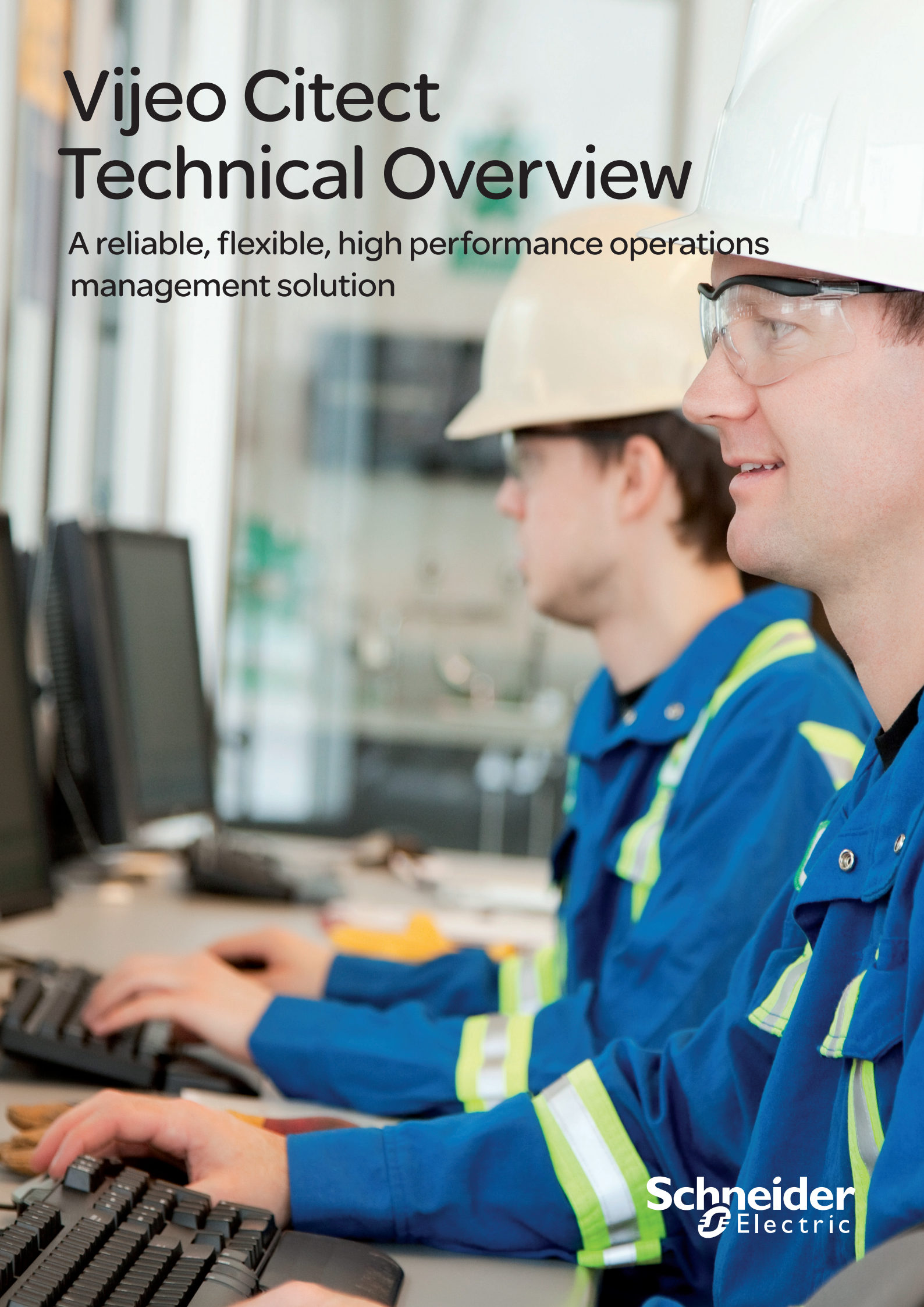


Vijeo Citect Technical Overview

A reliable, flexible, high performance operations
management solution



Schneider
Electric

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At Schneider Electric we understand that companies need to implement strategies to optimize processes and reduce operating costs. For example, Vijeo Citect allows you to integrate automation & control with energy monitoring to optimize process energy consumption.

Thomas Hinninger, Schneider-Electric,
VP Operation & Optimization Software Activity



Microsoft
GOLD CERTIFIED
Partner

Microsoft is pleased to be working with Schneider Electric to deliver powerful and reliable control and monitoring solutions for industrial customers worldwide.

Chris Colyer
Worldwide Director of Plant Operations
Strategy for Microsoft

The Schneider Electric Offer

Solutions are not solely based on technology but also the expertise behind the technology. At Schneider Electric we have been delivering solutions for manufacturing and process industries for over 40 years. We understand what is needed to help you meet your goals in automation and energy managements.

A history based on innovation

More than 40 years ago, we invented the first PLC and paved the way for companies to drive efficiency by replacing physical logic relays by programmable logic controllers.

In 1979 we introduced Modbus to the market, a de facto communications standard, truly open and the most widely used industrial protocol in the world.

In 1985 we launched our first SCADA product focused on Mining and Food & Beverage.

In 1991 we released Citect for Windows. A system that has been used to implement one of the world's largest Windows based control systems.

In 1996 we introduced our first programmable automation controller (PAC) with embedded web server capabilities and onboard data logging.

In 2003 we launched Process Analyst, combining Alarm, Trend and Tag information on a unified display.

We have a history based on innovation and openness, and today we continue in the same spirit with the introduction of PlantStruxure™.

PlantStruxure is a collaborative system that allows industrial and infrastructure companies meet their automation needs and at the same time deliver on growing energy management requirements. In a single environment, measured energy and process data can be analysed and used to yield a holistically optimised plant.

A leader in process automation

We have come a long way since we installed our first PLC and today we are amongst a select few as a leader in process automation, delivering solutions for all types of applications. We understand that each application is unique and that is why we offer a system that can be tailored to meet the needs of all types of processes including discrete, batch, continuous, safety or a combination.

Delivering solutions across the enterprise

We have an unmatched automation offer from the sensor that measures your process and the automation system that controls your production to the historian and manufacturing execution system that helps you to improve your production efficiency and achieve operational excellence. All this coupled with the ability to provide integrated enterprise wide energy efficiency solutions and backed by a team of dedicated professionals focussed on delivering the solution you need.

A leader in energy efficiency

Not only are we a leader in process automation, but we are number one in energy efficiency. Every day we help companies to identify and implement ways to reduce their energy consumption and decrease their environmental footprint.

The Vijeo Citect Offer

Vijeo Citect is the operating and monitoring component of PlantStruxure. With its powerful visualisation capabilities and operational features, it delivers actionable insight faster, enabling operators to respond quickly to process disturbances for increased effectiveness.

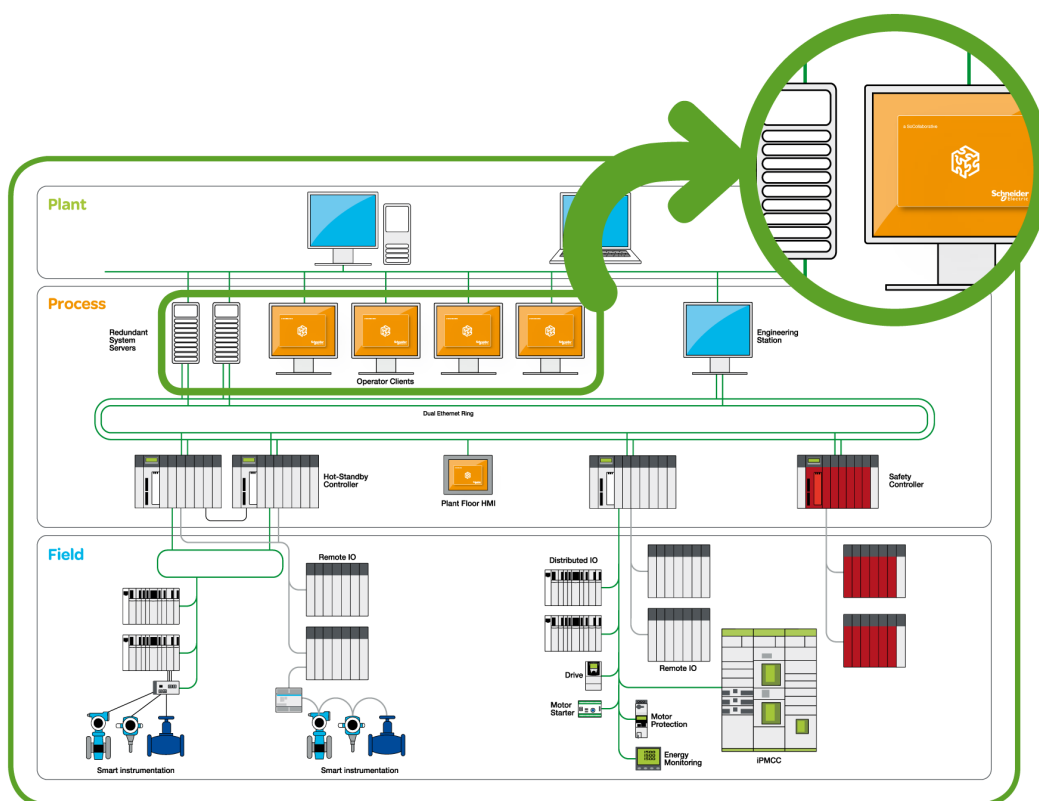


A wide range of industry solutions

Schneider Electric is dedicated to understanding our customers' needs and providing them with the best technology available.

Our solutions are implemented in numerous industries, including:

- Aerospace & Defense
- Automotive
- Building Automation
- Cement & Glass
- Chemical
- Electronics
- Food & Beverage
- Machinery & Manufacturing
- Metals
- Mining & Minerals
- Oil & Gas
- Pharmaceutical
- Power / Utilities & Generation
- Pulp & Paper
- Telecommunications
- Telemetry
- Transportation
- Water & Wastewater



+ Scalable

for changing times

From tens of I/O to hundreds of thousands, the scalability of our system means that you can start out small and grow as your requirements change.

+ Integrated

to reduce risk

The system is integrated inside, from devices to MES all of the system components are designed to work together with each other and with our chosen technology partners.

+ Flexible

because your process is unique

Our system supports the architectures that you need for your application. Single site, multiple sites, distributed control, local control, discrete, process, safety, batch all within the one system.

+ Collaborative

to increase efficiency

Our system is open to exchange information with other plant and business software, and fosters an environment of collaboration by delivering the process information you need in the way that you like to see it.

System Architecture Topologies : Scalable



Your SCADA system has unique requirements that change with time, so how can you choose the best architecture? Vijeo Citect gives you the ultimate system architecture scalable to any application size.

OEM Solutions

Vijeo Citect Lite has been designed for stand-alone HMI type applications and includes a wide variety of drivers and connectivity options.

Vijeo Citect Lite is a scalable solution which can be upgraded to Vijeo Citect. This is as simple as reprogramming the software key.

Features include:

- Historical and real-time trending, advanced alarming and reporting
- Customizable installation
- On-time runtime language switching to support global customers
- OLE Automation for automated building of graphics pages
- Two programming languages – Cicode and CitectVBA
- Statistical Process Control
- Graphical elements including Genies, Super Genies and ActiveX objects

Scalable Architecture

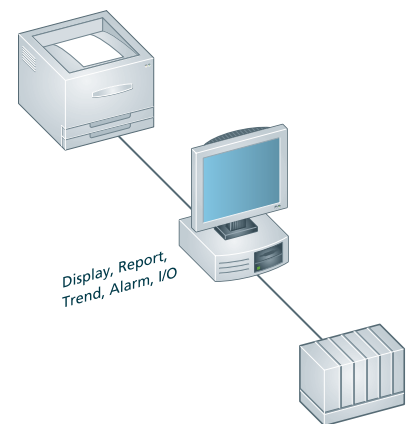
Scalability is the power to resize your system — up or down — without having to modify any of the existing system hardware or software. Vijeo Citect's innovative scalable architecture allows your system's architecture to grow with your requirements, while preserving your initial investment. If you require a second operator interface, just add a LAN and a new computer, and nominate it as a Control Client. The new computer can share the same configuration, and will receive I/O from the first Vijeo Citect computer.

Machine or Local Control

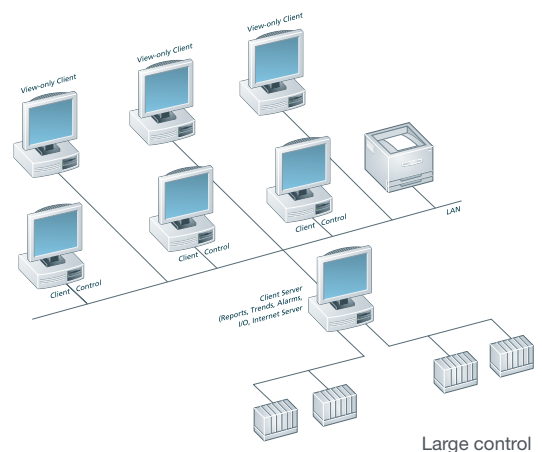
Running on Windows XP-embedded, Vijeo Citect software provides users with a control system that has the power to match the requirements of advanced machines. Our embedded systems provide the same level of functionality of our full SCADA package and can be run as a stand-alone system or integrated as a local control panel within an integrated control system.

Standard Control

Many Vijeo Citect systems have grown from a single computer to large control systems. The ability for a single system to grow without changes being made to the configuration enables Vijeo Citect customers to be confident in the long term future of their control system investment.



Standard control



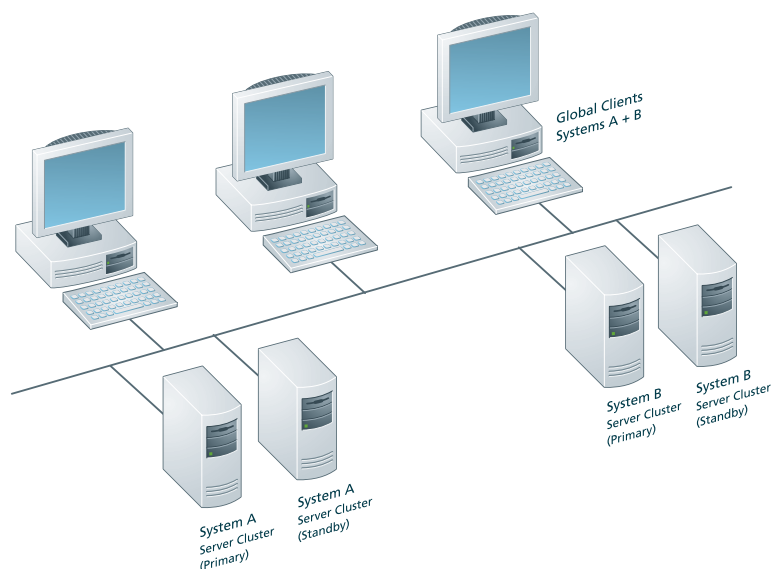
Large control

Large Control

Vijeo Citect software has a reputation for being the expert at large control systems. The first control system to be implemented on Vijeo Citect in 1992 contained in excess of 50,000 tags. In order to complete projects on this scale, Vijeo Citect has developed advanced communications topologies and project structures that enable the design, implementation and maintenance of larger control systems.

Clustered Control

With the current economic climate of cost cutting and centralizing control, Vijeo Citect's ability to unify any number of control systems into a single "clustered" system provides users with the perfect topology. With each local site able to view its own control system, global clients can be implemented that can view across the entire control system, complete with unified alarm lists and the ability to compare trended data across multiple systems.



Cluster Control

Large Systems

Vijeo Citect applications can scale easily to all company application sizes - small, medium or large. Coverage is available for very small applications with only a few points, through to large applications that monitor and control over half a million points. This is achieved by providing the option of using centralized or distributed processing. Centralized processing has the benefit of keeping all the data and processing in one PC which is a more economical solution. However, for very large applications, distributed processing allows you to share the processing over multiple computers.

Customer Profile:

Argyle Diamonds

In 1992, the Argyle Diamond Mine commissioned the first Schneider Electric SCADA system for Windows system. Since commissioning, this fully automated 24 hour/365 day operation has never encountered production downtime due to the Schneider Electric SCADA system.

- 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

System Architecture Topologies : Flexible

Your SCADA system, like your business, must react to changing requirements. New production lines or pressures on costs can prove difficult. Vijeo Citect software uses its client-server architecture to enable you to design and redesign your system, as required.

Flexible Architecture

Designed from the start for true client-server architecture, Vijeo Citect 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. Vijeo Citect has five fundamental tasks which handle: communications with I/O devices; monitoring of alarm conditions; report type output; trending and user display.

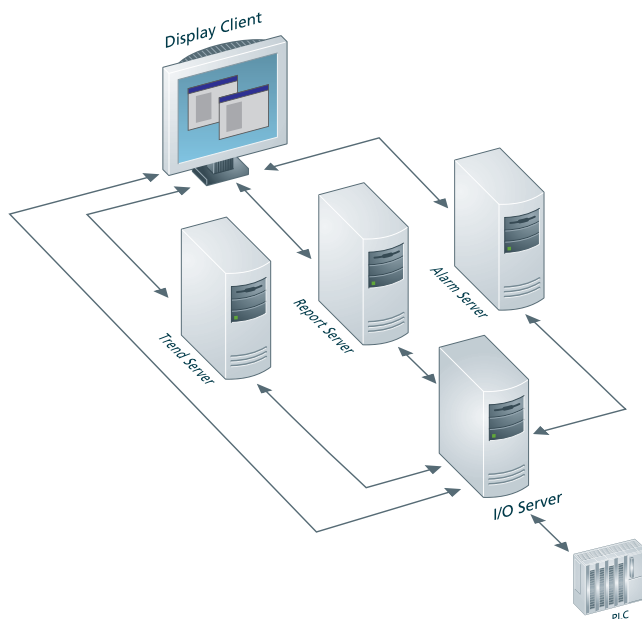
Each of these tasks is independent, performing its own processing. Due to this unique architecture, you have control over which computers in your system perform which tasks. For example, you can nominate one computer to perform the display, and report tasks, while your second computer performs display,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

The initial design step for your control system places I/O servers as required to access the data. The ability to support up to 255 I/O servers, each with licenses for the large number of protocols included

with Vijeo Citect, provides the control system with access to your data wherever it lies. Once the data is available with the I/O servers, the source of the data becomes irrelevant to the control system designer. This allows the communications and the control system design to be completely separated and provides more flexibility with changing I/O server locations or system connections in the future.

Between the I/O servers and the other tasks within Vijeo Citect, a publish/subscribe interface exists. The interface ensures that the bandwidth requirements between the clients and servers are driven by the activity or number of changes of a specific variable rather than the size of the system. Vijeo Citect servers can be separated from the I/O servers via shared bandwidth communications, increasing the options for server locations and the flexibility of the control system.

With the tags available, Vijeo Citect tasks can now be located to meet the requirements of the system. Often Vijeo Citect systems are built around a central pair of servers, each acting as the primary or standby server for all the Vijeo Citect tasks. This design will optimize its performance by executing each Vijeo Citect task individually.



Scalable, flexible, reliable architecture

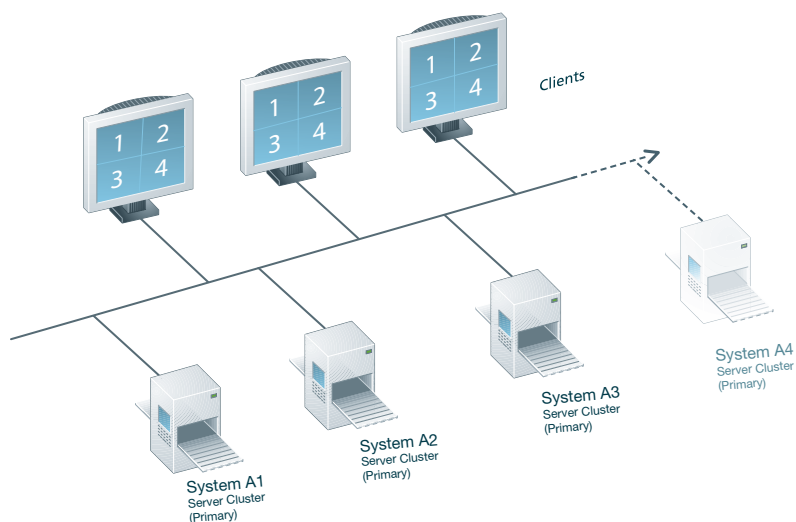
In doing so, the Vijeo Citect system can create separate server and client components across all available CPUs, resulting in improved performance and stability. A system with individual task processes can either remain on the central server or have each task distributed as required to meet system needs.

As well as relocating system tasks to meet growing requirements, Vijeo Citect software can also duplicate system tasks by adding clusters to enable system expansion. Additional clusters enable the SCADA system to expand by either using more of the existing resources or by adding new resources. For example, a system may reach a point where the number of trends being recorded needs to be enhanced. Without clusters, a larger more expensive computer must be purchased. With clusters, the system can add an additional trend task and progressively add trends on this new server without the added hardware cost.

SCENARIO

You have four identical machines with identical projects. Vijeo Citect allows you, with a single Vijeo Citect project, to view all the alarms, trends, I/O and reports, and to use the same displays to display information from each of the systems. This offers a great reduction in the level of testing required within the project.

An example of this could be a windmill project where you have N turbines and just one Vijeo Citect project, but can monitor the entire windfarm.



System Architecture Topologies: Reliable

Reliable Architecture

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

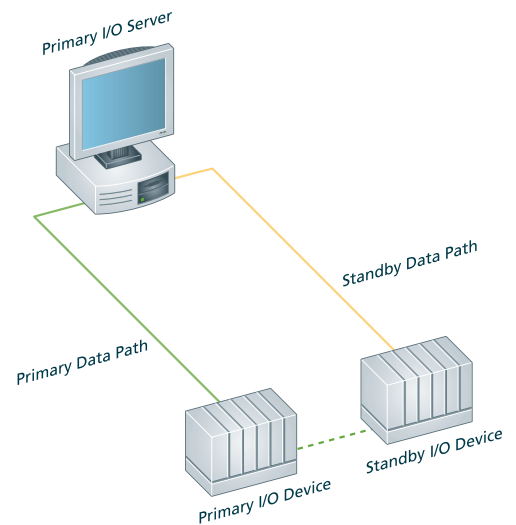
Vijeo Citect software supports full, hot standby configurations, providing complete I/O device redundancy. By nominating one device as primary and the other as standby, Vijeo Citect will automatically switch from one to the other in the event of failure. Using Vijeo Citect's ability to write setpoint changes to both primary and standby I/O devices, even 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, Vijeo Citect 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.

