PRAKTIKUM SISTEM OTOMASI

Nama :

No Pokok :

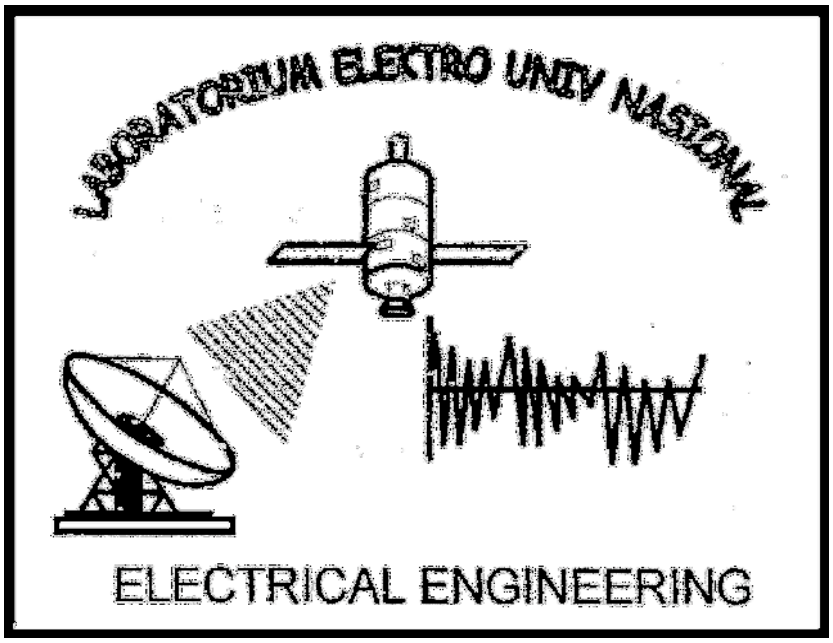
Jurusan :

Hari / Shift :

Group :

Rekan Kerja : 1.

2.



LABORATORIUM TEKNIK ELEKTRO
FAKULTAS TEKNIK DAN SAINS
UNIVERSITAS NASIONAL
JAKARTA
2020

FORMAT JURNAL

Berikut ini disajikan bentuk format jurnal untuk praktikum Elektronika Daya, yang dapat anda jadikan acuan dalam pengerjaan laporan praktikum :

1. Dasar Teori

Dalam dasar teori ini anda hanya perlu menyampaikan hal – hal yang sifatnya penting dan berhubungan dengan praktikum yang anda telah lakukan, sebagai batasan anda hanya boleh menuliskan dasar teori sebanyak 3 halaman dari masing-masing unit yang anda praktikumkan

2. Alat dan Bahan

Dalam alat dan bahan anda dapat tuliskan, apa saja yang anda gunakan dalam melakukan praktikum

3. Langkah Kerja

Dalam bagian ini anda dapat menceritakan kronologis kejadian yang terjadi yang anda lakukan pada saat anda melaksanakan praktikum (hanya bagian penting saja yang anda tuliskan) hingga anda memperoleh hasil.

FORMAT LAPORAN

Berikut ini disajikan bentuk format laporan untuk praktikum Elektronika Daya, yang dapat anda jadikan acuan dalam pengerjaan laporan praktikum :

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4. **Pembahasan**

Dalam bagian ini anda dapat melakukan pembahasan, mengenai hasil yang anda peroleh, ingat komponen penilaian utama ada dalam pembahasan jadi usahakan berilah alasan-alasan yang masuk akal dengan mendasarkan pada dasar teori yang tepat tentang hasil yang anda peroleh pada saat praktikum

5. **Jawaban Pertanyaan**

Dalam bagian ini anda dapat memberikan jawaban atas pertanyaan-pertanyaan yang muncul pada bagian pertanyaan, jika anda tidak menemukan bagian pertanyaan dari setiap unit praktikum anda kosongkan saja bagian ini.

6. **Kesimpulan**

Dalam bagian ini anda simpulkan apa yang anda peroleh dari hasil praktikum tersebut.

7. **Daftar Pustaka**

Dalam penulisan daftar pustaka anda wajib mengikuti penulisan daftar pustaka yang baik dan benar

8. Seluruh laporan praktikum ditulis tangan

Vijeo Citect

Helping you reduce development cost, time and risk

Schneider Electric

Schneider Electric complete offer

- Vijeo Citect is the SCADA solution developed by SCADA Activity, a world leading industrial automation software specialist for over 35 years.

- Together with Vijeo Historian, the SQL portal to the information system, this offer provides a well integrated automation solution that is totally consistent with the Schneider Electric complete offer.

- You are ready to connect to the MES world thanks to the Ampla solution.

SCADA Activity

- SCADA Activity Customer Satisfaction
  - Overall Customer Satisfaction 94.0 % very satisfied or better [1].
  - Global Support 95.5% very satisfied or better [2].
  - Educational Services 99.5 % very satisfied or better [3].

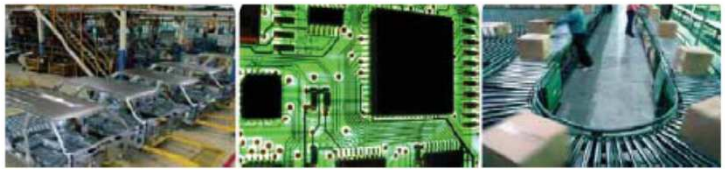
  [1]Global Support 2008 Surveys Average Score. [2] Global Support Event Survey, March 2008.
  [3] Educational Services Evaluation Feedback, April 2009.

- SCADA Solution
  - 11.1% global market share [1].
  - One of the top 5 players in HMI Software Suppliers category [2].
  - Market leader in Australia [3].
  - Over 160,000 licenses sold worldwide [4]

  [1]ARC 2008, reporting on 2007 data. [2]ARC 2008, reporting on 2007 data. [3] Internal competitive audit 2007.
  [4]Licenses sold inclusive of Vijeo products and sold from year 2000 till now

Servicing a strong blue-chip client base

Extensive industry experience



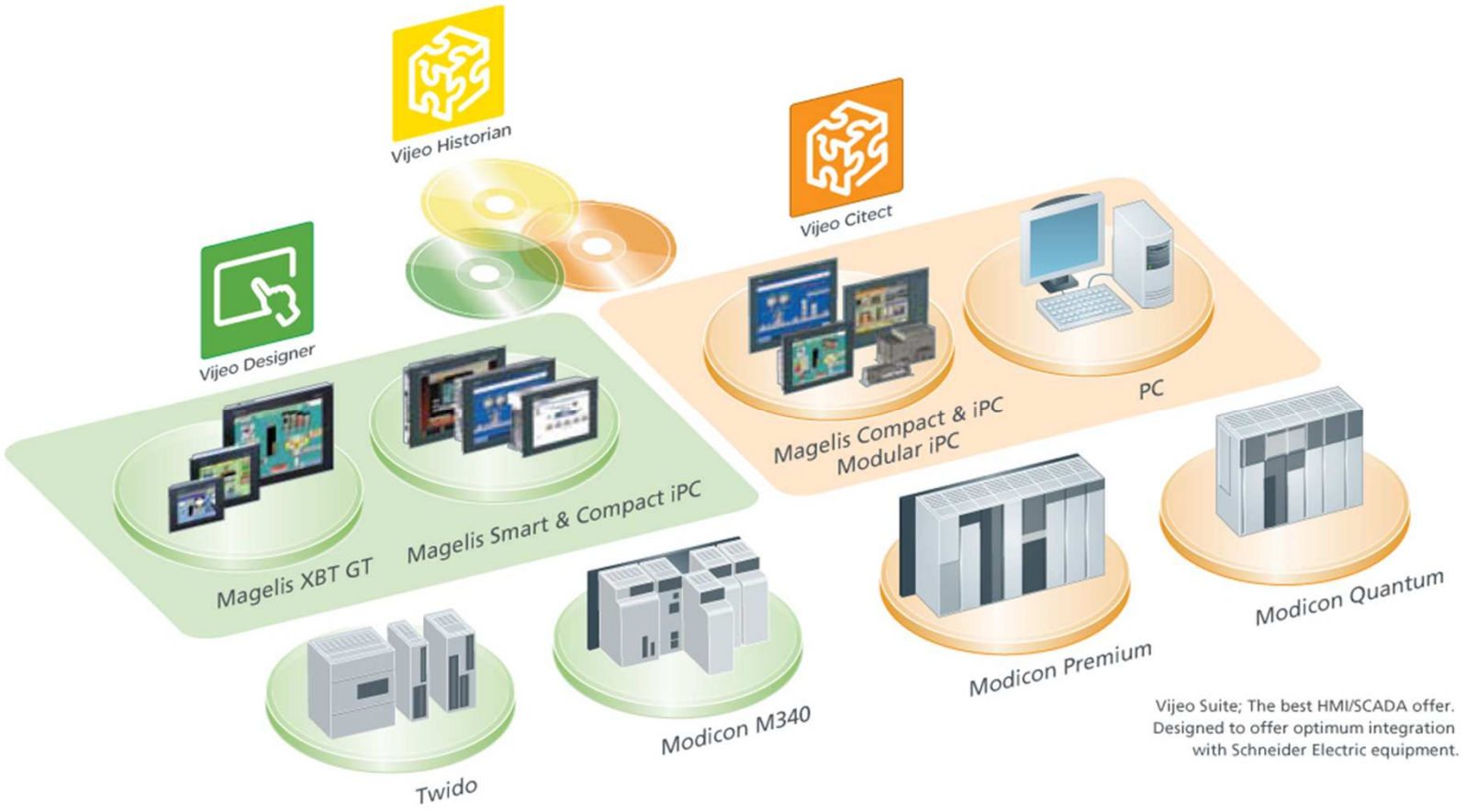
- Aerospace & Defence
- Automotive
- Building Automation
- Cement & Glass
- Chemical
- Electronics
- Food & Beverage
- Machinery & Manufacturing
- Metals & Mining
- Oil & Gas
- Pharmaceuticals
- Power, Utilities & Generation
- Pulp & Paper
- Transportation
- Water & Wastewater

You need to ...

Achieve more while using less

You Vijeo Citect

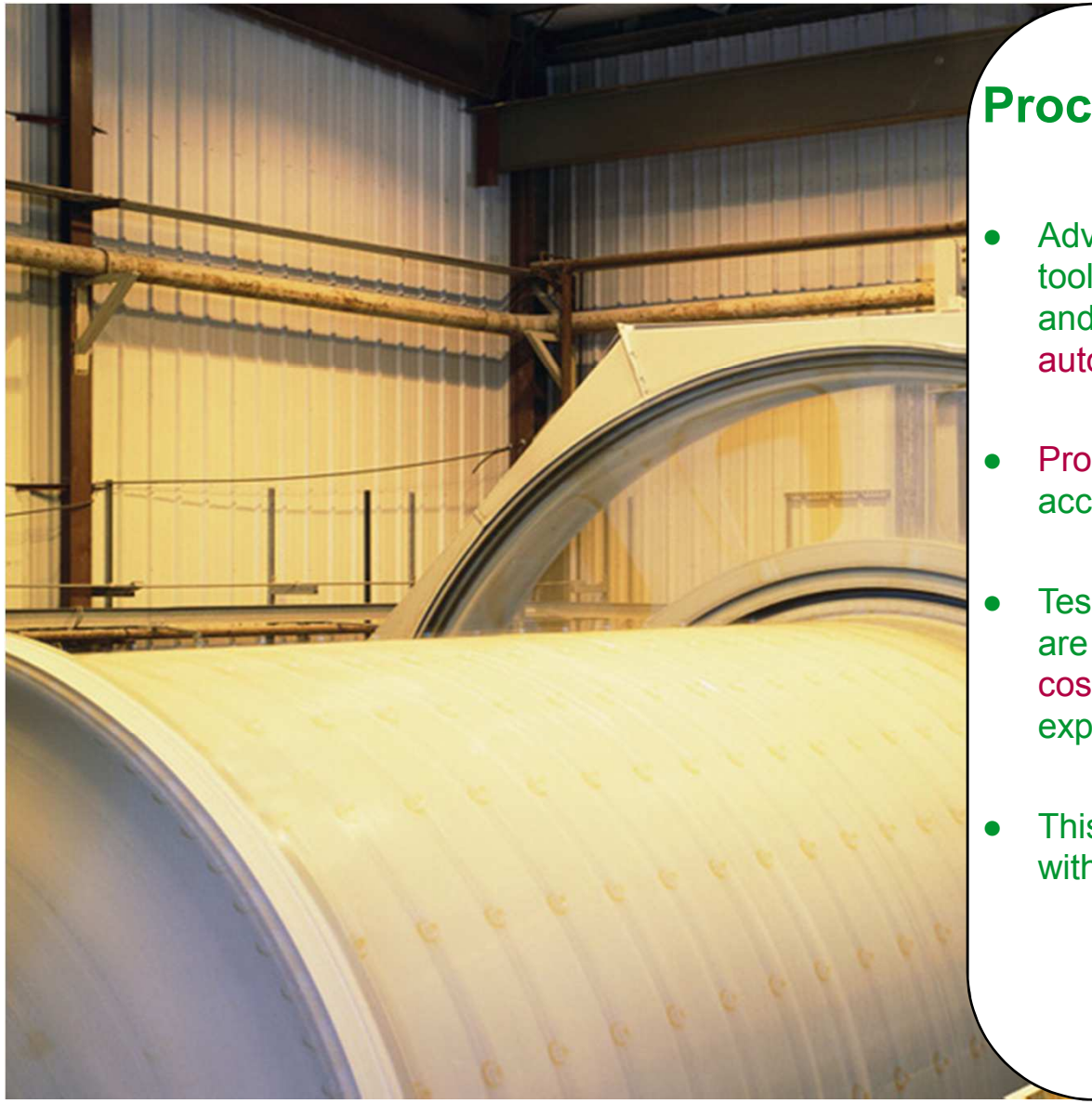
The integrated solution offer from Schneider Electric



Seamless integration

- Vijeo Citect provides seamless integration between your SCADA and PLC programming software, giving you a single database solution and thereby greatly reducing development time and eliminating the chance of configuration errors occurring during project maintenance and development.
- By permanently linking your variable database to the Unity Pro software, changes made at the controller are automatically updated in Vijeo Citect.
- It is the ideal solution for use with Unity Pro architectures, making it the most suitable application for use with Schneider Electric equipment.

Process control solutions



Process Design Tool

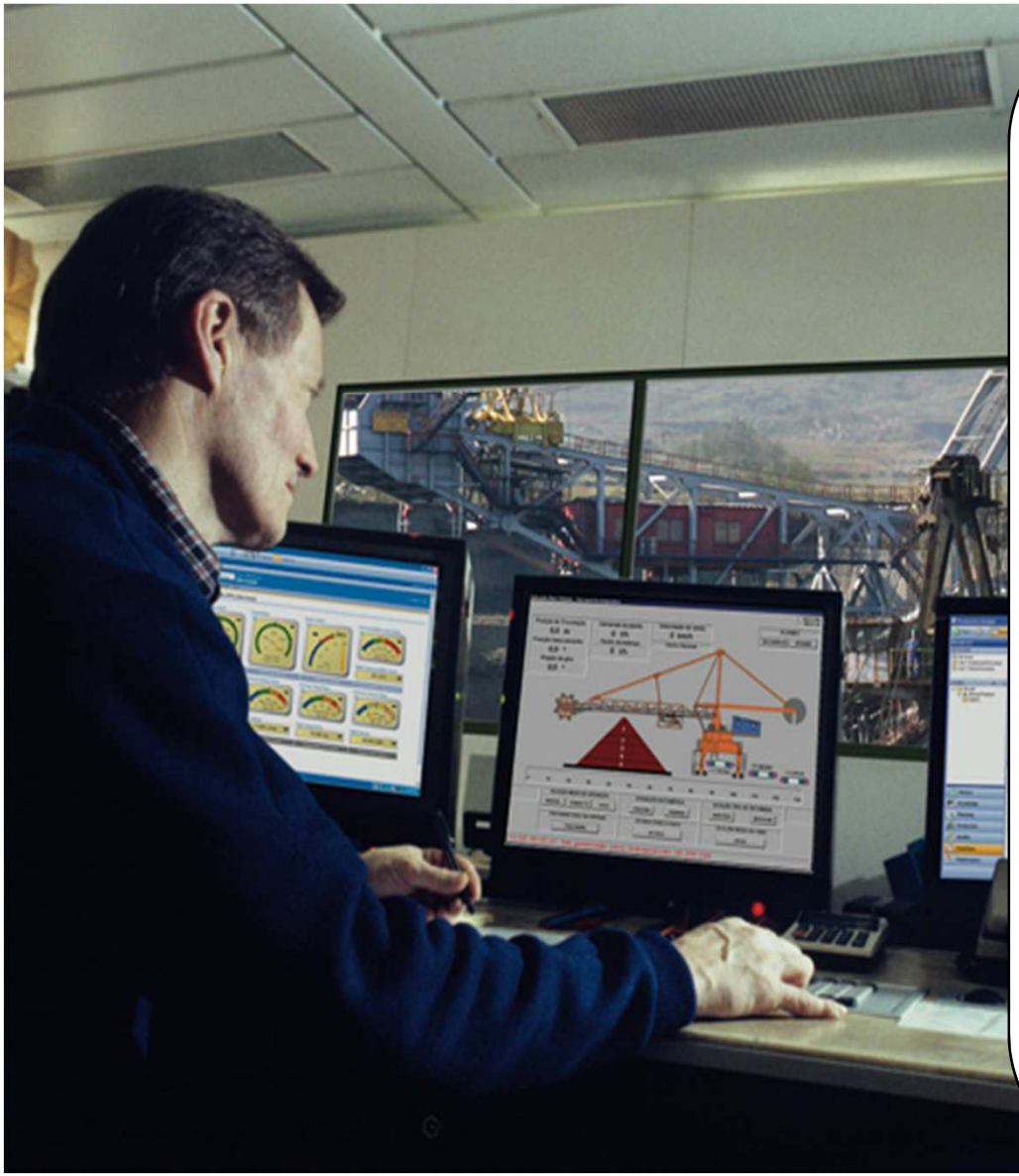
- Advanced design and generation software tool that integrates multiple control systems and supervision to provide a distributed automation solution
- Process-oriented design and configuration according to plant hierarchy
- Tested process control and object libraries are available, saving on development costs. They can be re-used for plant expansions or new plants.
- This solution brings together PLC flexibility with DCS benefits

Process control solutions

Programming

- Create and customise your function blocks
  - Time saving
  - Easy for debugging (the blocks are already tested)
  - Easy to expand (re-usable)
- Multiple programming languages (Process Engineers / Electricians / Maintenance)
- Off-line simulation
  - Test your model before operation
    - Better and safer commissioning process
    - Less errors

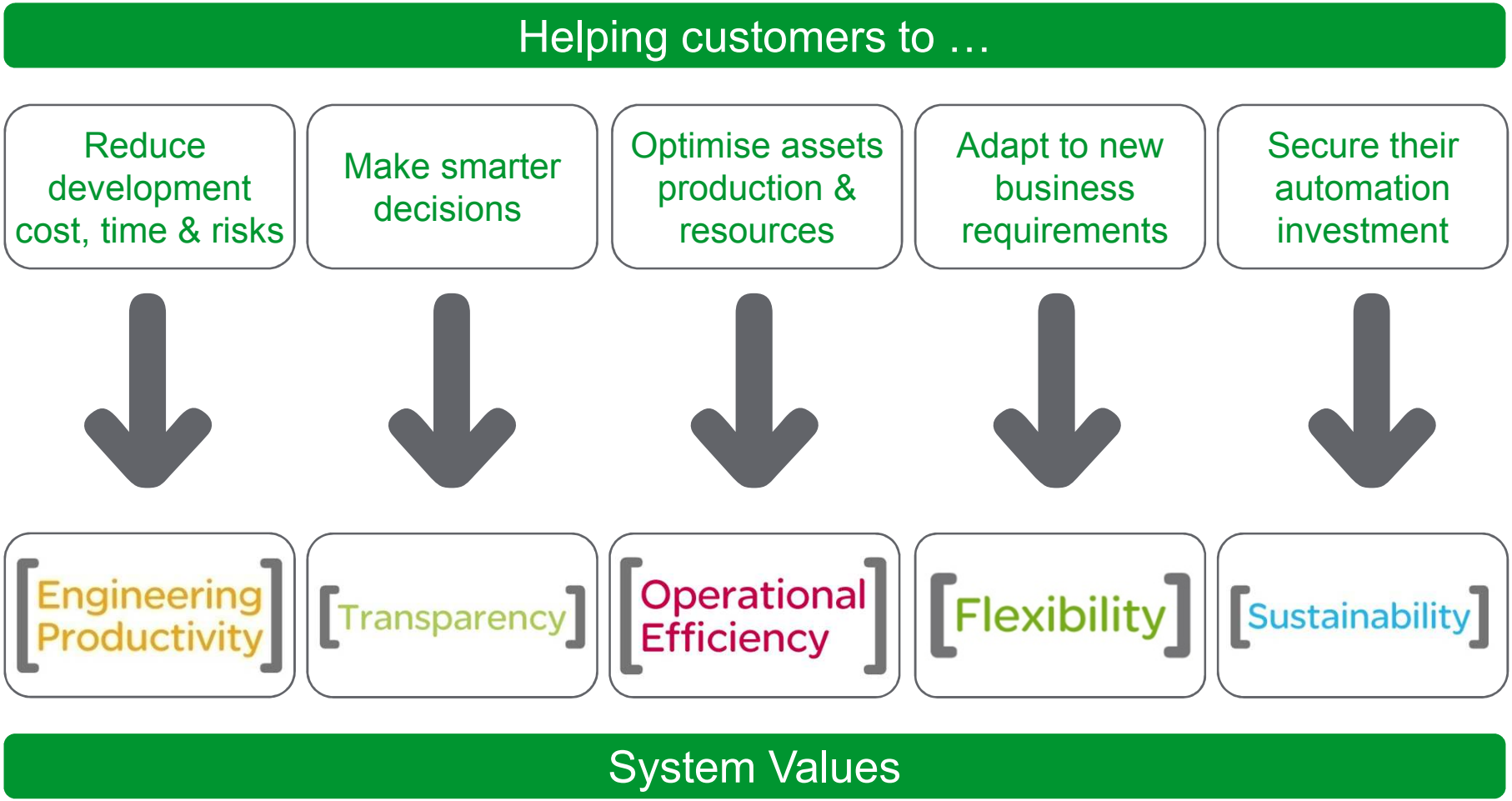
Process control solutions



Supervision and Operation

- Integration with programming software
  - Integrated database eliminates duplicated work
- Scalability
  - Easy to expand or modify the system as your challenges change
- Performance
  - Multiple servers assure high performance data updating
- Reliability
  - Ability to work with multiple redundant servers
- Process analysis tool
  - Powerful tool that integrate alarm and trend screens to analyse process disturbances

