



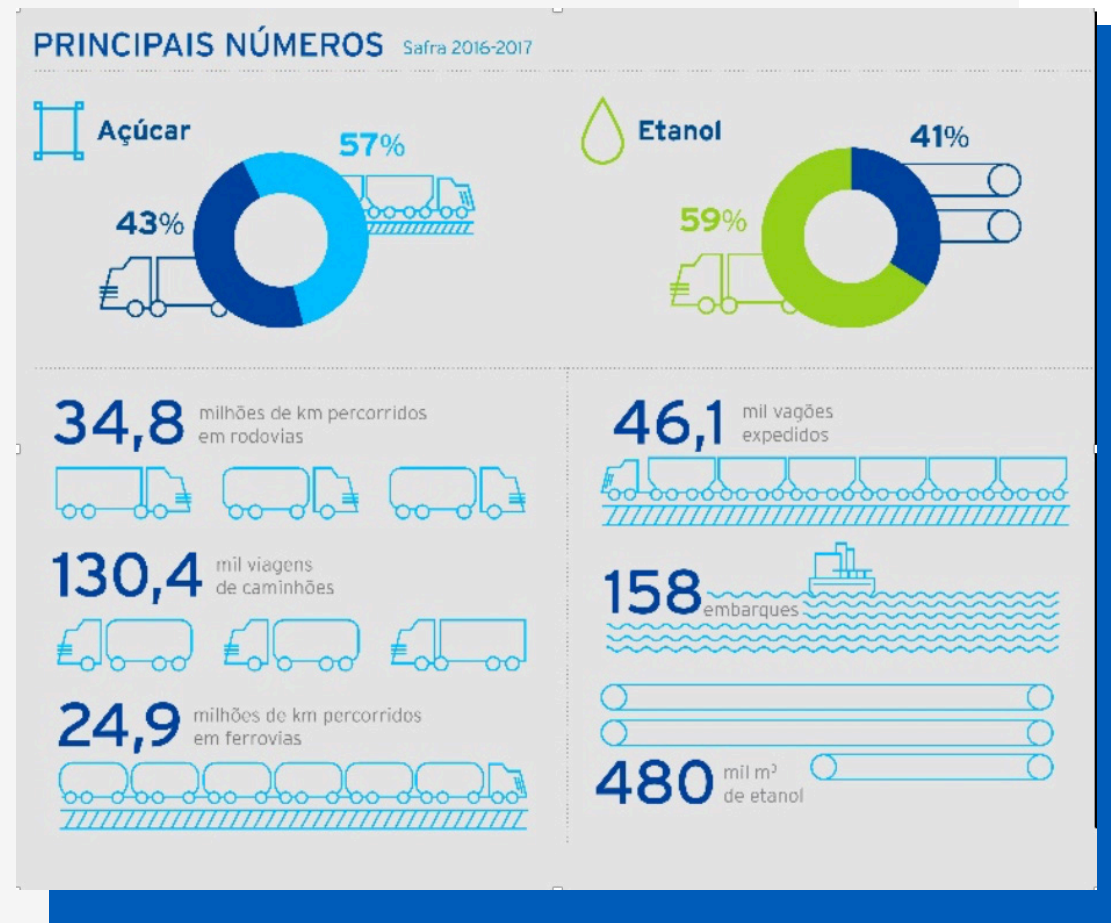
Digital Transformation at Copersucar

360° view of a Port Logistics Operation

Copersucar is redesigning their processes, reformulating their operation and facilitating decision-making, to place the company in the map of Industry 4.0.



Working within the sugar cane supply chain and uniting field and industry, Copersucar is the largest Brazilian exporter of sugar and ethanol with integrated logistics throughout the business value chain.



Source:

<https://www.copersucar.com.br/release/lucro-da-copersucar-atinge-r-254-milhoes-no-ano-safra-20162017/>

With a unique business model in this sector, Copersucar doesn't count with production assets, but with sugar and ethanol acquisition contracts, supplied mainly by the member plants.

From the joint venture with Cargill, Alvean was created, which has accelerated the global expansion of the company.

Copersucar's strategy for sugar is based on the investment in multimodal terminals for the storage and transport of sugar, like in Ribeirão Preto and São José do Rio Preto, and at the Sugar cane Terminal Copersucar, located at Porto de Santos (SP), with a capacity of movement of 10 million tons of product per year.

Crop of 5.3 million tons of sugar and 4.2 billion liters of ethanol are commercialized with a \$254 million of consolidated liquid profit, at the end of the crop year. Copersucar owns the largest capacity of sugar and ethanol storage in Brazil.