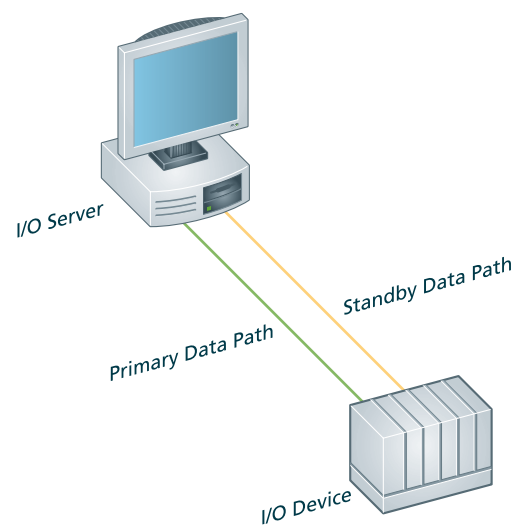
When communicating with an I/O device, many systems demand redundant I/O server configurations. To avoid conflict of data, and to maximize communication bandwidth, only the primary I/O server communicates with the I/O device.

Vijeo Citect systems use LANs to connect the elements, but something as simple as a faulty network card can destroy communication. Vijeo Citect'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, Vijeo Citect will automatically try to connect on the other available LANs with no configuration required.

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



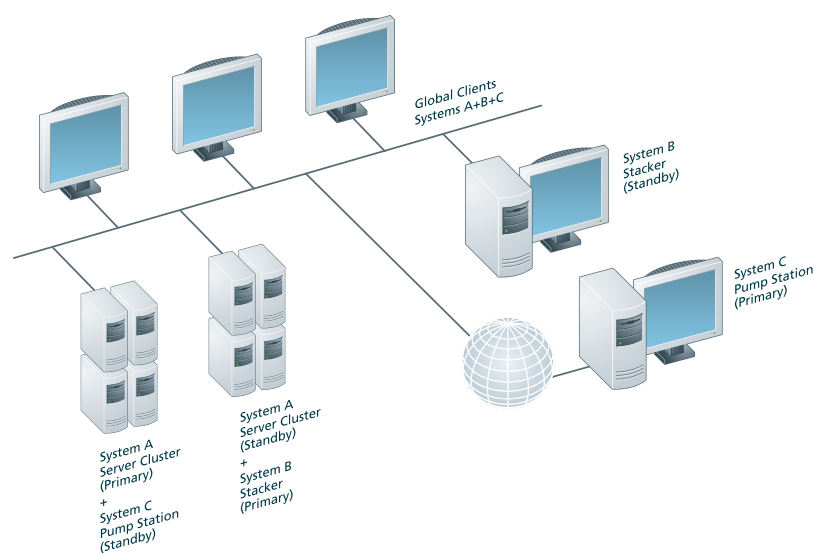
I/O device redundancy



Data path redundancy

Impressively, all the redundancy features of Vijeo Citect can be used together, providing you with maximum protection. Because of Vijeo Citect's task based architecture, you get an unrivalled level of SCADA redundancy. Each of the tasks in Vijeo Citect, (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 resynchronized automatically, minimizing gaps in your history files.

Since all tasks are different in nature, Vijeo Citect software offers you a separate redundancy strategy for each. If you need to upgrade or make configuration changes, you can load a new project onto the standby server. Once loaded, switch from the primary server and run the new project on the standby server. Should it not work as expected, you can switch back to the primary server without disturbing production.



Network fault tolerance



At a glance

- Redundancy provides fault tolerance throughout the system
- I/O device redundancy with hot standby configuration
- Multiple communication paths for each I/O device
- Provides I/O device data path redundancy
- Redundant LAN using multiple networks
- File server redundancy
- Task redundancy across multiple computers
- Clustering provides multiple redundant ar



...there has never been any production downtime thanks to Schneider Electric's SCADA solution.

Senior Process Control Engineer, Argyle Diamond Mines

System Architecture: Clients



Add Flexibility

Web Clients add flexibility and convenience to managing plant operations.

Current Vijeo Citect users can now monitor operations from an Internet/Intranet supported location.

It is economical to provide access for users (maintenance and quality assurance) because server-based licensing means you only pay for concurrent users.

Applications are numerous:

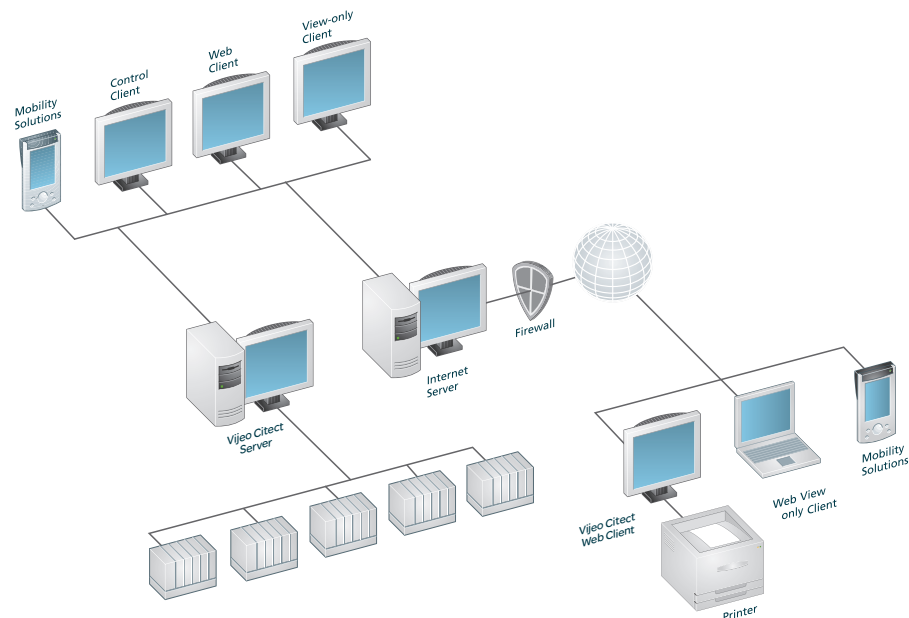
- Mobile users
- Remote users
- Suppliers
- Remote plants
- Special users

Vijeo Citect provides the flexibility to access data from anywhere via its range of client interfaces and delivery systems.

Vijeo Citect software provides two levels of clients. A control client has the complete functionality of the application to view any screen and read and write any variable controlled through the SCADA system. This makes the control client the perfect tool for operators. A view-only client is able to view all information within the SCADA system but is unable to write to any variable or execute code to communicate with another server. This makes the view-only client perfect for upper management, process optimization or casual users of the control system. View-only access is also available via a control client using project security.

Clients

Both levels of Vijeo Citect clients can be used to display control system information. Within the control room, it is typical to install the complete Vijeo Citect client application onto a machine. These machines are typically dedicated to running the control system and an application interface provides the maximum viewable space for visualization and the fastest possible response. The user can select to have a license key located on each client or locate the license keys on the servers and have the client licenses “float” between clients.



Typical Internet Client Architecture

Web Clients

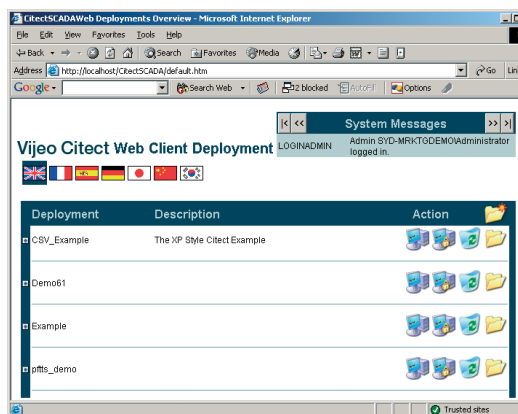
Vijeo Citect web clients allow the users outside the control room to access control system data in real time. The web client is a completely functional client with an identical interface to the dedicated control clients (displayed within a web page), which requires zero maintenance. The client controls and project updates will automatically be synchronized with the web clients.

Security

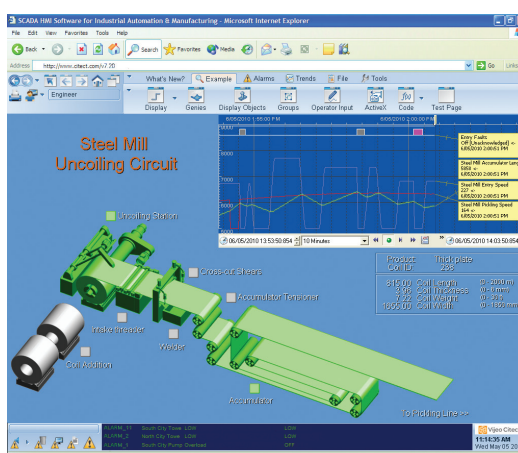
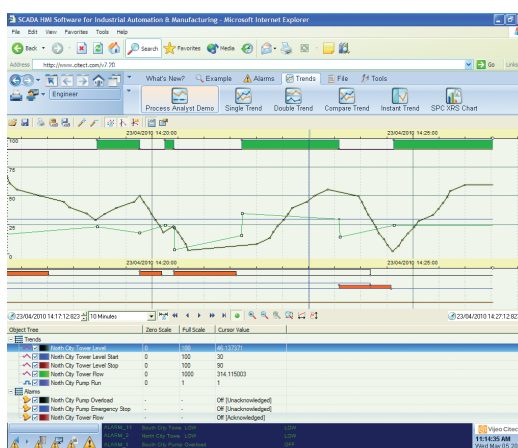
Security of web clients is controlled by the web server's advanced firewall and encrypted password protection technologies to ensure secure operation. Access to the web clients are controlled or denied based on Windows user name and password, or when the number of web clients available has been exceeded. Additionally, the Vijeo Citect project configuration requires a local user name and password, making it secure for enterprise and remote access.

Licensing

Vijeo Citect's licensing is calculated on the number of Vijeo Citect clients connected to the server, not on the number of computers with Vijeo Citect software installed, making it one of the most cost efficient SCADA systems available.



Example of the Web Client Deployment page



Web Client in action



At a glance

- Full system functionality
- Impressive runtime performance
- Simple installation
- No emulation
- Zero-maintenance web client
- No rebuilding of graphics
- No client side protection keys

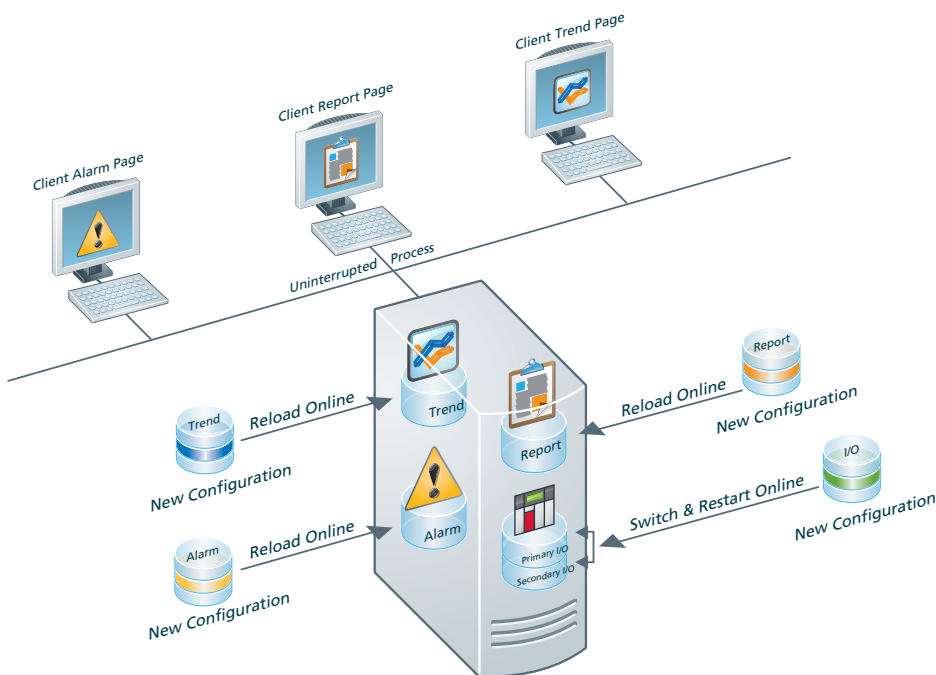
For simultaneous viewing of two or three different projects, Vijeo Citect supports multiple web clients running on the same computer.

Site-wide web view-only clients

Site licenses for web view-only clients are available, making your control system visible to everyone within your organization.

System Architecture: Online Changes

Configuration changes can be applied online with Vijeo Citect. This allows you to change your production environment without interrupting operator control and real-time data gathering.



Online changes are supported for all system architectures, from a single computer up to a system with a set of fully redundant networked servers.

Alarm, trend and report servers do not need to be restarted just because one tag has been added or removed. Server-side online changes allow the user to change the configuration, recompile and set the server to reload the configuration. This allows for adding, removing or modifying items that have changed without stopping your running system.

Alarm, trend and report servers can reload their configuration on demand, adapting to any changes. Unchanged elements in the servers will not be affected by a configuration reload so there is no break in data availability, thereby optimising operational efficiency. A reload can be operator-initiated or coded for automatic or remote operation.

Client changes are applied by simply re-displaying the graphics page. All page configuration, including Cicode page expressions, as well as navigation menu configuration are reloaded online without requiring a client restart.

Rapid application of changes during production is now possible without system interruption using server-side online changes.

Adding a new alarm or trend to an online system is simple. Define the new record and select to reload the server process. Reload operations are supported for alarms, trends, reports and accumulators. A reload operation does not impact the processing of unchanged records.

I/O communication infrastructure and tags support the application of changes using online switching of the I/O server processes. Switching the processes allows for a complete range of I/O functionality to be seamlessly changed online during the restart of each process.

Client pages are always accessible, even when any new associated Cicode library data is not available. Applying changes to a Cicode library does require a restart of the process.

When a new page is compiled using a new set of user code library functions, the page will display a valid error indication when accessing a new function when the library is awaiting a restart.

System Architecture: Data Quality

Tag extensions for each data tag provides a more holistic picture of your process through improved real-time data values and traceability.

Tag Extensions

With the addition of tag extensions in Vijeo Citect V7.20, each variable tag now represents data as a collection of data quality and time stamp elements.

Operators can be informed about the value of each real-time tag along with the last time of the value change and the quality status. Data quality is split into three groups - good, bad and uncertain - with more detail available to provide additional analysis. The tag data has a time stamp for when the data value last changed and for when the quality last changed.

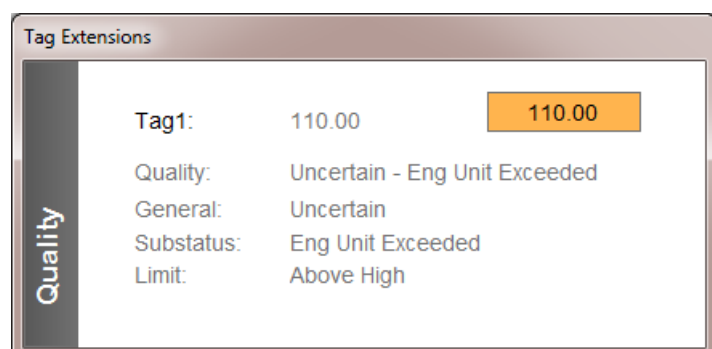
Vijeo Citect provides real-time data quality and status information. The 'quality' of the data is available to the operators, allowing for better informed processing decisions. Each tag data point contains extensions that provides the data values along with the associated quality and time stamp of the data change. This allows each client access to not just the data, but also information about when and how the data was collected from the field.

Having the validated last known data values provides operators with a clearer picture of the situation when a field communication has failed. Understanding the age and accuracy of the data can provide better results from your control system calculations.

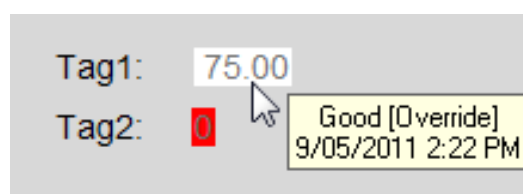
Vijeo Citect lets you choose what a client will display during a communication outage, either an error indication or the last known value. By default, tags are displayed with a tool-tip that shows the last known quality and time stamp of the tag.

Time-stamped data provides greater data synchronisation. All variables are time-stamped either at the I/O server or for some protocols (RTU-based) at the source. Using the integrated quality and time-stamped data, you can attain a more holistic picture through improved real-time data values and traceability.

Variable tag extensions provide functionality for Tag Override and Control Inhibit. The Tag Override function makes it possible to manually set the variable value when there is an external device error. This allows upstream systems to be unaffected when operators using manual controls during the failure of automatic sensors. Tag Control Inhibit functionality ensures that critical system information can be protected and inhibits the unauthorized writing of data. Such functions are designed to enhance the security of your process while increasing efficiency in case of a false alarm.



Tag Extensions



Visualization of tag quality

Communication

OFS (OPC Factory Server) Transparent Communications

Traditional communications between the controllers and the SCADA system are based on large tables of PLC memory being made available for the SCADA system to request values by address. While this communications structure delivers high performance in communications, it also requires an additional level of configuration in modern PLCs to link object information to addresses in memory. This configuration was additional effort and may result in many limitation in the PLC design as memory block allocations are filled or change over time.

Communication between Vijeo Citect and Schneider Electric hardware has overcome these limitations through the use of the industry standard OPC protocol. This protocol removes the hard coded addressing from the SCADA configuration and allows the SCADA user to use the same object-based names as in the controllers. To simplify, the configuration and synchronisation of your Vijeo Citect system enables the tag database to automatically link to the OFS configuration, with changes in the OFS reflected in the SCADA system tag database.

By providing an unrestricted and automatically maintained communication link between the controllers and the SCADA system, Schneider Electric frees your system to be built and grow as required.

The OFS is a multi-controller data server that enables communications with all your new and legacy Schneider Electric hardware using any combination of supported protocols. OFS provides simple, real-time access to Modicon Quantum, Premium, TSX Micro, Twido and Momentum controllers, as well as all Modbus devices.

As well as providing a standard interface to the data within Schneider Electric PLCs, OFS (when used with the OFSOPC driver) opens up numerous options to help optimize the performance, system loading and functionality of the integration between the PLC and SCADA.

Typical OPC solutions poll the PLC at a specified rate for each tag. Polling at a fixed rate may result in higher overall communications load, as the server may read tags that are not required. It may also reduce system performance as the tags required by the systems are unable to be read at the desired rate. Vijeo Citect maintains a set of customisable poll rates in the OFS server. It then moves tags between them to match the requirements of the operators and the configuration of the SCADA system. A tag may be polled at a slow rate for trending (while the page is not displayed) but when the page is displayed the poll rate is seamlessly increased to ensure a high update of information for the displayed screen. All this optimisation is handled internally by Vijeo Citect (and OFS) enabling you to take on large and high performance projects using industry standard protocols.

Vijeo Citect integrates data from the OFS server seamlessly with the alarming and trending systems within the SCADA system. Time time-stamped data sent from the OFS server on change of value or quality is sent to the I/O Server, Alarm Server and Trend Server. Connecting I/O change events directly to all three servers enables significant reductions in the CPU loading of the SCADA systems. This provides the ability to increase system capacity and expand using existing hardware. Connecting the I/O change data events directly to all three servers also enables the alarming and trending systems to utilize the time-stamp of the changes to provide a reliable and millisecond-accurate indication of sequence of events.

Speedlink

While the OPC servers traditionally represent additional effort for configuration and maintenance on a SCADA system by linking Vijeo Citect and OFS, with Speedlink we can reduce effort throughout the project life cycle. Speedlink synchronizes the tag data from the OFS server with the SCADA configuration so that no additional tag configuration is required. An automated (rules based) process then runs to generate all the alarms, trends, accumulators or any additional local variables. In this way, adding a function block to the PLC results in a database configured without additional effort. Because this is linked to the PLC configuration it will continue to synchronize the configuration as the project is maintained.



At a glance

- > Access to all the data within the controllers (allocated and non-allocated)
- > Fast communication to your PLC
- > Synchronisation of the PLC tag data directly with the SCADA system (to reduce configuration)

Open to anyone

While using Schneider Electric controllers will provide the best possible results with your Vijeo Citect system, we recognize that communication to a wide range of controllers is the key to ensuring a complete view of your control system. To accommodate communication with these controllers, a collection of over 150 protocol drivers are included within Vijeo Citect.

Vijeo Citect's open connectivity from various information systems allows seamless dataflow, promising real-time and rich process information. Vijeo Citect has the flexibility to operate with open standards supported by hundreds of hardware and software vendors.

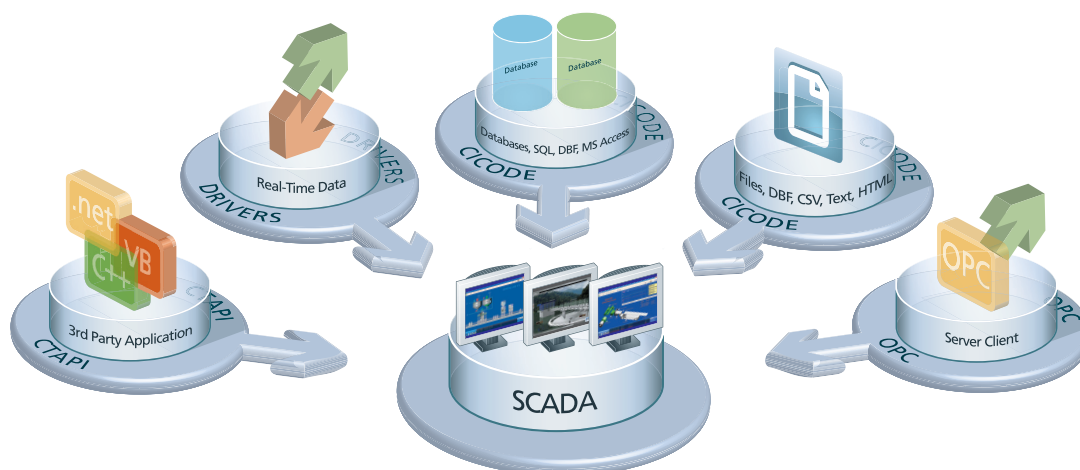
Maximize data transfer

Vijeo Citect recognizes that many I/O devices can be slow and inefficient when responding to requests for data. The following strategies allow Vijeo Citect to maximize data transfer.

Vijeo Citect'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 of up to eight times faster than without it.

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. By compiling a list of the registers that must be read in one scan, Vijeo Citect automatically calculates the most efficient way of reading the data.

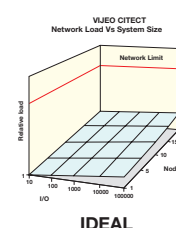
Vijeo Citect's client-server processing allows further performance increases, through the use of a cache on the I/O server. When an I/O server reads registers, their values are retained in its memory for a user defined period (default 300ms). If a client requests data that is stored in the cache, the data is provided without the register being re-read. In a typical two-client system, this usually occurs 30% of the time, resulting in a potential 30% increase in performance.