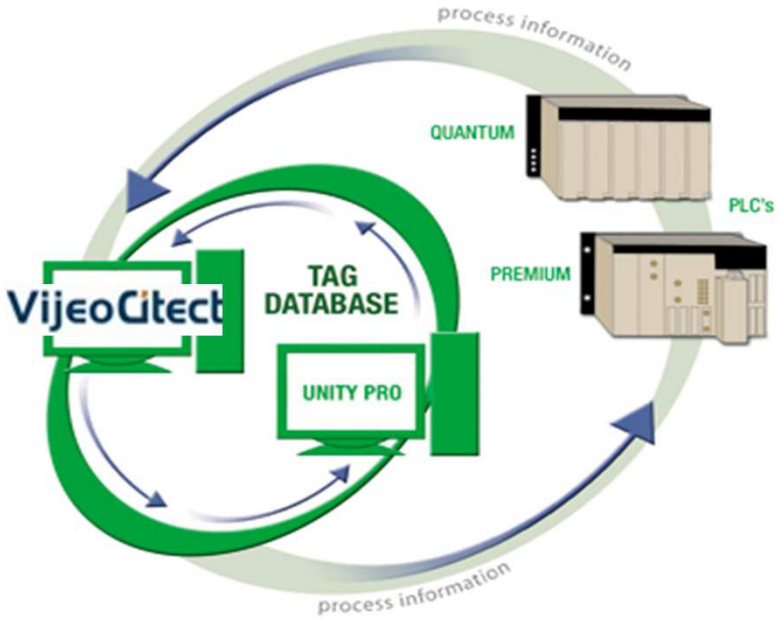
Vijeo Citect key business benefits



Reduce development cost, time & risks

Engineering Productivity

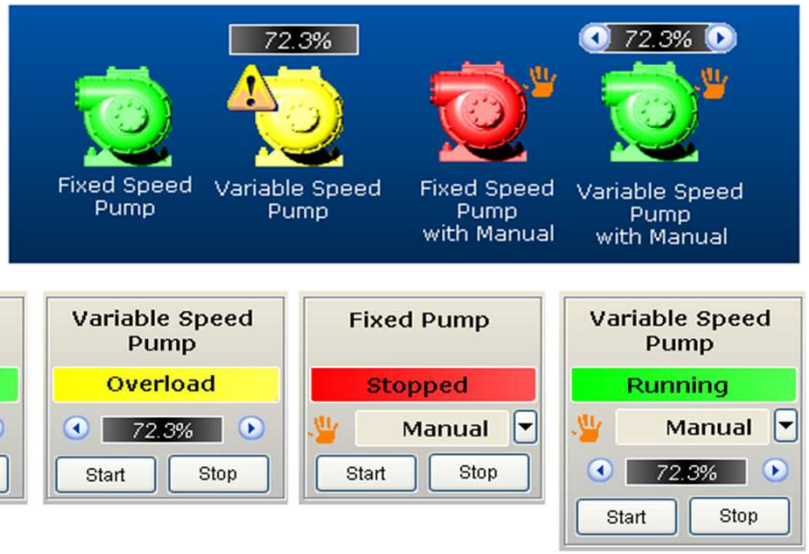
- Rapid configuration of Unity-based PLC and Vijeo Citect
  - Automation application generator through UAG
  - Unity SpeedLink: Dynamic and static linking
  - Single tag definition including alarm and trends
- Fully validated and interoperable with the Schneider Electric offer
- Compliant with transparent ready preferred architecture



Cost effective project maintenance

Engineering Productivity

- Easy and powerful configuration
  - Over 70 ready-to-use templates
  - More than 800 symbols
  - Object-based configuration: Genies, Super Genies
  - Magelis HMI remote visualisation ActiveX
- Free development

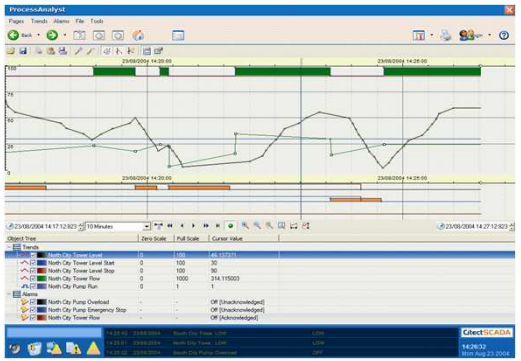


Open connectivity

Seamless dataflow; our open connectivity to various information systems

Make smarter decisions

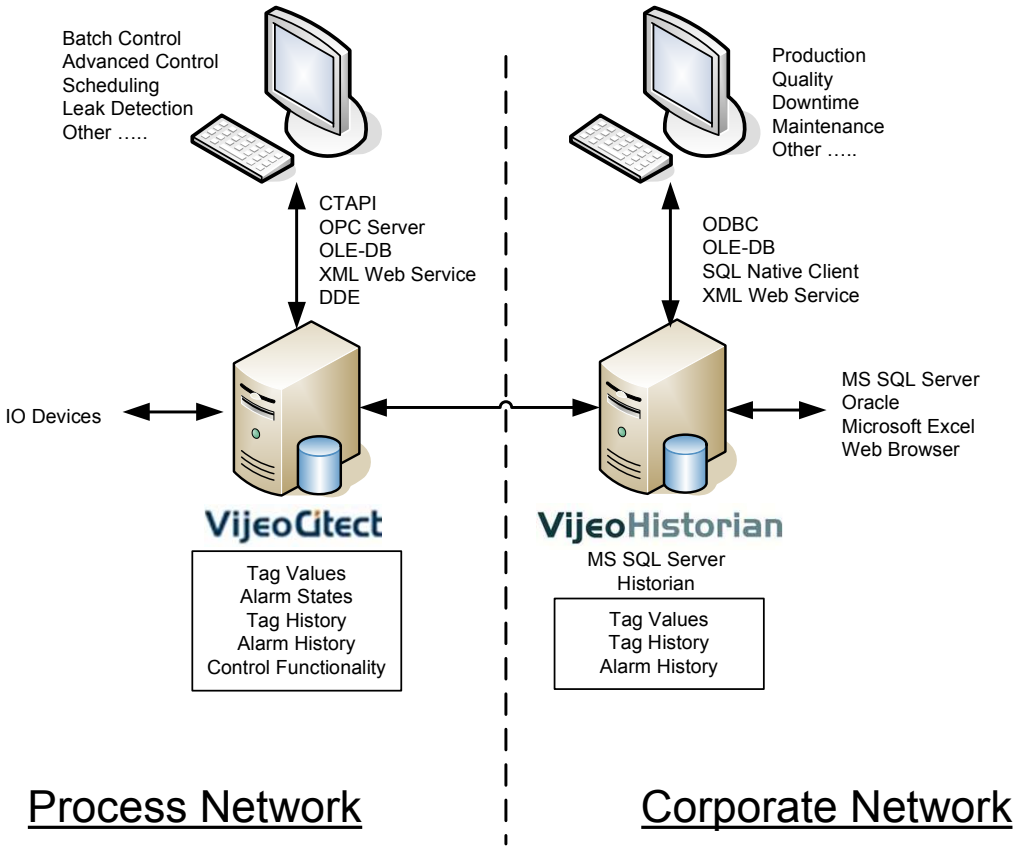
- Improves operational decision-making for operators and plant managers
- Process Analyst
  - Disturbance analysis
    - Display all data in one visual display
  - Data comparison
    - Compare the same trend at multiple time intervals
    - For real-time and/or historical/archived data
  - Sequence of events
    - See exactly how any number of alarms or trends interacted
  - Statistical Process Control
    - Statistical analysis tool to improve quality
- Advanced alarms management, trending
  - All types, acknowledgement, filter/sorting
  - 1 ms for time-stamped alarm
- Reports
  - By a variety of triggers (time, event, input)
  - Multiple outputs (printer, file, email, html)



Optimise assets production & resources

Operational Efficiency

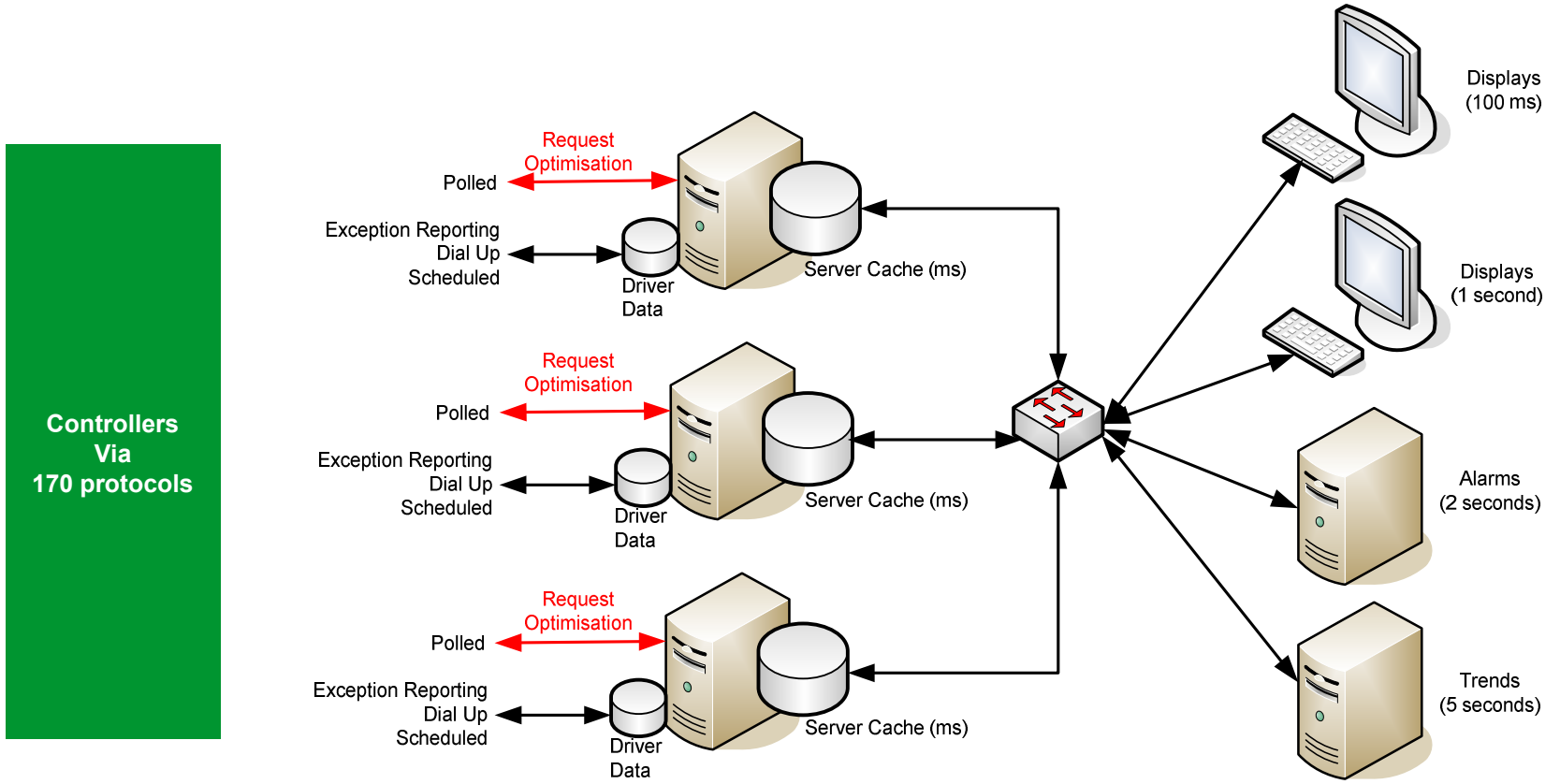
- Integrate information from the control system with other business applications and people.
- Open access
  - Latest industry standards
  - High performance
  - Corporate IT-friendly



High performance

Operational Efficiency

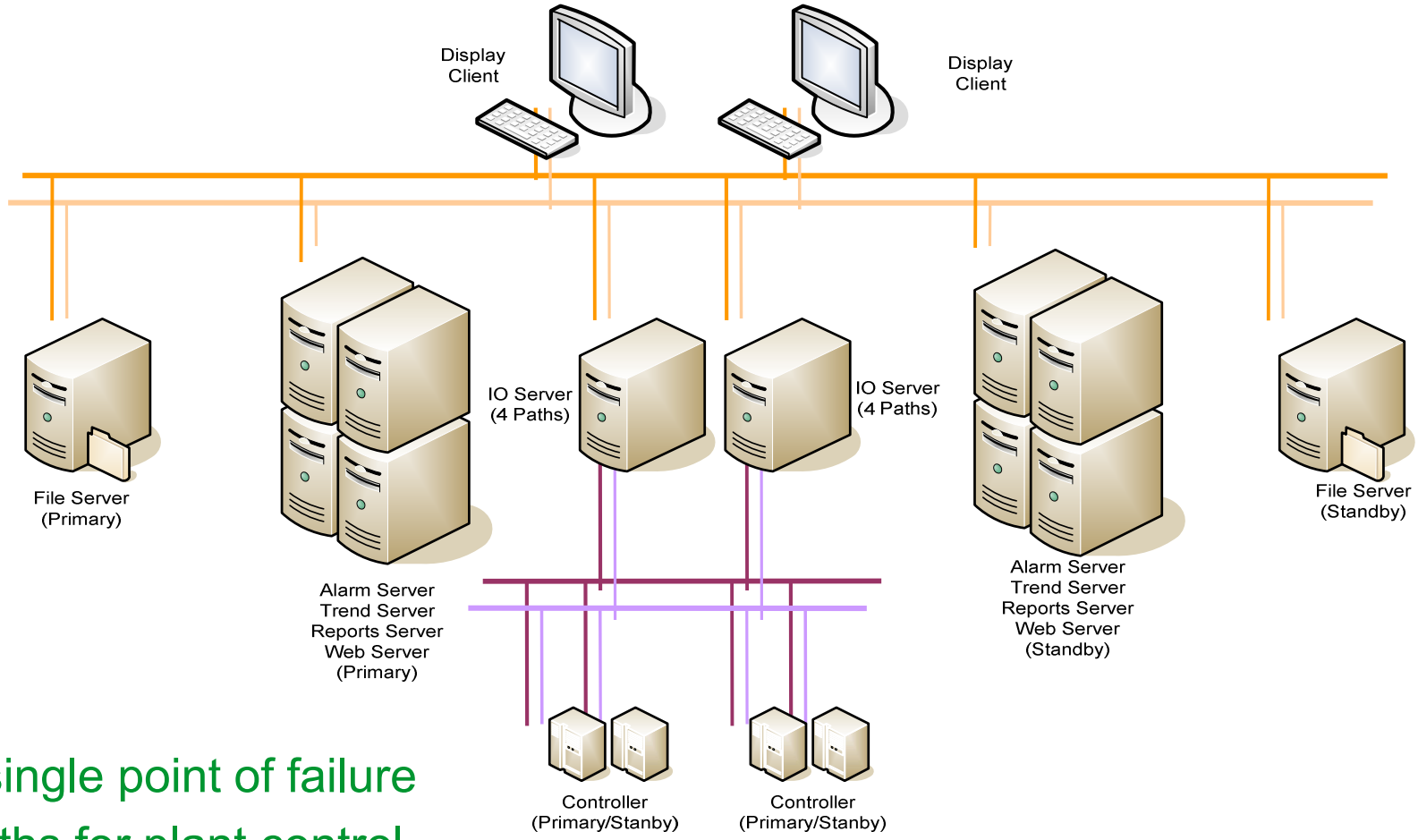
Communication
(What we need to know)



- Access accurate information and run your process optimally
- Most communication options
- Most responsive control system

Reliable system architecture

Operational Efficiency

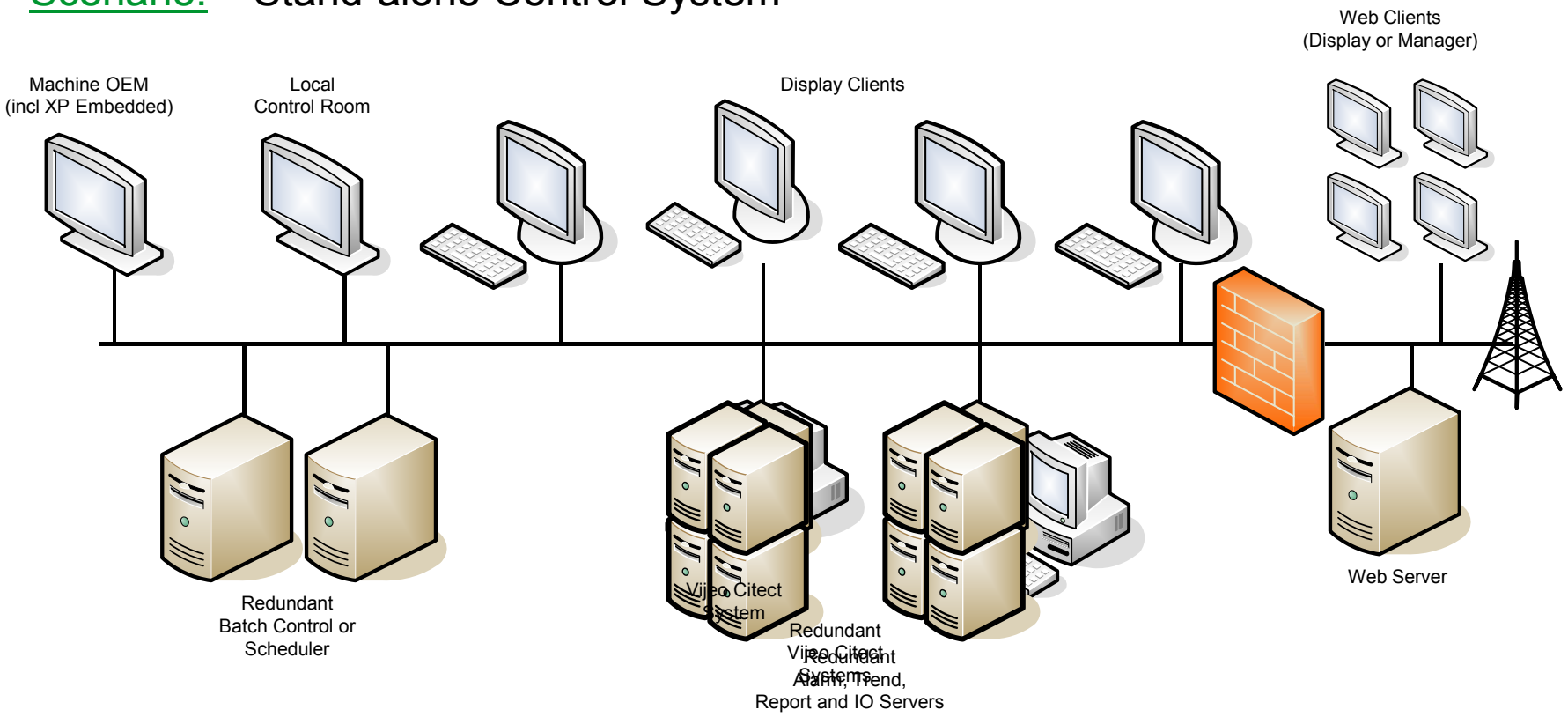


- No single point of failure
- 8 paths for plant control
- Out of the box

Provide scalability of system

Operational Efficiency

Scenario: Stand-alone Control System

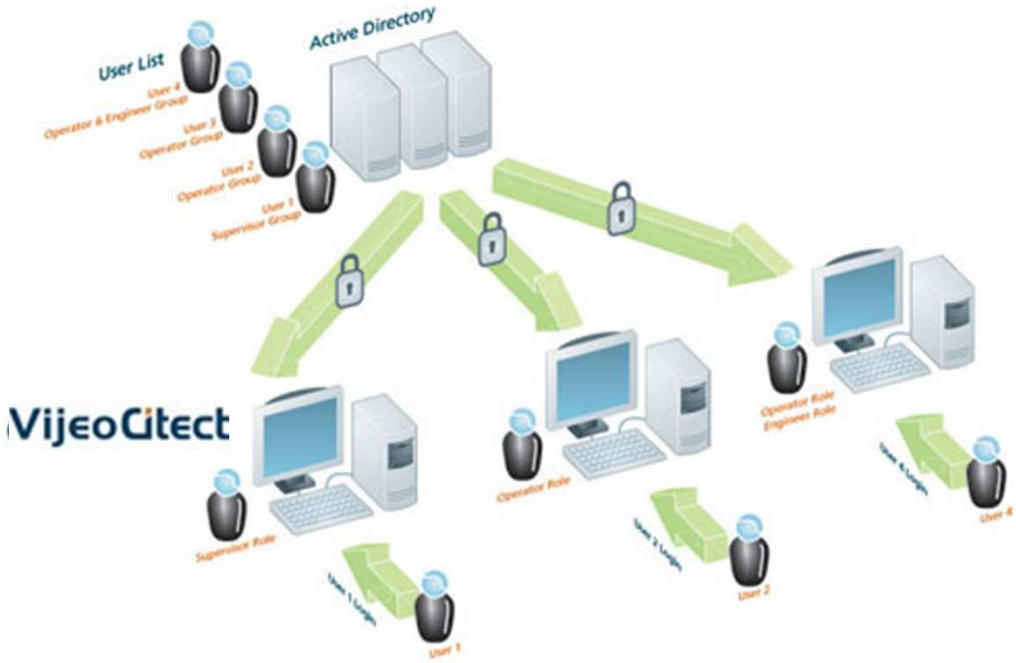


Result:

- Scales to meet business needs
- No configuration changes

Optimise your resources

Operational Efficiency



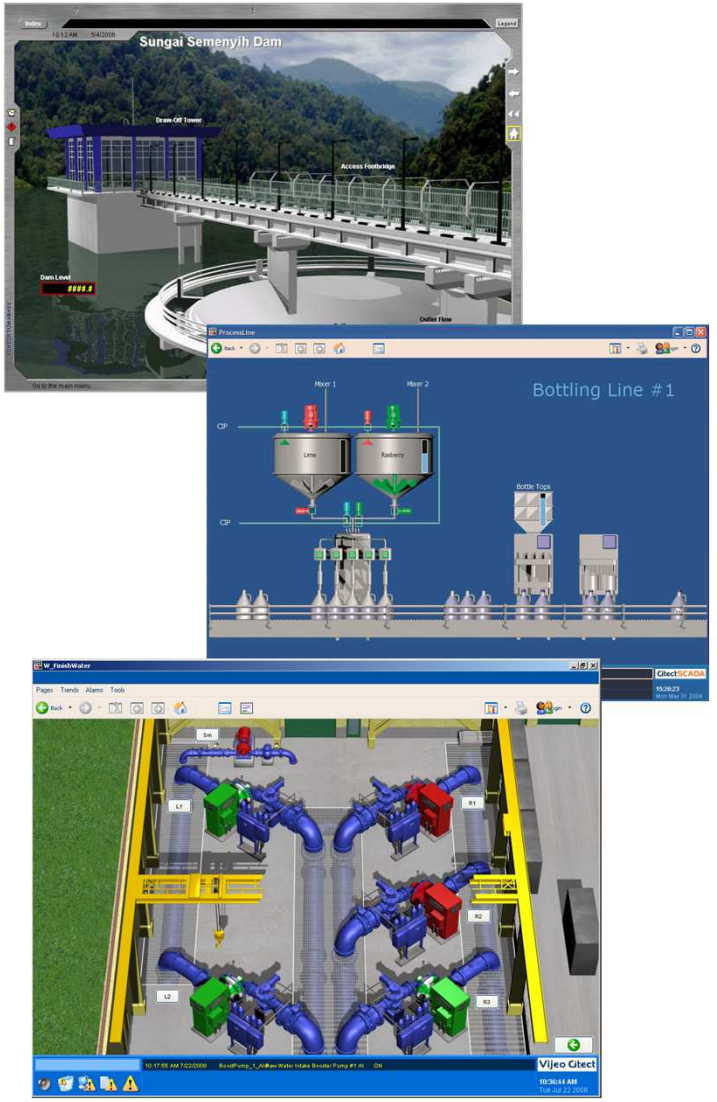
- Vijeo Citect's integration with Windows security ensures that the same corporate security standards apply to the control system as to other applications.
- With Vijeo Citect support for Microsoft Windows Vista, you can take advantage of the additional security features built into this operating system, as well.
- Dual signature functionality provides a second level of security for actions.

