

Vijeo Citect Technical Overview

An in-depth guide to our high performance
operations management solution

> Reliability > Flexibility > Scalability

Schneider
Electric



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

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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



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The Schneider Electric Offer

Solutions are not only 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 achieve your goals in automation and control, and energy management.

A history based on innovation

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

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

In 1985 we launched our first Supervisory Control And Data Acquisition (SCADA) system, tailored to the Mining and Food & Beverage sectors.

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 within a unified and intuitive display.

We have a solid history based on innovation and openness, and today we continue in the same spirit with the introduction of our energy management solution, 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 analyzed and used to yield a holistically optimized plant.

Leaders in process automation

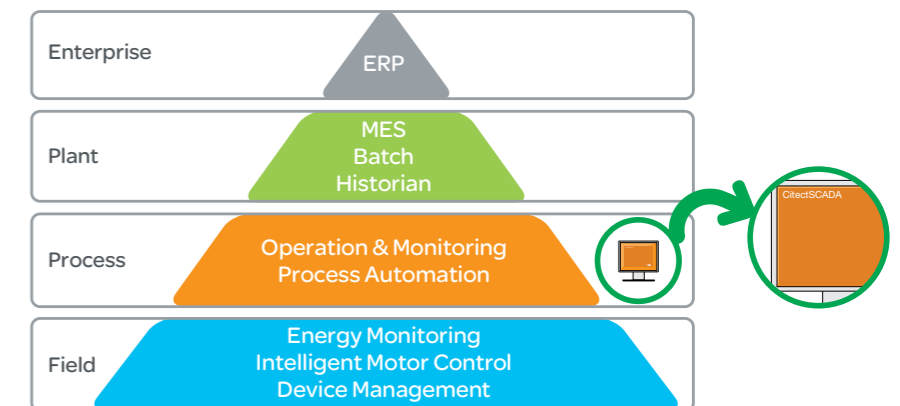
We have come a long way since we installed our first PLC and today we are amongst a select few leaders in process automation, delivering solutions for a wide range of applications. We understand that each application is unique and that is why we offer a system that can be tailored to meet the needs of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

Enterprise wide solutions

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

Leader in energy efficiency

Not only are we leaders in process automation, but we lead the way in energy efficiency. Every day we help companies identify and implement ways to reduce their energy consumption and decrease their environmental footprint.



PlantStruxure Product Pyramid

The Vijeo Citect Offer

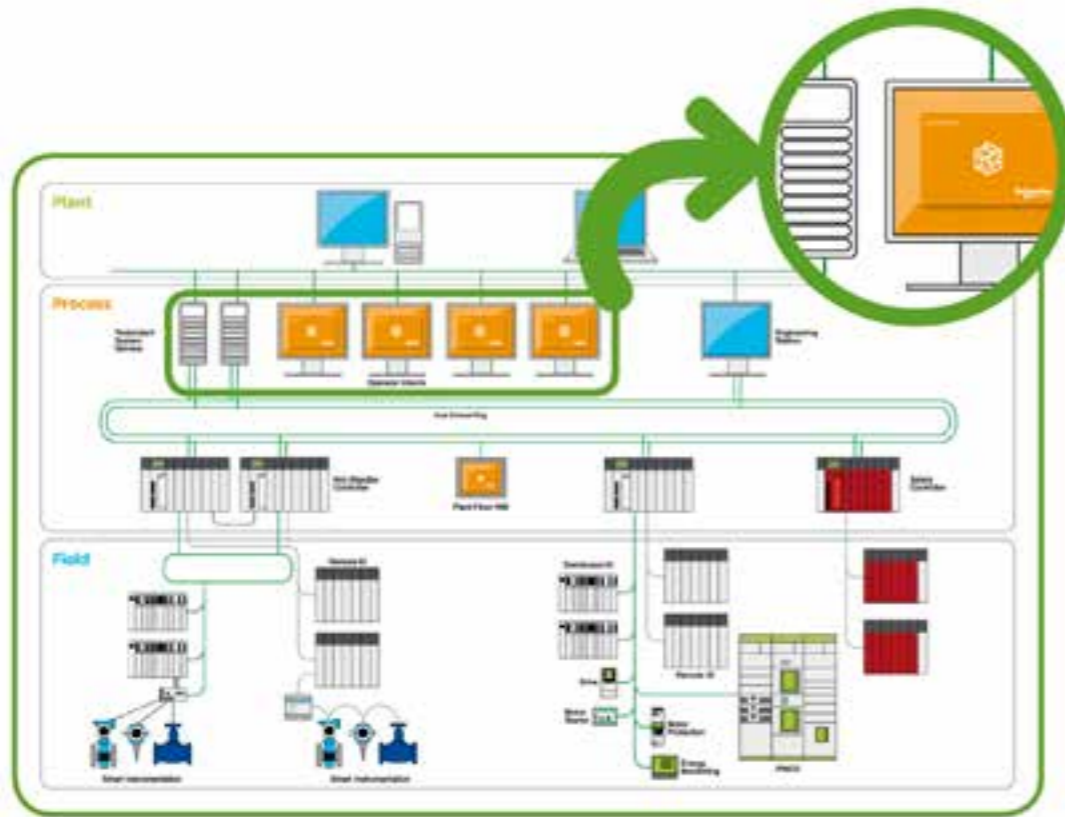
Schneider Electric's Vijeo Citect™ is the operating and monitoring component of PlantStruxure. With its powerful visualization capabilities and operational features, it delivers actionable insight faster, helping to increase effectiveness by enabling more timely responses to process disturbances.

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 & Defence
- > 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

Vijeo Citect software protects your investment by providing system architecture that is scalable to any size application.

OEM Solution (Vijeo Citect Lite)

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 upgrading the license.

- Features include:
- > Historical and real-time trending, advanced alarming and reporting
 - > Customizable installation
 - > Ontime runtime language switching to support global customers
 - > Graphics API 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

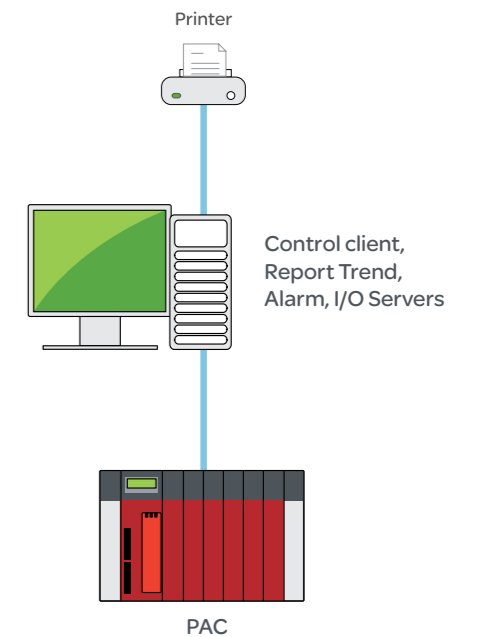
Scalability is the power to resize your system — up or down — without having to modify the existing system hardware or software. Vijeo Citect's innovative scalable architecture allows your system's architecture to grow with your requirements, while preserving your initial investment. Easily add an operator interface by using the computer set-up wizard to add an additional network and establish a control client on a new computer. The new computer can share the same configuration, and will receive I/O from the first Vijeo Citect computer.

Machine or Local Control

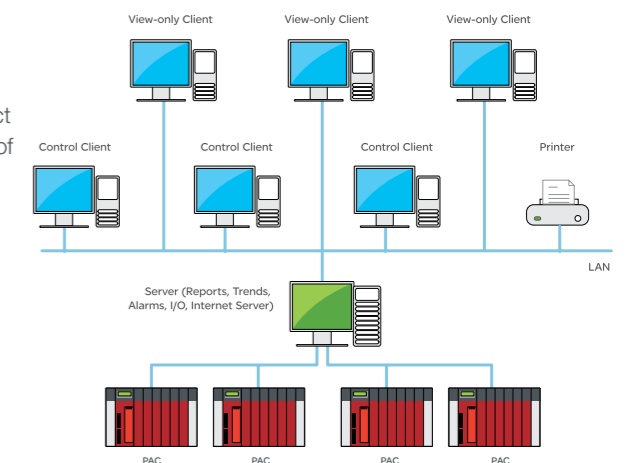
Running on Windows embedded, Vijeo Citect software provides users with a control system that has the power to match the requirements of advanced machines. Our embedded systems provide the same level of functionality of our full SCADA package and can be run as a stand-alone system, or integrated as a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

Standard Control

Vijeo Citect systems have the capacity to grow from a single computer, to large scale control systems. This ability for a single system to expand without configuration changes, enables Vijeo Citect customers to be confident in the long-term future of their investment.



Standard control



Large control

System Architecture Topologies: Scalable



Customer Profile: Argyle Diamonds

In 1992, the Argyle Diamond Mine in Australia commissioned the first Schneider Electric, Windows-based SCADA system. Since commissioning, this fully automated 24 hour/365 day operation has not encountered production downtime thanks to the Schneider Electric SCADA system.

The system:

- > 33 PACs
- > 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

Large Control

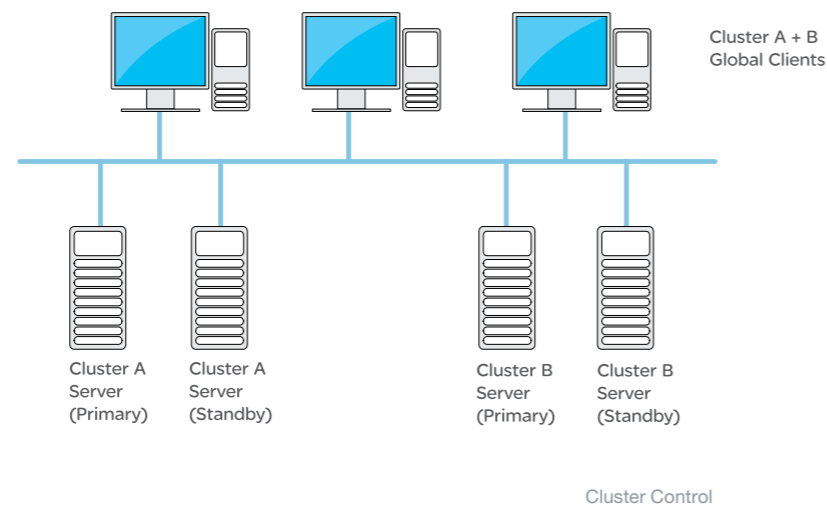
Vijeo Citect software has long had an impressive reputation with large control systems. One of the large Vijeo Citect based control systems implemented in 1992, contained in excess of 50,000 tags. In order to complete projects on this scale, Vijeo Citect developed advanced communications topologies and project structures that enable the design, implementation and maintenance of larger control systems.

Clustered Control

In an economic climate of cost rationalizing and control, Vijeo Citect's ability to unify any number of control systems into a single "clustered" system, provides users with optimal topology. In addition to the capacity for individual local site view, global clients can be implemented with visibility across the entire control system, complete with unified alarm lists as well as comparisons of trended data across multiple systems.

Large Systems

Vijeo Citect can easily scale to a variety of company application sizes. Coverage ranges from applications with only a few points, through to large scale applications monitoring and controlling in excess of half a million points. The option of centralized or distributed processing allows for scalability to various system sizes. Centralized processing has the benefit and more economical option of keeping the data and processing to one PC. However for large scale applications, distributed processing allows for the sharing of processing over multiple computers.



System Architecture Topologies: Flexible

Your SCADA system, like your business, must react to changing conditions. Production expansion and cost pressures can prove challenging to any system. The flexibility of Vijeo Citect software alleviates this pressure with its client-server architecture and in-built capacity for you to redesign your system as required.

Flexible Architecture

Designed from the outset with true client-server architecture in mind, Vijeo Citect provides valuable high performance responses and data integrity, in real-time.

Taking full advantage of the client-server architecture begins 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 and equipment conditions; report type output; trending and user display.

Each of these tasks is independent with its own processing, allowing control and flexibility over which computers in your network perform particular tasks. For example, you can nominate one computer to perform the display and report tasks, while your second computer performs display, I/O, alarm 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, enables the control system to access your data wherever it is located. Once data is available from the I/O servers, the source of the data becomes transparent to the control system designer. This allows the communications and the control system design to be completely independent and facilitates greater flexibility with changing I/O server locations or system connections in the future.

Between the I/O servers and other tasks within Vijeo Citect, a publish / subscribe interface exists. This interface enables the bandwidth requirements between the clients and servers, to be driven by the activity or number of changes to a specific variable, rather than by 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. Vijeo Citect systems are often built around a central pair of servers, each acting as the primary or standby server. Depending on the tags available, Vijeo Citect tasks can now be relocated around particular system requirements. This design flexibility helps optimize performance by executing each Vijeo Citect task individually.

In doing so, the Vijeo Citect system can create separate server and client components across the 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 particular system needs.

As well as relocating system tasks to meet growing needs, Vijeo Citect software can 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 needs to be purchased. With clusters, the system can add an additional trend task and progressively add trends on the new server, without the need for additional hardware investment.

System Architecture Topologies: Flexible

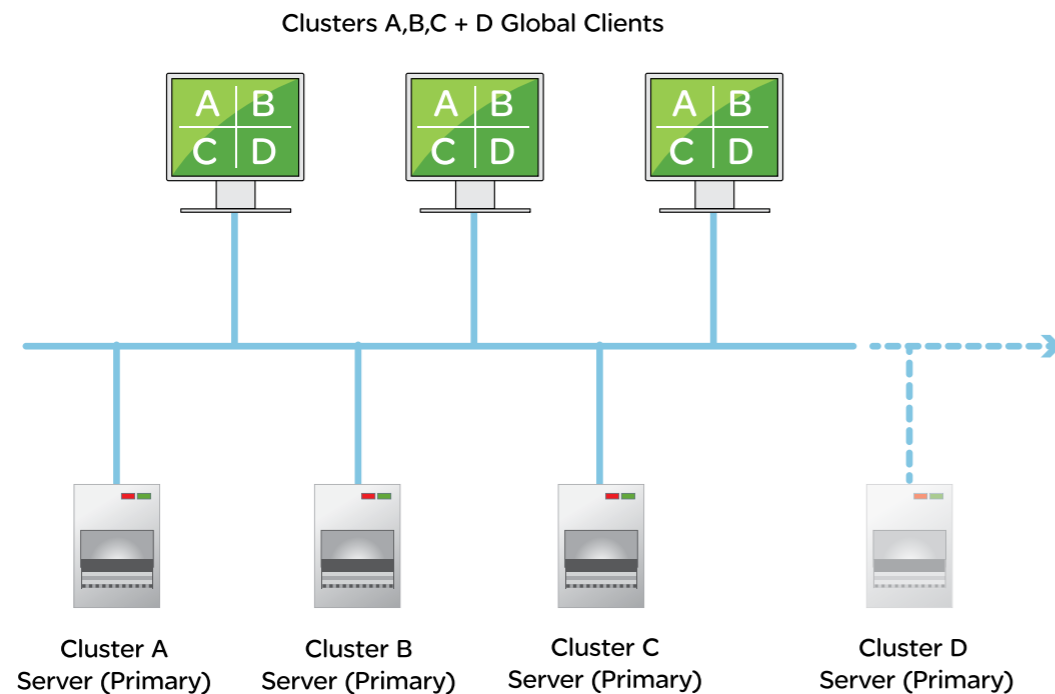
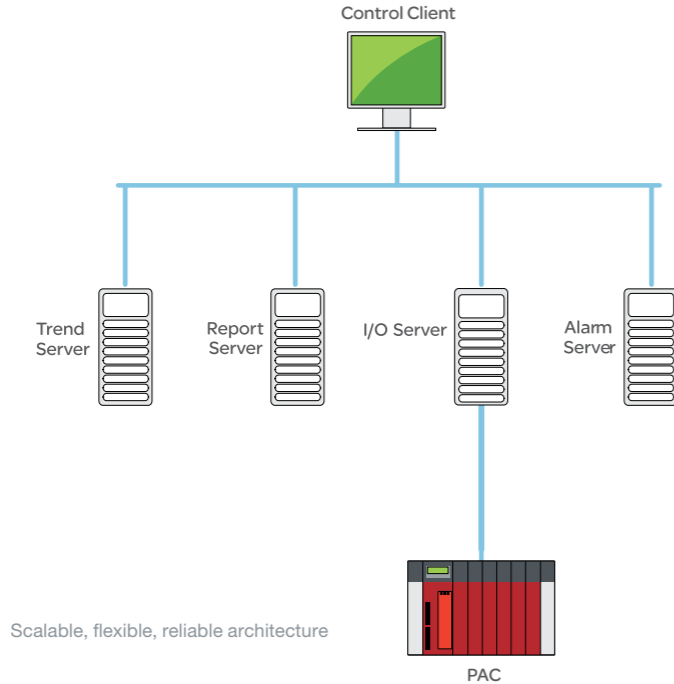


SCENARIO

You have four identical machines with identical projects.

With a single Vijeo Citect project, Vijeo Citect allows you to view the alarms, trends, I/O and reports; and to duplicate display information from each of the systems. This greatly reduces the normal level of testing required within the project.

An example of this could be a wind farm project with multiple turbines, where with just one Vijeo Citect project, you have the ability to centrally monitor the entire windfarm.



System Architecture Topologies: Reliable

Reliable Architecture

In factory automation and other mission critical applications, hardware failure leads to costly production loss and can result in potentially hazardous situations. Vijeo Citect's redundancy can tolerate failure anywhere in your system, in order to maintain functionality and 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 a failure. With Vijeo Citect's ability to write set-point 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.

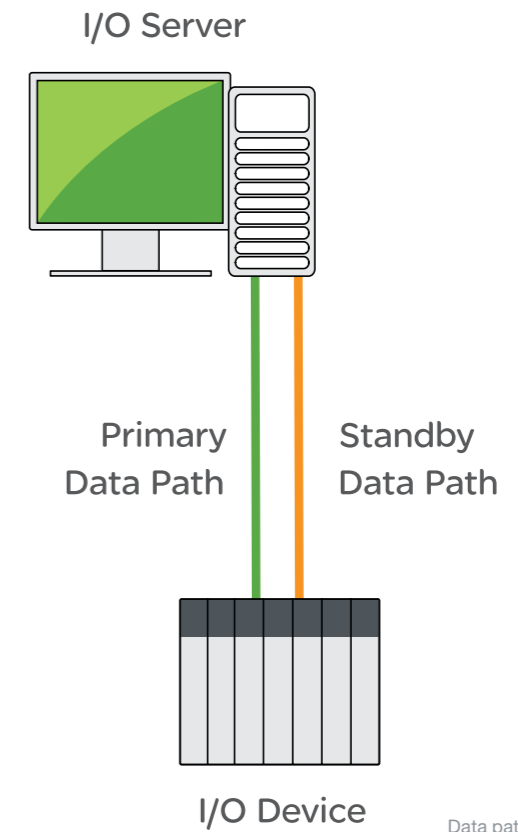
When communicating with an I/O device, many systems demand redundant I/O server configurations. To avoid conflict of data, and to maximize communication bandwidth, only the primary I/O server communicates with the I/O device.

Vijeo Citect systems use LANs to connect the elements, but something as simple as a faulty network card can disrupt 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, without the need for additional configuration.

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 to operate normally. 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.

The redundancy features of Vijeo Citect can be used together, providing you with enhanced 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.

