Premier FMCG Durban, South Africa

Engineering, operation & maintenance in a single process automation system

Wheat mill modernizes aging systems with PlantStruxure PES
Aging systems & expansion drive modernization

The existing control system used in Premier’s wheat mills (Siemens S5 PLC and CitectSCADA system) was aging, and the lack of support and spare parts for its Siemens PLCs presented a definite operational risk. Additionally, they expanded the plant with a new wheat mill, increasing their production capacity. As part of this expansion, Premier decided that the time was right to replace and modernize the control, automation, and electrical systems. They sought to:

1. Modernize the control system based on a proven and mature architecture
2. Standardize the control system software based on a proven and mature automation software standard/philosophy
3. Apply power metering and variable speed drives to monitor, control, and optimize energy usage

From its humble origins in the 1820s as a local Durban bakery, Premier FMCG has grown and expanded into milling and commercial baking, in addition to other lines of business. It currently operates 16 bakeries, five wheat mills, two maize mills, a sugar confectionery plant, and 24 distribution depots across South Africa, Swaziland, and Lesotho. Its wheat mills have a total capacity of 800,000 tons of wheat per annum, and two are designed specifically to mill flour for speciality industrial customers.

Goal
Modernize aging control, automation, and electrical systems in wheat mills.

Solution
PlantStruxure PES, the single process automation system to engineer and operate the plant.

Results
- Cost effective engineering
- Advanced operation services that reduce downtime
- Future ready solution
- Improved energy management
- Robust, scalable, and flexible automation architecture
Innovative systems integration a key selling point

PlantStruxure PES, Schneider Electric’s innovative process automation system which is designed to meet the demands of production facilities with hybrid control applications, played a key role in the customer’s selection of Schneider Electric for this modernization project. Premier was impressed by all the functionalities provided by PES to efficiently manage their process and energy use, starting with its single environment for engineering, operation, and maintenance. They also liked the fact that PES is built on Ethernet, an open industry standard which allows seamless integration of system components, like smart devices, and provides connectivity to business systems for fast and easy information exchange.

Long-term backup and support were also important considerations for Premier and the reasons they always prefer to partner with large companies. Schneider Electric offered a large pool of engineering resources and support services that will give Premier confidence in their systems well into the future.

Solution

- PlantStruxure PES V4.0 SP1
- Vijeo Historian V4.5
- Quantum controllers (4)
- M340 controllers (1)
- Altivar Process drives (530)
- X80 remote I/O drops (25)
- Profinet remote master gateways (15)
- PM820 energy meters (15)

System size

2,300 digital I/O; 150 analog I/O

Key physical communication layers & protocols

- Control & Supervision level Ethernet fiber optic ring – Conveys OPC traffic for upper communication
- Multiple MCC level Ethernet fiber optic rings – Conveys Modbus TCP traffic
- Multiple field level Ethernet fiber optic rings – Conveys X80 remote I/O and Modbus TCP traffic
Leveraging PlantStruxure PES in a fully connected architecture

Schneider Electric delivered an industrial control, supervision, and reporting solution for a wheat mill that produces various types of flour. Built on the single PlantStruxure PES platform, the system consists of redundant supervision servers and clients, connected to multiple controllers, remote I/O stations, and 500+ variable speed drives on an industrial Ethernet network.

The architecture implemented by Schneider Electric is mature, has a proven track record, and is based on a wide range of Schneider Electric’s Ethernet devices. It is robust through the use of redundant Ethernet ring networks, as well as flexible and scalable for easy expansion in the future.

PlantStruxure PES offers a single, object-oriented database that allows it to maintain consistency – both during engineering as well as throughout the system’s life cycle – for complete traceability and easy modification or extension during operation and maintenance.

PES’ all-in-one configuration functionality also means faster system design from a single data entry point. Through the application manager, the application can be easily replicated as it is in real life, using any model. The design can be based on a hierarchical organization, according to the P&ID definition, for easier evolution of the installation.

The system was engineered from scratch, without reusing existing code, to leverage the benefits of an object oriented platform. A multi-phased approach was used to switch over the existing system to the new system during plant shutdown / maintenance periods so that only small portions of the plant were impacted at any given time.

The flow of wheat and flour through each of the plant’s processes (in tons per hour) is continuously monitored and displayed on the supervision system. This system is integrated into Premier’s intranet, but not directly to the Internet. Remote access and control is available to limited users on the intranet, from any of their sites around the country.

PlantStruxure PES collects process, quality, and energy data from the plant and generates detailed reports to support effective decision making. It seamlessly connects to the production and business systems to ensure that the right people have access to the information they need.

Reports have been configured to present plant management and accounting staff with the operations and production data from the plant. They can generate production and mass balance reports to determine the amount of wheat and flour processed by each section of the plant. The flexible reports allow analysis over any desired time frame (e.g. hourly, daily, weekly, monthly, annually etc).

PlantStruxure PES also provides Premier with a mechanism to back up its system configuration, as well as process data like setpoints, tuning parameters etc.

PlantStruxure PES engineering licenses are tailored to the size of the application. Its runtime licenses are tailored to the instances’ objects count and architecture of the application, i.e. separate floating licences for servers, clients and web clients.

In-house design & integration a value-added service

The system’s design and integration was performed by the Projects Department of Schneider Electric’s solutions and execution center in Midrand, South Africa, as a value-added service to the project. Schneider Electric assembled a dedicated team to perform all project management, design, procurement, manufacturing, factory acceptance testing, and onsite integration functions for the entire electrical, control, and automation systems.