For the products to reach their customers in tens of countries, it is necessary to have a complex logistics infrastructure, integrated by their own and contracted transshipment terminals and storage, in addition to an extensive outsourced road, rail and sea transport network.

Challenge

When a major fire struck the warehouses of the company, Copersucar had the need to update the entire operation.

In the area of Industrial Automation, an audit was conducted to identify the improvement opportunities through upgrades, new technologies and new processes. The Santos terminal was operating with some level of industrial automation, but the possibility to reduce contingencies and making operation and maintenance more predictable was identified. Additionally, it was not possible to quantify the losses related to performance and efficiency problems in a detailed manner and with identification of causes.

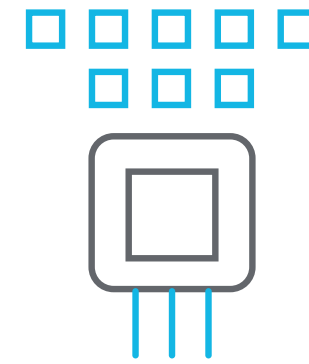
It was in this period that Copersucar brought in Marcelo Latrova to assume the Maintenance and Engineering Management, with a mission to redesign the processes and place Copersucar in the Industry 4.0 map, through the adoption of systems with an elevated level of integration, a consensus among the different approaches that exist today for digital transformation. Soon after, he had the arrival of the Industrial Automation Specialist Eduardo Pateis to supervise and implement the new project.

One of the priorities was to identify and address aspects of the process that could compromise the safety of the operation and impact daily production, due to possible unplanned downtime and complications.

With the new Industrial Automation project underway, Copersucar operates its regular activities at the same time as it manages the necessary changes, aiming at its modernization and increased efficiency as goals. This transition process is the most challenging point for the entire team of managers and operators.

Aiming for greater effectiveness, the team made the decision to restart and redesign processes and bring new technological solutions to overcome the challenges presented. It took nearly seven months within the Operational Control Center (CCO) to configure the systems.

The Engineering and Maintenance team is fully aligned with the corporate initiative, with the conviction that the project will increase Copersucar's competitive advantage. The current scenario is changing dramatically, however, with significant improvements at each stage.

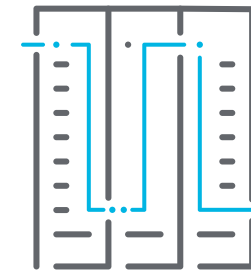


Solution

Aquarius Software was the chosen partner for this project, acting as supplier of the systems and assisting Copersucar in the solution design, software training and support for the implementation of each system.

The overall idea of the solution includes the technological upgrade of the supervisory system with revision of the architecture used, upgrade of GE Digital's iFIX HMI/SCADA system, configuration of Hot / Stand-by redundancy, server virtualization and flexible access to client interfaces, operation via Terminal Services, with access management via ACP ThinManager. Proficy WebSpace allows viewing of the HMI/SCADA screens anywhere, any time through a web browser.

In addition, increased operational safety, change management and automated backup in automation applications (PLC and SCADA programs) will be delivered by AuVersy's VersionDog software.



Finally, through the implementation of the PIMS and MES suite, also from GE Digital, it will be possible to have the entire shipment process digitized, through the ERP (SAP) connection to obtain the information on what is stored and what to ship in each ship, following the execution of the loading and returning consolidated information on each operation.

“This project once again proved that it is possible to employ new software and services on existing technological bases, resulting in extraordinary results such as increased operational safety and greater integration between automation and corporate systems, with continuity of operation and investment greatly reduced.”

— Diogo Gomes, Aquarius Software



Critical Points

Within the scope of automation, PLCs were already interconnected in a control network, but there was no digital storage of process history. The records were made on paper. It was necessary to adapt the PLCs' ladder to the norms and to create new supervision system screens, processes that are in final phase of implementation.

The VersionDog deployment - has brought improvements in the dynamic of changes and access control of these programs. "Now it is possible to follow the changes / revisions in ladder diagrams, to know who performed them, when they were performed and, through the analysis of the data, to correct all the flaws and deviations," explains Pateis.

The solution will be completed with the implementation of the PIMS and MES systems, consisting of GE Digital's Proficy Historian, Proficy Plant Applications and Proficy Workflow software, which will allow the reading and analysis of the history and efficiency of the process, as well as integration with other Copersucar systems.

The PIMS and MES systems will also be instrumental in bringing relevant information to operational decision making. Latrova points out that from the implementation of these systems it will be possible to detect with more clarity and objectivity the causes of various types of outages and improve the process in general, including those related to the definition of specific training for operators.

“Protect processes. This is one of the essential roles of Automation.”

