Citect Plant2Business system components; The Citect Plant2Business Server; and a typical Plant2Net mix-line screen.

Software Licensing

Every CitectSCADA package you buy has all the features and protocols/device drivers included. CitectSCADA's no-nonsense licensing scheme allows you to choose an appropriate package to match your system, providing you with maximum value for money.

CitectSCADA's licensing is based on the number of computers that will be **running CitectSCADA at once,** not the number of computers with CitectSCADA installed. So, if CitectSCADA is installed on 100 computers, but no more than 15 run it any one time, you only need 15 licenses.

The price of each license is determined by a number of factors:

Point Count and Limit

A point is an individual digital or integer variable, read from an I/O Device. **CitectSCADA only counts points from the I/O Device** no matter how many times they are used**.** You get memory, disk, and Cicode variables free of charge.
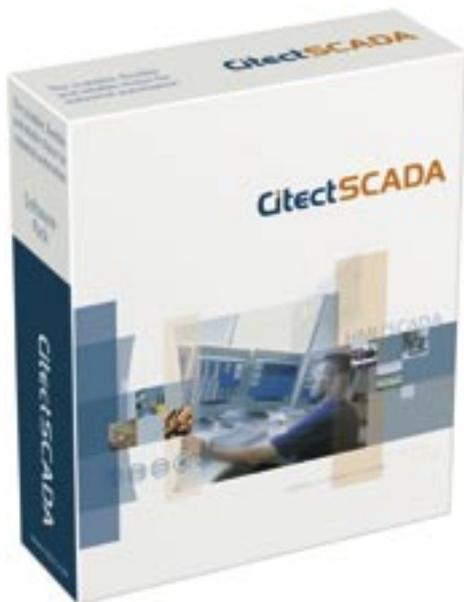
The point limit is the maximum number of I/O Device addresses that can be read. CitectSCADA caters for any point limit – 75, 150, 500, …, 150 000, …, unlimited.

Computer Role

In networked applications, not all CitectSCADA tasks are used on each computer. Since you shouldn't have to pay for what you don't use, you have the option to purchase **display and manager client licenses instead of a full license.** A computer with a Display Client license is able to perform all operator interface functions, and exchange data with servers, but it cannot be a CitectSCADA server. A computer with a manager client license provides read only displays – perfect for just monitoring a process.

Single vs Multi-User

CitectSCADA licenses can be supplied as **single user or multi-user.** Multi-user licenses allow anyone on the LAN or WAN to run a session of CitectSCADA. This means you can use any PC to run CitectSCADA without having to install a software or hardware protection key on every PC. It also means you can access any information from any computer.

CitectSCADA Features

Architecture
- True client/server architecture
- Centralized I/O, alarm, report and trend processing
- Add nodes without re-engineering
- Unlimited size single database
- Reference sites with over 450,000 tags in a single system

Performance
- Maintains performance regardless of size
- 100,000 integer/sec update from I/O device [1]
- Low network load regardless of size
- Dynamic optimization with all drivers
- Low CPU requirements
- Data read on demand

Networking
- Quadruple network support
- Redundant network support
- Supports WAN, PSTN dial-out, RAS
- Internet ready without modification
- No protection key required on dial-in PC
- Internet Display and Manager Clients for remote access

I/O Communication
- Dial-out I/O communications for remote devices
- All drivers included at no extra cost
- Set up I/O device communications within 60 sec
- 256 Serial ports on a single server
- 4095 I/O devices per I/O server
- 255 concurrent protocols per I/O server
- Definable comm break indication
- All serial drivers operate on: RS232, RS485, TCP/IP, Arcnet and RS422

Redundancy
- Built-in Primary and Standby functionality
- LAN redundancy
- Alarm server redundancy
- Trend server redundancy
- Report server redundancy
- I/O server redundancy
- Automatic change over

- Automatic trend history synchronization
- Automatic alarm table synchronization
- Time Server Redundancy

