PcVue LET'S ENGINEER



PcVue
SUCCESS STORIES

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SUCCESS STORY

LARGE HADRON COLLIDER AT CERN

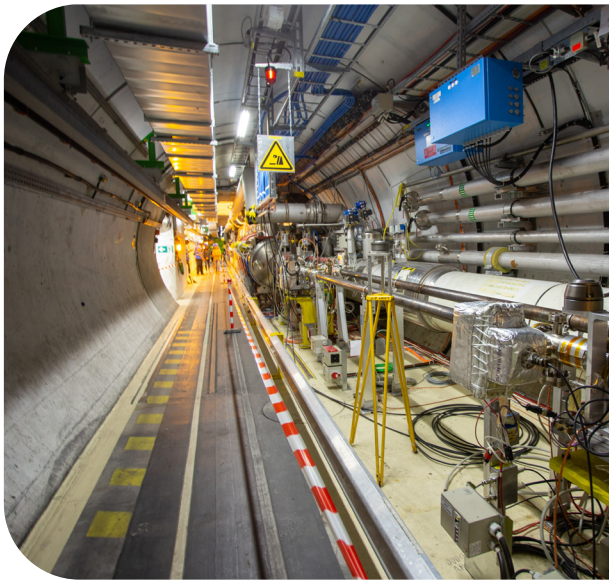
PcVue platform manages thousands of safety alarms while handling a continuous growth of the application.



CERN, the European Organization for Nuclear Research, is one of the world's largest and most respected centers for scientific research. Its business is fundamental physics, finding out what the Universe is made of and how it works. At CERN, the world's largest and most complex scientific instruments are used to study the basic constituents of matter - the fundamental particles. By studying what happens when these particles collide, physicists learn about the laws of nature.
The instruments used at CERN are particle accelerators and detectors. Accelerators boost beams of particles to high energies before they are made to collide with each other or with stationary targets. Detectors observe and record the results of these collisions. Founded in 1954, the CERN Laboratory sits astride the Franco–Swiss border near Geneva. It was one of Europe's first joint ventures and now has 20 European member states.

THE PROJECT

In 1994 CERN approved one of the most ambitious scientific projects of our era: the creation of the greatest and most complex particle accelerator in the world, the Large Hadron Collider (LHC), at a cost of nearly €7M ($9.5M USD). With this tool the researchers are intent on studying the elementary particles that make up matter, but also anti-matter, by recreating the initial conditions of the Big Bang, with the objective of clarifying the mystery of the creation of the universe.
The accelerator consists of a ring 27km (17 miles) in circumference at a depth of 100 meters (325 ft.) below the Franco-Swiss border. In the year 2000 CERN launched a competition for a contract for a higher-performance safety system for the accelerator.



BUSINESS OBJECTIVE

Safe operation of the Large Hadron Collider

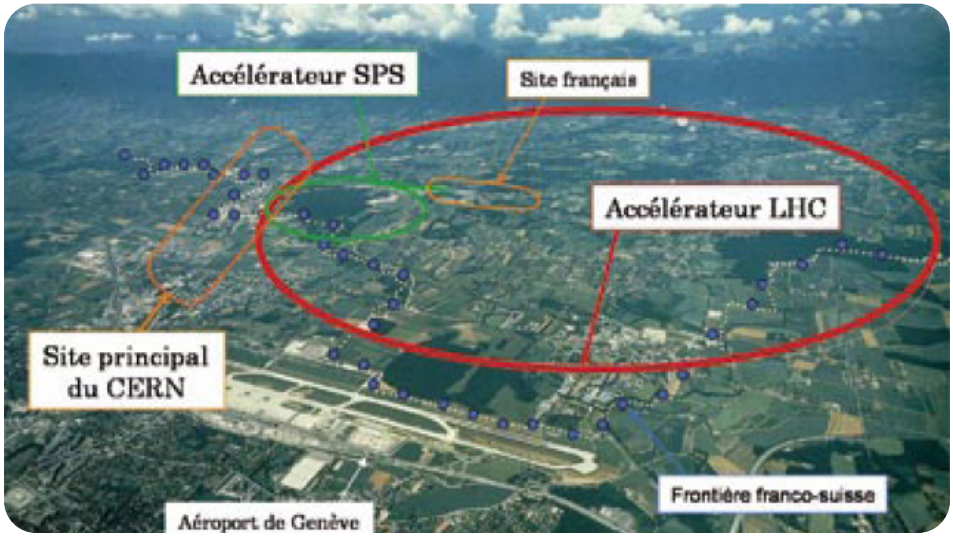
Eventually SPIE, a European leader in electrical, mechanical and HVAC engineering, energy and communications systems, chose PcVue, a SCADA software from ARC Informatique for its flexibility to suit the specific requirements at CERN.

DYNAMIC SUPERVISION

The implementation of a supervisory system across such a geographically distributed site is complex and the degree of difficulty is heightened by the need for continuous development.
This requires an on-line database to be available to handle an increasing number of data variables. Thanks to the collaboration between ARC Informatique and SPIE, an innovative solution has been developed for a system able to be updated both dynamically and independently.
The applications extract the required information from a database of around 300,000 variables stored in Oracle.
Scientists working at CERN come from all round the world, hence another aspect that illustrates the dynamic nature of the supervisory system is the use of workstations with multilingual capability.
PcVue was able meet the necessary specifications to reach Safety Integrity Level 2 (SIL2) for the IEC 61508 standard of secure operation.

MANAGEMENT OF THE ALARMS

The LHC project required the implementation of a central control room such that all of the supervisory terminals for CERN's 3 accelerators are in one location and able to monitor all safety related alarms. The alarms, managed by 2 file servers, are arranged in 4 levels of priority. Overall there are around 21,000 alarms that can be sent to the control room.
Management of the alarms results is particular important due to the layout and dimensions of the whole installation so it is seen as vital to implement the most efficient supervisory system possible.
The supervisory system is a fundamental element of the project but the most complex part to implement has been a redundant network for alarm management. This redundant TCP/IP network connects the various LSACs (Local Safety Alarm Controller) for automatic display of alarms in the 33 different safety zones and the SAMC (Safety Alarm Monitoring Center) with its data acquisition file server.
Each of the safety zones has 2 redundant PLCs for acquiring the alarms. These have been installed with touch-screen Panel PCs that act as PcVue clients with the same functionality as the central stations. The alarm management system was already operational before the LHC system was activated.
Everything is measured, published and archived, from curves of gas detection in the buildings to transmission times for the alarms. The criticality of the system further requires no more than 100 minutes of downtime a year. Given the importance of the application, everything has to be flawlessly under control.



KEYS TO SUCCESS

- Manage one or several buildings in a centralized and cohesive manner
- A centralized control room connected to 33 local alarm monitoring centers
- Manage 300,000 variables for a dynamic list of equipment
- Manage 21,000 alarms
- Accommodate multiple languages
- Achieve 99.98% reliability

RESULTS

The solution with PcVue meets the specification to reach Safety Integrity Level 2 (SIL2)



SUCCESS STORY

GRENOBLE ALPES UNIVERSITY HOSPITAL

Adeunis and ARC Informatique join forces to create a building management system solution (BMS) integrating the IoT universe at the Grenoble Alpes University Hospital.



Two recognized player in IoT technologies are integrating their solutions to achieve unprecedented IoT equipment integration with an existing Building Management System (BMS) using LoRaWAN technology at the heart.
The Grenoble Alpes University Hospital´s technical teams wanted to be able to instrument and control various equipment quickly, inexpensively and without cabling (Ethernet and power). The Grenoble Hospital asked Adeunis and ARC Informatique the question of how to best solve this operational challenge.
In addition, the Hospital expressed the wish to do this with their existing BMS software without adding additional software layers.

PcVue supervision published by ARC Informatique, is the BMS in charge of managing two of the Hospital´s sites, the GTB and the GTE site.
The first step, of this project consisted of a LoRaWAN radio coverage study of the site. This study, done by the Adeunis team, who are experts in this field, made it possible to identify the best location of the LoRa antenna, to ensure the zones (floors, buildings, parking, etc.) are correctly covered to allow desired positioning of the Adeunis® IoT sensors.The LoRaWAN architecture makes it possible to set up a private network, specifically in indoor and deep indoor configurations, while taking advantage of the radio coverage of LoRaWan´s «Long Range» network. Indeed, only one antenna at the top of a building (15th floor) can cover almost all buildings on the site but also reach a second site about 6kms away. The cost of the network infrastructure is therefore very small when compared to a WiFi solution.
After the preparation and installation of the LoRaWAN infrastructure by the Adeunis team, the Adeunis® «PULSE» IoT sensors were installed to measure water meter readings on numerous external locations of the Grenoble University Hospital. Other sensors detect drifts in temperatures in sensitive locations such as drug storage areas.

The integration of the LoRaWan network at the heart of the GTB PcVue solution allows feedback from sensors used with the existing BMS supervision. The «raw» data of the sensor (Temperature, On / Off) is enhanced by the power of PcVue to enrich and treat this data including, creation of threshold, alarms, mimic, curves and archiving.
Integration of IoT equipment maintenance data is also implemented with monitoring of remaining battery life of sensors and sensor position in the building.
This project thus provides the operator with significant savings both in commissioning and in operation of the Hospital facilities. Furthermore, the installation of the LoRaWAN infrastructure allows development of many new services through additional sensors integrated with PcVue´s data treatment features.

In conclusion, these GTB hybrid solutions, allowing both the control of standard automation equipment and simplified instrumentation thanks to the use of Adeunis® IoT technologies, are clearly part of a modern and innovative approach.
This technological partnership between Adeunis and ARC Informatique will solve many use cases in other sectors such as infrastructure, water, environment or the industry of the future, sectors where these two players have already acquired strong expertise.





SUCCESS STORY

THE LOUVRE BUILDING MANAGEMENT SYSTEM

Solution with PcVue reaching up to 30% energy savings.



The building's owner SFL (Lyon Property Company) recently undertook extensive renovation of the Louvre office space. An efficient BMS was needed to enable the company to monitor and operate the 37,000m2 (400,000 ft2) building.
The objective is to allow energy consumption to be reduced by 20% to 30%. This building dates from 1852 and is situated opposite the Louvre Museum in Paris.
It was built at the direction of French emperor Napoleon III and was initially used for shops. Today, the first two levels of the Antique Dealers' Louvre contains over 250 shops in 10,000 m2 (108,000 ft2) including 30 artistic specialty shops with artifacts from Europe, Asia and the Middle East.
Six upper floors are dedicated to the business Center called The Business Louvre (Louvre des Entreprises) which has hosted prestigious tenants since 1990, including the Ministry of Finance, the U.S. Embassy and the Bank of France.

The PcVue supervision monitors various equipment including:

- France Energie heat pumps with KARNO OEM regulators; in all, 1,200 heat pumps will be monitored.
- Lighting with ACELIA infrared multi-sensor modules.
- Blinds with ACELIA modules for 230V motors.
- THERMOKON remote controls for centralized control of heat pumps, lighting and blinds.
- Data acquisition from divisional panels on several levels, via Johnson Controls FX15 PLCs.



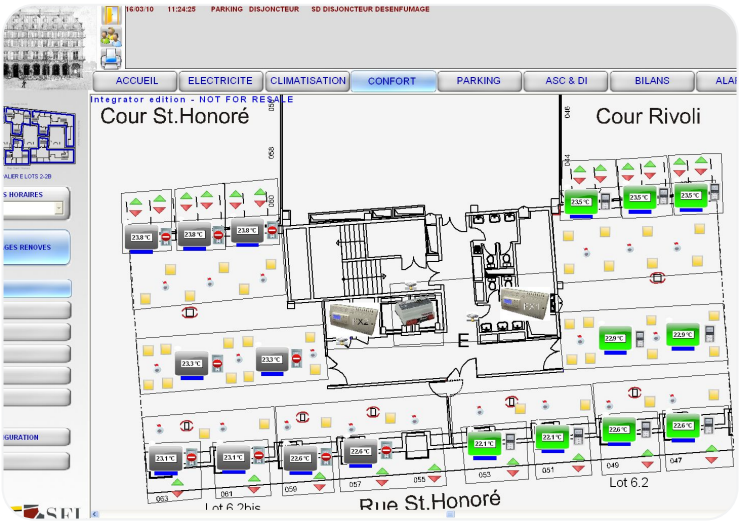
BUSINESS OBJECTIVE

- Monitor and operate a 37,000 m2 (400,000 ft2) building efficiently
- Reduce energy consumption by 20% to 30%

This architecture uses LonWorks® technology and is complemented by:

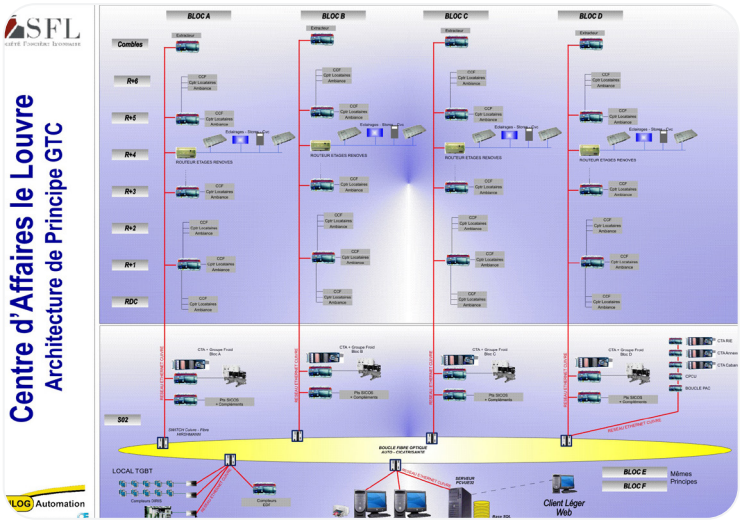
- Supply equipment: air conditioning units and substations for electrical regulation and distribution, controlled via TREND IP devices.
- All of the tenants' meters and the central low-tension boards: PcVue processes and analyzes data from some 250 meters on Modbus.
- A TSX PLC supports management of the backup supply (GE).

The scope of the project will comprise over 2,500 LonWorks® nodes.
The BMS architecture consists of 36 Loytec L-INX servers, 3 PcVue supervisory stations with WebVue thin-client access via Internet/intranet and NL Facilities from Newron System (using the Monitoring and Zoning version for surveillance and subdivision of areas).
Together with PcVue's flexibility and advanced technology, APILOG AUTOMATION was able to achieve open systems integration of the hardware and software. The solution provides for management of all of the building's equipment and quick response times in case of emergency. It exhibits easy-to-use, effective behavior that affords quick control of each area while allowing for dynamic reconfiguration.
This application is outstanding for its management and optimization of energy consumption, meeting expected energy savings in the order of 20% to 30%.



KEYS TO SUCCESS

- Integration of all building equipment and control panels using a variety of communication protocols including 2,500 LonWorks® nodes
- Remote access to graphical screens



RESULTS

Solution with PcVue results in energy savings up to 30%

PcVue platform allows rapid control and dynamic reconfiguration of each building area enabling quick response to emergencies

SUCCESS STORY

PASSIVHAUS STEFFEN

Optimized energy performance of an ultra-low energy building using PcVue.



This trend-setting building is a clinic for physical therapy. It also houses the offices of the builder, Steffen Holzbau. All of the efficiency systems are monitored from a PcVue BMS system with remote WebVue access linked to BACnet controllers and communication.

As a specialist in design of wooden buildings, Steffen Holzbau planned and built the facility in cooperation with Sanichaufer based in Luxembourg - where the building is situated - and the contractor GIGA-Automation of Saarbrücken in Germany. GIGA-Automation is a PcVue Solutions Certified Partner which provides integrated building management systems (IBMS) in Germany and Luxembourg.
The BACnet network was developed to rigorous specifications: PcVue for the operator workstation and control system, DDCs from SAIA Burgess with native BACnet communication and a Menerga Control System for the swimming pool and therapy controls.



The building conforms to the Passivhaus standard for energy efficiency with minimum ecological footprint. The clinical and administrative areas have been optimized for ultra-low energy usage across several kinds of heating and cooling.
Two central ventilation systems provide sterilized air to both areas. The cooling and heating plant uses special convector systems built into the floors and arranged in front of the window surfaces.

BUSINESS OBJECTIVE

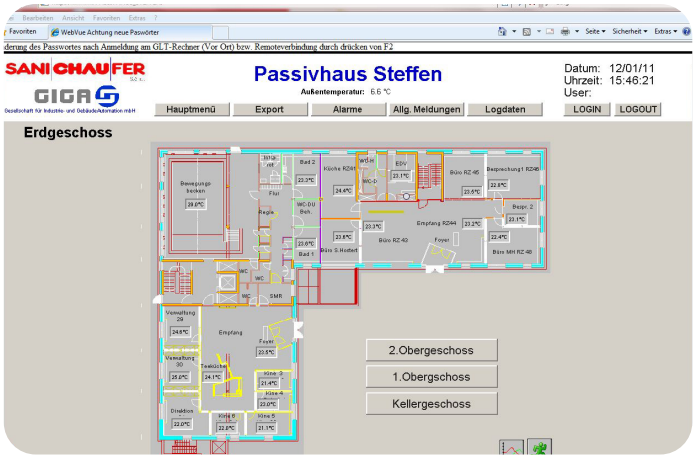
Optimize energy efficiency with minimum ecological footprint

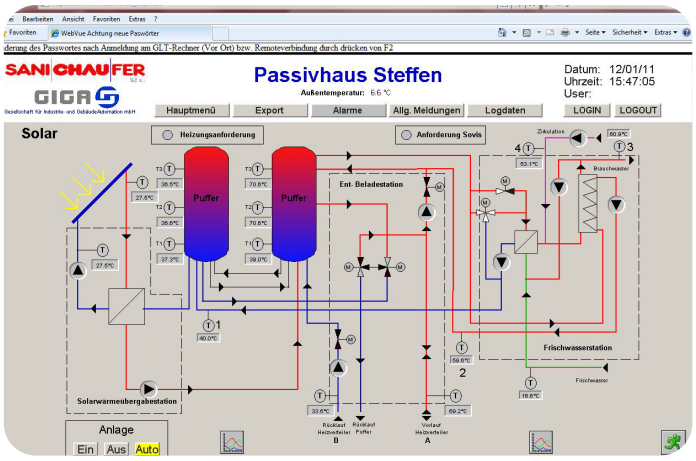
The ventilation is equipped with efficient heat recovery systems and adiabatic cooling. There are approximately 50 m2 (550 ft2) of solar panels on the roof for hot water production and heating support. As backup for the solar water heating (140 kW) both the ventilation and the pool heating are assisted by woodchip boilers (100 kW) and an oil-burning system.

The high-grade steel therapy pool has a water treatment plant installed to ensure water quality. The pool is equipped with a countercurrent feature and underwater massage nozzles. Space heating and dehumidifying of the swimming-pool area are achieved with a special air handling unit.
PcVue combines the data from those systems and from 65 sensors at various points in the façade, roof and outer surface of the building to measure temperature and in some cases humidity.

The results are sent to a laboratory for evaluation to assess the influence of external conditions on the internal environment and thus help to optimize the building´s energy performance.
For complete control of the clinical and office areas the BACnet EDE-File Import process populates the PcVue database automatically. The BACnet communication gives access to 2,000 BACnet I/O points in total.

The project also includes BACnet Scheduling for the pool heating cycle. Historical data will be archived using Microsoft SQL Server. Reporting is via SQL Server Reporting Services (SRSS) for data exchange with scientific institutions, including spreadsheet export for the energy analysis.







KEYS TO SUCCESS

- Automatically populate PcVue's database using BACnet EDE-File giving access to 2,000 I/O points
- Include BACnet scheduling for the pool heating cycle
- Archive monitored points with SQL Server and use SQL Server Reporting Services (SRSS) for data exchange with scientific institutions for energy analysis

RESULTS

Solution with PcVue optimizes energy usage in an ultra-low energy building



SUCCESS STORY

ST. JOSEPH-STIFT HOSPITAL

St. Joseph-Stift hospital in Dresden relies on networked solution that secures the building envelope, but also much more.



In its efforts to provide more security against unauthorized access and improved monitoring and control, the technical services department of the St. Joseph-Stift hospital in Dresden relies on the proven technology of the BMS manufacturer PcVue and the door and window specialist GEZE. Over time the originally isolated PcVue solution becomes an all-purpose tool.

In the 2019 major hospital rating of the Frankfurter Allgemeine Zeitung (Frankfurt general newspaper, FAZ), the St. Joseph-Stift in Dresden came top six in the category “150 to under 300 beds”: The patients surveyed were not only above average satisfied with the medical and nursing care, but the hospital also received top marks for the organization of procedures and service.
The hospital, which currently has 250 beds, treats around 35,000 patients a year. In order that the nursing and medical staff can concentrate fully on the patients, the hospital operator also regularly invests in the technical infrastructure. The new comprehensive control technology solution from PcVue and GEZE is an example.
In the origin the visualization and control function of an existing intercom system was used for the building´s door and lock automation. Due to further requirements, especially with regard to scheduling and standardization of the data exchange with a heterogeneous field layer, the need for a comprehensive monitoring and control solution became apparent.
This solution exists in the form of PcVue, which connects doors and locks from different manufacturers via the OPC, ICX and BACnet communication protocols.
That generates a powerful abstraction layer, at instant. A particularly elegant solution is the connection of GEZE door systems via BACnet/IP, as the PcVue software includes a dedicated library with symbols and function blocks for various GEZE module types. Thanks to this simple integration, the connection can be carried out independently by the technicians on site.

PcVue enables the implementation of complex, building-specific logics, which are necessary due to the existing building topology. Sequential control and flexible networking options are of fundamental importance in such scenarios. The same applies to the special purpose emergency switch in the emergency room. In the event of structural changes, it must be possible to convert escape routes at any time. Thanks to the use of a PcVue developer license, as well as the intuitive configuration interface of the PcVue software and the intensive on-site training, it is possible for technical staff to reconfigure the system at any time.

A MULTITUDE OF BENEFITS FOR VARIOUS USER ROLES

Users of the system include medical and administrative staff. Using web-based thin clients on 32» flat screens at the gate and in the emergency room staff can always keep an eye on the status of the building´s lock

status. At off-peak times, the medical staff in the emergency room and receptionists are authorized to acknowledge certain alarms autonomously.

Torsten Klotzsche, head of the building´s technical services department, describes the requirements for the system as follows, among other things «The aim is to facilitate the daily work of the operating departments». Above all, this could be achieved by relieving certain functional areas.
His own department also benefits from the system´s versatile functionality. Thanks to the 100% Wi-Fi coverage within the building area, which has been in place since 2019, technical staff have access to the PcVue web visualization (WebVue) via notebook and tablet anywhere and at any time, which is a decisive advantage for mobile maintenance workers. An additional screen is available in the technical area, which also serves as an alarm monitor for the on-call service.

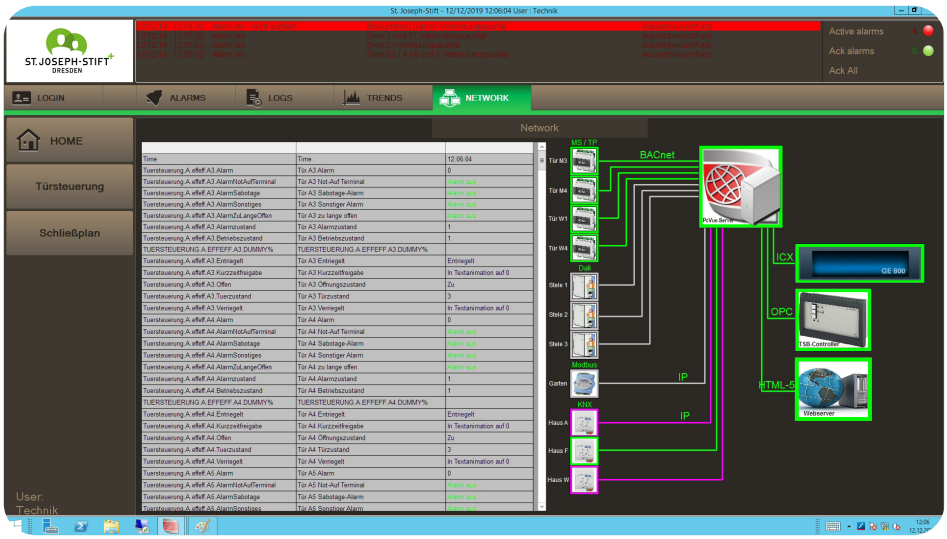
A UNIFORM ARCHITECTURE AND EXTENSIVE NETWORKING POSSIBILITIES

Torsten Klotzsche´s vision of «achieving intelligent control of neuralgic information and control points with manageable investments» is fulfilled by the solution in that the four main buildings and four annexes of the facility can be supervised with a simple yet flexible, future-proof architecture. The control system consists of a PcVue server station for up to 65,000 data points, five web clients and a development and test station. All stations are networked with each other, so that new project versions can be created, deployed and distributed at any time. This happens almost in real time, as PcVue projects do not have to be compiled before deployment. Data and control commands are currently exchanged via several different communication protocols, including BACnet, OPC, Modbus, KNX and ICX. Also integrated into the project´s web interface is the WebScheduler, the user interface for managing PcVue´s native schedules and BACnet schedule objects. By now PcVue even monitors status messages from the intercom system by using the ICX protocol.
Connecting the doors brings more transparency, comfort and safety.