—*Marcelo Latrova*

Maintenance and Engineering Management, Copersucar



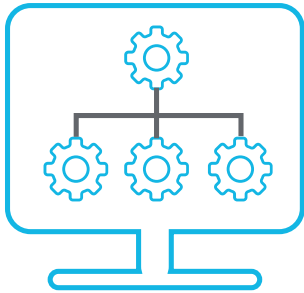
Project Highlights

- Implementation of a modern CCO, with digitalized and centralized process information, available in real time through intelligent and reliable systems, allowing the decision making with greater speed and assertiveness;
- Implementation of MES / MOM project (GE Digital's Proficy Plant Applications and Proficy Workflow software), enabling the control of ship loading efficiency and integration of process data with the ERP (SAP) system;
- Installation of change management system in automation and automatic backup systems (Auvesy VersionDog software);
- Virtualization of Automation Technology systems in IT (Information Technology) servers to increase the availability and robustness of the applications;
- Improved security and reliability of the system, with the implementation of a physical network backbone with intelligent redundancy and ring topology;
- Investment in the Lean Manufacturing methodology to make the whole operation more efficient, making the correct integration of Industrial Automation with each person involved in the operation of the terminal.

This new control philosophy also brought the need to create an Operational Manual that is in the process of being elaborated and a final training for the operators.



Figure 1. Operational Control Center of the Copersucar Sugar Terminal (TAC)



Technology employed	Main function
iFIX HMI/SCADA	Supervision and Control (SCADA)
Proficy Webspace	Viewing iFIX through a Web browser, anywhere, any time
Proficy Historian	Process Historian (PIMS)
Proficy Workflow	System Integration (Including SAP), eSOP and process automation
Proficy Plant Applications	Efficiency management of the operation (MES/MOM)
VersionDog	Automatic change management, SCADA backup and PLC programs
Thin Manager	Remote access management via remote desktop (thin clients)