Variable Tags
- Max 80 character tagnames (standard is 32 characters)
- Supports unlimited number of tags

Graphics
- 4096 x 4096 pixel resolution
- Screens resizable at runtime
- Dual monitor support
- RAD graphics
- Synchronized flashing colors
- Page update selectable from 10ms
- 256 User colors definable from a palette of 16.8 Million colors
- 3D pipe tool
- 3D effects on objects
- ActiveX Objects
- Multiple animations on the same object
- Animate a sequence of symbols
- Unlimited graphic displays
- 32,000 animations per page
- Imports directly:
  Windows Bitmap (BMP, RLE, DIB)
  AutoCad (DXF)
  Encapsulated Postscript (EPS)
  Fax Image (FAX)
  Ventura (IMG)
  JPEG (JPG, JIF, JFF, JGE)
  Photo CD (PCD)
  Paintbrush (PCX)
  Portable Network Graphic (PNG)
  Targa (TGA)
  Tagged Image Format (TIF)
  Window Meta File (WMF)
  Wordperfect (WPG)
- Automatic dithering on import
- Transparent color support
- Comm break indication on all objects

Symbol Libraries
- User configurable symbol libraries
- Transportable libraries between projects
- Automatic page update if library changed
- Libraries have animation properties

- Over 500 symbols supplied
- 3rd party symbol libraries available

General
- Year 2000 compliant
- Long filename support*
- Automatic time synchronization of all nodes
- 3,000 operator commands
- Windows 98/NT look and feel
- International date formats
- 12hr and 24hr clock
- Definable decimal separator

Template Libraries
- User configurable template libraries
- Templates can be saved as styles
- Templates transportable between projects
- Automatic page update if template changed
- Templates have animation properties
- Over 70 page templates supplied

Data Exchange
Supports: SQL client, SQL server, ODBC Server and Client, DDE, MAPI, Email, HTML, DLL, CitectSCADA API, Windows API, Native dBASE, ASCII files, TCP/IP, Serial, OLE DB, OPC Server and Client

Close integration with: AdvaBatch, Beckhoff, FuzzyTech, Gello, OpenBatch, OpenControl, Paradym, Sixtrak, Steeplechase, UNAC, VMIC, High-Level Language (Cicode)
- True pre-emptive and multitasking
- Up to 512 concurrent threads
- More than 600 SCADA functions provided
- Libraries for user-written functions
- Capable of more than 2,700 user functions
- Local, module & global variables
- No additional software required to write own functions
- Direct access to trend data, report values and alarm details

Editor with:
  Runtime breakpoints
  Variable watch
  thread monitoring
  colorcoding*
  breakpoints window

Single stepping

Current line indication

Remote debugging (NT only)

Automatic debug on error

Multi-Language Support

- No extra configuration for multiple languages
- Seamless change between languages at runtime
- View old reports in any language
- View alarms in any language
- Switch between single-byte and double-byte languages (e.g. Italian <-> Chinese)

Alarms

- Unlimited number of alarms
- Centralized processing of alarms

Alarms can be defined as:

Digital

Analog

Timestamped

High level expression

Multi-Digital

- On-line change of language for all alarms
- Network acknowledge without configuration
- Network disable without configuration
- Category, area and priority of alarms
- Alarm Delay
- 1ms precision of time stamped alarms
- Variable data in alarm messages
- Acknowledge individually or in group
- Acknowledge based on category or priority
- Acknowledge graphically, in alarm list or through Cicode

Trending

- Unlimited number of trends
- 16,000 trends per page
- Display any historical trend in less than 1 sec
- Control of trend file sizes
- View archived trends transparently in the running trend system
- Resolution user selectable from 1ms [2]
- Compare trends

SPC

- Cp & CpK Charts
- X, R & S Charts
- Pareto Charts
- Adjustable subgroup size & limits
- Alarms on the following Above UCL, Below LCL, Outside CL, Down Trend, Up Trend, Erratic, Gradual Down, Gradual Up, Mixture, Outside WL, Freak, Stratification and High Level expression