Locking the doors in the evening once forgotten is a thing of the past. Thus, for example, unwanted visitors remain outside, which could cause a lot of damage in such a property. Instead, the doors are now automatically locked by the system after a certain time using sophisticated scheduling. The controlled admission of persons is easily possible at any time.

Other functions that have changed as part of the integration are:

- Temporarily putting indoor doors into «permanently open» state; reducing the door cycles (movement of the door)
- Connecting the weather station; enabling the doors to be opened and closed accordingly (e.g. in strong winds) or to switch into automatic mode.





The first GEZE doors are now connected to the PcVue system thanks to the simple integration. This creates more transparency, offers more comfort and above all makes the building safer. Thanks to that technology, the conversion measures were changed while the building was still in operation without affecting the regular operation of the building. It was possible for the technical team on site to create an intelligent door control system with manageable investments. In the first stage of the expansion, three door control units, three sluice systems, a revolving door and several other automatic doors were activated.

This also relieves the staff, doors no longer must be locked manually, unexpected visitors have no access and the technician on site has an easier time managing the building. During the next round of door maintenance, a check is made to see which door systems can be connected to the PcVue system with little effort using BACnet. This simplifies to connect the subsystem «doors» step by step.

FURTHER SYSTEM EXPANSION

After the planned handover of the control system to the IT department of the hospital and the associated virtualization of the system, the connection of further GEZE automatic doors, the integration of blind controls, as well as critical and non-critical power supply lighting over KNX into the system are planned for the near future.

The incorporation of remote branch offices via the IOT protocol LoRa, as well as the integration of video surveillance systems in PcVue, also play a role in the considerations of the technical team. Furthermore, a new part of the building is planned, where the entrance door will also be connected via BACnet. All this is easy to implement with the versatile PcVue solution. The technicians on site therefore have now a true all-purpose tool at their disposal.

SUCCESS STORY

TELECITYGROUP DATA CENTER

Data Center customers receive realtime energy reports from PcVue.



Systems integrator ETDE has chosen PcVue from ARC Informatique to monitor the electricity distribution and air conditioning systems for the entire range of installations at TelecityGroup´s new Data Center in the Paris region.
The software´s openness and the simple hierarchy used for the communication architecture were determining factors in this choice.
PcVue can, as part of its functions, generate reports on the electricity consumption by each of the servers operated by TelecityGroup´s customers.
TelecityGroup, whose head office is in London, is the European leader in independent data center operators. The company designs, develops and manages high-connectivity secure environments where technical, Web and IT infrastructures can be hosted in total security.
TelecityGroup manages 23 data centers across the main European business hubs.
Its new building, Condorcet, with 3400 m2 (36,000 ft2) of floor space available to customers, is the perfect solution for businesses looking to locate their critical infrastructure in a data center. It won the trophy for “Best Data Center in Europe” at the Data Center European awards 2010.
The new site has been designed in accordance with international standard ISO 27001:2005, which governs information security, and ISO 14001:2004, which ensures effective environmental management.

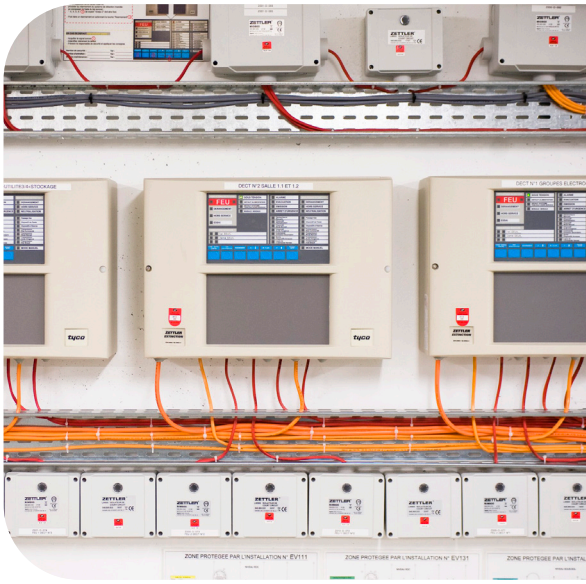


BUSINESS OBJECTIVE

- Report Data Center customers’ electrical use of their servers
- Monitor the air conditioning to reduce energy consumption

Energy-efficient design principles have been implemented in the construction of the building, along with the use of sophisticated intelligent air conditioning and free cooling technology to reduce energy consumption.

In addition, the multiple connectivity options available on site are enhanced by PANAP and SFINX connectivity, offering customers high-quality national and international peering and Internet connectivity options.
The building includes a monitoring center, an NOC (Network Operations Center), with a video wall comprising twelve 52-inch screens, each dedicated to a different system: 6 screens for security and video surveillance, 1 screen for fire detection, 3 screens for systems operation applications, and two PcVue workstations.
The first workstation is dedicated to the electrical distribution system, and the second manages the air conditioning. Each workstation has three screens: one screen showing a schematic diagram (air conditioning and electrical supply) on the video wall, and two further screens at the operator stations.
One is for a detailed systems display, and one remote screen for PC Security monitoring, and which includes the general schematic.
“We chose PcVue for two main reasons. First, so that we could provide our customer, TelecityGroup, with an open, multi-protocol system capable of keeping up with new standards in the market, and compatible with building management control systems and PLCs.
The second reason was that with PcVue there are only two protocol conversion points. Direct LON or MODBUS communication gateways collect the reading data and then the PLCs are directly accessible via the IP network.
This simple-hierarchy architecture is much more reliable and offers faster data processing. With the other solutions on the market, there can be up to 4 different conversion layers before reaching an SQL type database”, explains Hélène Gaury from ETDE.
On the electrical supply side, PcVue monitors all of the systems, from the transformers to the uninterruptible power supplies, distribution boards and consumption meters for each of the server bays. On the air conditioning side, PcVue includes monitoring of the whole circuit from the cooler units to the pumps, root-top installations and cabinet air conditioners in the server areas.
The Dream Report software - an integral part of ARC Informatique´s PcVue Solutions offer - allows TelecityGroup to generate complete dynamic reports about the systems, and particularly the amount of electricity used by each customer.





KEYS TO SUCCESS

- Conformance to ISO 27001:2005, which governs information security
- Conformance to ISO 14001:2004, which ensures effective environmental management
- Open, multiprotocol system compatible with standards compatible with building management control systems and PLCs

RESULTS

PcVue platform tracks and generates electrical use report for each data center customer

PcVue platform monitors the entire air conditioning circuit and computer security



SUCCESS STORY

IBERDROLA RENEWABLE ENERGIES TOLEDO OPERATION CENTER

IBERDROLA
Ingeniería y Construcción

PcVue is the CORE SCADA solution for efficient remote control of wind farms.

Iberdrola Renewables is the world leader in electricity production from renewable sources, in particular from wind power. Founded in 1995 by merging several engineering companies, Iberdrola Ingeniería y Construcción is an energy operations center at Toledo, near Madrid, that manages and remotely controls ten wind farms across all the regions of Spain. The firm is responsible for the installations in terms of electrical generation, distribution and control. It ensures services that comprise project management, engineering, supply, construction and operational support. Iberdrola Renewables aim is to provide the service without geographical limits.

In the context of a project for supervision and control of modern wind power systems, Iberdrola Ingeniería has chosen ARC Informatique's PcVue software for its reliability, scalability and high performance in a Client-Server data architecture.

The main objective of the project was to make the information from the wind farms, especially alarms and historical data, available remotely.

The control system at each site samples the main operational data from the generators and the various substations. These systems are connected to the CORE (Iberdrola's Renewable Energies Operation Center) via long-distance communication links.

CORE uses this data to identify and diagnose potential problems and respond with corrective action. Previously each wind farm was monitored from one local SCADA station and the operators sent the data in by telephone. All the required data were saved to disk and then forwarded for manual data recording.

For remote monitoring of the wind farms and so for remote control through a dedicated VSAT network, Iberdrola Renewables has chosen to install in the CORE an OPC based architecture with PcVue SCADA server and FrontVue clients.

PcVue and FrontVue are both Windows-based software packages capable of managing millions of I/O points online from thousands of devices. The PcVue-FrontVue SCADA system in the CORE has been implemented to provide the operators



BUSINESS OBJECTIVE

- Remote access to wind farm information
- Ensure efficient service

with all the required information regarding alarms from the turbines.
Up to 2.4 million data items are monitored by the FrontVue client stations, which communicate via OPC with the front end over a 1,000 Mbps redundant TCP/IP Ethernet network. Each front end can receive up to 70,000 I/O points.
Currently they are 30 redundant PcVue servers that manage a million real-time variables and the network can be extended without limits or structural changes.

AN EASY, EFFICIENT PROCESS

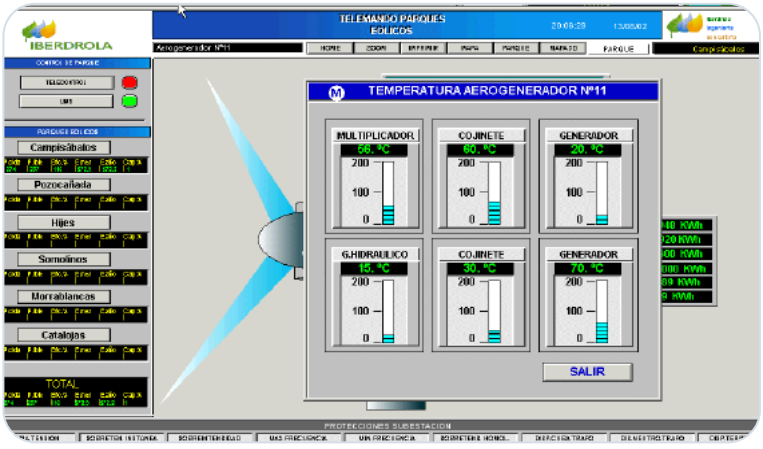
Using the PcVue-FrontVue architecture, the operators can analyze the data from the remote wind farms in detail.
Given the huge volume of data (around 350 points per turbine) and so as to ease maintenance operations, the supervision takes place at two levels:

- The upper level gives a panoramic view of the most significant alarms, data values and counters, as required for monitoring the turbines and to detect faults that require intervention;
- The next level is more detailed to enable better analysis of all the data from the turbines so that the operators can immediately and accurately diagnose problems and take appropriate action.

All of the data received are processed by way of set points, historical data, alarms and trends.
The solution implemented with the PcVue SCADA software has allowed a remarkable reduction in maintenance costs, while centralizing all the information from the remotely controlled plants.

MAIN TECHNICAL FEATURES

- 2.4 million points
- 270 wind farms
- 3500 Megawatts
- 6000 turbines
- 30 redundant PcVue servers



SUCCESS STORY

IBERDROLA RENEWABLE ENERGIES PORTLAND OPERATION CENTER

IBERDROLA
Ingeniería y Construcción

PcVue is the nerve center of a solution for centralized control of wind farms across the United States.



Wind energy is the fastest-growing source of energy in the world and a tremendous source of homegrown power and Iberdrola Renewables has a nerve center in the wind industry at its National Control Center in Portland, Oregon.
Iberdrola Renewables is the largest provider of wind energy in the world and the second-largest provider in North America, helping utilities to 'green up' their energy portfolios. The Center is professionally staffed 24/7/365 to provide energy management, scheduling and generation dispatch. These capabilities help the customers of Iberdrola Renewables to manage risks and uncertainty in the natural gas and power generation industries while fulfilling energy requirements with clean, sustainable power.



The company began operating in Oregon in 2001 with 12 employees. At that time it was called PPM Energy and was part of Scottish Power. As of 2010, more than 850 workers throughout the United States maintain, develop, build and operate over 3,500 megawatts of wind power and other energy facilities in 20 states. With a goal of adding about 1,000 megawatts of new renewables each year, this exceeds the capacity of any other renewable energy supplier in the U.S.

The latest operation at Iberdrola Renewables is the National Control Center. Located in a room that looks a little like NASA's Mission Control, systems analysts oversee every turbine at every wind farm throughout the country, 24-seven. They monitor the performance and efficiency of every turbine. They keep an eye on approaching storms to warn technicians in the field to get to safety before harsh weather hits.

BUSINESS OBJECTIVE

- Monitor and control of wind farms installed across the US, from one location
- Manage a big data system
- Scalable at high growth rate

They even help scientists conduct groundbreaking wildlife research at wind farms. And they help the nation's various transmission system operators ensure grid reliability to keep the lights on under any circumstance! A vital element of this operation is the SCADA system. Each wind turbine has a control box at the top containing a PLC, power converter, control boards and I/O device. Sensors for wind speed, wind direction, shaft rotation speed and numerous other factors collect and transfer data to the PLC. By detecting the direction of the wind, the control system can use a motorized yaw gear to turn the entire turbine in the proper direction for maximum power generation.

All turbines are connected to a Local Area Network (LAN), with each wind tower's control box using Ethernet to link to the base of the tower where there is a fiber-based, redundant ring LAN connection. The LAN is connected to a remote control station running a control system that in the CORE has been implemented to provide the operators manages and collects data, adjusts turbine settings and provides intelligent alarm, troubleshooting and reporting capabilities via the central facility.

The National Control Center has a powerful SCADA system supplied by PcVue that acts as a 'nerve center' for all of the wind farms. It connects to this central control room the individual turbines, substations, meteorological stations, bird/bat avian radar and other surveillance systems for preserving wildlife. It provides visibility for the operator to supervise the behavior of all the wind turbines in all of the wind farms. By keeping a record of activity on a time-interval basis, the SCADA allows the operator to determine what adjustments and corrective action, if any, need to be taken. It also records energy output, availability and error signals. It offers the capability to implement any compliance requirements and to control (among other matters) the power factor, voltage and reactive power production. This is to manage the wind farms' contributions to network voltage and frequency control. It also enables operators to manage power output based on real-time grid requirements.

The SCADA communicates with the turbines via a communications network that uses optical fiber for almost all its links. Iberdrola Renewables uses turbines of various types and each turbine supplier provides their own control/HMI system. The major advantages of using PcVue as the main SCADA system are that it is neutral to turbine suppliers and is not tied to any one PLC vendor so it can be free to provide data reporting and analysis formats irrespective of turbine type.
PcVue is one of the few SCADA providers on the market that is not owned by a PLC provider and is able to invest wholly in its core competency, which is about robust, high performance SCADA systems.



This was of particular importance to Iberdrola who have wind farm operators using many turbine types and a myriad of PLC types. The Iberdrola team also really liked how PcVue is user-friendly and easy to configure. Its ability to iconize animated mimics and use pop-up windows reduced the risk of overlaying crucial information and helped to simplify the SCADA view. Also, the creation of templates for contents and behavior ensures consistency of all animations in mimics. Iberdrola uses multi-level access rights and menus associated with each user to ensure that navigation within the application is tailored to the needs and permissions of each individual. This ensures a layer of security, traceability and control for users' actions.

Iberdrola Renewables has been in the global energy business since 2000. In the past with a small number of wind turbines transmitting energy into the grid, the process of entry to the industry was fairly easy. Currently, congestion has become a large issue with wind energy suppliers balancing energy production with available inputs for transmission. Requirements are quite strict, thus Iberdrola has designed an integrated system using curtailment via set-points to manage the generation profile

on a real-time basis. They are working towards a more scalable system to suit the next generation of renewable energy markets.

According to the Managing Director, Head of Operations Services – Wind Operations for Iberdrola Renewables in Portland, Oregon, "we are installing wind turbines to operate in harmony with other sources such as nuclear power, solar, hydro and other energy in a netting arrangement to optimize performance. We are on the cutting edge." To manage their growing business, Iberdrola Renewables has developed fiber optic networks on their wind farms in the U.S. along with the National Control Center that is a state of the art facility located in Portland, Oregon.

PcVue's centralized configuration provides the capabilities for management and traceability of the various application versions and changes. It also supports automatic updating of the stations that make up the supervisory system. At each start-up of a station on the network, PcVue automatically runs consistency checks of the application versions in use. Without geographical limitations, the Operation Center has a global potential to supply energy management services to any owner of such facilities. The facilities in the U.S. are currently producing 3,600 megawatts of wind power across 50 independent power plants. Iberdrola maintains 2,479 wind turbines. Each wind turbine supplies about 300 to 350 data points, which equates to approximately 700,000 to 850,000 I/O data points on more than 22 servers. To cope with the diverse demands of maintaining Iberdrola's wind farms, the PcVue application's alarms are highly configurable.

Alarm messages may be printed, viewed in alarm lists and archived. Operators configure the behavior of alarms by using groups, filters, sorting, acknowledgement and masking. They also create alarm counters and associate specific any alarm. Alarms can be acknowledged by operators directly from mimics and those actions can be broadcast automatically to all nodes on the network.

Iberdrola Renewables is using OPC as the communications protocol, along with other protocols, to pull data from the various PLCs. Wind farm applications often use OPC™ and the KEPServerEX™ driver to communicate seamlessly with diverse systems. Iberdrola uses PcVue's OPC Data Access Client and the OPC DA XML Client for exchange of real-time data with communication servers, plus the OPC DA Server to facilitate data exchange with third party applications.

All of the data acquisition that occurs is routed back to the National Control Center. The development team at the National Control Center in Oregon found the PcVue Solution to be reliable, scalable and easy to configure. CORE had been kept up and running very successfully. PcVue provides a single user view that allows an easy visual display and overall management of the myriad systems in place from the PLC, HMI and control system equipped on the turbines. According to the Managing Director of the Control Center. "As we monitor avian migration and weather in addition to controlling and managing our turbines, we needed a system that would provide a simple, easy to read GUI so that we can react at a moment's notice."

KEYS TO SUCCESS

- Robust and reliable architecture which is easy to extend to new wind farms
- Scalable to hundreds of thousands of tags accessible from multiple clients 3500 Megawatts
- Open system allowing easy integration with other automation technology

The new PcVue SCADA software integrates and connects with the wind turbines via the PcVue-GUI interface acting as a light client to the PcVue application and managing up to 2.5 million data elements. This configuration provides the operator with all required information about the turbine signals. Iberdrola Renewables is utilizing this distributed client-server architecture with a redundancy mechanism to ensure that the design is fault tolerant. Using PcVue's built-in redundancy features, Iberdrola Renewables is able to ensure continuity of data collection in the event of failure of a system component. PcVue also supports dual networks both for communication with field equipment and among PcVue stations.

Each component and each station in the configuration has a validity status to enable the operators to view the condition of the system in real time. These client stations are communicating via OPC with the redundant communication front ends connected to the 1,000 Mbps TCP/IP Ethernet network. Each front-end is able to receive up to 100,000 I/Os. Using the PcVue architecture, operators can see in depth details of the data from the remote wind farms in a real-time status display. The supervision is arranged on two levels to handle the large volume of information (around 350 signals per turbine) and to facilitate operation and maintenance of the facilities.

A first supervisory level provides an overview of the most relevant alarms, values and counters, which is enough to supervise the turbines in a normal situation and to detect failures that need to be corrected. A second, more detailed level of supervision is triggered on request to display selected data from the turbine so that the operators can immediately and precisely diagnose any failures that have occurred and determine remedial operations. The data received can be processed as set points, historical records, alarm management, trending and so forth.

The control system in each installation collects the main operational information from the generators and their associated substation. The control system is connected to the National Control Center through a remote communication channel, which eases maintenance. The Center receives this information and processes it into an organized and simplified structure that enables easy identification and diagnosis of failures. This triggers the appropriate actions for its solution: remote reset or activation of local maintenance teams. As a result, average downtime decreases and availability is increased.

MAIN TECHNICAL FEATURES

- 1,000,000 I/Os
- 2479 WTGs
- 50 wind farms
- 3600 Megawatts
- 22 redundant PcVue servers

RESULTS

Solution with PcVue is remotely controlling US wind farms from the National Control Center in Portland, Oregon

PcVue has decreased average downtime and increased availability

PcVue is a complete wind farm model enabling an out-of-the-box expansion for newsites

SUCCESS STORY

PcVue SUPPLIES THE SCADA SOFTWARE PLATFORM FOR THE FIRST PHOTOVOLTAIC PLANT WITH BATTERY ENERGY STORAGE IN SPAIN

When Iberdrola was considering a pioneering project in Spain, installing batteries for the first time in a photovoltaic plant, it did not hesitate to turn to PcVue to supply the software platform for monitoring production and managing load. PcVue's SCADA system more than fulfilled its mission in terms of performance, ease of installation and almost full compatibility with all types of hardware.



The Campo Arañuelo complex is a grand photovoltaic project of the power company Iberdrola, with an investment of 80 million euros. The complex, located in the municipality of Romangordo (Cáceres, Extremadura), consists of three photovoltaic plants, called Arañuelo I, II, and III, with a total installed capacity of 143 MW.
The entire installation generates renewable energy equivalent to the supply needs of a population of 65,000 homes per year and will prevent the emission of 41,000 tons of CO2 into the atmosphere per year.



Arañuelo III, the most recent plant, with a power of 40 MW, came into operation in 2022 and has a particularity that makes it a unique installation in Spain: it is the first photovoltaic plant with batteries, whose power is 3 MW and its storage capacity reaches up to 9 MWh.
In addition, the batteries have been integrated into the photovoltaic plant itself in a distributed manner. Specifically, the batteries have been coupled in DC coupling mode, i.e. connected to the same DC input of the inverter to which the photovoltaic panels are connected.

The advantages of this novel structure are increased efficiency and better utilization of surplus solar production. In other words, a higher level of plant optimization is achieved.
Ingeteam, a company specializing in electrical conversion, supplied Iberdrola with everything from power systems such

as electrical substations, solar inverters and battery containers to the SCADA (Supervision Control And Data Acquisition) monitoring system.

20 YEARS AS IBERDROLA'S SOFTWARE PLATFORM

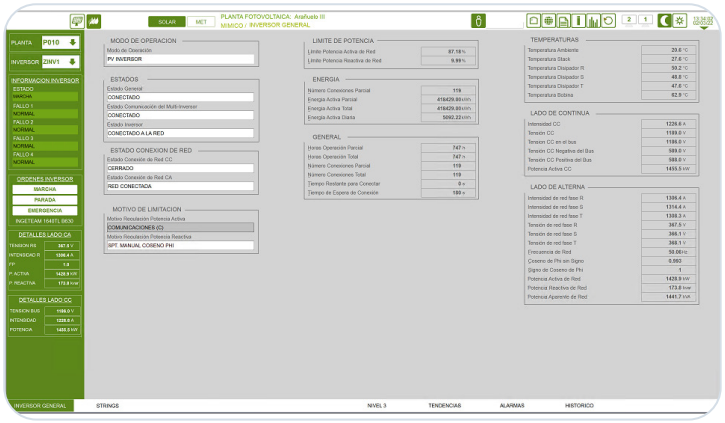
Ingeteam had it very easy when it came to the SCADA system, as it contacted PcVue Spain, a company belonging to the French ARC group, which has been supplying its software platform to Iberdrola for more than 20 years.