Intuitive graphics

[Flexibility]

- Clearly display the process and provide the right information to the operator.
- Easy to identify nuisance information which could distract operators

- Applications
  - Complex processes
    - Clear representation aids operator control
  - Information overload
    - Cluttered graphics confuse operators
    - Too many alarms cause operators to lose focus



Adapt to new business requirements

[Flexibility]

- The ability to maintain any number of separate functional control systems while providing complete system visibility.
- A seamless operator view across existing control systems
- A combination of control (including alarms, reports and trends), local to the process, paired with a central standby server
- Additional processing support for expansion requirements by simply adding a new server to the control system
- Ability to segment your control system, ensuring changes in one business unit do not affect the others
- Ability to connect to multiple control systems and analyse the alarms and trend data directly from the SCADA systems

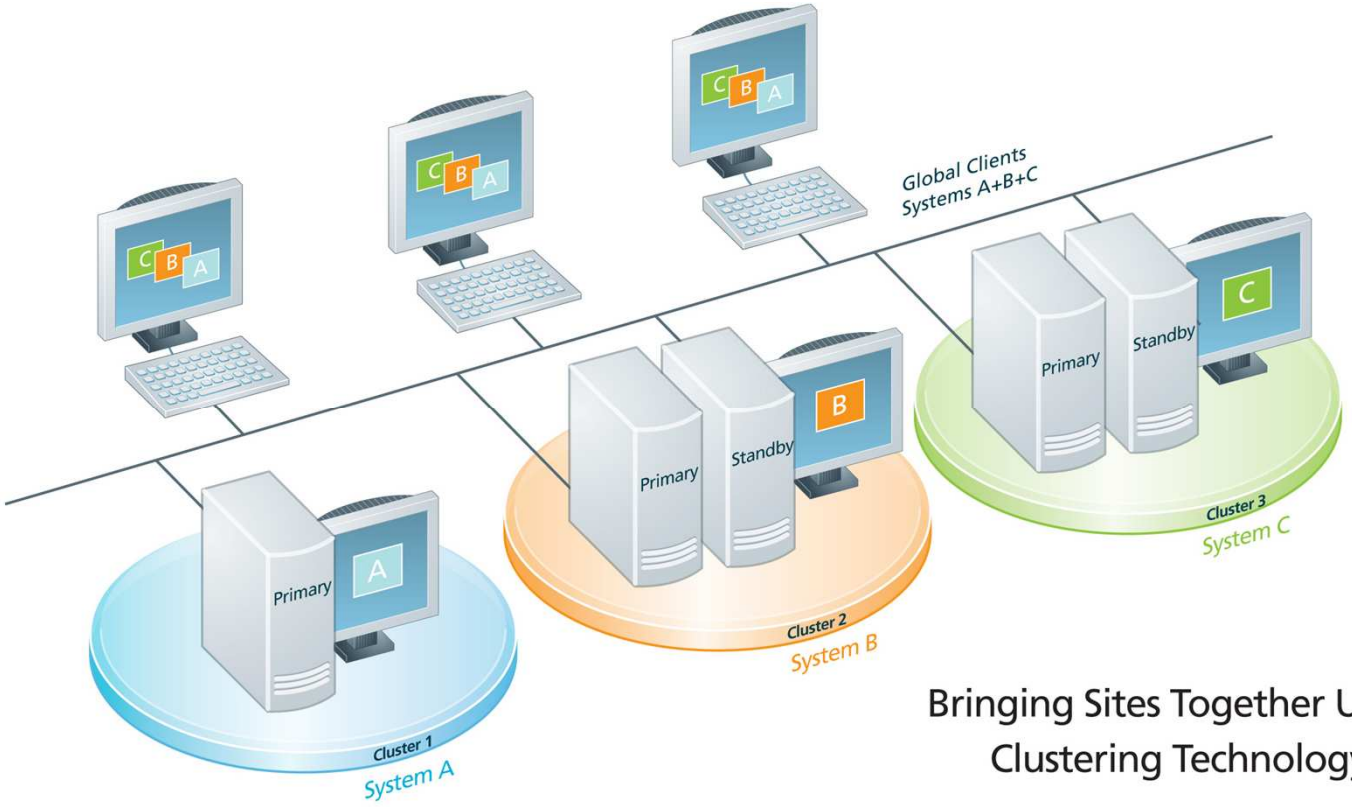
Using clustering

[Flexibility]

- Unify any number of control systems into a single “clustered” system providing users with the optimum topology.
  - While each local site can view its own control system, global control clients can be implemented to view across the entire control system, complete with unified alarm lists and the ability to compare trended data across multiple systems.
- Support for dynamic clustering means each site can be monitored and controlled from a central control room.

Bringing sites together with clustering

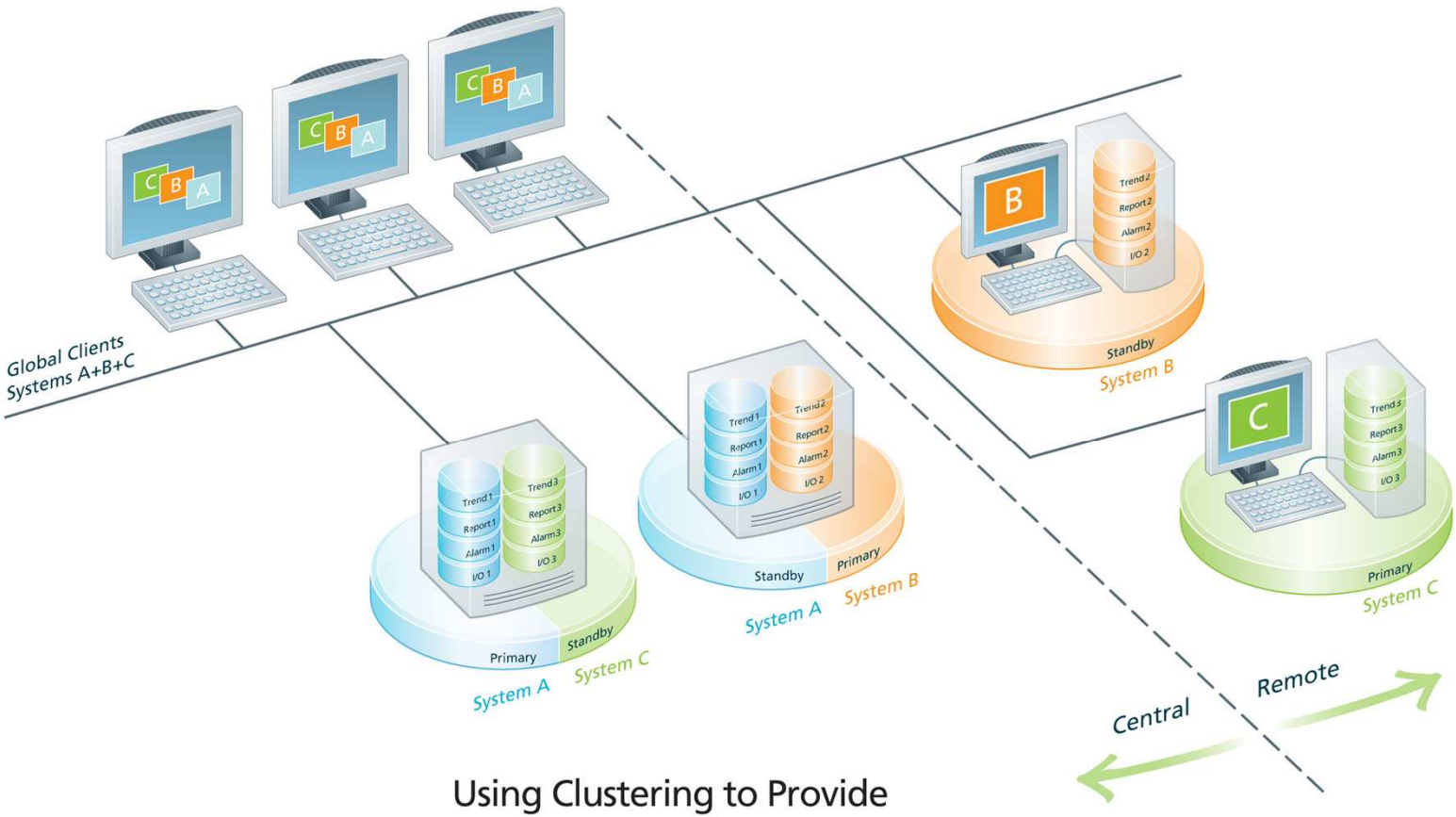
[Flexibility]



Bringing Sites Together Using Clustering Technology

Splitting up the sites

[Flexibility]



Using Clustering to Provide
Central and remote locations

One central control room

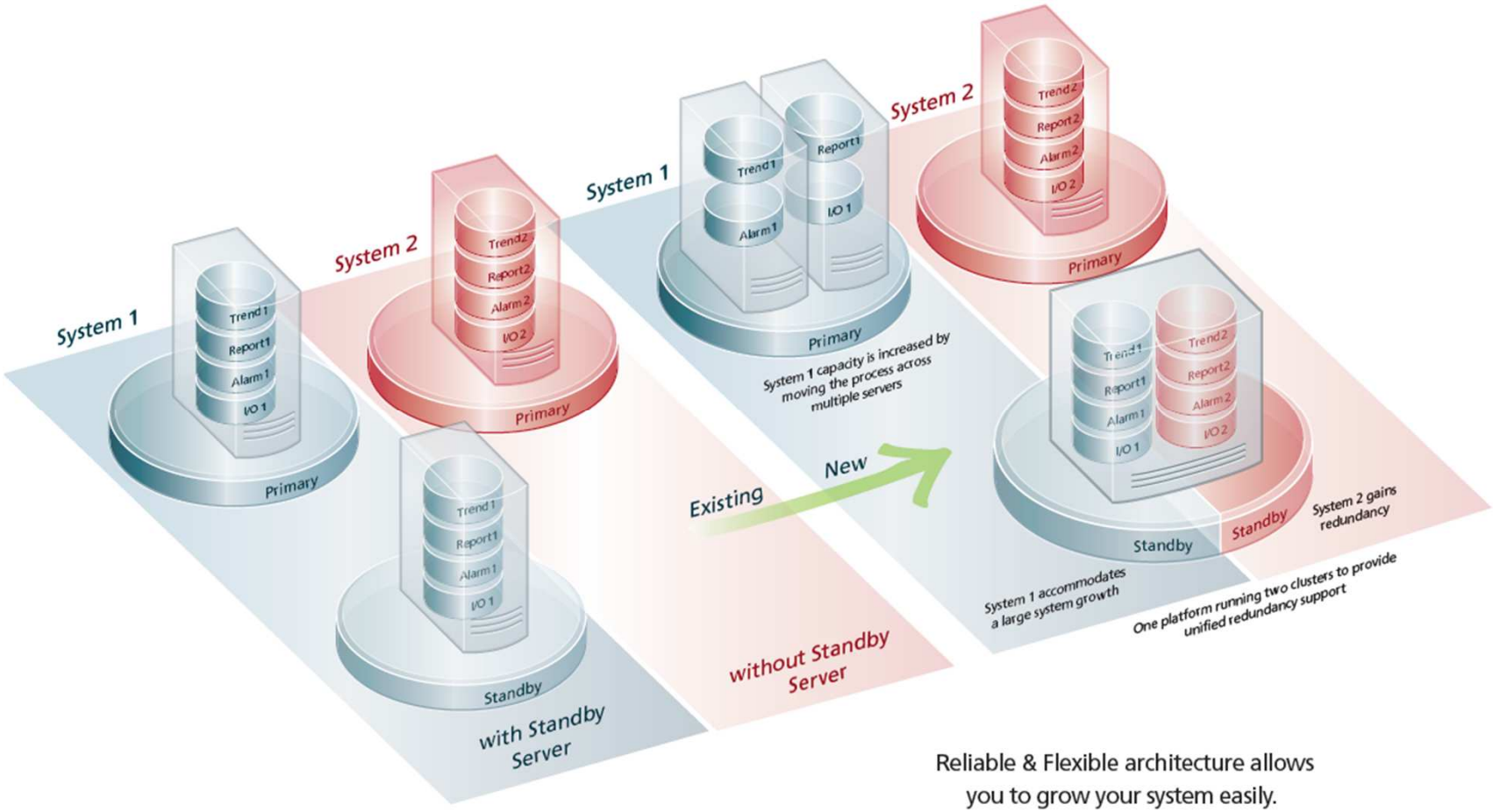
[Flexibility]

- The ability to monitor all your plant processes from a single control location affords you:

•Better operational efficiency,
•Better maintenance efficiency,
•Better energy efficiency,
•Less manpower requirements and,
•Reduced operating costs.

Solutions for the right fit

[Flexibility]



Reliable & Flexible architecture allows you to grow your system easily.

Connect to existing and future investments

[Sustainability]

- Vijeo Citect includes more than 150 communication drivers
  - Easily integrates existing “alien” devices
- Support for Dial-in and out of remote devices (RTUs), as well as GSM/GPRS connections
- Open connectivity
  - OPC Client and Server
  - OLE-DB
  - ODBC Client and Server
  - ActiveX

Global Support

Secure your automation investment

[Sustainability]

- Receive maximum return on your automation investment with our Global Support Services.
- Ensure maximum reliability and uptime of your system with our latest support technology and expertise wherever and whenever you need it.
- Prevent future problems and improve issue resolution times.
- Services are provided by a comprehensive support team of industry professionals embracing world-class best practice methodologies.
- Service Capability and Performance (SCP)-certified global customer centre, assures high quality service.
- Our Educational Services provides multi-level courses for end users, engineers and system integrators, allowing students to gain practical knowledge and apply new skills back in the workplace.

Global SCADA Support

[Sustainability]

Global Support

The Gold Maintenance and Support Agreement is the standard support platform, providing a formal structure of application software support services.

GoldPlus Support

The GoldPlus Maintenance and Support Agreement is a 24/7 extension to the Gold Support service and is differentiated by enhanced response and escalation commitments.

Enterprise Support

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 added at any time during the Support Agreement, subject to a fee.

Specialty Driver Support

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

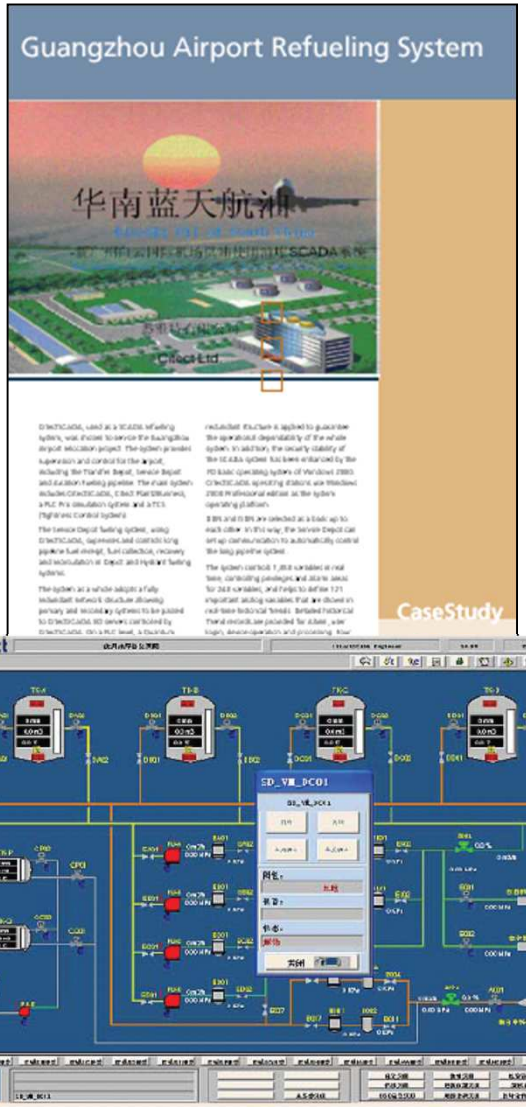
Customer Reference

SCADA Solution

Schneider Electric

Guangzhou Airport refuelling system

- A safe and reliable refuelling system for one of the world's busiest airports.
- Built-in redundancy and hot standby features, along with real-time monitoring and control for all aspects of the refuelling system - the highest level of system stability.
- Using the Historian solution to formulate a variety of historical reports and analysis enables them to transfer the industrial data from the SCADA system to the LanTian OA system database – the optimal reporting solution for refuelling systems using multiple platforms.



Western Mining Corporation

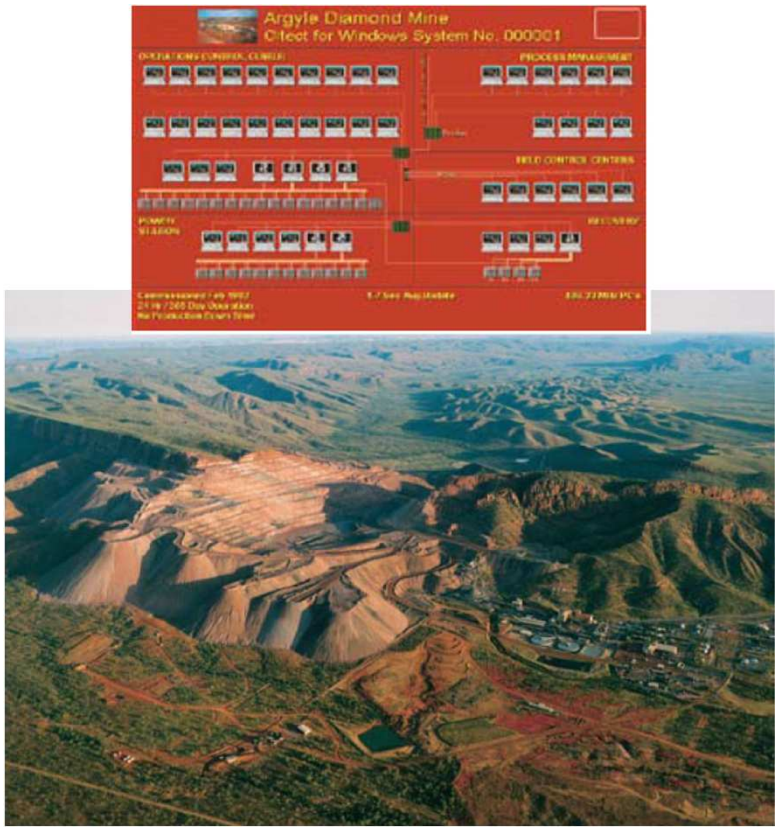
The world's largest Windows-based SCADA installation

- Over 500,000 real-time controller data points
- 24-month project completed in 18 months
- > 42 engineers (peak manning levels)
- > 2000 pages
- > 300 PLCs and drivers
- 100 Clients
- $18,000,000 turnkey project scope

Argyle Diamond Mine

The world's largest diamond supplier

- 24/365 operation – no downtime
- Guaranteed high availability of system
- Largest diamond mine in the world
  - 30% of world's diamonds
- Installed 1992 Windows 3.1
- 33 PLCs
- 33,000 digital I/O points
- 16,000 analogue I/O
- 11,500 alarms
- 50 operator interfaces



Schneider Electric provides

- A scalable, flexible and reliable architecture, proven for all sizes of utilities applications – an easily configurable SCADA solution
- Integrated, open and easy-to-use historian and reporting for seamless connection to the business system
- True remote monitoring and diagnostics anywhere, anytime (Web)
- Powerful and easy-to-use features for real-time analysis
- Fully integrated in the Schneider Electric automation environment (UAG, Magelis HMI, Unity PLC, OFS)
- Free development licenses
- A secure investment that provides the latest product technical knowledge and features

Worldwide Partnership

Global Partner Network

- In 2009, Schneider Electric's Global Partner Network consists of some 2000+ Integration Partners.
- Our comprehensive solutions ensure Schneider Electric partners deliver market-driven solutions to enhance the value of the channel partners' core offerings. This, in turn, allows the channel partners' customers to reap the full benefits.
- Schneider Electric's global position within the next generation SCADA industries assures that distribution and channel partners benefit from a solid platform to establish brand equity that can be leveraged worldwide.

Become a Partner

- Increase your business opportunities
  - By becoming an approved Schneider Electric partner, we will direct our customers to you.
- Drive sales
  - Partners receive access to sales tools, providing you with the complete message for the customer.
- Reduce risk
  - Partners gain access to world class support, reducing the risk when developing HMI/SCADA projects.
- Reduce costs
  - Partners receive licenses for system development and testing at no extra cost.
- Show your skills
  - Partners with exceptional skills receive awards that recognise their achievements worldwide.

"Make the most of your energy.

In less than an hour, completing this tutorial will give you a basic working knowledge of CitectHMI/SCADA software.

Learn how to build a small project, create dynamic graphics, configure alarms and trends, then run your project like a real plant.

This tutorial will also show you some shortcuts, that over time, will save you far more than the one hour you may take to complete the tutorial.

CitectHMI
CitectSCADA

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Configuring Tags....8
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Welcome, and thank you for purchasing CitectHMI/SCADA. We would like your experience with the product to be a pleasant one, so we have created this tutorial to help new users get familiar with some of the fundamental features of the product.

The tutorial is designed so that you can complete it in under one hour. The tutorial is not intended as a substitute for attending a CitectHMI/SCADA training course. We encourage you to attend a training course to complete your basic training, learn how to use time saving tools or go on to learn some of the more advanced features of the product.