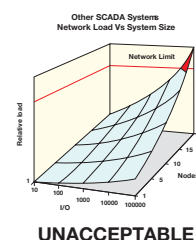
Seamless dataflow: Our open connectivity to various information systems.

Reliable Performance

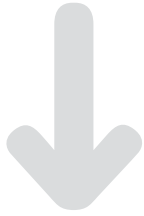
Vijeo Citect's distributed processing and network optimization give you excellent network performance, even when you have over 450,000 I/O and 60 Vijeo Citect computer stations:



Without Vijeo Citect's network optimization, you can expect network load to increase dramatically, 'choking' as you add more I/O and computer stations:



Communication: RTUs



Using standard wide area communication technologies, Vijeo Citect provides an effective method to communicate with remote telemetry units (RTU) for a fraction of traditional operating costs.

PSTN Monitoring

Vijeo Citect's Remote Device Monitoring supports scheduled Dial-Out and unsolicited Dial-In, making it easy and economical for Vijeo Citect 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 and distribution
- Pipelines

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

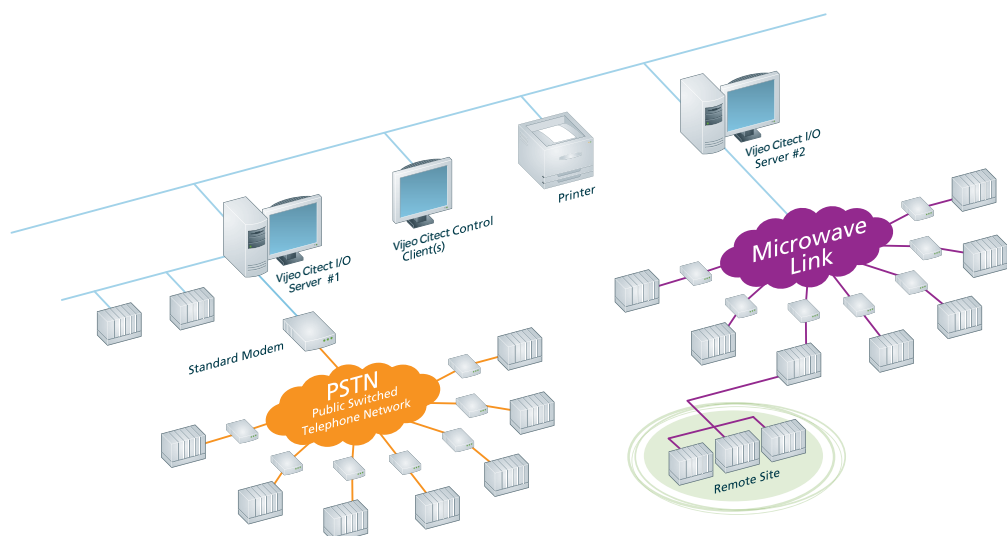
By working with most serial protocols provided with Vijeo Citect, remote I/O device monitoring provides the user with flexibility in selecting a wide range of PLCs or RTUs.

Built-in management

Vijeo Citect'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.
- Vijeo Citect 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 Vijeo Citect 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. Vijeo Citect keeps a local record of the last values read from each device.
- If Vijeo Citect cannot connect to the remote device after a 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 Vijeo Citect only, if desired.
- Vijeo Citect supports connection to devices which communicate using different data frames.



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

Easy to configure and use

Based on a user-selected schedule, Vijeo Citect'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 device monitoring is more than a remote monitoring feature, it can also be used to implement Cicode functions on connection or disconnection.

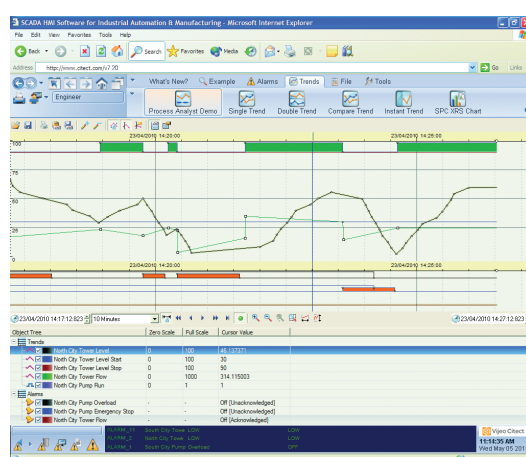
The Express Communications Wizard includes telephone number and call schedule fields. Set it up and let Vijeo Citect look after the call schedules, data transfers and disconnections. It's automatic!

Implementing the Dial-In feature requires a remote device or modem that is capable of sending an identification string (ID string). Vijeo Citect uses the ID string to identify the remote caller along with the appropriate communications protocol. If the device cannot support an 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.

Quality data is available for all data points that provide automatic indications for bad quality data. Quality error indications can use default error text, background display colour or a custom animation. A default tooltip on animations provides the operator with the last known value and time stamp for the associated data point.

Time-stamped data

Vijeo Citect enables time-stamped data from RTU event logs to be easily uploaded and back-filled into historical records. Any alarms configured for this data will trigger new alarms based on the original time stamp.

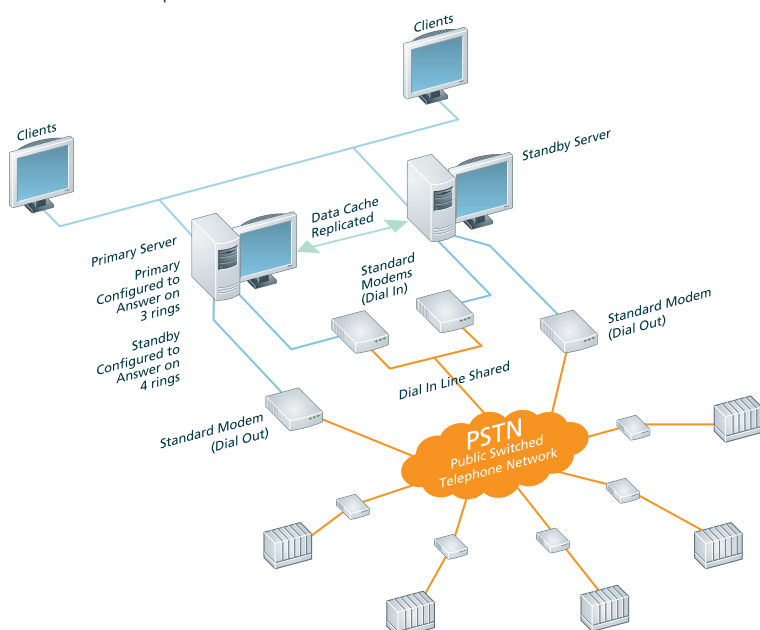


Vijeo Citect accurately represents time-stamped data in Process Analyst



At a glance

- Economical solution for monitoring remote trend, alarm and tag information
- Easy to configure
- Dial-in for alarms
- Full redundancy support



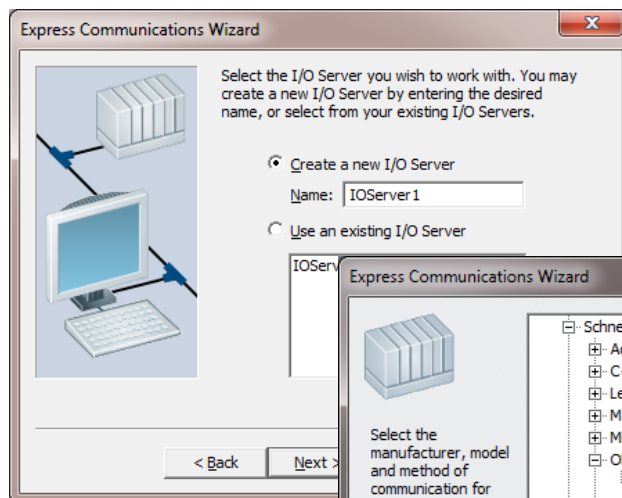
Example of remote I/O device monitoring configured for both redundant Dial-Out and Dial-In for secure monitoring of remote sites and devices.

Communication: Wizard

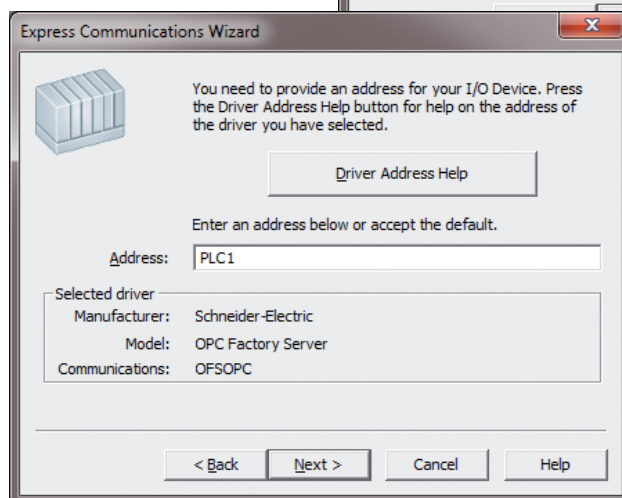
Vijeo Citect's I/O device communication wizard will have you communicating in less than 60 seconds.

The Express Communications Wizard configures your I/O devices quickly and easily, getting your system up and running fast.

All standard communications protocols are included with your Vijeo Citect package.



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.

Vijeo Citect allows you to develop and test your project without the need to physically connect to the I/O device. Simply set the memory property of the I/O device and Vijeo Citect will behave as if it were communicating to a real I/O device. You can specify any protocol and Vijeo Citect will use that device driver to communicate, ensuring a very thorough test.

Security: Configuration

We recommend addressing security at all levels within your control system. While the components themselves need to be secured, your control system infrastructure and, in particular, your network need to be secured from attack.

To stop unknown people from tampering with your plant when the operator station is unmanned, you can have Vijeo Citect automatically log people out of the system (for example, if the mouse is idle for five minutes). Without an appropriate user name and password, no unauthorized users can access the system.

Support for read-only projects allows you to secure your Vijeo Citect configuration from unauthorized changes. CIPs and OEMs can deploy a project safe in the knowledge it is read-only secured.

Cicode commands are protected in the Kernel, preventing unauthorized access. A user is required to log into the Kernel before Cicode commands will execute in the Kernel window, regardless of whether they are logged into Vijeo Citect.

In the past, SCADA networks were separate from other networks and physical penetration of the system was needed to perpetuate an attack. As corporate networks became electronically linked via the Internet or wireless technology, physical access was no longer necessary for a cyber attack. One solution is to isolate the SCADA network; however, this is not a practical solution in a world where control systems are being controlled more directly by the business system or where the data required for that control and monitoring is coming from increasingly remote data sources such as remote terminal units (RTUs).

To aid in the development of strict control system security, we have produced a white paper available at www.citect.com/security. In this document we detail the design considerations that you require in order to keep your control system secure as a whole rather than focusing on each specific part. The core guidelines covered within this document are:

- Keep your network design simple (reducing contact points).
- Use firewalls to protect each part of your system and, in particular, wherever your system passes outside your control (wireless or radio communications).
- Utilize the power of VPNs to enable authorized users anywhere in the world to access your control system securely.
- Use IPsec to ensure that only the right devices are connected to the network.

While there are core elements of security that are required for every network, additional security is required for wireless networks. The two most common ways of gaining unauthorized access to a wireless network are by using an unauthorized wireless client, such as a laptop or PDA, or by creating a clone of a wireless access point. If no measures have been taken to secure the wireless network then either of these methods can provide full access to the wireless network.

When implementing a wireless network, a couple of standard security measures can be taken to minimize the chance of an attacker gaining access to it:

- Utilize the ability to restrict MAC addresses
- Require WPA/WPA-2 protocols to be available
- VPNs for the wireless clients

Read-only Projects

Within a secure network, Vijeo Citect configuration can be undertaken by any user from within the business. For these users, Windows security provides a simple and secure method of control over project configuration. Each project can be secured so that it is only accessible to a subset of users. For larger projects, this can control access for different users to different parts of the process or security. For an OEM style customer, this enables them to secure a sub component within a project to ensure included projects cannot be changed while the OEM is not present. Utilising Windows security also ensures that regardless of the editor used for configuring your projects, they are always secure.

Security: Runtime

Vijeo Citect's comprehensive security features are integrated into all interface elements, helping to ensure a secure runtime system.

All control systems need to be secured against unauthorized access, and most applications have operations that only qualified people should perform. Your system must provide some form of security to prevent accidental or deliberate tampering to protect personnel, the environment and equipment.

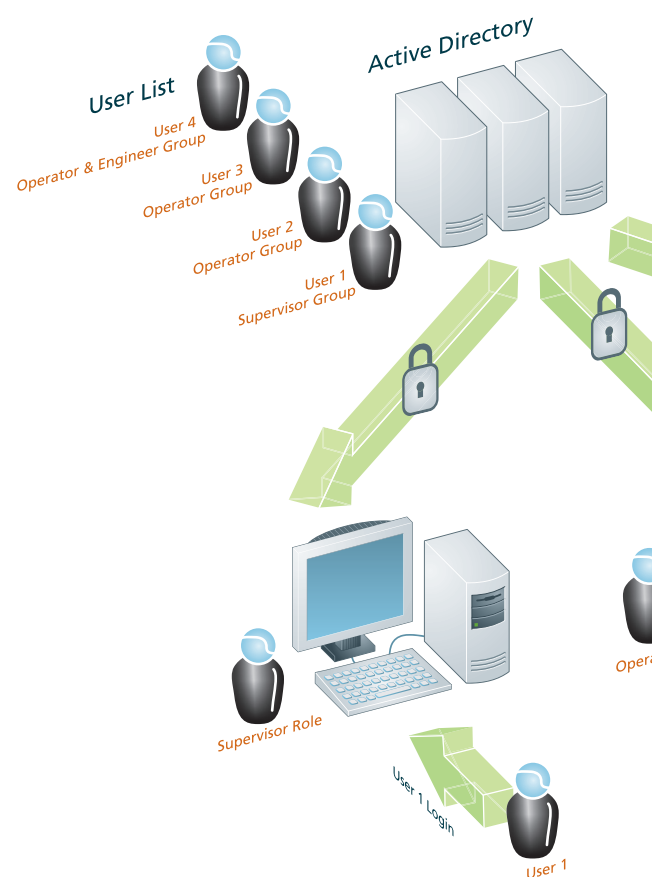
Vijeo Citect's runtime security system is user based, meaning that each user of the runtime system (operators, maintenance personnel etc.) have their own username and password. This username can be managed in Vijeo Citect's native security model or integrated with corporate domain-based security (Windows Integrated Security). Regardless of the model you choose to implement, access to the system is controlled by granting roles the ability to view different areas. Each user, integrated or native, is assigned to one or more roles. If allowed 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 and report, you are able to define the area to which it belongs, and what privilege levels are required to make it visible or usable. Since users can use any Vijeo Citect computer, access is granted or denied by the server, not by the client – providing additional security for Wan applications.

View-only access

Vijeo Citect view-only clients are a cost-effective way to provide view-only access, and the clients can be shared amongst many users anywhere on the network. Simply allow sufficient view-only client licenses to satisfy the maximum number of users that are required to be logged in at any one time.

Windows Integrated Security

Integration with Windows security provides the additional benefit of ensuring that the same corporate security standards apply to the control system as to other applications. Further, it creates a single location for the management of user accounts. For example, when an operator leaves the organization and their access to the company's domain is removed, their access to Vijeo Citect will also be removed. Similarly, when a new operator is employed, there is no need for additional Vijeo Citect configuration to grant them access to Vijeo Citect. It can all be achieved when their account on the domain is created.

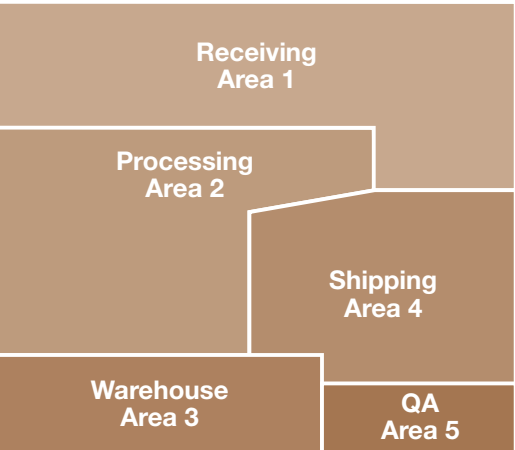
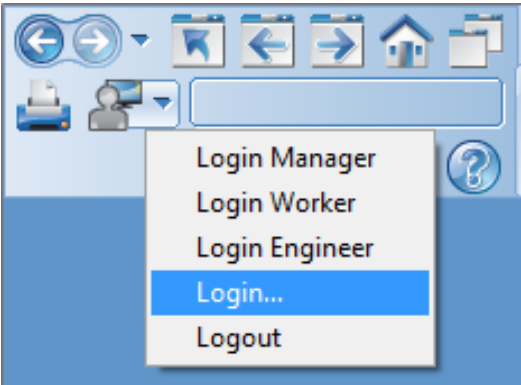
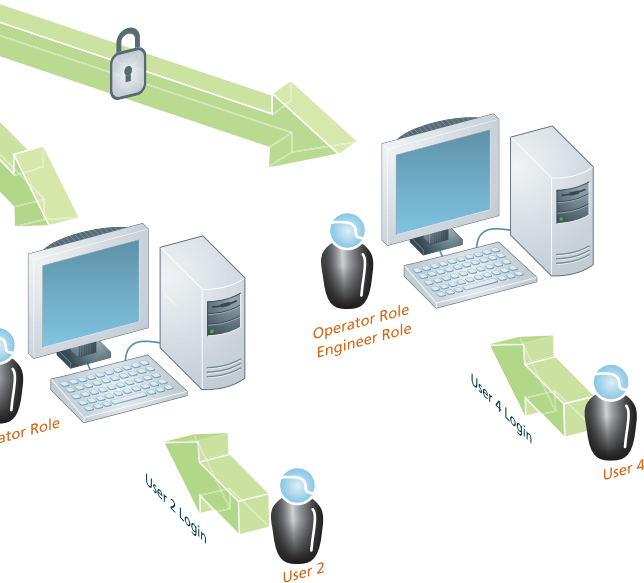


Securing the Environment

Typically, Vijeo Citect is intended to be run on dedicated terminals only. You can secure the Vijeo Citect runtime environment, itself, by preventing users from switching to the Windows operating system or other non-approved programs.

Runtime Only Install

Vijeo Citect allows an installation to only provide the runtime components, such that the configuration tools are not installed. An additional security layer is provided by restricting the computers where the project configuration can be modified.



- Operator 1:**
Viewable Areas: 1, 3, 5
Global Privileges: 3, 5
Additional Privileges in Areas: 1, 2, 4
- Operator 2:**
Viewable Areas: 1, 3
Global Privileges: 3, 5
Additional Privileges in Areas: 1, 4
- Supervisor:**
Viewable Areas: Plantwide
Global Privileges: 1, 2, 3, 4, 5
Additional Privileges in Area: 1

Graphics

Show different states

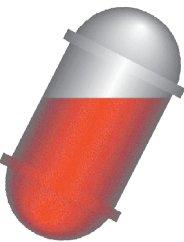
Graphics allow you to create a realistic, intuitive operator interface. For example, you could configure a tank that can be...



filled,



heated,



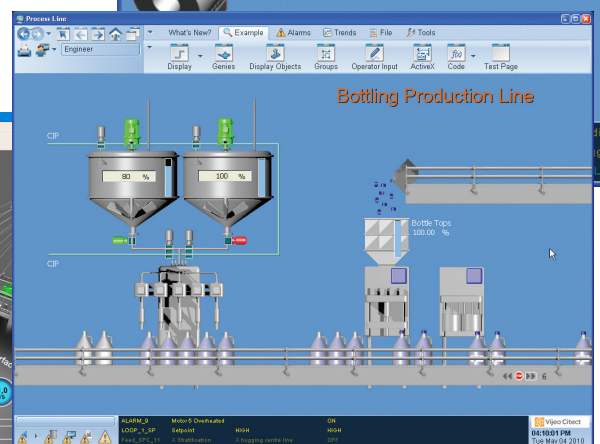
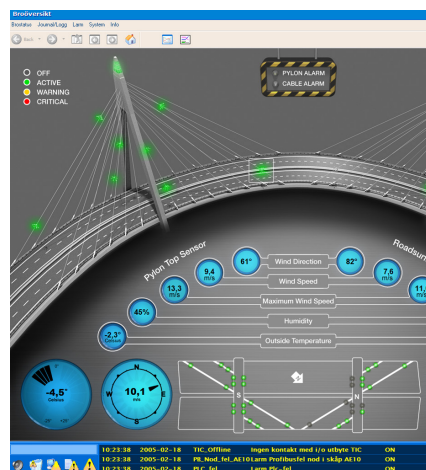
or rotated.

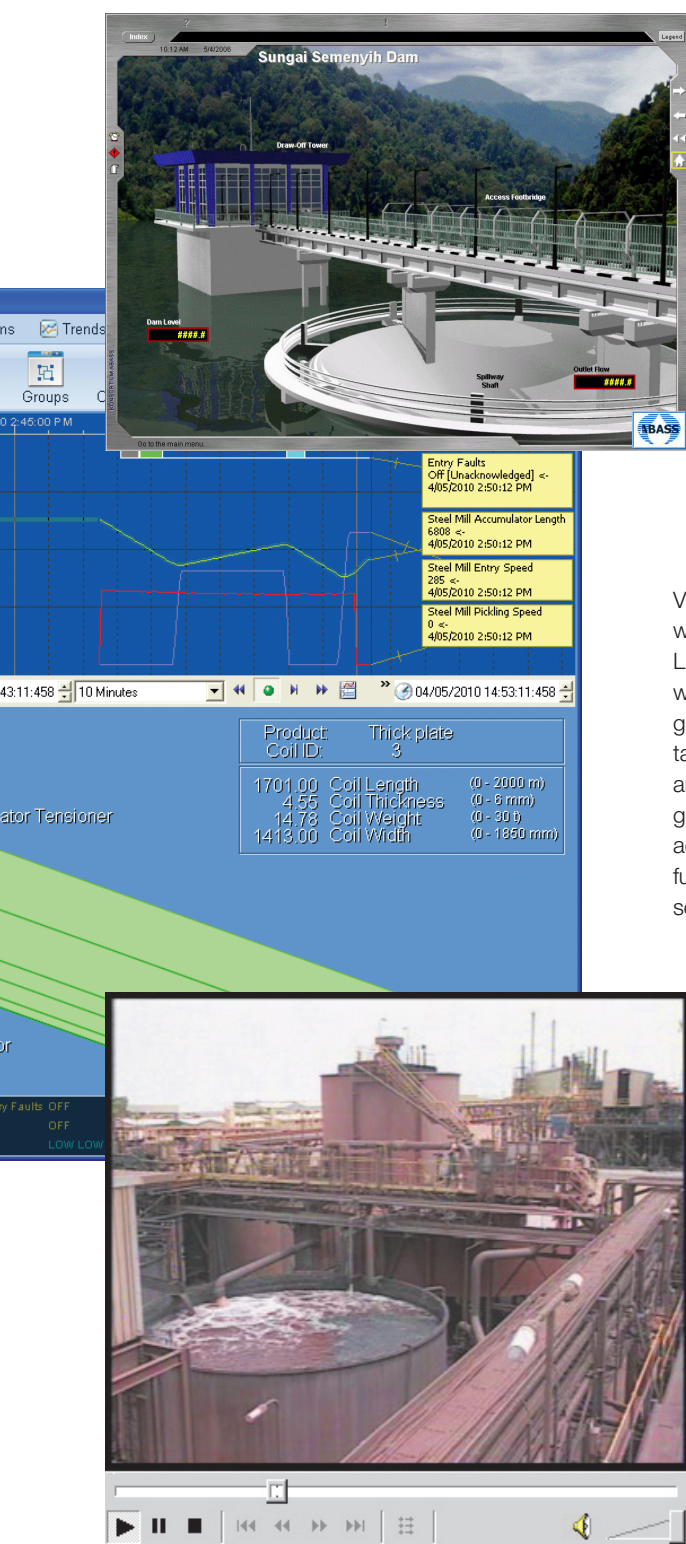
Just by using graphics, you will find yourself developing new ideas for your interface.