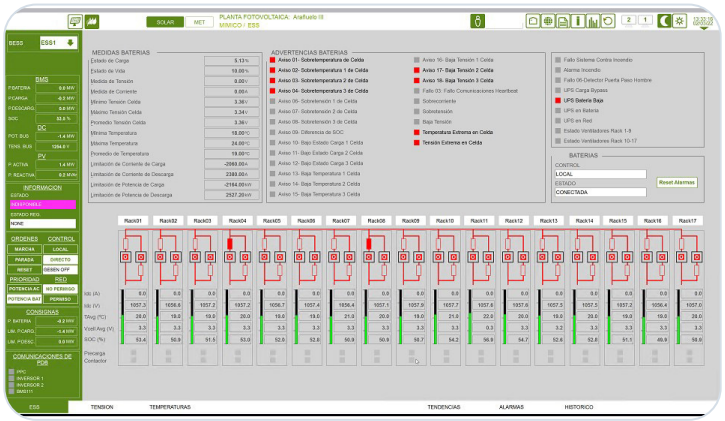
«The platform, in this case configured and installed by Ingeteam, is the central digitization tool of the solar plant. It enables production monitoring and load management,» explains Vincent Reynaud, CEO of PcVue SPAIN.

Ingeteam's implementation was guaranteed thanks to the certification and training on the PcVue platform obtained through previous training sessions. This was complemented throughout the project by the continuous local technical support offered by PcVue SPAIN from Irun (Basque Country). The technical capabilities provided by PcVue software to Ingeteam and Iberdrola are divided into three main areas, the first being field data acquisition. In this area, the key has been its almost total compatibility with the equipment on the market and specifically with native protocols such as IEC 104, IEC 61850, DNP3 (Distributed Network Protocol version 3) and ICCP (Inter-Control Center Communications Protocol), all of them approved by reference organizations around the world.

A second aspect covered by PcVue is the high availability architecture by integrating the platform with multi-stations and redundant servers, hybrid architectures with servers hosted in the cloud or data centers. Finally, data visualization is guaranteed with the possibility of entering real-time commands on media ranging from PCs with HTML5 web browser to mobile notification messages and contextual information.

The complexity of the supervised process is evident when describing the implementation of PcVue for Iberdrola through Ingeteam. This took the form of a client/server architecture that, through 11 PLCs (programmable logic controllers), collects information from inverters, strings (sets of solar panels connected in series), meteorological towers, electrical substations, etc., the plant's PPC (Power Plant Controller) and the EMS (battery management system).





Iberdrola's demands in terms of management capacity show how ambitious the project is and demonstrate PcVue ability to meet the high requirements. In fact, through the Modbus TCP PROTOCOL, the system handles 17,000 signals, of which 9,000 are alarms and 2,000 are historical and serve to track trends.

DIRECT DATA COLLECTION

The suitability of PcVue for the Arañuelo III PV plant, as well as for many other applications, goes far beyond the described performance.
«PcVue offers the possibility of collecting field data via native communication protocols, without an intermediate software layer, such as IEC 104,» Vincent Reynaud emphasizes. «This solution is also scalable and its handling is intuitive when it comes to adding several servers and/or visualization clients.»

Its degree of compatibility is also excellent:
«Being open, it can provide its data to third-party systems, such as Iberdrola's CORE (Renewables Operation Center) in Toledo, guaranteeing optimal data quality at all times,» says Vincent Reynaud. Plant maintenance tasks of equipment are also facilitated because PcVue has tools for this purpose. Ingeteam greatly appreciates the support provided by PcVue, as well as its performance.

«Apart from being the tool approved by Iberdrola for photovoltaic plants, we have verified in practice that it is indeed a powerful and flexible system,» acknowledges Ángel Medrano, Ingeteam's Director of Engineering Services.

«It is a complete system that incorporates many functionalities, and therefore makes it possible to dispense with additional software for the resolution of the project».

AN INDEPENDENT PROPOSAL

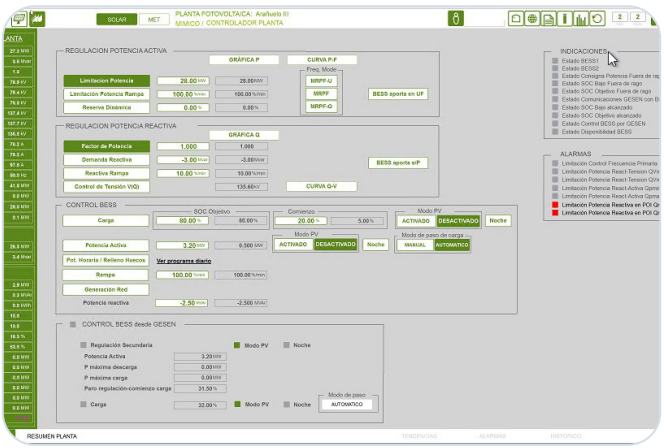
A differentiating factor of PcVue SPAIN, and the ARC group, is its total dedication to software development and remains PLCs vendor agnostic. In addition, the availability of numerous native protocols allows direct communication with the equipment.

«Its real-time database management by branch facilitates the maintenance of plants throughout their service life, whether the applications installed are small or large,» explains Vincent Reynaud.
The presence of PcVue in the renewable energies sector has Iberdrola as one of its cornerstones, but it is common in the control of many other photovoltaic plants and wind farms. Siemens Gamesa, for example, has been using PcVue for its turbine control center worldwide for 10 years. General Electric, for its part, has more than 300 wind farms with PcVue platform installed.

THE PcVue PLATFORM, AN ESSENTIAL BASE FOR IBERDROLA

The choice of PcVue for the SCADA of this latest generation photovoltaic plant of Iberdrola - unique in Spain due to the installation of batteries integrated in the facilities themselves - has been another milestone for the ARC group company in its long relationship with this electric company, a world reference in renewable energies.

Back in 2003, Iberdrola chose PcVue to set up its control center for renewable energy assets: the CORE (Renewable Energy Operation Center) in Toledo, whose mission is to ensure the remote control of wind farms, solar and hydroelectric power plants from a single location. Iberdrola selected PcVue software for its reliability, scalability and high performance in a client/server data architecture.
The close collaboration between Iberdrola and ARC Group transformed into a longtime partnership and today there are more than 4 million points connected



within the PcVue architecture. It has evolved into a world-class platform with native communication protocols especially suited for energy management and smart grid interoperability, such as IEC 61850 client (certified by DNV KEMA), IEC 60870-5-104 client and server and DNP3 master.

The resounding success, experience, expertise and in-house developments have made the ARC Group a valued supplier also in Scotland (Scottish Power Control Center), the United States (Avangrid Control Center), Australia (Battery Energy Storage System) and Brazil (Neoenergia Control Center). Iberdrola itself uses the PcVue platform in such distinctive installations as Pizarro, the largest photovoltaic plant in Europe with its 590 MW.

KEYS TO SUCCESS

Iberdrola selected PcVue software for its reliability, scalability and high performance in a client/server data architecture

SUCCESS STORY

SOLAR ELECTRIC PHOTOVOLTAIC SYSTEM

Solution for monitoring and control of Solar PV farms down to the string level with PcVue.

A performance monitoring system is very important to a solar electric photovoltaic (PV) system. The monitoring system must account for the amount of energy produced in real-time to be sure the system overall conversion efficiency remains intact over time and enable immediate response to any event that degrades the PV system performance.

We are all familiar with our residential electric meter used by the utility company to record and bill us monthly the kilowatt-hours consumed. Over the course of a year, these bills can be compared to determine monthly consumption. While this scenario illustrates usage consumption, it is different for monitoring production with PV systems.

A meter is also used to measure the energy produced but, instead of a monthly basis, we are interested in the amount of energy produced during short time intervals – perhaps every hour or every 5 minutes. The recording frequency requires more sophisticated meters than the residential ones called data loggers. Data loggers feed data into a memory system that can be archived for use at a later time. They also have communication interfaces, which allow a computer to connect to it and retrieve the data.

Most electric utilities in the United States have adopted standard criteria and guidelines for interconnection of distributed generation (DG) to their electric distribution systems. Photovoltaic system installations effectively reduce the customer load and, during minimum loading conditions, may export energy back to the utility in a transaction known as “net energy metering” (NEM). A set of guidelines (IEEE P1547.6) were recommended by the Institute of Electrical and Electronic Engineers (IEEE) to PV system integrators to support them designing systems operable in parallel with the utility systems.

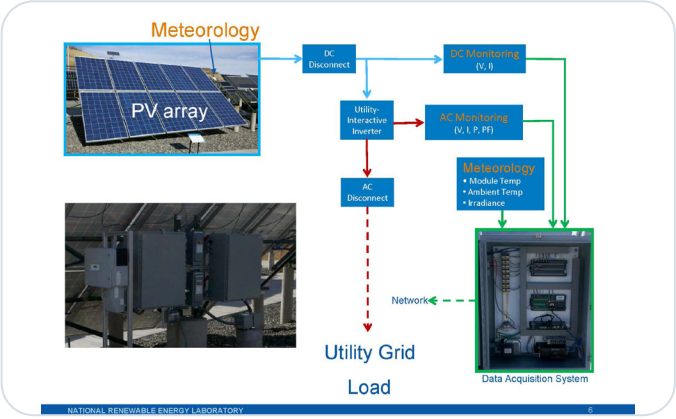


BUSINESS OBJECTIVE

- Understand Maintain PV system conversion efficiency
- Respond immediately to any degradation of system performance

Advanced SCADA (Supervisory Control and Data Acquisition) software find ideal application to support the operation of an electric utility. Automation sequences usually managed by means of SCADA system include: fault detection, localization, isolation, and load restoration (FDIR). These sequences will detect a fault, localize it to a segment of feeder, open the switches around the fault, and restore un-faulted sources via the substation and alternative sources as available.
SCADA implemented algorithms work to safely minimize the fault duration and extent, significantly improving the SAIDI (system average interruption duration index) and SAIFI (system average interruption frequency index) performance metric

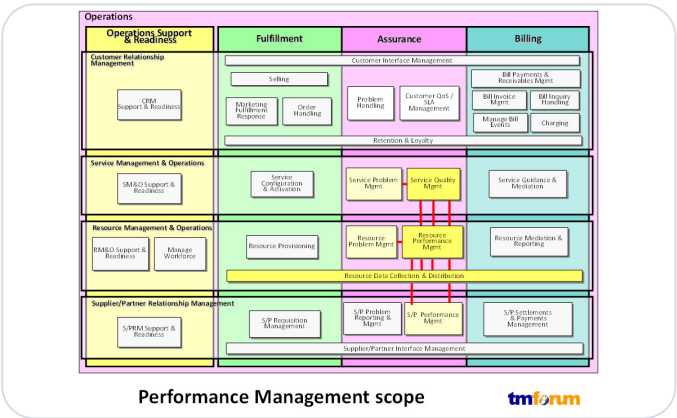
for the customers on those feeders. An additional important sequence is the automatic check of equipment loading and thermal limits to determine whether load transfers can safely take place.



Modern SCADAs communicate using standard protocols like IP and secure Ethernet LAN system, which provides significant improvement over a serial system, including supporting peer-to -peer communications, multiple access to tie switches, and simplify remote access by communications and automation maintenance personnel. Benefits to manage distributed generation include: higher efficiency; improved security of supply; improved demand-response capabilities; avoidance of overcapacity; better peak load management; reduction of grid losses; network infrastructure cost deferral; power quality support; improved reliability; and environmental monitoring.

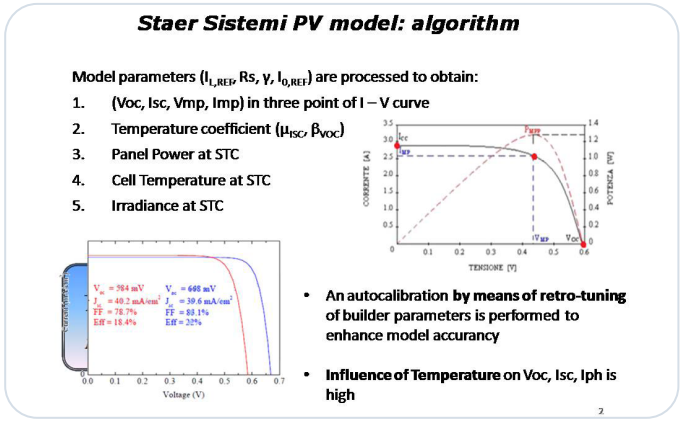
SCADA based applications offers extraordinary value because they provides a flexible range of combinations and customizable configurations that provides a balance between cost and reliability.
Distributed generation is considered a more desirable generation asset because it is “closer” to the customer and is more economical than central station generation and its associated transmission infrastructure.
While the disadvantages of distributed generation are in the electric utility perspective awkward remote operation, fuel delivery logistic (for combustion engine based distributed generation), cost of connection, dispatching, and production forecasting (wind and solar related), the SCADA system helps to offset such costs through automation, remote, real time monitoring capabilities.

PV systems monitoring due to the volatility of solar radiation at ground level, which is mainly due to atmospheric turbulence, stress SCADA real time capabilities requiring a fast sampling pace (5 seconds or less) of main physical variables.
As designer of PV plants monitoring systems Staer Sistemi, conducted tests on many industrial SCADA meeting requirements as fast sampling speeds, flexibility, scalability and ease to use and programming, selecting PcVue of ARC Informatique. This choice allowed designers to be confident to effortless manage data streams in the range of several thousand measures per second and concentrate on the most specific aspects of the application. PcVue capabilities allow monitoring and controlling of all the various plant component and subsystems operations, including trackers, inverters, grid substations and meters.
The PcVue based system logs any problem and triggers alarms so that the engineering staff can fix or change components or fine-tune the process of plant operation.
The automatic comparison between the calculated and the real production figures (supplied by the data logger) provides a precise indication of the plant performance or plant health every minute or less.



Today monitoring and performance analysis of solar PV plants has become extremely critical due to the increasing cost of operation and maintenance as well as reducing yield due to possible performance degradation during the lifecycle of the plant equipment.
This means that the use of a monitoring system can become essential to ensure high performance, low downtime and fault detection of a solar PV power plant during the entire lifecycle.
At the AC level, inverters expose RS485, CAN or Ethernet ports to allow a simple connection using the native communication drivers from the SCADA. PcVue support a large collection of standard

protocols to manage any kind of inverters.
All data collected are augmented by the SCADA system with a time stamp for real-time processing: alarming and displaying, trend analysis and storage for reporting activities.



The SCADA capabilities are further used in monitoring of grid protection relays, energy meters, weather monitoring station/sensors, LT (low tension) and HT (high tension) control panels, DC Switches, transformers and in general any devices capable of affecting - directly or indirectly- plant production.
Additionally, to make PV management applications as effective as possible, its important take into consideration other aspects of the SCADA applications features in order to support plant operations.

PcVue as an example, provides dynamic configuration, stand-alone and client-server and web configurations architectures, redundancy, historical and real-time trends analysis support as well as advanced alarm management.
Looking further at compliance, the support of such protocols as IEC 61850 and DNP3 enable communications with various electric sub-station devices, which becomes essential when the local electrical utility is engaged in Smart Grid implementation.
User-friendly graphical interface with 2D and 3D displays, scheduler, and an event-driven engine all make the management processes much smoother.
Finally, web access capabilities provide mobility and access to remote devices to make PcVue the SCADA of choice for PV Monitoring.





KEYS TO SUCCESS

- Fault detection, localization, isolation and load restoration (FDIR)
- Minimize fault duration and extent while maintaining safety
- Improve SAIDI and SAIFI indices for customers on the feeder
- Monitor equipment loads and thermal limits to enable safe load transfers
- Scalable to several thousand measures per second with capability to automatically filter to most critical aspects of the system
- Monitor and control trackers, inverters, grid substations and meters
- Log operations and provide alarms for maintenance and fine-tuning of plant performance
- Track real-time production versus predicted production and provide real-time performance metrics

RESULTS

Conversion efficiency

Security of supply

Power quality

Reliability

Peak load management

Demand response capability

Environmental monitoring capability

Over capacity

Grid losses

Network infrastructure costs

SUCCESS STORY

PcVue AT THE HEART OF A SYSTEM OF PHOTOVOLTAIC SHADES

TSE´S AGRICULTURAL CANOPIES

Transitioning to sustainable energy sources is the major challenge of our era. Emission reduction, optimization of consumption, clean energy that is accessible to all, and de-carbonization are some of the challenges to be met in order to preserve the environment and combat energy insecurity.Faced with these many challenges, a host of initiatives for a new, more robust and sustainable energy model are emerging. One of these is agrivoltaics, a system that produces energy using both renewable energy sources and agricultural crops.

PHOTOVOLTAICS FOR AGRICULTURE

The concept is simple, photovoltaic panels are installed on barn roofs and other agricultural structures. They are designed for integration with the grid in a rural environment. Farmers can then produce their own energy at lower cost and without impairing their agricultural production.
TSE is one of the main independent players in solar energy in France. The company was founded more than ten years ago to develop solar power stations and agrivoltaics solutions that transform solar energy into electricity.

TSE supports their customers and partners in building the solar power station´s complete value chain starting from design through financing, construction, supervision and operational management.
In 2022, TSE inaugurated its first agrovoltaics pilot site in 3 hectares located in Amance, France. A photovoltaic shading system with a capacity of 2.4 MWp, equivalent to the power consumption of a community of 1,350 inhabitants, it is installed on large-scale crops of soya, wheat, forage rye, winter barley and canola.

The project came into being because of production limitations on the farm. It had been suffering from very hot and arid summers for more than a decade. The agricultural canopy, developed by TSE, was chosen by farmers because it is designed with



rotating shades. These shades enable the system to mitigate climatic conditions in the summer season by lowering the temperature under the shade.

INSTALLATION OF THE AGRICULTURAL CANOPY IN AMANCE

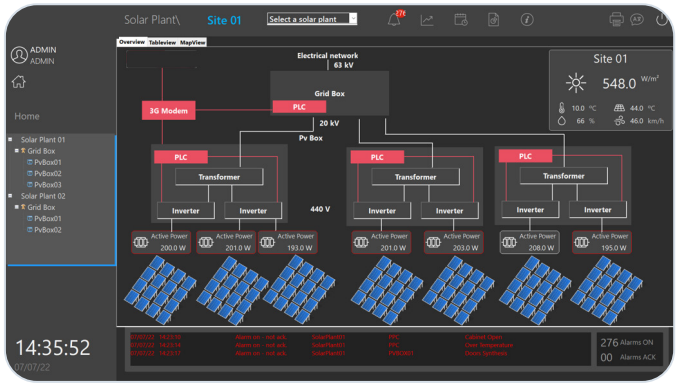
The agricultural canopy is composed of a large shading structure equipped with solar panels with tracker systems fixed on cables 5 meters above the fields. A supervision system is also provided to control the orientation of the panels, depending on the weather conditions, and to completely automate the acquisition of operational data.

After carrying out a market study, the Data & Optimization Division of TSE selected the PcVue platform to implement the SCADA (Supervisory Control & Data Acquisition).
Among the decisive criteria for choosing the PcVue platform, in preference to several other competitors, was the ability to have complete control over the platform, the ease of development, leveraging a dedicated solar solution supplied with the platform and, the quality of service from the technical support team.

On site, the supervision system manages a database of 25,000 data points. An optimized display enables alarms to be quickly understood by operators, supporting rapid problem resolution. The architecture features a central controller with PcVue acting as the data acquisition server. This system provides the link with all the solar transformation equipment as well as with several NCUs (Network Control Units) for the control and tracking of each of the 612 solar tables that make up the canopy structure.

Specific controllers handle high frequency data acquisition rates down to 10 milliseconds sampling. This is done in order to supply mathematical models running in real time. This very precise data is also used to determine how the system will response under specific conditions of interest.

TSE has formed a partnership with the Ecole des Mines, of PSL Research University, to work on some of the subjects related to photovoltaics. The remainder of the research and development is performed internally. For example, multiple tests are carried out from the photovoltaic station to ensure that factors such as cable tension, potential erosion of the system of cradles, etc., do not impact durability of the station.
The pilot project at the Amance site is the first 9-year demonstrator for TSE. TSE is the specialist in solar energy has 3 similar projects under construction and 12 other pilot projects in the development phase (construction planned for completion 2024-2025).



Example of PcVue - mimic (solar plant)



Example of PcVue - mimic (solar plant)

KEYS TO SUCCESS

- Complete control over the platform
- Ease of development
- Quality of service from the technical support team

SUCCESS STORY

PcVue SCADA HAS BEEN SELECTED TO CONTROL ALTO JAHUEL SUBSTATION, THE LARGEST ONE OF CHILE NATIONAL ELECTRIC SYSTEM

With almost 10,000 kilometers of lines and more than 60 substations, from the Arica y Parinacota Region to the Los Lagos Region, Transelec is the main supplier of high voltage systems in Chile. More than 70 years of experience in the energy sector support its vast expertise, allowing them to provide jobs to more than 500 workers. They also represent a fundamental piece in the country's progress, since they are the main electric power transmission company in Chile and transport the energy that reaches 98% of the population living from the north to most of the south, with an 84.5% share of the National Electric System.

Transelec's work is a continuous reinforcement of the electrical system in order to make it increasingly robust and thus enable the connection of renewable energies, while advancing towards the decarbonization of the energy matrix. Transelec is owned by a consortium made up of the Canadian Pension Plan Investment Board, British Columbia Investment Management Corp., Public Sector Pension Investment Board, and China Southern Power Grid International.

Transelec's main task is to provide an uninterrupted electrical system in which energy is transported through high voltage transmission lines from generation sources to cities and industrial and mining users. Substations convert the energy to low voltage for distribution to end users, contributing to the improvement of their quality of life and by extension to the country's development.
Among its various substations, the Alto Jahuel substation stands out, located in the Metropolitan Region of Santiago, it is the substation with the largest capacity in the National Electric System, with an installed capacity of 2,554 MVA. It also has yards with all the voltage levels that exist in the



Chilean transmission system: 500kV, 220kV, 154kV, 110kV, 60kV and 13.2kV.

BUSINESS OBJECTIVE

- Guarantee of computer security for operational continuity and safety of collaborators and contractors
- Scalable and multifunctional platform allowing the integration of future requirements

ELECTRICAL SCADA PROJECT

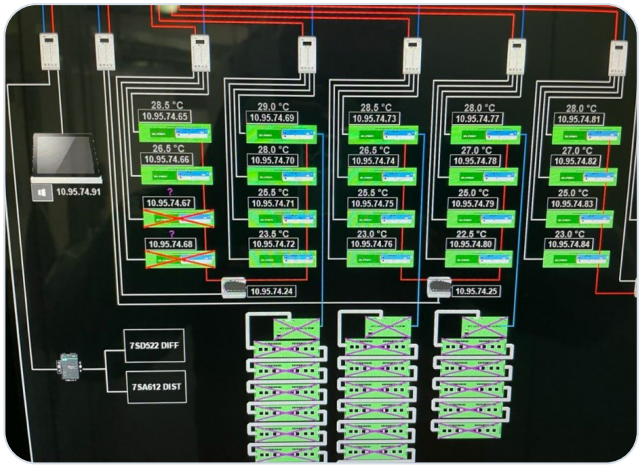
Being specialists in the development and implementation of SCADA systems, SCADATECH was chosen by Transelec for this project. As part of its comprehensive engineering solutions for electrical power systems, the company selected the versatile platform of PcVue Solutions for the automation of the Alto Jahuel substation, allowing the monitoring and control of its 7 yards.

Initially, the customer did not have local HMIs to monitor the yards from the control rooms associated with each of them, so the operations had to be performed directly on the control equipment. Due to this, SCADATECH proposed PcVue's SCADA solution to provide a scalable and multifunctional platform that would allow the integration of future requirements and reduce the risk for operators when executing maneuvers by transferring operations to the control rooms of each power yard.

Technically, the application allows direct integration in MMS protocol standard 61850, in addition to the DNP 3.0 protocol, which was chosen as the basis for the project, as well as the use of existing adaptable programming within the PcVue platform. It provides the flexibility to display the dynamic coloration of the voltage levels in the substation's single-line diagrams according to the standard used by Transelec, in which different types of alarms are indicated according to the aforementioned coloration.

Likewise, the HMI stations allow the visualization in real time of status and measurements of the electrical system. It also carries out the remote control or operation towards the IED field equipment, having total control and supervision of the existing electrical system. For the control and supervision of the different displays: general unilinear, alarms and events panel, communications diagram and other areas, a menu was configured on the right side of the screen that facilitates navigation between the different areas, allowing the operator to execute his tasks locally.

Within this supervision project, the DNP 3.0 and MMS under the IEC 61850 standard protocols were used and Touch screens were placed in each of the yards, which allow the deployment of the applications



View of HMI communications



General one-line diagram on Touch Screen

built in the PcVue software. The application collects data from NTX-U57 equipment used for the retrofit of the TELEGYR RTUs, that allows sending the RTU database in DNP 3.0 protocol to each of the associated displays.