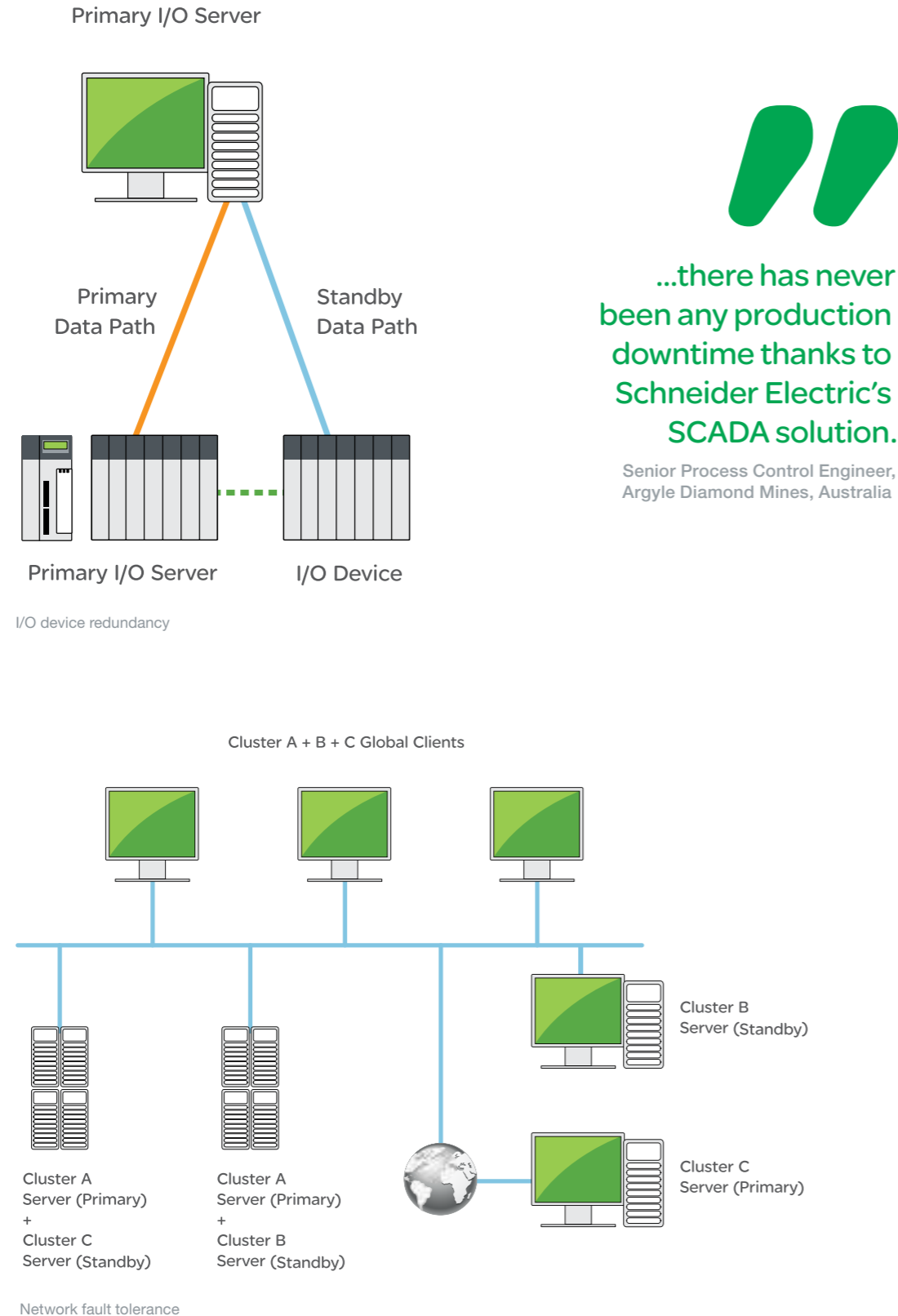
Since tasks are often different in nature, Vijeo Citect software offers you a separate redundancy strategy for each. If upgrades or system configuration changes are needed, new projects can be loaded on the standby server. Once loaded, switch from the primary server and run the new project on the standby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



System Architecture Topologies: Reliable

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
- > I/O device data path redundancy
- > Redundant LAN using multiple networks
- > File server redundancy
- > Task redundancy across multiple computers
- > Clustering provides multiple redundant architectures



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

Senior Process Control Engineer, Argyle Diamond Mines, Australia

System Architecture: Clients

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

Add Flexibility

Web and mobility clients add flexibility and convenience to managing plant operations.

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

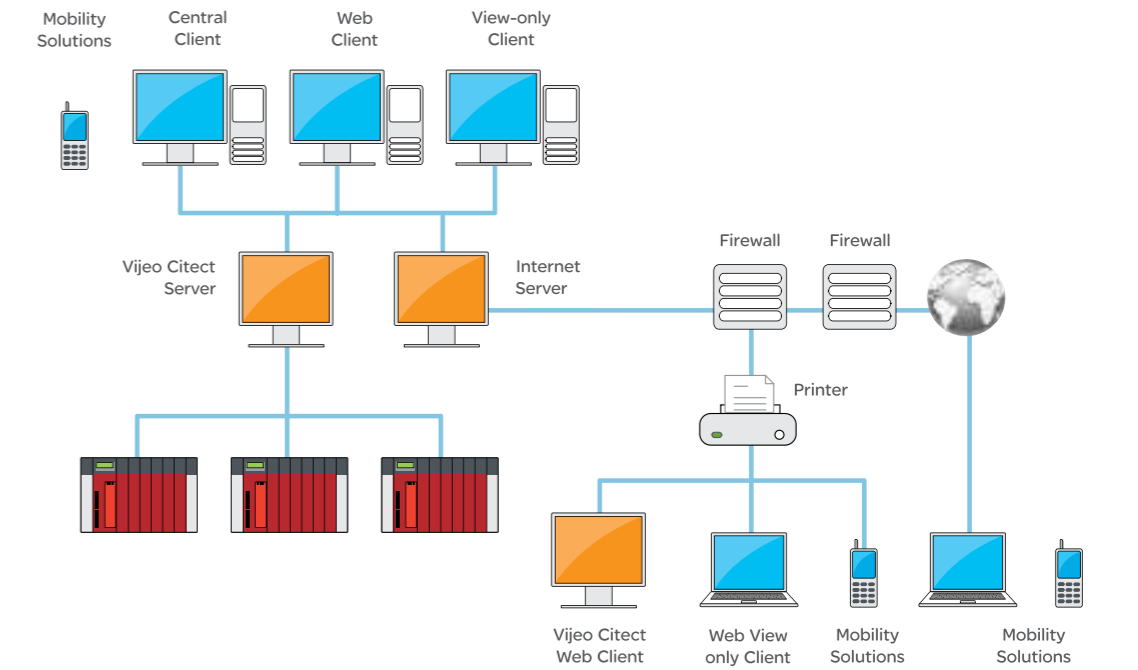
It is economical to provide access for users as server-based licensing, means you only pay for concurrent users.

Applications are numerous:

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

Clients

Both levels of Vijeo Citect clients can be utilized 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 with an application interface providing 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

System Architecture: Clients



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

Vijeo Citect supports multiple web clients on a single computer, ideal for simultaneous viewing across a variety of projects. Access to the web clients is controlled or denied based on Windows-based login credentials, or when the number of web clients has been exceeded. As an additional measure, Vijeo Citect project configuration requires a local user name and password, making it secure for both enterprise and remote access.

Visibility

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

Web Clients

Vijeo Citect web clients allow 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 are downloaded from the website, with project updates automatically synchronized with web clients.

Security

In securing operations, web clients are controlled by the web server's advanced firewall and encrypted password protection technologies. Access to the web clients is 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

Rather than the number of computers with software installed, Vijeo Citect's licensing is calculated on Vijeo Citect clients connected to the server, making it one of the most cost efficient SCADA systems available.



Example of the Web client deployment page



Process Analyst via web client



Web client in action

System Architecture: Object-based Design



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 navigation from an alarm list

Vijeo Citect provides the ability to utilize object-based design to define processes in a hierarchical structure.

Through the use of object-based design, Vijeo Citect facilitates improved efficiency by streamlining the creation and management of configuration records for each piece of equipment, such as tags, alarms and trends.

This ability to define individual objects in Vijeo Citect, such as a motor or a pump, allows items to be saved as a template. Templates can then be used and duplicated throughout your project. This functionality facilitates consistency in your project design, while at the same time assisting in reducing the engineering workload.

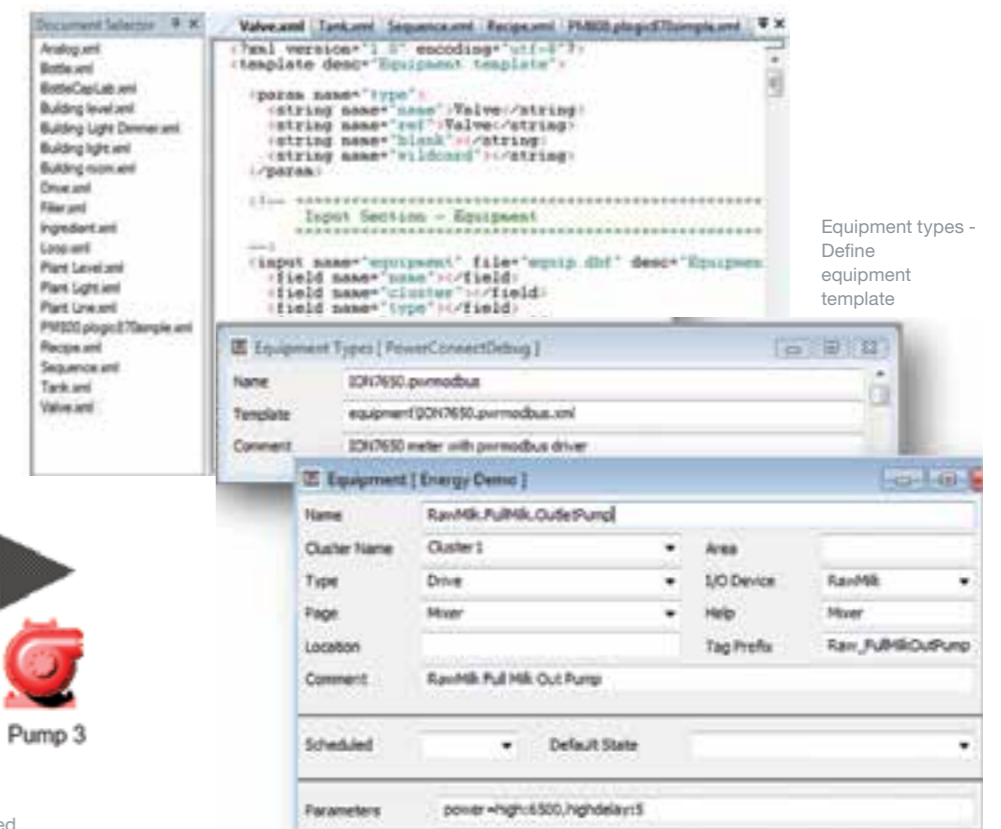
For example, if your plant has 20 identical motors, you only need to define the motor equipment template once, and simply replicate it 20 times. The alternative of manual individual configuration is both time consuming and lends itself to human error.

Equipment templates allow you to create database records throughout the entire SCADA configuration, providing a simple way to produce advanced designs.

Ongoing maintenance of your equipment is also simplified through Vijeo Citect's equipment templates. Functionality additions to existing equipment is achieved by updating a single template and synchronizing the instantiated equipment. Changes are implemented across the entire project in one go. Expansion is also simplified using equipment templates, with additional objects added and synchronized across the plant.

Vijeo Citect's genies and super genies for graphics within equipment templates, provides an end-to-end object design throughout your control system. This enables the creation of object-based libraries which can be reused and duplicated across multiple projects.

Equipment templates - Define tags, trends, alarms & states properties



Equipment types - Define equipment template

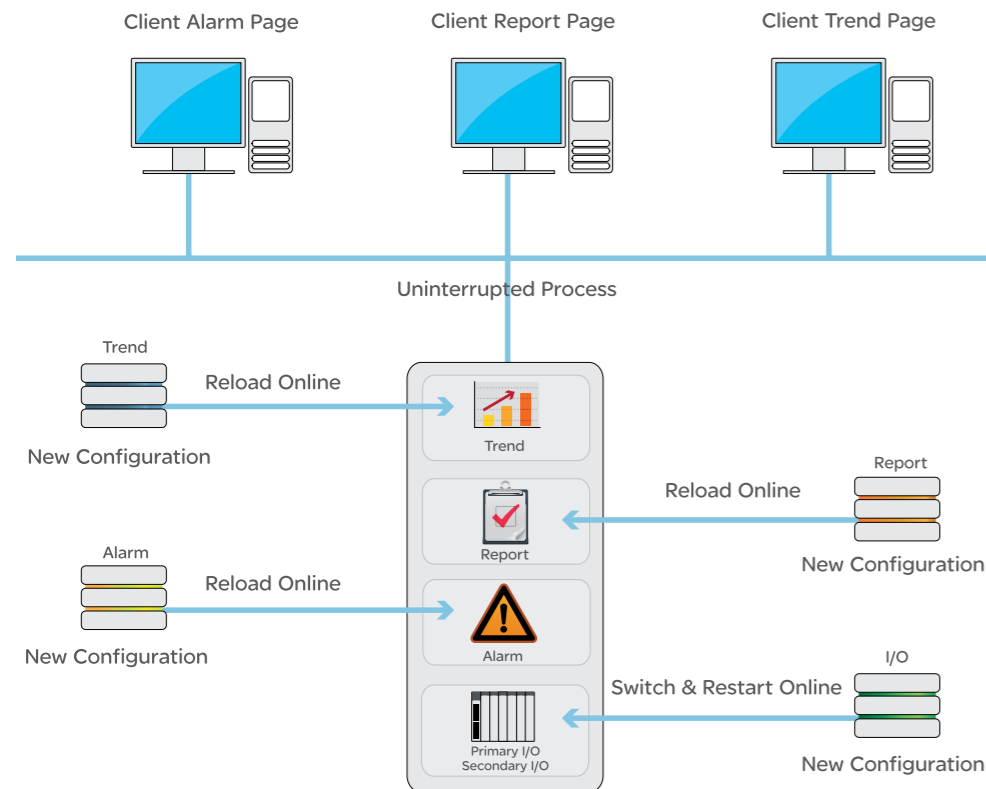


Once an equipment template has been created, multiple consistent instances can be used throughout your process.

Equipment instances - Define instances of equipment types

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.



In Vijeo Citect, 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 need not be restarted when 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. Operational efficiency is optimized, as unchanged elements in the servers are not affected by configuration reloads and, as such, there are no breaks in data availability. A reload, such as for a new alarm or trend, can be configured on demand, or coded for automatic or remote operation.

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

requiring a client restart. Users will, however, be notified of any library scripting changes if a restart is required.

Rapid application of changes during production is now possible without system interruption using Vijeo Citect's 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 changed online during the restart of each process, without interrupting communication to devices. This can also be achieved in a single machine using two I/O server processes.

Communication: OFS

OFS (OPC Factory Server) Transparent Communications

Traditional communication between controllers and SCADA systems are based on vast amounts of PAC memory being made available to the SCADA system. While this communications structure delivers high performance in communications, it also requires an additional level of configuration in modern PACs to link object information to addresses in memory. This configuration requires additional effort and may result in limitations in the PAC design, as memory block allocations are filled or change over time.

Communication between Vijeo Citect software 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 used in the controllers. To simplify, the configuration and synchronization 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 expanded as required.

The OFS is a multi-controller data server that enables communications with your new and legacy Schneider Electric hardware using any combination of supported protocols. OFS provides simple, real-time access to Modicon Quantum™, M340, Premium, TSX Micro™, Twido™ and Momentum controllers, as well as Modbus devices.

As well as providing a standard interface to the data within Schneider Electric PACs, 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 PAC and SCADA.

Typical OPC solutions for all tags may result in a higher overall communications load, with the server reading 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.

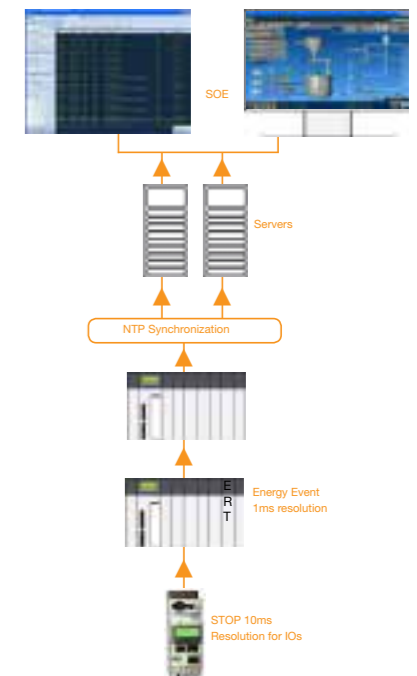
Vijeo Citect maintains a set of customizable poll rates in the OFS server. It then moves tags between them to match the requirements of the operators and the configuration of the SCADA system. A tag may be polled at a slow rate for trending but when the page is displayed, the poll rate is automatically increased to provide a faster update rate of information for the displayed screen. This optimization 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 to the alarming and trending systems within the SCADA system. Timestamped 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 makes it possible to increase system capacity 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 timestamp of the changes to provide a millisecond-accurate indication of sequence of events. The use of Schneider Electric controllers with dedicated timestamp modules allows millisecond-accurate timestamps to be passed through from the originating device all the way to the SCADA display.

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 effort can be reduced throughout the project's lifecycle. 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 the alarms, trends, accumulators or any additional local variables. In this way, adding a function block to the PAC results in a database configured without additional effort. Because this is linked to the PAC configuration, it will continue to synchronize the configuration as the project is maintained.



Communication: RTUs



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 (PSTN).

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

- > Cellular networks
- > Rail systems
- > Water supply
- > Power transmission and distribution
- > Pipelines

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

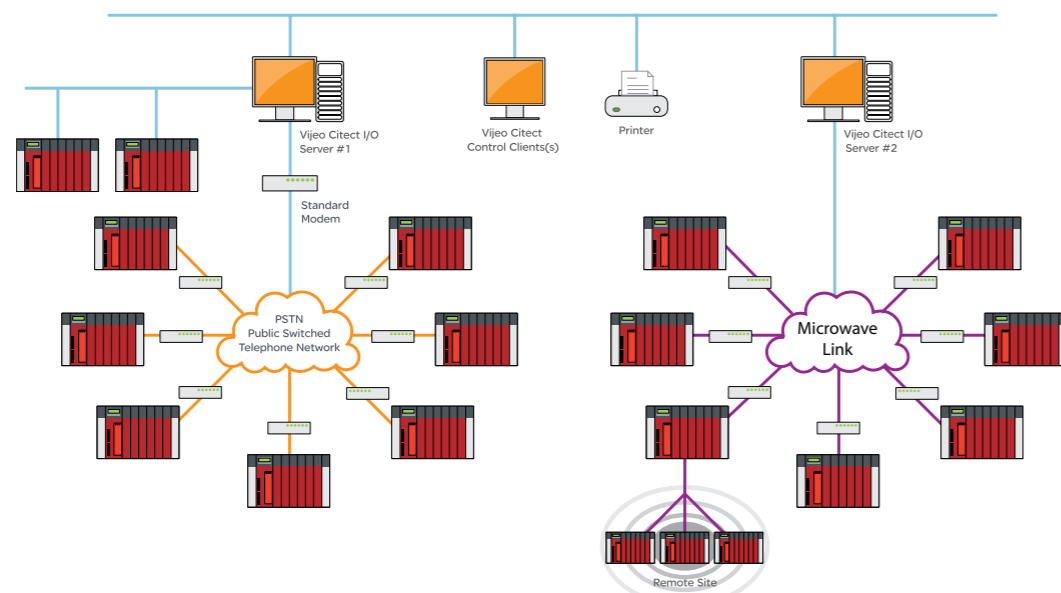
Vijeo Citect software can schedule connections to RTUs (for example, via modems or microwave links). To minimize data communication costs, Vijeo Citect can call up the I/O device according to a user-defined schedule or when needed to exchange data, and then automatically disconnect.

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 PACs or RTUs.


Built-in Management

Vijeo Citect's comprehensive built-in features for managing remote devices include:

- > 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 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 offline 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 a variety of 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.



At a glance

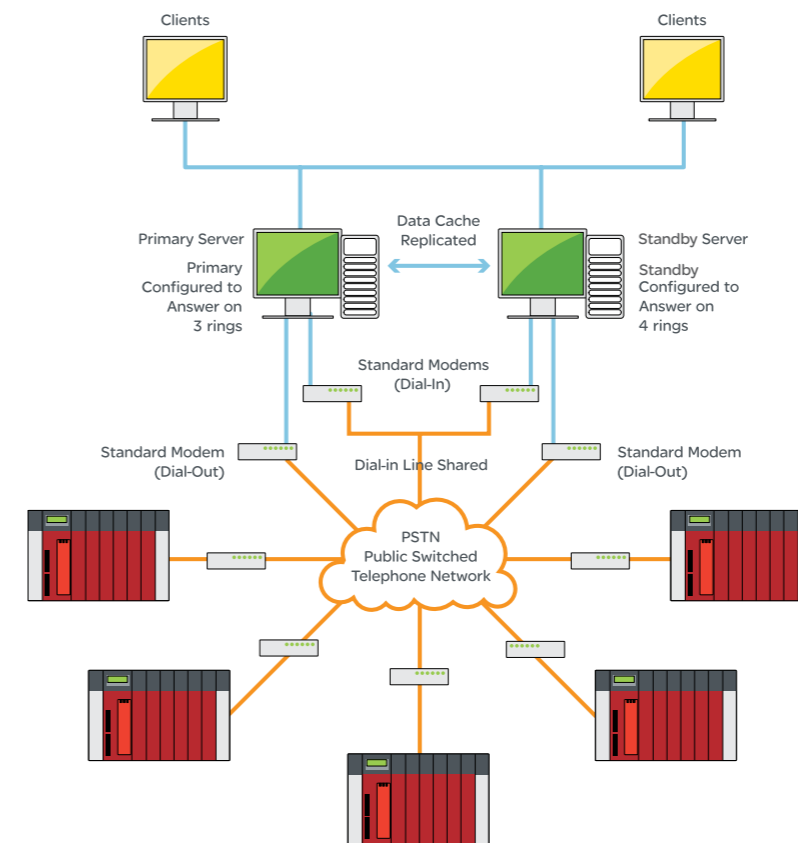
- > Economical solution for monitoring remote trend, alarm and tag information
- > Easy to configure
- > Dial-In for alarms
- > Full redundancy support

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.