The graphics capabilities of your SCADA system are a critical factor in its overall usability. The graphics in Vijeo Citect software allow you to quickly develop true colour, easy-to-use displays that provide the operator with an intuitive, consistent user interface.

Vijeo Citect's 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 behaviour to be directly linked to your plant variables. The movement, rotation, size, colour, fill and visibility of any object can be used to realistically mimic plant floor conditions. 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 graphics were developed with optimization in mind, you can expect excellent runtime performance.





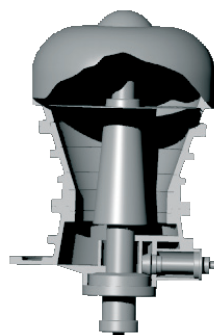
Vijeo Citect utilizes screen resolutions up to 4096 x 4096, which you can choose to suit the application. With these resolution capabilities, you can even use high quality images (scanned photos, etc.) to provide instant recognition of plant equipment.



At a glance

- Flexibility
- Intuitive graphics reduce operator error
- Minimum operator keystrokes
- Increase learnability through clarity
- Blend control and display functionality into one object
- Efficient use of screen space

Vijeo Citect comes with rich Symbol Libraries, loaded with commonly used graphics – like pumps, tanks, valves, motors and crushers. These graphics will instantly add consistency and functionality to your screens.



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

Graphics Builder

Graphics import

Vijeo Citect can import a wide variety of different file types including:

- Windows Bitmap (BMP, RLE, DIB)
- AutoCAD (DXF) — both 2D and binary
- Windows Meta File (WMF)
- Tagged Image Format (TIF)
- JPEG (JPG, JIF, JFF, JGE)
- Encapsulated Postscript (EPS)
- Fax Image (FAX)
- Ventura (IMG)
- Photo CD (PCD)
- Paintbrush (PCX)
- Portable Network Graphic (PNG)
- Targa (TGA)
- ActiveX objects

So if the picture you want is already drawn, just import it!

The import process is simple. If the source application supports click and drag, then do just that: click on the file, and drag and drop it onto a page in the Graphics Builder. Once the object has been imported, Vijeo Citect sees it as a graphics object, with all of the associated configuration features and flexibility.

The Graphics Builder allows you to quickly and easily design an intuitive operator interface for your Vijeo Citect system. 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...

Because objects can be placed precisely using guidelines or the grid, your graphics pages will look professional and precise.

Objects can be locked onto a page so they cannot be accidentally moved or deleted.

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

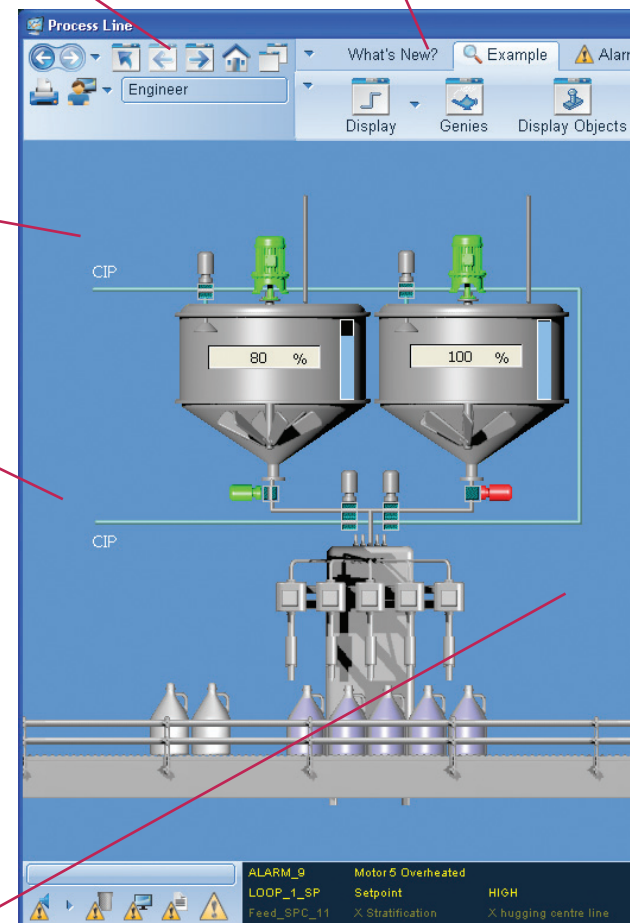
Metadata provides a simple way to pass a list of variable tags to a Super Genie.

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

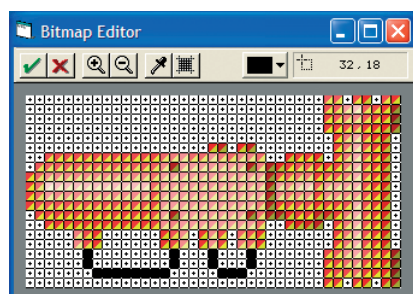
All the graphics tools have their own tool tips and each is fully explained in the Online Help.

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 hide it altogether.

Select the Graphics Builder Help to learn more about the Graphics Builder, using the interactive click-and-learn facility.

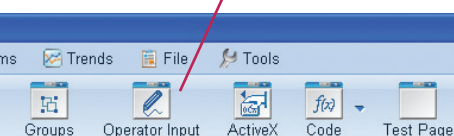


Nodes of lines, polylines and pipes can be moved, added or deleted.

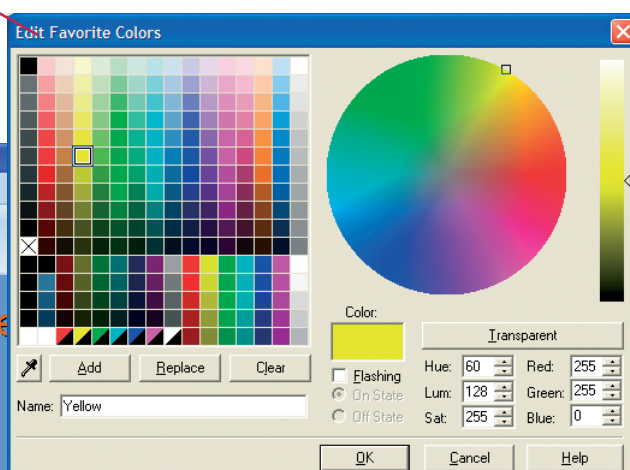
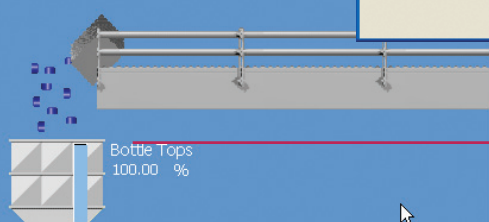


Vijeo Citect enables any number of flashing colours on a single page, allowing users to display flashing 3D symbols.

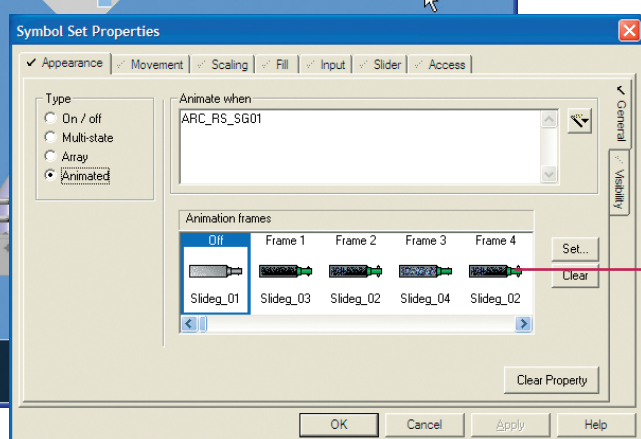
To display the true colour palette, click on the colour swatch at the right-hand end of the Toolbar.



Bottling Production Line



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



To animate a symbol, simply enter the tag name and select the set of symbols.

Bitmap editor

Any graphics object (or group of objects) can be converted into a bitmap in one simple step.

Bitmaps are edited using the Bitmap Editor. The Bitmap Editor is a tool that allows you to edit your bitmap pixel by pixel. Because you can zoom in and out, even the smallest details can be edited precisely. You can even change the size of the bitmap.

Colour swapping

The colours in a graphics object can be changed automatically. This is particularly useful for 3D object manipulation. For example, a 3D green ball can be made blue at the press of a button, and the quality and illusion of depth remain the same.

Gradient fill

Gradient colour and direction for objects including ellipses, rectangles and polygons can be defined with the gradient fill feature.

OLE automation

Graphics can be automatically generated from a database using the OLE Automation interface for the Graphics Editor. This allows an application to be created to interact with the configuration graphics objects.

Metadata

Each graphics object can have a list of values defined that can be accessed at runtime for customized and advanced designs. Metadata provides direct support for SuperGenie configuration.

Page Templates

Page templates save you time and effort because you don't have to draw each page from scratch. When you base a new page on a template, the page design is already complete. All you have to do is enter the information that is unique to the new page.

Templates are also useful when you need to make the same modification to a group of pages. If all the pages are based on the same template, you can just change the template. The pages will be updated automatically.

If you take advantage of Vijeo Citect's page templates, you will notice your project developing a consistent look and feel. Consistency reduces both operator learning times and operator error.

Vijeo Citect 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.

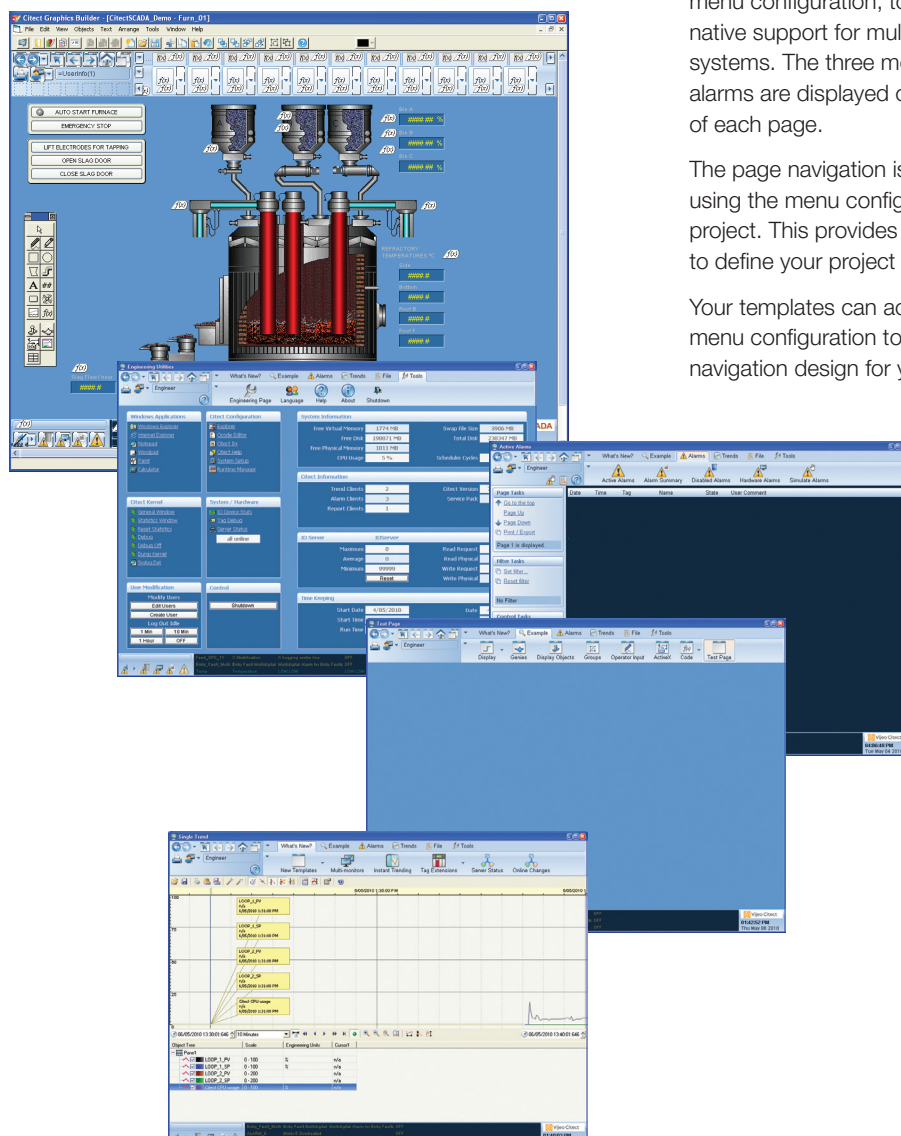
Vijeo Citect software provides a comprehensive selection of templates. Specialty pages such as Alarm, Trend, and SPC displays, come pre-built — all you have to do is add the relevant tag names, etc. More unique pages can be based on generic templates such as the Normal template. No matter what template you use, the basic elements, including borders, status bars and navigation tools, are already configured.

Tab-style template

The template includes user defined menu configuration, toolbars and native support for multi-monitor systems. The three most recent alarms are displayed on the bottom of each page.

The page navigation is defined using the menu configuration in the project. This provides a simple way to define your project structure.

Your templates can access the menu configuration to offer the right navigation design for your system.



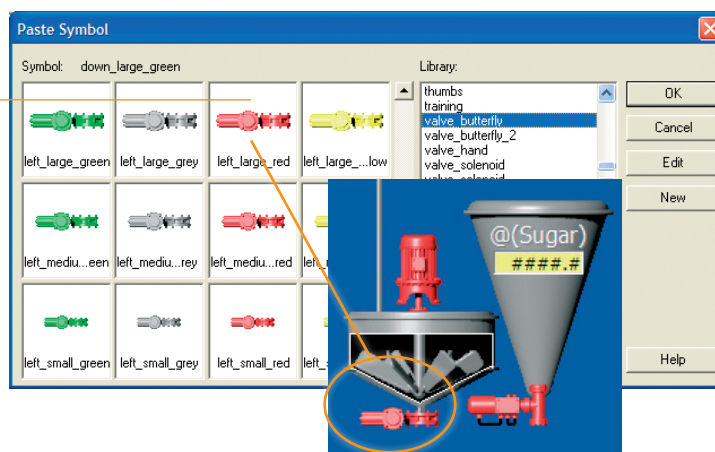
Symbols

If you use a particular graphic regularly, you can store it in a library as a symbol. Rather than constantly redrawing the graphic, you can then just paste the symbol from the library.

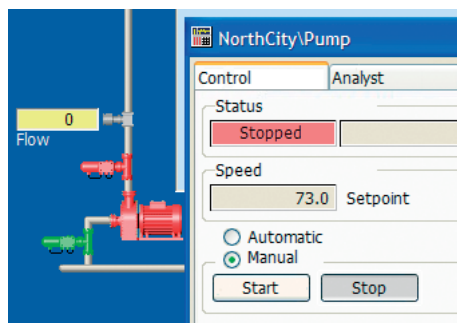
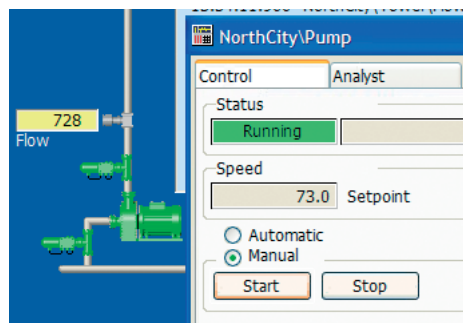
For example, if you need the same valve graphic on multiple pages as a static background picture, draw the valve, and copy it to the symbol library — it is now a symbol.



First check the standard symbol library shipped with Vijeo Citect. If the symbol exists then simply paste it onto the page. If not, draw the required symbol directly into the symbol library.



Symbols can change dynamically based on the state of a device. For example, you could assign two pump symbols to a device using different coloured symbols for running and stopped indications..



Vijeo Citect comes with several pre-defined symbol libraries and more libraries are available from the Vijeo Citect toolbox and website. Also supplied standard with Vijeo Citect 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.



At a glance

- Pre-defined and custom libraries
- Ongoing library development
- Changes to library updated automatically on all pages
- Over 500 symbols included

Symbols have many benefits

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.

Object-based Configuration

Typical examples of Genies include:

- Pumps
- Valves
- Values (with input)
- Tanks
- Conveyors
- Faceplates (on graphics screens)
- Any repeated configuration

Typical examples of Super Genies include:

Device popups

- Loop control
- Sequence control
- Duty/Standby
- PLC/RTW status
- Identical machine control
- Any repeated popup or page

Equipment database

The equipment database allows you to define a list of all the equipment objects in your system. The list can be accessed at runtime. Each equipment object can have properties defined such as a page reference. This database can be used to provide a cross reference, allowing for navigation from an alarm list.

SCADA systems comprize objects or devices which range from simple pushbuttons through pumps and valves to complex loop controllers, sequencers or motor control centres. When building your control system, you should use a common standard for the operator interface.

Vijeo Citect software enables you to quickly and easily develop your control system by providing object-based configuration tools for development. In addition, the use of object-based configuration reduces maintenance and helps to ensure a consistent operator interaction. Vijeo Citect provides existing libraries that can be extended and customized or enhanced to suit the requirements for your project, or you can simply build your own.

These tools are optimized by the use of a tagging standard within the device tags. A good tag naming convention reduces the amount of configuration entry and hence lowers the risk of errors.

Both internal and user defined libraries can be easily transferred between projects to leverage development or maintain a consistent corporate standard. In all cases, modifications made to enhance these libraries can be seamlessly retrofitted within previous Vijeo Citect projects.

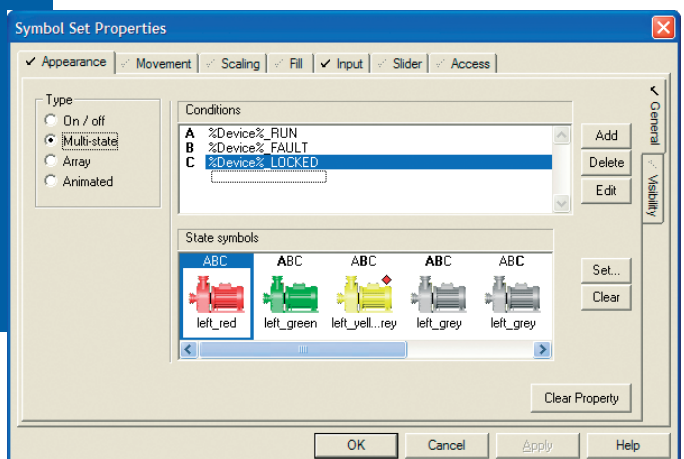
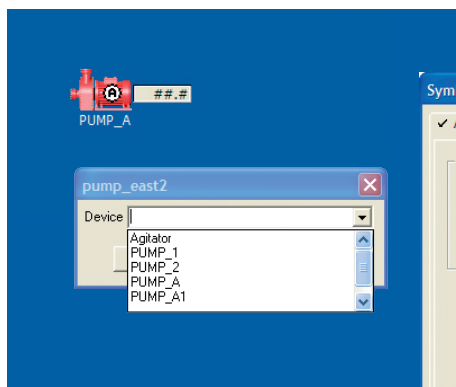
Genies

Vijeo Citect Genies act as a macro within project development. The Genie is built to combine any number of individual graphics objects together. A pump may consist of the pump display plus an auto/manual indication and an alarm indication. All of these configurations are grouped together in a Genie.

The configuration is made by combining fixed text with parameters. The parameters can represent a whole field alone or be combined with other parameters or fixed text to represent the contents of a field.

Optional parameters can be provided to enable a reduction in the number of Genies, resulting in reduced maintenance and testing costs. The optional parameters enable pumps without auto/manual control to hide this indication based on the fact that the auto/manual tag has not been defined.

Each parameter is exposed when the Genie is added to the graphics page. The form used to display the parameters can be tailored to include additional help information for the user or to provide a drop down list from the devices within the database.