As an architecture, a star connection was chosen, where the displays have an independent connection per yard, which has the advantage of not depending on the fiber optic links to the substation server room to collect data, but they work as STAND-ALONE equipment within each yard. Among the equipment integrated into the local HMIs are GE D25 bay controllers, protections (ABB-Siemens-General Electric, MICOM), CISCO communication switches and Schneider Electric ION meters. One of the great benefits of PcVue is that it is a multi-brand

platform and easily adapts to equipment from any manufacturer.

SCADATECH, the company integrating this project, states that they chose PcVue Solutions' proposal because it has native support for various electrical protocols. This feature considerably increases the availability of the system, eliminating points of failure and reducing development time, since it is not necessary to configure different applications and interfaces, as it is generally done in the integration of communication protocols in the electrical sector. Among other elements, the PcVue platform has the highest quality standards within a highly competitive price, which made it easier for

SCADATECH to be favored in the bidding process.
For Transelec, the commitment to the operational excellence of the electric transmission system and mainly the safety of collaborators and contractors of the company was a priority and PcVue has important elements to guarantee the computer security. So, it represents a key factor to facilitate the increase of the security level for the people and to improve the telecontrol in a significant way for all the voltage yards.

SCADATECH is currently developing an application with PcVue to extend local control to general monitoring of the entire substation from a centralized SCADA in Alto Jahuel, which will allow operators to make control decisions in the event of failure of Transelec's main SCADA. The application has a general display of the substation, in 3 total screens, including the 7 voltage yards, local monitoring of the networks through SNMP protocol, monitoring of all control equipment associated with the system (temperature and status of each of the more than 90 NTXU57 cards installed between all voltage yards) and general status of communications between the substation Gateway and the voltage yards.

IEC-60870-5-104 is being used as the communication protocol, since the monitoring is carried out with the same existing databases in Transelec's centralized SCADA, which will also allow verifying the correct operation of the communications within the system. In fact, Transelec, together with its systems integrator SCADATECH, continue to bet on the reliability provided by the PcVue software for the electrical control and monitoring of the Alto Jahuel substation. Given its capacity to adapt to different ranges of computer architectures and the ease with which PcVue provides data analysis and, therefore, quick decision-making for the operators, the platform was expanded to other corners of the company.



SUCCESS STORY

ELECTRIFYING REMOTE VILLAGES IN SARAWAK, MALAYSIA WITH PcVue SCADA

In 2021, Sarawak Energy Berhad initiated a project to electrify remote villages in Sarawak using renewable energy sources such as solar and mini-hydro turbines. The project faced significant challenges due to the remote locations, which made effective monitoring and control essential. The solution? PcVue SCADA software, seamlessly integrating various devices and equipment across multiple sites.



WHY PcVue?

Sarawak Energy and one of the system integrators selected PcVue for its interoperability and user-friendly interface and robustness. The integrator was already familiar with PcVue's capabilities and PcVue's support for multiple communication protocols (Modbus RTU and Modbus TCP) eliminating any learning curve and ensuring a quick start. This made it possible to easily interface with multiple devices such as solar inverters, energy meters, and battery management systems.

This familiarity meant that the team could immediately focus on configuring and optimizing the system rather than struggling with implementation issues. PcVue's proven ability to handle complex projects with multiple communication standards made it the most reliable choice.



THE NEED FOR A ROBUST SYSTEM

Given the remoteness of the villages, having a robust SCADA system was vital. If the system failed, no skilled personnel would be on-site to address issues immediately, potentially leaving the community without power for extended periods.

PcVue's fault tolerance and reliable data logging ensured that even if there were connectivity issues, data would be stored locally and transmitted once the connection was restored. This provided peace of mind to both engineers and stakeholders, knowing that the system could handle interruptions without data loss or failure.
Every month, a Sarawak Energy employee visits the sites to check the system's integrity and back up the data, but PcVue's reliability has minimized the need for frequent interventions.

IMPLEMENTATION HIGHLIGHTS

The project involved integrating 50-60 monitoring tags per site, covering everything from solar production to battery levels. The straightforward configuration process helped the system go live quickly, which was crucial given the logistical challenges of traveling to remote sites. PcVue's flexibility allowed the team to manage different devices with varying protocols, ensuring smooth data collection and visualization.

Looking ahead, there are plans to enhance the system by establishing internet connections at the sites. This will enable real-time data transmission and automated fault reporting, reducing the need for manual interventions and enabling quicker responses to any system malfunctions. With PcVue already in place, these upgrades can be easily implemented without significant changes to the existing system architecture.

CONCLUSION

PcVue's ability to integrate diverse equipment, its user-friendly interface, and its fault tolerance made it the ideal SCADA solution for this project. By choosing PcVue, the system integrator and Sarawak Energy were able to make a lasting social impact, helping bridge the gap between urban and rural areas.

RESULTS

Seamless integration: Over 60 monitoring points per site using PcVue SCADA

Community impact: Electrified more than 548 remote villages, improving the quality of life for over 15,006 families

Sustainability: Enabled access to solar energy and reduced reliance on diesel generators, cutting down environmental impact

Future-proofing: Plans for real-time monitoring and automated fault detection with the upcoming internet connection, enhancing long-term system performance and reliability

SUCCESS STORY

OPTIMIZATION AND CONTROL OF NATIONWIDE EV CHARGING STATIONS

How PcVue supervises the charging stations of FIRALP e-vehicles fleet



FIRALP, a French company of public works and specialized sectors (Energy, Civil engineering, High voltage, etc.), monitors its charging stations using advanced diagnostic features to increase availability and optimize maintenance activities.
As sustainable mobility has become a priority for many countries, notably in Europe where the parliament just voted to end sales of petrol and diesel cars by 2035, e-vehicles have grown into a booming market.
According to estimates from EV-Volumes, electric cars and plug-in hybrids accounted for 4.2 percent of global new passenger vehicle sales last year, up from 2.5 percent in 2019.
Moreover, the number of electric vehicles on the road should reach at least 145 million units by the end of the decade according to the International Energy Agency (IEA).
At FIRALP, the move to electric vehicles has been underway for several years now. However, 2022 marks a decisive shift, with more than 100 electric vehicles ordered and charging stations already installed in the branches. The deployment of dual-energy pods is also continuing, as is the order for a dozen gas (CNG) trucks. This renewal meets environmental expectations and anticipates the restriction of the most polluting vehicles in low-emission mobility zones by 2025.



MANAGING MOBILITY

To support its transition to electric vehicles, the group, through its subsidiary EREC, has chosen PcVue Solutions for the supervision of its charging stations.
EREC Technologies is a national specialist in process management and has been a PcVue partner for over 20 years; it supports its customers in the maintenance and operation of turnkey solutions in electricity and automation.
The project began in 2020 with the aim of managing internally the hundred-22kW charging stations of FIRALP's fifty branches, with an open and flexible solution.
The tests carried out during the lockdown, allowed communication configuration with the charging stations of various manufacturers. OCPP was the selected protocol to monitor the stations for it ensures interoperability.

The charging stations also rely on Load Management Systems which required several firmware updates in order to obtain the desired performance.
The PcVue platform was installed on an ESXi VM managed by the IT department. The VLAN implementation was already available but was relatively complex and required the opening of the VLAN channel by the department.

Several information are reported in the PcVue application: power delivered by station during charging in time, end-of-charge event, alarms, start/stop of charging. In addition, 10 WebVue clients provide access to reports visualizations for a better use of the stations. A BMS supervision of the head office, the Château, is also coupled.
As of today, access to the charging stations is free, but each branch has a portal to control it. The number of charging stations is currently sufficient for the number of e-vehicles, but the strong desire of the FIRALP group to expand their fleet of e-vehicles may make access to the stations increasingly difficult.

In the coming months, FIRALP will receive an order of more than 100 electric vehicles to complete their fleet, thus requiring the implementation of resource optimization tools. It is in this context that the innovative mobility solutions offered by the PcVue platform were presented to the FIRALP group.

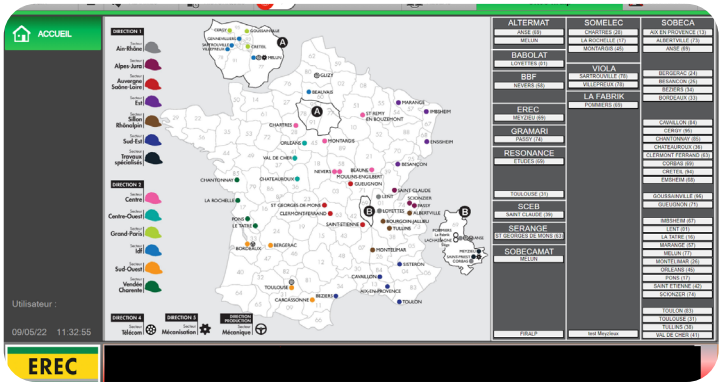
DIGITIZING THE QUEUE TICKET MACHINE: HOW PcVue MAKES LIFE EASIER FOR EV CAR DRIVERS

The main problem that may be encountered concerns the cars remaining connected even after a full charge making the charging station inaccessible for other waiting vehicles.

To solve this challenge, PcVue Solutions offers a solution that allows e-vehicles drivers to sign in with their cell phone when they arrive at parking lots and to indicate the desired charge rate. PcVue stores this information regarding the charge need and rate and when a charging station becomes available, the PcVue platform is able to notify the driver on his mobile of the charging station to use. Once the vehicle is connected, PcVue will trigger the charging. A configurable time-out is also available if the driver decides to finally not charge his vehicle, in that case PcVue move to the next charging request available in its ticket queue.

The mobile application dedicated to vehicle charging stations is realized without a single line of code thanks to PcVue's bot functionality. It allows the creation of a mobile graphic interface adapted to the client's needs, both functional and graphic.
In the FIRALP context, it will be possible for the driver receiving the charging authorization on his mobile to transfer it to a third person in case of unavailability, or simply to postpone it.
These mobile and intelligent solutions allow the three parties involved: vehicles, charging stations and drivers, a perfect match between availability, charging and time.
Adopted by all the employees, "Absolutely no one wants to go back to thermal vehicles", says Jerome Dorne, head of studies and execution, about 40 new charging stations of various powers (from various manufacturers) and a hundred electric vehicles have been ordered by FIRALP.

One of main ambition is to have a solution ensuring MOC (Maintenance in Operational Condition) that is to say an obligation of maintenance contract for each installation of a charging station.
In the near future, EREC would also like to become an installer for several other customers.



TOWARDS EVEN GREATER ENERGY EFFICIENCY

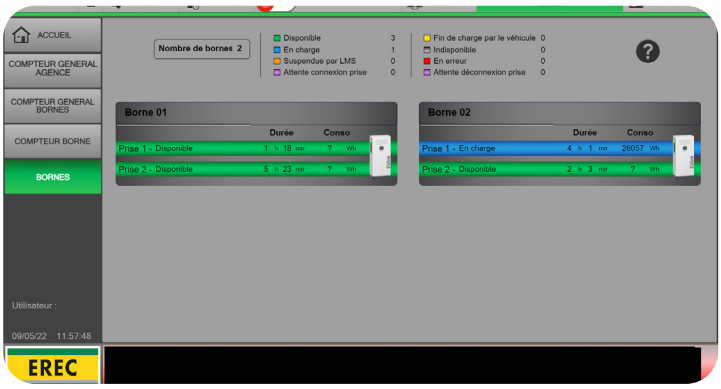
Finally, the energy performance of FIRALP's assets has always been the subject of innovation: the Montereau-sur-le-Jard site, south of Paris, is already covered with 600 m2 of photovoltaic panels managed by the Departmental Energy Syndicate. The next new buildings will also be equipped with them. The Group plans to go one-step further by recovering solar energy for its own consumption. The principle is to use the energy produced by the panels of its truck shelters to power the heating and air conditioning of buildings or to charge electric vehicle terminals.

"Our objective is to control the energy of our buildings, whether it comes from the panels or from

the ENEDIS network, an expertise mastered by our subsidiary EREC. These actions should reduce the footprint of our buildings by 10%," emphasizes François Chapel, real estate manager at FIRALP.
In addition to self-consumption, the next high tension site in Meyzieu, near Lyon will experiment with energy storage using recycled batteries. It will be the first site to be built with low-carbon asphalt. A composition based on Landes pinesap will also be tested.

In 2021, FIRALP has carried out a full carbon assessment to calculate the direct greenhouse gas (GHG) emissions generated by the Group's activity.

After the time of measurement, 2022 will be a time for experimentation and action.
To carry out this low-carbon approach, the Group has relied on the firm Oksigen. Following the assessment, 4 priority actions were defined to act on the carbon footprint (concrete, recycling, alternative energies and carbon calculator) and working groups were set up. The goal is to reduce their CO2 emissions by 10% by 2025 and by 20% by 2030.



RESULTS

About one hundred 22kW terminals

About 50 agencies

About 40 new charging stations of various powers by 2023 (from multiple manufacturers)

A hundred vehicles ordered in 2022

SUCCESS STORY

TRACKING OF RECHARGEABLE HYBRID VEHICLES (RHV)

PcVue supervises the world's largest experiment with RHV's

In May 2010 Toyota, EDF and Strasbourg City and Urban Community launched a joint project called "Kléber" for a full-scale demonstration of rechargeable hybrid vehicles (RHV).

This experiment is vital as Toyota is now marketing a plug-in version of its well-known Prius range. The Kléber program is part of a world-wide project rolled out by Toyota, with 600 Prius RHVs also being tested in Japan, the United States, England, Canada and Australia. For EDF it is an opportunity to test the charging facilities in practice.
The Kléber project is the largest experiment of its kind in the world with a fleet of 70 RHVs and 145 charging stations, almost all connected via cellular network. The 145 stations are installed in all the places one might expect: at the roadside (8 stations), in public car parks (18), at the vehicle owners´ homes (44) and in the car parks of the businesses where they work (75).

To manage the remotely metered portion of the charging data from the EDF stations, the sponsors of the Kléber project selected the PcVue SCADA software as it is a proven reliable industrial tool that is used to supervise numerous devices in many large-scale projects around the world.
The choice was also influenced by its meeting performance requirements and value for money.

The main function of PcVue is to collect data for transfer to other computer systems for analysis.
The acquired data is collected in industry standard databases for processing via analytical software such as spreadsheets.



BUSINESS OBJECTIVE

- Understand RHV customer expectations
- Verify RHV and infrastructure performance
- Develop methods for evaluating fuel consumption and CO_2 emission

Data is also processed directly by PcVue for display using pre-defined symbols that are instantiated in the mimics.
The data acquired by the charging stations is transmitted over a cellular network also managed by PcVue.

The database created by PcVue using the collected data is shared with an EDF central server via a web service. This means that the data can be accessed over the Internet or an intranet via secure access.

The PcVue software logs the usage of the charging stations throughout the Strasbourg area. It also provides real-time management of any charging station that malfunctions improving maintenance of the overall system.

One year into the experiment and the EDF and Toyota teams started analyzing the technical data gathered from the charging stations, uploading the data recorded in the RHVs during visits to the dealer, and reviewing user questionnaires and field surveys.

The PHVs involved in the project were intensively used in an urban environment and for longer journeys. PHV users averaged a yearly mileage of 19,000 km (12,500 miles), which is above the 13,000 km (8,000 miles) average for French drivers. The solution implemented with the PcVue SCADA software has allowed a remarkable reduction in maintenance costs, while centralizing all the information from the remotely controlled plants.



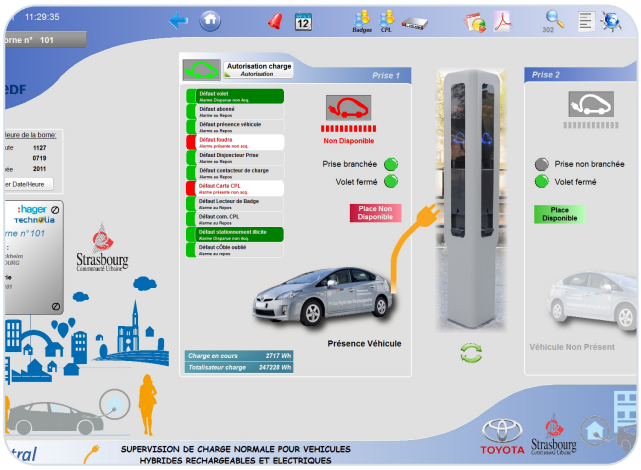






KEYS TO SUCCESS

- Responsiveness of vendor due to very short time frame from concept to implementation



RESULTS

PcVue demonstrated that PHV performance is in-line with customer expectations and meets a significant share of daily commuter needs

Solution using PcVue identified that PHV environmental performance depends on utilization

PcVue consultants responsiveness and software tools proved capable of meeting aggressive development schedule

SUCCESS STORY

MONITORING THE CHARGING STATIONS OF THE E-BUS FLEET OF THE CITY OF JENA

How Jena's public transport system monitors its charging columns for the e-bus fleet and uses advanced diagnostic features to increase availability and optimize maintenance activities.



In the city of Jena, electromobility has been present in the form of a tramway in service for 120 years. Supplemented by a fleet of diesel-powered buses, an efficient public transport system has been created over time. Last year saw the introduction of e-mobility in the operation of city buses as well.
Three first vehicles started regular service in 2020 to contribute to CO_2 savings (53,000kg per bus and year), but also to reduce particulate matter and noise emissions in the urban area.
The attractiveness of public transport is essentially promoted and maintained by smooth and punctual operation. In this context, operations of tramways in particular require a reliable and uninterrupted power supply, which is the responsibility of the power supply department at Jenaer Nahverkehr, operator of the city's public transport.

Nevertheless, malfunctions of the system technology can occur in rare cases. In order to minimize the effects of malfunctions on the operational process as well as on the passengers, it is necessary to keep downtimes as low as possible. This is supported by a reliable control and telecontrol system implemented on the basis of the PcVue SCADA software.
For many years, Actemium Germany's Automation Frankfurt business unit has been the partner of Jena's public transport system for the implementation and further development of the control and telecontrol technology for the power supply, but also for the monitoring of signaling and safety systems.

Maintenance of the newly introduced charging infrastructure for the electric buses fell under the responsibility of the Power Supply department, and the desire arose to integrate the chargers into the control system. Actemium Automation Frankfurt was commissioned to do this.
The primary goal of this expansion is remote monitoring of the charging infrastructure by the power supply

BUSINESS OBJECTIVE

The primary goal of this expansion is remote monitoring of the charging infrastructure by the power supply department so that any faults that occur can be detected and eliminated as quickly as possible

department so that any faults that occur can be detected and eliminated as quickly as possible. And to do so while reducing travel times for service personnel as much as possible, especially in a city that, due to its topography and its location within the Saale Valley, has a high traffic density on a small number of routes.
With the existing control system, the possibility of processing the data for visualization, archiving and data exchange with external systems via various industrial communication protocols, as well as remote alarming, is already provided as standard.

OCPP- DRIVER FOR COMMUNICATION WITH CHARGING STATIONS

Typically, the open standard protocol OCPP (Open Charge Point Protocol) is used for monitoring e-charging stations, which ensures the interoperability of products from different manufacturers.
With its latest PcVue version, the manufacturer ARC Informatique provides a communication driver for the OCPP protocol that supports the current protocol versions 1.6-J and 2.0.1 as well as the security profiles 1 and 2. The software also overcomes a typical OCPP problem, which is that a charging station can only communicate with one Charging Station Management System (CSMS). Using a proxy function, the charger's OCPP messages can also be passed on to third-party systems. This represents a typical feature of the open PcVue system, which inherently has a wide range of data exchange options.

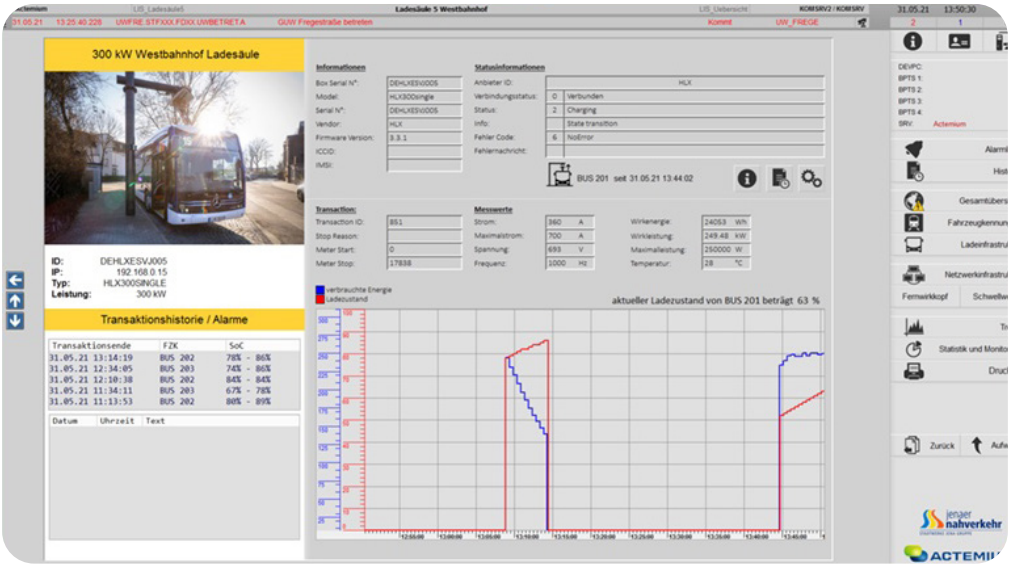
INTEGRATED OPERATING FUNCTIONALITY

A newly added entry point into the user interface that is seamlessly integrated with the existing system, is a map display that shows the charging stations distributed throughout the city area as symbol markers. The newly added part of the visualization benefits from a very short learning curve for users who have been familiar with the existing functions and operating philosophy of the control system for years, and which is also reflected in the charging station monitoring area.

DATA ANALYSIS AND MONITORING

The central function of the implementation by Actemium is alarm and log data management, which allows precise fault analysis in live operation as well as in the evaluation of historical data. The alarm system enables the on-call service to diagnose the fault in advance via the secure remote access of the public utility company and then to rectify it or initiate appropriate measures.

In addition, the traffic control center benefits from the connection to the charging infrastructure. The dispatcher workstation there shows the whereabouts of a bus at the corresponding charging points in real time and points out faults that affect operation. This means that adjustments can be made quickly in vehicle deployment planning to avoid cancellations or delays in the route schedule. Afterwards, the maintenance personnel can determine the actual cause.



Alarms of particularly high priority are sent as remote messages to the mobile terminals of the on-call service.

The users of the system can monitor active charging processes via a trend data display, whereby all measured values, such as currents, voltages and power values of a transaction, can be visually compared. Likewise, already completed charging processes can be called up from the transaction history and viewed in retrospect, as well as compared with each other. The respective vehicle is identified and its current state of charge is documented.

The transaction history is exported at the push of a button or automatically and stored as a weekly and monthly report. Of particular interest is the respective energy consumption per vehicle and charging process, but also the number of incorrect transactions.

The implemented user interface of the system further enables:

- An access management system for charging stations
- Lock or unlock charging stations for use
- Remotely activate or cancel charging processes
- Store and retrieve charging station-specific documents.

PRACTICAL BENEFITS PROVEN AFTER JUST A FEW WEEKS

Christian Zeh, a testing and maintenance engineer at Jena's public transportation system, is enthusiastic about the solution:
"By integrating the monitoring and control system for e-charging stations, all operating states are now visible in the control system, which opens up immediate intervention options for us. The charging infrastructure is thus fully integrated into the operational workflows of the power supply department. The usefulness of the system was proven after just a few weeks in daily operation, especially with regard to controlling temperature fluctuations in the charging stations."
With the implementation of the charging infrastructure in its control and telecontrol system, the power supply team is thus well prepared for the already planned increase in the electric bus fleet and the associated expansion of the charging infrastructure.

SUCCESS STORY

DUNN-EDWARDS PAINT

Solution integrates PcVue and ERP to coordinate plant-floor process control and automation.

Since 1925, Dunn-Edwards Corporation has been the leading manufacturer and supplier of architectural and industrial coatings in the Southwest, providing a complete line of paints and painting supplies to professionals and quality-conscious consumers.
Dunn-Edwards paints are manufactured exclusively in the Southwest and formulated specifically for the climate of the Southwest. From the hot, arid deserts of Arizona and Nevada, to the cool, moist seacoast of California, Dunn-Edwards paints are uniquely formulated to withstand the elements, and protect and beautify a wide variety of architectural surfaces.