Repetition is an important part of learning or memorizing. One way you can speed up your familiarization is to take a few minutes to click through all the menus in the product and (briefly) try and figure out what each thing might be for, if you can't make sense of something, don't be concerned just move on to the next thing anyway. You may not consciously remember everything you see, but it helps to set a framework for the mind to put things when you revisit these places in the tutorial and in this way you will remember them much better.

By completing this tutorial you will learn the following…

- Creating a New Project
- Setting Up Communications with a PLC
- Configuring and deleting tags
- Creating New Graphics
    - Use Templates
    - Button Commands
    - Disabling Buttons
    - Dynamic Symbols
    - Drawing objects
    - Manipulating objects Copy, Paste, Align, Mirror, Send to Back, Size, Move
    - Drawing Text
    - Displaying analog values
    - Drawing Pipes
    - Grouping Objects
    - Change background color
    - Defining Alarms
    - Configure an alarm page
    - Storing Trend Data
    - Configuring a trend page
- Operating Runtime Displays
- Backing up and restoring a project

Definition of Terms

Click	= Briefly press left mouse button
Double Click	= Press left mouse button twice – quickly
Right Click	= Briefly press right mouse button
Check	= A tick or cross in an options box
Type **Text**	= Type in the word Text
Drag	= Position mouse, click and hold left mouse button, move mouse, then release mouse button.
Alt+Tab	= Press the Alt key, hold it down, then press the Tab key.

Single Click

Double Click

Type

Citect is made up of a several configuration tools and a runtime section.

Citect Explorer – Top level configuration interface

Citect Project Editor – Mainly used for entering database type information

Citect Draw – Used for creating graphics

Citect Runtime – Provides the active operator interface

You can switch between these applications

1. using the icons at the top left of each application, or
2. hold down the Alt key, then press Tab until the application you want is selected, then release the alt key.
3. Clicking on the icons that appear near the start button as shown below.

To make sure that you have selected the correct icon you can let the mouse hang over the icon for about 2 seconds and a tool tip will appear to guide you.

As you go through this tutorial you might like to click on the Help button located on many of the dialogs as this will show you some of the other things available to you that are not covered by this tutorial.

Project Folders store all of the Citect files for your project including graphic pages, tag definitions, code etc. You can combine multiple projects into one project using the “include” function described in the on line help.

Tips.
Consider using the Quickstart Project as this can save you a lot of time.

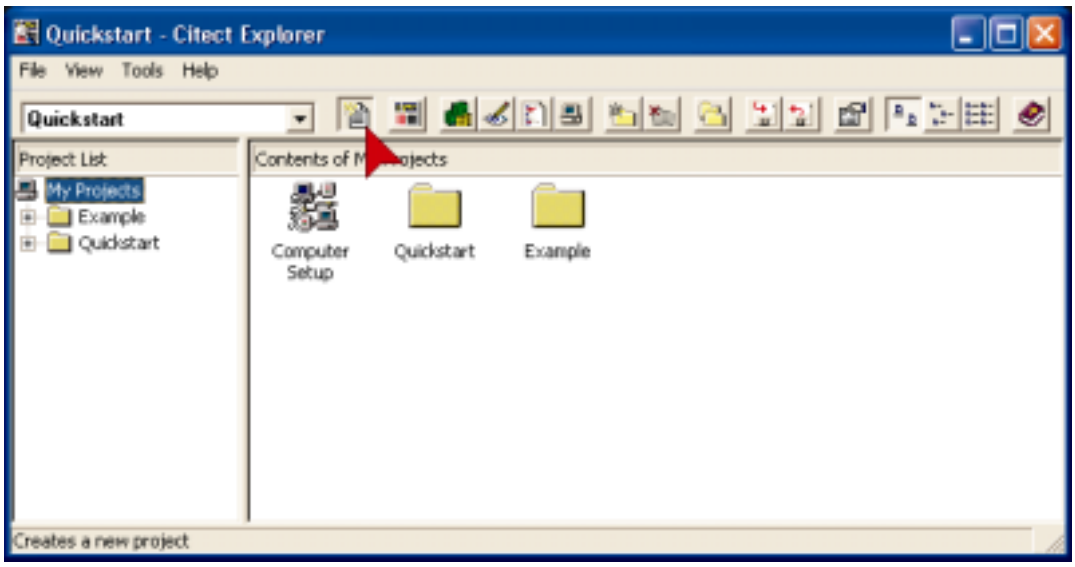
Use the Example project to get ideas and learn how things are made, by pulling them apart.

Create a New Project Folder

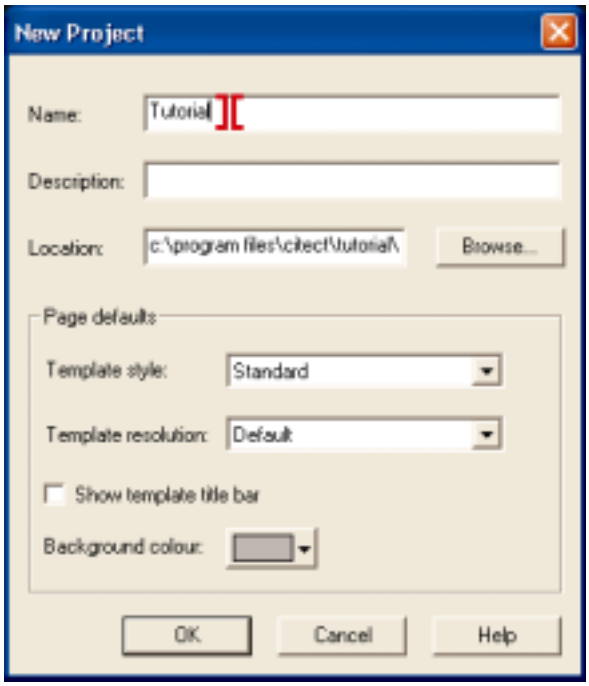
Run the Citect Explorer. The Citect Exporer allows you to create and manage your CitectHMI/SCADA projects. It is also the controlling configuration application from which you can run the Project Editor, Graphics Builder and Cicode Editor.

Click on **Start**, **Click Programs**, **Click Citect**, **Click Citect Explorer**.

On the Tool Bar, **Click** on the **New Project** icon.



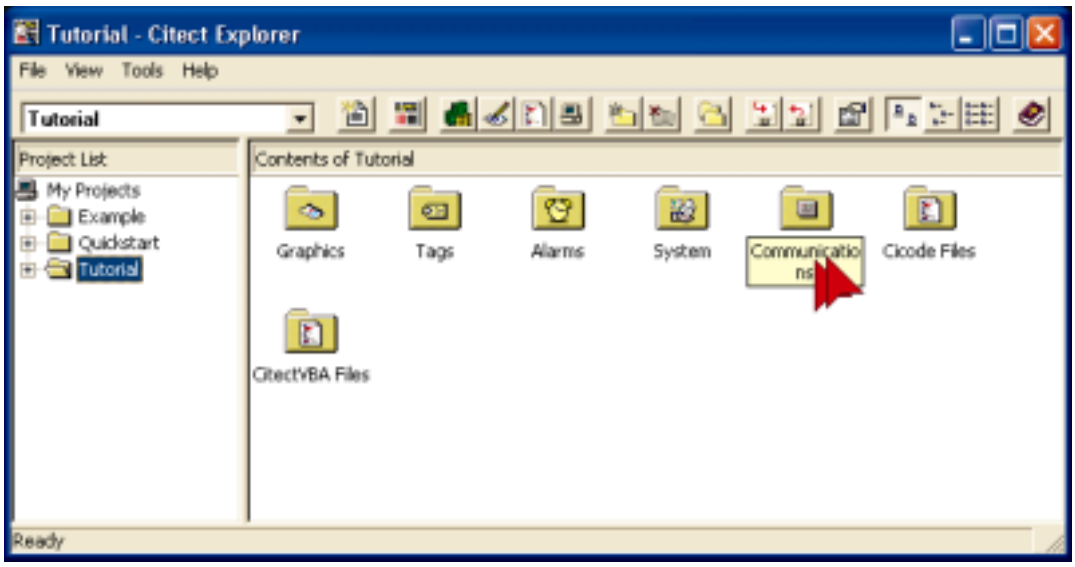
In the **New Project Dialog Box**, type **Tutorial** in the **Name field** to give the new project a name, then **Click OK**.



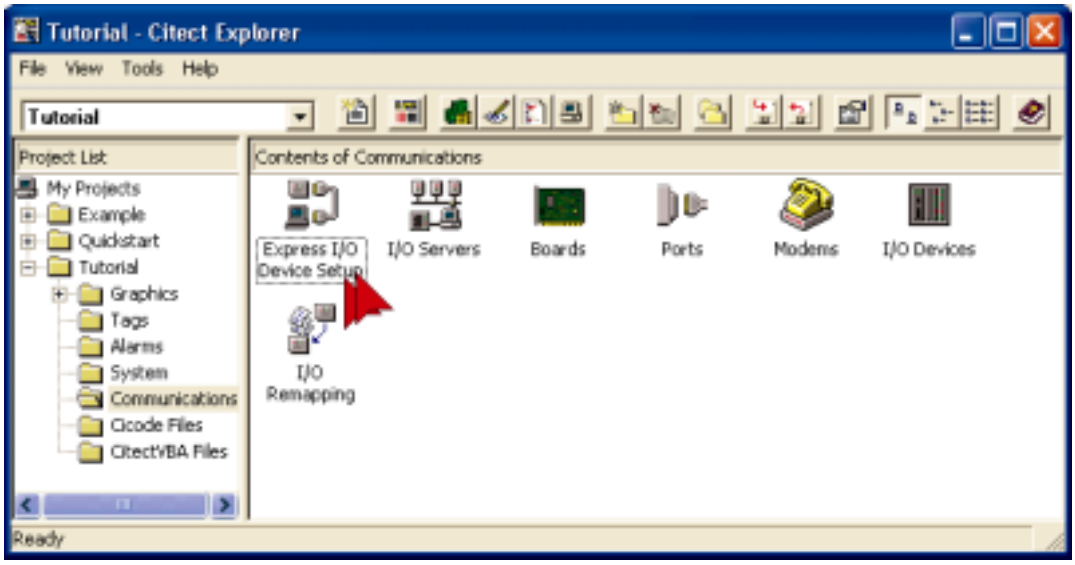
You may notice that the label on some folders is cut short. Eg; Communi.. instead of Communications. The exact nature varies from one version of windows to another but you can just ignore it as it is only cosmetic.

Configure an I/O Device

Make sure the Tutorial project is selected and **Double click** on the **Communications** folder.



Double click on **Express I/O Device Setup**.



Configuring I/O Device Continued…

On the **Express Communications Wizard**, just press the **Next** button for these windows.

When you see the window below **Click Disk I/O Device**
Click Next

A Disk I/O device emulates an external I/O Device such as PLC/RTU/DCS etc. A file on the hard drive is used to store an image of the variables. The file format is determined by the protocol being used. This is a great way to test your projects if you don't have an external I/O Device available. Memory I/O devices are the same, except they are stored in RAM and are therefore volatile.

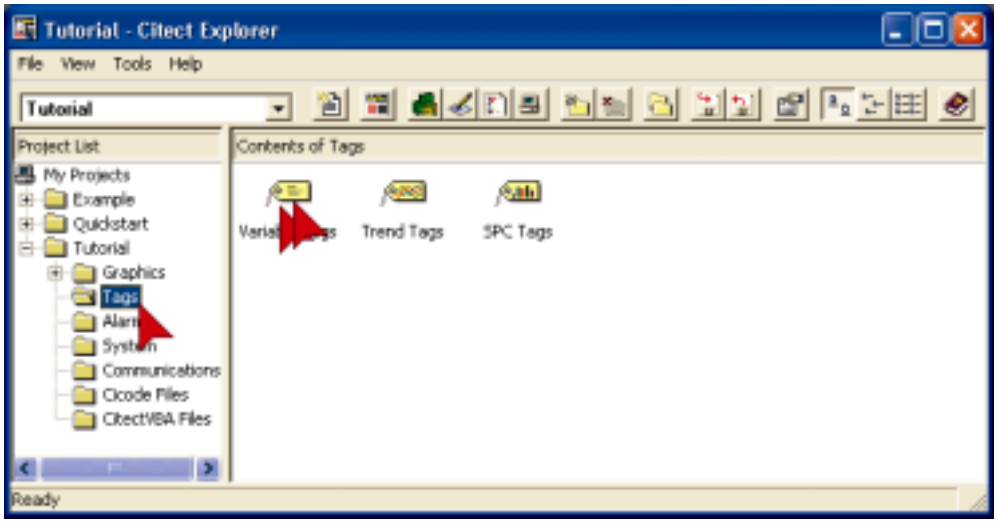
When you see the page below **Click** on **Citect Generic Protocol**

The Citect Generic protocol is a simple protocol that is designed for internal Citect variables like Disk or Memory I/O Device variables.

On the following screens you just need to press the **Next** & **Finish** buttons.

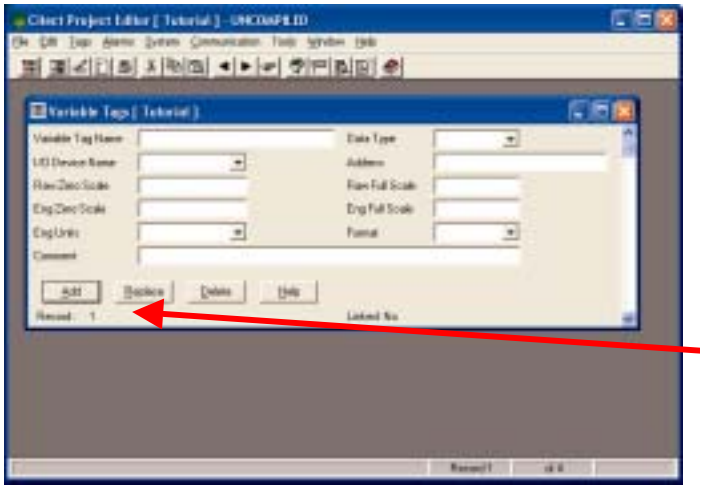
Configuring Tags

Click on **Tags** (in **LEFT** pane)
Double Click on **Variable Tags** (in right window)



The right hand window will display Variable Tags, Trend Tags & SPC Tags as shown above.

This will bring the Project Editor to the foreground and display the Variable Tags dialog. The Project Editor is mainly for editing database type information.



The Variable Tags Database has one record for each Tag you define.

Each Tag has multiple fields. (Variable Tagname, Data Type, Address etc)

You can see the record number indicated in the bottom left of the dialog box

IMPORTANT

Do **NOT** press **Enter** before filling in all the required fields. Each time you press **Enter**, a new record will be added . For learners, it is better to use the **Add** button instead. If you add an extra record by mistake, you can use the **Delete** button to mark it for deletion. Once marked for deletion the record will be ignored.

If you press delete by mistake you can press it again to undelete. To view records marked for deletion go to **Tools**, select **Options**, check **Show Deleted**.

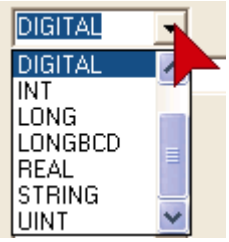
To permanently remove the record go to **File** then select **Pack.**

You can save a lot of time configuring tags by entering similar types of Tags together and just changing the parts that are different before pressing Add.

Use the mouse to highlight the parts that you want to change, then just overtype. Eg; Pump_1_CMD can easily be changed to Pump_1_M. Highlight CMD then type M.

If you arrange your variables in your PLC into blocks where all the Digitals are contiguous and all the Integers are contiguous then the performance will be significantly improved as CitectHMI/SCADA software will be able to read large blocks of data in a single message instead of multiple messages.

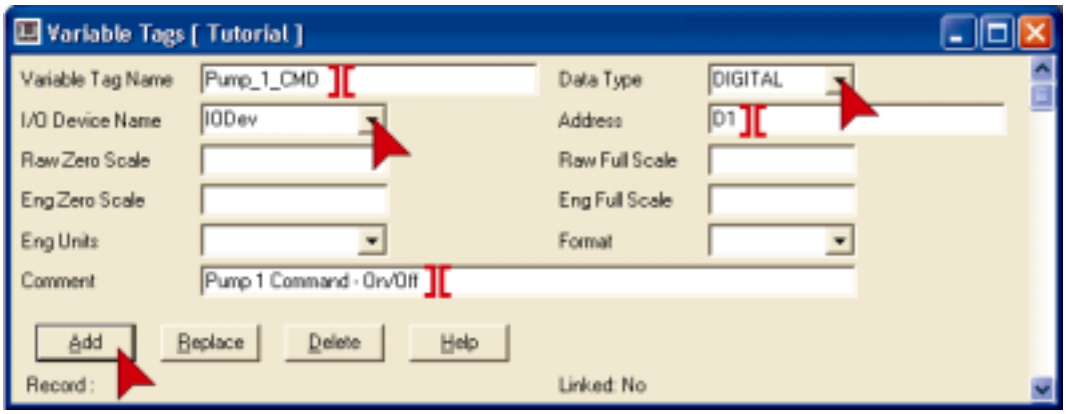
Configure Tags Continued…



CAUTION
Where a drop down is provided you should use it. If you mistype data into fields that require specific settings you may cause compile errors.

Next you will configure three tags as shown below. Remember to fill in the form before pressing **Add**. Use the Tab key or the mouse to move between fields.
To make corrections after you have pressed add, you can move to the Tag or record by using the scroll bars on the right hand side, then press **Replace** when you have made the changes.

The cursors have been added as a guide to show you where you should type and where you should click.



If you are having difficulty reading from the screen grabs here is the information in text form.

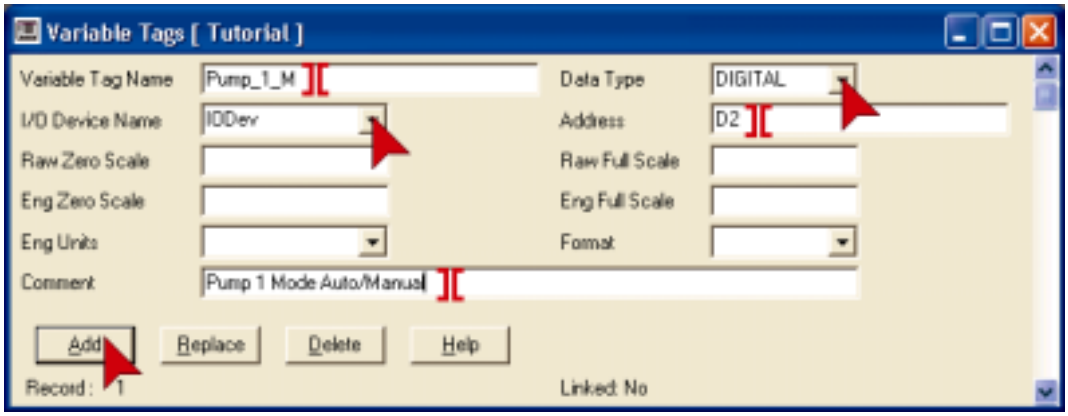
Variable Tag Name	**Pump_1_CMD**	Data Type	**DIGITAL**
I/O Device Name	**IODev**	Address	**D1**
Raw Zero Scale		Raw Full Scale	
Eng Zero Scale		Eng Full Scale	
Eng Units		Format	
Comment	**Pump 1 Command – On/Off**		

The format field defines the default style of displaying this vavriable.

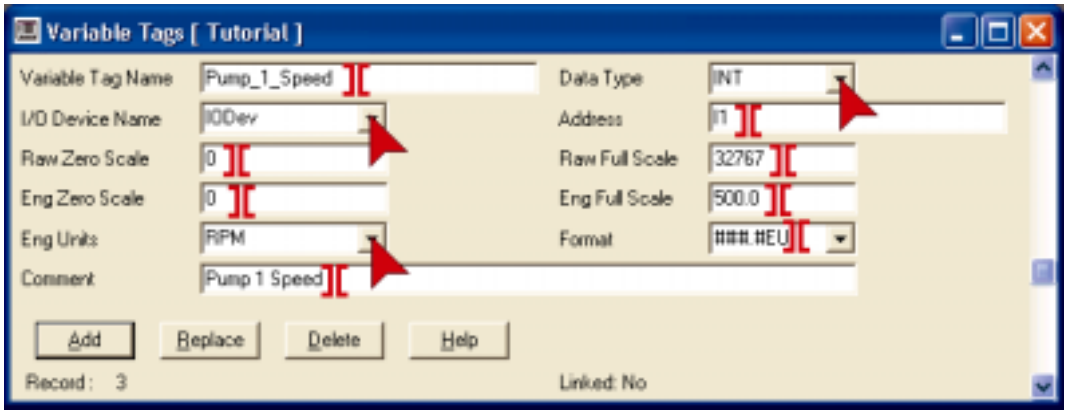
defines number of characters. Eg; ###.## would have 3 digits to the left of decimal and 2 digits to the right.

Adding EU to the end specifies that Engineering Units will be appended to the value at runtime. Eg; 123.12 RPM.

Configuring Tags Continued…



Variable Tag Name	**Pump_1_M**	Data Type	**DIGITAL**
I/O Device Name	**IODev**	Address	**D2**
Raw Zero Scale		Raw Full Scale	
Eng Zero Scale		Eng Full Scale	
Eng Units		Format	
Comment	**Pump 1 Mode Auto/Manual**		



Variable Tag Name	**Pump_1_Speed**	Data Type	**INT**
I/O Device Name	**IODev**	Address	**I1**
Raw Zero Scale	**0**	Raw Full Scale	**32767**
Eng Zero Scale	**0**	Eng Full Scale	**500.0**
Eng Units	**RPM**	Format	**###.#EU**
Comment	**Pump 1 Speed**		

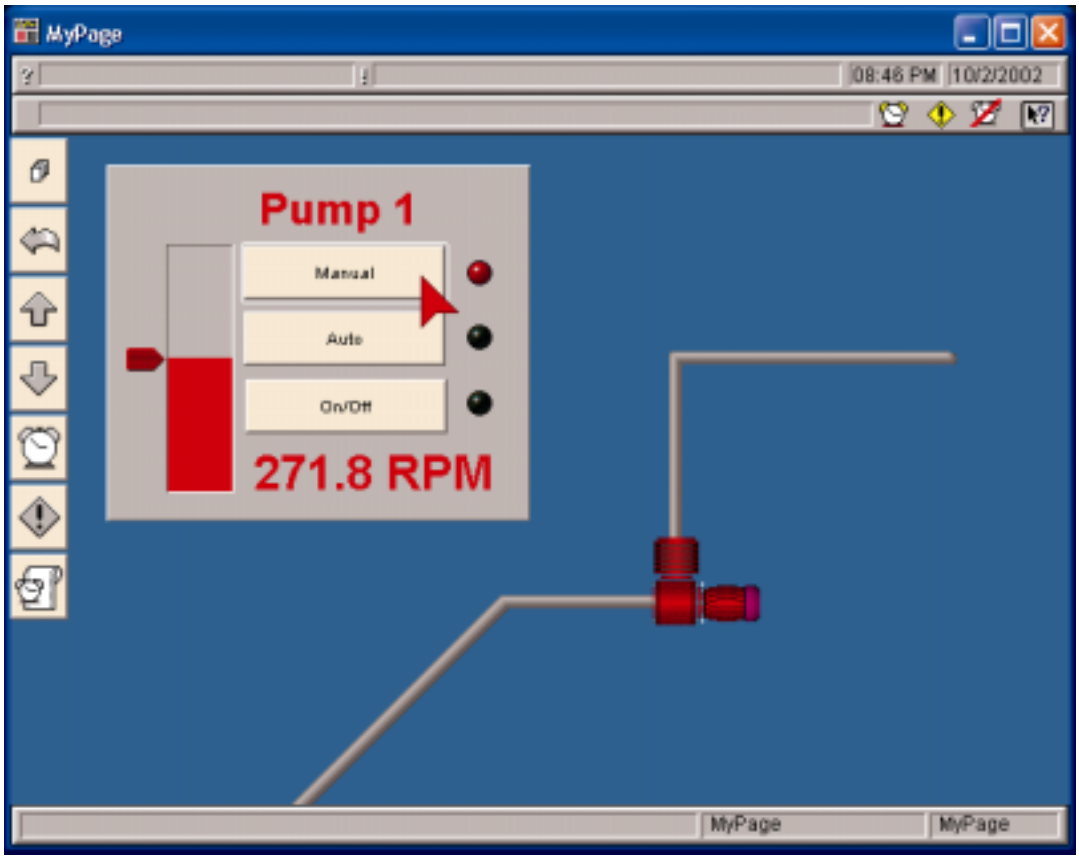
Note: The format field on Pump_1_Speed will need to be typed in.