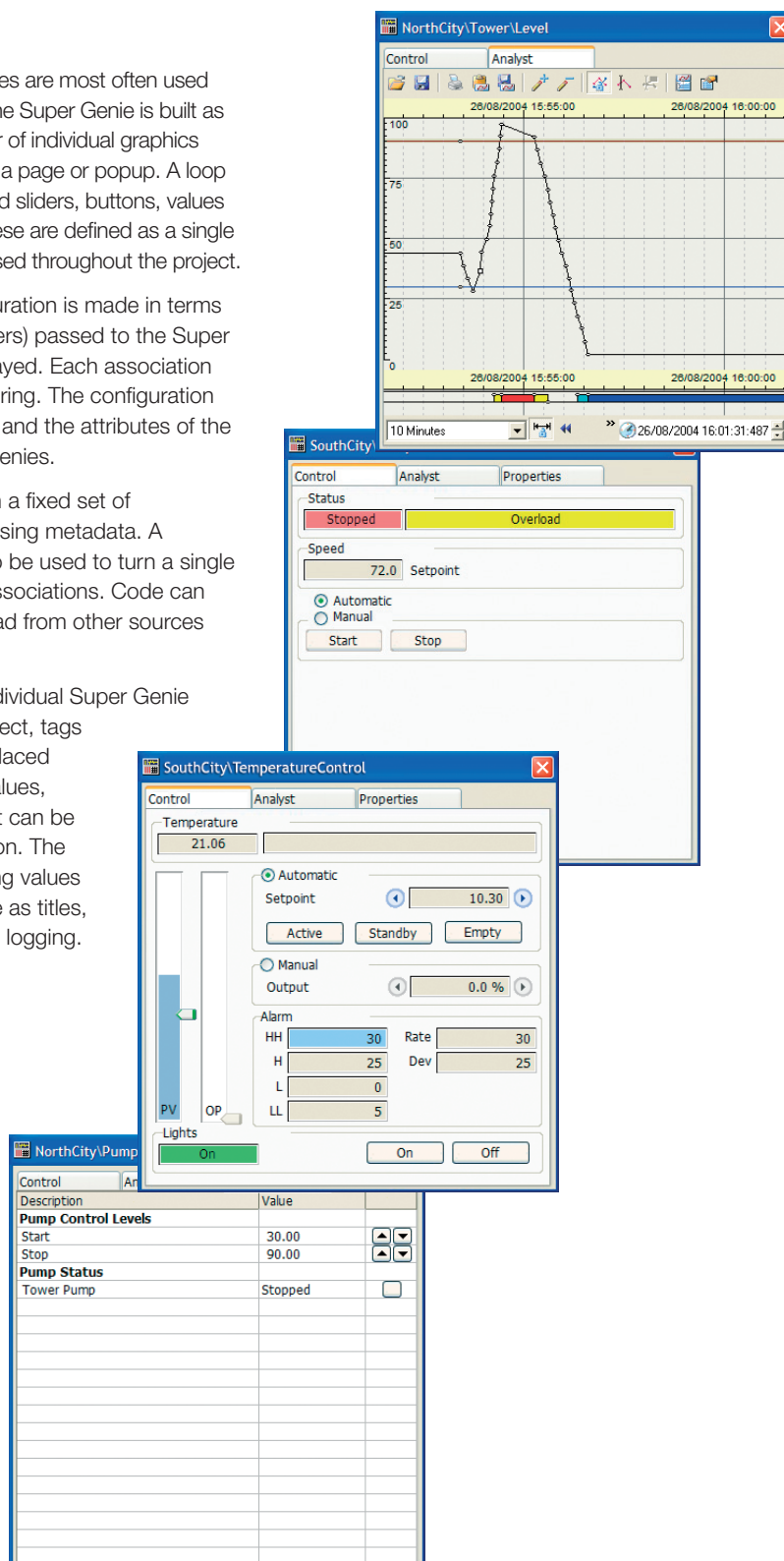
Super Genies

Vijeo Citect Super Genie pages are most often used for device control popups. The Super Genie is built as a combination of any number of individual graphics objects grouped together on a page or popup. A loop control popup may have trend sliders, buttons, values and other configurations. These are defined as a single Super Genie and can be reused throughout the project.

To enable reuse, the configuration is made in terms of associations (or parameters) passed to the Super Genie page when it is displayed. Each association represents a tag, value or string. The configuration can access both the values and the attributes of the tags passed to the Super Genies.

A Super Genie can be given a fixed set of associations from a Genie using metadata. A tagging convention can also be used to turn a single device name into a set of associations. Code can enable parameters to be read from other sources (databases, files).

To reduce the number of individual Super Genie pages required within a project, tags that do not exist can be replaced by default values. Default values, error values and a comment can be specified for each association. The user can also pass text string values into the Super Genie for use as titles, display information or within logging.



Genies and Super Genies have many benefits

You only need to draw and configure an object once. You can then save it to a library and use it over and over again.

When you change a Genie or Super Genie from the library, it will be automatically changed wherever you have used it throughout your project. (A Genie remains linked to its library unless you deliberately cut the link).

As with symbols, Genies and Super Genies save you disk space because you only save one copy of the actual configured object. They also reduce the amount of memory required by the runtime system.

Vijeo Citect has a library of pre-configured Genies and Super Genies that you can use in your Vijeo Citect system.

Operator Actions



At a glance

- Tool tips
- Sliders
- Keyboard commands
- Mouse touch commands
- Screen target regions
- Popup menus
- XP-style buttons

System pages and custom graphics utilize a variety of user-friendly commands and controls for operators to interact with the Vijeo Citect runtime. You can assign privileges to the different commands and controls as well as send a message to the command log each time an operator issues a command.

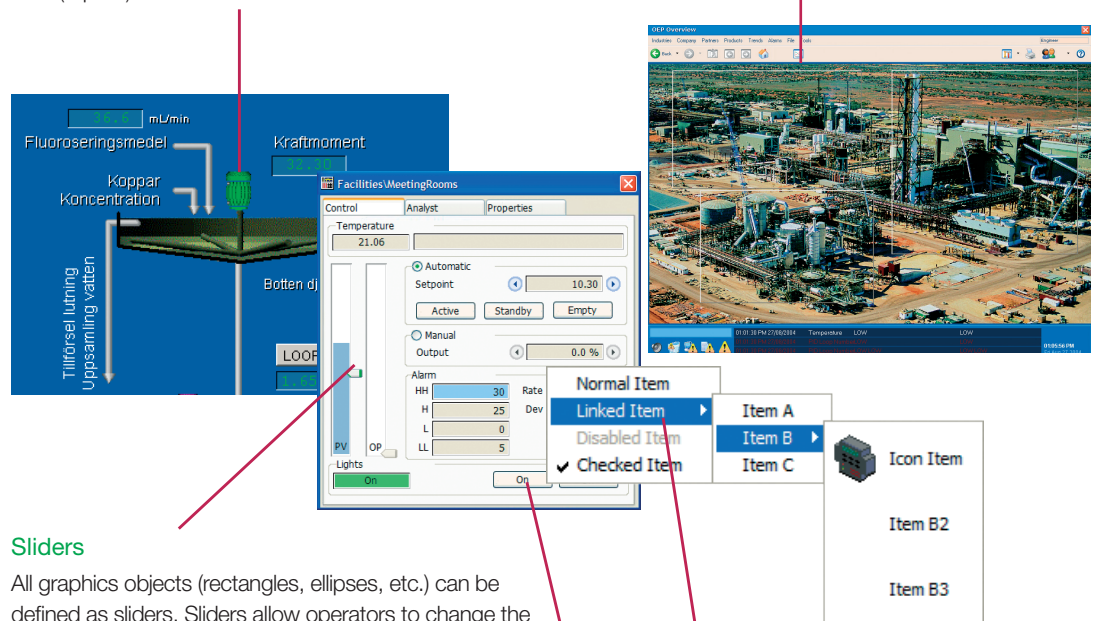
Touch Commands

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).

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.



Sliders

All graphics objects (rectangles, ellipses, etc.) can be defined as sliders. Sliders allow operators to change the value of analogue 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.

Keyboard Commands

Global (or system) keyboard commands can be issued from anywhere in the runtime system. 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.

Popup Menus

Popup menus simplify navigation and can also be used to trigger Cicode or CitectVBA functions.

Popup menus can be disabled, checked or linked to other menu items.

XP-style Buttons

There is an option to create buttons in the XP style with dynamic property support, which further saves time in training for operators who are already familiar with the XP environment.

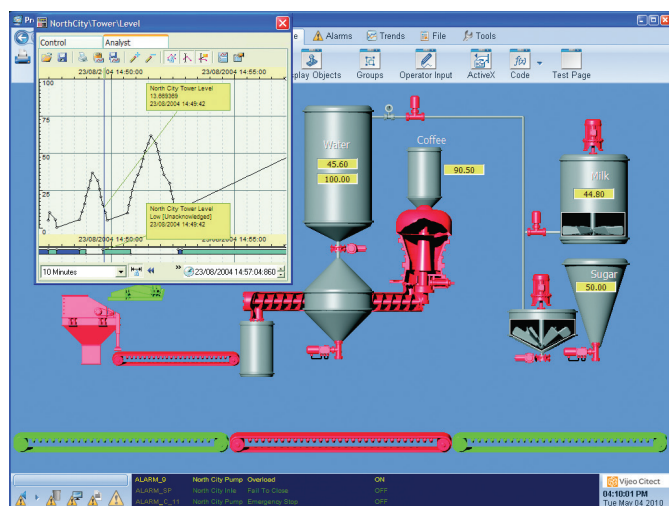
Process Analyst

Process Analyst is an intuitive visualization tool designed to help you analyze the cause of process disturbances and improve productivity in the process.

Process Analyst allows operators and process engineers to analyze the cause of process disturbances by bringing together trend and alarm data, which are traditionally stored separately. With Process Analyst, users can simply view them all on a single integrated display.

Complete flexibility is provided to the user on how the pens can be displayed. For example, they can be overlaid, stacked or placed in different panes to reduce clutter and make the display easier to read.

Process Analyst includes many unique features including true Daylight Savings Time support, accuracy to millisecond resolution, individual time axis per pen, customizable toolbars, rich printing and saving of all display settings for easy recall.



The Process Analyst window, displaying trend and alarm data, can be viewed simultaneously with your project screen for enhanced monitoring.

Examples of Use

Root Cause Analysis

When a process upset or disturbance occurs, finding the root cause is always time consuming. In the past, the process engineer had to compare trend data from the screen with alarm logs. With Process Analyst, all the engineer has to do is simply add any pen (analogue, digital, alarm) that could have contributed to the process upset to the display. Each process change can then be easily compared as alarms occur, enabling sophisticated analysis of the disturbance.

Compare Different Batches

With Process Analyst, it is easy to compare different batches in a single integrated view. Simply place all the variable tags, alarms and state changes for a batch unit on one pane, and the same set on a separate pane. Then the operator simply has to scroll one of the panes through time. Any differences in the batch execution will immediately be visible.

Sequence of Events

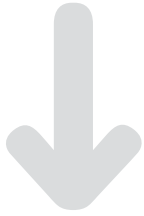
With SCADA systems, the data is distributed around a wide area and typically the RTUs collect the data at millisecond resolution and send it to Vijeo Citect every time it is polled. Process Analyst displays historical alarms and trends to millisecond accuracy, making it easy to determine the sequence of events.



Process Analyst is a vast improvement on existing SCADA systems and enables processes to be optimized by making it easier for operators to analyse disturbances.

Paul Donald, Telemetry Officer,
Central Highlands Water

Improve operations with Process Analyst



Easy to use

Process Analyst's capability to display such rich information requires it to have an easy-to-use, yet powerful navigation system. Every pen added to Process Analyst has a number of properties, including:

- Pen colour and name
- Tag properties such as engineering units, scales etc.
- Cursor values (multiple cursors are available)
- Data average / minimum / maximum

The information available is customizable, allowing you to add or remove any of the standard column types (e.g. engineering units), and also add custom columns.

Customizable

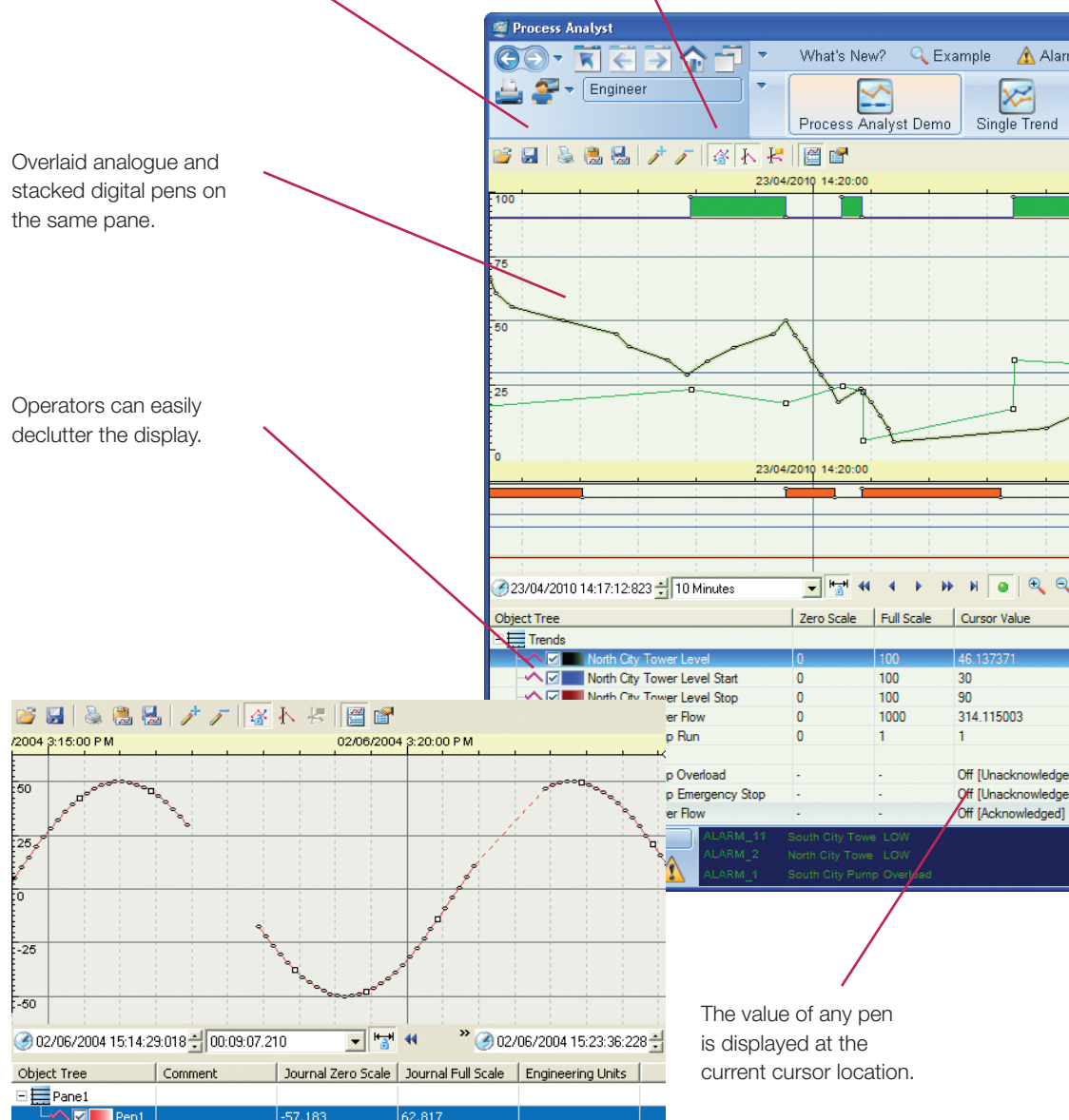
Users can select which buttons to appear on each instance of Process Analyst. The security access required can also be defined and users can add custom buttons for additional functionality.

Save the current view as either a template or process snapshot.

Overlaid analogue and stacked digital pens on the same panel.

Operators can easily declutter the display.

Individual pens can be unlocked, allowing their values to be compared in different time frames.



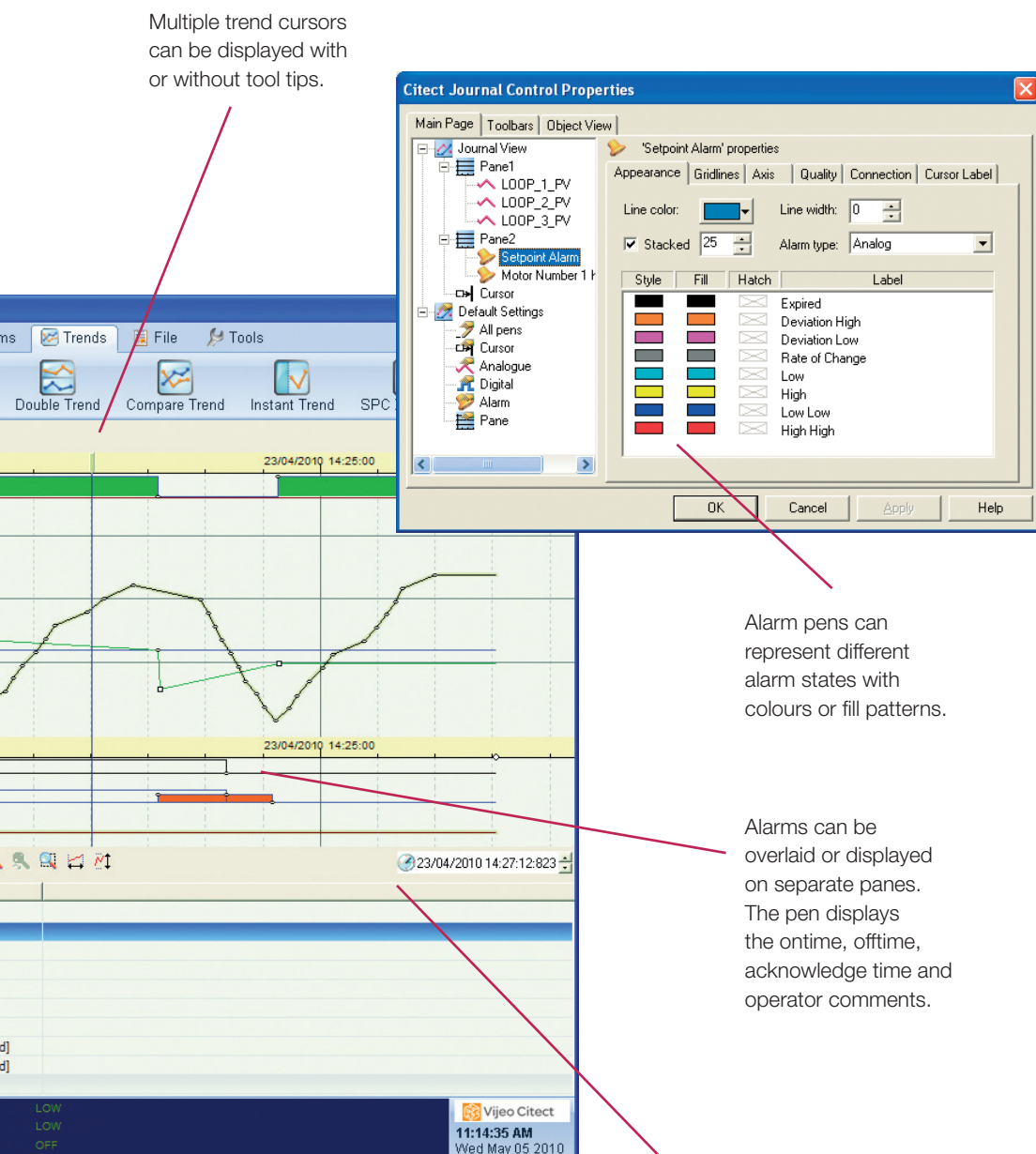
The value of any pen is displayed at the current cursor location.

Trend example showing different quality attributes.



At a glance

- Analyses the cause of process upsets quickly and simply
- Allows operators to recognize patterns that may lead to process disturbances
- Provides total flexibility on how you view and analyze your process
- High quality output to printers
- True daylight saving support
- Historical trend data pens can be added
- Alarm pens display the alarm states
- Variable tag pens can be added for instant trending



Customizable Trend Pages

Vijeo Citect trends are a seamless combination of real-time and historical data. When you display a Vijeo Citect trend page, you can monitor the current activity as it happens, and simply scroll back through time to view the trend history.

Vijeo Citect's trend task is client-server based. The Primary Trend Server collects and records the trend data, sending updates to a Standby Trend Server (if one exists) as requested. When a trend is displayed on a client computer, the client has only to request the necessary trend data from the Primary Trend Server.

You can choose to have redundancy by allocating a Standby Trend Server (using a wizard). If the Primary Trend Server fails, the Standby will instantly assume its role, obtaining data directly through the I/O server and responding to all client requests. Because the Standby Trend Server tracks all trend data, even when the Primary is operating, no data is lost if the Primary fails. When restarted, the failed computer receives updates from the new Primary Server, and becomes the Standby Trend Server.

Vijeo Citect'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. Vijeo Citect 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 behaviour. Trend samples can be taken periodically, or when specific events occur in your system. Sampling rates can be as frequent as 10 milliseconds and as moderate as 24 hours.

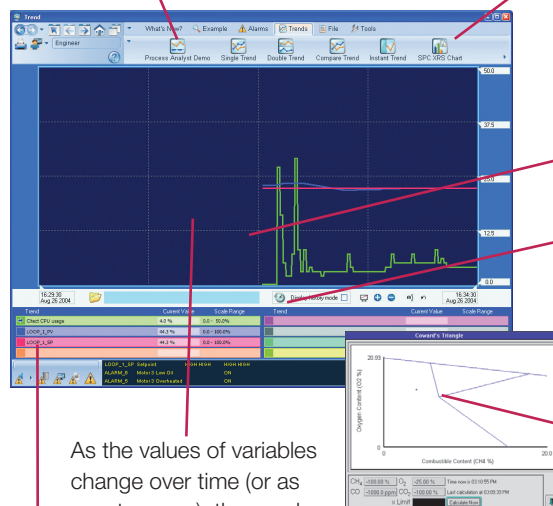
Vijeo Citect software comes with a host of ready-made Process Analyst templates, allowing you to quickly create trend graphs complete with navigation tools and dynamic readouts from the plant floor. You can display trends in single, double or popup windows, but if you feel that you want something specific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

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

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

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

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



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

The X,Y plot feature is very flexible, allowing you a high level of customization. You can display your plots on screen or as a printout — using the full colour palette.

Example: a Vijeo Citect plot used in underground mining (Coward's Triangle), 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.

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

Statistical Process Control (SPC)

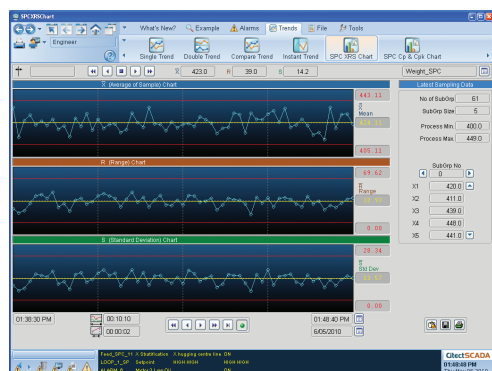
For an easy-to-understand graphical indication on product quality, you can use SPC charts. Prevent out of limit deviations before they happen with Vijeo Citect's easy-to-understand SPC charts.



At a glance

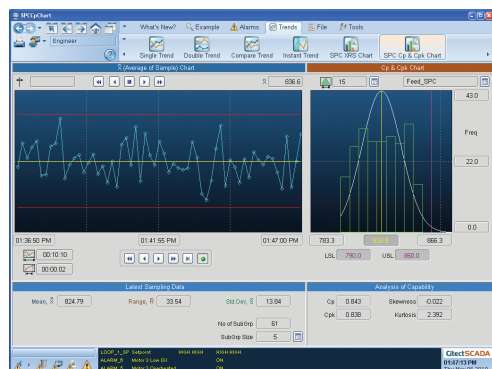
- Mean, Range and Standard Deviation (XRS)
- Pre-configured calculation routines
- Template-based pages (easy configuration)
- Capability charts
- Pareto charts
- SPC alarms are integrated into the alarming system

Vijeo Citect provides the three types of charts most commonly used for statistical analysis.