The customer regards Schneider Electric as their technology partner. The two companies enjoy a mutually beneficial relationship based on their confidence in Schneider’s technical expertise and our ability to provide ongoing support for their operations, both in terms of the existing installed base as well as future projects. After all, we are the experts at applying our own technology to provide complex, integrated solutions for our customers.
Benefits for the customer

By selecting PlantStruxure PES for its modernization project, Premier chose one of the most innovative process automation systems on the market. Its innovation is in its unique combination of the best of both worlds – the integration and single database of a traditional DCS with the openness and ease of use of a PLC/SCADA system.

Cost effective engineering and future ready solution

Using a Schneider Electric Tested, Validated, and Documented Architecture (TVDA) in the Ethernet network design, provided Premier with a system that has predictable and deterministic performance characteristics. It is also flexible and scalable, enabling easy expansion in the future.

PlantStruxure PES, with its MS Excel import capability, reduced the engineering time required, saving the customer time and money. It drove the development of the control & supervision applications in a standardized and structured way.

PlantStruxure PES provides a library of templates that seamlessly integrates the network, control, and supervision components of the process automation system – development of the communications, control, and supervision software for a particular application employs these templates in a single engineering process.

Once the templates and standards were established, it was simple to roll them out on a large scale. However, this strong drive to structure and standardize does not reduce PES’ flexibility which remains flexible enough to easily incorporate custom code for non-standard scenarios.

Operators now have access to the control code and documentation (manuals and drawings) directly from the supervision via the Runtime Services provided by the PlantStruxure PES server. With a traditional control/supervision solution, finding the correct control code to inspect in order to determine the cause of a particular fault is laborious. PES offers a direct short cut from the supervision display of a particular plant area to the relevant control code. Shortcuts to equipment manuals can also be included in the same navigation tree.

PlantStruxure PES is also scalable and can be used to engineer any size of automation solution ranging from very small and basic to large and complex, using any of Schneider Electric’s M340, M580 or Quantum controllers. This feature will serve Premier for future expansions to their systems.

Energy awareness reduces usage & waste

PES’ embedded energy management features combine energy and process data in one system so the customer can reduce energy consumption and waste for a positive real-time impact on process efficiency.

Energy consumption (kWh) per volume of production/processing (tons) is also measured and logged by the supervision and historian to provide them with real-time energy efficiency data.

Thanks to PES and its seamless integration with Schneider’s electrical devices, including power meters, Premier now has energy metering at almost every level of the plant, from an overall plant level right down to the device level. This energy metering is compared to the through-put of the plant and can be used to determine if any part of the plant is degrading in terms of efficiency. The customer’s operators can use this as a tool to schedule maintenance and to optimize the plant over time.

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<thead>
<tr>
<th>PlantStruxure PES Benefits</th>
<th>PlantStruxure PES Features</th>
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<tbody>
<tr>
<td>Faster system design, diagnostics, and maintenance, based on ISA88 standard</td>
<td>Single data-entry supporting the “configure once” philosophy in an object oriented and hierarchical environment</td>
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<tr>
<td>Integrated objects offer consistent and standardized functionality throughout the system. Open, so engineers can build their own objects if needed</td>
<td>Open and extensible objects and object libraries</td>
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<td>Connectivity, flexibility, and information transparency</td>
<td>System-wide Ethernet-based architecture which is also open to other industry standards</td>
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<td>Predictive maintenance alerts for equipment to reduce energy use and downtime</td>
<td>Process and energy in a single system</td>
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<td>Automation system can be tailored to suite any size of application</td>
<td>Powerful and scalable controller platform</td>
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For more information on PlantStruxure PES, go to schneider-electric.com/pes
IoT-enabled solutions that drive operational and energy efficiency

EcoStruxure is Schneider Electric’s open, interoperable, IoT-enabled system architecture and platform.

EcoStruxure delivers enhanced value around safety, reliability, efficiency, sustainability, and connectivity for our customers.

EcoStruxure leverages advancements in IoT, mobility, sensing, cloud, analytics, and cybersecurity to deliver innovation at Every Level including Connected Products, Edge Control, and Apps, Analytics & Services. EcoStruxure™ has been deployed in 480,000+ sites, with the support of 20,000+ system integrators and developers, connecting over 1.6 million assets under management through 40+ digital services.

One EcoStruxure architecture, serving 4 End Markets with 6 Domains of Expertise

Connected Products
The Internet of Things starts with the best things. Our IoT-enabled best-in-class connected products include breakers, drives, UPSs, relays, sensors, and more. Devices with embedded intelligence drive better decision-making throughout operations.

Edge Control
Mission-critical scenarios can be unpredictable, so control of devices at the edge of the IoT network is a must. This essential capability provides real-time solutions that enable local control at the edge, protecting safety and uptime.

Apps, Analytics & Services
Interoperability is imperative to supporting the diverse hardware and systems in building, data center, industry, and grid environments. EcoStruxure enables a breadth of agnostic Applications, Analytics, & Services for seamless enterprise integration.

Find out more about EcoStruxure
schneider-electric.com/ecostruxure
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Discover EcoStruxure™ for Plant & Machine
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Redefining dairy efficiency with Fonterra
Significant savings in production, logistics, and inventory for F&N Dairies

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