Reports

- Native report editor, WYSIWYN reports, Rich Text reports

Triggered by: Time Schedule, External Event, High Level Expression, Operator Input

Output to: Printer, File, Email, Screen, HTML

Security

- Based on individual users as well as groups of users
- 250 simultaneous logged in users
- Unlimited number of user names definable
- Definable area & privilege profile per user name

Security level can control:

Visibility of objects

Access to graphic displays

Acknowledge of alarms

Running of reports

System utilities

Configuration

- Tag import/export supported with 3rd party packages
- Automatic tag synchronization
- Concurrent configuration by multiple engineers
- Single command backup/restore
- Simulation of I/O device's with single switch between real and virtual I/O devices
- Supports non-standard industrial keyboards
- Unlimited UNDO (graphics builder)
- Automatic documentation of configuration

Licensing

- Free development license
- Free runtime testing (includes I/O comms.)
- Same installation on every PC
- Only based on physical points
- Unlimited internal tags, includes derived, memory, disk and Cicode tags [3]
- Hardware and software key available
- All tools included
- All drivers included

Support Tools

- Keyless upgrade utility
- On line protocol analyzer
- On line command execution
- On line NetBIOS analyzer
- Kernel window with more than 300 pages of system information
- Open sessions between CitectSCADA computers
- Knowledge Base
- Internet website
- Sample projects

Support via: Telephone, Fax, Email, World wide distributor network

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1 Measured by an independent 3rd party, results dependent on I/O device type.

2 Precision depends on I/O device type, CPU, amount of memory etc...

3 Internal tags are free if source of data is internal

* Version 5.30 onwards.

Glossary of Terms

ActiveX©

is a label for a broad family of Microsoft Component Object Model (COM) technologies that is used to extend an application's functionality. ActiveX controls, or objects, are self-sufficient programs that can be shared by larger programs, or applications, which are generally referred to as containers. ActiveX objects range from downloadable animations and buttons on websites to calendar and calculator functions in application programs.

Objects must first be installed into Windows and entered into the registry. Once installed, the ActiveX object can be used by any ActiveX container application resident on the PC. Each time the object is used, a different "instance" of that object is loaded into memory. This way several instances of the same object can be operating concurrently, behaving differently and independently.

API

Application Program Interface. Provides 'hooks' into a program via a DLL interface, allowing third party developers to create extensions.

Client

The end user of the service/data provided by the server.

Client-Server

The underlying philosophy of centralized processing. In multiple computer systems it can be more efficient for only one computer (the server) to perform certain operations. When another computer requires the data, no processing or synchronization is required, the data is merely requested from the server.

COM

Component Object Model, is a family of Microsoft specifications and software that produces platform independent, object-oriented and scalable components. It is the "glue" that integrates the operating environment with plant applications and supports the inter-operability of applications, devices and systems. COM compliant interfaces are built into applications and "glued" together using the COM services and the Windows infrastructure.

Configuration

(environment) When you are designing and creating (configuring) your Runtime CitectSCADA application.

DCS

Distributed Control System. A global hardware and software solution to the requirements of a control system, usually provided by one manufacturer.

FDDI

Fibre Distributed Data Interface. A fiber-optic communication architecture/technology providing very fast data transfer even over large distances, and inherent redundancy capabilities.

File Server

Controls network file usage, providing a central location for shared information.

HMI

Human-Machine Interface. The interface between the operator and the process machinery – CitectSCADA performs this role.

I/O Device

Refers to any control or monitoring hardware that conveys information to or from CitectSCADA – PLC's, RTUs, microcontrollers, loop controllers, DCS elements, weighers, bar code readers etc.

IPX/SPX

InterPacket eXchange/Sequential Packet eXchange. Networking protocol used for some LAN operating systems.