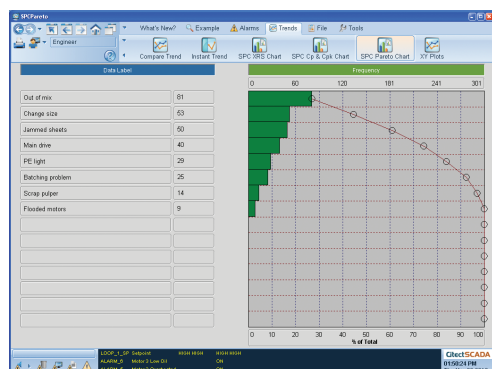
Control (XRS) Charts

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.



Capability Charts

You can use capability charts to determine whether your process is meeting your specifications. Vijeo Citect is pre-configured to arrange the data and make all necessary calculations.



Pareto Charts

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

Fast and Reliable Alarms

There are often many alarms that trigger simultaneously.

You can specify the action to be taken when the alarms are triggered (e.g. activate an audible alarm such as a .WAV file).

To assist operators in dealing with alarms, you can create graphic help pages that contain information about the alarms, such as the action an operator must perform to correct the situation. You can display these pages automatically when the alarm occurs, or only when an operator specifically requests help.

An efficient alarm system allows you to quickly isolate and identify faults, reducing the amount of downtime. The Vijeo Citect 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 Vijeo Citect Alarm Server. Any Vijeo Citect control client can display alarms and acknowledge alarms. This eliminates duplicated processing, 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 Vijeo Citect alarm system.

Working in conjunction with the I/O device, Vijeo Citect'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.

Quick recognition and identification of alarms is important. Vijeo Citect displays alarms on dedicated alarm pages, but the most recent alarms are always visible on every page. Alarms can be organized by colour, 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.

For system alarms, Vijeo Citect also continually runs diagnostic routines to check both its own operation and all peripheral equipment, such as I/O devices. This facility is fully integrated within Vijeo Citect, and no configuration is necessary.

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.

Date	Time	Tag
5/05/2011	02:45:22 PM	ALARM_6
5/05/2011	02:45:21 PM	ALARM_8
5/05/2011	02:45:17 PM	ALARM_3
5/05/2011	02:45:17 PM	ALARM_1
5/05/2011	02:46:30 PM	Feed_SPC_11
5/05/2011	02:46:02 PM	Entry_Fault_M
28/02/2011	11:01:24 PM	Feed_SPC_6
28/02/2011	08:41:08 PM	Feed_SPC_8
28/02/2011	04:43:40 PM	Feed_SPC_9
5/05/2011	02:46:42 PM	ALARM_2
5/05/2011	02:46:40 PM	ALARM_7
7/01/2011	12:36:25 PM	Temp
7/01/2011	12:36:25 PM	LOOP_1_SP
7/01/2011	12:36:25 PM	Bed_Depth

ALARM_6 Motor 3 Low Oil ON
 ALARM_8 Motor 4 Low Oil ON
 ALARM_3 Motor 2 Overheated ON

Columns can be resized to make it possible to view alarm cells.

Default templates provide support for easily adding or removing alarm columns from the view



At a glance

- Analogue, digital, SPC and custom alarms
- Integrated hardware/ diagnostic alarms
- Millisecond resolution
- Configurable display formats
- Summary/history logging
- Filter is customizable using alarm properties
- Acknowledge from multiple network computers
- ODBC, DBF, CSV and ASCII data formats
- Support for RTU-based alarms

Alarm Properties

Alarm properties can be used to change the appearance of your graphics objects — when a specific alarm occurs, you might change the colour of a symbol from green to red, or display a ‘danger’ icon.

- Alarm Tag, Alarm Name, Alarm Description
- Alarm Category, Help Page, Area, Privilege
- Disabled, Acknowledged, Unacknowledged
- On Time, Off Time, On Date, Off Date, Alarm Duration, Acknowledged Time/Date
- Operator Definable Comment
- Alarm State for High High, High, Low, Low Low, Rate, Deviation
- Value of the variable and the alarm deadband (hysteresis)
- Custom Filters

Alarm Filters

A good alarm system should not overwhelm operators with excessive alarm information. Vijeo Citect allows the operator to filter alarms based on any alarm property. Filters can be saved and automatically loaded based on the current user.

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

Operators can add/remove and resize columns at runtime to display the desired information.

Name	State	User Comment
Motor 3 Low Oil	ON	
Motor 4 Low Oil	ON	
Motor 2 Overheated	ON	
Motor 1 Overheated	ON	
X Stratification	OFF	
Entry Fault Multidigital	OFF	
XUpTrend	OFF	
XGradualUp	OFF	
XGradualDn	OFF	
Motor 1 Low Oil	ON	
Motor 4 Overheated	ON	
Temperature	LOW LOW	
Setpoint	LOW LOW	
Bed Depth	LOW	

Advanced Alarm Filter

Match Dates/Times

Date Time To Date Time

Match Text

Tag

Name

Description

Match Type

State ON ON OFF HIGH HIGH

Type Unacknowledged Acknowledged Unacknowledged Disabled

Area

Category

Priority

Apply Cancel

Integrated Video

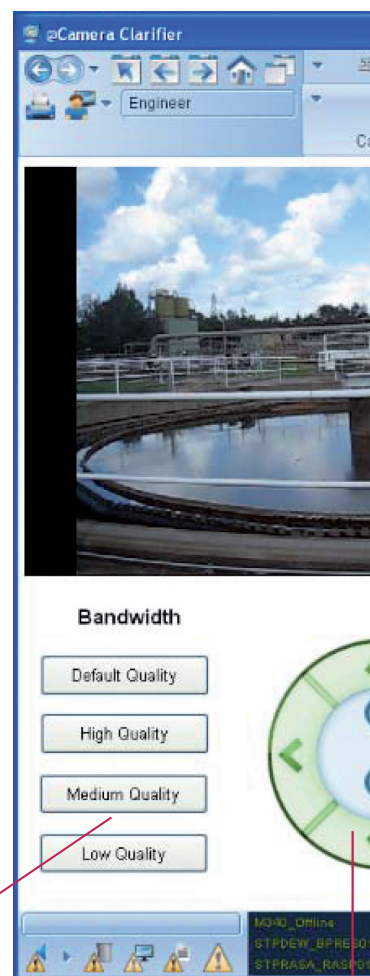
With real-time video display in Vijeo Citect, operators can live video on their screens direct from IP cameras located across remote, as well as central, locations. User-friendly controls like Pan, Tilt and Zoom and event-triggered display features make this enhanced solution an intuitive set of 'eyes on site' for the operator.

Surveillance and remote monitoring & control functions have become critical for many companies. They seek solutions that can strengthen site-wide security and tighten access control to secured areas. They also require the ability to closely monitor critical processes, high-value equipment and strategic production materials. These tasks can all be accomplished thanks to Vijeo Citect's ability to view video feed from Pelco cameras on its SCADA screens.

Integrating Pelco cameras allows live video to be viewed within Vijeo Citect. Third party cameras can be integrated through Pelco DVRs (Digital Video Recorders). Operators can also control cameras from a web client, thereby providing facilities management with remote security monitoring.

The advantages of being able to use Pelco cameras in Vijeo Citect include:

- The convenience of having video displays directly on operators' SCADA screens
- User-friendly controls like Pan, Tilt, Zoom (PTZ), Brightness and Contrast facilitate operator efficiency
- Additional features such as pop-up display for motion/intrusion detection and linking of events
- Cameras can be added, removed or edited. The video streaming bandwidth (kilobytes per second) can be adjusted and selected from amongst several levels
- Cameras can also be controlled remotely from a web client
- Automatically switch to another camera in a viewer or to a different preset, or run a pattern.



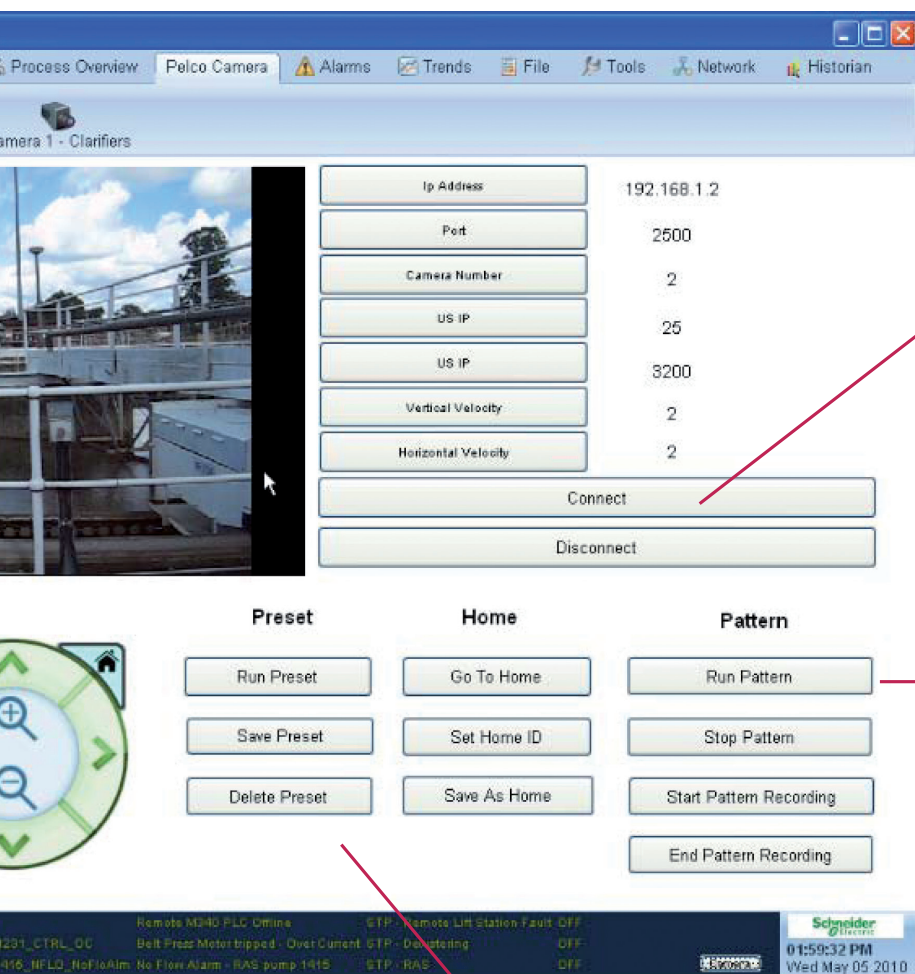
Change the quality of the video bandwidth.

Zoom, pan and tilt the camera using the controller.



Pelco Cameras

Pelco is a world leader in the design, development and manufacture of video and security systems and equipment. With a long and prestigious history of offering high quality products and exceptional customer service, Pelco has become one of the most sought after product suppliers in the security industry.



Connect or disconnect the camera and set its IP address.

Run or stop the camera's run patterns.

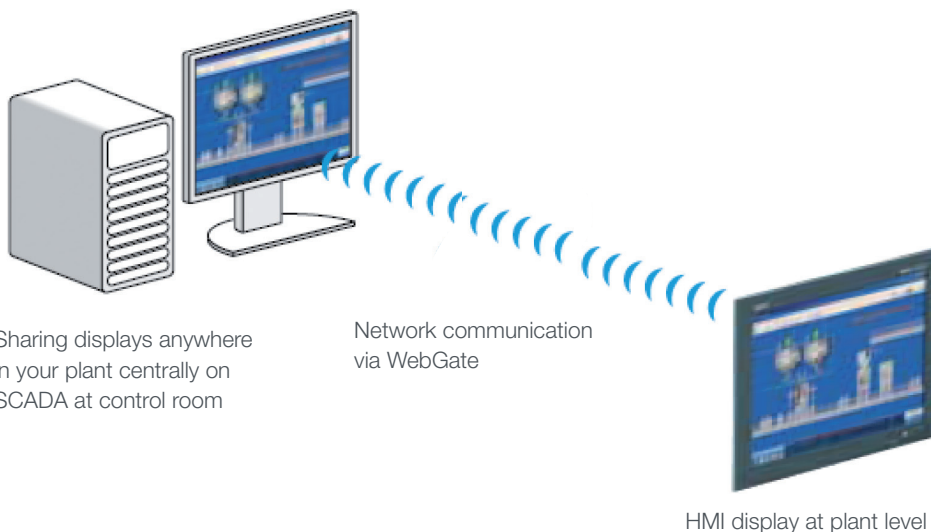
Go to the preset camera positions; you can run or stop the camera's preset patterns.

Plant Floor Visualization

In an increasingly automated environment operators and control systems engineers are challenged by the need to have information and control available at the plant floor and the control room without duplicating the engineering, commissioning and system maintenance efforts.

Screen Sharing

For applications that require panel interfaces or have machines on the plant floor Schneider Electric utilizes Vijeo Designer software and Magelis hardware to rapidly build and maintain user interfaces. When these panel interfaces are part of a larger control system Vijeo Citect provides (via WebGate) the ability to display and interact with the plant floor interfaces within the SCADA system. Using WebGate operators can access all the screens on the panel as if they were standing on the plant floor.



At a glance

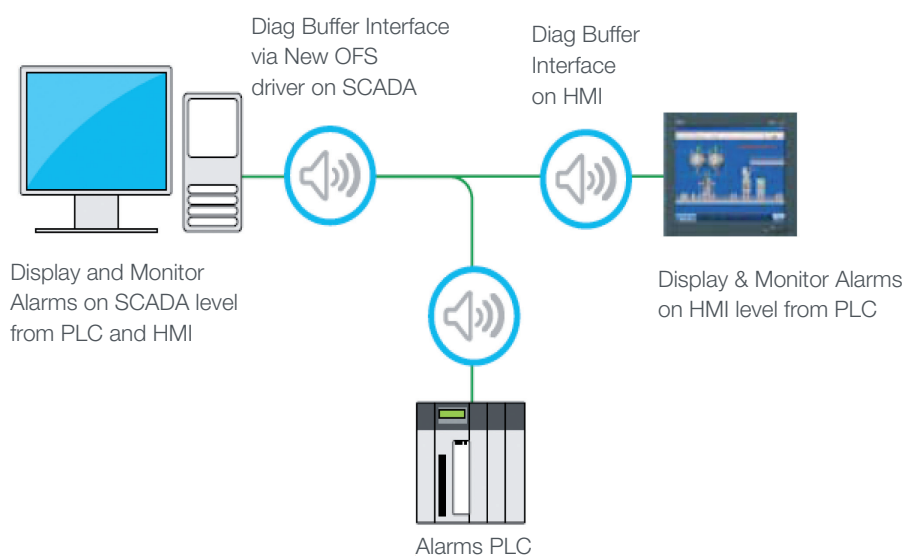
- Interact with HMI screens within the SCADA system
- View HMI displays through an Internet browser
- Perform remote maintenance on HMIs
- Control and monitor HMIs from anywhere in the world

WebGate brings PLC closer to Vijeo Citect

The WebGate control object within Vijeo Citect allows you to remotely view HMI displays, and read and write data from your Magelis terminals and Schneider Electric PLCs and devices. View all the panels from across your plant at one centralized and truly unified operator interface.

Alarm Sharing

As plant floor interfaces become more complex customers also require the ability to share alarming status between plant floor interfaces and the control room. The diagnostic buffer within the Schneider Electric Unity processors provides both HMI and SCADA systems a common alarm repository. On both HMI and SCADA system screens, alarms stored in the Unity processors are displayed beside local alarms. Acknowledgement of alarms on either system is reflected globally.



Plant Floor Hardware

For applications where the customer has the need for richer controls even at the plant floor the ability to host Vijeo Citect on our extensive range of Magellis hardware provides a perfect platform for the SCADA system. The latest Box PC design is able to support the hosting of remote client or server applications in almost any environment.



Universal Box PC: fanless for harsh environments

Performance Box PC: high performance industrial PC

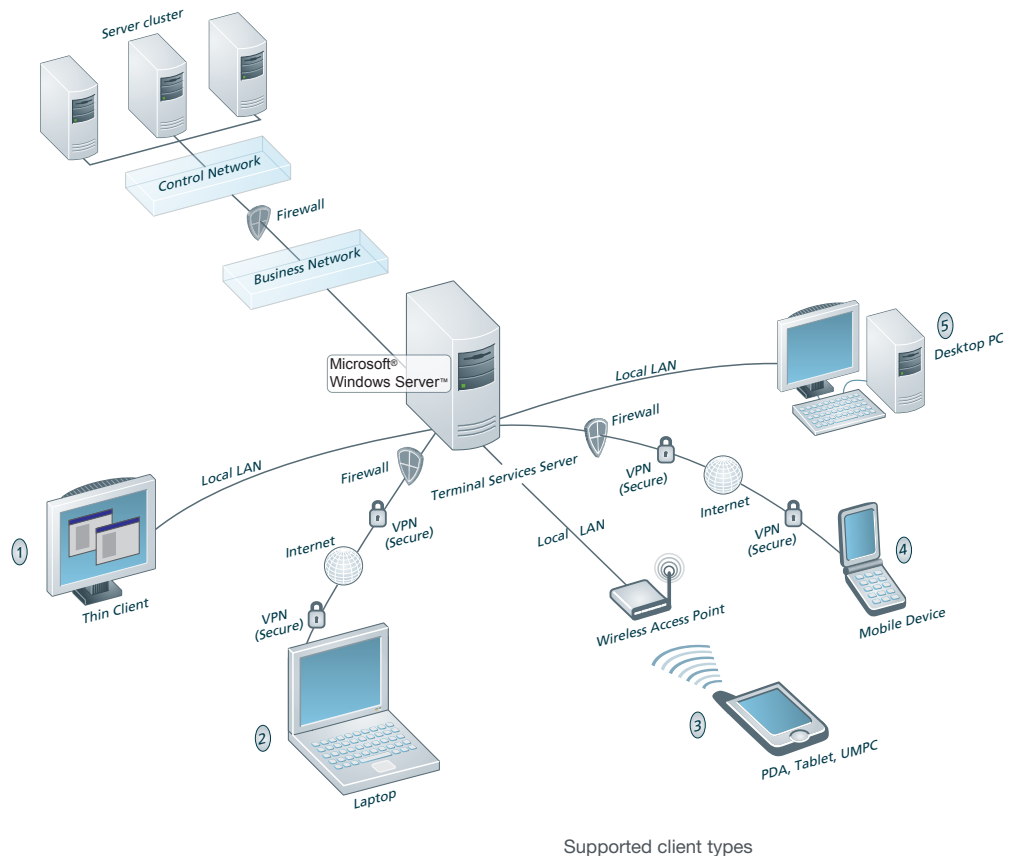


Mobility Solutions



At a glance

- Remote application control
- Wireless access
- Multiple platforms and devices
- Easy update to existing applications
- Increased reliability
- Decreased costs to deploy automation projects
- Reduced implementation time



Supported client types

Vijeo Citect's mobility solutions extend the capabilities of Vijeo Citect software by providing easy access to the SCADA application from several different software platforms and devices. This increases visibility into the plant's real-time processes and can lead to more intelligent decisions.

With the Vijeo Citect mobility solutions, remote control and application shadowing have become possible. Designated users can dial in via a remote access server and request simultaneous control of the session. Our mobility solutions also support wireless clients throughout the plant operation for easy mobile access to Vijeo Citect applications.

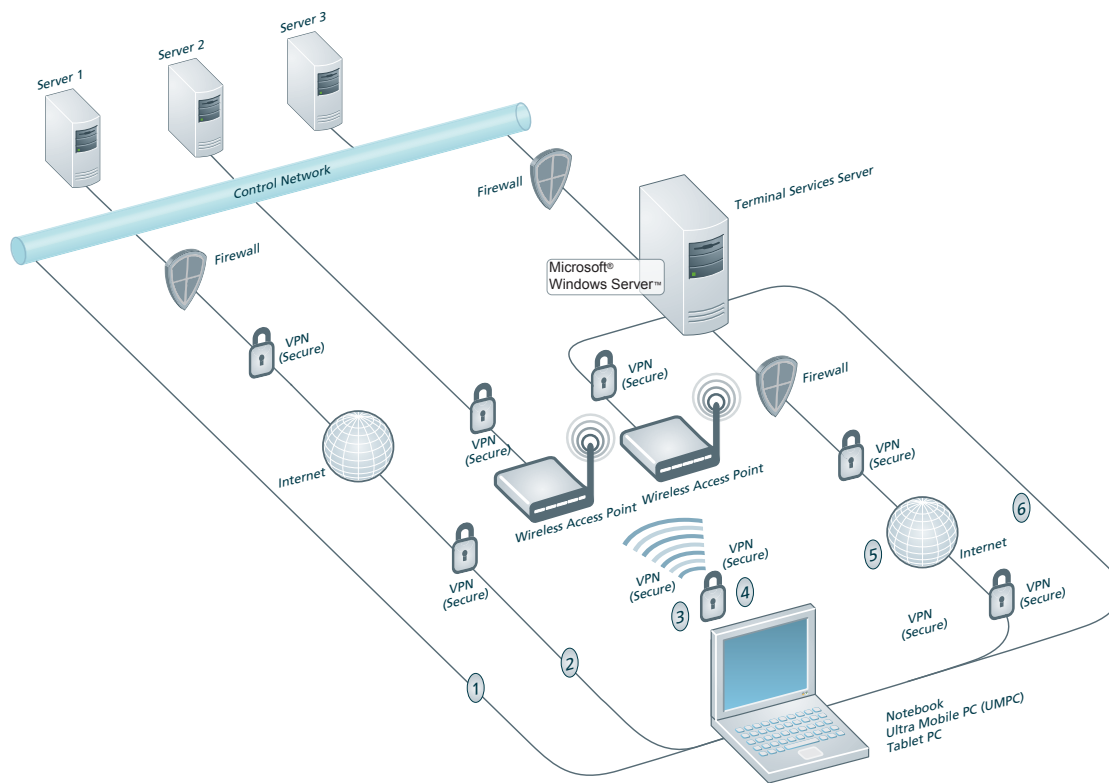
Virtually any wireless remote device can be used over any TCP/IP connection. This brings your Vijeo Citect system to you anywhere you go.