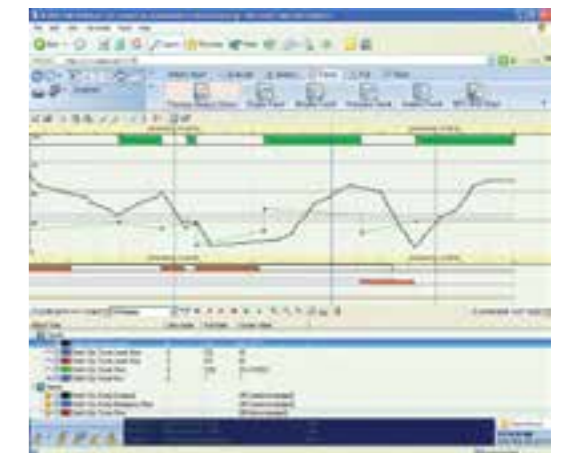
Implementing the Dial-In feature requires a remote device or modem that is capable of sending an identification string (ID string). Vijeo Citect uses the ID string to identify the remote caller along with the appropriate communications protocol. If the device cannot support an ID string (for example, the serial port may be limited to a native protocol), industrial modems produced by Sixnet® and others can provide a suitable interface.



Quality information is available for data points acting as automatic indications of bad quality data. Quality error indications can use default error text, background display colour or a custom animation. A default tool-tip on animations provides the operator with the last known value and timestamp for the associated data point.

Timestamped data

Vijeo Citect enables timestamped 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 timestamp.



Vijeo Citect accurately represents timestamped data in Process Analyst

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

Communication: Open Access

At a glance

- > OPC® DA version 2.05 and 3.00 compliant
- > Enabled in project configuration
- > Browse tags by hierarchy
- > Cluster aware
- > Supports rich tag data

Vijeo Citect is open to exchange information with other plant and business software and fosters a collaborative environment by delivering the process information you need, in the way that you like to see it.

OPC DA Server

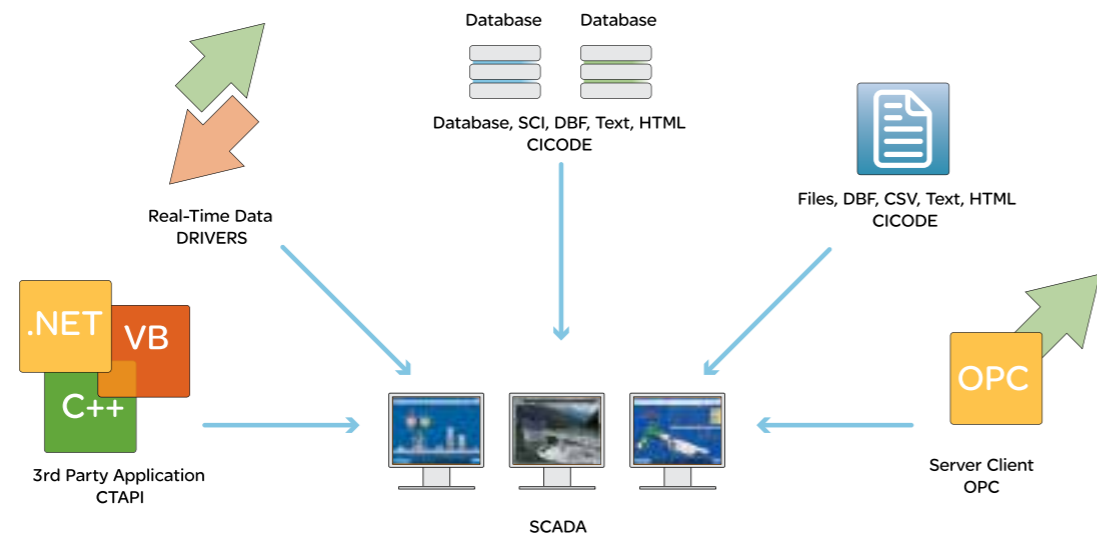
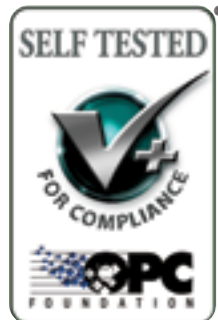
In order to provide the highest level of interoperability with third party OPC DA client applications, the OPC DA Server module is self-certified by the OPC Foundation's certification self-test procedure, as a fully compliant implementation of OPC DA interface standard v2.05 and v3.00.

The OPC DA Server is an integral part of Vijeo Citect. It is defined as part of the SCADA project configuration and managed at runtime by the SCADA runtime manager.

As most advanced applications (OPC DA Clients) run on a separate physical machine, the implementation of the OPC DA Server supports remote communication concerns, as it can reside on a separate machine from other SCADA servers.

For maximum flexibility, the OPC DA Server allows browsing of configured tags in two modules: "Flat" where tags are presented in a single directory tree, and "Hierarchy" where tags are presented according to their position in the SCADA tag hierarchy tree, relative to configured clusters and equipment.

Read access to selected SCADA variable tag configuration fields and tag data quality elements of the individual tags can be performed via Vendor Specific Properties, as specified by the OPC DA interface standard.



Seamless dataflow: Our open connectivity to various information systems.

At a glance

- > Supports both types of record-sets disconnected and connected
- > Multiple pre-defined queries per connection
- > Support for parameters
- > Native transaction management support

ActiveX Data Objects (ADO)

ActiveX Data Objects (ADO) is a native feature in Vijeo Citect. ADO allows for simple and easy data exchange from other systems, such as Enterprise Resource Planning (ERP), recipes, order planning or billing. It allows two-way communication with external databases such as Microsoft® SQL®, Access® and Oracle®, and allows information to be exchanged with your SCADA system.

Two very basic scenarios of using the Cicode SQL database interface can be distinguished:

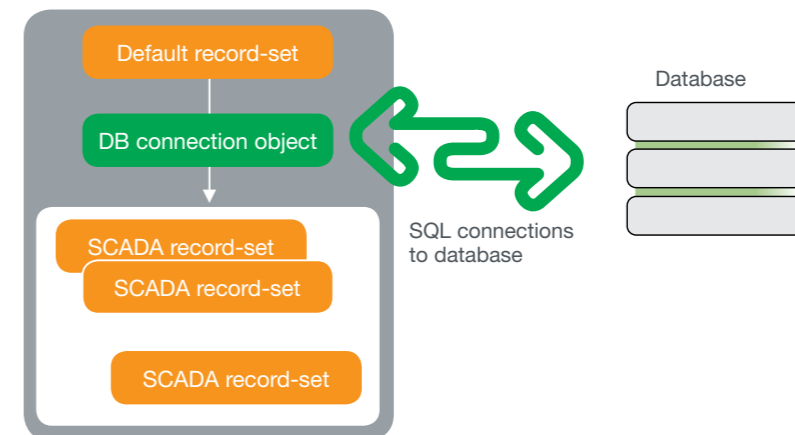
- > Accessing and analyzing data in a Cicode procedure(s)
- > Accessing and displaying data on a graphics page

The technology allows connection to databases to obtain data sets, by executing either ANSI SQL commands, or any database-specific dialects of SQL (if a dedicated provider such as T-SQL or PL/SQL).

The implementation introduces database connection objects as containers for parameters describing SQL connections to the database. Users can execute SQL queries via database connection objects and get either disconnected SCADA record-sets, or the connected SCADA record-set, containing results of the queries.

A set of Cicode SQL functions is also introduced. They can be divided into four categories:

- > Creation/connection – functions servicing separate creation of database connection objects and separate connection initialization
- > Multiple recordsets per connection – functions enabling users to obtain and use handles to disconnected record-sets
- > Parameterization – functions providing more secure ways of building SQL queries
- > Multiple queries per connection – functions enabling users to obtain and use handles to queries



Communication: Drivers



DriverWeb

DriverWeb is a forum-based repository of Vijeo Citect driver information. Each driver has its own forum that contains the latest driver pack, as well as previous packs should you need to replicate an existing system. You may also find downloadable documents and information on the devices that the driver works with, as well as information on how to connect them. The full text search makes it easy to find a lot more information than was previously available.

Vijeo Citect Driver Development Kit

A Driver Development Kit (DDK) is available so that you can develop your own Vijeo Citect device driver. Alternatively, you can modify a configurable ASCII driver, or develop a simple driver in Cicode. See DriverWeb for more details at www.citect.schneider-electric.com/driverweb

I/O Devices

Vijeo Citect comes with over 150 I/O device drivers included. These allow you to connect to over 300 different models of I/O devices — PACs, RTUs, micro controllers, loop controllers, DCS elements, weighers, bar code readers, scientific analyzers and more.

Open to anyone

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

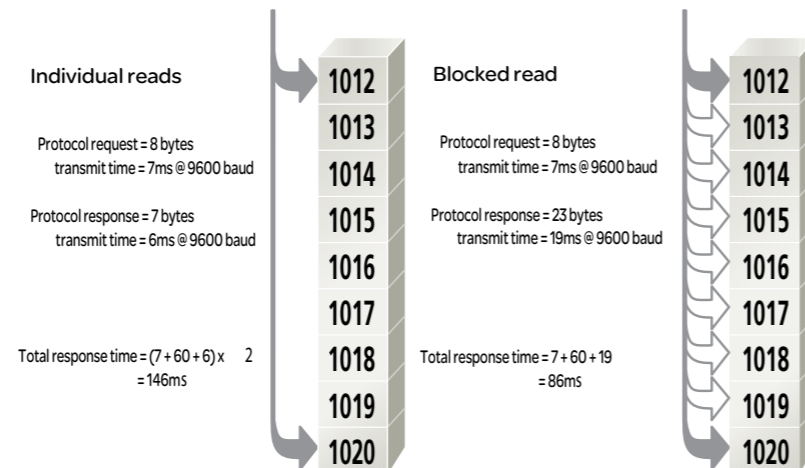
Vijeo Citect's open connectivity from various information systems allows accurate dataflow, providing real-time and rich process information. Vijeo Citect has the flexibility to operate with open standards supported by hundreds of hardware and software vendors.

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 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 read 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.

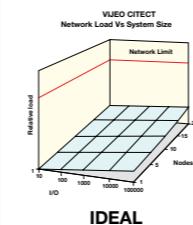


Blocking Example: Vijeo Citect requires registers 1012 and 1020. The I/O device has a read overhead of 60ms — which is independent of the number of registers read.



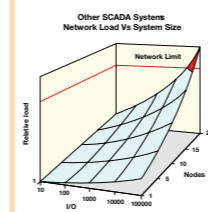
Reliable Performance

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:



IDEAL

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



UNACCEPTABLE

Automatic Tag Synchronization

Vijeo Citect FastLinx links your database in Vijeo Citect to the PAC programming software, giving you a single database solution. This significantly reduces development time and reduces the chance of configuration errors occurring during project maintenance and design. The bi-directional linking feature allows changes to be made in any development environment are automatically updated when simultaneous projects are worked on. When Vijeo Citect and PAC projects are worked on separately, the Import and Export feature is an invaluable tool that helps to ensure both environments are maintained and kept up-to-date. Regardless of whether you develop your Vijeo Citect and PAC project simultaneously or separately, Vijeo Citect FastLinx makes it possible for all variable tags to be maintained and updated automatically.

The Automatic Tag Synchronization feature makes it possible for changes made to controller tag definitions at the PAC level to automatically be updated in Vijeo Citect. By permanently linking Vijeo Citect tags to the PAC programming software, changes made at the controller are automatically replicated in Vijeo Citect.

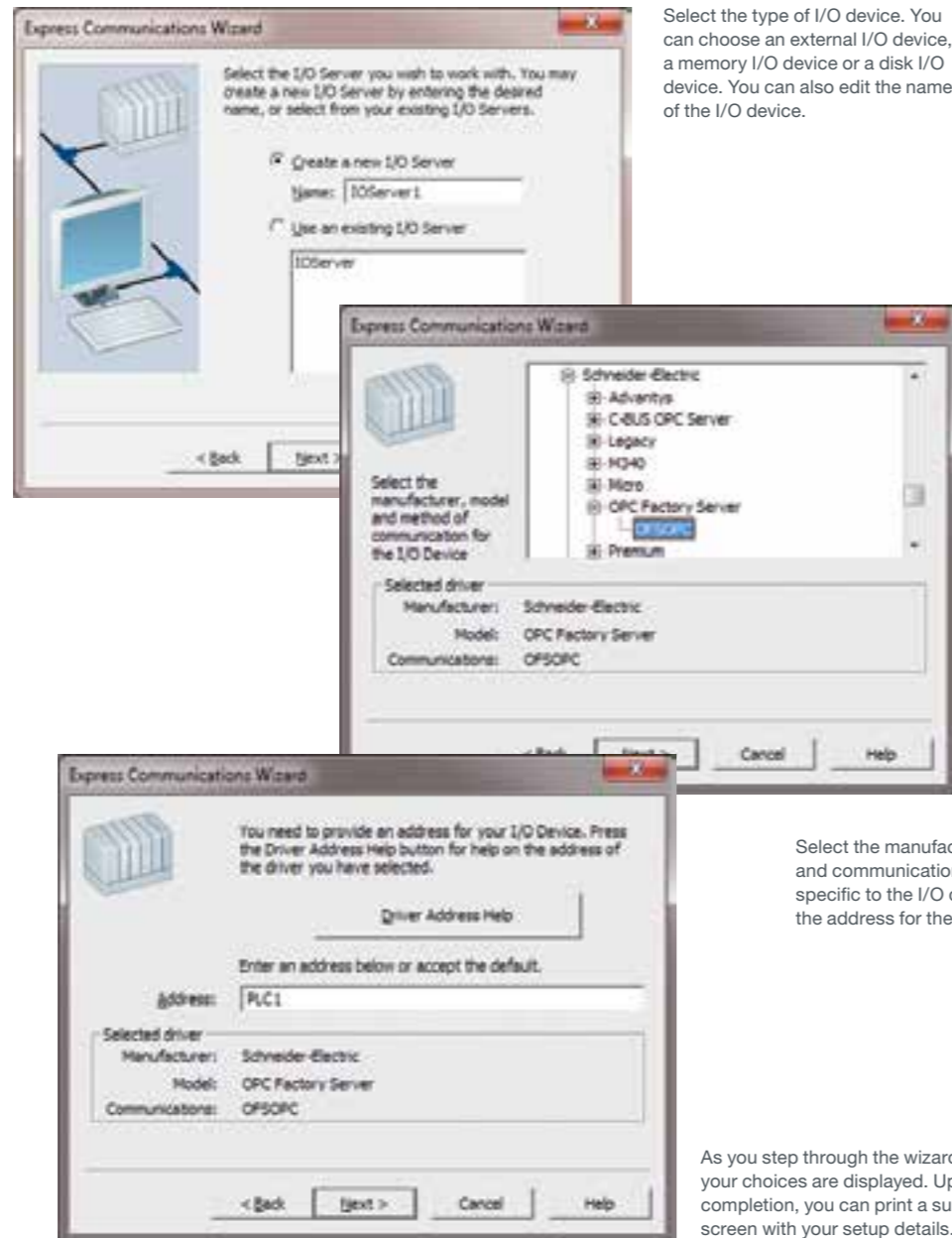
To protect data integrity, the synchronization process is triggered on actions in Vijeo Citect — such as "Insert Tag". These triggers cause Vijeo Citect to check the controllers to see if changes have been made and, if needed, update Vijeo Citect's tag database.

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

Communication: Simple

Vijeo Citect's I/O device communication wizard will have you communicating quickly. 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. Additionally, setting the persistence property of the I/O device will allow the last known status to be retained during a device restart. You can specify a protocol and Vijeo Citect will use that device driver to communicate, providing a very thorough test.

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.

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

Security: Configuration

We recommend addressing security at all levels within your industrial automation and control system. While individual components need to be secured, your control system infrastructure and your network need to be secured from potential threats.

To help prevent tampering with your plant when the operator station is unmanned, Vijeo Citect can automatically log people out of the system (for example, if the mouse is idle for five minutes). Without an appropriate user name and password, unauthorized users cannot access the system. Support for read-only projects allows you to secure your Vijeo Citect configuration from unauthorized changes. System integrators and OEMs can deploy a project 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 have evolved and become linked via the Internet or wireless technology, physical access is no longer necessary for a cyber attack. One solution is to isolate the SCADA network. This, however, is not a practical solution, where control systems are managed by business systems, or where the data is coming from remote data sources, such as RTUs.

To aid in the development of strict control system security, it is recommended that customers implement plans that cover the following areas:

- > **Security Plan:** Focuses on creation and application of security policies and procedures. The policies and procedures must provide a mechanism to assess vulnerabilities, mitigate and avoid risks and define disaster recovery procedures.
- > **Network Separation:** The industrial automation and control system (IACS) must be fully separated from internal and external networks by creating a buffer. a "demilitarized zone" (DMZ) between the systems, network and rest of the world, using switches. All in-bound traffic should be blocked except through the DMZ firewall. Non-critical servers (eg historian, web servers, anti-virus servers, authentication servers, wireless access points) should be primarily hosted in the DMZ. Schneider Electric recommends the usage of Hirschmann® routers and firewalls (MACH, Eagle20, Eagle Tofino).
- > **Perimeter Protection:** Industrial automation and control systems (IACS) must be protected from unauthorized access by using firewalls, authentication, authorization, VPN, network intrusion detection systems and anti-virus software. All these mechanisms must also have the capacity to manage remote access.
- > **Network Segmentation:** Customers must use switches and Virtual Local Area Networks (VLANs) to divide the network into sub-networks. This allows containment of a potential security breach to the affected segment.

- > **Device Hardening:** Customers must configure PCs, switches, I/Os and instruments for increased security which encompasses serious password management, user-profile definition and deactivation of unused services and interfaces.
- > **Monitoring and Update:** Customers must ensure permanent surveillance of network communications and all operator activities. The implementation of a risk-based patch management mechanism is recommended, so that software and firmware updates are adequately applied based on the risk.

While there are core security elements that are required for every network, additional security is required for wireless networks. Two 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 are recommended to minimize the chance of potential threats:

- > Restrict MAC addresses
- > Require WPA/WPA-2 protocols be available
- > Utilize VPNs for 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, access can be managed for different users to different parts of the process. For an OEM style customer, this allows them to secure a sub component within a project so included projects cannot be changed while the OEM is not present. Utilizing Windows security helps keep your projects secure, regardless of the editor used to configure.

Security: Operations

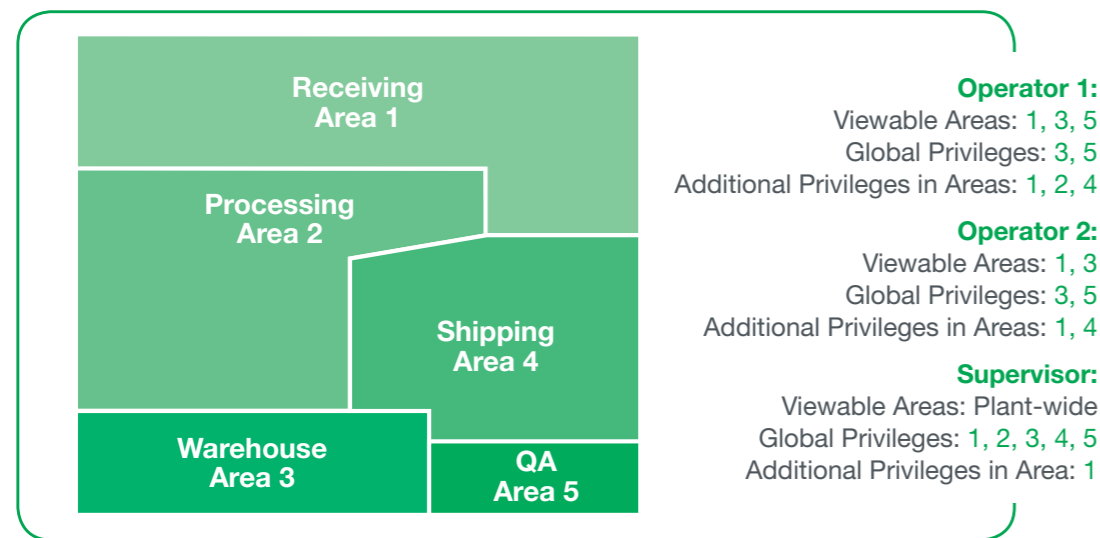
Vijeo Citect's extensive security features are integrated into all interface elements, helping to deliver a secure runtime system.