Please use the scroll bar on the right to scroll through each tag (record) and double check that you have entered the correct information. On the last tag, check that the number of tags (records) = 3.
Close the Variable Tags window by clicking on the X in the top right corner.

Creating Graphic Pages

Switch to the **Graphics Builder** – **click** on the **Graphics Builder Icon**. The Graphics Builder is an editing utility that you can use to create your graphics pages and the objects that comprise the graphic pages.

Before you start lets take a look at what you will create.



The fastest way to drive any application is with the keyboard. Most programs have shortcut keys – you may be surprised how quickly you can learn them.

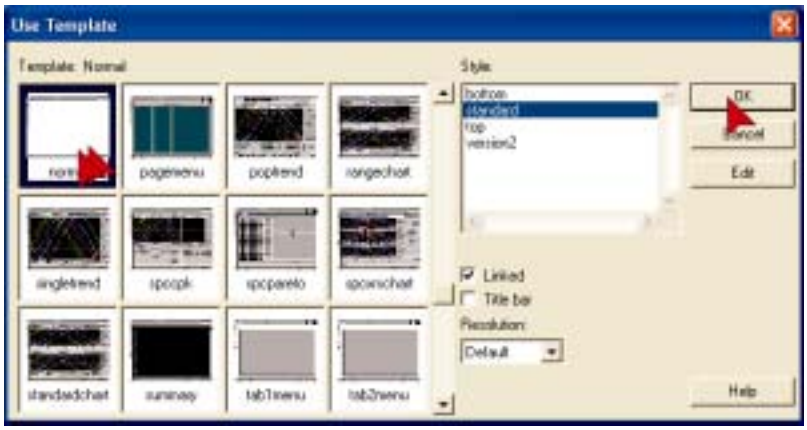
Creating Graphic Pages, Creating a new page

Click on the **New** Icon

You can also use File, New from the Menu but clicking the icon is faster.

Click on the **Page** button

In the **Use Template** dialog, make sure **Standard** is selected in the **Style** box, then **Double Click** the **Normal** template as shown.

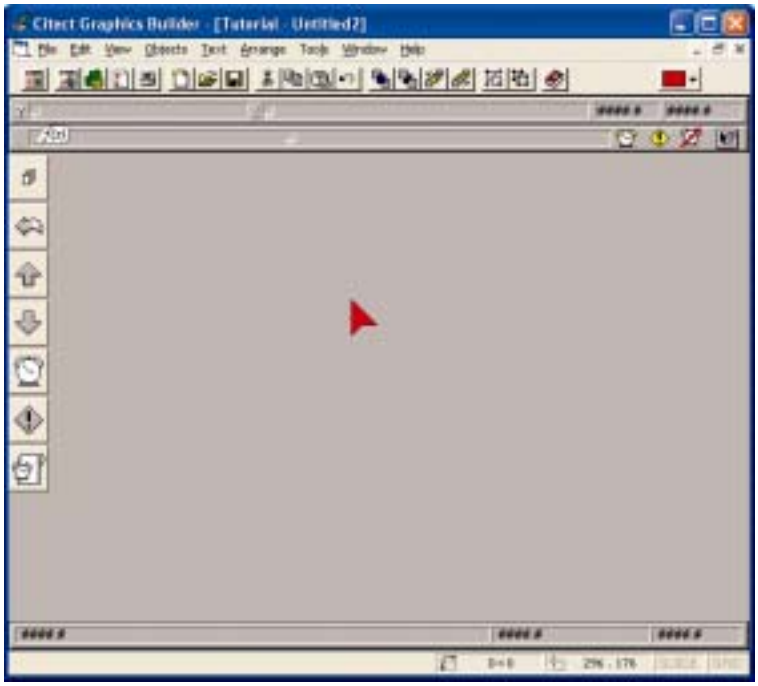


Instead of double clicking on Normal we could single click on Normal and then click OK

You can move the Toolbox by placing the cursor on the title bar, hold down the left mouse key while moving the mouse.

Creating Graphic Pages, Saving your page

By using the built-in templates you get a head-start on building your page. There are navigation buttons already configured for you and using templates helps to ensure a consistent look and feel throughout your project. This is very important if you want to make it easy to use for operators.



Templates are displayed pretty much as they appear at runtime.

###.## indicates dynamic values that will change at runtime.

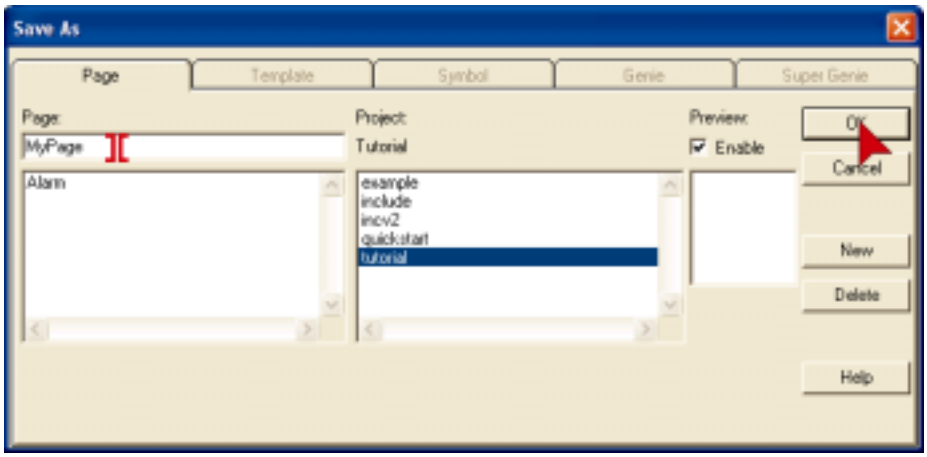
+1, +2 etc are Animation Numbers that are used as references for values that will be placed at these points at runtime.

F(x) is a script that is executed with the page.

It is good practice to save your graphics pages regularly, so lets begin the habit right now.

Click on the **Save** Icon on the menu bar.

Type **MyPage** in the **Page:** Edit Box, then press **OK.**



Creating Graphics pages, Configuring buttons.

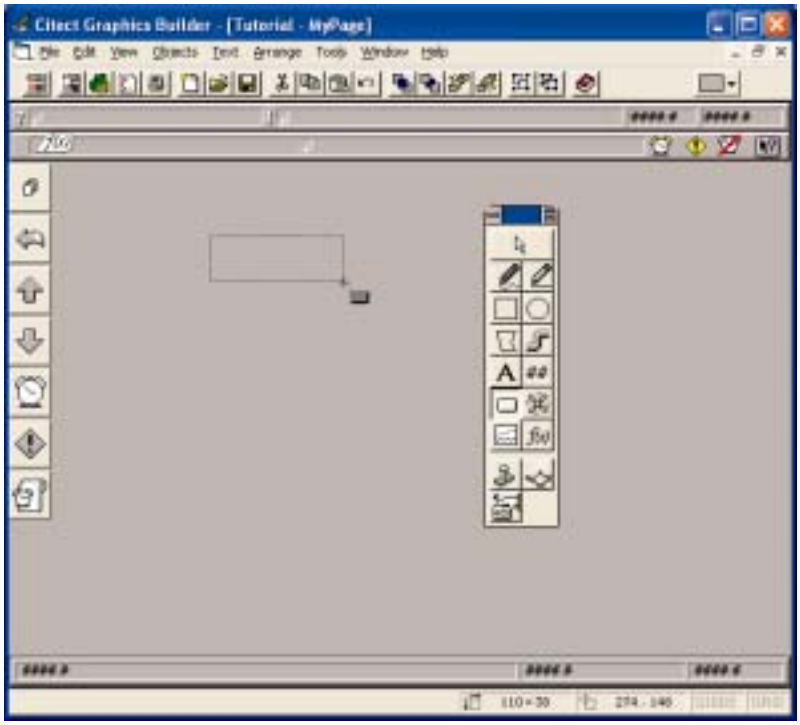
Next we will configure some buttons to control the mode of the pump.

On the Toolbox **click** on the **button** icon.

You may notice that the cursor changed after selecting the button tool. This makes it easy to see which tool you are using.

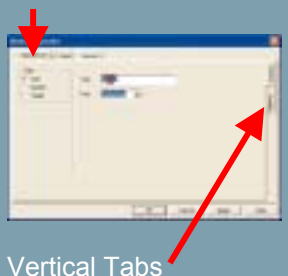
After you draw a button you will be put back into edit mode as this is normally the next step. To draw another button you need to select the button tool again.

To draw the button, **Click and hold** the **left mouse button** while moving the mouse then **release** the **left mouse button**. ie; Drag the mouse.



If you don't see the expected property sheet as you go through these exercises, then you may need to locate the correct sheet by looking at the screens on the page then click on the horizontal & vertical tabs to find the right sheet.

Horizontal Tabs



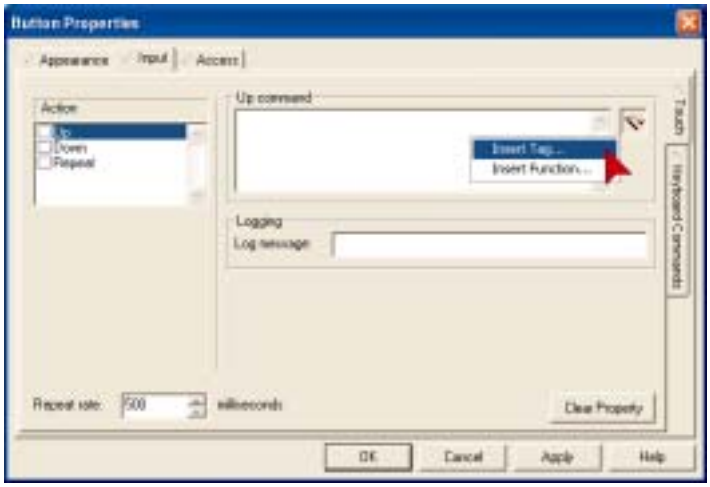
Vertical Tabs

Creating Graphics Pages, Configuring Buttons Continued…

Double Click on the word **button** in the **Text:** Edit Box. This is a quick way to select a complete word. Next type **Manual.**

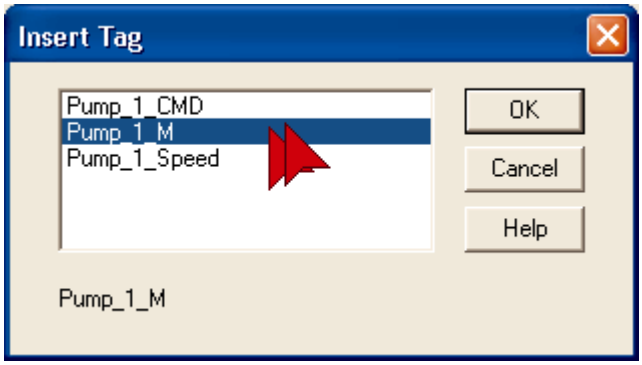
Click on the **Input** Tab

Click on the Insert button.
Click on Insert Tag…

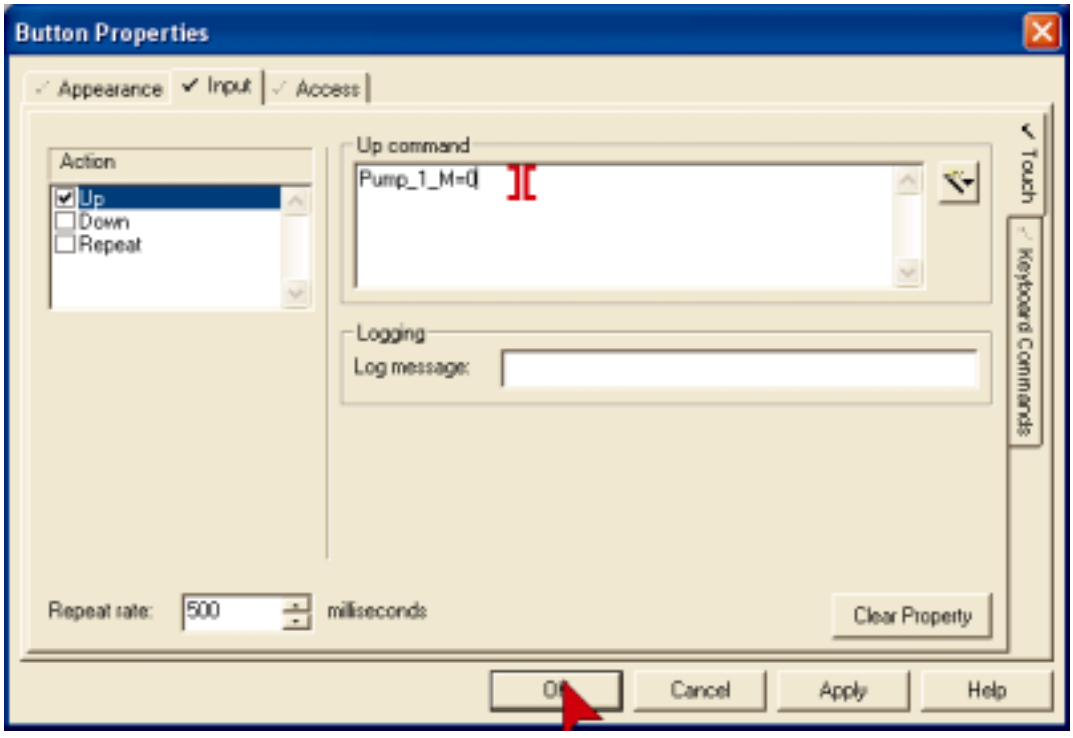


Creating Graphics Pages, Configuring Buttons Continued…

In the **Insert Tag** Dialog **Double Click** on **Pump_1_M**



Pump_1_M will be inserted into the Up Command Edit Box. Click your mouse to the right of the Tag Pump_1_M and type **=0**.



When the project is run, pressing on the Manual Button will set the Tag Pump_1_M to 0.

We will now configure a second button to set the tag to a 1.

There are many ways to copy objects.

Ctrl + D will duplicate the currently selected object.

Ctrl + C will copy an object.

Ctrl + V will paste an object.

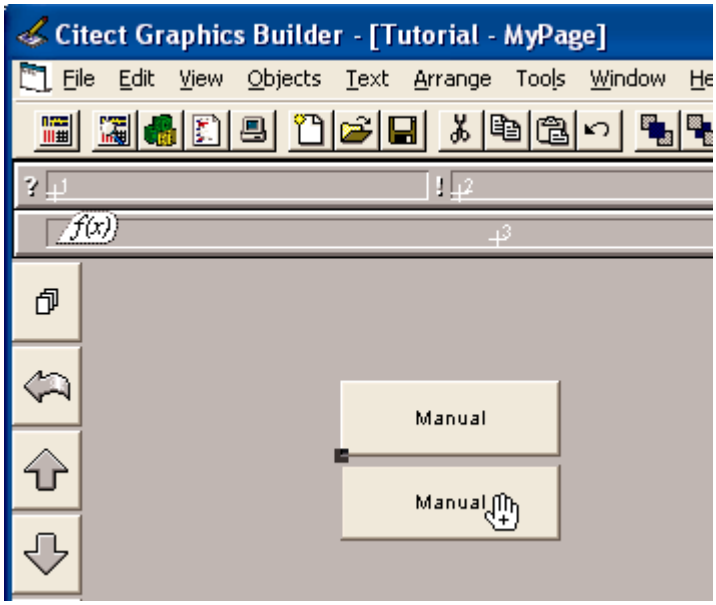
These last two work in almost all windows programs so are well worth remembering.

You can also select Copy, Paste or duplicate from the Edit menu or by using the icons on the menu.

Creating Graphics Pages, Configuring Buttons Continued…

It is quicker to make copies of things than to draw them from scratch. Here is a quick way to make a copy and position an object.

Place the cursor over the Manual Button.
Hold down the Ctrl Key.
Hold down the **left mouse** button.
Move the **mouse** to position the copy.
You don't need to be precise with position at this time – we will fix that later.

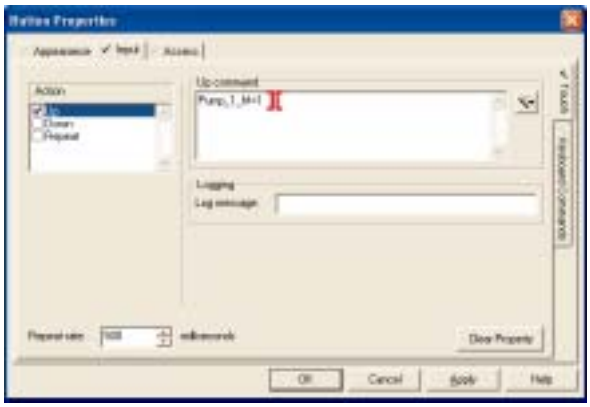


If you move the mouse immediately after holding down left mouse button, then you will only see the outline of the object as it is moved.

If you wait half a second before moving the mouse, you will see the object itself being moved. The + sign will appear on the hand about half a second after pressing the left mouse button indicating change of mode.

This feature is useful when handling a large number of objects at the same time.

Double Click on the new button.
In the Up Command Edit Box, replace the 0 with a 1.



You can also use the reserved word TRUE instead of a 1, and FALSE instead of a 0.

TRUE and FALSE are not case sensitive, but this is a common convention used to indicate that this is a reserved word.

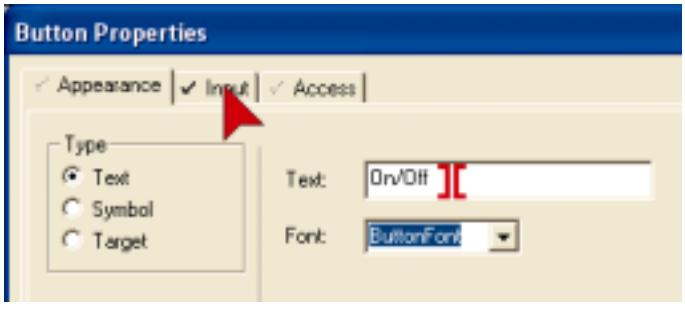
Creating Graphics Pages, Configuring Buttons Continued…

Click on the **Appearance** Tab
Double Click on the word **Manual** in the **Text:** Edit Box, **overtype** with **Auto**
Click OK

Now we have made some buttons that will set the control mode of the pump into Auto or Manual. Next we need something to turn the pump on and off. Instead of using two buttons, one for on, and one for off, we'll use just one button.

Make a copy of the Auto Button. (**Hold Ctrl**, **Click** on **Auto Button** and **hold** then **move the mouse**).

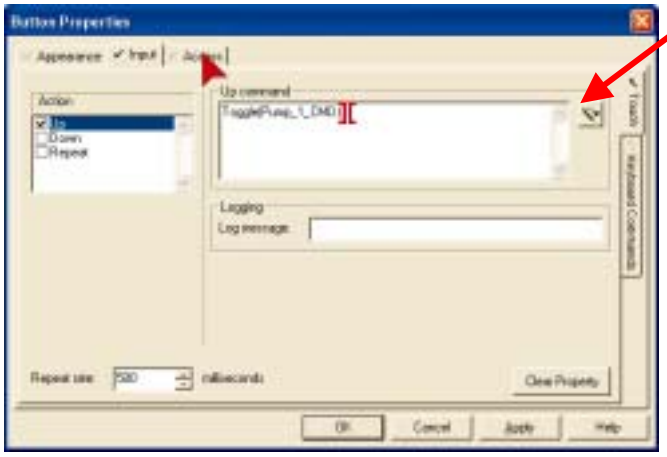
Change the button Text to read "**On/Off**", then **Click** on the **Input** Tab



Under the access tab you may notice there is a section called security. This is a very powerful feature in Citect that allows you to precisely define who can access what. Configuring security is covered in the Citect Configuration training course.