ISDN

Integrated Services Digital Network. A digital based communication technology supporting both voice and data.

LAN

Local Area Network. A data communication system which is typically confined to a few kilometers radius, and supports transfer rates up to about 100 Mbps.

NetBEUI

NetBios Extended User Interface. A Microsoft implementation extending NetBIOS.

NetBIOS

NETwork Basic Input Output System. A fundamental instruction set providing network access.

Object

Objects are the basic building blocks of a graphics page. They are drawn using the toolbar, and can be moved, resized, re-shaped, and copied after they are drawn. Most objects possess a number of properties which allow them to change dynamically under user-definable runtime conditions. This means that they can provide animated display of conditions within the plant. You can even use an object as a slider to change conditions.

ODBC

Open DataBase Connectivity. A Microsoft standard designed for relational database interfacing. See SQL.

OEM

Original Equipment Manufacturer. Builds and supplies the production equipment used in a variety of industrial applications. Control products (like CitectSCADA) are often included as part of the package.

OLE DB

Superceding ODBC as Microsoft's universal data access method. It allows users to view data from a wide range of devices, databases, Web data sources, applications and relational mainframes as if the data resided at a single source. It is the infrastructure component that ensures complete access to system data by all "clients".

PLC

Programmable Logic Controller. Dedicated control equipment with hardware and software specifically designed for reliability, speed, and simplicity.

Project

The elements of a CitectSCADA monitoring and control system, such as graphics pages, objects, etc. These elements are stored in files of various types, for example, graphics files for graphics pages, databases for configuration records, etc.

Protocol

The rules that govern communications between two or more devices. Usually covers data format, control signals, message structures, and timing.

RAD Graphics

CitectSCADA's RAD (Rapid Application Development) Graphics are based on a simple set of objects, namely rectangles, ellipses, bitmaps, straight lines, freelines, polylines, text, symbols, and pipes. Associated with all these objects is a common set of object properties. These properties allow an object's behavior to be directly linked to plant variables.

RAS

Remote Access Service. Allows remote connection to a network operating system like Novell Netware or Microsoft Windows Networks.

RDBMS

Relational DataBase Management System. A standard designed to control interfacing with rigid relational database structures.

RTU

Remote Terminal Unit. A control or data collection unit situated remotely to the main control and monitoring system.

Runtime (environment)

When your custom made CitectSCADA application is running – controlling and supervising your processes and machinery.

SCADA

Supervisory Control And Data Acquisition. A system with a primary function of collecting information (data) and providing an interface to control specific equipment (PLCs, RTUs etc.)

Server

The centralized processor, designed to provide service for the clients.

SQL

Structured Query Language. A standard language that can be applied to query and update data sources that support the ODBC standard.

Symbol

An object that has been stored in a library. A Symbol can be pasted onto any graphics page. This means you only need to draw the object once. When you change a symbol (in the library), it automatically changes on all pages throughout the project.

TCP/IP

Transmission Control Protocol/Internet Protocol. A protocol suite which has been widely adopted for a number of applications, including the Internet and PLC communications.

WAN

Wide Area Network. A data communication system where the distance between units is considerable (i.e. greater than 10km). Typically uses ISDN or similar technologies and have much slower communication speeds than a LAN.

Wizard

Guides you through the more complex steps of an operation. For each step just specify what you would like to do, and the Wizard will do it for you.

WYSIWYG

What You See Is What You Get.