Control systems need to be secured against unauthorized access, with most applications having operations limited to particular personnel.

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 integrated with corporate domain-based security (Windows Integrated Security) or managed in Vijeo Citect's native security model. 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 with the clients shared amongst several users across the network. Simply allocate sufficient view-only licenses and be mindful of adhering to the maximum number of users that can be logged in at any one time.



Windows Integrated Security

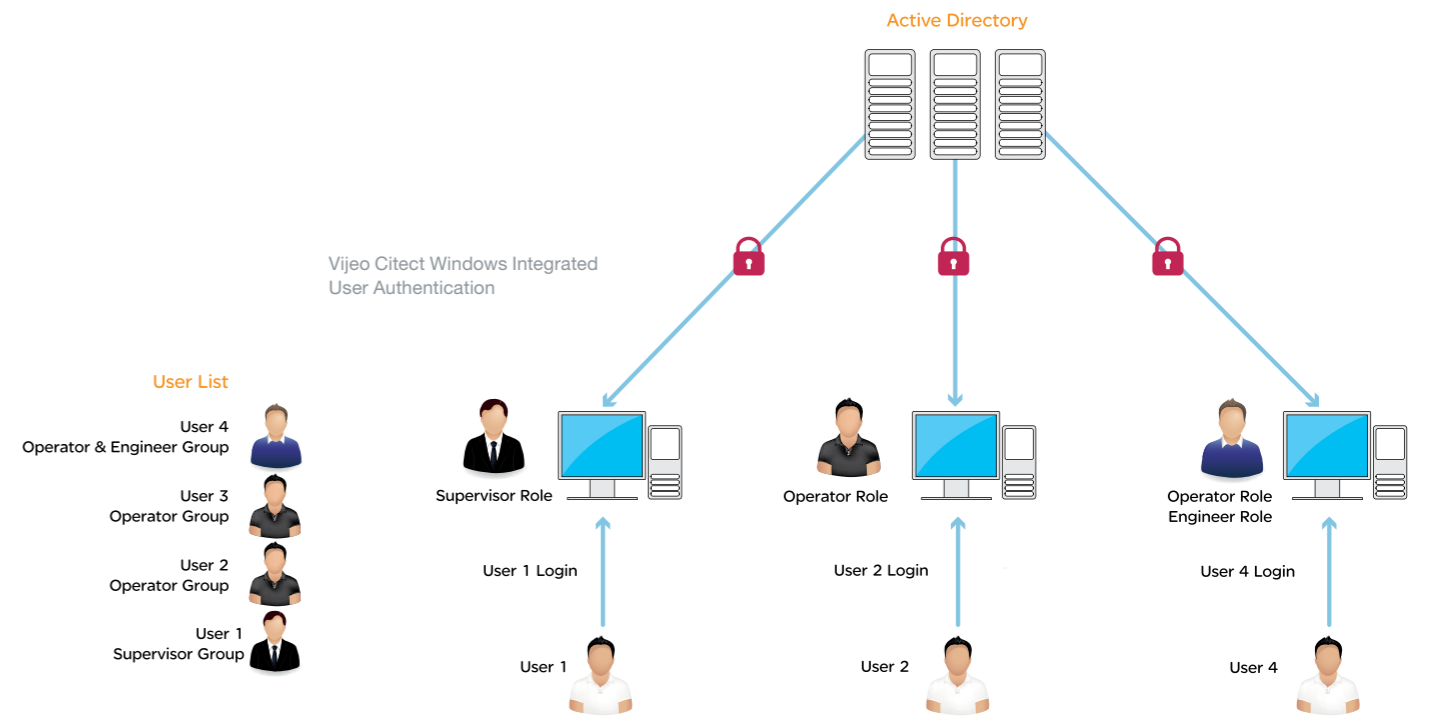
Integration with Windows security provides the additional benefit of applying the same corporate security standards to control systems as to other applications. It also creates a single location for the management of user accounts. For example, when an operator leaves the organization and their access 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 corporate 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 provide only the runtime components, preventing the installation of additional configuration tools. An additional security layer is provided by restricting the computers where the project configuration can be modified.



Operations: Graphics

Define your own view

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



filled,



heated,



or rotated.

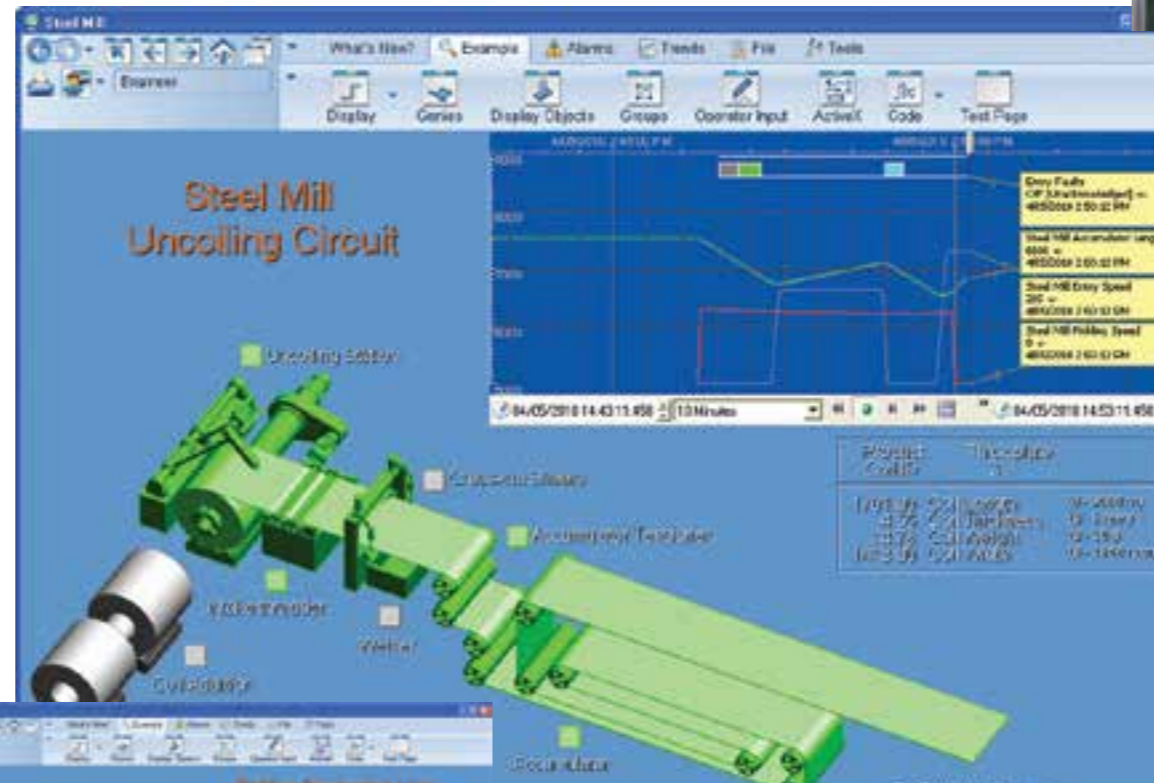
Just by using graphics, you will find yourself developing new ideas for your interface.

The graphics capabilities of your SCADA system are an important 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 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 even for 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 experience excellent runtime performance.

Vijeo Citect provides a number of different common screen resolutions in varying aspect ratios. To create a new resolution, you can simply choose an existing aspect ratio and resize accordingly. 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 graphics.

Operations: Operator Actions

Operations: Data Quality

System pages and custom graphics utilize a variety of user-friendly commands and controls to facilitate operator interaction with the Vijeo Citect runtime. Privileges can be assigned to particular commands and controls, and messages distributed each time an operator issues a certain command.

At a glance

- > Tool-tips
- > Data grid
- > Tree control
- > Scroll bars
- > Sliders
- > Keyboard commands
- > Mouse touch commands
- > Screen target regions
- > Pop-ups menus
- > Buttons

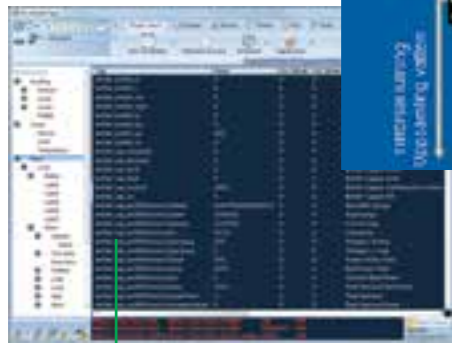
Touch Commands

Touch commands can be assigned to any graphics object, including button objects. The objects are activated when the operator clicks on them.

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

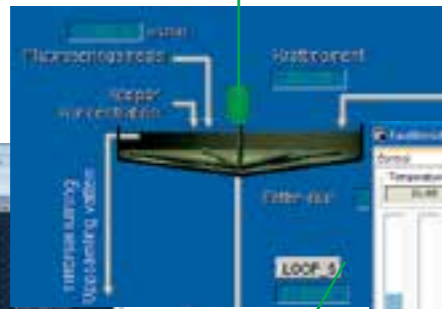
Screen Targets

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



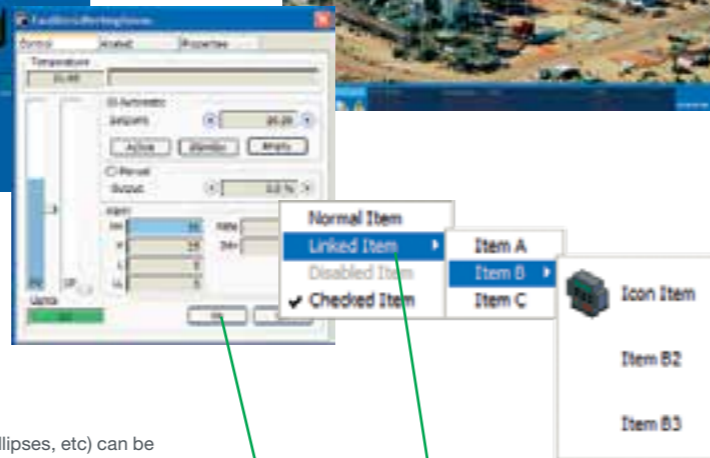
Data Grid

The grid view library control allows operators to quickly view system data in a familiar Excel-like grid view layout. Vertical and horizontal scroll bars can be added to this view to allow ease of navigation.



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.



Pop-up Menu

Pop-up menus simplify navigation and can also be used to trigger Cicode or CitectVBA functions.

Pop-up menus can be disabled, checked or linked to other menu items.

Tree Control

The tree library control provides the ability to:

- > Link to menus for vertical menu navigation
- > Link to equipment for filtering views

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.

Buttons

There is an option to create buttons with dynamic property support, further reducing operator training time.

Vijeo Citect delivers quality information with each data tag, providing a more holistic picture of your process through improved real-time data values and traceability.

Data Quality

Each variable tag represents information as a collection of data quality and timestamp elements. Operators can be informed about the value of each real-time tag, along with the last time the value changed 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 and the quality last changed.

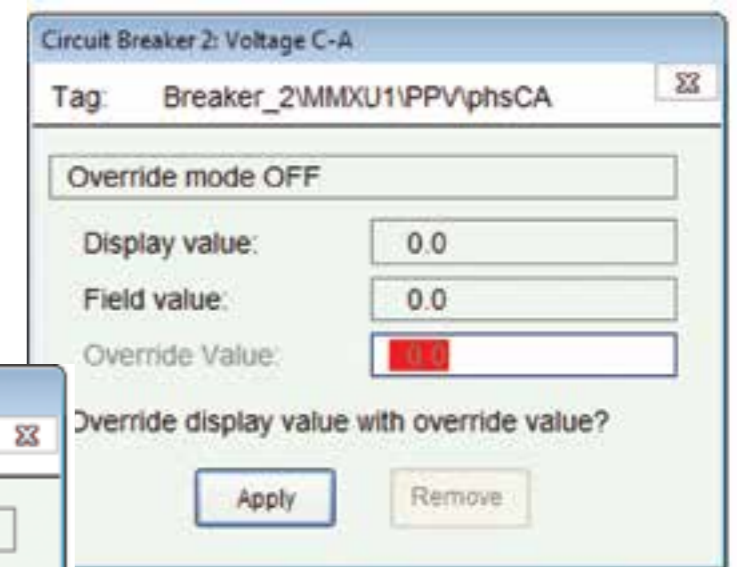
Vijeo Citect provides real-time data quality and status information. The 'quality' of the data is available to the operators, allowing for better informed processing decisions. Each tag data point contains properties that provides the data values along with the associated quality and time stamp of the data change. This allows each client access to not only the data, but also to 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 assists other control system calculations.

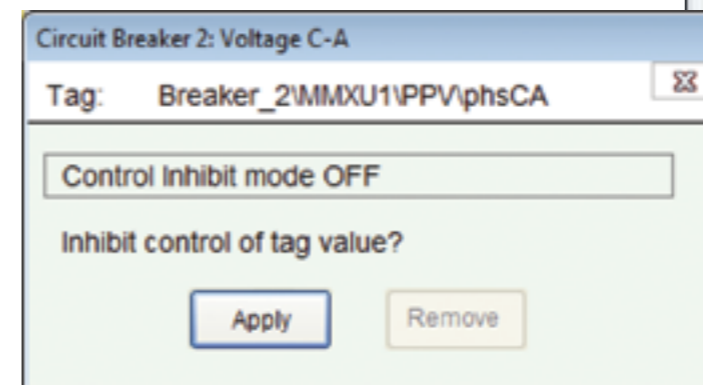
Vijeo Citect lets you choose what a client will display during a communication outage, either an error indication or the last known value. By default, tags are displayed with a tool-tip that shows the last known quality and time stamp of the tag.

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

Variable tag properties 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 remain unaffected when operators are using manual controls during the failure of automatic sensors. The Tag Control Inhibit functionality allows critical system information to be protected and inhibits the unauthorized writing of data. Such functions are designed to enhance the security of your process while increasing efficiency in the case of a false alarm.



Rich tag data



Control Inhibit mode

Operations: Alarms & Events



There are often many alarms that trigger simultaneously.

In such an instance, 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 actions an operator needs to perform to correct the situation. You can display these pages automatically when the alarm occurs, or only when an operator specifically requests help.

The equipment tree helps to quickly drill down to specifically identify faults or problems at the equipment level

The splitter makes it easy to resize or hide the equipment tree

Active alarm counts can easily be viewed

An efficient alarm system helps 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.

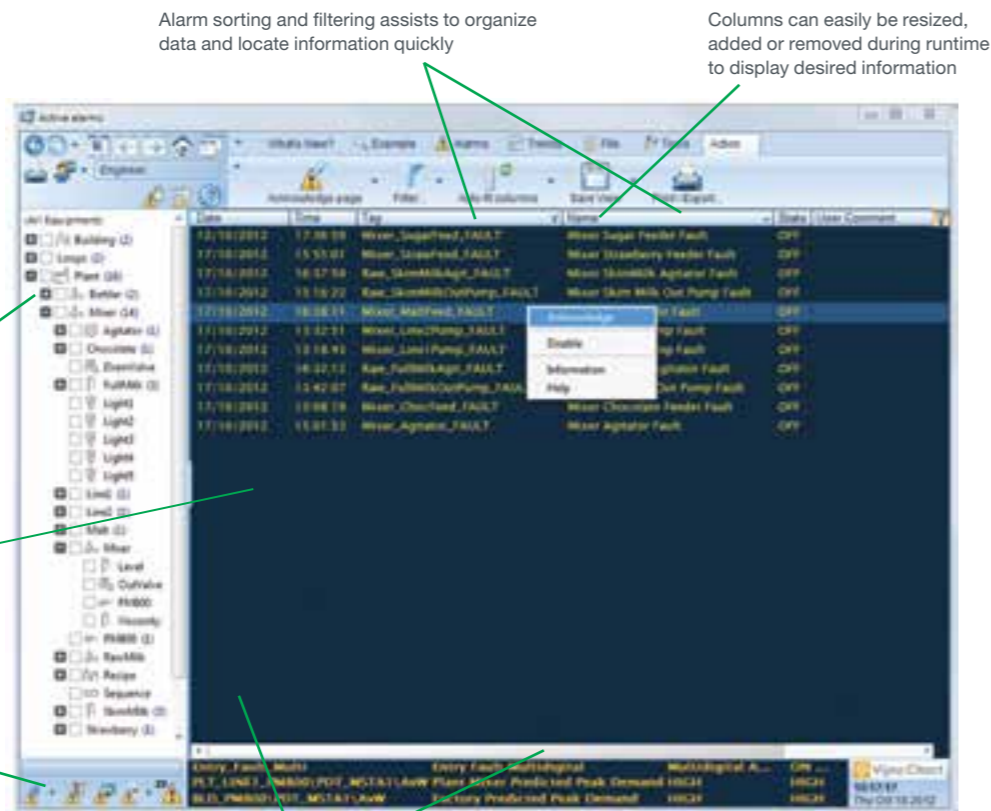
Alarms are processed and managed by the Vijeo Citect alarm server. Any Vijeo Citect control client can display and acknowledge alarms. This eliminates duplicated processing, facilitates the system-wide acknowledgement of alarms and provides for server-based security checking.

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 timestamped, 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 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 alarms that have occurred on your system, the Sequence of Events page provides a complete history.

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



Alarm sorting and filtering assists to organize data and locate information quickly

Columns can easily be resized, added or removed during runtime to display desired information

Active alarm page

Vertical and horizontal scroll bars make it easy to navigate through the data



At a glance

- > Analogue, digital, SPC and custom alarms
- > Integrated hardware/diagnostic alarms
- > Millisecond resolution
- > Configurable display formats
- > ODBC access for historical events
- > OPC A&E server for the retrieval of active alarms
- > Filter is customizable using alarm properties
- > Acknowledge from multiple network computers
- > ODBC, DBF, CSV and ASCII data formats
- > Support for RTU-based alarms

Alarm configuration changes are now highlighted in the SOE summary page

Historical Alarm Events

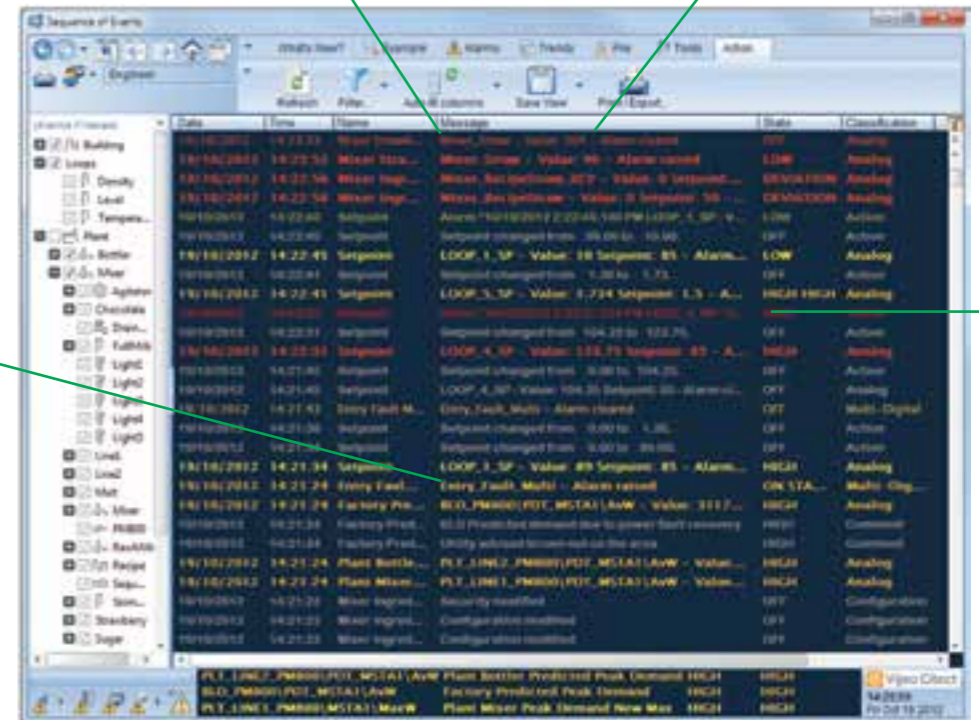
For a record of the alarm related events that have occurred on your system, the Sequence of Events (SOE) page provides a complete history.

