SUCCESS STORY

Panorama crosses the Channel

PROFILE

- Subject :
  SCADA
- Process :
  Electrical networks Management
- Client :
  National Grid RTE
- Date :
  2008
- Installed based :
  - Panorama E²
  - Panorama P²
  - 2 redundant servers
  - SNMP Protocol
  - Windows NT
  - Windows XP pro
  - Tablet PC

The AC-DC power conversion station in Mandarins, Calais - France

AIMS

Supervise the IFA 2000 link.

Improve the SCADA system, and ensure its longevity.

BENEFITS

Performance, robustness, and stability.

Turnkey solution adapted to end user requirements.

Both the RTE and National Grid power network operators chose Panorama to supervise the IFA 2000 link. Created in 1986, IFA (the France-England undersea link) provides electricity for over 3 million people via a link under the English Channel.

The IFA 2000 project

RTE: Operator of the French Power Distribution Network in France.

RTE was created in the year 2000 to manage electrical grid networks. Its mission is to carry electricity across the power grid linking power generation sites to consumption centers. It is a real control point for both monitoring and supervising the grid.

RTE in north-eastern France covers all or part of the Nord-Pas de Calais, Picardie, and Champagne-Ardenne regions. This grid is intercon-

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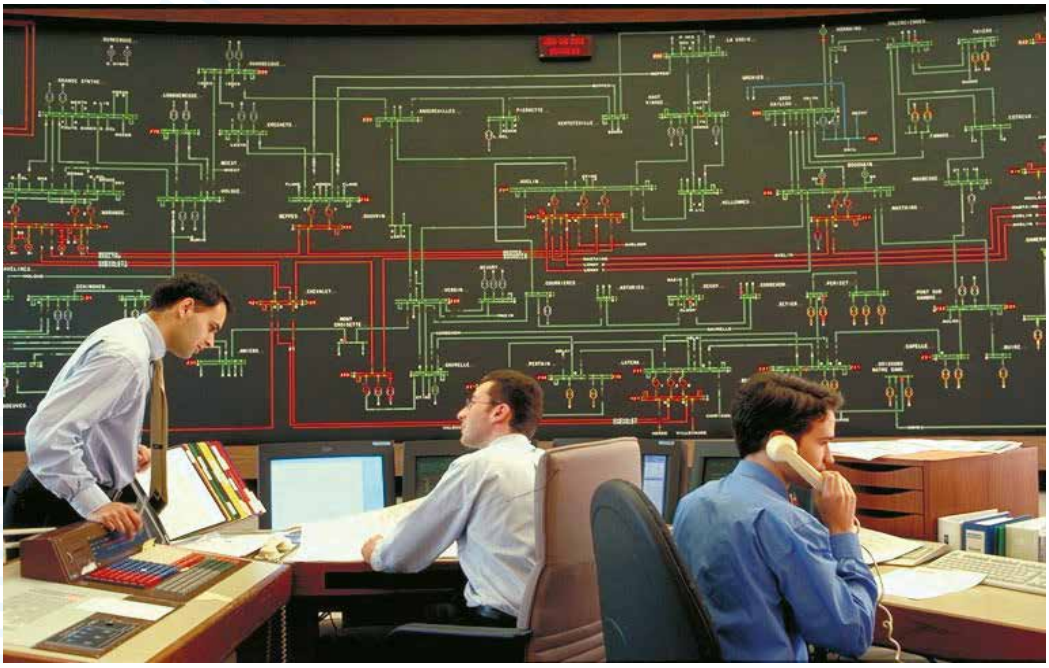


Regional dispatching in Lomme - France

nected to six countries, which includes e IFA 2000 link to the United Kingdom. The grid represents 500 billion kW h of the French grid, and consists of 100,000 km of high voltage lines. Nevertheless, in the coming years RTE is committed to installing underground connections to replace certain overhead lines in protected and urban areas.RTE has obtained both ISO 14001 environmental certification and ISO 9001 quality certification.

The IFA 2000 project : Connecting France and England

Created in 1986, IFA 2000 is a sub-sea link between England and the rest of Europe via France. The project provides electricity to over 3 million people and delivers 2000 megawatts of energy. In 2002, RTE decided to both renew its equipment and replace obsolescent devices. The call for tenders, awarded to Cap Gemini, involved two stages. The first stage, begun in 2002, automated exchanges across the link. The second stage, in 2004, renewed all the equipment. The Panorama E² Supervisory Control and Data Acquisition. (SCADA) software was selected to manage the link. It took 18 months to develop the IFA 2000 application, and acceptance testing at the plant began in late 2006. To address changing requirements, Cap Gemini deployed a new application which ran in controlled mode between February and June 2007. Final acceptance was approved in August 2007.