Increase network flexibility

- Have a computer network adapted to your enterprise
- Enable remote access
- Access your SCADA system from almost anywhere
- Only requirements for clients are screen, keyboard and sufficient circuitry

Improve data security

- Less vulnerable to hacking
- Focus your security measures on the server while ignoring the clients because all data is processed on the server
- No data loss if client is damaged
- When operating over the Internet, Virtual Private Networks (VPNs) are recommended for data encryption



Connection methods

Minimize downtime

- Save time: upgrade your entire network with a single operation
- Install only on the server side
- Any future software upgrades are limited to the server
- Vijeo Citect project files exist only on the Vijeo Citect server but are available to the entire network

Mobile visualization and control – go anywhere

Vijeo Citect for Terminal Services software gives users the mobility and flexibility to view Vijeo Citect applications through:

- Hardware systems
- Thin-client terminals
- PDAs
- Internet browsers

Hand-held PDAs can display Vijeo Citect for Terminal Services applications, with the added benefits of mobility and constant application supervision:

- Empower users
- Increase productivity
- Give users mobile visualization and control
- Go anywhere and stay in control

Integrated Reports



Vijeo Citect's reports system is a fully integrated feature of the product. When you invest in Vijeo Citect software, you automatically receive the tools you need to create and run attractive, informative reports.

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)

Shift Report

24 March 2011

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
Yield:	0.069	Kg/L

A Vijeo Citect 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 Vijeo Citect 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 or change recipes.

Reports can be displayed on a page at runtime, printed when the report runs or saved for printing or display at a later date. You can use a text editor or word processor to view, edit or print these reports. Your reports can be saved in HTML format, so that they can be viewed over the Internet, using a standard web browser.

For more sophisticated reports or reports that integrate data from multiple SCADA systems, CitectHistorian should be used. It is a powerful reporting and analysis tool that seamlessly collects, historizes and reports data from multiple SCADA systems. Users can utilize the integrated database containing trend, alarm and event data to get a complete understanding of plant operations.

Grower Status

24 March 2011

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%

Database Viewer

The DatabaseExchange is an ActiveX control that enhances the ability of Vijeo Citect to utilize database information.

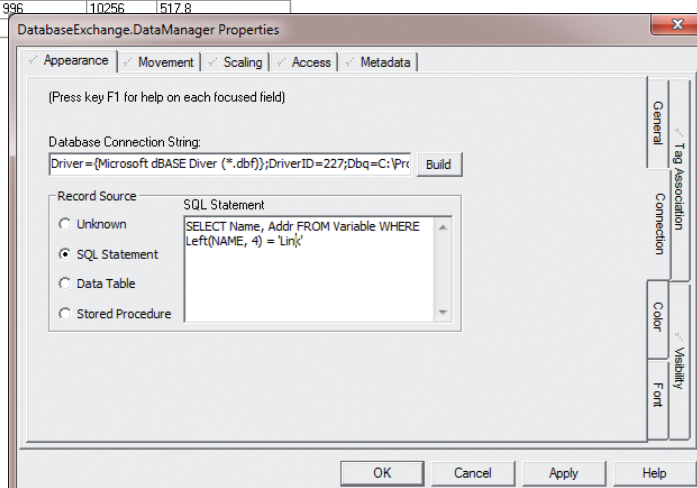


At a glance

- Menus can be positioned at the top or bottom of the control.
- The control supports parameterized queries of a Microsoft Access database.

Filter	Download	Upload	Hide Cols	Show All	Print	Setting	Update	Refresh
Country	LastName	FirstName	ShippedDate	OrderID	SaleAmount			
UK	Suyama	Michael	10/07/1996	10249	1863.4			
USA	Peacock	Margaret	11/07/1996	10252	3597.9			
USA	Peacock	Margaret	12/07/1996	10250	1552.6			
USA	Leverling	Janet	15/07/1996	10251	654.06			
UK	Dodsworth	Anne	15/07/1996	10255	2490.5			
UK	Buchanan	Steven	16/07/1996	10248	440			
USA	Leverling	Janet	16/07/1996	10253	1444.8			
USA	Leverling	Janet	17/07/1996	10256	517.8			

The returned data ready to display or exchange



Use the power of SQL directly from Vijeo Citect.

The DatabaseExchange will display data from any configured database (via ODBC) within an operator's screen. The data displayed can be controlled by a query that is able to be configured within the project. The DatabaseExchange is able to react to settings within the control system as operators can edit data within the control. The data can also be altered via code at runtime. These changes will automatically persist to the database.

As well as displaying information from the database, the control enables the user to define tags for each column within the data returned. The user is then able to select to upload or download information between these tags and the database. In this way, machine setup parameters or set points can be loaded from a database or persisted to database after an optimal performance. The newly uploaded of data will replace the existing data if a row is selected or else an additional row of data will be added to the database.

The DatabaseExchange is integrated into the Graphics Builder toolbar.

Project Development

Vijeo Citect 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 centred around the Vijeo Citect Explorer, which is used to create and manage projects.

Vijeo Citect Explorer can be customized to suit special use and OEM applications. Menus, toolbar buttons and features can be altered or removed.

Clients can be installed for runtime only

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

Vijeo Citect software provides tools to enable rapid development of small and large projects alike. Each project can be divided into a large number of included projects. Each of these projects can be worked on by different developers in a variety of locations. In these cases, it is difficult to maintain control of project standards and merge changes from different teams together. Vijeo Citect included projects enable this to occur without placing additional effort on the development teams.

Vijeo Citect manages standards within a project by placing all the standard symbols, objects and user interfaces within a single base project. Each development team can include this base project within their own sub-projects and have access to all the project standards. When standards are changed or updated, the new base project can be sent to development teams to update their sub-projects and see the changes within their project.

Vijeo Citect facilitates remote development of projects by enabling any Vijeo Citect projects to be combined together. A remote developer can include the project standards as well as their own section of development. This can be used during development of the existing project or during maintenance – a single project can be updated by an Integrator at the same time as small changes are being made by the local maintenance team.

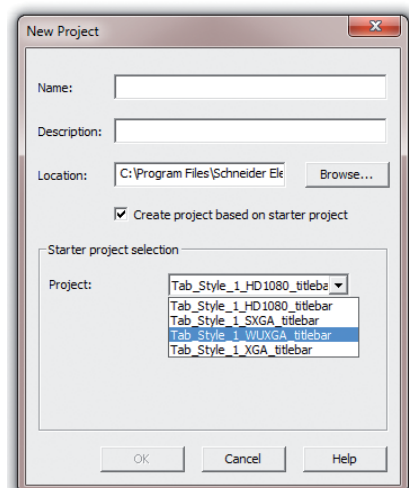
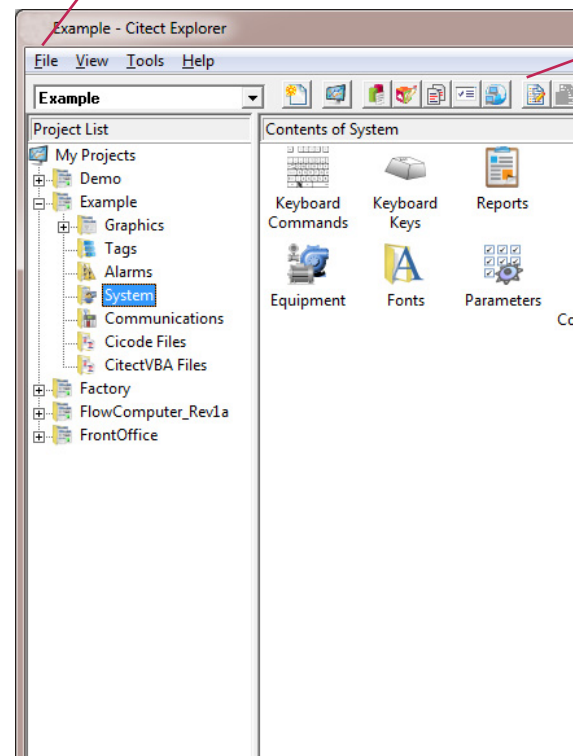
Starter Project

When creating a new project, you can select to use a starter project. Each starter project includes configuration such as alarm pages, alarm fonts and shutdown confirmation. The configuration is added to your new project, so it is easy to get started and customize in the future.

Find and Replace feature

The Find and Replace feature enables you to find and replace text strings within a single graphics page, template, Graphics Builder or across multiple projects when accessed in the Project Editor. There is a warning for unused tags on full compile, which identifies unused tags. All these contribute to a significant reduction in the configuration time.

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





Use the tool bar to switch to the other applications in the Vijeo Citect environment (Project Editor, Graphics Builder, Vijeo Citect Batch, Cicode Editor, Online Help).

Vijeo Citect can work on projects located on file servers. Simply use “link” and “unlink” to bring projects from the file server into the development environment.

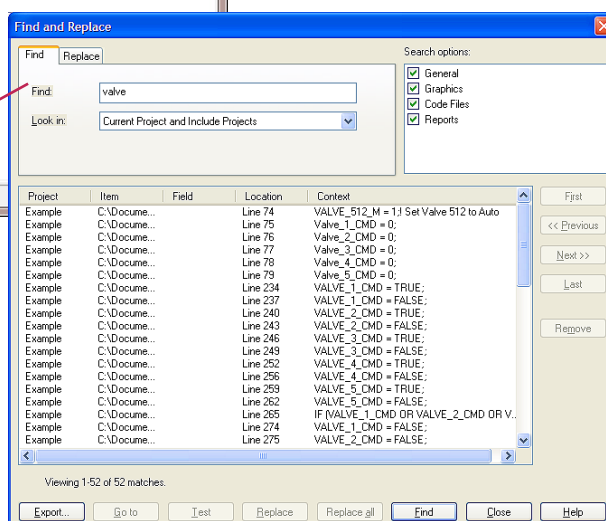
At a glance

- Quick, easy access
- Familiar interface
- Simple, convenient management of projects
- Single step backup and restore of entire project

Vijeo Citect provides one-step backup and restore functions for all parts of a project. A project can be backed up to removable media, your local drive or a network drive.

The Vijeo Citect development environment can open any number of projects. This enables CIPs to edit projects from different customers at the same time. The projects are displayed in the tree. Their file structure is displayed as you navigate with the + and – symbols.

Configuration is made easy with the Find and Replace feature.



Vijeo Citect forms and dialogues have a Help button which invokes context sensitive help.

Project Development: Flexible

Cicode

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 Vijeo Citect users with unmatched flexibility for extending the functionality of their SCADA/HMI systems without compromising system performance.

CitectVBA

CitectVBA is a Visual Basic-compatible scripting language and is perfect for integrating Vijeo Citect with ActiveX objects and third party applications. CitectVBA utilizes the Cicode engine to ensure the running code is multi-threaded.

Events

Events can be set up so that they trigger Cicode 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 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

Many applications have special requirements. To provide you with maximum flexibility and power, Vijeo Citect comes with two programming languages: Cicode and CiVBA. Both languages can be used to extend the data available to most fields in your system configuration.

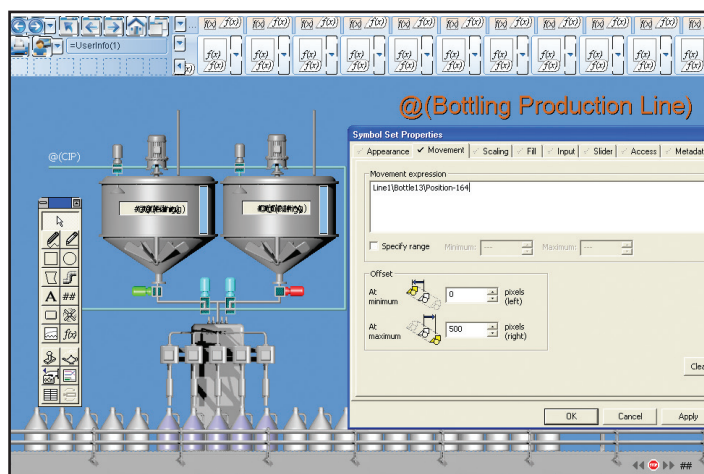
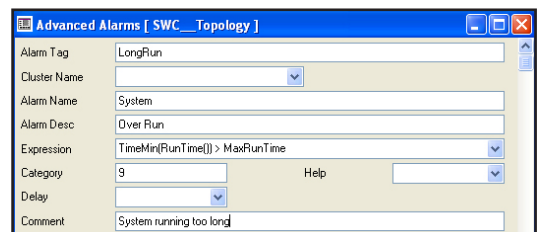
Almost all of the fields available within the graphics and database configuration are able to utilize an "expression" rather than just a tag value. Adding an expression allows you to smooth an analogue value for trending, transform numeric values into strings or simply combine multiple tags in a simple expression.

There is an extensive library of functions for both Cicode and CitectVBA which can be directly accessed within an expression field. Additionally, you can create new functions using a combination of in-built or other user-defined functions.

Code can also be triggered by events or buttons within the user interface. This code runs as a separate thread within Vijeo Citect and gives access to enhanced functionalities within the system. For example, it can retrieve information from remote servers, call databases and external libraries or spawn additional threads to wait for events in the future.

To aide with code diagnostics, Vijeo Citect provides comprehensive logging and tracing.

The Vijeo Citect debugger provides a step-by-step debugging system for code with access to the state of all internal and external variables. Additional debug traces can be activated before compilation or at runtime in order to track the operation of real-time or time sensitive code within the SCADA system. Combining the debugger and detailed tracing provides the tools to rapidly diagnose any problem within your Vijeo Citect system.



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



At a glance

- Easy-to-use
- Industry standard
- Pre-emptive
- Multi-tasking
- Compiled for optimal performance — not interpreted or scripted
- Extends the functionality of Vijeo Citect
- Integrates seamlessly as part of Vijeo Citect
- Proven, robust language
- Over 650 SCADA functions included

Breakpoints

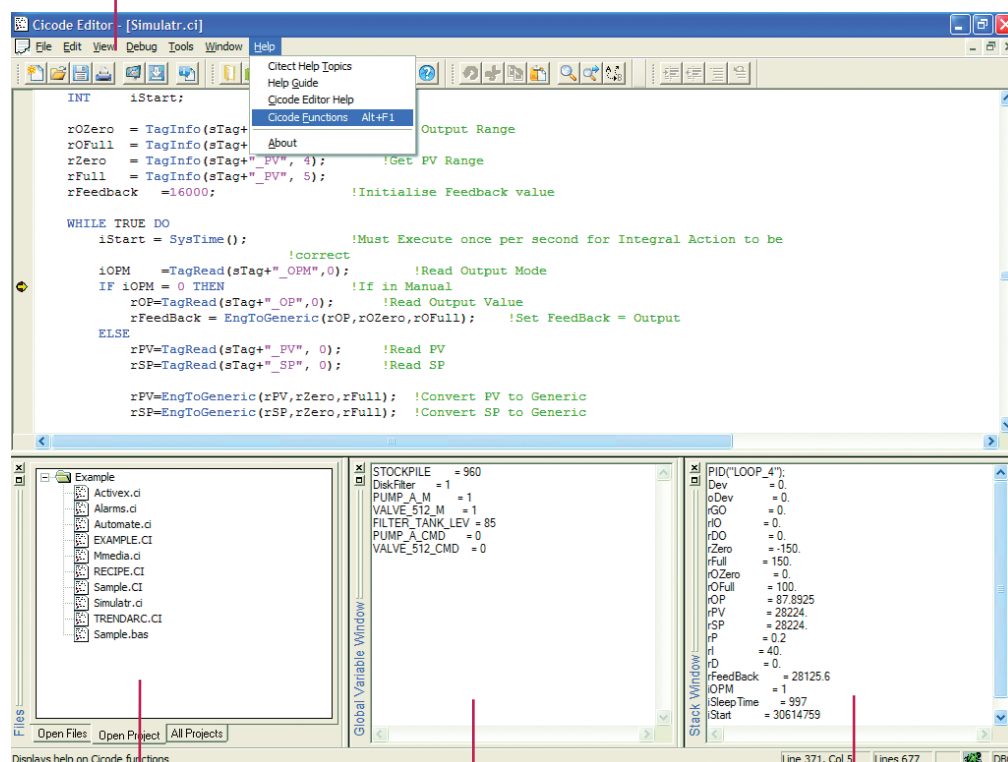
To debug a function, you must first stop the code at a desirable point. The DebugBreak function, a manually inserted breakpoint or a hardware error will halt a Cicode thread.

Stepping through CiCode

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
- Continue



The Files window displays all Cicode and CitectVBA files for each project linked to the development environment.

The Global Variable window displays the current value of each global variable.

The Stack window displays the functions called, their parameters and the value of local variables within each function.

Online Help



Vijeo Citect's Online Help is a comprehensive package, logically structured, easy to find and easy to understand. It is accessible in a number of different ways from any part of the Vijeo Citect system.

At a glance

- Comprehensive coverage (over 4000 pages)
- Context sensitive
- Effective search facility
- Web and PC-based help

Vijeo Citect dialogues 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.

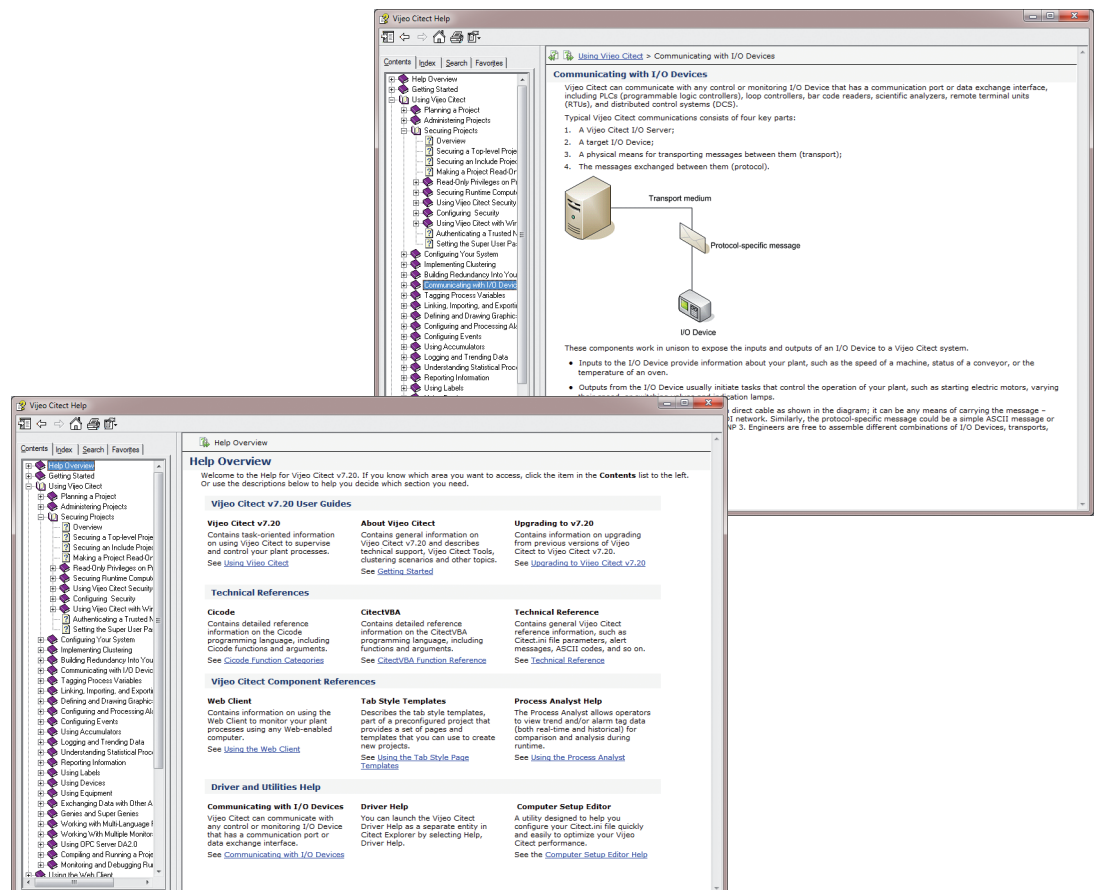
Of course, you can always just press the Help Topics button to the right of the toolbar and display the Contents.

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 require, the Vijeo Citect Online Help provides the tools to find it.

Vijeo Citect's Online Help Index operates using standard Windows functionality. To find the

information you need, just type part of a keyword — the keyword list scrolls automatically to the closest match. You can also do a full text search using the Find facility.

Vijeo Citect's Online Help provides easy access to the information you need. It includes a logical grouping of Help items on the Vijeo Citect Help Overview page, easy access to driver Help, and the use of "breadcrumbs" to facilitate navigation.

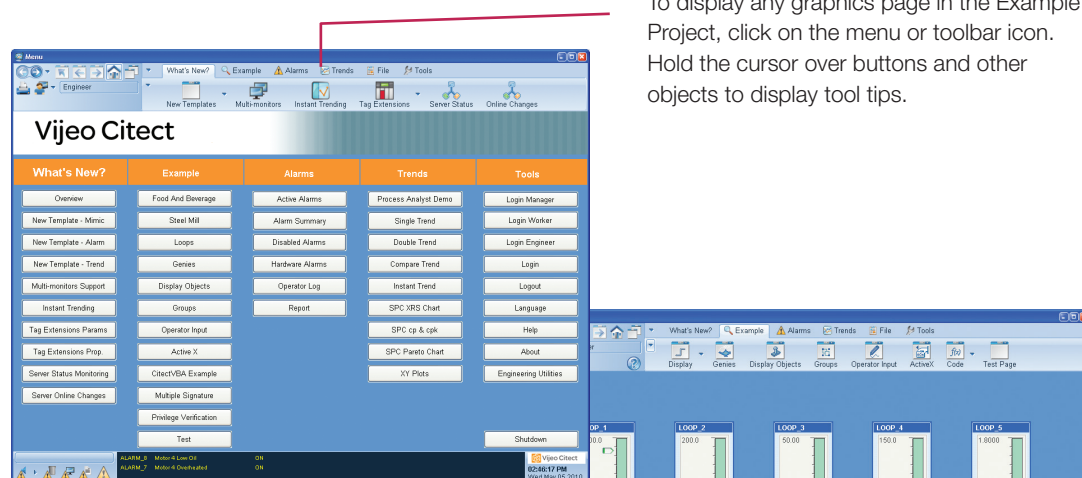


Example Project

Example Projects are supplied with Vijeo Citect based on different templates. These are fully configured projects that are ready to run and can be used to give you 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.