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 specific alarm icon. Properties include:
- > 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

Operator changes to alarm set point events can be added

Multiple operator comments can be easily added to any individual alarm event



Sequence of Event summary page

Alarm lists allow you to quickly analyze what has occurred in a section of the plant to assist in the implementation of process improvements and operator training.

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.



Alarm filter form

Operations: Trends

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 helps 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 have the ability to view all of the data on a single integrated display.

Users have complete flexibility in how the pens are 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.

Examples of Use

Root Cause Analysis

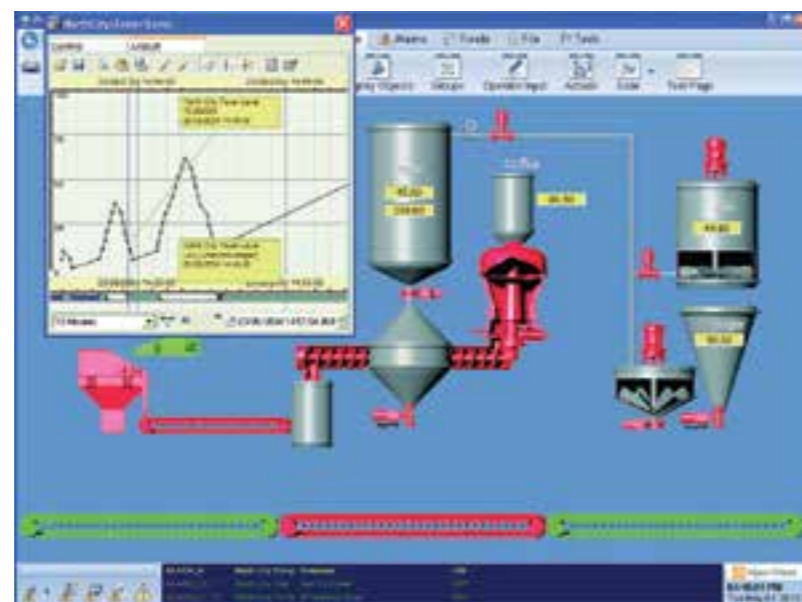
When a process upset or disturbance occurs, finding the root cause is often time consuming. In the past, the process engineer had to compare trend data from the screen with alarm logs. With Process Analyst, all the engineer has to do is simply add to the display any pen (analogue, digital, alarm) that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

Sequence of Events

With SCADA systems, the data is typically distributed across a wide area and sent via RTUs in millisecond resolution to Vijeo Citect each time the data is polled.




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



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

Paul Donald, Telemetry Officer, Central Highlands Water



Vijeo Citect trends are a 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).

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 client requests. Because the Standby Trend Server tracks 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.

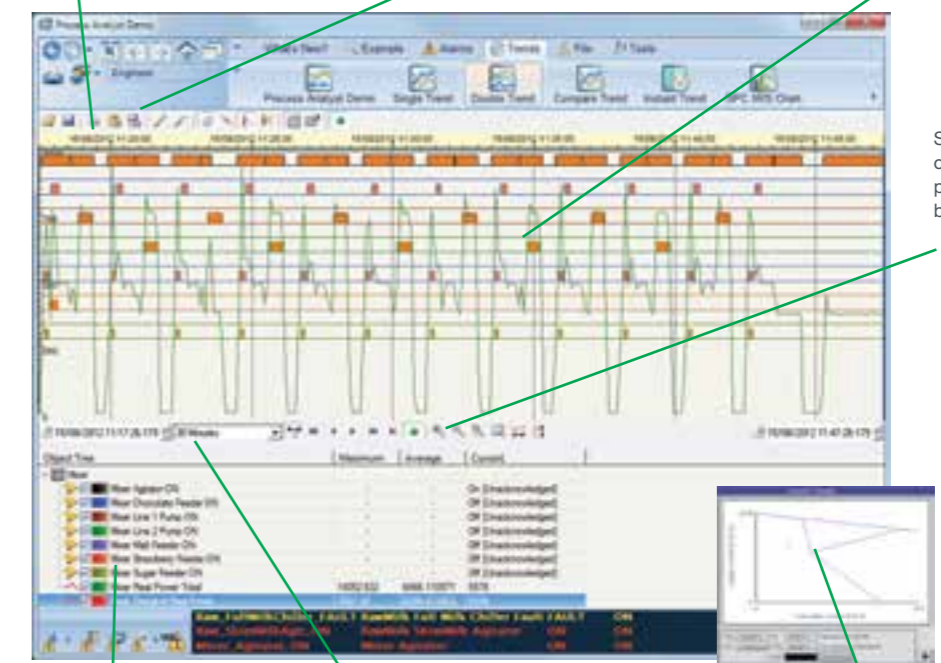
Any plant floor variable can be logged and trended. A trend builds a picture over time of how the variable (product output, level, temperature etc.) is changing or how a device or process is performing. Vijeo Citect trends are created from a selection of sample values. The sample values are plotted against 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 or 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 pop-up windows, but if you feel that you want something specific to your system, you can easily configure it yourself, with your own functions and trend pens.

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

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

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



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

Change the resolution and timespan of the graph while it is running.

The X,Y plot feature is very flexible, allowing you a high level of customization. You can display your plots onscreen 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. When a plot point inside the dynamically calculated triangle indicates an explosive condition, the mine is evacuated.

Operations: Trends



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 in each instance of Process Analyst. The security access required can also be defined and users are able to add custom buttons for additional functionality.

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

Multiple trend cursors can be displayed with or without tool-tips.

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

Overlaid analogue and stacked digital pens on the same pane.

Operators can easily declutter the display.

Alarm pens can represent different alarm states with colours or fill patterns.

Alarms can be overlaid or displayed on separate panes. The pen displays the ontime, offtime, acknowledge time and operator comments.

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

Any variable tag can be added to a pane and it will start graphing instantly.

Chart Journal Control Properties dialog box showing 'Setpoint Alarm' properties and a table of alarm states:

Style	Fill	Mark	Label
[Black]	[Black]	[None]	Expand
[Red]	[Red]	[None]	Deviation High
[Green]	[Green]	[None]	Deviation Low
[Blue]	[Blue]	[None]	Rate of Change Low
[Yellow]	[Yellow]	[None]	High
[Cyan]	[Cyan]	[None]	Low-Low
[Magenta]	[Magenta]	[None]	High-High

Trend example showing different quality attributes.



At a glance

- > Helps analyze the cause/s of process upsets quickly and simply
- > Allows operators to recognize patterns that may lead to process disturbances
- > Provides flexibility on how you view and analyze your process
- > High quality output to printers
- > True Daylight Savings support
- > Historical trend data pens can be added
- > Various alarm states
- > Variable tag pens can be added for instant trending

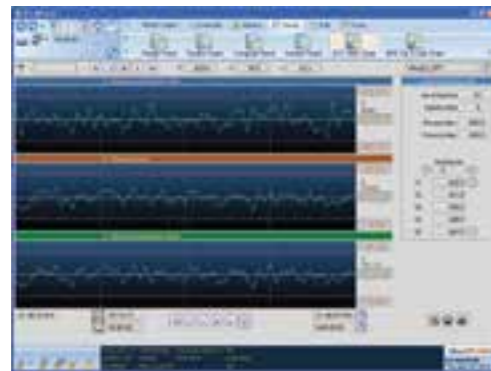
Operations: Statistical Process Control (SPC)

For an easy-to-understand graphical indication of production quality, users have access to intelligent statistical analysis tools. Out-of-limit deviations can be prevented with Vijeo Citect's range of SPC charts.

At a glance

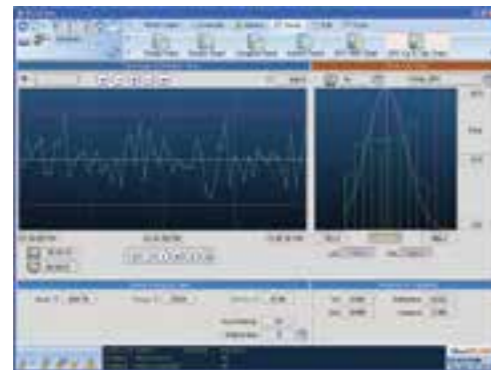
- > Mean, Range and Standard Deviation (XRS)
- > Pre-configured calculation routines
- > Template-based pages (easy configuration)
- > Capability charts
- > Pareto charts
- > SPC alarms are integrated into the alarming system

Vijeo Citect provides three types of charts commonly used in statistical analysis: Control (XRS) charts, Capability charts and Pareto charts.



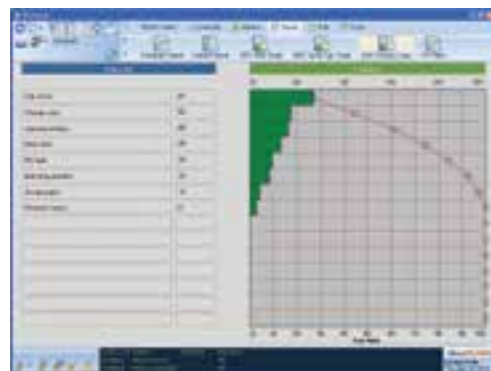
Control (XRS) Charts

Control (XRS) charts help 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 assume necessary calculations.



Pareto Charts

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

Operations: Integrated Video

With real-time video display in Vijeo Citect, operators can access live video feeds on their screens directly from IP cameras located both at centralized and remote locations. User-friendly controls like Pan, Tilt and Zoom and event-triggered display features make this enhanced solution a valuable set of 'on-site eyes' 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 be accomplished thanks to Vijeo Citect's ability to view video feed from Pelco cameras directly onto 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 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 as required
- > 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

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.



Change the quality of the video bandwidth

Zoom, pan and tilt the camera using the controller

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

Connect or disconnect the camera and set its IP address

Run or stop the camera's run patterns.

Operations: Mobility

At a glance

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

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 expanded access can visibility into the plant's real-time processes and can lead to more timely and intelligent decisions.

Remote control and application shadowing have become possible with Vijeo Citect's mobility solutions. 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 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

- > Adapt your computer network to your enterprise
- > Enable remote access
- > Access your SCADA system from almost anywhere
- > Client requirements include screen, keyboard and sufficient circuitry

Improve data security

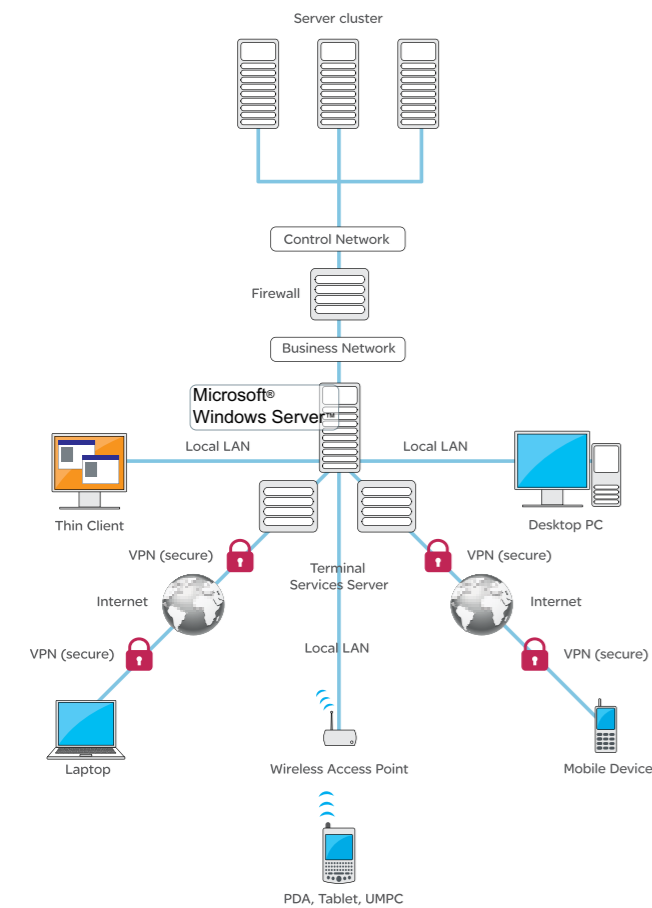
- > Less vulnerable to hacking
- > Focus your security measures on the server, where the data is processed
- > No data loss if the client is damaged
- > When operating over the Internet, Virtual Private Networks (VPNs) are recommended for data encryption

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

- > Vijeo Citect for Terminal Services software gives users the mobility and flexibility to view Vijeo Citect applications through:
 - » Thin-client terminals
 - » PDAs
- > 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



Supported client types

Operations: 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

In an increasingly automated environment, operators and system engineers strive to have data and control available at both the plant floor and the control room, without duplicating engineering, commissioning and system maintenance efforts.

Screen Sharing

For applications requiring panel interfaces, or with 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 the screens on the panel as if they were standing on the plant floor.

Alarm Sharing

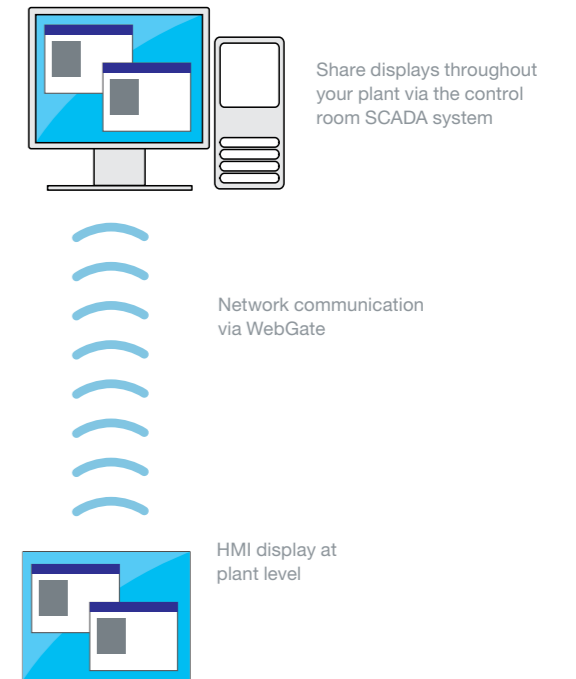
As plant floor interfaces become more complex, customers also require the ability to share alarming status between plant floor, interfaces and the control room. The diagnostic buffer within the Schneider Electric Unity processors provides both HMI and SCADA systems with a common alarm repository. On 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 demands richer controls even at the plant floor level the ability to host Vijeo Citect on our extensive range of Magellis hardware provides a great platform for the SCADA system. The latest box PC design can host remote client or server applications in almost any environment.

WebGate brings PAC 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 Magellis™ terminals, Schneider Electric PACs and devices. View all the panels from across your plant on one centralized and unified operator interface.



Operations: 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 three incremental measures:

- > 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)

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

Shift Report

24 March 2012

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, either 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 a number of different formats. 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, Vijeo Historian should be used. It is a powerful reporting and analysis tool that collects, historizes and reports data from multiple SCADA systems. Users can utilize the integrated database containing trend, alarm and event data to gain a holistic understanding of plant operations.

Grower Status

24 March 2012

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%

Operations: Database Control



At a glance

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

The DatabaseExchange is an ActiveX control that enhances Vijeo Citect's ability to utilize and provide database information.

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

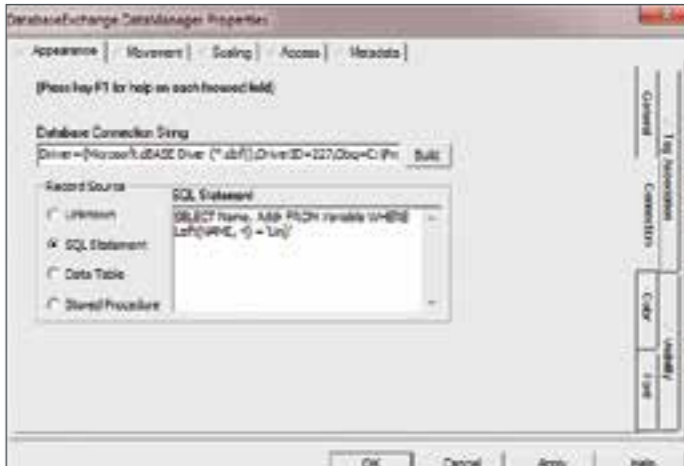
As well as displaying information from the database, the control enables the user to define tags for each column within the data returned. The can then select to upload or download information between these tags and the database. In this way, machine setup parameters or set points can be loaded from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

The DatabaseExchange is integrated into the Graphics Builder toolbar and uses the power of SQL directly from Vijeo Citect.



Country	Lat/Long	Full Name	Status Code	Code	Subprocess
UK	50°51'N 0°	Melton	1000	1000	1000
USA	38°57'N 96°	Magee	1000	1000	1000
USA	38°57'N 96°	Magee	1000	1000	1000
USA	38°57'N 96°	Magee	1000	1000	1000
UK	50°51'N 0°	Melton	1000	1000	1000
UK	50°51'N 0°	Melton	1000	1000	1000
USA	38°57'N 96°	Magee	1000	1000	1000
USA	38°57'N 96°	Magee	1000	1000	1000

The returned data ready to display or exchange



DatabaseExchange Data Manager Properties

Appearance | Movement | Scaling | Access | Metadata

(Please lay FT for help on each focused field)

Database Connection String
 Driver={Microsoft Access Driver (*.mdb)};DriverID=127;Dbq=C:\P\

Record Source
 Microsoft Access
 SQL Statement
 Data Table
 Stored Procedure

SQL Statement
 SELECT Name, App, Pch, vrate WHERE
 Lch(WPE, 0) = 1

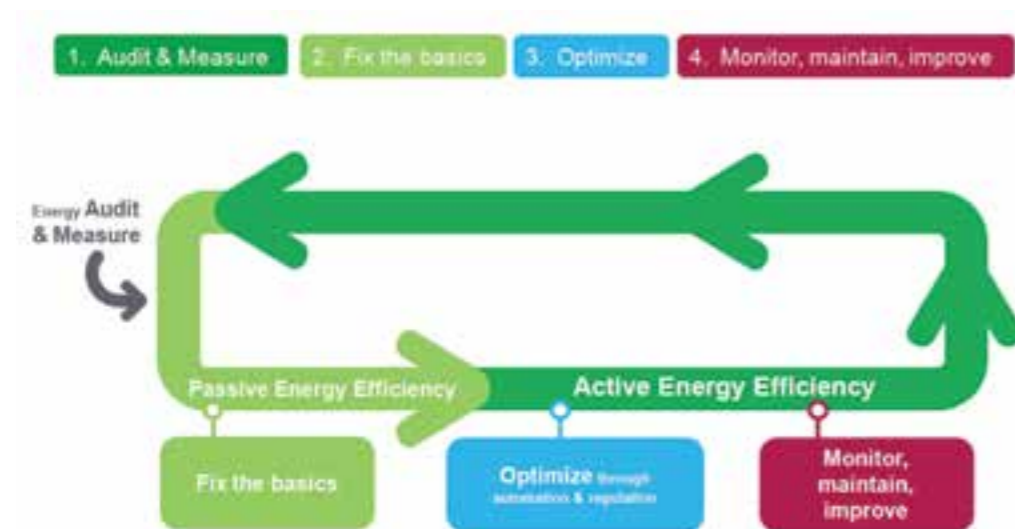
OK Cancel Apply Help

Use the power of SQL directly from Vijeo Citect

Energy: Process

As leaders in Energy Management, Schneider Electric is committed to helping our customers with the challenges of reducing both the cost and the consumption of energy. Within process solutions, our customers are focused on maximizing production and increasing regulatory compliance, while at the same time minimizing energy costs and consumption.

To assist our customers in optimizing their production output, we have adopted a continuous improvement approach based on Define, Measure, Analyze, Improve and Control. Schneider Electric has developed specific tools for each stage of this process.



Measure

The more you know about your energy consumption, the less energy you are likely to use and the more money you can save.

Vijeo Citect +PowerConnect connects users to the rich data available within Schneider Electric power meters. This holistic view of detailed energy consumption data coupled with the process information available within the SCADA system, places operators in an optimum position to manage their energy.



Examples of Schneider Electric power meters

Vijeo Citect +PowerConnect provides rich communication to key Schneider Electric power meters through either Modbus or the industry standard IEC 61850 protocol.