Creating Graphics Pages, Configuring Buttons Continued…

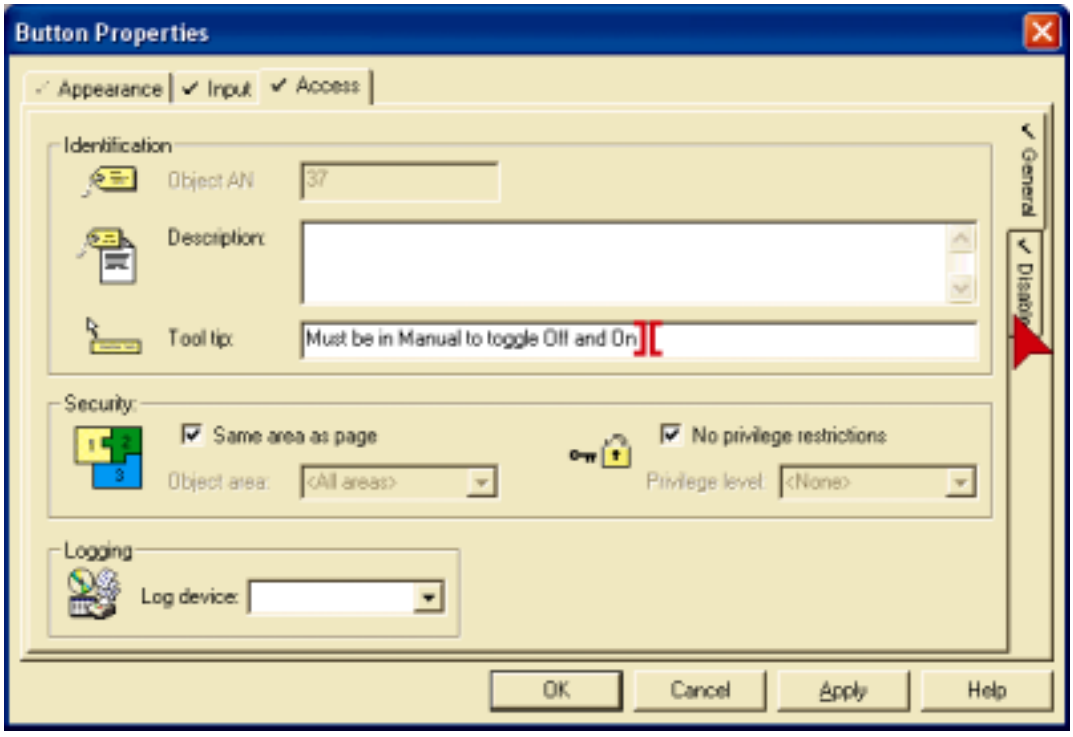
In the Up Command Edit Box **overtype** with **Toggle(Pump_1_CMD**)
Click on the **Access** Tab



*You can also use the **Insert** button to lookup the Toggle **function** and paste it into the Up Command.*

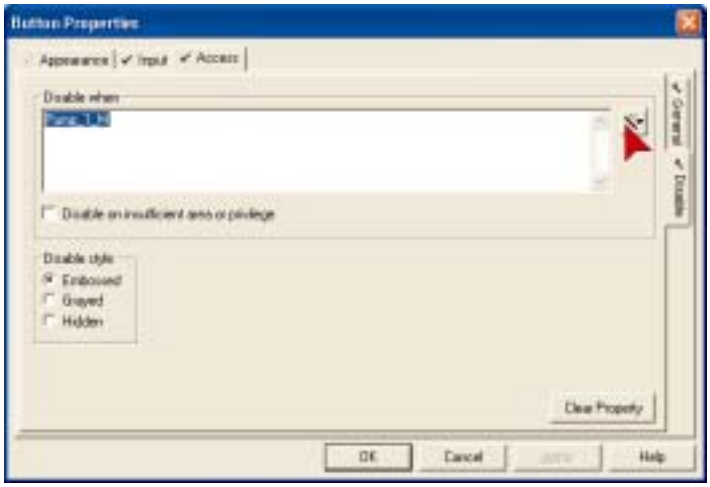
Now we will prevent the On/Off button from working while the pump is in Auto mode and we'll add a tool tip on the way.

In the **Tool tip**: Edit Box **type** "**Must be in Manual to Toggle Off and On**"
Then **Click** the **Disable** Tab. (on the right side of the dialog).



Creating Graphics Pages, Configuring Buttons Continued…

Click on the **Insert** icon.
Click Insert Tag
Double Click on Pump_1_M
Click OK

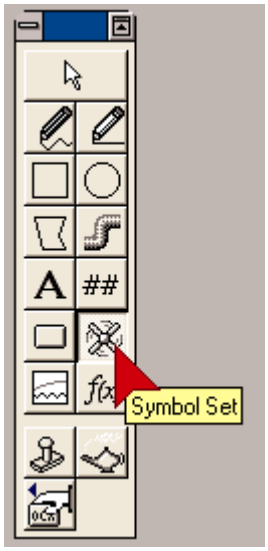


When Pump_1_M is true (in Auto) this button will now be disabled. The buttons appearance will be altered using the Embossed style to indicate that it is disabled. The tool tip will not be disabled.

Creating Graphics Pages, Configuring Symbol Sets

Next we need some indicators to tell us when the pump is on, off, auto or manual.

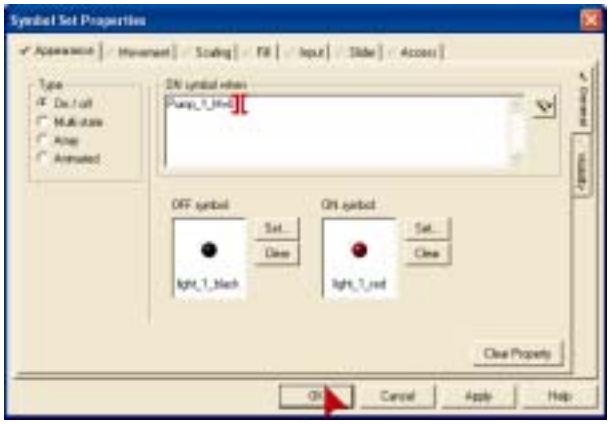
On the Toolbox **Click** on the **Symbol Set** Tool.



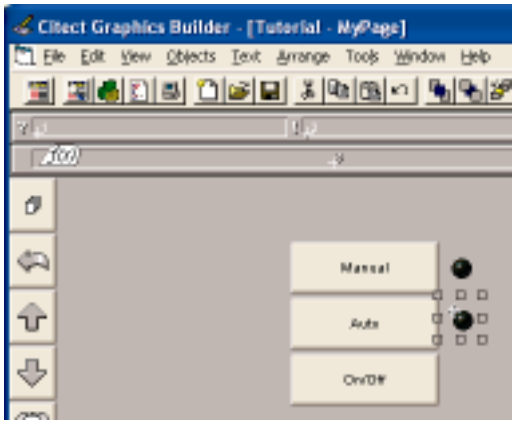
Creating Graphics Pages, Configuring Symbol Sets continued…

Place the cursor next to the Manual button, then **Click.**

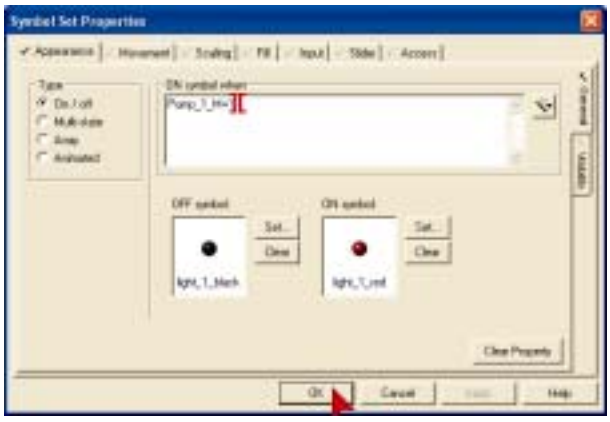
In the **ON symbol when** Edit Box **type Pump_1_M=0** then **Click OK**.



Copy the **Symbol Set** and place the new one next to the **Auto** button.
(Hold Ctrl, Hold Left Mouse button on object, move mouse).



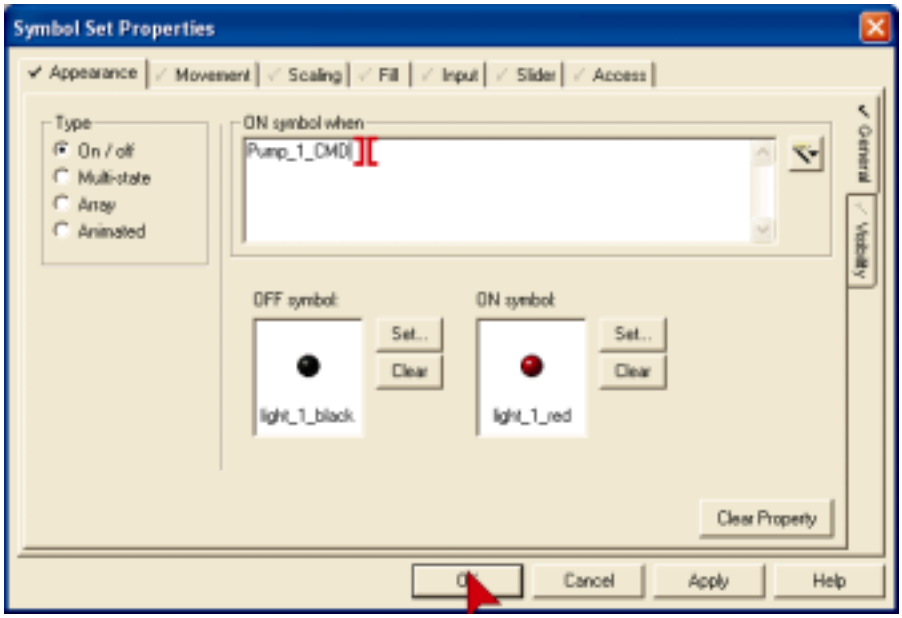
In the **ON symbol when** Edit Box **overtype** with "**Pump_1_M=1**" then **Click OK**.



Creating Graphics Pages, Configuring Symbol Sets continued…

Make a copy of the symbol set and position it next to the On/Off button.

In the **On Symbol When** Edit Box **overtype** with **Pump_1_CMD** then **Click OK**



At Runtime, when Pump_1_CMD = 1 the Red Light will be displayed.

Remember to save regularly. Press the Save button now.

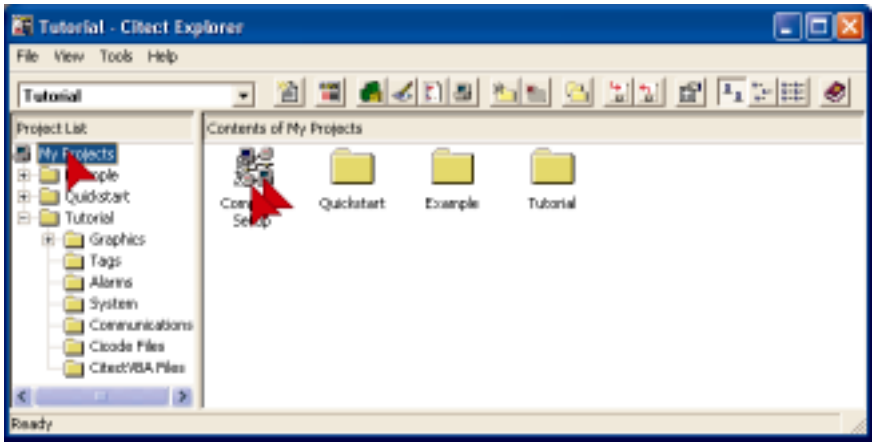
Testing Graphics Pages, Computer Setup Wizard

It's time to take a look and see how your page looks and feels to an operator.

First however, we need to run the Computer Setup Wizard to configure how you want this computer to run your project.

Switch to Citect Explorer (Alt + Tab).

In the Project List tree view **click My Projects.**
In the right hand pane, **Double Click Computer Setup.**



Check Express Setup then **Click Next**

Check Server and Display Client, then **Click Next**

Testing Graphics Pages, Computer Setup Wizard continued…

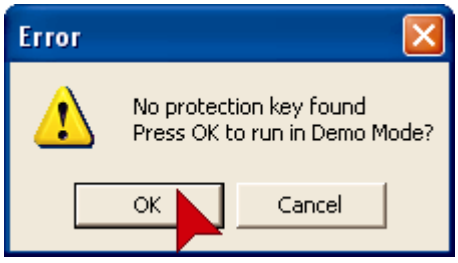
Click the **Project Name Drop Down** and **Click Tutorial**

For the next two screens just **Click Next** then **Click Finish**.

Testing Graphics Pages, Runtime

Press the Run button

If you have not inserted the protection key you will see the following message. Just **Click OK**.



If the runtime does not start, it is likely that there has been a compile error. Switch to the Project Editor and it will display a list of errors. Correct each one and then press the Run button again.

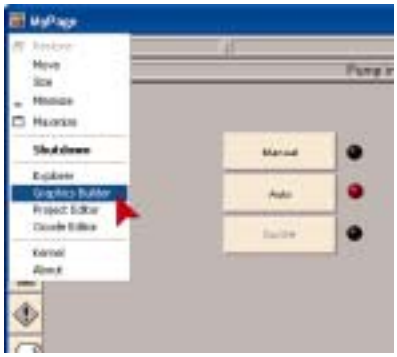
Testing Graphics Pages, Runtime continued…

The menu page is built automatically and is the first page you will see when runtime starts.

Click the **MyPage** Button

Click on the **Auto button** and check to see that the light turns red.
Move the mouse over the On/Off button and wait a couple of seconds to see that the tool tip appears. See what happens if you **Click** on the On/Off button. **Click** on **Manual**, then try **clicking** on the **On/Off** button again.

To switch from runtime back to Graphics Builder, press **Alt + Space** together
Then **Click** on **Graphics Builder**.



If you've made to this point, give yourself a gold star and take a moment to stretch your muscles.

Creating Graphics Pages, Precision Drawing

Next we're going to tidy up the appearance of the page. It is worthwhile to make your pages look good as it will encourage operators, to take a little more care and have more confidence in the system.

Making sure everything is drawn precisely, aligned correctly and evenly spaced helps to make your pages look professional.

First we need to select all the buttons. Place the cursor near one of the corners, **hold down** the **left mouse button** while moving the mouse to opposite corner, then **release** the **left mouse button**. ie; Lasso the buttons with the mouse.

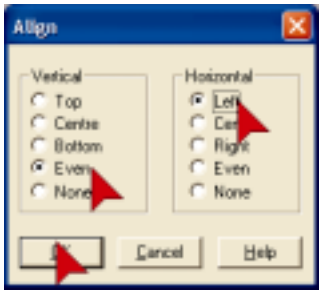
You can also select multiple objects by holding down the Ctrl Key, then clicking on each object that you want included in your selection.

On the menu, **Click** on **Arrange**, then **Click** on **Align**.

Notice that the Keyboard shortcuts are shown, next to the commands on the menu.

Ctrl +A for Align is worthwhile remembering as this is frequently used when building graphics.

In the **Vertical** section, **Click** on **Even**. In the **Horizontal** section **Click** on **Left**, then **Click OK.**



Using **Snap to Grid** can save you a lot of aligning. The nice thing with grids is that it forces objects to be placed in specific positions – but this is not always what you want. You can turn the Grid on and off quickly using the **F8** function key.

You can turn the zoom on and off quickly using the F10 key.

Creating Graphics Pages, Precision Drawing Continued…

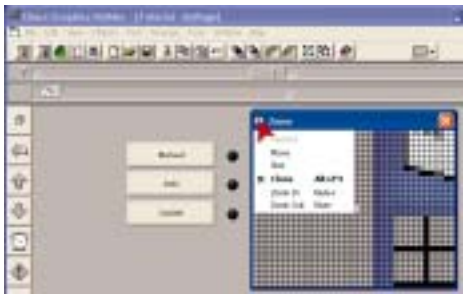
To align the lights you can use the same process, but first align one light with the center line of the top button and one light with the center line of the bottom button.

Click the the top button and the top light. Then Align – Vertical – Center.
Do the same for the bottom button and light.
Now select all the lights.

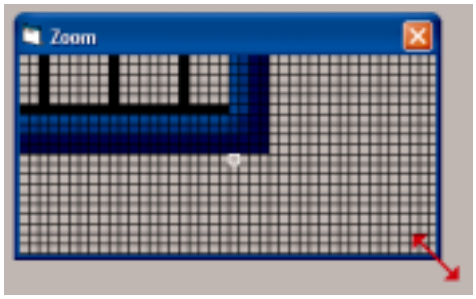
Use Align, **Vertical - Even**, **Horizontal - Left** to evenly space the lights.

You may notice that the lights are not perfectly in line with the center line of the buttons. This is because the hot spot or anchor point for this symbol is in the top left of the symbol rather than in the middle. To correct for this we will use the zoom and the nudge tools.

To make sure your objects are aligned or positioned perfectly you can use the Zoom tool. From the **Menu** select **View, Show Zoom**.



The zoom tool will display an enlarged view of the region around your cursor. You can alter the "magnification" by clicking in the top left corner of the zoom window



You can change the size of the zoom by placing the cursor over one corner until the resize cursor is shown, then hold down the left mouse button and move the mouse.

You can move the zoom window by placing the cursor on the title bar (the big blue bar at the top) then hold down the left mouse button and move the mouse

Creating Graphics Pages, Precision Drawing Continued…

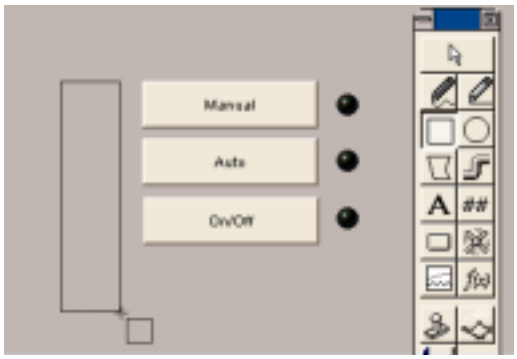
Select all the lights so that we can move them all at once. Place **cursor** above and to left of top button**, hold down left mouse button** and **move mouse**, then **release mouse** button.

You can precisely position the lights by placing the **cursor over** the **lights** (make sure the hand cursor appears) then press **Enter** (or hold down left mouse button), next use the **arrow keys** on the keyboard to move the buttons one pixel at a time in the direction that you want. Press enter again to set the position (or release left mouse button if you used that method). Close the Zoom window.

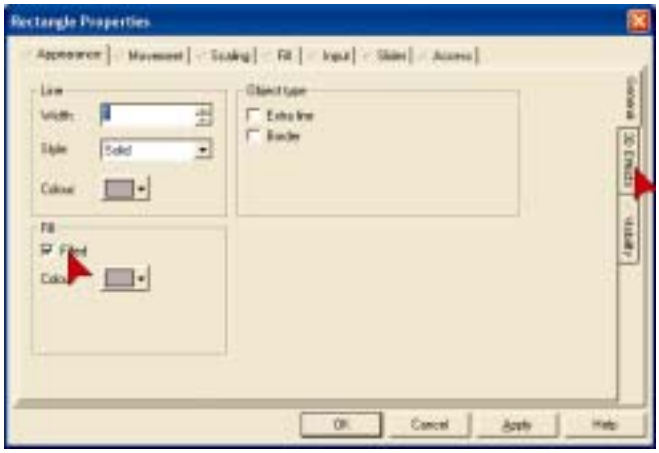
Creating Graphics Pages, Analog Indicators & Controls

Next you will create a bar (rectangle) indicator that will change height dynamically with the variable tag. You will place this inside a lowered 3D rectangle to make it look nice. You will place a bitmap next to the rectangle and make it operate as a slider control to adjust the value of the analog variable tag.

Select Rectangle Tool from the Toolbox. Place the cursor to the left of the Top button and draw a rectangle as shown. (Hold down left mouse button and move mouse).



When the **Rectangle Properties** dialog appears, **Click** on **Filled**.



Click on the **3D Effects** Tab on the right hand side of the dialog.

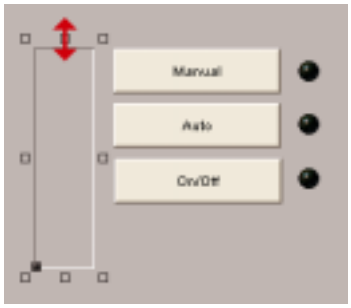
You can move the mouse in conjunction with the nudge tool to give you coarse control whilst using the arrow keys for fine control. Just remember not to move the mouse when you only want fine control.

Creating Graphics Pages, Analog Indicators & Controls continued…

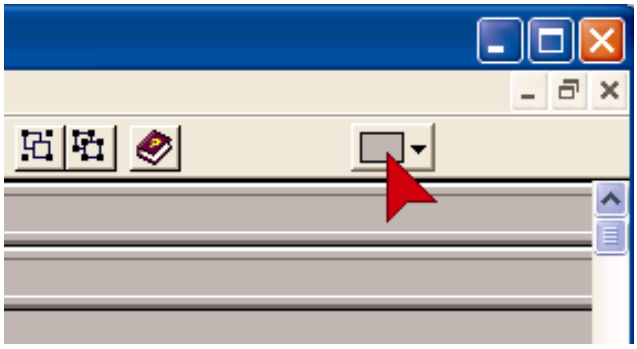
Click on **Lowered**.
Click OK.

Next use the Zoom and nudge to precisely position the Rectangle. You may need to change the vertical size to match the height of the buttons.

Place the **cursor** over the top (or bottom) center selection handle, when you see the cursor change to the **vertical selection arrows**, press **enter** to switch to nudge mode, then press the **up** or **down arrow** keys (on the keyboard) until the height is correct.



With the rectangle selected, **Click** on the **Palette button** on the **tool bar**.
Click on the **gray** as shown below.

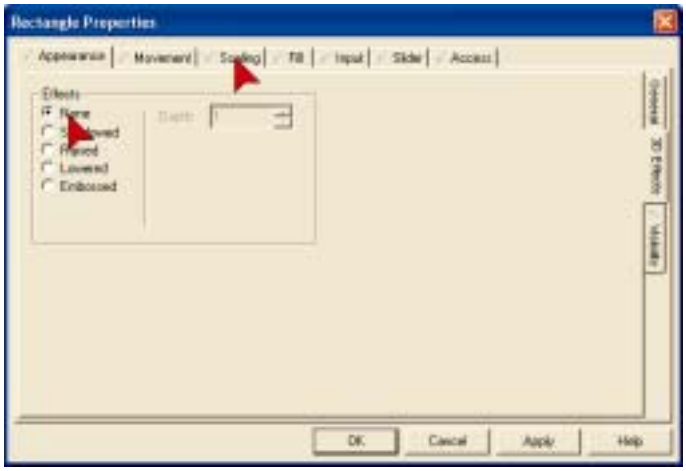


Creating Graphics Pages, Analog Indicators & Controls continued…

With the **Rectangle selected**, make a copy of the the rectangle. (**Press Ctrl + D**).

Double Click on the new Rectangle to open the property dialog.

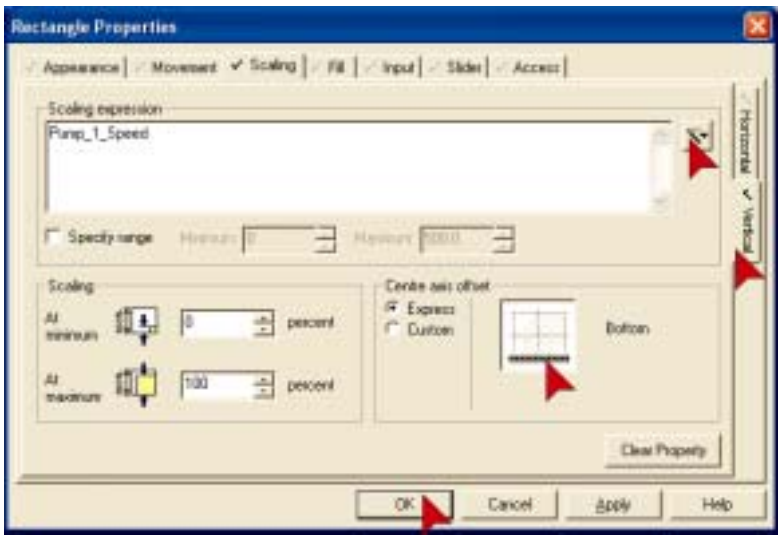
In the **Appearance** - **3Deffects** sheet, select **none**.
Click on the **Scaling** Tab.