Why choose Panorama ?

Flexible system.
24h/24 accessibility.
Real time display.

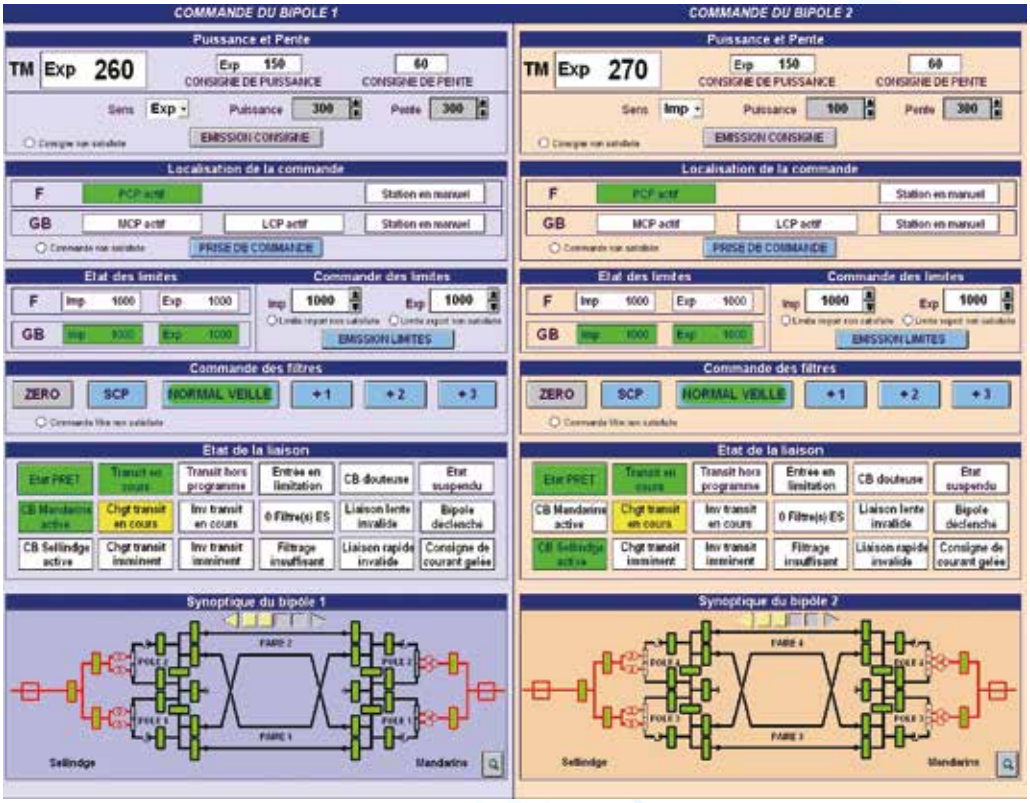
The IFA 2000 project involves several sites both in France and England. The control room to manage the system is located in Lomme, a town near Lille in northern France. Two workstations have been installed to manage the link in Mandarin, near Calais (France) and

Sellindge (UK). "Via the remote workstation, we can for example change the operations or transfer program from either side of the Channel," says Mr. Alain Lozon, the IFA Link Manager at RTE. "The link is controlled on alternate weeks by the French and the English teams. Control activities are synchronized between the French and English teams every Thursday, but also whenever a problem arises. This rotation enables both units to keep their skills up to date."

The hardware and software architecture of the IFA 2000 link

Before the Panorama SCADA application was deployed, the application ran under a Linux system. RTE launched a call for tenders in order to upgrade its aging technologies, improve the SCADA system, and ensure its longevity. Cap Gemini chose Panorama E² instead of a custom development project, which would have cost 3.6 times as much in programming costs. Panorama E² is a ready-touse tool with a much shorter development cycle and offering basic functions adapted to end user requirements. Although RTE was initially reluctant to use a Windows based soltion, the company is extremely satisfied with their SCADA solution. The company cited improvements in performance, robustness, and stability. Furthermore, the setup time was relatively short for a project of this size. RTE opted for a client/server software architecture based on Panorama E² which both controls the system and performs data acquisition. Custom development is seamlessly integrated into the Panorama Architecture. Each PCP workstation manages five major functions:

- The Human Machine Interface function supervises the IFA link and the two-terminal networks, and enables programming,



An operator workstation: Controlling two-terminal networks

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Bipolar maintenance of the conversion station at the post of the Mandarins

- The Supervisor function controls and transmits operating instructions, limits, urgent transit requests, etc.
- The Configurator function,
- The Pre-programmer function,
- The External Information System Exchange Management function sends and receives data to other systems.