These power meters deliver rich data with millisecond resolution in relation to:

- > Power consumption
- > Voltage
- > Current
- > Power factor
- > Harmonic distortion
- > Sliding window demand

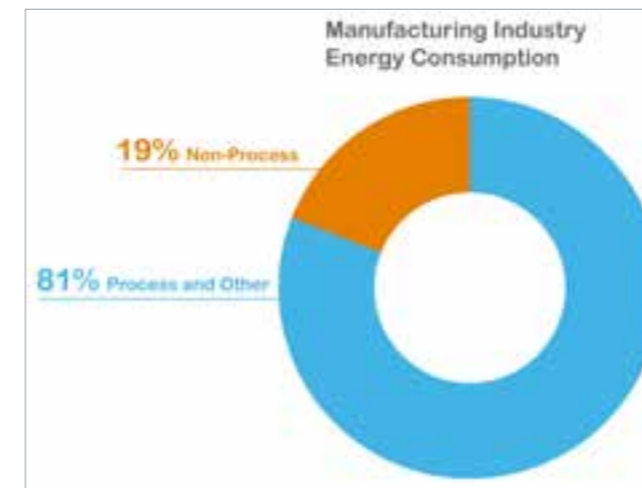
Detailed impact analysis of process changes is provided via access to on-board power meter alarms, detecting any rapid changes in energy variables.

In order to provide simple access to this data, Vijeo Citect +PowerConnect uses equipment templates. These templates facilitate rapid configuration, helping to deliver a faster return on your investment. A single entry within Vijeo Citect provides access to all key variables within the meter.

Vijeo Citect +Facilities is Schneider Electric's solution for the effective management of process and building automation

In addition to delivering energy management solutions for process control, we also help customers achieve a more holistic view of energy consumption across an entire site. Vijeo Citect +Facilities helps industrial SCADA users reduce their overall "total site" energy costs, with a comprehensive approach to improving efficiency, both in their process and in building management, to reduce their overall energy costs.

Production is generally the highest area of energy consumption and is, therefore, where optimization plans are usually focused. However, non-production energy consumption in a facility accounts for an average 19% of total energy consumption. The synergy of +Facilities packaged with Schneider Electric's Vijeo Citect SCADA software, allows organizations to develop a total energy optimization plan.



EIA 2006: Table of average energy consumption across all manufacturing industries

Vijeo Citect +Facilities provides access (and in some cases control) to operational information from your building facility, by integrating various building automation systems across your enterprise, including:

- > Heating, ventilation and air conditioning (HVAC)
- > Lighting
- > Access control
- > Elevators
- > Video security
- > Fire and smoke control

In the same way that combining process and power information allows you to analyze and optimize the energy consumed in production, the energy consumed within your facility can also be analyzed and optimized.

Analyze

For example, using detailed timestamped data, a highly effective analysis can determine the causes of peak demand.

Vijeo Citect +PowerConnect connects your Schneider Electric power meters to your SCADA system with the inclusion of IEC 61850 protocol meters. With Schneider Electric power meters, you have the added benefit of simple and rapid configuration using pre-defined equipment templates, helping to deliver a faster return on your investment.

Additionally, this data can contribute to reducing energy waste, by identifying any energy-consuming devices that are still running during downtime periods.

+PowerConnect helps operators play a more active role in reducing costs thanks to increased visibility of energy production data. For example, this information can alert operators when energy consumption exceeds or falls below pre-defined consumption levels. Operators can help facilitate more efficient energy management as they are in an ideal position to respond to any variations.

Vijeo Citect +PowerConnect also processes with a fixed output such as compressors. When such a process is not achieving optimal energy efficiency, appropriate and timely action can be taken.

For example, where Vijeo Citect +PowerConnect highlights a spike in the energy usage of a compressor, an operator may be alerted to schedule appropriate maintenance.

Vijeo Citect +PowerConnect delivers overall business benefits by providing valuable information to help improve the efficiencies of current production processes. Information can be used to implement best practices and ensure that production is running at an optimized energy consumption level. The data can also assist with energy regulation compliance, specific standards and energy reduction targets.



Process Analyst

Energy: Optimize

Energy Management for Process Systems

Energy Management strategies embody two key foundations: the use of more efficient devices and improvements in the process itself. With this in mind, Schneider Electric is committed to continued improvements in process efficiencies with the optimization of our variable speed drives, as well as developments in power correction technologies.

Traditional energy management systems utilized load-shedding and were focused on disconnecting devices and/or entire circuits. They enabled you to start or stop devices at specific times or during uncertain conditions. However due to the interconnected nature of process control systems, any stoppage on a single device invariably halted a process, as well as, potentially, the entire production system.

An alternative to stopping any individual devices or systems, is to isolate specific process operating modes or states, which in turn will result in a reduction in power consumption. This can be achieved by changing the set points of a system, running the system at a lower capacity, or producing a particular product which uses less energy during production.

Each mode has an action which is executed when the state is entered. To avoid a spike in energy consumption as the device moves into the new state, a delay can be scheduled to distribute the energy consumption. The scheduler also allows repeating actions, which enables you to gradually lower set-points or continue running devices.

The scheduler provides flexibility to move your processes between pre-defined states, allowing you to define the most energy efficient and cost effective way of meeting production requirements.



Scheduler calendar interface

Recurring schedule form

Time-Scheduling

It is not uncommon to have peaks and troughs in power consumption. In an effort to discourage consumption during peak periods and avoid the need to initiate extra generation, power companies increase energy tariffs during high demand periods.

The Vijeo Citect scheduler enables users to schedule different states at any point within the process hierarchy, allowing various locations around the plant to operate in different states. The schedule and state can be defined based on the calendar and time of day. Additionally, the scheduler can provide different schedules for "special days," such as maintenance days or high volume run-days, to deliver you the flexibility you may require.

In addition to being linked to different energy cost periods, scheduling can also be linked to shift periods or office hours, optimizing energy by scheduling devices to be switched off at a certain time.

Time-scheduling allows for the scheduling of particular states, such as "empty all the sumps in the process in the last 15 minutes of the off-peak periods." Such a command would reduce the amount of sump pumping activities during the peak and costly energy periods. By doing this, the number of sump pumping activities during the peak energy cost period is reduced.

Process Condition Scheduling

Process condition scheduling has the same impact as changing the operational states of the equipment, but rather than acting based on a specific date/time period, it responds to process conditions.

Process condition scheduling is utilized when part of a process fails. For example, when a downstream device fails, the upstream devices will continue to operate until the buffer between the devices reaches a defined level. It is at this point that the operation of the upstream device will change based on this condition. Using process conditions, the operational state of the upstream devices can be adapted to halt production, supply alternate downstream devices or reduce as the buffer increases. In doing so, the process remains at the optimum state to resume full production whilst also minimizing energy costs.

In each case, the actions taken to manage energy consumption are provided in the system configuration. The scheduler is simply reacting to the process conditions and modifying the operational states.

Demand/Response or Spot Market Scheduling


Demand/Response is the name given to the ability for the control system to reduce its energy consumption when requested by an external source. Typically, the external source is the power company, trying to limit the costs of starting up unscheduled generators. To avoid this scenario, the power companies will provide either a reduced tariff to the customer, or reimburse them according to the level of energy savings achieved. The alternative is that the customer purchases power on the spot market and defines their own algorithm for converting the power cost into an operational state for their plant.

Energy savings are achieved by moving the production system between pre-defined operational states (one of which may be stopping the equipment in a process). In this case, however, the request from external sources is not scheduled by time or defined by a failure condition. Because it is necessary to maintain other scheduling components to minimize overall energy consumption, the demand/response state change is done without permanently altering the defined operational state and using a demand / response over-ride value.

The demand/response functionality allows the definition of multiple demand/response levels for each operational state. For example, while a water pumping station may remain in an "operational" state, it may be restricted to a lower pumping set-point, based on the particular demand/response level being activated.

Demand/response levels are hierarchical, with levels set in one area of a plant, also adopted in any child relationship throughout the plant. The result is that all associated child relationships adopt this demand/response level.

Configuration: Design



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 centered 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 also be installed for runtime only.

Disorganized projects lead to maintenance problems. The Vijeo Citect Explorer is the hub of the configuration process, simplifying project management by allowing access and modifications to any part of projects.

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 accessed 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 projects facilitate this, without placing additional effort on development teams.

Vijeo Citect manages standards within a project by placing 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 a system 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 an existing starter project. Each starter project includes configuration such as alarm and tag browse pages, server definitions, menus 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. These features all contribute to a significant reduction in the configuration time.

The File menu contains commands for creating, removing, organizing 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, Cicode Editor, Online Help).

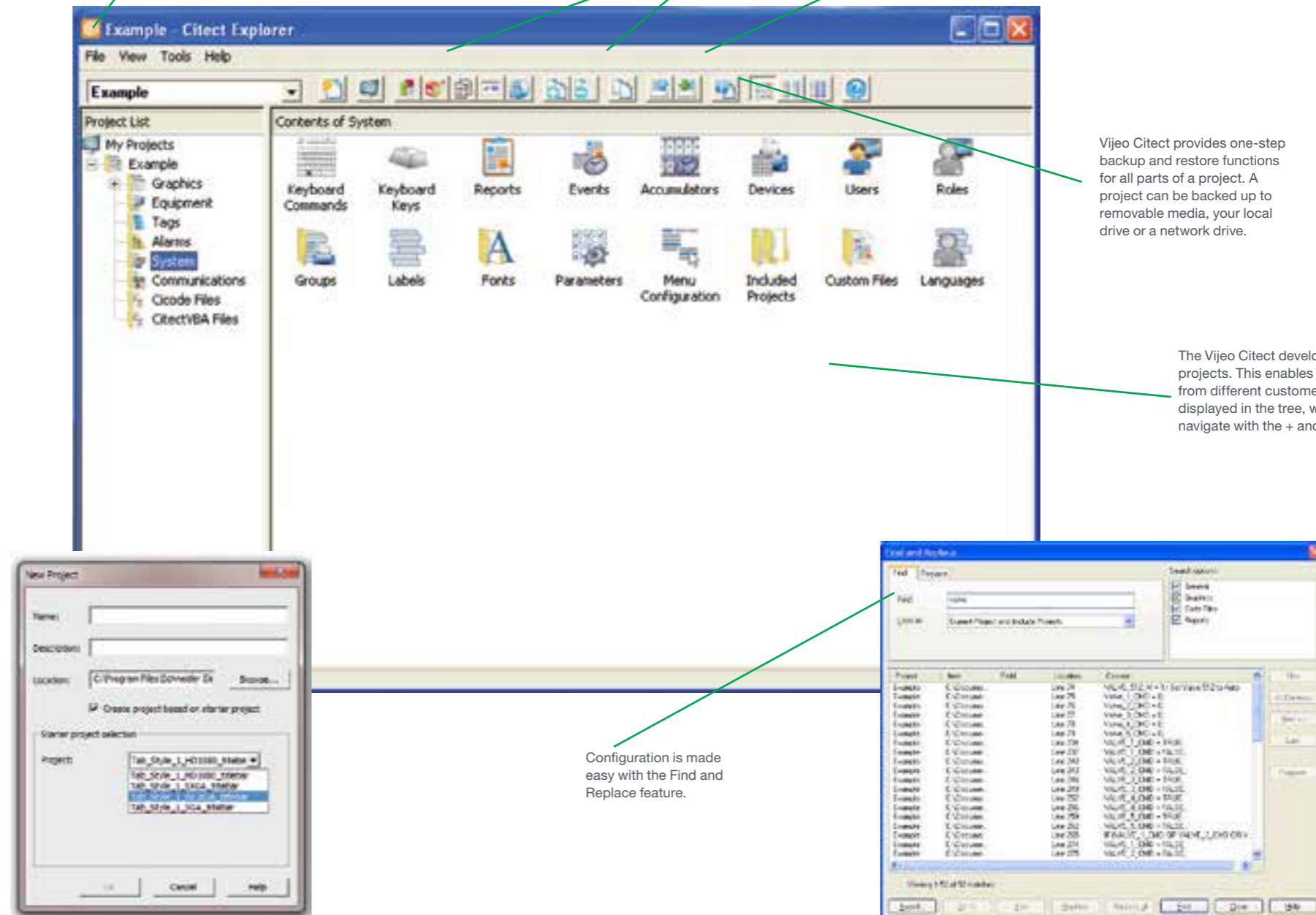
Vijeo Citect can work on projects located on file servers. Simply use “link” and “unlink” to bring projects from the file server into the development environment.

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 multiple projects. This enables integration partners to edit projects from different customers at the same time. The projects are displayed in the tree, with their file structure 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.

Configuration: Pages



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: drag, then simply 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 or 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 to draw your own graphics objects.

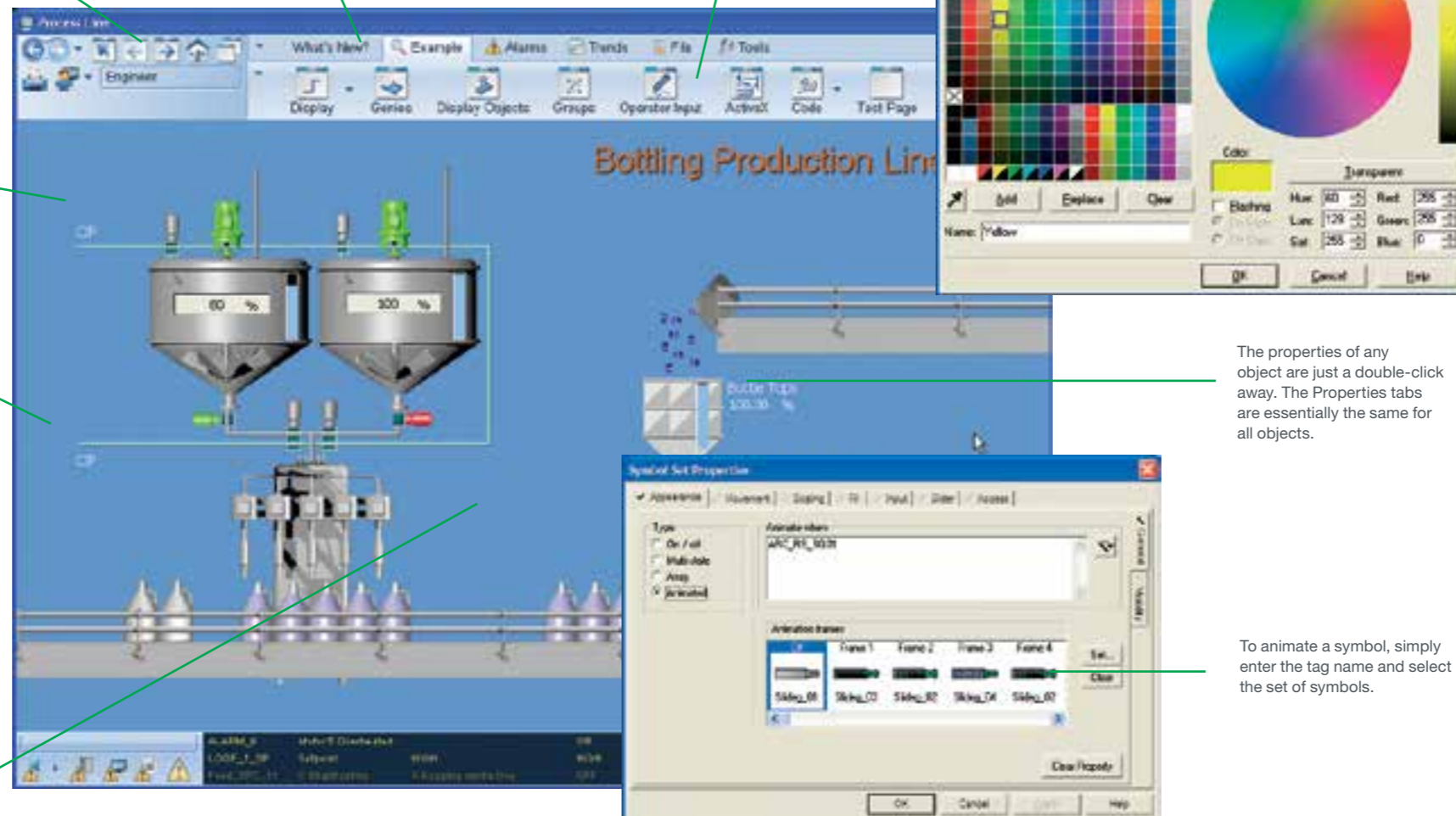
The graphics tools have their own tool-tips and each is fully explained in the Online Help.

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.

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

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

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



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

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.

Configuration: Graphics 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 can reduce both operator learning times and operator error.

Vijeo Citect provides templates for all common page types and graphics pages are easy to create. Templates are based on tried and tested page designs that you can adapt and customize to your own environment.

Vijeo Citect software provides a comprehensive selection of templates. Specialty pages, such as alarm, trend, sequence of events 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. Regardless of the template you use, the basic elements, including borders, status bars and navigation tools, are already configured.

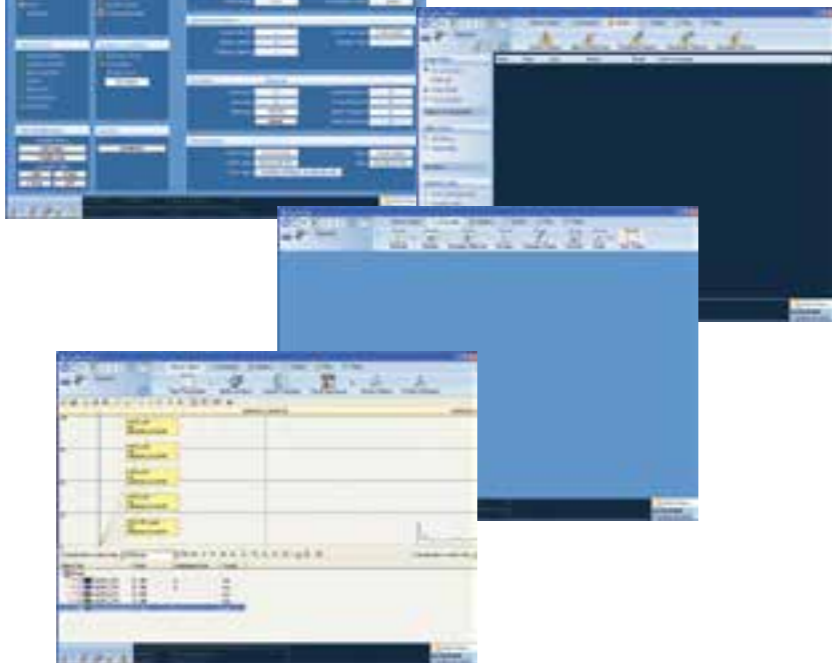


Tab-style Template

The template includes user defined menu configuration, toolbars and native support for multi-monitor systems. An alarm banner, incorporating alarm count information and displaying the three most recent alarms, is 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.



Configuration: Graphics Symbols



At a glance

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

Symbols have many benefits

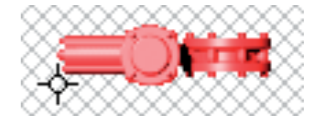
You only need to draw an object once. You can then save it to a library (as a symbol), and use the symbol many times on any of your graphics pages.

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

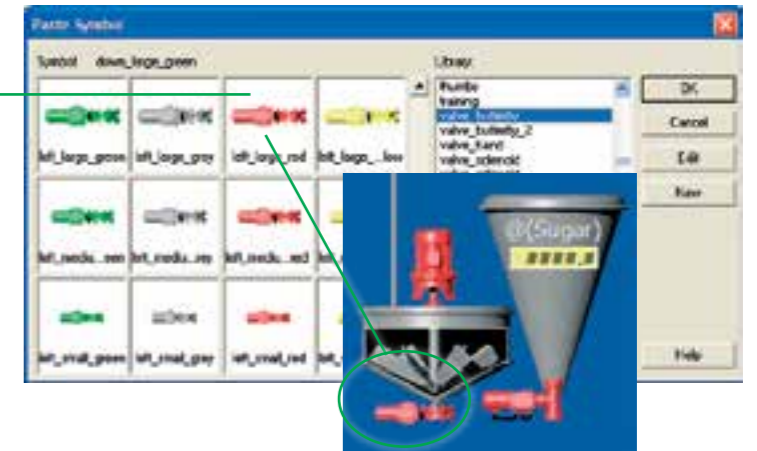
By storing common objects in a library, you reduce the amount of disk space required to store your project and reduce the amount of memory required by the runtime system.

If you use a particular graphic regularly, you can store it in a library as a symbol. Rather than constantly redrawing the graphic, you just select and paste your symbol from the library and replicate its occurrence on all relevant pages.