GE Digital iFIX Customized Screens

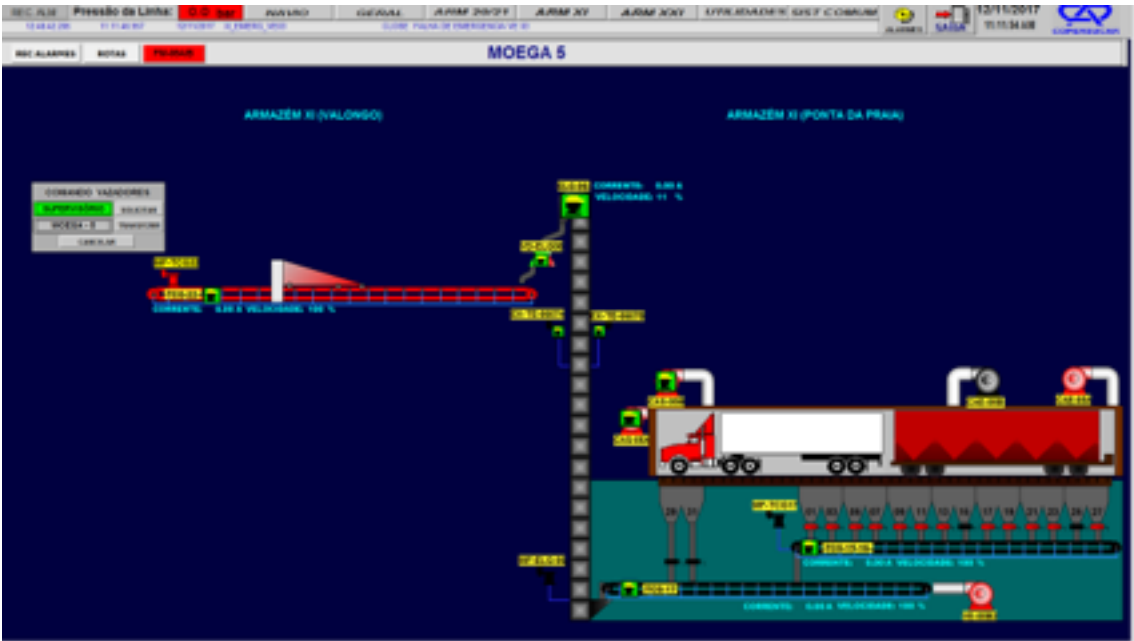


Figure 2: Hopper 05 - Optimization of Routes

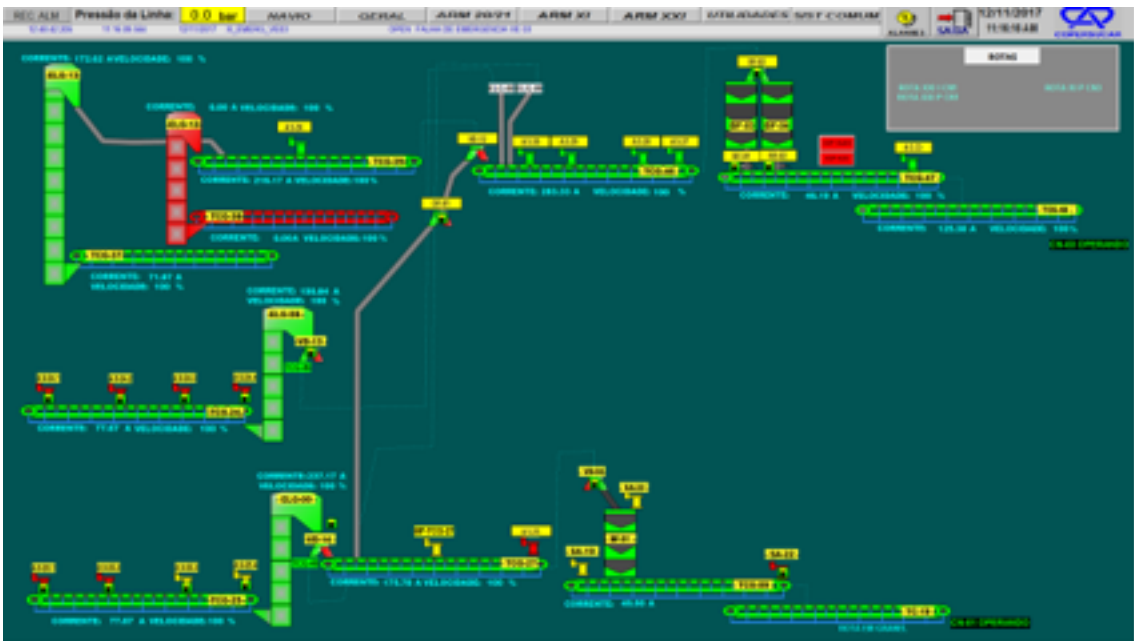


Figure 4: General Shipping Screen - All Optimized Routes

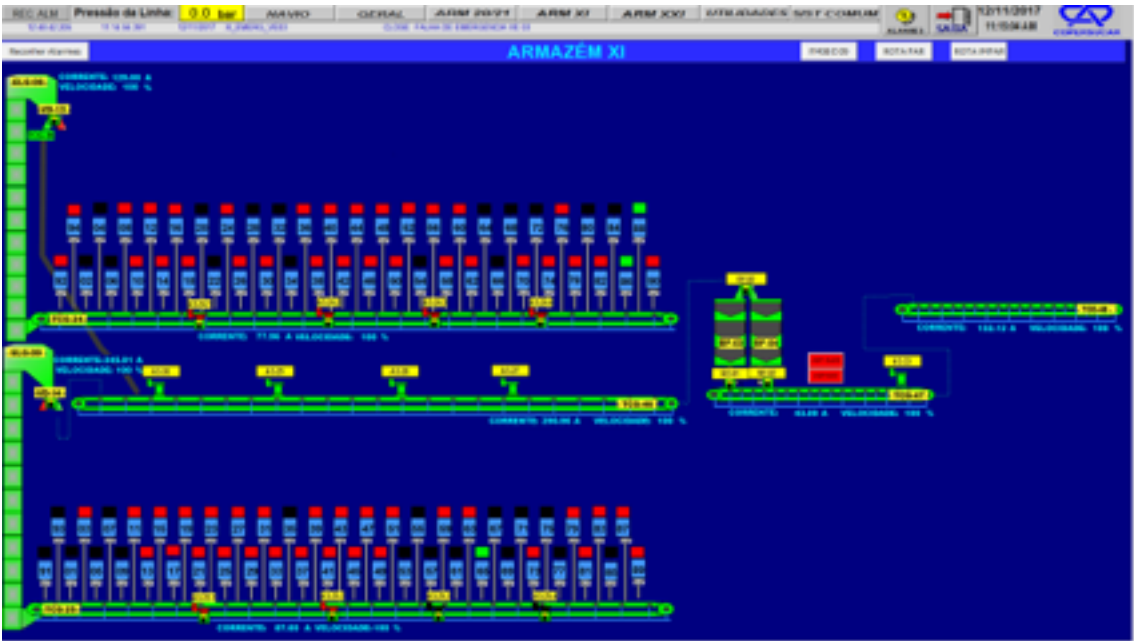


Figure 3: Warehouse XI - Shipping Line - Optimization of Routes

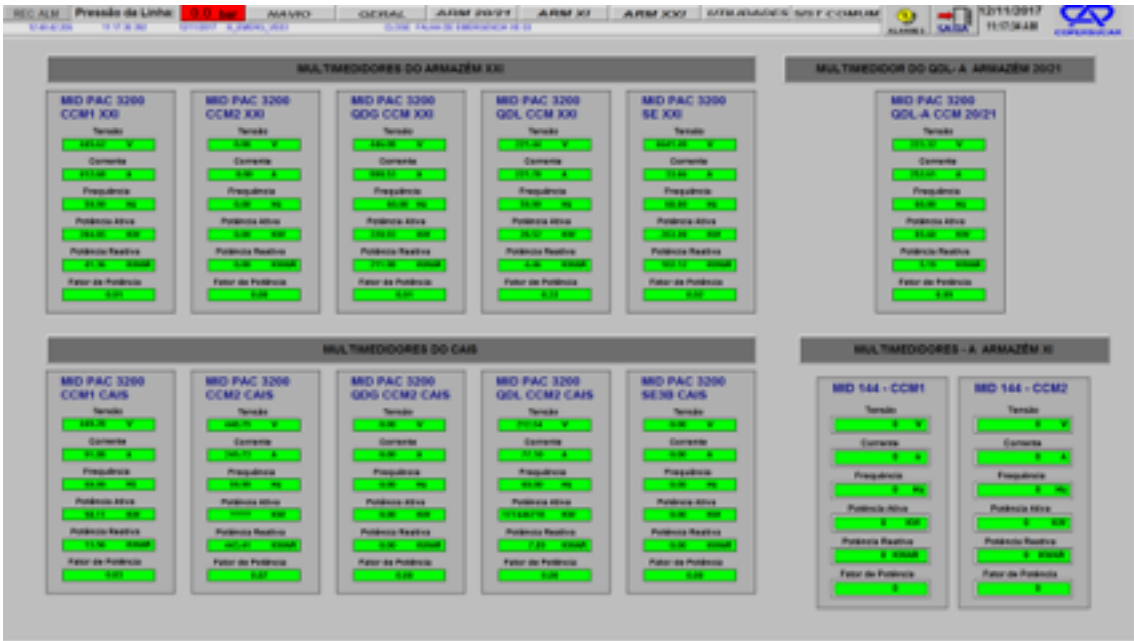


Figure 5: Electrical Quantities - Optimized on a Single Screen

Results

At the current stage, some major results have been obtained:

- With the advances in the implementation, it is notable that the number of overtime necessary has been reduced drastically, which is reflected in a higher quality of life for all those involved in the operation and in economics for the company;
- Several reports that help make decisions are now available. These reports are critical for process adjustments, as well as assist in the planning of activities, resulting in higher productivity;
- An automatic collection of historical data and the integration of the systems made the teams use their time in a more efficient way, since, with the direct and assertive visualization of the processes, the terminal operators could focus on the guarantee of operational efficiency, instead of spending their time collecting and analyzing manual data as previously required;
- Operators now work in much more organized and logical physical and operational environment. This also increases productivity and quality of life at work, in addition to increasing operational safety.