Panorama P² manages all equipment at the National Grid site

National Grid Company, the UK power distribution network operator located in Sellindge (UK), uses Panorama to manage all its site equipment.

The 14,000 hectare (35,000 acre) Sellindge site, located 18 km from the subsea cable reception zone, and was chosen because it offered a direct connection to the national network's existing 400kV overhead lines. Direct current is converted into alternating current at the Sellindge converter station and then connected to the grid at the 400kV facility in Sellindge. Initially the Sellindge site used a Honeywell DPS6 system.

By 1998 the equipment had become obsolete and needed to be replaced. At the same time, National Grid decided to install a new SCADA system to manage its latest installations. The call for tenders required data collected from devices to be timestamped at the source to one millisecond precision; redundant data acquisition; alarm and event management; and the possibility to extend the application. Panorama was chosen because its advanced technology made it compliant to the National Grid specifications. Panorama P² version 7 under Windows NT went online in 2000. Through a maintenance contract with Elisys Engineering, the certified Panorama integrator, the application has been upgraded to Panorama version 8.0 under Windows XP Professional.

All the equipment at the site is quickly and efficiently managed from the control room. Incoming data from the field

arrives via two PLCs (twin acquisition lines) and is processed by Panorama (dual signal voting). Thus the data processing is guaranteed even if one of the PLCs fails. "This makes the system totally reliable," said Allen Saunders, Maintenance Operations Manager at National Grid. Panorama manages over 9,000 digital and 1,000 analog data points, 800 formulae, and 20,000 alarms. All these alarms are timestamped at the source to one millisecond precision. The network application architecture can be separated into two parts, with two redundant data acquisition servers and five workstations. "We have total visibility of the entire plant from any workstation. Furthermore, during maintenance operations such as a change of equipment or a software update, we can cut off part of the network while the rest remains fully operational," said Allen Saunders. The workstations provide a real-time view of all types of information: alarms, events, and analog data such as temperature, pressure, or volume. Operators can instantaneously view and validate the information, as well as analyze the application's historical data. Since 2006 the National Grid site uses an 802.11 wireless network and Tablet PCs. Now the SCADA application is accessible from anywhere at the site, without going through the control room. "This is a great

KEY FIGURES

The RTE Northeast network :

- 9200 km of overhead power lines
- 200 km of sub-sea power lines
- 220 transformation units
- 4 cross-border interconnections
- 10% of the French national network

IFA 2000

- Total length: 70 km, including 45 km under the Channel
- High voltage direct current
- 2000 megawatts

ELISYS ENGINEERING

Elisys Engineering was founded in 2003 mainly to assist National Grid in deploying Panorama.

The company's qualified staff receives training from Codra in France. Today it is the leading English Panorama Certified Integrator (PCI).

Elisys Engineering develops turnkey applications, manages maintenance and updates, and provides quality technical support.

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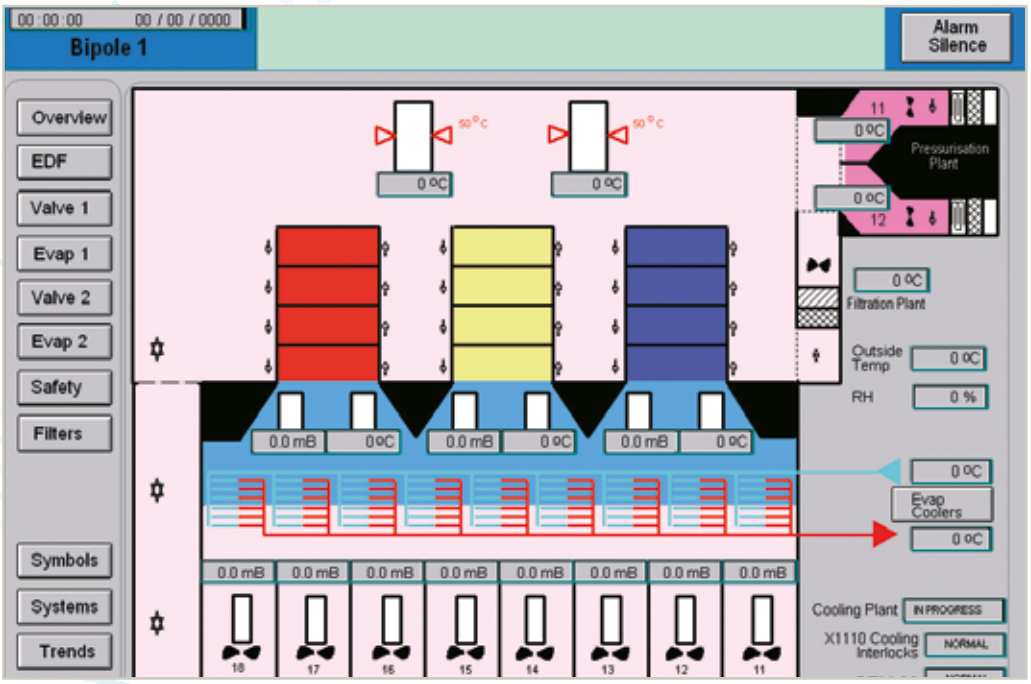