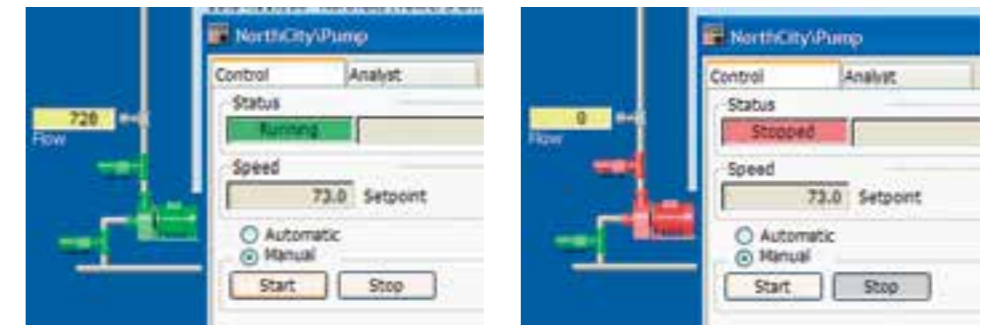
For example, if you need the same valve graphic on multiple pages as a static background picture, draw the valve, and copy it to the symbol library to create a new symbol.



First check the standard symbol library within 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.

Configuration: Graphics Objects

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 pop-ups
- > Loop control
- > Sequence control
- > Duty/Standby
- > PAC/RTW status
- > Identical machine control
- > Any repeated pop-up or page

Library control Genies that are shipped with Vijeo Citect:

- > Tree
- > Data Grid
- > Equipment Tree
- > ADO Data Grid
- > Scroll Bars
- > Alarm Data Grid

SCADA systems consist of objects or devices which range from simple push-buttons 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 includes a set of pre-built Genies that deliver rich interface controls, providing operators with an enhanced runtime experience.

The tree control provides both page navigation and an equipment hierarchy view. The table control allows for viewing data in a grid format for simple display.

Vijeo Citect software enables you to quickly and easily develop your control system by providing object-based configuration tools. 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 of your project, or you can simply build your own.

These tools are optimized by using a tagging standard within the device tags. A good tag naming convention can reduce the amount of configuration entry and hence can help lower the risk of errors.

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

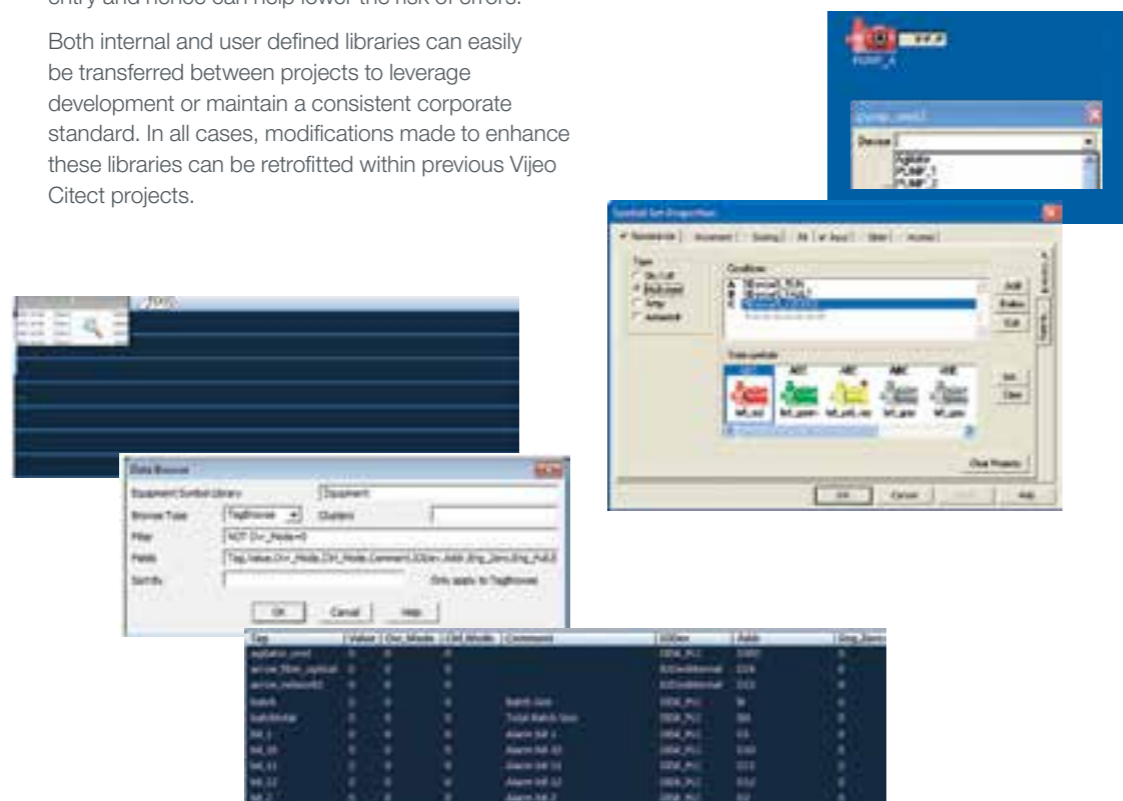
Genies

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 reduce the number of Genies, helping to reduce maintenance and testing costs. The optional particular 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.



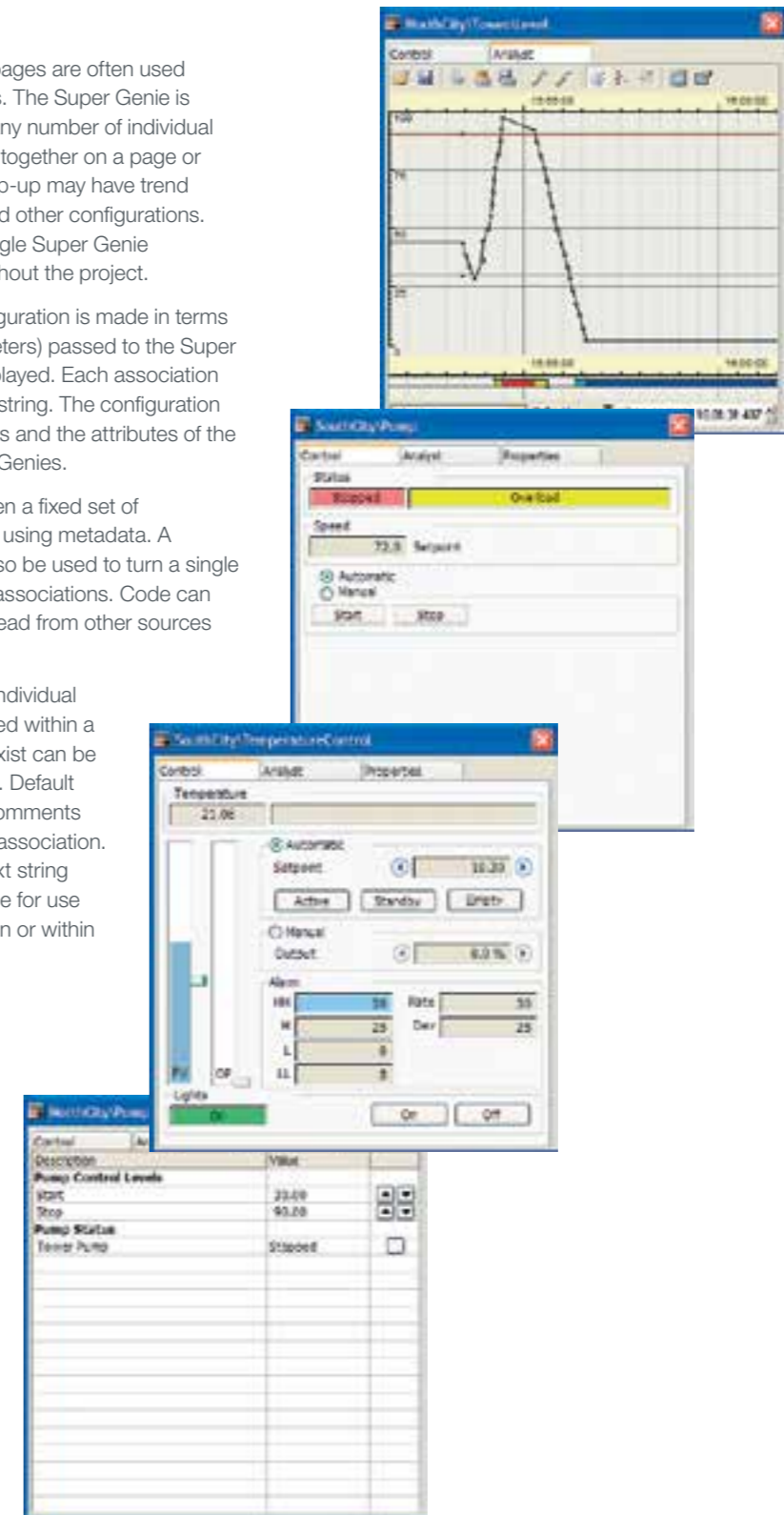
Super Genies

Vijeo Citect Super Genie pages are often used for device control pop-ups. The Super Genie is built as a combination of any number of individual graphics objects grouped together on a page or pop-up. A loop control pop-up 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, etc).

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 comments 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

1. 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.
2. When you change a Genie or Super Genie from the library, it will be automatically updated wherever you have used it throughout your project. (A Genie remains linked to its library unless you deliberately cut the link).
3. 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.
4. Vijeo Citect has a library of pre-configured Genies and Super Genies that you can use in your Vijeo Citect system.

Configuration: Flexible

Cicode

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

As applications have particular requirements, Vijeo Citect provides you with the flexibility and power of two programming languages: Cicode and CitectVBA. Both languages can be used to extend available data to fields within 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 future events.

CitectVBA

CitectVBA is a Visual Basic-compatible scripting language and is used for integrating Vijeo Citect with ActiveX objects and third-party applications. CitectVBA utilizes the Cicode engine and, therefore, 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 can be notified and a series of instructions can 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




Cicode within graphics expressions

To assist in 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 the 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 users with the tools to rapidly diagnose issues within their Vijeo Citect system.



Cicode within database configuration



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 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.

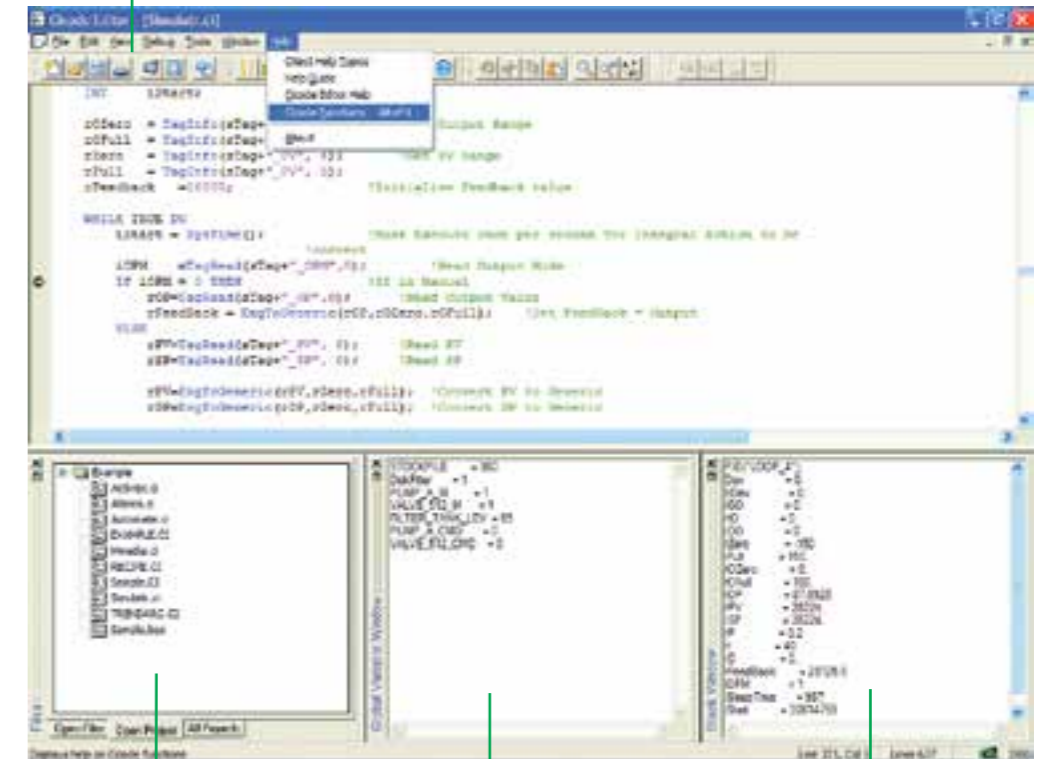
Stepping through Cicode

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

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



The Files window displays 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.

Product: Help

At a glance

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

The help tool is a comprehensive and logically structured package. It is designed to be easy to find and understand and can be intuitively accessed in a variety of ways and languages, from any part of the Vijeo Citect system.

Vijeo Citect dialogues have a Help button that invokes context sensitive assistance.

For more general information, you can use the Help menu. It provides 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 just press the Help Topics button to the right of the toolbar and display all Help Contents.

Once Help is open, you can perform index or keyword searches or browse the 'Help Direct' topics. Regardless of the 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 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.

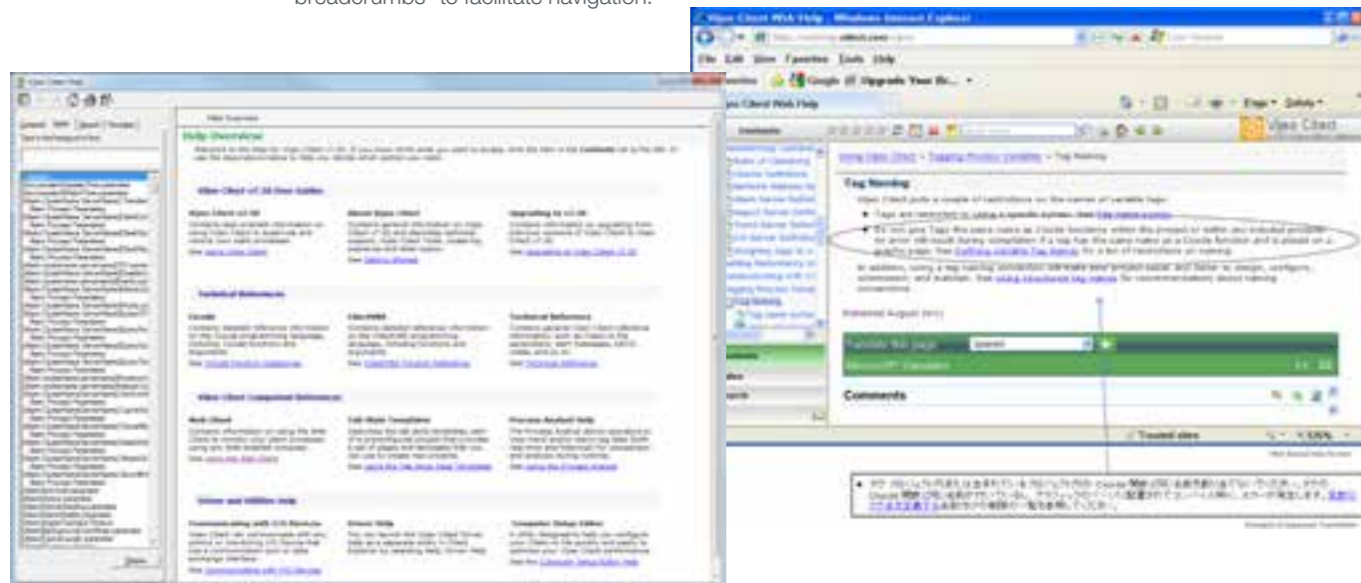
Web-based Help

Web based help is also available for Vijeo Citect. This version has the advantage of being as up-to-date as possible.

Web-based help can be accessed at <http://webhelp.citect.com/vijeo>

Web-based help is available in 36 different languages by utilizing the Microsoft Translator real-time translation server.

Simply select the language of your choice from the drop-down box and click the forward arrow. This will display the entire main page in your language. The language selection also follows you as you move from page to page. Any time you want to check back to the original English language, just hover the mouse over any text and it will display a "shadow" version in English.



Product: Example Project

↓

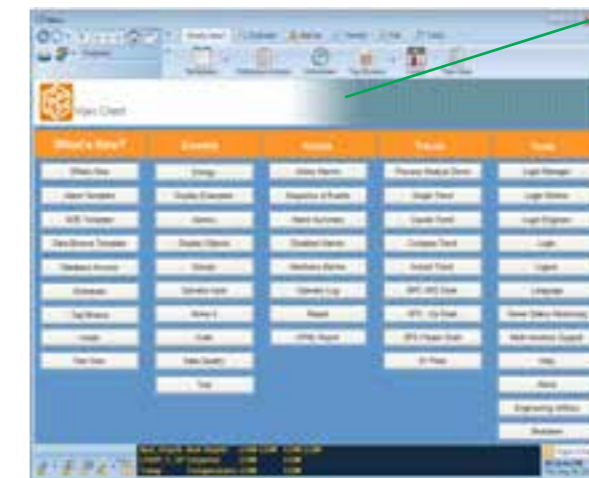
The Example Project is automatically installed when you install Vijeo Citect software.

You can use the Example Project when you want to experiment. The test page is already set up to display directly from the menu page.

The Example Project comes complete with the ability to switch online between the following languages:

- > Chinese
- > English
- > French
- > German
- > Hebrew
- > Italian
- > Japanese
- > Korean
- > Russian
- > Spanish

Example Projects are supplied with Vijeo Citect based on a number of different templates. These are fully configured projects that are ready to run and can be used as test projects to help you with possible ways 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.

Product: Licensing

Every Vijeo Citect software package you invest in comes with most protocols/ device drivers and features included. Vijeo Citect’s no-nonsense licensing scheme allows you to choose a system-appropriate package, providing you with true value for money.

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.com/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 stand-alone 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.

Vijeo Citect’s licensing is based on the number of computers that will be running Vijeo Citect concurrently, 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, regardless of how many times they are used in your project. You receive 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 in addition to 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 purely 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 information from any computer.

Product: Migration

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

When we build control systems, we have information on hand 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.

Switch2Citect can unlock the data within 75% of the world’s SCADA systems, including:

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

By utilizing the legacy SCADA configuration, Switch2Citect not only minimizes engineering time but also operator training costs and commissioning efforts.

Systems with a high degree of customization may not gain the maximum benefit or time savings from using Switch2Citect. An assessment is recommended to determine if Switch2Citect or system re-engineering would deliver the more effective outcome.

How does it work?

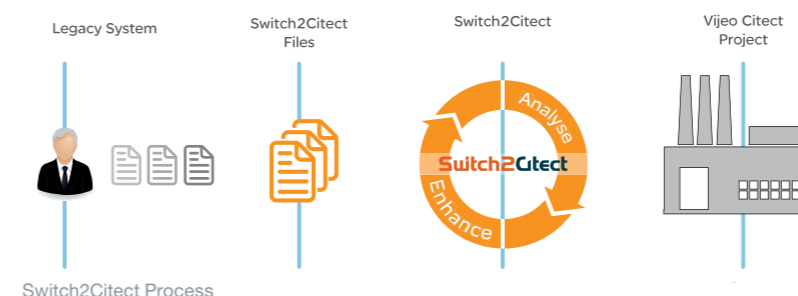
Switch2Citect reads the configuration of the legacy control system into an intermediate format. This format represents all the information from the graphics and database configuration as properties of objects (like your original project database).

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.

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 in Vijeo Citect designed as you would a new SCADA system and hence provides an ideal platform for future system development.

The Genie approach also allows the system to be “standardized” with a number of existing objects brought into it using a single unified Genie to improve the consistency of the new system. For larger (or repeated) projects, the additional time to define the roles can result in an improved SCADA configuration.

In addition to the graphics, the Switch2Citect system also allows the user to convert the database from the existing systems to Vijeo Citect.



Switch2Citect Process

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.”

Complementary Products: Historian

Vijeo Historian™ helps your plant and IT personnel optimize operational efficiency by providing a powerful, plant-wide reporting tool that collects, and delivers meaningful reporting data from multiple, disparate systems. By using the information provided by Vijeo Historian, you can make more effective decisions toward optimizing operational performance.

Comprising of historian and client functionalities, Vijeo Historian enables you to accurately store data for long-term reporting while also giving you the option of visualizing and accessing the information through the Vijeo Historian client, Microsoft Excel or reporting services.