Click on the **Vertical** Tab on the right hand side of the dialog.

Use the **Insert** button to insert the tag **Pump_1_Speed**.

In the **Axis** control box, **Click** on the **bottom** of the box as shown to anchor the scaling point at the bottom. **Click OK**.



Creating Graphics Pages, Analog Indicators & Controls continued…

With the new rectangle selected, **Click** on the **Color palette button** on the toolbar, then **click** on **bright red**.

Now position the new rectangle over the top of the first one.

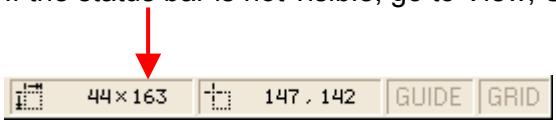
The easiest way to do this is to use the Align tool.
Select both rectangles. (**Hold** down **Ctrl** and **Click** on the original)
Press **Ctrl + A** (for Align).
Click the Vertical **Centre** radio button.
Click the Horizontal **Centre** radio button.
Click OK

Next we will create a slider to adjust the pump speed.

You will need to know the how far (in pixels) the slider needs to move. To find this out (make sure you still have the rectangle selected) take a look at the bottom right corner of the Graphics Builder.

The status bar will show you the width and height of the selected object. Write down the height of the rectangle.

If the status bar is not visible, go to View, Show Status Bar and click on it.

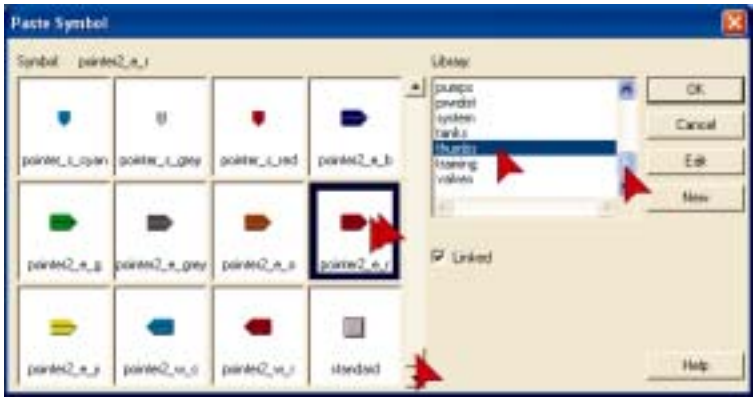


Creating Graphics Pages, Analog Indicators & Controls continued…

On the Toolbox **click** on the **Paste Symbol** tool.

Use the **scroll bars** to display the **thumbs library**,
Click on **thumbs** in the **Library** list box.

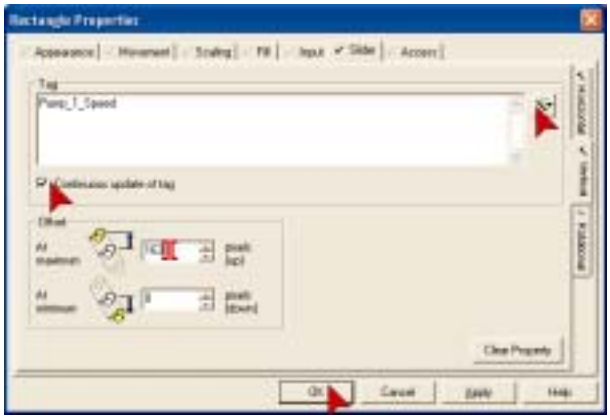
Use the **scroll bars** to locate **pointer2_e_r**,
then **Double Click** on **Pointer2_e_r**.



Position the pointer at the left bottom side of the red rectangle.
Double Click on the **Pointer Symbol** to open the Properties sheet.

Click on the **Slider Tab**, then **Click** on the **Vertical Tab** on the right hand side.

Use the **Insert** button to insert **Pump_1_Speed** tag.
Make sure **Continuous update of tag** is checked.
In the **At Maximum** edit box type the height in pixels that you wrote down earlier.
Click on OK.



Now is a good time for a regular page save. **Click** the **save icon**.

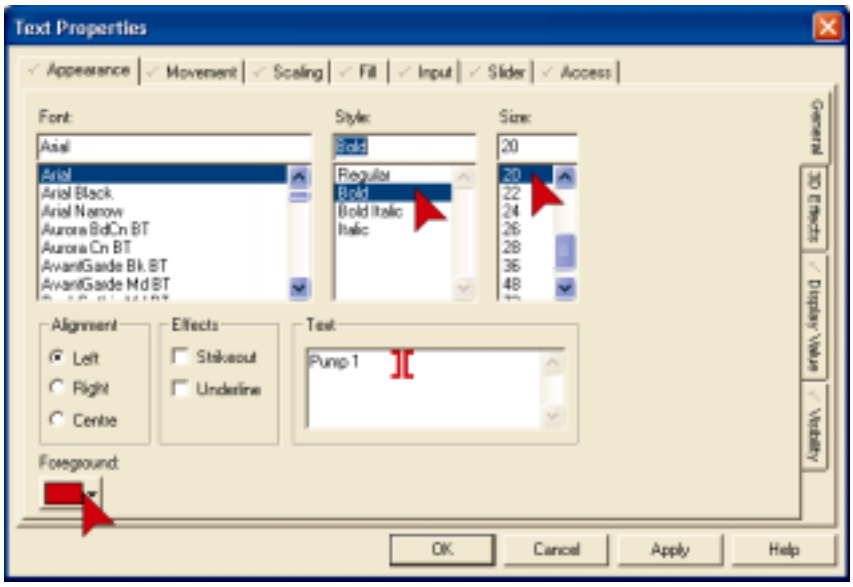
Creating Graphics Pages, Configuring Text

Now we will place some text above the buttons to label the controls.

Click on the letter **A** on the Toolbox.

Type **Pump 1.**
Note: If you do not see any keyboard echo as you type it is most likely because the currently selected color is the same as the background.

Place the cursor above the buttons and **click** to position the text.
Click Bold, Size **22** (point) and make sure the Foreground color is red.
Click OK.



Creating Graphics Pages, Configuring Numbers

On the **Toolbox**, click on the **number tool**.
Click below the **On/Off** button to place the number.

Use the **Insert** Button to enter the tag **Pump_1_Speed.**
Click OK.

The Number tool is actually the Text tool. When you access it via the number tool icon you are presented with the Display Value sheet instead of the General Appearance sheet.

Click on the **General** Tab on the right han
Set the font to **Bold**, **22** point.

Creating Graphics Pages, 3D rectangles

Next we'll add some cosmetics.

Draw a large rectangle that covers all the things you have drawn so far.

Set the Line color to **gray**, **Check** the **Filled** Check box and set the **Filled color** to **Gray** also.
Click on **3Deffects tab.**

Click Raised on the 3D Effects sheet.
Click OK.

Creating Graphics Pages, 3D rectangles continued…

Since it will be difficult to see your work with the large rectangle in front of it, we need to send it to the back.

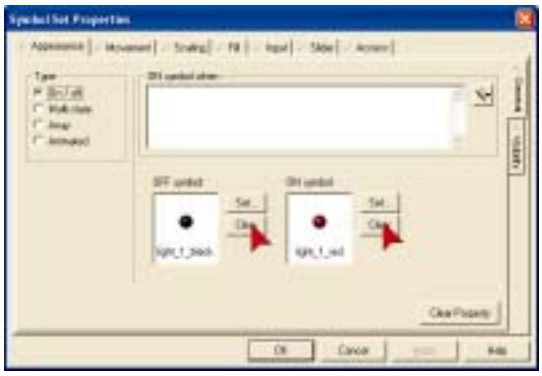
Click on the **Send To bac**k button on the **Tool Bar**.

Creating Graphics Pages, Pumps & Piping

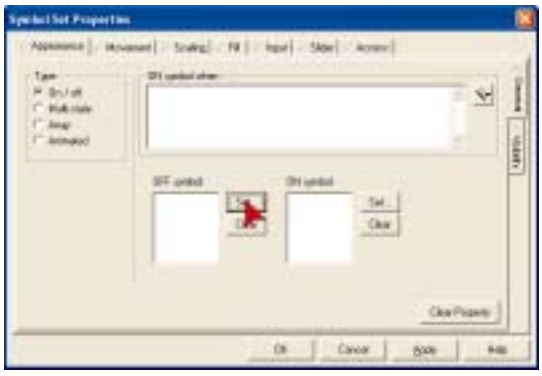
Next we will add a picture of the pump and some piping.

Click on the **Symbol Set** tool.

Click to the right and below the new rectangle to place the symbol set.
Click on both **Clear** buttons.

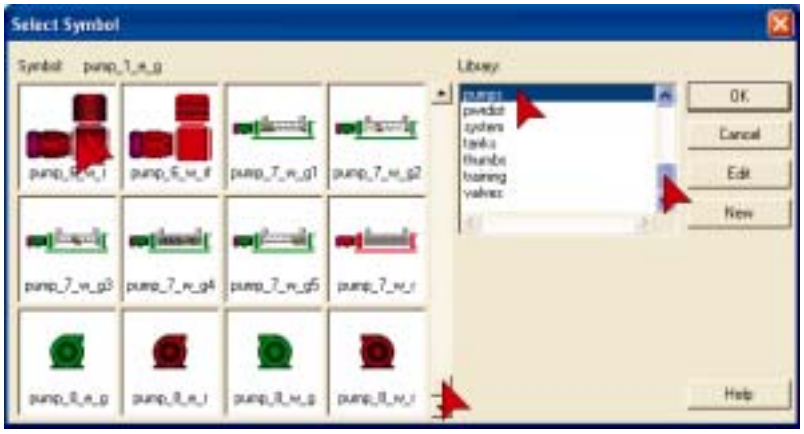


Click on the **Set Button** next to the **Off Symbol**: edit box**.**



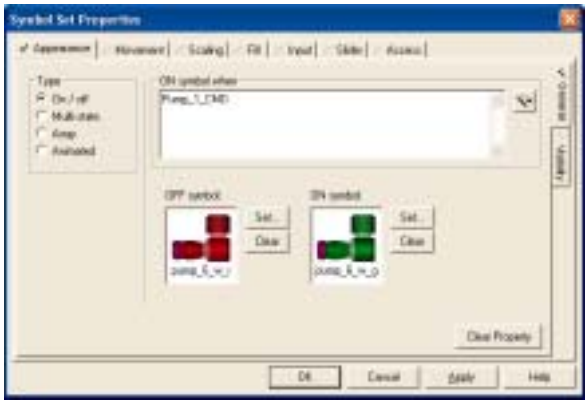
Creating Graphics Pages, Pumps & Piping continued…

In the **Library** box, use the **scroll bars** then **click** on **pumps**.
In the **Symbol** window, use the **scroll bars** to locate **Pump_6_w_r** then **Double Click** on it.

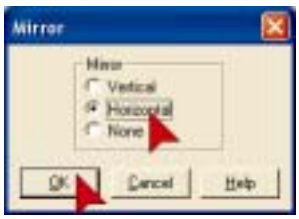


Click on the **Set Button** next to the **On Symbol**: edit box**.**
Using the technique above, locate **Pump_6_w_g** then **Double Click** on it.

Use the **Insert** button to insert the tag **Pump_1_CMD**
Click OK



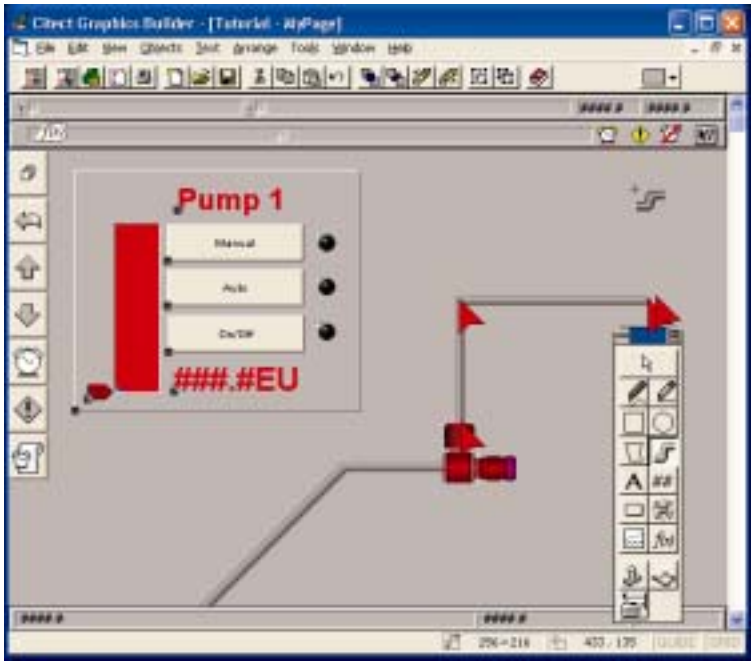
In this case we will want the pump flipped horizontally.
Make sure the pump is selected.
Click Arrange on the **Menu**, then **Click Mirror**.
Click on **Horizontal** then **Click OK**.



Creating Graphics Pages, Pumps & Piping continued…

Click on the **Pipe Tool** on the **ToolBox**.

To draw the top pipe.
Hold down the **Ctrl Key**. (It will keep your pipes constrained to be either horizontal and vertical).
Place cursor on top of the Pump, hold down left mouse button and move mouse up.
Release mouse key when you have moved up far enough.
Move mouse to the right and **Double Click** to end the pipe.
Release the **Ctrl Key**.
Click on **OK** to close property dialog.



To draw the lower pipe.
Place **cursor on pump**. **Hold down Ctrl Key**.
Hold down **left mouse button**. **Move mouse** to left then **release mouse button**.
Move mouse to **45 Degree** position. Move the mouse slowly until you see the pipe click into the 45 degree position then **Double Click** to end the pipe.

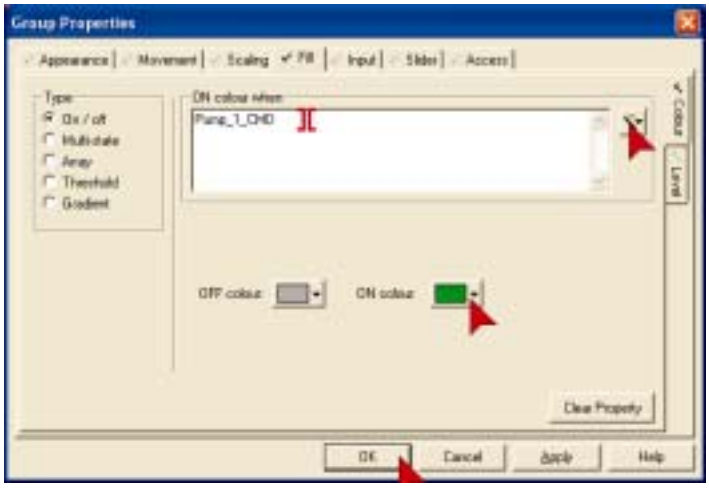
Creating Graphics Pages, Pumps & Piping continued…

Select both pipes.
Hold down the **Ctrl Key**. **Click** on each pipe. **Release** the **Ctrl Key.**

Click the **Group** button on the **tool bar**.

Click the **Send To Back** button on the **tool bar.**

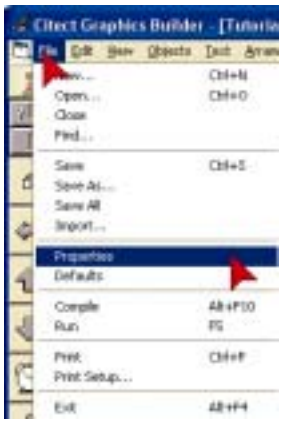
Double Click on the **pipe** that you have drawn.
Click on the **Fill** Tab.
Insert Pump_1_CMD tag into the **ON color when** edit box.
Make sure the **Off Color** is gray. Make sure the **On Color** is Green.
Click OK.



Creating Graphics Pages, Change Background Color

Finally, we will change the color of the background.

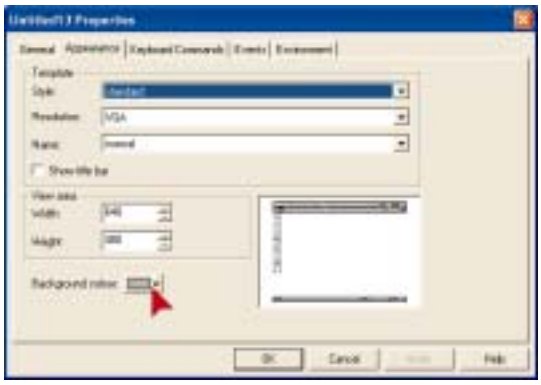
Click on **File**, then **Click** on **Properties**.



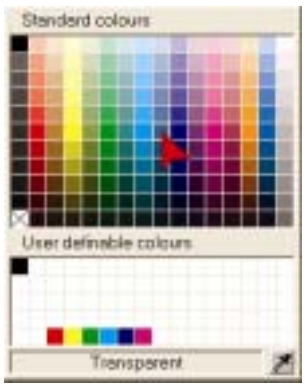
Creating Graphics Pages, Change Background Color continued…

The properties dialog will be displayed. On the General Tab you can set the Window title and other properties of the page. **Click** on the **Appearance** Tab to access appearance properties.

Click on the **Background Color** drop down.



Click on the color shown below. (If you choose a different color some items you will configure later on may not be visible or stand out very well).

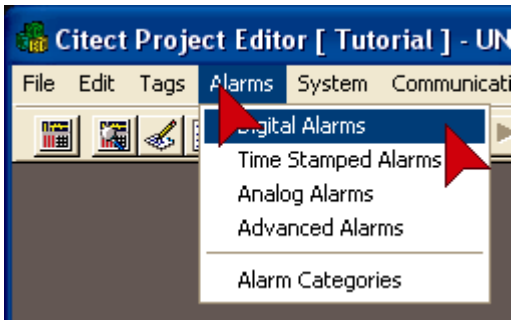


Click OK to close the properties dialog and apply the changes.
Now is another good time to save your page.

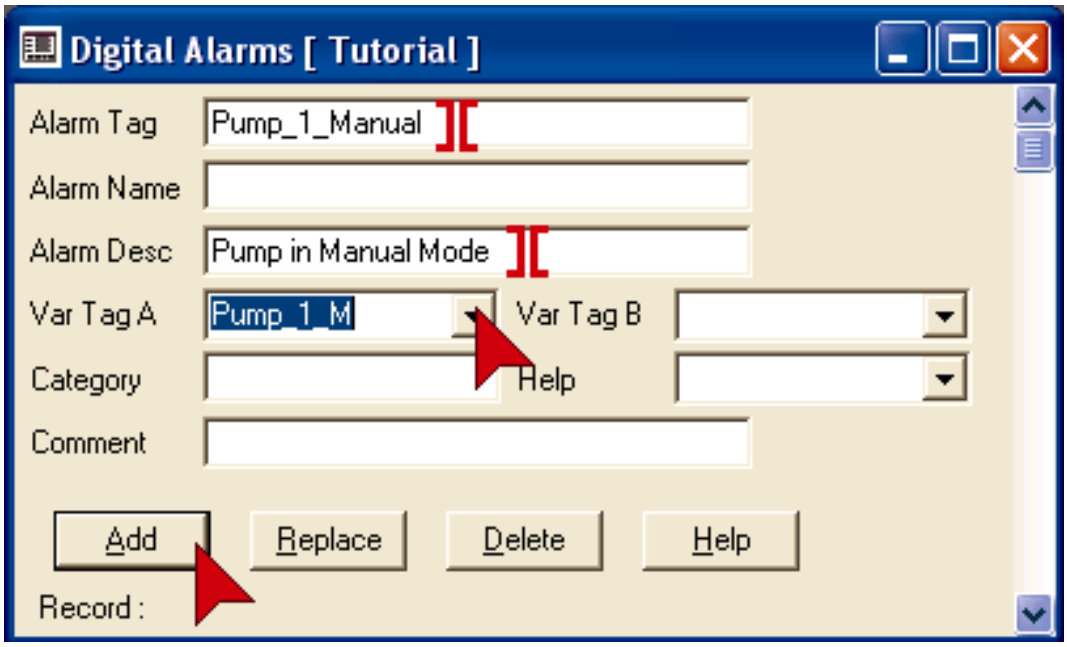
Configuring Alarm

Switch to Citect **Project Editor** (**Click** on the icon or use **Alt +Tab** keys).

On the **Project Editor** Menu, **Click** on **Alarms** then **Click** on **Digital Alarms**



Fill in the **Digital Alarms** form as shown below. Remember it is better to use the drop downs to ensure data is entered correctly. When the form is complete press **Add**.

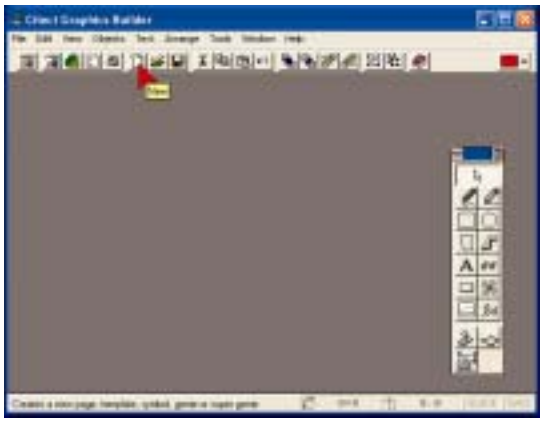


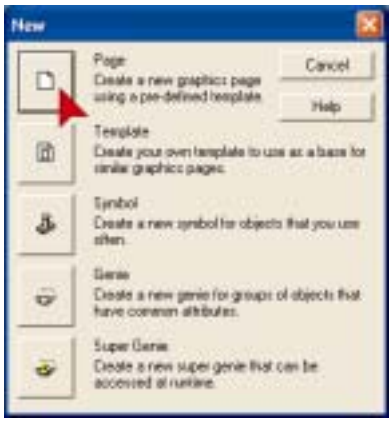
Click on the icon to close the Digital Alarms dialog.