Dunn-Edwards was operating plants in Tempe, AZ and Los Angeles, CA. The Tempe plant was not automated and the Los Angeles plant had only has a small section of its operations automated. Dunn-Edwards commissioned the consolidation of both operations into one large, state of the art manufacturing facility located in Phoenix, AZ, which is has the advantages inherent with automation.
Paint is generally custom-made to fit the needs of various end users. For example, certain industrial users might be especially interested in a fast-drying paint, while another might desire a paint that supplies good coverage over a long lifetime. Paint intended for the consumer can also be custom-made. Paint manufacturers provide such a wide range of colors that it is impossible to effectively keep large quantities of each on hand. To meet a request for “stonish beige,” “whisper white,” or “aloha sunrise,” the manufacturer will select a base that is appropriate for the deepness of color required. The base is developed at Dunn-Edwards using a slurry system and the PcVue SCADA software automates this process. The software is integrated with three PLCs based on ISaGRAF, which are fully compliant with both IEC 61499 and IEC 61131 industrial control standards.



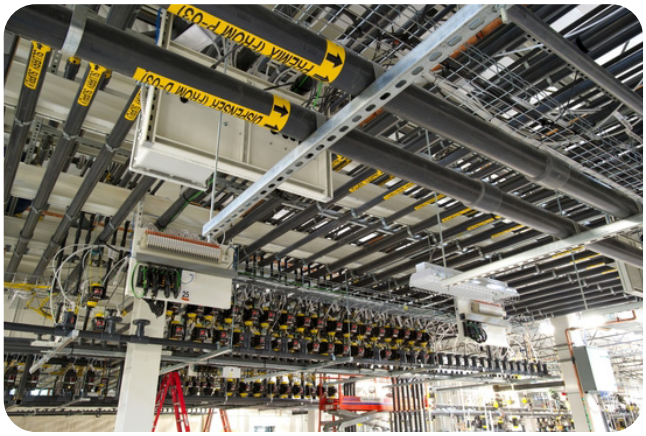
BUSINESS OBJECTIVE

Consolidate two existing plants into a single state-of-the-art manufacturing facility

The automated slurry system, currently residing at the Los Angeles facility, frees workers from having to add ingredients by hand into paint mixing tanks. This high-tech paint making method ensures consistent paint quality because it is almost entirely computer automated polling about 1,200 physical I/O points and monitoring approx. 5,000 variables in total. There is one PcVue server communicating with three PcVue client stations running on Ethernet and Profibus devices. Every step in the manufacturing process is controlled by dual computer networks in order to achieve redundancy.

to adjust the exact amount of raw materials needed to make each paint batch perfect. In a few months, these operations will be moved to the new Phoenix facility and expanded upon. Centris Technologies, known for its industrial control and automation expertise, was chartered to develop and integrate all the real-time process control and SCADA development on the plant floor.

The Phoenix plant has been designed to accommodate future growth of the company for years to come. To handle this volume of production, the system architecture for the new plant is completely state of the art, consisting of two PcVue servers set up in a redundant configuration and connected to 10 Centris Technologies Advanced Process Controllers (APCs), each running ISaGRAF over TCP/IP. The servers are connected to 12 PcVue Human Machine Interface (HMI) stations residing in key operator locations, some running WebVue through the facility. WebVue is PcVue's solution for remote monitoring and maintenance through the use an ordinary browser. WebVue enables Dunn-Edwards staff to display and control their paint manufacturing process remotely across the Internet or an intranet network. Through management of user rights and authentication processes, operators are able to access in polling mode the real-time values of PcVue's variables and lists of alarms, events, historical data, etc.





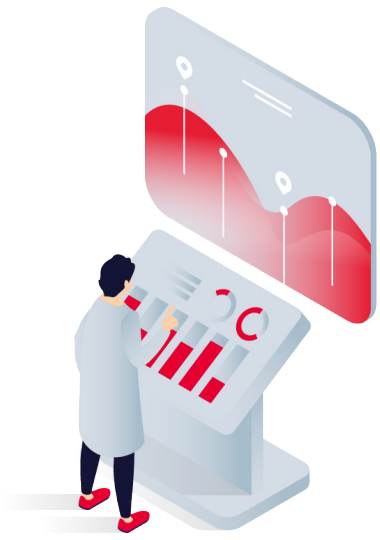
All of Dunn-Edwards production systems are linked to PcVue through standard connections to access both historical and real-time production data. Staff are able to trend, plot, analyze and report on any details workers need to see in order to make better decisions about their batch processes.
Dunn-Edwards utilizes an extensive array of quality control measures. The ingredients and the manufacturing process undergo stringent tests, and the finished product is checked to insure that it is of high quality. Typical inspections for a finished paint include: density, fineness of grind, dispersion, and viscosity. Paint is also applied to a surface and studied for bleed resistance, rate of drying, and

texture. There are thousands of data points PcVue collects and manages through the quality control process.

The PcVue SCADA performs data acquisition and collection of approx. 75,000 data points and is integrated with the enterprise resource planning system (ERP) from SAP -- sharing some 55,000 of those I/O points. SAP has embedded a Pico module for I/O connectivity which is communicating to PcVue's SCADA through OPC.
Manufacturing paint is a material intensive process. SAP is handling the accounting, lab, reporting, POS, sales, purchasing, inventory and production and PcVue manages all the process control and automation on the plant floor. Operators manage anywhere between 10 – 20 batches per shift within PcVue.
By investing in automation, Dunn-Edwards has gained deep insight into their batch processes. They have also facilitated information-sharing among their production and supervisory staff so that they are able to better monitor production in their appropriate contexts.

KEYS TO SUCCESS

- Manage up to 20 batches per shift per operator
- Manage 75,000 data points
- Integrate 55,000 data points with the enterprise resource planning system



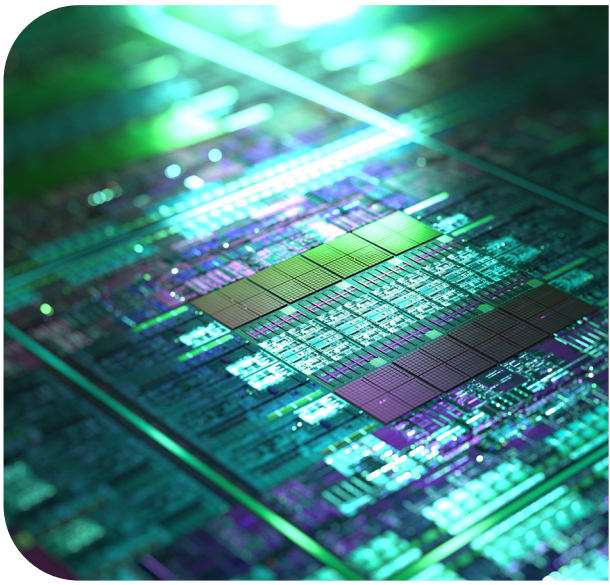
RESULTS

Solution with PcVue provides deep insight to the batch processes by managing all the process control and automation on the plant floor

Solution with PcVue provides operators with remote access and ability to collect and report on data to support improved batch processing

SUCCESS STORY

HEIFEI CHANGXIN 12-INCH DRAM WAFER PROJECT



Ruili Integrated Circuit Co. Ltd, the parent company of ChangXin Memory Technologies Inc., raised $2.39 billion from a group of investors including Hefei State-owned Assets Supervision and Administration Commission, Xiaomi Changjiang Industrial Fund, Gigadevice Seminconductor Beijing Inc., and the National Integrated Circuit Industry Investment Fund to build the first 100% Chinese owned semiconductor facility.

This 12-inch DRAM Wafer project in Hefei (referred to as “506 project”) is the first 100% Chinese-owned DRAM integrated design and mass production manufacturing facility in Mainland China, as well as the largest industrial project with independent investment in Anhui province. It is in the Airport Economic Demonstration Zone, covering an area equal to 105 hectares with a total investment of $22.3 billion. It plans to produce 125,000 DRAM wafers per month when running at full capacity.

Those DRAM are mainly used for electronic devices such as computers, mobile phones and mobile devices. It will be divided into three phases of implementation. The first phase plans to invest approximately $2.4 billion to build a 12-inch memory product line.

By the end of 2020, Hefei Changxin 12-inch DRAM wafter manufacturing project had reached the expected capacity of 40,000 wafters per month in advance and started the construction of the second production line of 60,000 wafters / month.

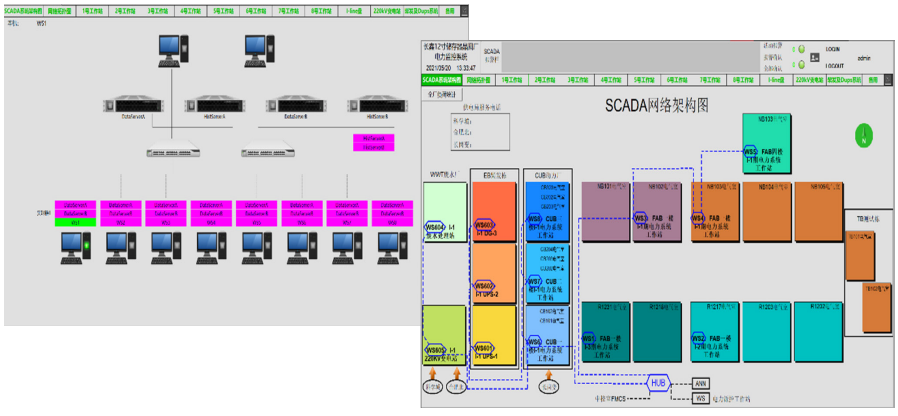


Fig.1 - SCADA Architecture

This project is a cornerstone of Hefei's master plan to transform the region and China into a powerful independent electronics superpower and was completed in 2018.
The power monitoring of a FAB is a critical system, even more critical than the process monitoring itself as the single fault can cause the halt of the production and loss of millions. With the collaboration of China Electronics Corporation NO.3 Engineering and System company and Beijing Locamation (1) Co., Ltd, the power control system was designed with the utmost security and reliability in mind. The field communication network was made redundant using 3-layer switches and to ensure 100% uptime of this critical core system, a 3-layer (2) redundant SCADA system was implemented.
The different system under supervisions includes the wastewater treatment stations, the 220 Kv Substation, the 380V power distribution system, the UPS system, the diesel generators and the DUPS system.

The overall site runs 541 protection relays from ABB (RET615) and Bay controller from Alstom (C264, now Schneider), the highest number of IEC 61850 devices in use in the industry.
Overall, PcVue records more than 40 thousand IEC 61850 equipment tags in real time, plus thousands additional IEC 104 datapoints from subsystems (I-Line), and thousands more Modbus RTU and TCP/IP connection to auxiliary systems. PcVue truly works as the data digitalization hub by sharing data to other systems via OPC such as the FMCS and the Power dispatching control station.

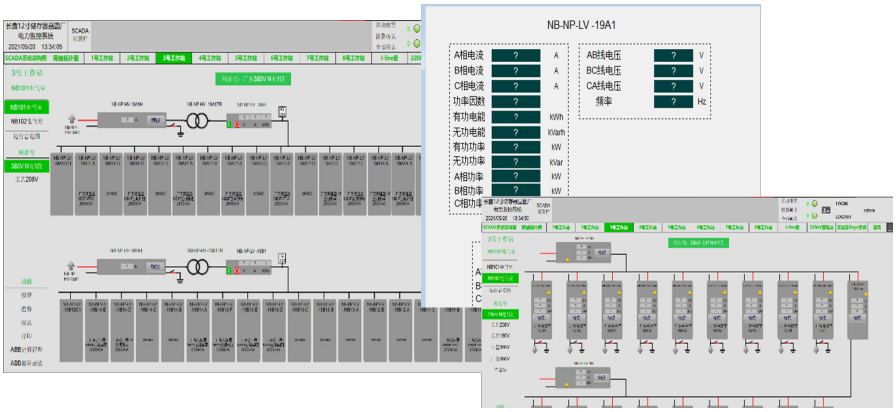


Fig.2 - Project Overview

(1): Locamation is part of PowerGo (Beijing) company

(2):In the central control room, a central real time data acquisition server is connected to each of the 8 separate production sites servers. It stays in hot/cold redundancy in case one of them fails. There is a second central real time data acquisition server acting as a backup redundant server as well. Both are connected to two historical data servers used for archive and replays, also redundant and synchronized.

SUCCESS STORY

BEAUTI-TONE PAINT

PcVue provides the edge needed to win against larger North American and global competitors.



Home Hardware Stores Limited is Canada's largest independent home improvement retailer. The company is owned by close to 1,100 independent small business operators from every corner of Canada, who operate under one of four banners: Home Hardware, Home Hardware Building Centre, Home Building Centre and Home Furniture. The company offers over 8,700 exclusively-branded products. Beauti-Tone Paint - produced along with many household products at its plant in Burford, Ontario - is just one well-known Home Hardware private-label success story. These Home Hardware branded products offer customers superior quality with economical pricing.

COMPETITIVE DRIVE

"From a macro perspective, it's all about competitiveness", according to Darrin Noble, Vice President and General Manager of Beauti-Tone Paint and Home Products. "So many Canadian manufacturers are working on a smaller Canadian scale but we are competing with North American and global manufacturers who are ten, fifty, up to two hundred times our size. These much larger companies are our most direct competitors".



In order to track progress, the plant is keeping a close eye on both production rates and yield. Darrin explained, "The objective is to do as much as we can in a labor hour while maintaining high quality. It's not just about beefing up the system and pumping more product out".

Streamlining communications so that the information is available more quickly to plant workers is a key factor in how PcVue helped the plant meet that objective. Eliminating the lag between the collection of data and the availability of that information to inform decision making was the first step.

BUSINESS OBJECTIVE

Grow Beauti-Tone market share against much larger competitors

Russell Banks, who is the plant manager, understands the importance of data for managing production and has been the champion of increased data collection. When the plant started collecting more data they found that some assumptions they had from simply viewing the line were incorrect. “I don’t think our impressions are very accurate, as far as what is holding us back and what our bottlenecks are”, remarked Noble. Knowing where the true bottlenecks are has enabled the plant to focus in the right place.

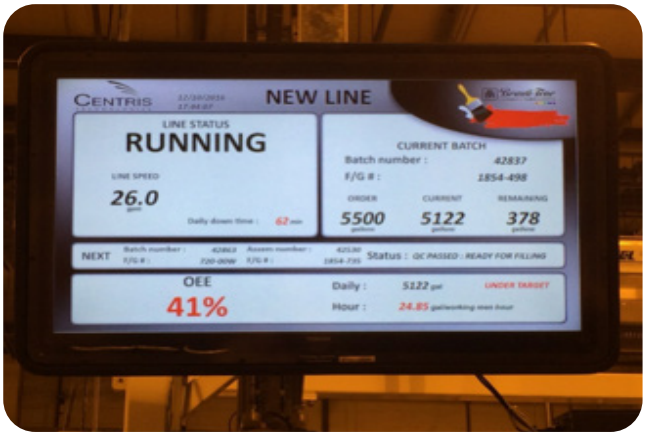
PcVue’s SCADA system is providing the plant with both a real-time and comprehensive view of the filling line which operates across multiple work centers. In the past, the focus of automation and data collection was on specific production equipment. The issue with this approach is that it gave the line workers a limited understanding of how the plant was performing as a whole.
Darrin summarized the situation, “We are focusing on finding those bottlenecks and opening up those freeways as well as the speed of communications to the floor. That way, we have our people wandering around less and knowing more about what is ahead of them, so they can plan for it”.

The system has also helped improve yield by eliminating some common problems in the handoff of work-in-process from one work center to the next. “It’s helped us improve quality” noted Russ. “The system automatically updates the equipment for the order that we’re running rather than having the operator do it by hand”. Automation reduces errors in changeover, which happens multiple times a day in their production schedule. Quality checks are also key elements of improved accuracy of the finished goods. For example, printing and scanning barcode labels to confirm the correct lot is at the work center before starting to process it.
Fifteen years ago, Beauti-Tone invested in materials handling automation to better manage the batch process for bulk paint manufacturing. At that time, production automation for the filling line was not a priority. The plant has a very stable and experienced work force with the majority of employees having worked in the plant for ten to fifteen years. They made few obvious mistakes in the production process. Darrin commented, “Maybe we would have got to control systems sooner if we were making a lot more errors.”



2 - Russ Banks demonstrating the front line worker interface of the PcVue production system

The lack of data made it difficult to measure plant performance. Darrin noted, “When I started here we were looking at sales every month. Now we do what we should do and look at sales every day.” The plant also looked at average gallons produced per labor hour, but did so on an annual basis.
Today, the plant looks at several additional measures and does so much more frequently. With the new production system on the plant floor, performance metrics are visible to everyone. In addition to visibility of the real-time production rate, they are now looking at performance against plan. Most recently, they have started to drill in further and look at performance to schedule and individual line performance as compared to overall plant performance.

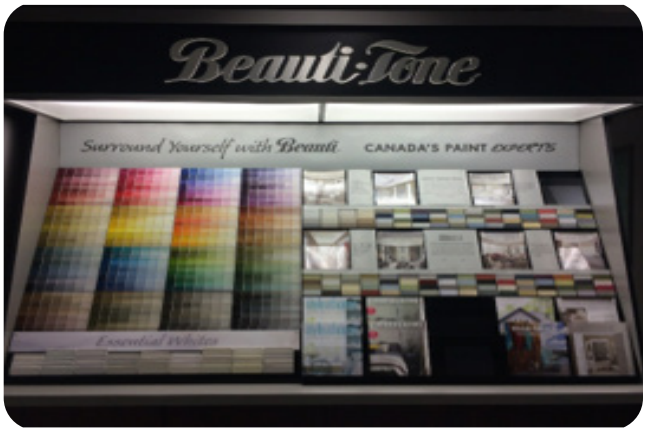


3 - Production system board showing real time metrics for line performance

ADOPTING CHANGE

Implementation of the system was done by Centris Technologies of Varennes, Quebec. Centris has experience implementing paint manufacturing

control systems and knows that no matter how good the system is, it will fail if there is not buy-in from the operators.
On one hand, some of the older workers at the plant were not really comfortable, even somewhat fearful, that the new technology would make their job more difficult. On the other hand, even those who were comfortable with the technology understood that in order to learn the system, it would require extra work on their part.
To address these issues, Centris put a priority on the design of the human machine interface in order to create a clean, simple, easy to understand layout. Soliciting feedback from the front line operators enabled a deeper understanding and buy-in from them. As an added benefit, familiarity with the purpose and layout of the interface makes training easier.



1 - Home Hardware's Beauti-Tone Paint products

Centris also established a partnership program with a 24 hour/ day hotline for the plant. Anyone, whether front line operators or management, is encouraged to call the hotline with questions or concerns. In new technology deployment, a common factor that turns users away from the system, is frustration. It can be frustration from not understanding how the system is intended to be used. It can also arise when things don't work as they are supposed to as the system is brought on-line. The hotline provides a means to address concerns quickly in order to eliminate these sources of frustration, which if not addressed will slow the adoption of the new system. Michel Kakos, President of Centris Technologies observed, "Companies who succeed at putting this kind of system in place, do so because everyone on the various teams involved are speaking the same language". This is an iterative process of developing the system on-line, soliciting feedback from the users, and then tweaking the system until everyone is on the same page. The result is a platform for growth and expansion that can be rolled out to the other lines much more easily.

MEASURING SUCCESS

The first PcVue production system was deployed initially at the end of 2016 with an expectation to complete a second production line in 2017. Beauti-Tone Paints is now producing twice the volume that they were achieving fifteen years ago without an overall increase in the number of employees. With the increase speed of communication and volume of data collection coming from the new plant control system, Beauti-Tone expects significantly more improvements to come.
Success of the project is measured from an improvement in gallons per labor hour and also in other metrics such as corrective actions and rework. Most importantly success for Home Hardware is achievement as the #1 top-of-mind retail paint brand, building on their current position as the market share leader by volume in the Canadian DIY market.
Internally, success is measured by the extent to which the users feel the production system makes them better able to perform effectively. "We know we have success when we hear the frontline assembly workers telling us that the system is helping them do their job and recommending that we expand it to other lines and areas of the plant", according to Darrin.
The PcVue is also intended as a platform for continuous improvement. Plans for enhancements include incorporating training documents and videos so that operators can easily reference standard work instructions. Russ added, "At the end of the day, the fact that we get more information to more people is a huge benefit to us down the road".

THE PcVue DIFFERENCE

PcVue was chosen for this project for two specific reasons. First, as an independent global software supplier, PcVue is not attached to any hardware manufacturer or affiliated with any brand of PLC or controller. This makes it a good choice in a typical plant environment with a mixture of hardware in use. Second, PcVue offered the optimum balance of

features, complexity and flexibility needed for the project now and supports future expansions.
According to Michel Kakos, “There are a lot of alternatives on the market. We prefer PcVue because it has the right balance between features and ability to customize. It is a generic platform for developing SCADA and HMI applications. We have worked with very complex and expensive platforms that require extensive training to use and we have worked with very simple platforms which were very difficult to customize. PcVue is the right balance for most customers.”

The project has been recognized by the High Tech News, 2016 Kinetic Process Innovation Award for Advanced HMI/SCADA Software Solutions. In addition to the business objectives and results described above, the integration with the plant Enterprise Resource Planning system to PcVue on this project was one of the elements of the Advanced SCADA that stood out for the judges.

KEYS TO SUCCESS

- Manage up to 20 batches per shift per operator
- Increase the amount of data collection done on the line
- Speed data communications to front line workers
- Automate the changeover process to reduce human error

RESULTS

Increased production rates

Lower production costs

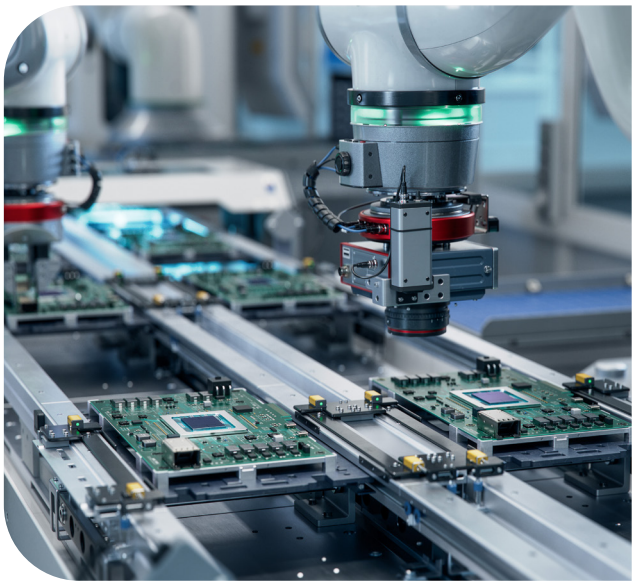
Reduced corrective actions and rework

SUCCESS STORY

PcVue SUPPORTS LUXSHARE: INTELLIGENT MANAGEMENT IN PRECISION MANUFACTURING

CUSTOMER OVERVIEW

Luxshare Precision was founded on May 24, 2004. It specializes in providing integrated intelligent manufacturing solutions for consumer electronics, automotive products, and enterprise communications—from core components and modules to system assembly. The Kunshan factory under Luxshare Precision features fully automated production lines and Class 10,000 cleanrooms. The products demand micron-level precision and extremely stable production environments.



PROJECT BACKGROUND AND CHALLENGES

With a surge in order volume, the Kunshan factory faced multiple challenges under the traditional manual operation and maintenance model:

- High Labor Costs: Equipment in the workshop required 24-hour manual inspection, with dedicated O&M personnel per production line, leading to extremely high annual labor costs.
- Delayed Fault Response: Equipment failures and environmental fluctuations relied on manual detection, resulting in long average response times.
- Environmental Monitoring Blind Spots: Precision semiconductor production requires temperature control at 22°C and humidity at 45% RH (Relative Humidity). Traditional instrumentation had blind spots, and local fluctuations sometimes exceeded thresholds.
- Severe Data Silos: Equipment data was scattered across isolated systems, making it impossible for management to obtain real-time, holistic production status.



To achieve intelligent upgrades, the Kunshan factory launched a comprehensive smart monitoring system project, introducing PcVue through Moran Automatic Control System (Shanghai) Co., Ltd. The entire project took six months to complete and covered full-facility deployment of intelligent systems.