Supported I/O Devices

ABB
- C110 (Advant Controller 110)
- AC160 (Advant Controller 160)
- AC31 (Advant Controller 31)
- AC410 (Advant Controller 410)
- AC450 (Advant Controller 450)
- AC70 (Advant Controller 70)
- Commander 100/150/ 200/300
- INSUM
- Masterpiece
- MOD 30DCS
- Procontic CS31 Series
- T200 Series PLCs

ABB Instrumentation
- "Controller, Controller XL, Recorder & Math Unit"
- MODCELL 2000

Action Controls
- Kingfisher RTU's Series 1
- Kingfisher RTU's Series 2

Advantech
- Adam 4000 Series
- Adam 5000 Series
- PCL-752 Intelligent System Monitoring Card

Alfa Laval Automation
- SattCon05
- SattCon15
- SattCon200
- SattCon31
- SattCon35

Alsthom
- K-Series HV Protection Relays

Allen-Bradley
- ControlLogix
- DeviceNet
- MicroLogix 1000
- PLC2
- PLC3
- PLC5

- PLC5/250
- SLC500

Ampcontrol
- Minescan RTU

April
- A2000/5000/7000
- PB200/400
- PB80

B&R
- B&R PLCs

Baker Hughes
- EXS-1000 RTU

Beckhoff
- TwinCAT

Bosch
- RK512/3964R capable devices

Bristol Babcock
- 3300 Series RTUs

Cegelec
- Alspa 8035
- Alspa 8075Contrec Systems

CJ International
- ISAGraf

Clipsal Integrated Systems
- C-Bus

Contrect Systems
- 405B, 405D

Control Microsystems Inc.
- TeleSAFE

Control Techniques
- Mentor II

Data Electronics
- 50, 500, 600

Detroit Diesel Corporation
- DDEC III ECM

Eberle
- 508, 509 PLCs
- 511S, 514S PLCs

Echelon
- LON Devices

Elpro Technologies
- Radio Telemetry Units

Elsag Bailey
- CIC01
- CIC03
- INFI90
- Network 90 (N CIU02/ 03/04)

Email
- FEP (Microtranll and VART)

Emerson
- DX Servo Controllers

Enraf
- 811, 854, 872, 873
- CIU Prime & CIU Plus

Eurotherm International
- T100 Series
- TCS6000 Series

Fischer & Porter
- Micro DCI 53MC1000
- Micro DCI 53MC2000
- Micro DCI 53MC5000
- Micro DCI 53MC6000

Fisher and Paykel
- PSC-3

Fisher Controls
- ROC 364 devices

Fluke
- Fluke Helios I

Foxboro
- 731/760/761/762 Loop Controllers
- I/A Series

Fuji Electric
- Flex PC-NB, NJ Series
- Micrex-F Series PLCs

Gantner
- ISM Series

GE
- Multilin

GE Fanuc
- 9030 Series PLCs
- 9070 Series PLCs
- Series Six PLCs

GEC
- GEM80 PLCs

GEC Alsthom
- K-Series HV Protection Relays

Harris Controls
- D20 RTU
- Harris 6000 RTUs

Hewlett Packard
- HP3852A

Hitachi
- H20, H200, H250, H252, H300, H700 series PLCs

Honeywell
- 620 Series PLCs
- TDC2000
- TDC3000
- UDC3000 Series

HWT (formerly Hunter Watertech)
- PDS Compact 500 Telemetry Processor
- PDS RTU Manager
- PDS500 Telemetry Processor

Hyundai heavy Industries
- ICM

ICON Control Systems
- StarGate System 7
- Clean Room Monioring

Idec Izumi
- Izumi FA Series PLCs
- Micro 3 PLC

Innotech
- Genesis II DDC (Direct Digital Controller)

Intelligent Instrumentation
- Field Devices

Intuitive Technology
- @aGlance/IT_Server

Johnson Controls
- DC9100

Kaye Instruments
- RP-3G,RP-4H

Keyence
- KV-300

Klockner Moeller
- 316 Series
- 416 Series
- PS316, Sucos PS 32

Leeds & Northrup
- Micromax 1
- Micromax 2

LG Industrial systems
- Glofa
- Master-K Series (500 and 1000)

Matsushita
- FP Series PLCs

Mauell
- ME30

Measurex
- MXopen Servers

Microwave Networks
- Radio Modems

Mindata
- MD3500 Data Logger

Mitsubishi
- Melsec Fx Series PLCs
- Melsec-A Series PLCs
- Melsec-AnA Series PLCs
- Melsec Q Series