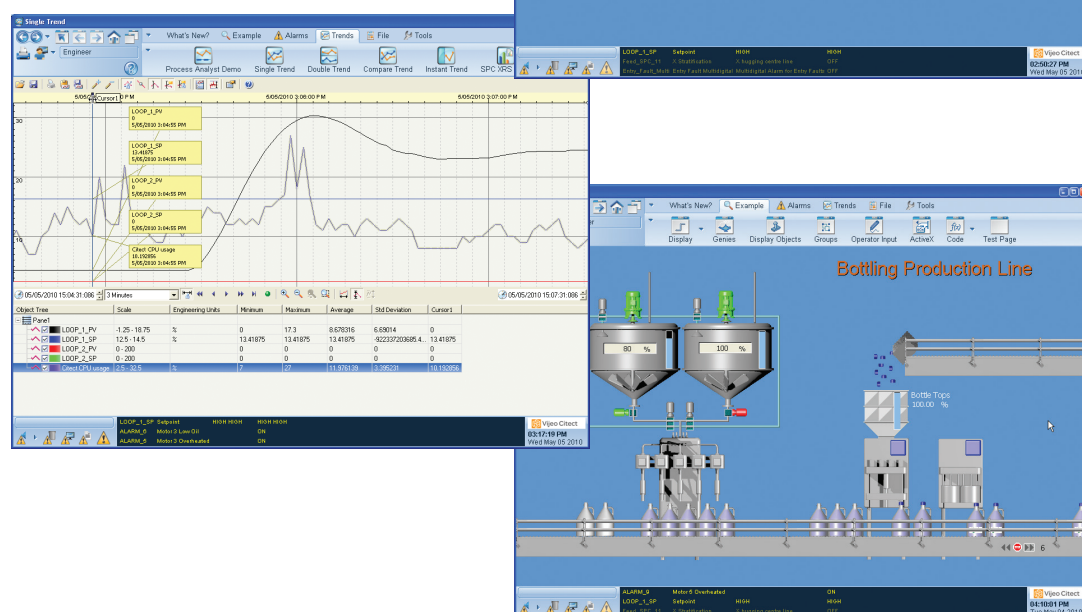
Every element of the Example Project functions exactly as it would in a 'real' project.

The Example Project is automatically installed when you install Vijeo Citect software.

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 online between the following languages:

- Afrikaans
- English
- German
- French
- Norwegian
- Polish
- Spanish
- Swedish
- Russian
- Chinese
- Hungarian
- Japanese
- Korean
- Dutch



Time Scheduler



Time Scheduler is an integrated tool that will provide functionality to automatically control equipment based on calendar events.

At a glance

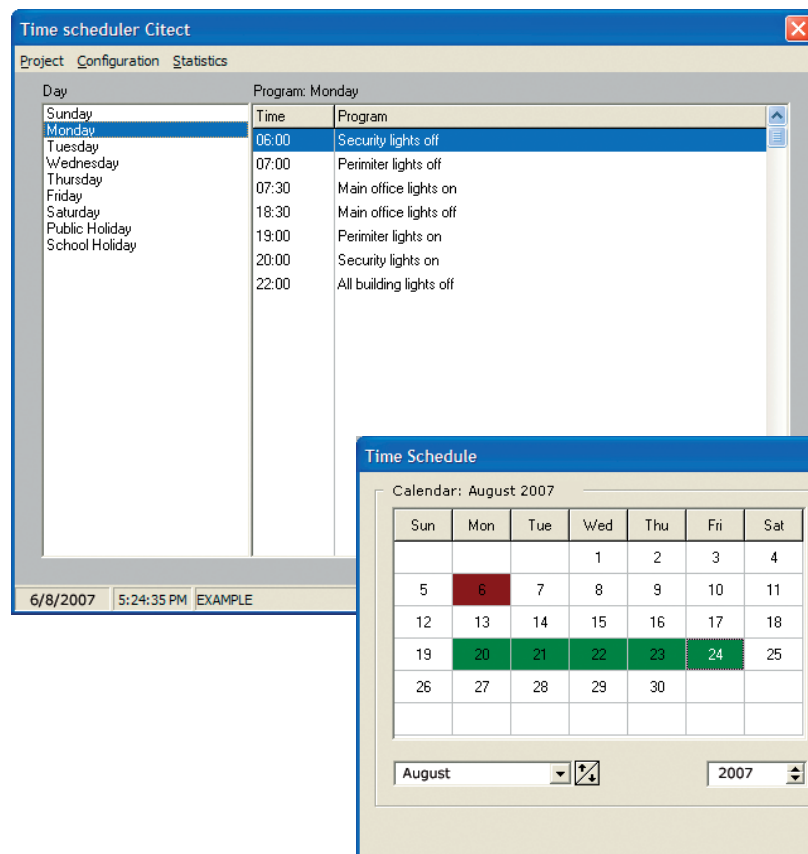
- Easy to use configuration interface
- Calendar control for simple overview of control events
- Tight integration with Vijeo Citect and CitectFacilities
- Up to 20 special days to account for irregular events
- Up to 200 programs that can be configured to control certain parts of your plant or building
- Expressions can be used in calendar events, i.e. $Tag = Tag + Value$
- Fully redundant scheduler functionality
- Automatic update of programs over redundant schedulers
- Simple access to programs for manual override
- Ability to schedule control of equipment connected to a large number of different devices

Scheduling is an important feature in both the building and industrial automation, where cost savings through optimized energy usage is a key factor.

For example, Time Scheduler ensures that after working hours, heating and lighting are automatically switched off, room temperatures are lowered, and plant equipment is not left running longer than required. Also, with configured “special days”, Time Scheduler can automatically control certain parts of your plant or building during holidays or other irregular events.

Time Scheduler is extremely easy to configure due to its calendar based user interface. A preset control schedule can be configured during project development, and if required, this schedule can be changed by managers or operators during runtime.

Vijeo Citect's ability to connect with a large number of different device manufacturers (Johnson Controls, Landis & Staefa, Honeywell and Schneider Electric's TAC), used in both the building and industrial automation, enables Time Scheduler to act as a single point of configuration for all your equipment.



NOTE: For event scheduling you can use Vijeo Citect Events (see page 44).

Software Licensing

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

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

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

Point count and limit

A point is an individual digital or integer variable which is read from an I/O device. Vijeo Citect only counts points from the I/O device once, no matter how many times they are used in your project. 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. Vijeo Citect caters for any point limit — 75, 150, 500, 1500, 5000 ... unlimited.

Computer role

In networked applications, not all Vijeo Citect tasks are used on each computer. Since you should not have to pay for what you do not use, you have the option to purchase control and view-only client licenses instead of only full licenses. A computer with a control client license is able to perform all operator interface functions and exchange data with servers, but it cannot be a Vijeo Citect server. A computer with a view-only client license provides read only displays — perfect for just monitoring a process.

Single vs multi-user

Vijeo Citect 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 Vijeo Citect. This means you can use any PC to run Vijeo Citect without having to install a software or hardware protection key on every PC. It also means you can access any information from any computer.



At a glance

- Concurrent licensing
- View-only clients
- Hardware or software protection keys
- Internal Variable Tags – free

If you want to try Vijeo Citect for yourself, you can obtain a fully functional evaluation pack from your Schneider Electric representative, or download it from our website at www.schneider-electric/vijeocitect.

The evaluation pack is exactly the same as a licensed pack, (including the software and manuals), but projects will only run for a limited time in a standalone network.

The configuration environment, on the other hand, can be utilized for as long as you want. Feel free to use the evaluation pack to build a trial project — to test the runtime and communication capabilities of Vijeo Citect as introduced in this document.

SCADA Migration

The SCADA system is the interface between our operators, the industrial process and our businesses. When a vendor stops active development of the platform it starts to age and the inability to access technology updates may restrict the way your business can operate. Migration of the operator interface to an active platform is the logical choice but the level of customisation and configuration can make that switch impractical. Switch2Citect is a rules engine based switching tool designed to make the migration of your SCADA interface to Vijeo Citect as simple as possible.

When we build control systems we have a set of information about device names and types which allows us to automate the production of databases and some SCADA screens. During migration of a project this information still exists but it is locked away within the existing configuration files. The aim of Switch2Citect is to unlock that information and make it available to assist in rebuilding your SCADA system in Vijeo Citect.

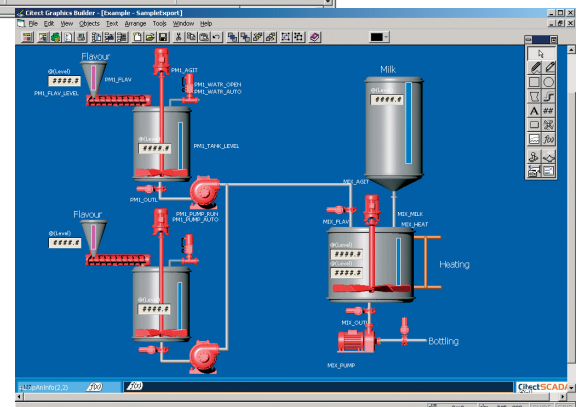
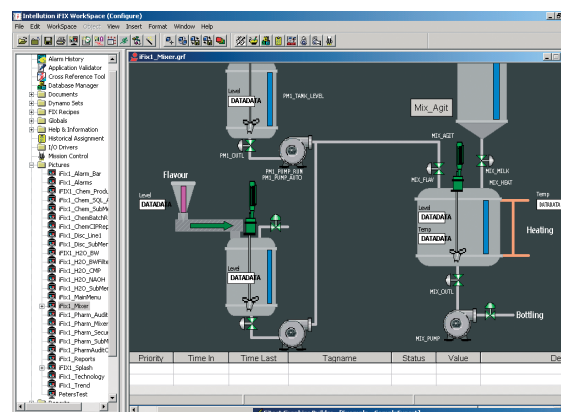
At current Switch2Citect can unlock the data within 75% of the worlds SCADA systems, including:

- Fix32 and iFix (Intellution)
- InTouch (Wonderware)
- FactoryLink (USData)
- RSView32 (Rockwell)
- WinCC (Siemens)
- Genesis32 (Iconics)
- Cimplicity (GE Fanuc)
- OASys, OVision & RTView (Telvent)
- Wizcon (Axeda)

By utilising the legacy SCADA configuration Switch2Citect not only minimizes engineering time but also operators training costs and commissioning effort.

It is not the solution for every migration. Systems with a high degree of code or inconsistent objects will require more engineering effort than is saved through Switch2Citect.

Legacy system BEFORE conversion



Vijeo Citect screen AFTER conversion

Switch2Citect is able to link any graphical element or group of elements with a single Vijeo Citect Genie. The mapping process allows the original attributes to be combined or modified before being used as a Vijeo Citect Genie parameter.

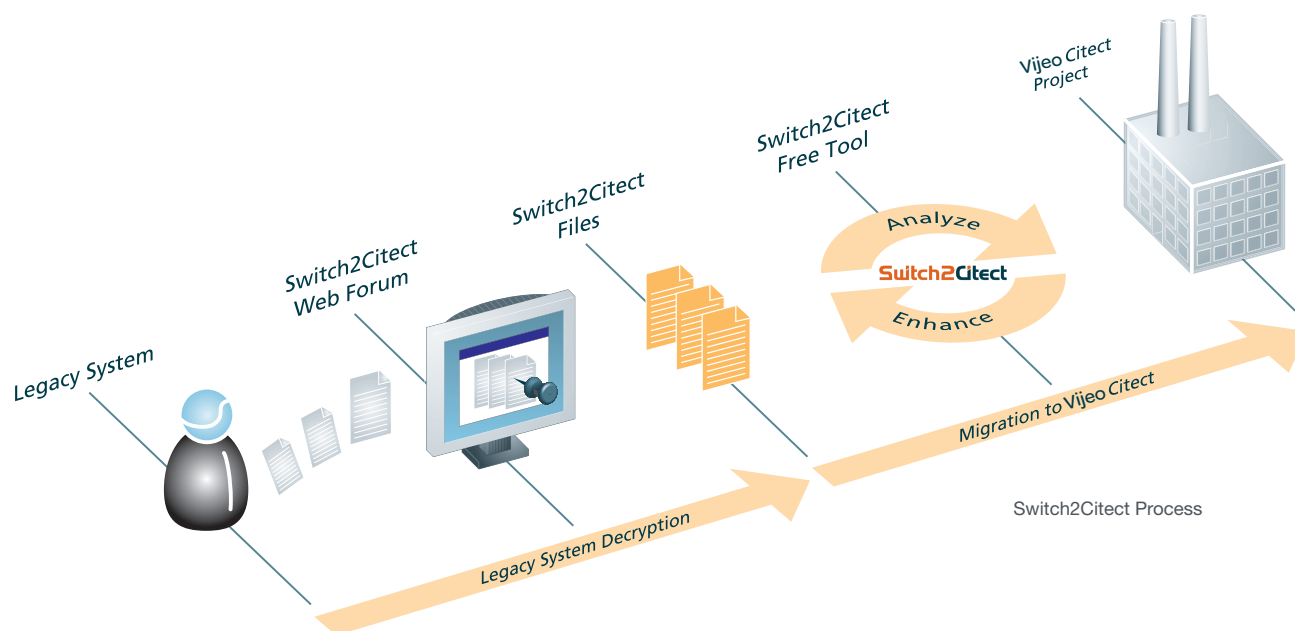
Is this you ?

"The cost of maintaining our system is becoming more expensive every year."

"Our legacy system doesn't meet the needs of our business anymore. It doesn't add value!"

"Our original system provider has abandoned us and left us with a system that is unsupported and outdated."

"We have multiple control systems, some of which are unsupported."



How does it work?

Switch2Citect reads the configuration of the legacy control system into an intermediate format. This format represents all the information from the graphics and database configuration as properties of objects (like your original project database).

Once the data is in this intermediate form it can be used to generate a Vijeo Citect configuration. Basic elements such as numbers, lines, symbols, bar graphs and trends can be automatically converted based on the information in the intermediate database and located on the screen as per the original. This is an efficient way of converting simple SCADA systems. As the resulting configuration is a direct copy of the existing legacy system it provides a familiar user interface and functionality for the operator. Care however should be taken to not only ensure that the result is correct but also that it is also ready to be maintained as the operator interface grows and develops.

The real power of a rules based engine for conversion however is that it can convert objects at a much

higher level (once the rules are defined). Converting objects rather than just the base elements allows the user to swap complete sets of legacy configuration into a Genie within Vijeo Citect. The Genie provides the equivalent functionality designed as you would a new SCADA system in Vijeo Citect and hence provides a great platform for future system development.

The Genie approach also allows the system to be "standardized" with possibly a number of existing objects brought into it using a single unified genie to improve the consistency of the new project over the last. For larger (or repeated) projects the additional time to define the roles will result in a improved SCADA configuration as well as a new SCADA platform.

As well as the graphics the system also allows the user to convert the database from the existing systems to Vijeo Citect. Again we can either use the simple basic conversion rules included with the product or enhance these to provide a more complete implementation and a more native and maintainable result.

Features

Architecture

Scalable

- Configuration free system growth
- Large project size
- 255 simultaneous connected clients
- LAN / WAN Support
- Web ready without configuration
- Support for low bandwidth operation
- Support for multiple active cluster systems

Flexible

- True Exception reporting
- Client/Server architecture
- Alarm, trend and report servers scalable across any machine configurations
- Project files centralized for maintenance, distributed for remote sites or a mix of both
- Changes in a single location

Reliable

- Built-in Primary/Standby level
 - File server redundancy
 - LAN redundancy
 - Alarms server redundancy
 - Trend server redundancy
 - Report server redundancy
- Multi-level I/O server redundancy
- Support for full reliability at local control panels
- Automatic server swap
- Automatic trend history synchronisation
- Automatic alarm table synchronisation
- Automatic time synchronisation
- Secure
- Automatic restart upon system failure

Performance

- Maintain performance regardless of size
- Multi-CPU support

Security

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

I/O Communications

Connectivity

- Support for open standards
- Multiple protocols per I/O server
- Drivers work on RS232, 422, 485, TCP/IP
- Driver setup in 60s
- 4096 I/O devices per cluster
- Dial-In/Out support for remote devices
- Driver Development Kit for custom protocols
- OPC Server DA2.0 support

Access

- Drivers at no additional cost
- Driver Web contains latest version
- Driver update to maintain up-to-date drivers

Performance

- Dynamic optimization of all drivers
- Data read on-demand
- Can support 100,000 integers per second update from an I/O device

Tags

- Large number of tags
- 80 Character tag name
- Support for quality and time-stamped on relevant drivers

Speedlink

- Single database solution for PLC and SCADA
- Bi-direction synchronisation with PLC development environment
- Static synchronisation for offline development

Import

- Automatic importation and synchronisation
- Import from multiple PLC types
- Add user defined importation schema

Graphics

Development

- True colour screens
- Easy pick colour selector with colour names
- Transparent colour support
- Advanced animations without coding
- Animation of symbols sets based on tag data
- 32,000 animations per page
- Full flashing colours support
- Support for multiple languages
- 3D pipe tool
- 3D effects (raise, lower, emboss)
- Import graphics
 - Windows Bitmap (BMP, RLE, DIB)
 - AutoCad (DXF)
 - Encapsulated Postscript (EPS)
 - Fax Image (FAX)
 - Ventura (IMG)
 - JPEG (JPG, JIF, JFF, JFE)
 - Photo CD (PCD)
 - PaintBrush (PCX)
 - Portable Network Graphics (PNG)
 - Targa (TGA)
 - Tagged Image Format (TIFF)
 - Windows Meta File (WMF)
- Large number of undo support
- Metadata

Templates

- Over 70 templates in multiple styles and at multiple resolutions are provided
- Templates are extensible in the graphics builder
- Templates can contain animations
- Changes in templates are replicated to linked pages
- Templates are transportable between projects

Symbols

- Over 800 symbols provided
- User defined symbols can be developed in the graphics builder
- Symbols can be animated
- Changes in symbols are updated to all instances
- Symbols are transportable between projects

Object-based configuration

- Large number of objects defined as Genies and Super Genies
- User-defined Genies enable user-defined plant equipment to be placed on the screen
- User-defined Super Genies enable a single user interface for multiple devices
- Genies and Super Genies can accommodate variations in the device tags without needing further development

Runtime

- 4096 x 4096 resolution
- Resizable screens (Isotropic and Anisotropic)
- Multi-monitor support
- Page selectable update times (min 10ms)
- Communication loss display
- Runtime language swapping
- Support for single and double byte character sets

Security

Security level can control:

- Visibility of objects
- Access to graphic displays
- Acknowledgement of alarms
- Running of reports
- System utilities

Operations

Controls

- Touch commands
- Mouse over detection
- Keyboard commands of system, page or animation level
- Sliders in one or two dimensions
- DatabaseExchange

Process Analyst

- Combine alarm and trend data
- 32+ pens
- 4+ panes
- 2+ cursors
- Stacked or overlaid pens
- Display of data quality
- Analogue and digital pens
- Alarm acknowledgement displayed
- Alarm description (analogue and multi-digital)
- Alarm comment display
- True Daylight Savings support
- Save views at runtime
- Views stored in redundant locations
- Display different time periods on the same display
- Customizable and extensible controls

Alarms

- Large number of alarms
- Centralized processing of alarms.
Alarms can be defined as:
 - Digital
 - Analogue
 - Time-stamped
 - High level expression
 - Multi-digital
 - Time-stamped digital
 - Time-stamped analogue
- 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
- Alarm sorting
- Alarm filtering
- Custom alarm fields

Trending

- Large number of trends
- Supports 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
- Compare trends
- Instant trends on any tag
- Event or periodic storage

SPC

- Cp and CpK charts
- X, R and S charts
- Pareto charts
- Adjustable subgroup size and 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
- Alarm management reports (EEMUA): alarm correlation, alarm count, alarm frequency, alarm major event, alarm longest standing
- Standard reports: disabled alarms, alarm statistics, alarm states, alarm states matrix, run hours, numeric statistics, tag calculation, tag value, string statistics, tag states, digital statistics

Online Changes

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

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

Configuration

Project development

- Flexible project size
- Divisible into included projects
- Easy standards definition
- Easy project maintenance
- Computer Setup Editor to configure each PC in network

Code

- True preemptive and multitasking
- Up to 512 concurrent threads
- More than 600 SCADA functions provided
- Libraries for user-written functions
- Supports more than 4,500 user functions per project
- Local, module and global variables
- No additional software required to write own functions
- Direct access to trend data, report values and alarm details
- Syntax colouring
- Online Help functionality
- Quick help as 'tool tip'
- Editor with:
 - Runtime breakpoints
 - Variable watch
 - Thread monitoring
 - Colourcoding
 - Breakpoints window
 - Single stepping
 - Current line indication
 - Remote debugging (NT only)
 - Automatic debug on error

Security

- Project level Windows integrated security

Data Exchange

- OPC server and client
- ODBC
- OLE-DB
- CTAPI
- DLL
- MAPI (MAIL)
- TCP/IP
- SERIAL

Supported Manufacturers

ABB
ABB Instrumentation
Action Controls
Advantech
Air Liquide*
Allen Bradley
Ampcontrol
Anybus*
April
Aromat Corporation
Aspen Technology*
B&R Industrial
Baker Hughes
Barber Coleman*
Beckhoff
Bosch
Bristol Babcock*
Busware*
Campbell Scientific Inc
Cegelec
Cimetrics
Clipsal
Colby Demag
Contemporary Control Systems
Contrec Systems
Cutler Hammer*
Danfoss
Data Electronics
Detroit Diesel Corporation
Eberle
Echelon*
Elpro Technologies
Elsag Bailey
Emerson
Engage Networks
Enron
Eurotherm International
Facon
Fischer & Porter
Fisher
Fisher and Paykel
Fisher Rosemount Systems*
Fluke
Foxboro*
Fuji Electric
Gantner
GE
GE Fanuc
GEC
GEC Alstom
Generic devices
Harris Controls
Hewlett Packard
Hima GmbH
Hitachi
Honeywell
Idemitsu
Intech (NZ)
Intuitive Technologies (@aGlance)*
Johnson Controls
Kaye Instruments Inc
Keyence
LG Industrial Systems
Matsushita
Mauell
Mettler Toledo*
Mitsubishi
Moeller
Moore Industries
Moore Products

Motorola
MOX Products
MTL Instruments
National Instruments
Nematron
NJ International
OmniTronics
Omron
Optimization Optilogic*
Opto 22
Philips*
Phoenix Contact
PLC Direct (Koyo)
Preferred Instruments
Reliance Electric
Rockwell Automation
Rosemount
RTP
SAAB
SAIA
Samsung
Satt Control
Schlage Electronics
Schlups & Partner
Schneider Electric
Siemens
Sisco
SIXNET
Softing AG
Sprecher & Schuh
Square D
Steeplechase
Telefrang
Telemecanique
Thermo Westronics*
Tibco*
Toshiba
Transmitron
Triconex Corporation
Unidata
Universal Instruments Corporation
Valmet*
Vikingegaarden
VIPA
Wago*
Weidmuller
West Instruments*
Westinghouse
Willowglen
Woojin
Yaskawa*
Yokogawa
ZWorld

Industry Standard Protocols

Ascii
BacNet*
DNP 3.0
EIB
IEC870-5
Modbus
OPC
Profibus
SNMP

NOTE: *Supported by using OPC.

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