SOLUTION & RESULTS

- Real-Time End-to-End Monitoring

PcVue integrates equipment data to visualize production parameters (pressure, temperature, speed) in real-time.

- Smart Alerts and Quick Response

Predictive maintenance through historical data modeling and health thresholds significantly reduced downtime due to faults. Alerts for abnormal events were promptly pushed, greatly reducing response times.

- Automated Workflow Optimization

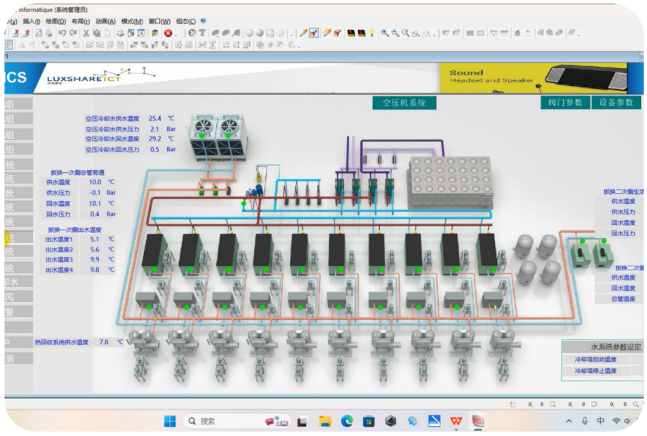
Integrated with the FMCS system (Factory Manufacturing Control System) to automatically dispatch work orders and sync production progress. When temperature or humidity exceeds limits, the system automatically adjusts air conditioning units to improve efficiency.

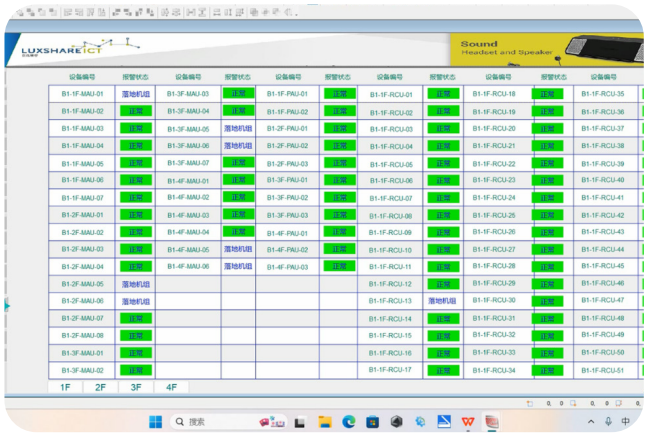
PROJECT HIGHLIGHTS

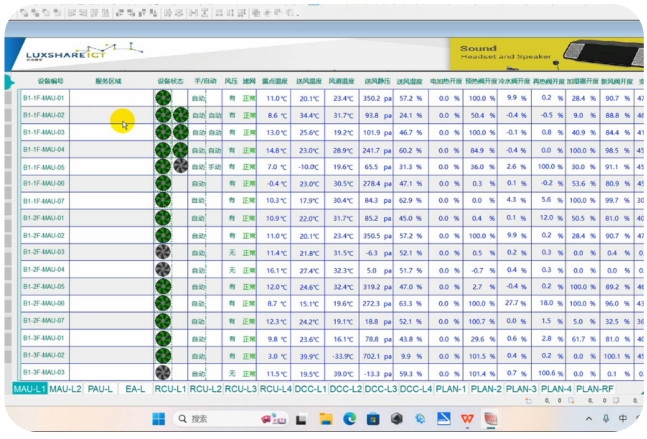
- Modular Deployment: Full-factory transformation completed in 6 months without disrupting normal production.

- User-Friendly Interface: Customized interfaces lowered training costs for staff.

Together with Moran Automation, PcVue enabled the digital and intelligent transformation of Luxshare Precision's Kunshan factory, significantly reducing operational costs and enhancing product quality and market competitiveness. This project stands as a benchmark for "smart factory" construction in the electronics and semiconductor industry.







SUCCESS STORY

VEUVE CLICQUOT CHAMPAGNE

World renowned champagne producer adopts a solution with PcVue to supervise its fermentation process.



Veuve Clicquot is a French champagne house known the world over. Founded in 1772, this prestigious house is now a subsidiary of LVMH. Its reputation is obviously no accident. The house does not compromise on quality and its motto is 'Only one quality – the finest'. In order to ensure that it always makes the finest champagne, it also needs to be able to closely supervise its production systems.

That is why, in late 2012, Veuve Clicquot revamped its fermentation cellar supervision system. The fermentation cellars are where the house makes its wine from harvested and pressed grapes. Supervising the tanks in which alcoholic and malolactic fermentation take place is crucial.

However, the software being used by Veuve Clicquot was at the end of its life and the publisher was no longer supporting it. It was therefore necessary that the house replace its 10-year-old supervision system by a more recent and better performing solution.



"We needed to replace it by a lasting solution that would be supported for many years to come," says Franck Berruyer, sales engineer at Arc Informatique, the company behind the PcVue supervision system installed at Veuve Clicquot.

"In addition to various technical factors, we chose the PcVue software suite because of the relationship of trust we have maintained with Arc Informatique and because the cost of the licenses is economically suited to Veuve Clicquot's needs," says Stéphane Fournier, manager of SF2I, the company that developed and integrated the supervision software.

BUSINESS OBJECTIVE

- Realize the company motto 'Only one quality – the finest'
- Closely supervise the fermentation cellars' 400 tanks of various types and volumes distributed in various towns across the Champagne vineyard at distances of 30 to 200 km (18 to 125 miles) from the main cellar

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Another advantage of PcVue is that it has the same HMI as the previous software, meaning that the operators were able to use PcVue immediately.

Furthermore, Guy Jendryka, manager of the electricity, automation and industrial computing department at Veuve Clicquot, stresses that one of PcVue's strengths is that it is easy to adjust and program. "With the previous system, you really had to be an IT specialist to be able to upgrade the software. PcVue is much easier to modify as needed."

The development architecture is based on PcVue objects and greatly facilitated the supervision software's design. Because Veuve Clicquot's fermentation cellars contain 400 tanks of various types and volumes up to 60,000 liters (16,000 gallons), the developers had to be able to use models to reduce programming, and maintenance times.



Depending on their type, the tanks are fitted with up to three temperature-control sensors and manual or automatic valves. The application manages some 40 variables per tank for a total of 16,000.

"The object development architecture saves time and simplifies operations. Once the model was made for the dozen existing tank models, it was simply a matter of instantiating the objects and automatically generating the communication variables," says Mr Fournier.

KEYS TO SUCCESS

- Relationship of trust between customer and ARC Informatique Group
- A solution that will last for many years
- A system that is easy to modify and maintain
- An integrated system linking distributed locations across the champagne region
- A system capable of running on virtualized servers
- A system which is fully accessible by supervisors from their personal computer
- A system which can be monitored and controlled via a 42” touch screen with a graphical interface attractive to visitors who will see it in the lobby

RESULTS

PcVue platform has made the fermentation cellars smart by managing 16,000 tank temperatures and diagnostic points

PcVue platform also monitors effluent at two treatment plants

Solution with PcVue incorporates weekly dashboard reports

PcVue platform automatically sends resupply alert e-mail to managers

SUCCESS STORY

THE CASE OF USV LIMITED, A MANUFACTURER OF LIFESCIENCE DRUGS

PcVue AS A SCADA AND INTEGRATOR

USV Limited, a prominent pharmaceutical company based in Daman in India, 4 hours away from Mumbai, is recognized for its high-quality pharmaceutical products, initiated a project to improve the monitoring and control of two 1200L Rapid Mixer Granulators (RMG04 and RMG06). At first, USV used another SCADA to monitor their granulation processes. However, frequent software crashes and issues with date and time stamps led to significant operational inefficiencies, prompting the company to seek a more reliable solution. In 2021, after testing PcVue SCADA for a couple of months, USV was impressed with its reliability and decided to proceed with the migration.



CHALLENGES AND THE NEED FOR A NEW PROJECT

The transition from the old SCADA system to PcVue came with several challenges.

USV had to navigate the complexities of dealing with a machine manufacturer that had gone inoperational;

They faced a lack of support from their existing supplier and associated automation product companies;

These challenges underscored the necessity of transitioning to PcVue software.



A SMOOTH INTEGRATION

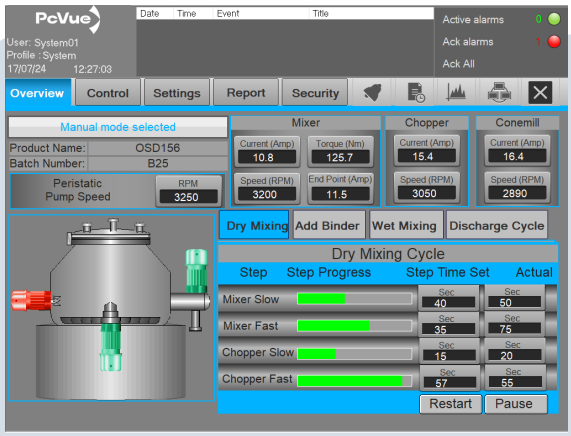
The integration of PcVue system into USV Limited's operations was executed smoothly, thanks to a collaborative effort. PcVue India partnered with USV Daman team for PLC programming, while our team independently handled the software implementation, ensuring a seamless transition from the old system.

PROJECT ARCHITECTURE

The system was built on PcVue 15 comprising of USFDA 21CFR part11 compliance, featuring two HMI panels and the configuration of 500 tags for monitoring and control. The communication interface with PcVue is using Mitsubishi MELSEC protocol and Dream Report for report generation.

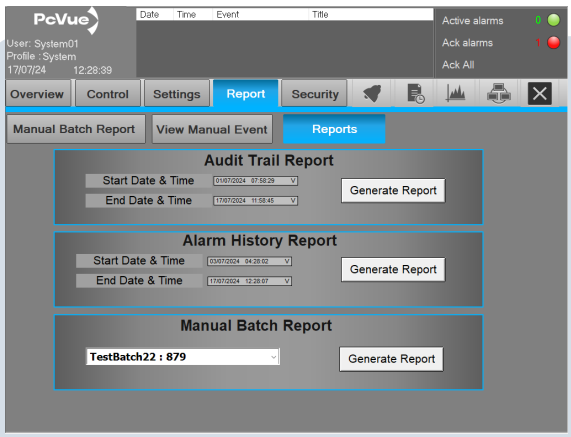
IN THE FUTURE

Currently, the project is fully operational and delivering the expected results. Discussions are already underway to expand the project by adding more machines, leveraging on the robustness and scalability nature of PcVue software. This successful integration underscores PcVue India team and their system integrators to support and implement complex customer requirements thanks to a holistic approach and understanding of the complete PcVue solution range of product.



TECHNICAL POINTS

- **Reporting Tool:** Dream Report
- **SCADA Version:** PcVue 15
- **HMI:** 2 HMI panels were integrated into the system on Advantech Panel PCs
- **Tags:** The project involved the configuration of 500 tags for monitoring and control
- **System Architecture:** Standalone project with OPC UA enabled for third-party communication
- **Protocol:** Modbus TCP/IP as well as Mitsubishi MELSEC Protocol



RESULTS

A successful migration: PcVue's dual role as both the SCADA provider and integrator ensured a smooth and efficient migration

A seamless integration: With PcVue handling the entire integration process, USV Limited experienced a streamlined implementation, resulting in minimal disruption to their operations

Reliability and stability: The project achieved enhanced system reliability, maximum uptime, with PcVue SCADA eliminating the previous issues of software crashes and incorrect time stamps, ensuring consistent and stable performance

SUCCESS STORY

LOMBARDY REGION TUNNEL MANAGEMENT

PcVue monitors and controls systems critical to comfort and safety of approximately 100 tunnels



Due to its mountainous topography, Italy is a country rich in road tunnels. In the Lombardy region, a new supervision and remote control system has been designed and implemented by Gemmo S.p.A. Based on the PcVue SCADA system from ARC Informatique, it ensures the comfort and safety of users along over 140 km (87 miles) of tunnels.
The wide alpine arc that surrounds and contains Italian territory is crossed by roads which include many tunnels. The tunnels are of different ages and the control system used inside them is mixed, due to differing implementation dates and technologies adopted. Thanks to a new wide-ranging project, the tunnel system of the road network is now managed by a new supervision and control system that is unique due to its size and complexity.

€140M ($190M USD) ON PROJECT FINANCING

The application falls within a national project for safety management and technology update of approximately 100 tunnels on state roads managed by ANAS S.p.A in Lombardy.
The wide scope includes the review and qualification of the technology of the tunnels and standardization or renovation of power, lighting, ventilation, video-safety and data transmission plants. The single or dual 'pipe' tunnels have lengths ranging from 250m to 5km (1/10th of a mile to more than 3 miles).
50% of the project is financed by ANAS and 50% by the private sector. Tunnel Gest (a company whose majority shareholding is held by Gemmo S.p.A.) is responsible for the management of the realized project for 17 years, starting in June 2013 when the 3-year construction and requalification period will be complete.
This time frame, which was defined in the financial plan at the start of the project, will allow the company make a return through the provision of services such as plant maintenance. The road management will remain ANAS's responsibility.
"The first stage, nearing completion, scheduled the technological requalification of the tunnels according to ANAS guidelines, which adopt the main European standards in terms of tunnel safety," says Ciro Ascione PE, Systems Business Unit Manager at Gemmo S.p.A. "Depending on their length,

BUSINESS OBJECTIVE

- Safety management and technology update of approximately 100 tunnels on Lombardy roads
- Ensure the comfort and safety of users along over 140 km (87 miles) of tunnels
- Standardize tunnel safety technology and renovate power, lighting, ventilation, video safety and communications

the tunnels are provided with plant of different complexity: from simple lighting, to equipment for ventilation, pollution analysis, heat detection, video-surveillance and image analysis, SOS management, audio for emergency situations, variable-message display panels and radio communication to support rescue organizations".
Each tunnel is provided with its own PLC-based automation system and is connected for supervision and control to the ANAS operations Center, located in Bellano (Lecco), through a communication network (WAN) using both fibre optic and microwave technology. For the integration been widely used because it allows direct and reliable control of peripherals and relevant data.

SUPERVISION AND REMOTE CONTROL

The supervision and remote control system configured by Gemmo S.p.A., a certified OEM partner of ARC Informatique, is based on a customized application of PcVue SCADA. Approximately 50,000 data points, 800 network nodes and over 500 graphical pages are managed.
From the main page which offers a system overview, it is possible to access the various tunnel subpages listed on the display. When a subpage is accessed an information window opens which aids navigation within the subpage.
At the same time, when a particular system is selected (the lighting system for instance) it is possible to visualize its status in any or all of the tunnels. Finally, by opening the information window of a particular piece of equipment it is possible to visualize several aspects of its operational status, set alarm limits, visualize alarm notifications and by-pass the local control logic to remotely control the equipment.
In fact, all represented objects can operate in either automated or manual mode. In the case of a problem (like fire risk or high pollution) the relevant automated procedures take over, but the operator can manually intervene for better management of the situation.
For instance, when an alarm procedure due to an excessive pollution in a tunnel is started automatically, the operator can watch the situation through the video system (composed of approx. 1500 cameras) and override fan settings and variable-message display panels to facilitate the outflow of the vehicles from the tunnel before the tunnel access is inhibited.

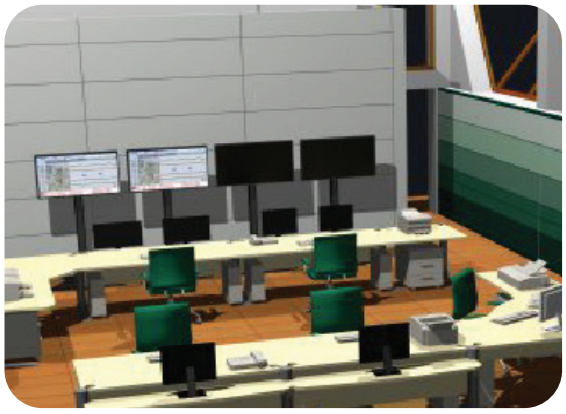


Fig.1 - View of the ANAS operations centre, located in Bellano (Lecco)

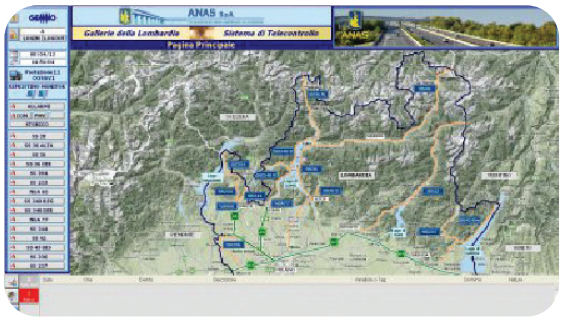


Fig.2 - The supervision and telecontrol system, designed and implemented by Gemmo S.p.A. and based on PcVue SCADA



Fig.3 - Main page with alarms and info window for the SS36 road

The hardware includes two servers in a hot backup configuration with a further server devoted to database management, two clients for ANAS, two clients for Tunnel Gest and one client for the Traffic Police. Two maintenance clients are used by the Gemmo team. Each workstation at the control Center has two 42" monitors side-by-side which can be used independently.
This allows, for instance, management of the SOS

system in a tunnel and simultaneous monitoring of the complete system. “We centralized all the tunnel plant monitoring at the ANAS operating Center of Bellano,” Ascione explains. “The SCADA shows the operator a series of video graphic maps that supply the status of all equipment in real time.” Thanks to the network connection, it is possible to connect through the web to the individual controllers.
Locally, using a portable PC, it is also possible to connect as a PcVue client and query a controller, or to navigate with a browser to the network server. Starting from the graphical pages displayed by the supervision system the operator can instantly know where an alarm was triggered or if a user is calling from inside a tunnel.

MAXIMUM SAFETY

The whole system is characterized by several safety levels. In every tunnel there is a redundant LAN connected to the general WAN, to which all automation peripherals and subsystems refer. The automation system of every tunnel is independent of the Operations Center and therefore all the subsystems interact through the tunnel LAN.
“When an SOS is triggered from any tunnel, a general alarm procedure is activated,” says Ascione. “From the main page, with a maximum of two steps, the operator is always guided to the point indicated by the alarm.”
Tunnels have mainly axial ventilation, but some also have cross or half-cross ventilation. In case of over-



Fig.4 - Main page with alarms and info window for the Regoledo tunnel

pollution the ventilation is activated and increases in volume as a function of the detected pollution level, to attempt to avoid the potential closure of the tunnel.
At the same time, user warnings are shown on the variable message display panels and in some cases, the audio system is activated, directing the users to abandon vehicles.
All this information is monitored by the SCADA system, giving the operator the opportunity of overriding the automatic system to directly interact with the involved systems by remote control.
In the SCADA main page the most important information is collected: the ventilation level, the status of the sign system and the pollution with different settable thresholds. Moreover, the status of every object is shown.
Using the simulation mode running special

KEYS TO SUCCESS

- Communication networks tie all automation components together
- Simple navigation from alarm notification to the equipment affected
- Manual override for remote control of systems in the tunnel
- Balance fan operation to synchronize maintenance
- Integrate smart video for surveillance and image analysis
- Support graphic changes on-line and the ability to make programmatic changes to graphic screens
- Ability to develop with teams working concurrently on application

algorithms, it is possible to change the alarm thresholds.
For instance, in the ventilation system, it is possible to cycle fan operation so that all fans simultaneously reach the number of hours scheduled for periodic maintenance, minimizing the possibility of emergency maintenance in which the tunnel must be closed.
In case of fire detection, the ventilation system is driven not only by opacity and CO sensors, but also by the image analysis and thermometric system. The Operations Center can intervene with messages that directly reach drivers through the FM radio system.
The fire-fighting system is based on one or more pumping and pressurization units that guarantee the water supply. The storage tanks provide flow rates from 21 cfm for tunnels with length greater than 1000m (1/2 mile), or a flow rate of 17.8 cmh (10.5 cfm) for shorter tunnels. Special fire hoses are located in SOS containers arranged every 150m (0.1 mile) within the tunnels.
The containers are also provided with VOIP phone communication equipment that is integrated within the network.
The integrated video system allows not only video surveillance, but also image analysis. It can operate on-demand, on operator request, or on event. Through image analysis, for instance, it is possible to detect a stationary vehicle due to accident or fault, a vehicle driving against the traffic, the presence of smoke, the presence of pedestrians on the roadway, or other alarm situations.
The video system is independent but integrated. "We developed interfaces on PcVue to be able to access special images and we also created an interface to the video system dedicated to the Traffic Police, who have operational headquarters in Bellano Center," says Ascione.

A FULLY OPEN SYSTEM

"We selected ARC Informatique's PcVue because we appreciated that the system is really open," says Ascione. "The openness is fundamental in our work as system integrators, because we can get inside the product to customize it and better use its capabilities, while exploiting the 50 years of experience that we acquired in the road industry. With PcVue we combined our specific know-how with the most advanced SCADA technology to reach a double target: on one hand, to be able to constantly monitor all the operations by presenting an interface that is relatively user-friendly while providing all the relevant information; on the other hand, to be able to collect the details that the technicians require to keep the operations efficient."
Gemmo S.p.A. has therefore used a single tool, serving different purposes.
A manager needs to use the graphical pages tool to better monitor the events on the road. On the other hand, the technician uses the tool with such detail that they can make a diagnosis and therefore prevent a malfunction. "This is the purpose of the concessionary company," Ascione emphasizes. "By keeping the plant operating efficiently through adequate remote control, we are able to prevent faults and to guarantee ANAS that they can perform their job, with the ultimate target of improved safety for the users."
"We understood the graphical editor of PcVue, because it was also used by FactoryLink®, a product that we knew in depth. This was another plus of the ARC Informatique solution and another reason why we selected it. We have been able to carry on to this platform all the know-how and the solutions that we developed with FactoryLink®," adds Ascione.



Fig.5 - Sub-page of Poggi tunnel, along the Strada Statale della Valsassina road

ENERGY MANAGEMENT

A future expansion of the system will concern the energy management system. This will allow ANAS to monitor consumption and to save energy by switching the lights off when the traffic in a tunnel is moderate and by regulating the fans as a function of the pollution level reached inside a tunnel.

RESULTS

Solution with PcVue provides detailed monitoring to improve safety and prevent malfunctions that disrupt traffic

PcVue platform manages 50,000 data points over 800 network nodes and 500 graphical displays

PcVue platform incorporates tunnel safety standards with several safety levels included



SUCCESS STORY

SUPERVISION OF TRUONG VINH TUNNEL IN VIETNAM

Modern infrastructure monitored by PcVue



PROJECT CONTEXT

Officially open to the public in September 2023, Truong Vinh tunnel is part of the North – South expressway project with a total length of 450m. It is a strategic, USD 193 Million, public investment, providing an economically strategic road link, between Thanh Hoa and Nghe An provinces.
It is a double boreholes conduits tunnel, each with 3 lanes and 14m wide, designed for driving speed of 80km/hour present and 120km/hour future.

THE IMPORTANCE OF EFFICIENT TUNNEL MANAGEMENT AND SUPERVISION

Efficient tunnel management and supervision are essential to ensure the safe and reliable operation of modern tunnel infrastructure. A Chau Industrial Technology JSC, (ACIT) was awarded the contract for the Tunnel automation system and elected to use PcVue SCADA software solution to control substations, generators, low-voltage panel cabinets, and various sensor technologies.

In the case of the Truong Vinh Tunnel, the complex nature of this transportation conduit demanded meticulous monitoring. PcVue provided a SCADA system installation, that allowed efficient Tunnel Management.

Ventilation, as a fundamental aspect of tunnel safety, is intricately monitored through the SCADA system. The ability to dynamically adjust airflow in response to changing traffic conditions is vital for maintaining air quality and visibility within the tunnel. Real-time ventilation control ensures that travelers experience a comfortable and safe journey.
Furthermore, PcVue system oversees the electrical distribution, particularly managing medium and low voltage components. Lighting is a critical component of tunnel safety, and the SCADA system provides the capability to control and monitor lighting in real-time. This not only enhances visibility but also contributes to overall safety and energy saving.