Moore Industries
- I/O express Data Collection Units

Moore Products
- 351&352 Controllers 383 Multipoint Display
- APACS

Motorola
- MDLC Gateway
- Moscad

MTL Instruments
- MTL8000 Series

National Instruments
- Data Acquisition H/W
- FieldPoint distributed I/O

Nematron
- Open Control PLC

Omnitronics
- Omnitronics RTUs

Omron
- All Omron PLCs
- CV Series PLCs
- DeviceNet products

Opto 22
- Mistic

- Optomux I/O Controllers

Philmac
- Philmac Irrigation Controller

Phoenix Contact
- Interbus S compatible devices
- Remote Field Controller (RFC)

PLC Direct (Koyo)
- DL105 Series PLCs
- DL205 Series PLCs
- DL305 Series PLCs
- DL405 Series PLCs
- SU-6B

Reliance Electric
- All Reliance PLCs
- Automax DCS

Rosemount
- EC 300 Controller

RTP
- RTP2x00

SAAB
- SAAB Radar tank level gauge

SAIA
- PCD2, PCD4, PCD6

Samsung
- Fara PLC
- Hibrain PLC

Schneider Automation (Modicon)
- 484, 584, 884, 984 PLCs
- TSX Quantum

Schneider Automation (Square D)
- Entire SY/MAX range
- Model 450 & 650 ranges
- Model 50 PLCs

Schneider Automation (Telemecanique)
- All (including TSX Series)
- Ethway devices
- TSX Micro
- TSX Nano
- TSX Premium

Siemens
- S5-95U, 115U

- S5-135U, S5-155U
- S5-90U, 100U, 102U, 103U PLCs
- S7-200, 300, 400 series
- Simatic PM500 PLCs
- Simatic TI305 PLC
- TI545/555/575 PLCs
- TI520/530 PLCs

SIXNET
- Ethernet Gateways
- EtherTRAK I/O
- Remote TRAK I/O
- Sixnet I/O
- SixTRAK I/O
- SixTRAK Gateways
- VersaTRAK RTU

Softing GMBH
- 4Control

Sprecher & Schuh
- 390, 490, 590, 690 series PLCs

SS Technologies
- 5136 SD Card

Steeplechase
- Visual Logic Controller (VLC)

TANO Automation
- TN-1000, TN-1001

Telefrang
- Telefrang

Teleperm
- AS220, 230, 231, 235, 448

Toshiba
- DPCS, PCS, OIS, SIS all models
- EX100 PLCs
- EX2000 PLCs
- EX250 PLCs
- EX500 PLCs
- MCS1000, MCS1200
- ONS
- T1, T2, T3
- Tosdic 200 DCS

Transmitton
- Telemetry Control Systems

Triconex Corporation
- Triconex via 4119 Module
- Triplex

Unidata
- Data logger 6003, 6004-1, 6004-2, 6004-3, 7000

Weidmuller
- Weidmuller 810977 CPU

Westinghouse
- PLC1500 PC1200

Woojin
- Pymax

Yokogawa
- 3880 Hybrid Recorder
- 4082 Hybrid Recorder
- Centum CS
- Centum XL
- Micro XL

Zworld
- ZWorld MicroG controller

The Supported I/O Devices listed are valid at the time of printing, for an updated list please contact your CitectSCADA distributor.

Industry Standard Protocols

Profibus FMS (CP5412A2 + Siemens s/w)

SNMP

BACNET

Profibus FMS (CP5412A2 + Softing s/w)

Profibus DP (Softing PROFIboard)

OPC Client

Modbus RTU (slave)

Modbus RTU

Modbus ASCII

DNP3.0

DF1 (Half-Duplex)

"Bar code readers, etc."

Profibus FMS (Softing ProfiBoard)

Citect