Mimic diagram of the cooling valve room – Sellindge, UK

advantage for everyone here. The system is flexible and available 24 hours a day. Thus we only need two people on call at a site, and one at home in case of emergency," said Gary Lima-Napier, the founder of Elisys Engineering.

The Panorama-certified integrator has also added a bilingual email function as well as a VoIP emergency call system.

Focus on...

High voltage lines are the main lines in the electrical power grid. They may be aerial, underground, or undersea or underwater. They are used for long-distance transport of electricity produced by various power plants, as well as for the interconnection of electrical grids.

Why use high voltage?

High voltage is required for transporting electrical energy over more than a few kilometers. The goal is to reduce both line voltage drops and conveyance loss, and to improve network stability.

Direct voltage lines

In the great majority of cases, these high-voltage lines carry three-phase alternating current. For certain undersea or underground links, however, the energy is transmitted using direct current (HVDC) for economic, congestion, and reliability reasons.

For the IFA 2000 link between France and England, electricity is transmitted via two pairs of conductors whose direct voltage compared to the ground equals +270 kV and -270 kV respectively, for a difference in potential of 540 kV between the conductors of each pair.

Why choose direct current?

As both the French and English grids use a frequency of 50 Hz, one could have used an alternating current link. However, an HVDC link was chosen to enable independent adjustment of the frequency in both countries, and

to better control energy exchange.

Description of the current installation

The two new thrysistor-based converter substations are located in Sellindge (UK) and Mandarins (in Bonningueslès-Calais, France). This HVDC link is 73 km long. The 46 km underse section includes four pairs of 270 kV cables between Folkestone (UK) and Sangatte (France); the pairs are spaced at about one kilometer intervals.

There are also four pairs of 18.5 km land-based cables in England and 6.35 km in France. The undersea cables were laid in trenches 1.5 meters deep on average in order to prevent them from getting caught in the nets of trawlers, which occurred frequently with the previous installation and resulted in an availability rate rarely above 50%.

Until 2001 the link was used exclusively by EDF. Since the opening of

BIDDING SYSTEM TO MANAGE POWER ACCESS

In order to guarantee the strictly equitable, nondiscriminatory assignment of rights to share the link among all market players (traders, suppliers, producers, etc.), RTE and NGC set up a coordinated bidding system on April 1, 2001 in order to ensure the fluidity and transparency of electrical exchanges, while providing a secure energy supply.

In both directions (France-England and England-France), various types of products are open to bidding according to different periods: annual, quarterly, monthly, daily, and (since 2004) half-yearly and week-ends. Bidding results (made anonymously) are published daily on the RTE Web site. The «use it or lose it» principle is applied: capacity not used by customers is reassigned.

Revenue from bids enables operators to cover their operating costs and repay the cost of the link: RTE's power distribution rates do not include access to IFA, which has its own financial accounting.

Equipment control room – Sellindge, UK

CÖDRA

Viewing the system over the wireless network via a Tablet PC, Sellindge, UK

the electricity market to competition on April 1, 2001, the link has been operated jointly by the French company RTE (Réseau de transport d'électricité) and its British counterpart National Grid.

Outlook

Studies are underway to further improve the link's availability and eventually to increase the capacity of its interconnection by 1,000 MW. However, it is difficult to predict both the future of these exchanges and the ideal link dimensioning, in light of the evolving energy demands in Europe.

ARCHITECTURE

- 2 redundant servers in the A & B equipment rooms
- 5 workstations (Bipole 1, Bipole 2, security workstation, alarm workstation, development workstation)
- SNMP protocol
- 2 Tablet PCs
- 24 wireless access terminals without disconnection

HARDWARE ARCHITECTURE

- 1 supervision server
- 3 workstations
- 1 firewall
- 2 printers
- 1 router for communicating with the printers

From industrial SCADA to a global information system

E2 P2

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