The traffic panels managed by the SCADA system are dynamic and responsive, providing up-to-theminute information to drivers. This feature optimizes traffic flow and ensures an

TECHNICAL POINTS

- 65,000 tags
- Hot-Standby redundant servers
- Modbus TCP and Siemens IP-ISO S7 protocol
- Open architecture concept for feature evolution

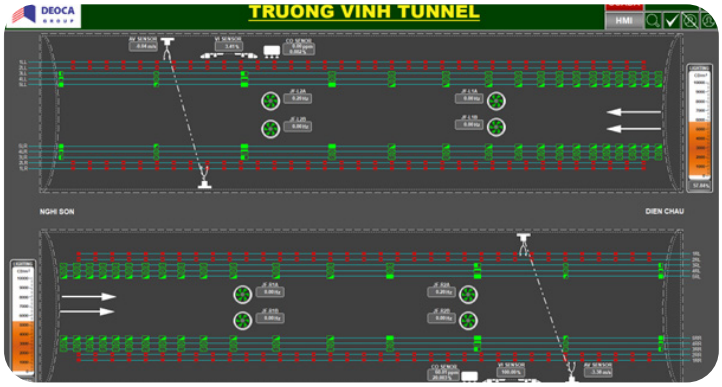


efficient and stressfree journey through the tunnel. Emergency response also relies on the SCADA system, using visibility sensors to detect accidents or incidents in real-time, facilitating swift responses by emergency teams, thus contributing to improved safety for all tunnel users.

TECHNICAL SPECIFICATIONS

The successful implementation of the Truong Vinh Tunnel project's SCADA system relied on precise technical specifications, carefully tailored to meet the unique demands of this tunnel infrastructure. The system utilizes 2 Hot-Standby redundant servers and 2 surveillance operator stations, ensuring uninterrupted tunnel operations even in the event of system failures, maximizing uptime and safety.

The open standard SCADA system communicates using industry standard protocols such as Modbus TCP and Siemens IP-ISO S7 protocol ensuring future interoperability with any automation equipment manufacturer. Today the system already monitors above 20 000 parameters and could allocate up to 65 000 tags in the future thanks to its open architecture concept.



"This project is the result of efforts from our engineers and very effective support from PcVue's technical support team. On behalf of ACIT, I would like to thank PcVue and the entire technical support team." Chinh Mạc Văn, Expert, R&D Department - Power Transmission & Distribution Board at ACIT.

RESULTS

User comfort is assured in terms of traffic flow and visibility

Traffic flows smoothly and problems are anticipated

PcVue monitors and controls:

- 1 transformer 35/10/0.4 kV, capacity 630kVA
- 1 generator 0.4kV, capacity 660 Kva
- 12 low voltage cabinet
- Sensors such as Carbon Monoxide, Visible Light, Air Flow Direction

Close collaboration between ACIT and PcVue team ensuring a very fast implementation within just one month

Project ready for future evolutions



SUCCESS STORY

CANADIAN NATURAL RESOURCES OIL AND GAS PRODUCTION

PcVue supplies production reports and validates data for regulatory audits



Canadian Natural Resources Limited (CNRL), founded in 1989 and headquartered in Calgary, Canada, possesses a diversified combination of assets in North America, the North Sea and Offshore Africa and today is the largest independent crude oil and natural gas producer in the Canada. Delivering a balanced mix of natural gas, light oil, heavy oil, in situ oil sands production, oil sands mining and associated upgrading facilities, CNRL engages in the exploration and development of geographic areas for the production of natural gas and crude oil. The company operates its business through three primary reportable segments: Horizon oil sands production, thermal heavy oil, and conventional oil and gas.
CNRL invested in a large scale automation project that primarily impacts the conventional oil and gas business that deals with the exploration, development, production and marketing of crude oil, natural gas liquids and natural gas.

SCALABLE SCADA AUTOMATION

Canadian Natural Resources needed a better way to manage the process control and monitoring of its 300 gathering stations, 800 compressor stations, and 150 gas processing facilities. CNRL's SCADA Specialist, Kurtis Jackson, spearheaded the company's automation project to replace its FactoryLink SCADA systems with the PcVue's SCADA and FrontVue solutions. CNRL has numerous independent automation systems of various brands and Jackson wanted to centralize and achieve consistency by integrating as many of these automation systems as possible on PcVue. In addition, CNRL wanted to leverage PcVue's ability to support multi-station architectures for networking and communicating Modbus Roc, Roc Talk, and BSAP.

The replacement process started when CNRL began migration of their FactoryLink SCADA to PcVue using the Smart Generator. This PcVue tool easily and automatically converts a very high proportion of existing applications to PcVue, while ensuring maximum compatibility and security.

"For most of our SCADA applications we were upgrading, between 60-80% of our FactoryLink applications converted to PcVue with ease. This saved us a tremendous amount of

BUSINESS OBJECTIVE

- Improve monitoring and control of 300 gathering stations, 800 compressor stations, and 150 gas processing facilities
- Improve monitoring and control of 300 gathering stations, 800 compressor stations, and 150,gas processing facilities

time with not having to reconfigure the entire applications and it meant that we did not have to retrain our users. It also says that we are investing in our future with SCADA automation, PcVue regularly enhances its SCADA with version updates and new features," said Jackson.
CNRL is measuring millions of tags and an approximate 800,000 I/O points within its primary operations. GE and Allen-Bradley PLCs, Fisher and Bristol Babcock RTUs are the major brands used throughout production. The PcVue SCADA is monitoring and providing pertinent data used by some 2,500 employees who need to access the information in some shape or form – i.e., monitoring, reviewing, or maintaining data in real-time.

"We run daily our production reports and utilize real-time and historical trending to give us the data needed to make sure we have met our production goals and will meet our sales contracts, such as to a pipeline company for example," said Jackson. Currently, Kurtis has already implemented eight PcVue servers with remote client access and expects to deploy approximately 40 PcVue SCADA systems within the next two years.

OIL AND GAS SYSTEMS SUPPORT AND ADVANCED COMMUNICATION INTEGRATION

CTH Systems Inc., a value-added reseller of PcVue, helped to configure and facilitate the migration to PcVue. Using Smart Generator, the engineers were able to convert all of the graphical elements (mimics, symbols and templates), local and shared libraries (symbols, pictures), all sets of variables for the application (including variable tables, alarm configurations and histories) and the database without any rework. It also converts the TCP/IP communication objects and their links.

"We were really happy with how easy it was to transfer all of our applications to PcVue in a very easy, straightforward manner," said Jackson.
In addition, CNRL uses TinBox Energy Software's IM-SCADA™, a multi-protocol measurement and communication software. It allows the wells that are equipped with different automation devices, such as RTUs (remote terminal units) or pump on/off controllers, to talk over a single radio channel in order to bring the data back to PcVue SCADA.



CTH Systems supported CNRL with implementing automatic and remote readings of gas compositions from the well, the upload of the corrected gas compositions to each well, and the elimination of variances between the well meter and the IM-SCADA™ database.

"We couldn't be happier with how robust and effective IM-SCADA works for us. It helps maximize operational efficiency," said Jackson. It minimizes the need to physically go to the well sites to download or upload the gas compositions.
Having 178 host servers along with 600 remote clients, CNRL is monitoring about 5,000 – 6,000 data points per host. Of these there are eight PcVue stations that are supervising anywhere from 50-400 wells and one to three facilities per host, depending on location or region.

"This translates to thousands of tags and alarm parameters that are being monitored and acknowledged daily," said Jackson. As the oil flows out of the well, it passes through a pipe arrangement, which is connected to flow lines that bring the oil and gas to gathering stations where sediment, gas, salt water and oil are separated. PcVue is also monitoring the gathering stations.
The PcVue SCADA collects such I/Os from PLCs and RTUS used in production fields and gathering stations such as gas/oil pressures, (ESD), pump start/stop, remote/local pump control, pump speed, pump run/stop, motor operated valves and motor operated valve shut down, choke set points /positions, temperature, emergency shutdown and fire alarms etc.

“One of the most important factors in our industry is safety. At every stage of the process, PcVue monitors our mission critical operations and maintains all of our safety measures to prevent fires, explosions, and ecological disasters,” said Jackson.

MEETING COMPLIANCE AND MANAGING DATA VALIDATION

Characterized by remote and widespread operations, CNRL wanted to have each automated activity whether in drilling/production, distribution, transportation or refining supervised from several of its control centers.

A solid and securely designed SCADA system must be able to control such critical factors as: flooding, leakage, fire, ESD, oil and gas flow rate and accumulated flow, line pressure, wellhead pressure, pump status, tank level, and gathering station equipment status, among others. Due to the nature of the product, which must be transported from the well to final consumer, and the potential adverse environmental effects of oil/petroleum accidents, SCADA systems are a necessity. “We wanted to leverage SCADA features and benefits that give us the ability to reliably gather more data and achieve more control,” said Jackson.

Frank Tarbox, President of CTH Systems aim is collaborate with Jackson and his team to provide an effective way to validate and correct the well data for gas measurement optimize it and then move the corrected data throughout the organization while still complying with Directive 17 and 76 standards.



“Through our expertise in this area, we’ve really become extremely proficient at managing the measurement requirements for oil and gas operations,” continued Tarbox. The Energy Resources Conservation Board (ERCB/Board) had mandated Directive 17, which constitutes the measurement requirements for oil and gas operations. CNRL achieves ERCB compliance and they use the data collected from PcVue for not only daily production reporting but for running audits and assuring compliance.

CNRL is looking forward to reaping the benefits of upgrading its automation systems and is really happy thus far with how well it has been working optimize their processes. “We are really glad we chose PcVue and IM-SCADA for our SCADA solution and that the configuration process has been very straightforward to implement, especially in consideration that most of our applications are mission critical and work around the clock,” said Jackson.

KEYS TO SUCCESS

- Manage 800,000 points
- Support multi-station architecture with various RTU communications
- Communicate over single radio channel to various brands of RTUs
- Automatically convert existing unsupported SCADA to new technology

RESULTS

PcVue monitors and reacts to critical factors such as flooding, leakage, fire, critical pressures (line and wellhead), emergency shutdown and equipment failures while monitoring and controlling oil and gas flow and recording accumulated flow

PcVue maximizes operational efficiency by eliminating the need to travel to the wellhead to upload and download gas composition to the flow computer on-site

PcVue maintains safety measures to prevent fires, explosions, and ecological disasters

Solution achieved Energy Resources Conservation Board compliance

PcVue solution validates data for regulatory audits

SUCCESS STORY

TOULOUSE TRAMWAY

PcVue platform integrates centralized maintenance, signaling, automatic vehicle location system and closed circuit TV into a unified system.

The railway systems integrator Roiret Transport, subsidiary of the Vinci Group, has selected the PcVue software solution from publisher Arc Informatique to supervise the centralized technical management (CTM) of the new Toulouse tramway.
After the Lyon tramway and the Singapore and Santiago (Chile) undergrounds, it is the thirtieth urban system to opt for this solution. Every day PcVue manages the information necessary for the transportation of more than 10 million passengers around the world.

PcVue is a centralized supervision (SCADA) software with an installed base of more than 38,000 licenses around the world.
In its railway version it is used to supervise the CTM (centralized technical management) equipment, i.e. the trackside equipment of the network.

This equipment includes electricity substations, stations (ticketing, traveler information terminals, etc.), intercom, CCTV, and sometimes even the track signaling systems.
In practical terms, if a ticket machine is faulty, for example, the software sends an alarm to the operator in the central control room so that the most appropriate corrective action can be taken. In the case of the Toulouse tramway, PcVue will interface with some thirty controllers (including one for each of the 18 stations).

The software manages 15,000 to 20,000 information items in real time. It can also run applications handling larger volumes, with up to several hundred thousand managed variables.
“We first appreciated the ability of Arc Informatique to develop specific protocols, particularly for the CCTV. This enables us to interface with the network supervision PCs that have ´business´ protocols and thus ensure the continuity of the installation. Next, PcVue provides a ´VCR´ function which records the events. For example, if an incident occurs at a junction, the entire scenario leading up to the incident can be played back. Lastly, the IntraVue module enables PcVue to supervise and integrate equipment such as the CCTV cameras directly on a TCP/IP network. It is no longer necessary to use a dedicated PC for each type of equipment.” said Mr. Clarenne, Business Manager at Roiret Transport.



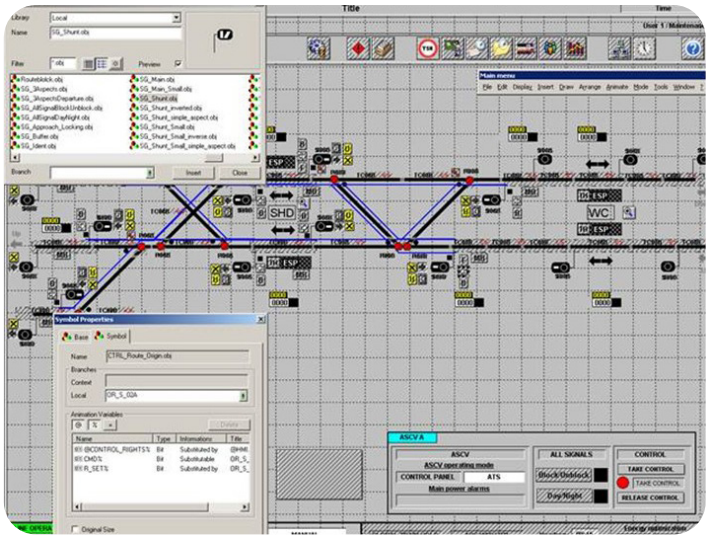
BUSINESS OBJECTIVE

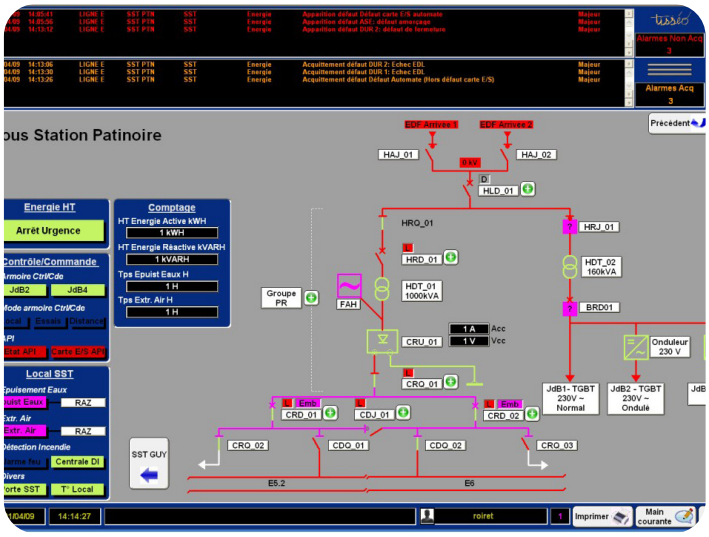
Safe Supervise the Centralized Technical Management (CTM) of trackside equipment for the new Toulouse tramway

In a central control room there is usually a computer work station for the signaling, another for the CTM, and yet another for the AVLS (automatic vehicle location system).

The standout feature of PcVue is that it can integrate everything. Signaling functions can be included on the CTM screen. In this case, with only two screens, the operator supervises the CCTV, the intercom with the trains or the stations, etc.

PcVue also provides native management of multi-screen displays and video walls.
Animated graphics managing the combinations required for object coloring are supplied in the form of libraries (track circuits, switches, signals, etc.).
Development kits are available as standard for interfacing with third-party applications (train tracking, space-time plots, etc.).







KEYS TO SUCCESS

- Manage Interface with some thirty controllers and manage 15,000 to 20,000 information items in real time
- Integrate signaling functions on the CTM screen
- Interface with the network supervision PCs that have «business» protocols and thus ensure continuity
- Native management of multi-screen displays and video walls
- Animated graphics managing the combinations required for object coloring are supplied in the form of libraries (track circuits, switches, signals, etc.)
- Development kits are available as standard for interfacing with third-party applications (train tracking, space-time plots, etc.)

RESULTS

PcVue platform provides integrated CTM and CCTV supervision

PcVue platform's VCR function records the events in the system

PcVue platform manages the industrial TCP/IP network for reliability and performance

SUCCESS STORY

CITY OF JENA TRAM SYSTEM

Solution with PcVue helps relieve Jena's suburban traffic congestion.



The attraction of urban public transport depends on faultless operation and punctuality. The traffic layout and topography of the city of Jena in the Saale valley are such that a large part of the intra-urban traffic is concentrated on a few commuter corridors. It is important to ensure regular operation and high availability on this main corridor. Outages at technical and railway facilities can cause failures in electrical supply, in control points and switchgear or to signals and security of passageways.

HISTORY

In 1992, the Jena city public transport company installed the first supervisory control of the electrical supply. Until 1996, all voltage rectifier units, security units and signaling units were connected to a single Unix-based system. The maximum capacity of the system was soon reached. In 2008 the system was ten years old and order to continue to ensure reliable operation it became necessary to renovate the system.

IMPLEMENTATION WITH PCVUE

The new supervisory control system was implemented by Cegelec using PcVue SCADA software running on a Microsoft Windows client server architecture. It consists of a communication server, a database server and four fixed workstations. There is an option of using any computer or laptop as a remote station. In addition, a development station is available for maintenance.

The servers act both as domain servers, provide user administration, wireless clock and data backup. The communication server is dedicated to the link to the PLCs via the ABB RP571 protocol. The handling of user actions, messages, alarms and variables take place on the database server running Microsoft SQL Server.

The graphical interface includes object-oriented diagrams that display the current state of the system, alarms, reports, real-time trends and historical trends, as well as running the customer's algorithms for tram operation.
PcVue's native capabilities, such as redundancy and automated project version management, made it was possible to have the project shared from the communication server. In this

BUSINESS OBJECTIVE

- Migrate obsolete SCADA to new scalable architecture capable of further expansion
- Improve efficiency and reduce overtime
- Improve reliability to reduce traffic congestion, both in trams and vehicular traffic

architecture, changes for any station in the network are only applied in one place.

PcVue allows a client to run as a Windows Terminal Server (now called Remote Desktop Session). In this way, authorized users can access the server of any workstation via remote terminal access, display existing information and – after their passwords have been verified – control the system.
Routers are used to provide a TCP/IP link from the telephone network to the local area network of the supervisory control system; no other software is needed.

To minimize the impacts of failures, it is important to reduce the length of breakdowns. The repair staff has significant travel due to the decentralized nature of the tram system. Travel to site plays a large part in the duration of the disruptions.
With PcVue, it is possible to visualize and control the electrical supply stations, points and switchgear; plus control and management of signaling alarms from a central location. Some predefined alarms are sent by SMS to the service technician's cellphone, via the alarm management function of PcVue. In the same way, it is possible to deliver voice alarms by telephone, so the technician on duty can get more information and more quickly resolve the problem.

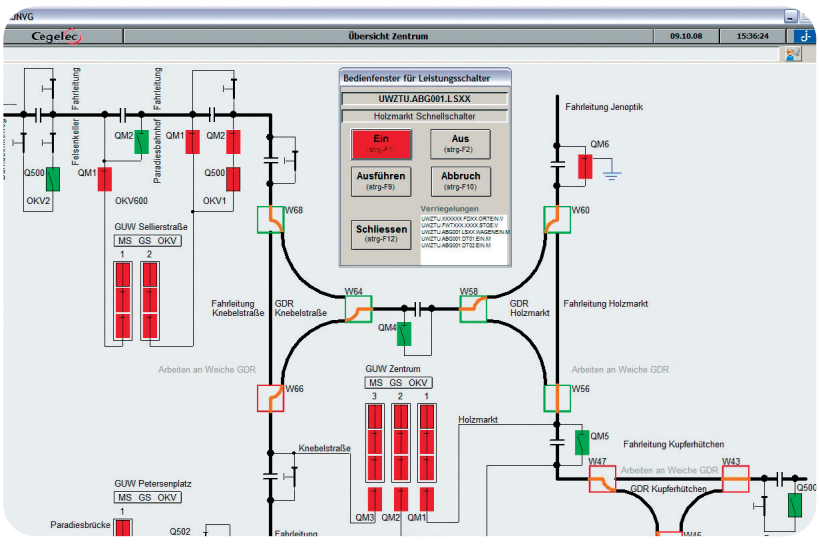
PcVue offers many native interfaces as standard, such as Modbus/TCP, Profibus and S7 via TCP, and it can be used as an OPC DA server, OPC client or OPC DA XML client. That was vital for modernizing the system, making frequent adaptation of hardware components a thing of the past, even when suitable spare parts could not be obtained.
Future communication between the different devices will be of the Ethernet type, preferably IEC 870-5-104.

EASIER HANDLING

The choice of PcVue was also in part, based on ease and speed of conversion from the Unix based SCADA. Design of the data model is accomplished by a set of menus, while changes during the project are integrated on the fly.
A major attraction of PcVue for Cegelec is the ability to view the whole data model or configuration definition as ordinary text files. Using standard tools they can configure variables in bulk with the filtering, copying, insertion and search and replace functions.

To make best use of this facility, and also for improving clarity and maintenance, the most meaningful naming structure possible was set up. The name of a variable indicates the collection, site and components as well as an individual explanation and the nature of the data.

The PcVue development tool represents the variable naming in a tree-structured manner which is also used to filter the data definition selection by site, collection and component type.
Images are easily converted into PcVue via an import tool. The installer can develop and maintain the application by dragging & dropping a preconfigured object as a referenced symbol. Production of the display pictures (mimics) uses a WYSIWYG technique (what you see is what you get).



START-UP

During the start-up of the new system, it was imperative to ensure interruptions to the old system be minimized. This was possible by concurrently running both systems during the transition, such that there was only a short bump during switch-over. To achieve that required two measures, first by coupling the data via an OPC link to the old system, then after disconnection of the link, retrieving data directly from the PLCs.



KEYS TO SUCCESS

- Ease and speed of conversion from the previous SCADA application
- Changes are applied in one place as the whole project resides on the communication server
- Concurrent running of the previous and new systems throughout the transition
- Remote access from any workstation for both monitoring and control
- Standard native interfaces such as Modbus/TCP, Profibus and S7 via TCP and IEC 870-5-104

RESULTS

PcVue eliminates the need to travel to site to perform electrical disconnects

PcVue enables emergency shutdown of the entire system in case of danger

Solution with PcVue enables swift response to issues resulting in less traffic congestion

PcVue provides early warning of potential problems enabling breakdowns to be avoided

Solution with PcVue improves reliability via remote reconfiguring of substation feeds

SUCCESS STORY

HOW PcVue PLATFORM SUPERVISES WATER MANAGEMENT AT THE KARIAN DAM IN INDONESIA

Situated in the province of Banten, just an hour's drive from Jakarta, The Karian dam testifies the Indonesia's commitment to water resource management. The dam area covers 2,226.44 Ha which can accommodate up to 314,7 million cubic meters of raw water. It also can irrigate 22,000 hectares of rice fields providing 13.9 cubic meters per second of raw water for irrigation, public water necessities and industrial needs. Karian Dam is a crucial infrastructure for the area. "The Karian Dam is one of Indonesia's biggest dams," said Joko Widodo, the Indonesian President at the inauguration ceremony in Banten. This project, which required a public investment of IDR 2.27 trillion (US$ 146 million), is not just about size, it is a key to a sustainable future for the region.



AN EFFICIENT DATA COLLECTION

One of the key challenges faced during the implementation of the Karian Dam project was the need for significant data collection. PcVue was chosen by the engineering company for its user-friendliness and flexibility.
Mr. Satrio, director at PT Sartika Mitrasejati, noted that "PcVue was easier to use than other products" highlighting the software's intuitive interface and cutting-edge features. PcVue software allows the team to supervise the dam's water flow and integrate multiple subsystems in a single platform.
The real challenge was to be able to collect data despite the great distance covered along the river. PcVue's adaptability and scalability were pivotal in overcoming this challenge.



A HELPFUL TECHNICAL SUPPORT

Mr. Satrio mentioned, "PcVue' support team was very accommodating and ensured that all our requests were met." highlighting the team's dedication to providing quick and efficient technical support.

MANY INTERFACES WITH OTHER PRODUCTS

The successful implementation of the dam project relied on tailored features to meet the unique demands of its infrastructure.
PcVue was interfaced with various other systems thus improving the operational efficiency of the dam as it provides a consolidated information platform for the operator:

- Remote monitoring through WebVue platform;
- Complete reporting using Dream Report;
- Integration of 8 CCTV cameras using Onvif protocol to confirm critical water level alarms visually.