Configure an Alarm Display Page

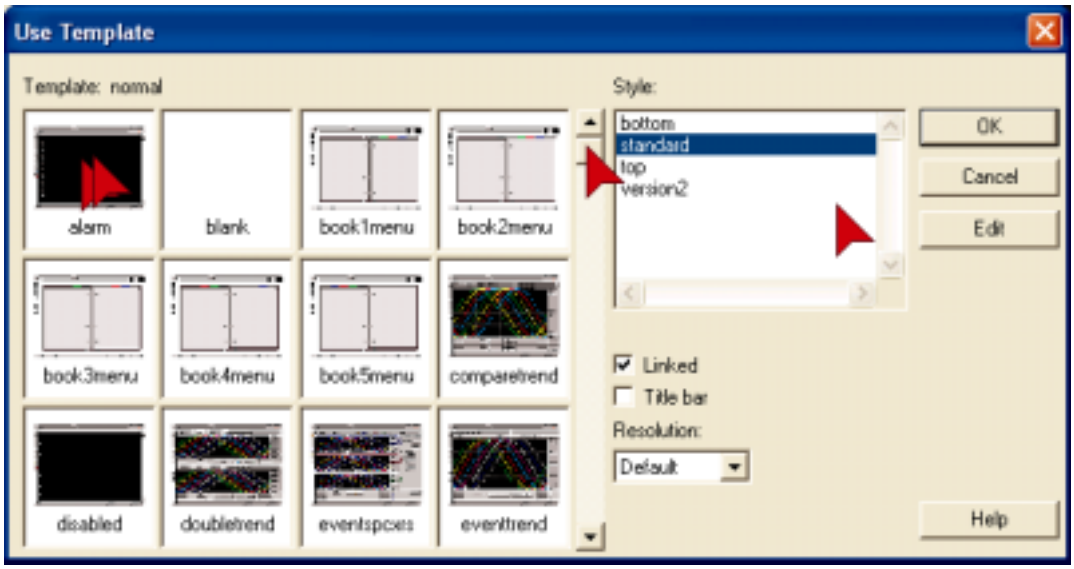
Switch to the **Citect Graphics Builder** using the icon or Alt + Tab keys.

Click on the **New** icon. When the New form appears click on the **Page** button.



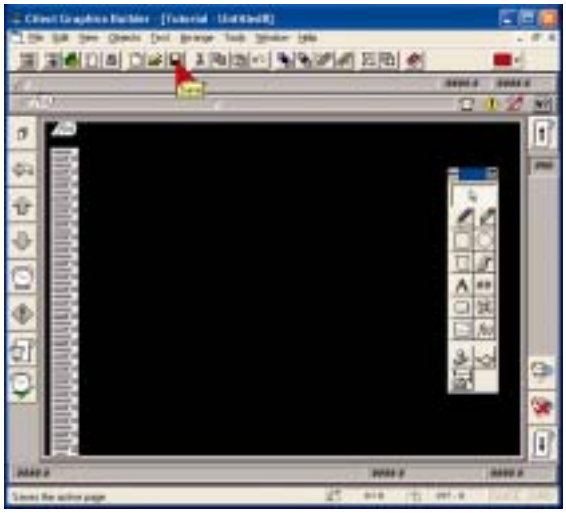


On the **Use Template** dialog, use the scroll bar to **scroll up** to the **Alarm** Template, then **Double Click** on the **Alarm** Template.

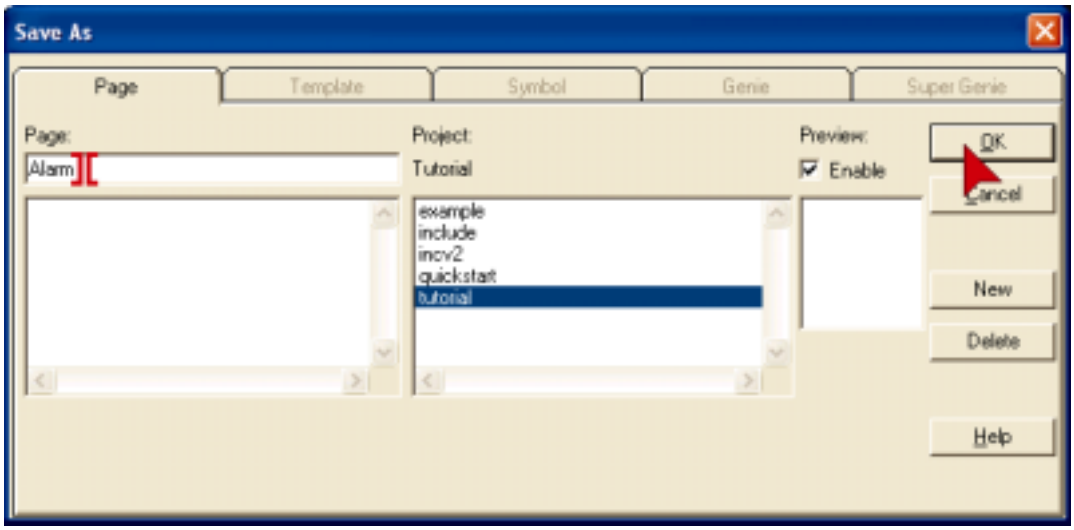


Configure an Alarm Page continued….

When the **alarm** template appears **click** on the **save icon**.



In the alarm **Save As** dialog, type **Alarm** in the **Page:** edit box, then **Click OK.**

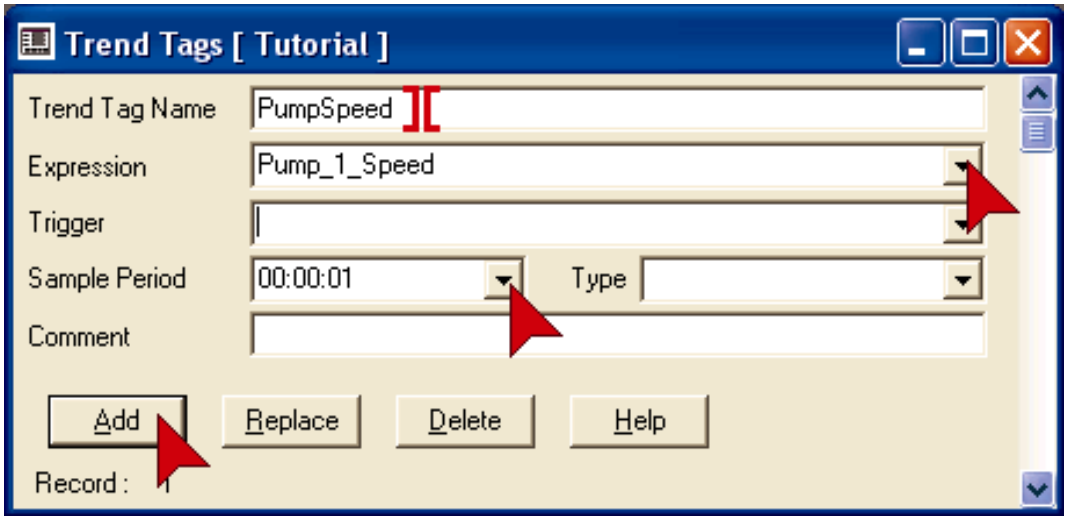


Configuring Trends

First we need to configure a trend tag to store trend data.
Switch to Citect Project Editor (Click on icon or use Alt +Tab keys).

On the Project Editor Menu, **Click** on **Tags** then **Click** on **Trend Tags**

Fill in the Trend tag form as below then **click Add**. Remember to use drop downs where possible.



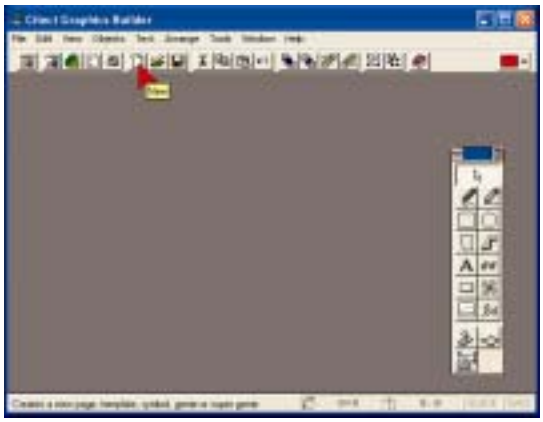
There are many more trend features available in Citect. Press F2 with this form open to see some of the advanced possibilities. Pressing F2 again will return you to the basic menu's.

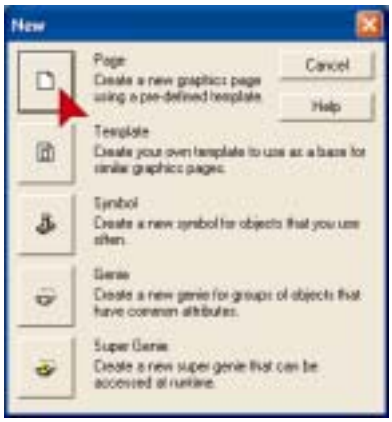
Click on the icon to close the Trend Tags dialog.

Configure a Trend Page

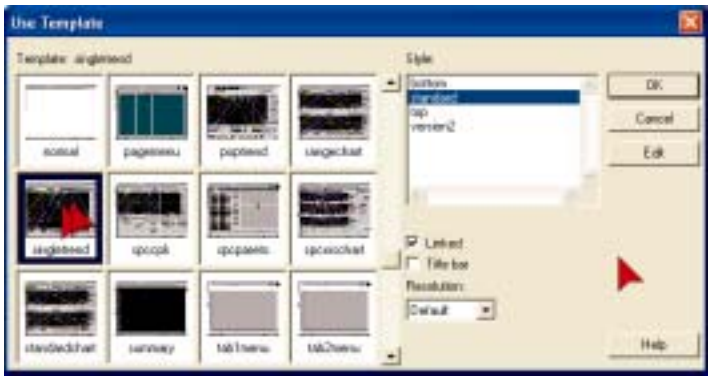
Switch to the **Citect Graphics Builder** using the icon or Alt + Tab keys.

Click on the New icon. When the New form appears click on the Page button.

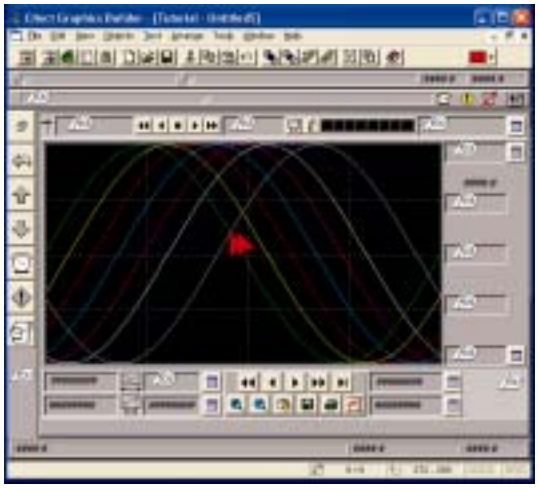




Double Click on the **singletrend** template

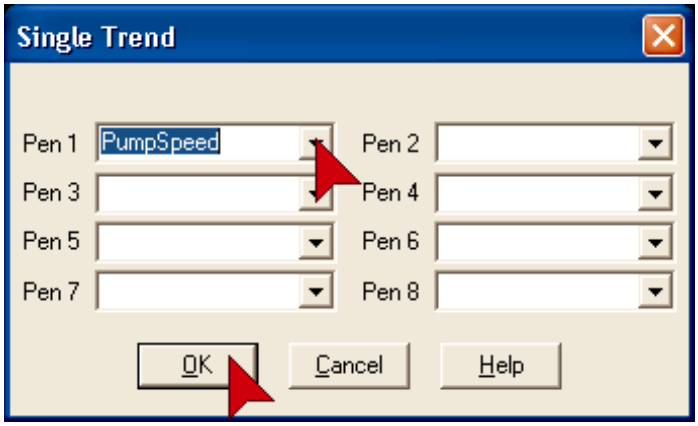


Double Click anywhere on the Trend Template



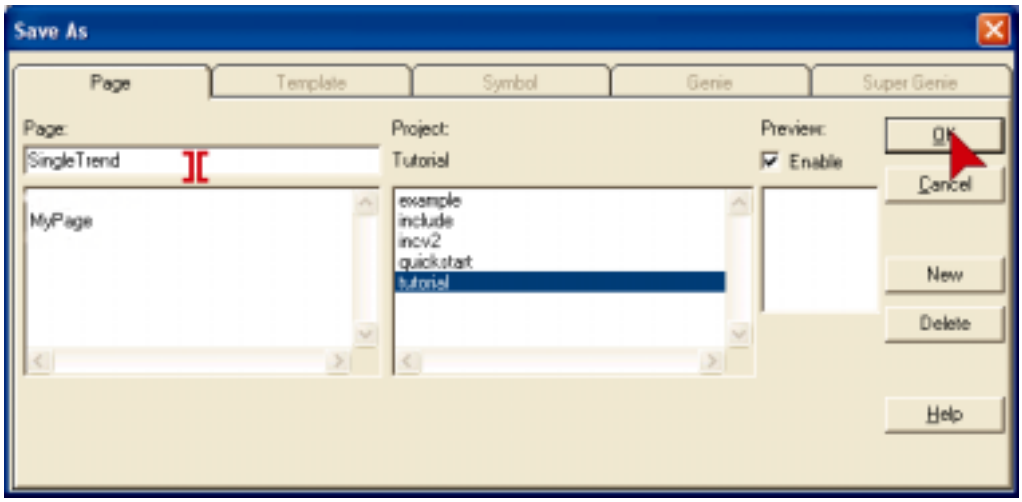
Configure a Trend Page Continued…

Click on the **Pen 1 drop down** as shown below and select Pump Speed from the list then **Click OK**.



Click on the **Save** Icon to save the Trend page.

In the Page edit box, **Type** in **SingleTrend,** then **Click OK**



Use the back button at runtime to go back through the pages that you have visited.

Runtime

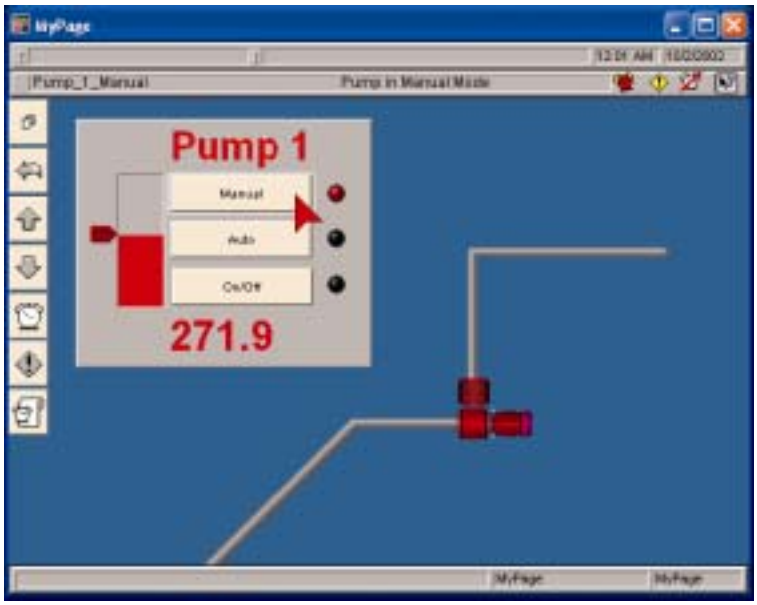
Now it's time to run your project and test it to make sure that you have completed the tutorial correctly.

Click on the **Runtime** Icon.

Click on the button called **MyPage.**

Click on **Auto** button then **Click** On Manual.
Click On/Off.
You will see that both pipes change color as the group properties will be applied to everything in the group.

You will also see an alarm is generated. The Alarm clock will rock back and forward.
Click on the **Alarm clock** to view the Alarm page.



Runtime continued…

You can acknowledge individual alarms by clicking on each alarm.

Click the button to go back to MyPage.

Place your cursor on the Pointer. Hold down the left mouse and move the mouse up and down. The red bar should change it's height in line with the pointer movement.

Click the button to go to the menu page.

Click on the SingleTrend Button.

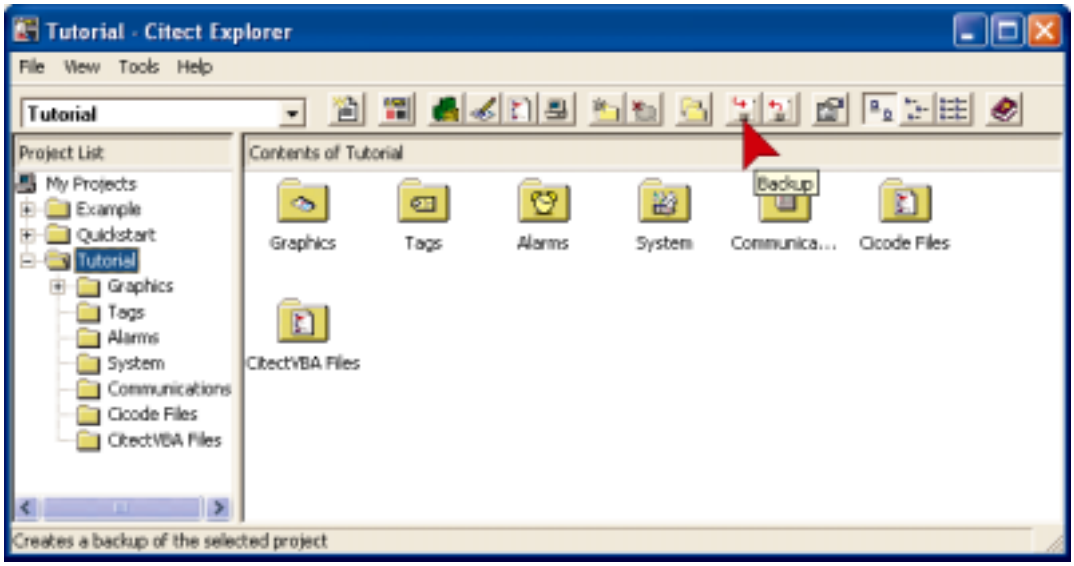
You should see the trend of the Pump Speed. Take some time to familiarize yourself with the buttons on the trend page.

Backing Up Your Project

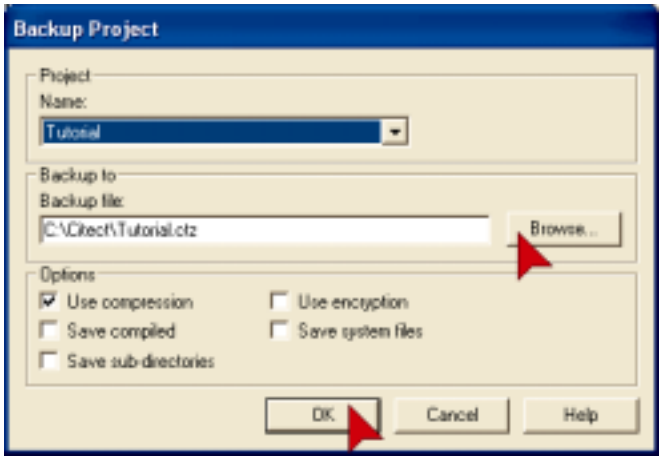
It is important to keep backup copies of your project, so that you can always recover from a disaster with minimum effort.

Make sure you are in the Citect Explorer. (Click on the icon or use Alt + Tab).

Click on the **Backup** Icon.



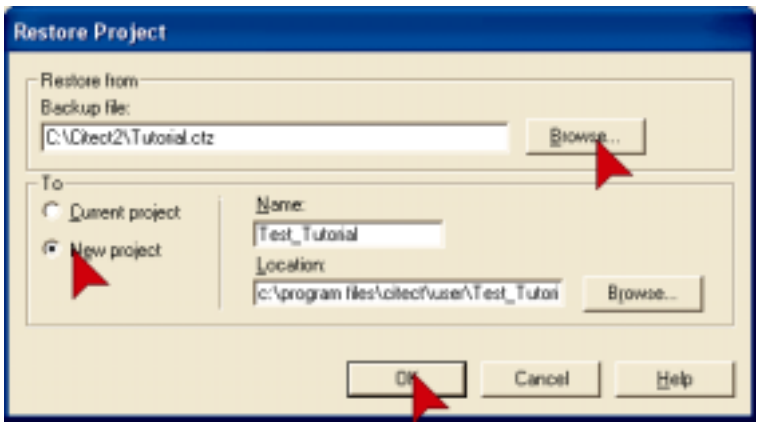
Use the **Browse** button to locate a directory where you want to save your files. Alternately you can type the directory and filename into the **Backup File:** edit box. If the directory does not exist Citect HMI/SCADA will automatically create it for you when it saves the file. **Click OK** and when the Backup Complete message pops up, Click OK on that also.



Restoring Your Project

With any software, it is good practice to check and make sure you can restore from your backup copies. It is a very rare to experience problems restoring from a backup but the time taken to check is a tiny fraction compared to the time it would take to recreate the project from scratch.

Click on the **Restore** Icon (it is next to the backup icon) or on the **menu Click Tools** then **Restore**.



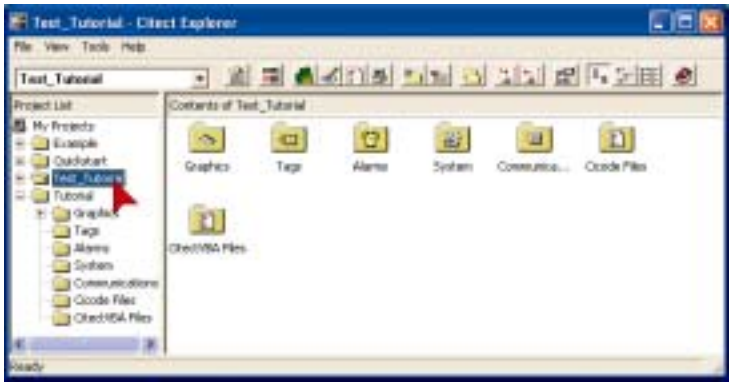
Click on the **Browse** button to locate your backup file.

We will restore to a New project, test it, then delete it, as this is a much better test than restoring over the existing project and less chance of anything going wrong (eg; what if the power fails half way through restoring over the top of your existing project and your backup has a fault in it?).

Make sure **New Project** is checked.

In the **Name:** Edit box type a name for the new project eg;**Test_Tutorial** then **click OK**.

When the restore is completed (Click OK on the Restore Complete Dialog), **Click** on the **Test _Tutorial** project to switch to that project.



Restoring your project continued…

Click on the **Citect Runtime** icon to make sure the project will compile and run, if it does then you can have confidence that you have a good backup.

To delete the **Test_tutorial** project, **Click File** on the Citect Explorer menu, then click **Delete Project**.

Congratulations! By now you should have a basic working knowledge of CitectHMI/SCADA software. If you are keen to build your level of competency we recommend that you attend a Citect Training Course. Details of training courses can be found at www.citect.com or by contacting your local Citect office or distributor.

Troubleshooting.

If you experience results that are different to what you see in the tutorial…

1. Go back and double check what you have done. Most likely you have done something different from the instructions.
2. The tutorial largely assumes Citect HMI/SCADA is freshly installed and default settings haven't been changed. By taking a closer look at the screens in the tutorial you may be able to identify any differences.
3. If problem is in Runtime, shutdown runtime and restart it.
4. Read the On Line Help. Most dialog boxes have a help button that provides context sensitive help with just a mouse click.
5. Read the CitectHMI/SCADA knowledgebase. This is available on the CitectHMI/SCADA software CD or from our website www.citect.com.
6. Worst case, start again, just create a new project and call it tutorial2. The upside to this is the extra practice will make you more proficient.

If nothing appears to happen when you press a button, do not press it repeatedly in the hope that something will happen – chances are your PC is busy trying to do what you've asked it to do.