Vijeo Historian can improve production reporting and ad-hoc analysis by connecting, aggregating and presenting real-time information from multiple disparate systems throughout the enterprise, helping corporate, IT, plant and production managers to make more informed and timely decisions.

Based on open, standard technologies, Vijeo Historian integrates your plant and business information systems to facilitate improved decision-making, that can lead to increased production and profitability.

An inclusive, secure and open platform, Vijeo Historian allows controlled access to both plant floor and business database information in a context that can be tailored to each individual.

Using familiar, easy-to-use tools and processes, production, quality assurance, maintenance, sales and even customers can access the latest information using a wide selection of viewing clients. Link every aspect of your business, from the plant floor right through to remote web clients, without disrupting the daily running of the plant.

Connect

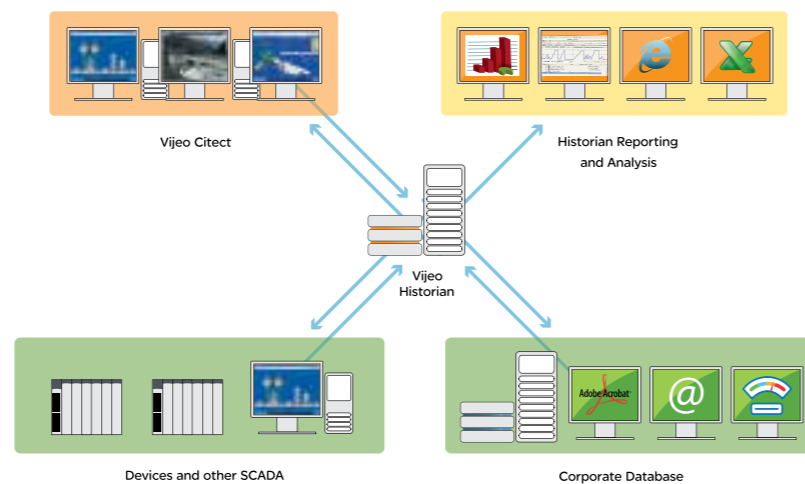
Vijeo Historian connects people to information throughout the enterprise from multiple disparate sources, including production control and business systems.

Reporting and Analysis

Production data is transitory, changing state in real-time rather than just the hourly resolution with which business users are familiar. Vijeo Historian captures and stores transitory data for reporting and analysis.

Presentation

Whether you need to analyze your productivity information in a spreadsheet or distribute it across the Internet, Vijeo Historian produces accurate historical reports visible through your web browser, exportable to Microsoft Excel, Word or in PDF format.



Vijeo Historian architecture: Connect your production and business systems

Complementary Products: Batch

Vijeo Citect Batch Manager enables manufacturers from a range of industries to optimize their flexible batch processes. It helps make operations more agile and flexible, while still delivering quality products.

Providing out-of-the-box features like recipe creation, material creation and batch execution means Vijeo Citect Batch Manager can deliver a rapid return on investment. The system aids in production optimization by allowing the operator or production planning tool to select the equipment to execute the batch. In addition, it delivers intuitive graphical tools to help increase visibility and efficiency throughout the process environment.

With the native genealogy and batch data traceability, this batch offer provides simple yet significant assistance to comply with industry regulations and standards. For example, by being based on the standards of S88 and S95, your batch system is easy to maintain and ready to connect to other tools as required.

Vijeo Citect Batch Manager offers a complete solution with a single operator interface through its integration with Vijeo Citect. It also offers a single process data repository ready for product quality management and performance analysis through integration with Vijeo Historian.

Recipe Management

- > Online creation of new recipes using procedure editor
- > Define material properties through material editor
- > Store and archive recipes
- > Create an unlimited number of recipes

Batch Scheduling

- > Schedules the production of a defined quantity of product in a defined process cell or equipment
- > Production orders can be defined manually or imported from an ERP system
- > Production planning can be displayed and an operator can modify planning or unit allocation
- > Sets up a short-term production based on an imported schedule
- > Verify the schedule against both material and equipment availability

Batch Execution

- > Displays information related to a selected batch or a batch produced in a selected unit
- > Views information such as batch status, messages pending or current active phases
- > Supports manual execution for any defined phase

Batch Quality Reporting

- > Certifies that production was in adherence to the standard process conditions
- > Comparison of product data against requirements can highlight any deviations in process engineering and help evaluate for process upgrades

Integration

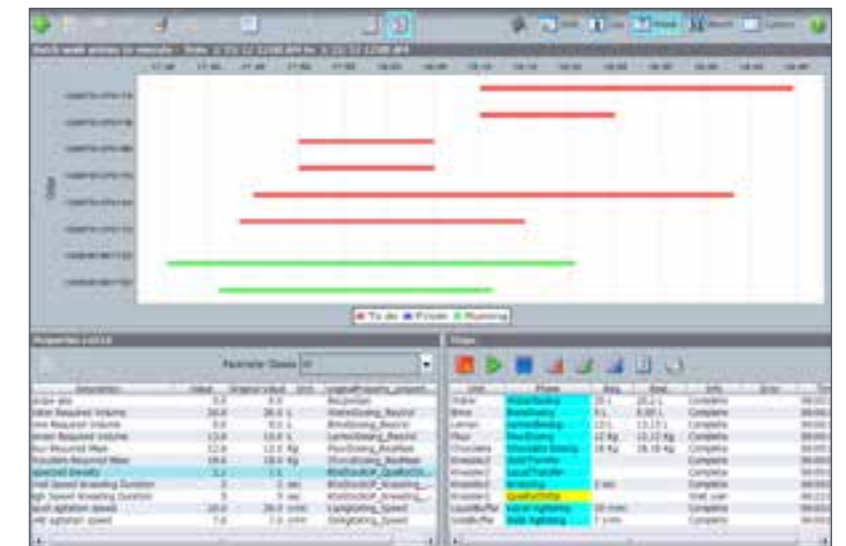
- > Provides a single operator interface through its integration with your Vijeo Citect SCADA system
- > Integrated user authentication
- > Links with energy reporting in Vijeo Historian to optimize energy use in production
- > Supports high availability through native redundancy

Traceability and Genealogy

- > Critical data collection at each stage of the manufacturing process
- > Comprehensive genealogy for either raw materials or finished goods
- > Enables tracking of user authentication and actions
- > Detailed data for audits, resource management and performance analysis

Industry Standards Alignment

- > Procedural and physical model based on S88 standard
- > Data model compliant with the S95 standard for an easy connection to a third-party tool



Production dispatching

Complementary Products: Operations Management

Ampla™ is Schneider Electric’s leading operation management software, designed to assist in the optimization of production, processes, performance and energy usage, by delivering near real-time access to plant and business information. Ampla makes it possible to capture data from multiple disparate sources, then aggregate and transform it into manageable information for productivity analysis, data mining, querying and reporting.

Ampla Downtime enables plant managers to make continuous efficiency improvements by analyzing production downtime causes. With this information, managers can prioritize maintenance, new equipment, and new operating procedures. By reporting on both scheduled and unscheduled downtime events, as well as underperforming equipment, Ampla Downtime can break down seemingly complex issues into common causes.

Ampla Production helps plant managers to see an accurate overall picture of the inputs and outputs of the plant, including materials, consumables, energy, waste, emissions, reject and product output. This information assists management to make better, more informed decisions for improved process efficiencies. Ampla Production enables you to minimize the amount of time, errors, and costs associated with manual and duplicate data entry. Ampla Production captures an accurate picture of production through the automatic near real-time logging and provides a single point-of-entry for manually entered production values.

Ampla Energy enables operations managers to make continuous energy improvements by analyzing the causes of energy over-consumption. With this information, you can identify new savings opportunities, stabilize energy usage, order new equipment, and improve operating procedures. By reporting on energy events, Ampla Energy breaks down complex issues into common causes and enables managers to address problems proactively.

Ampla Metrics draws data from other Ampla modules to calculate near real-time Key Performance Indicators (KPI) and presents this information visually in a

graphical dashboard display. Ampla Metrics shows instantaneous measures such as overall equipment effectiveness (OEE), yield, and energy consumption per output unit. Additionally, Ampla Metrics can show the trend of these measures over time so that management can gauge the effect of improvement initiatives or operational changes.

Ampla Inventory gives you the visibility to understand your work-in-progress and to know the real cost of your inventory. It collects data about the quantity, movement, and storage of plant-side materials, and provides the means to manage and track your inventory and material movements, helping to give you control over your production and costs.

Ampla Quality delivers automatic, near real-time qualitative data directly from the production control system to enable key decision makers to better analyze, report, and manage product quality throughout the manufacturing cycle. The delivery of more timely and accurate reports allows better, more informed decision-making for improved output quality and control.

Ampla Planner bridges the gap between the Enterprise Resource Planning (ERP) system and the plant floor. This module provides production supervisors and planners with an online visualization tool for scheduling production orders, planned maintenance activities and standby periods to help optimize the use of the available plant, equipment and resources.

Ampla Recipe provides support for implementation of the S88 Batch Control standard. You can create and maintain recipes in Ampla Recipe. Then, when you

select production or process orders for execution, Ampla downloads the parameters to plant automation systems.

Ampla Knowledge gives you a complete picture of how your business is performing by capturing important information and knowledge from the people who are closest to the plant. The online diary, which acts as an operator’s logbook, creates a central bank for information about incidents that affect production, such as information about deliveries, unusual equipment set ups and other miscellaneous information. The diary features a sketchbook to include visual records as well as text.

Ampla Knowledge also features a reference library so that plant personnel can immediately find information they need, including photographs of the plant and equipment, operating procedures, drawings, diagrams and manuals.

Ampla Maintenance helps you get the optimal performance out of your business equipment by collecting essential data about asset operation and maintenance. Ampla displays this data graphically for management to analyze and optimize operations. You can also upload data to Enterprise Asset Management (EAM) systems for maintenance planning and scheduling.

Ampla Cost empowers you to track the real costs of your business by providing greater visibility into your financial data. The module does not replace existing financial packages, but enhances the usability of the data produced by these packages and making the information more relevant to the user.

Complementary Offers: Customer Service Resolution

Optimize your technology investment with our SCADA & MES Software Global Support offering. Customers with maintenance and support agreements are entitled to receive product upgrades, service packs and hotfixes. In addition, you get access to our professional SCP-certified and trained support team who can help you overcome issues quickly and easily, either by phone, live chat or email. We also offer the option of 24/7 support with some of our support contracts.

Customer Service Requests (CSRs)

Our centralized SCADA & MES Software Global Support enables logged Customer Service Requests (CSRs) to follow the CSR Technical Resolution Workflow. A fully documented procedure, this model allows calls to follow a clear path to resolution, giving you updates at every stage. CSRs can be logged by telephone, Case Manager, live chat or email. The recent introduction of our Case Manager tool allows you to manage, update and monitor the progress of your CSRs via the Internet.

Virtual Engineer

Virtual Engineer allows one of our Support Engineers to securely connect to your system anywhere in the world and cost effectively locate the cause of your issue. Improved response and resolution times have been documented since the implementation of this industry standard authentication technology. This means your issues are dealt with quickly, minimizing any disruption to your business.

Additional Information

For critical and major severity cases, Account Managers and Support Management are informed of the case progression through the workflow. During case workflow, Support Developers and the Support Engineers may consult with the Product Development group and other resources.

Technical Resolution Workflow	Support Engineer	Senior Support Engineer	Support Developers
Critical severity* GoldPlus customers	15 Minutes	Not able to be progressed within 1 business day and product defect suspected	Cases scheduled based on severity model**
Major & Medium severity* GoldPlus customers	Not able to be progressed within 1 day	Not able to be progressed within 3 business days and product defect suspected	Cases scheduled based on severity model**
Critical severity* Gold customers	Not able to be progressed in 2 hours	Not able to be progressed within 2 business days and product defect suspected	Cases scheduled based on severity model
Major & Medium severity* Gold customers	Not able to be progressed within 3 business days	Not able to be progressed within 4 business days and product defect suspected	Cases scheduled based on severity model

*Schneider Electric will determine the severity of an issue by analysis of the impact and urgency of a reported issue. **GoldPlus customers receive additional priority in scheduling.

Complementary Offers: SCADA Support



Service Capability & Performance (SCP)

The SCADA & MES Software Global Support organization is SCP certified so you can be assured of quality service. SCP certification quantifies the effectiveness of customer support, based upon a stringent set of performance standards and represents best practices in the industry.

Support Services

A range of direct and self-help technical assistance options help you to maintain optimum performance from your software, whilst automatic product updates keep you at the forefront of technological advancements.

Maintenance and Support Agreements cover all our software, as well as Standard Drivers. Specialty Driver Support is required for the following licensed Drivers: Bailey, IEC870-5-104, Moscad and SemAPI. Specialty Driver Support is an add-on support service to Gold and GoldPlus Support Agreements.

Gold

Access Support

Fast access via telephone, live chat, e-mail and Case Manager during normal business hours* to experienced Support Engineer professionals supported by a comprehensive lab where they can replicate a customer's configuration and reproduce issues experienced on-site.

Online Support Tools

A dedicated area of the SCADA & MES Support website (www.citect.schneider-electric.com) gives you access to a range of support tools including: Support Portal, Live Chat, Toolbox, DriverWeb, Driver Discussion Forum, Authorization Code Generator.

Product Upgrades

SCADA & MES Software Global Support will provide notification of new releases and product upgrades (available for download). Support can assist and advise on appropriate planning and risk mitigation.

Driver Upgrades

Automatic product updates keep you at the forefront of technological advancements in drivers (available for download).

Service Packs

Support customers are advised of new service packs and are provided with links to download.

Emergency Support

Emergency software patches are provided via an intensified escalation process in situations where critical issues are impacting upon customer business operations.

Customer Service Request (CSR) Resolution Workflow

A rigid framework of issue prioritization and severity ensures an appropriate management process is applied to all your issues until resolution. Prioritization is based on industry best practice.

Online Knowledge Base (KB)

Support customers can access the KB anytime for information that consistently delivers support services and resources to sustain customers' return on investment.

Security Advisory Service

Users may subscribe to the Knowledge Base (KB) under Security to receive RSS feeds whenever the KB is updated. SCADA & MES Software Global Support will provide proactive notification for any known security issues that affect the product, allowing customers to take immediate action to protect their systems.

The Insider Newsletter

Your source for the latest Support updates, new product information, technical tips and tools, The Insider is a quarterly newsletter distributed exclusively to customers in support.

GoldPlus (all the above features plus)

Priority Telephone Support

24/7 priority access to the Support service via a dedicated telephone access point, minimizing the response process and optimizing resolution times. The service offers engineer call-outs at preferential rates.

Priority After Hours Telephone Response Commitment

Assurance of a 15-minute response commitment on calls placed 24/7.

Priority Customer Service Request (CSR) Resolution Workflow

Support calls not progressed within 15 minutes for critical severity issues by the first line support engineer are automatically escalated to a Senior Support Engineer. Support calls not progressed within one day for major and medium severity issues by the first line support engineer are escalated automatically to a Senior Support Engineer.

Optional Support Services (subject to additional fees)

Enterprise Support

Global Enterprise Support Agreements can be set up to include any of SCADA & MES Software Global Support services. An Enterprise Support Agreement ensures a single point of management, common commercial terms and annual purchasing price reviews. Multiple global sites are covered and additional sites can be covered at any time during the Support Agreement, subject to a fee.

Specialty Driver Support

Specialty Driver Support is an add-on support service to Gold and GoldPlus Support agreements. Specialty Driver Support is required for the following licensed drivers: Bailey, IEC870-5-104, Moscad and SemAPI.

*Hours are 9am to 5pm, Monday to Friday, local time. Technical Support is provided in English only.

Complementary Offers: Educational Services

Educational Services offer a suite of programs and courses designed for end users, engineers, system integrators, technical colleges, universities and educational establishments.

Our courses provide you with hands-on experience, leaving you feeling confident to design and configure your own systems, whilst our programs are designed to facilitate the latest education and application of our software.

Instructor-led, online, on-site and self-paced courses are offered. Courses include configuration and programming courses, update courses and introductory courses for Vijeo Citect and Vijeo Historian.

Programs include the Certified Education Centre Program which regulates the standard of our courses. The Academic Program provides tertiary institutions with access to world-class courseware to use in conjunction with their degree and diploma courses in related fields. The Certified Engineer Program (CEP) recognizes engineers skilled in the integration of automation projects using our software. The first of these qualifications is the Vijeo Citect Certified Professional (VCCP). To gain this qualification, an engineer or operator needs to pass the Vijeo Citect Configuration exam. To become a Vijeo Citect Certified Engineer (VCCE), there are four exam elements that must be achieved: Configuration, Cicode, Architecture & Redundancy and Customization & Design.

Our educational methodology has proven to be effective through thousands of hours of instruction. Feedback received from customers confirms our success and drives continuous development in our services offerings. We have implemented a guided stream of learning that facilitates progression from basic through to advanced knowledge of all our products.



Custom Training: When and where you want it!

Run a training course on-site at your premises or at your chosen location, allowing your organization to train more employees while saving on travel time and expense.

Book a training course

All courses can be booked online at www.citect.schneider-electric.com/training or via your Account Manager.

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 configuration
- 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 synchronization
- Automatic alarm table synchronization
- Automatic time synchronization
- 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

Object-based Design

Equipment

- Hierarchical structure
- Templates
- Type definitions
- Multiple states
- Scheduling functionality

I/O Communications

Connectivity

- Support for open standards
- Multiple protocols per I/O server
- Drivers work on RS232, 422, 485, TCP/IP
- Rapid driver setup
- 4096 I/O devices per cluster
- Dial-In/Out support for remote devices
- Driver development kit for custom protocols
- OPC Server DA v2.05 and v3.00 support

Access

- Drivers at no additional cost (excluding specialty drivers)
- Driver Web maintains 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 timestamped on relevant drivers

Speedlink

- Single database solution for PAC and SCADA
- Bi-direction synchronization with PAC development environment
- Static synchronization for offline development

Import

- Automatic importation and synchronization
- Import from multiple PAC 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)
- Support for multiple undo/redo actions
- Metadata

Templates

- Over 70 templates in multiple styles and at multiple resolutions
- Templates are extensible in the Graphics Builder
- Templates can contain animation
- 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

Library Controls

- Data grids
- Scroll bars
- Trees

Objects

- 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

- Multiple resolution and aspect ratios available
- Resizable screens (Isotropic and Anisotropic)
- Multi-monitor support
- Page selectable update times (min. 10 millisecond)
- 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 acknowledge 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
 - Timestamped
 - High level expression
 - Multi-digital
 - Timestamped digital
 - Timestamped analogue
- Online 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 timestamped 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
- Named alarm filters
- Alarm counts
- Historical alarm view (SOE)
- Operator comments on alarm events
- OPC A&E Server Support
- OLE-DB support
- Custom alarm fields

Trending

- Large number of trends
- Supports any historical trend in less than 1 second
- Control of trend file sizes
- View archived trends transparently in the running trend system
- User selectable resolution 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

- Graphics page updates
- Addition and deletion of alarm, trends, equipment, accumulators and variable tags

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
 - Colour-coding
 - 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 Alsthom
 Generic devices
 Harris Controls
 Hewlett Packard
 Hima Gmbh
 Hitachi
 Honeywell
 Idec Izumi
 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

Optimation Optilogic*
 Opto 22
 Philips*
 Phoenix Contact
 PAC Direct (Koyo)
 Preferred Instruments
 Reliance Electric
 Rockwell Automation
 Rosemount
 RTP
 SAAB
 SAIA
 Samsung
 Satt Control
 Schlage Electronics
 Schlaps & Partner
 Schneider Electric
 Siemens
 Sisco
 SIXNET
 Softing AG
 Sprecher & Schuh
 Square D
 Steeplechase
 Telefrang
 Telemecanique
 Thermo Westronics*
 Tibco*
 Toshiba
 Transmitton
 Triconex Corporation
 Unidata
 Universal Instruments Corporation
 Valmet*
 Vikingegaarden
 VIPA
 Wago*
 Weidmuller
 West Instruments*
 Westinghouse
 Willowglen
 Woojin
 Yaskawa*
 Yokogawa
 ZWorld

Ascii
 BacNet
 DNP 3.0
 EIB
 IEC870-5
 Modbus
 OPC
 Profibus
 SNMP
 Konnex
 IEC61850

NOTE: *Supported by using OPC.
 This list is valid at the time of printing. Please register on our support web page and visit the DriverWeb for an up-to-date list of all supported manufacturers and devices (<http://www.citect.schneider-electric.com>).

 Make the most of your energySM

For more information contact your local Schneider Electric office.

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