A PROJECT WITH NOT ONLY ECONOMIC BUT ALSO SOCIAL IMPACT

As the largest dam in Indonesia, the Karian Dam project is not just about breaking records, it's about making a real difference in people's lives. Although the project is still expanding with the addition of several telemetric stations, the dam is already changing lives. Not only boosting the region's agriculture efficiency but also serving as a vital tool to prevent floods.



This project also helps on a global scale. Jakarta, Indonesia's capital, faces a significant challenge as it continues to sink at an alarming rate. This subsidence, primarily caused by excessive groundwater extraction, threatens the city's infrastructure and more importantly, the well-being of its inhabitants. The Karian Dam presents a crucial solution to this problem by providing a new and reliable source of water thus reducing the city's dependency on groundwater, the dam helps mitigate the subsidence issue.

The Karian dam is therefore not only a vital infrastructure project for water management and agricultural efficiency, but also a key player in meeting Indonesia's environmental and societal challenges.

PcVue is proud to play a pivotal role in a project helping communities on such a large scale.

TECHNICAL POINTS

- PcVue Version 16
- 3 PcVue clients
- 5000 Tags
- WebVue 5 concurrent client
- Dream Report
- Modbus & OPC communication
- Onvif cameras for CCTV

RESULTS

A project with positive economic and social impact

Avoid floods in the region and allow irrigation for agriculture

Data collection for long term analysis and statistics of local weather conditions

Ready for future expansion with planned addition of several telemetric stations

SUCCESS STORY

INDUSTRIAL AQUEDUCT OF LAKE COMO

PcVue incorporates pump energy profile management to minimize costs.



The Como Industrial Aqueduct is a fully automated system which, via a network of approximately 60 km, reaches all its users spread across the Como area. Built in the 1980s by a consortium of industrialists in the area, it has been revamped in the last decade to overcome the obsolescence problems of the remote control system.

The pumping process (which takes water directly from Lake Como and sends it to the storage tanks is monitored by some operators in the control room during daylight hours on weekdays, while for most of the time it operates unattended, with an emergency system managed by an external supplier, always available in case of anomalies automatically detected by the supervisor.

The system, which stands out for its reliability, guarantees an uninterrupted and constantly monitored service to user companies.



The infrastructure, as well as from a technological point of view, has also been improved from an energy, eco-sustainability, management and ease of maintenance point of view.
A critical aspect that had to be addressed was the time available for replacing the infrastructure, as the system (totally automated) allows operation in manual mode only for short periods. Since it is a centralized system, its blocking would have resulted in the total shutdown of the infrastructure.
It was therefore necessary to plan well-coordinated interventions which, thanks to the intervention of multiple technicians working simultaneously on multiple sites of the distribution network, made it possible to reduce installation and execution time to a minimum.

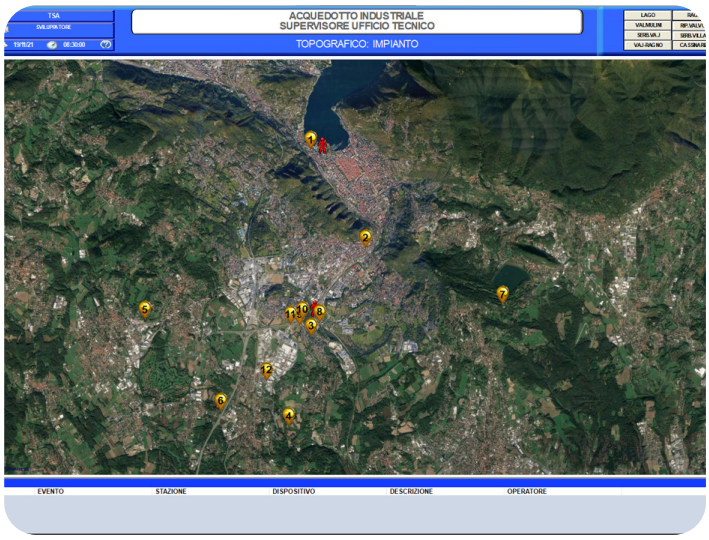
The system has been carefully redesigned with a new structure, more open and modular than the previous one, which favors the use of easily maintainable technologies, protocols and standard hardware.

The communication infrastructure has been entirely replaced, abandoning proprietary data transmission protocols in favor of a new Ethernet network, capable of exploiting multiple protocols, guaranteeing communication between PLC (ABB products of the ACS500 series) and supervisor regardless by the control systems adopted by the chosen suppliers.

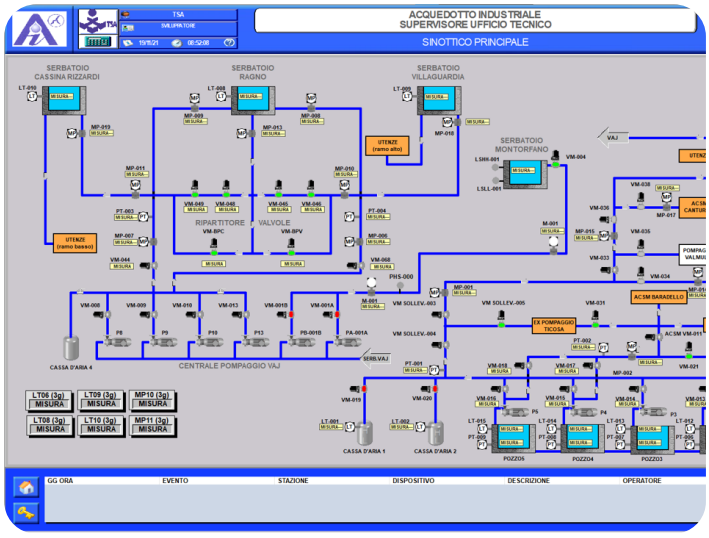
Communication between the various aqueduct systems was created thanks to a Long Range WiFi network, made up of multiple radio links, which allow communication between all sites with good bandwidth. To guarantee network security, a Firewall with the appropriate policies has been installed at each site, which filters traffic. In the event of failure of the radio links, with consequent loss of communication, this is made up for with 3G modems which ensure the essential communication for the continuous service of the system in back-up mode, until normal operation is restored and with reduced bandwidth.

Solution was chosen on the PcVue platform by ARC Informatique, in Client-Server mode. PcVue allows you to build user-friendly graphic interfaces with real-time animations and guarantees easy maintainability: thanks to its backward compatibility, in its ten years of service, the software has been constantly updated to the latest version available.

The system can be managed both by the server in the control room and by two “Thin Clients” connected via Remote Desktop (RDP) and positioned in the two main operational offices. With this architecture it is possible to update or modify all supervisors in a short time, since they are all present on the same physical machine. Furthermore, there is remote access software on the server, which allows technicians and maintenance workers to connect and control the system even without being in one of the aqueduct locations.
About a thousand alarm conditions are set in the system, divided into priority levels: from simple signals to serious faults that can compromise the entire functioning of the system. All alarm states are stored and tracked in the “Log” files. The occurrence of a critical alarm situation generates the sending



Plant topography



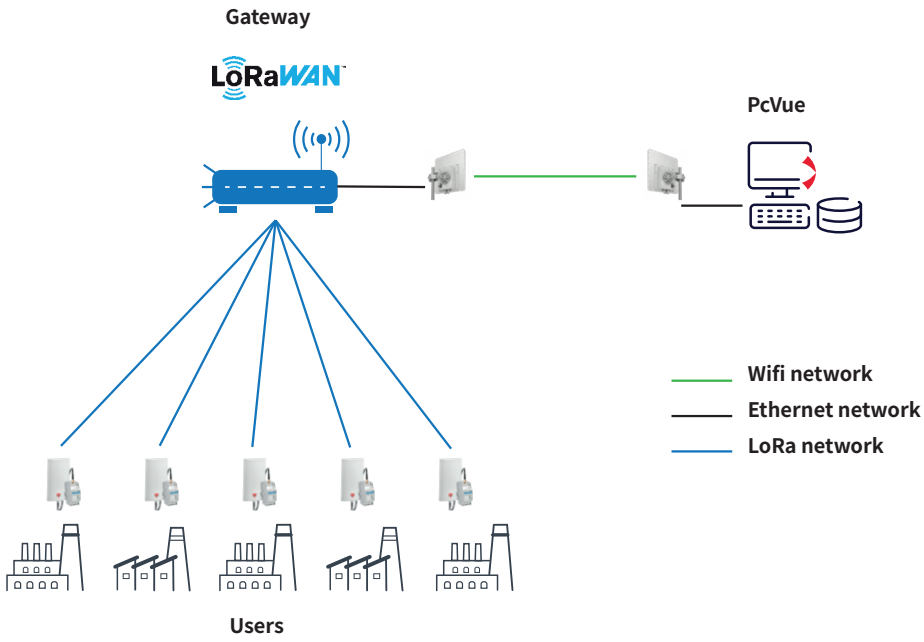
Main mimic

of notifications via SMS and e-mail to maintenance workers and operators to guarantee the minimum intervention time.
The need for the Aqueduct is to monitor the actual consumption of water by each individual user on an hourly basis. For this purpose we chose to use sensors with LoRa communication protocol, which allow communication over long distances with low energy consumption. Each user has a flow meter, which counts the cubic meters withdrawn from the network.

Every hour the LoRa sensor transmits the updated data to the receiver, which forwards it to PcVue, which makes it accessible via dedicated pages. Furthermore, the system is able to generate automatic reports (compiled in Excel, PDF or other formats) which are shared on the company network via a back-up on the server.

KEYS TO SUCCESS

- System reliability
- Intuitive and easy-to-use graphical interface
- Reduced commissioning times



Architecture

RESULTS

User friendly human-machine interface

It is possible to reach each device remotely, guaranteeing a first intervention to evaluate the event or carry out diagnoses on the functioning of the process

The monitoring system allows you to collect all the significant data of the system with continuous recordings of all physical quantities, pressures, levels, flow rates and meters

SUCCESS STORY

NORTHERN ROCKIES REGIONAL MUNICIPALITY WATER AND WASTEWATER TREATMENT

PcVue enables operations team to improve their productivity



The Northern Rockies Region of northeastern British Columbia isblessed with a significant wealth and diversity of natural resources, heritage and cultural attributes. Over the last four decades, the region has experienced up and down cycles due to the growth and decline of numerous resources and development activities. There have been interesting development proposals such as the Horn River Shale Gas Development, a working partnership that would link the Northern Rockies Regional Municipality, Fort Nelson, and First Nation communities with the oil and gas industry and provincial government agencies.

CONFIGURATION OF THE WATER TREATMENT SYSTEM

The Northern Rockies Regional Municipality water and wastewater treatment facilities - comprising of a network of pump houses and other facilities - produces the treated water needed to run operations for the oil & gas patch and forest & mining activities, in addition to serving its population of about 5,000 residents. They have a bulk water station that furnishes water for those who are not on municipal water and to the trucks that transport water to operations in the oil/gas patch, such as for fracking.

“Fort Nelson has a fully automated bulk water station, which delivers an average of 400 m3 (14,000 ft3) of treated water for residential and industrial usage daily. This station is fully integrated into the municipalities’ SCADA system, which facilitates monitoring of flow totalization, alarming of heat trace and boiler systems, as well as trending chlorine residual levels in the water being dispensed, etc.,” said Michael Ferguson, Electrical and Automation Specialist for the Northern Rockies Regional Municipality.

According to Ferguson, the municipality recently moved from FactoryLink, to PcVue for use with their SCADA system. Fort Nelson’s SCADA system includes 22 Motorola ACE RTUs at various pump and lift stations, which communicate over a 900 MHz IP Radio network.

BUSINESS OBJECTIVE

Automate and reduce repetitive tasks and improve staff productivity

"We have two Motorola IP Gateways (of the ACE3600 platform), which are primary and redundantly configured. The IP Gateways are the interposing link between the network of field RTUs and the managing Servers (also redundantly configured). Our servers are located at the Municipalities Water Treatment Plant."
Through the help of their value-added reseller (VAR), CTH Systems, they chose the hardware independent PcVue SCADA Solution that integrates seamlessly with CTH Systems' IM-SCADA™, an advanced multiprotocol measurement and communication software.

"CTH Systems provided the key component (the IM-SCADA™ Driver Software) that allowed for a quick transition to PcVue," said Ferguson.
CTH Systems used PcVue's SCADA application builder tool, called Smart Generator, to port Northern Rockies applications to a more secure and robust SCADA architecture. PcVue and CTH's IM-SCADA™ software sit on these servers as well as the historical databases.

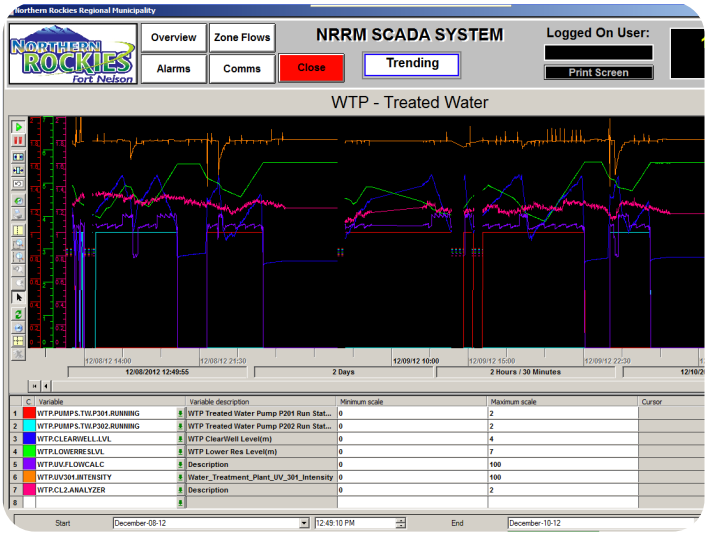
FIRST AND ONLY RESOURCE MUNICIPALITY

The Fort Nelson facility also happens to be British Columbia's first and only "Resource Municipality" to service the industry, local residents, and businesses. It covers more than 10% of the Province and includes the majority of the vast Horn River Shale Gas Development. Ferguson manages the electrical systems, process control, automation and communication component of the municipalities' water and wastewater infrastructure.

Currently Fort Nelson's SCADA system manages about 8,000 tags. With ongoing capital projects such as a new UV disinfection station to treat wastewater effluent, the system is poised for growth.
Fort Nelson's water treatment process begins by drawing raw water from the Muskwa River, downstream of the Alaska Highway bridge crossing.

There are several critical processes involved in filling the municipalities' raw water reservoirs. The initial pumping of the raw water from the Muskwa River requires multi-stage pumping with PID control to overcome tremendous head pressure and control the variable flow rates.

"The process of treating water is not a static process for us. Process variables such as turbidity, color, and organics are influenced from things such as weather events. For instance, we once experienced a mudslide where the river we pump raw water from was impacted," said Ferguson.



REPORT AND TREND GENERATION FOR PREVENTATIVE MAINTENANCE

CTH has provided engineering support to allow the municipality to export data in the form of text files (CSV format) to a report and trend generation service called 'FlowWorks.' FlowWorks conditions incoming data with various algorithms such as time-weighted averaging, allowing for the municipalities' non-operations personnel to view trends and generate reports. Additionally CTH has provided real-time and historical trending as an inherent feature of the IM-SCADA™ driver. This feature presents the data needed to make decisions on how to best optimize operations.

As Ferguson further works to develop the potential of Fort Nelson's water and wastewater SCADA system, he plans to integrate PcVue with other management applications such as their work order system.

"The goal of our responsible management and preventative maintenance philosophy is to 'bundle' systems like SCADA, PDAs, and work order application software together. To responsibly operate and maintain a productive multi-million

dollar infrastructure such as ours, it requires that we combine the use of technologies, the efforts of personnel, and a forward thinking approach," says Ferguson.

Currently Ferguson is working to have automatically generated work orders based on pump run-times and pressure changes that indicate wearing seals, etc. In addition, he would like to have the ability to view system data such as alarms, pressure, and levels from a mobile device such as an iPhone, which is now possible with the use of the latest version of the IM- SCADA™ driver.
"Having the freedom to access real-time system data from a mobile phone is a welcomed feature, which will get a lot of use from operators at NRRM," adds Ferguson.

PcVue is configured to have one mimic per site along with configured pop-up windows so that if additional details are needed on a pump house or certain critical values, an operator can just simply click on the icon to open a pop up window to give the information needed.
"We have multiple mimics built in PcVue that facilitate the various exchanges between the operator and host. Graphically the mimics are the same as what would have been in FactoryLink," continued Ferguson.

PcVue contributes to Fort Nelson's effort to reduce reactionary repairs, and unexpected equipment replacement. This is achievable by tailoring alarm and reporting functionality to expose issues at their incipient stage. The use of a fully automated SCADA system is essential in downtime prevention in water and wastewater services provided by this growing municipality.



KEYS TO SUCCESS

Tight integration between the Remote Terminal Units and the SCADA host for quick resolution of issues

RESULTS

PcVue allows operations to be more efficient in their work

SUCCESS STORY

SUPER RIMIEZ WATER TREATMENT PLANT

PcVue manages water treatment process, pumping stations and secondary processing equipment.

The global water industry leader Veolia selected ARC Informatique PcVue Scada software as their solution to monitor and control services and operations at its Super Rimiez water treatment plant near Nice (South of France) – recognized as the one of the largest drinking water supply sites in Europe.

Performance, ease of use and lower total cost of ownership provided by ARC Informatique solutions were key factors in Veolia selecting the PcVue solution. Additionally, the 20 year relationship and trust between the two companies made the decision easier for Veolia.

The Veolia Super Rimiez water treatment plant is a cutting edge example of global water treatment technology. Constructed in 1972, the plant has seen a number of adaptations, including a total overhaul in 1998 and a systems update in 2007.

The Alpes Maritimes Secteur Nice facility covers twelve drinking water production sites with a total capacity of 460,000 m3 (122 million gallons) per day (and 3,400 km (over 2,000 miles) hydraulic network for the distribution of drinking water to 64 cities and towns with a total population of over 950,000 people.

Super Rimiez supplies the City of Nice (population of around 350,000) and surrounding area. Water is distributed to the population by a 1,200 km (745 mile) hydraulic network fitted with multiple valves, pumps and regulating equipment.

The Super Rimiez plant manages every stage of an extremely complex process that takes water all the way from collection points to household taps. Apart from the collection and distribution of water, Super Rimiez is also responsible for treating and storing the water in reservoirs located at elevated locations. This includes managing processes at the site itself, as well as all of the remote command and control functions



BUSINESS OBJECTIVE

- Manage every stage of an extremely complex process that takes water all the way from collection points to household taps
- Maximize performance, ease of use and lower total cost of ownership
- System should be self-sufficient in energy and water treatment services

for pumping stations and secondary processing installations located up and downstream, including 20 treatment works and the 90 telemetry stations forming part of the overall system.

To ensure the effective monitoring and smooth operation of such a complex infrastructure, Veolia uses a Supervisory Control and Data Acquisition (SCADA) system. For this, Veolia has chosen the ARC Informatique PcVue SCADA monitoring software package. The monitoring software gathers data, stores it in a central IT system and then the data is processed. PcVue directly processes the data and displays it as animations (called mimic panels) using symbols that can be instantiated (known as objects).

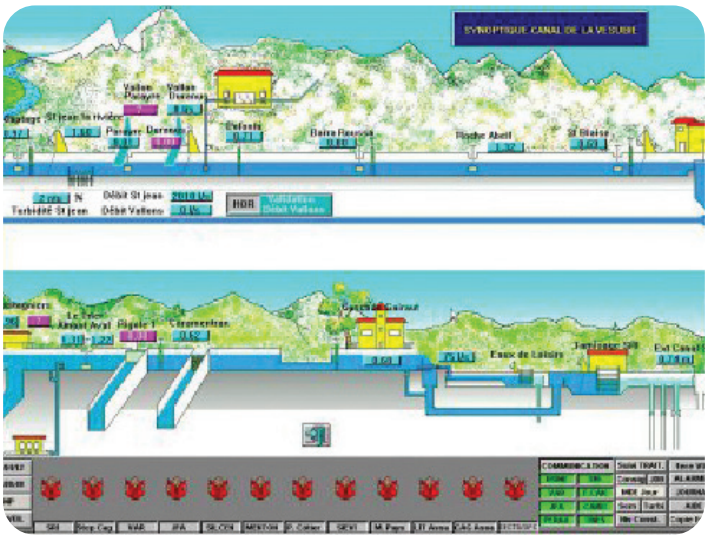
The information gathered is converted into standard PcVue objects and then stored in databases for subsequent use in associated spread sheet tools.

At Super Rimiez, the software controls and monitors processesnot just at the main site, but also at secondary sites. The remote control and monitoring service installed comprises no fewer than 26 SCADA terminals, which acquire around 50,000 variables from some 400 industrial PLCs (programmable logic controllers) and remote terminals. To achieve this, the team of engineers at Super Rimiez configured 1,800 mimic panels and 600 objects.

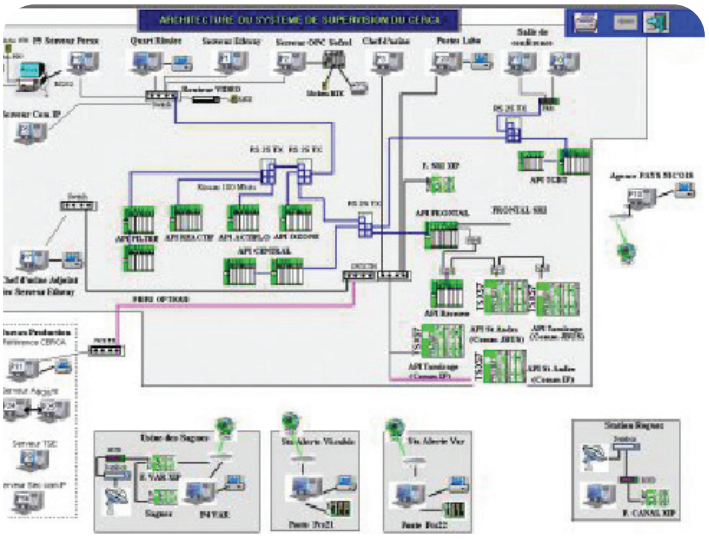
“In addition to ultra-high performance, a major benefit of the ARC Informatique PcVue is the user-friendly graphic interface, which enabled our team of development engineers to configure mimic panels and objects much more quickly than with a traditional SCADA solution. This helps to reduce costs and application roll-out times significantly”, explains Marc Pons, Veolia Water engineer and Head of the Control-Command department at the Côte d’Azur operational Center.

With regard to the data transmission network, the TCP/IP communication protocol is used throughout the plant, and at the 26 SCADA terminals. The system is based on a virtual private network on ADSL lines and the GPRS network, with a satellite link for the main connections and RTC, GSM and SMS packet transmissions for time-stamped data stored by a secure archiving server.

The network serves around 450 monitoring sites and is capable of issuing an average of 8,000 remote



Mimic panel representing a drinking water pipeline feeding into the Super Rimiez plant



Mimic panel of the monitoring and control architecture

commands and acknowledging and supervising 7,000 alerts every month.

“The performance, ease of use and application roll-out cost reduction associated with using the PcVue software were certainly key deciding factors in Veolia opting for this solution. But it is also very important for us to have total confidence in the companies we work with, and this has been the case between Veolia and ARC Informatique for nearly twenty years now”, explains Marc Pons of Veolia.

The authorities of the urban communities of Nice intend to be self-sufficient in energy and water treatment services. They are producing electricity from the potential energy generated by a cascade of water. In order to reduce greenhouse gas emissions, the City of Nice is installing 4 micro-turbines in the water supply system for converting potential energy into useable electric power.

Untreated water coming down from the mountains is channeled to Super Rimiez above the city and 280m (900 ft) above sea level. The head pressure achieved in this way, which can be up to 17 bars (nearly 250 psi), is converted into electric power by the micro-turbines.

This solution for producing renewable energy makes it possible to generate over 12 GWh of electric power per year – the equivalent of the average electricity consumption of over 3,000 households.

KEYS TO SUCCESS

- Efficiently manage 26 SCADA stations, 50,000 variables from 400 PLC's and RTU's
- Ultra-high performance system with user-friendly graphic interface
- Effective development tools that minimize costs and application roll-out times
- Long history of trust between Veolia and ARC Informatique Group allowing for close collaboration

RESULTS

PcVue manages 4 micro-turbines in the water supply and the solution produces 12 GWh of electric power per year

PcVue manages the treatment plant processes as well as remote control of pumping stations and secondary treatment facilities

PcVue



Success stories

ARC Informatique

arcnews@arcinfo.com
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