“If you solve your problems faster and more definitively, you gain operational agility. This is critical for our business.””

— *Marcelo Latrova*

Maintenance and Engineering Management, Copersucar

Next Steps

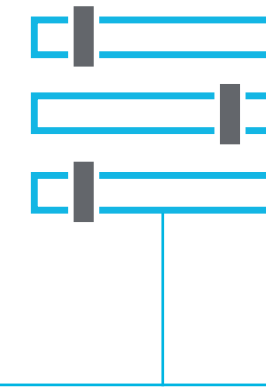
One of the next steps is the standardization of the operating interface. There will be similarity of processes and screens of the Supervisory System. This means that the operator working in one position may work in another, or in different shifts, with parity of procedures.

Another clear perspective is the continuous integration and collaboration between the Industrial Automation and IT teams. At Copersucar there is a reconciliation of the goals of continuous improvement of the two teams. This creates an extremely positive scenario for the company to follow its Digital Transformation journey and obtain solid results, in line with Industry 4.0's propositions.

Partnership with Aquarius Software

Copersucar had been a long-time user of the SCADA system distributed by Aquarius, GE Digital's iFIX, and planned the version upgrade when it entered the search process for partners for its new Industrial Automation projects. Analyzing the Aquarius portfolio, he was surprised to realize that he could solve all his challenges through a single partner, in an objective and integrated way.

Aquarius offered support beyond expectations, including expert advice for project management. One of the highlights was support in integration with IT, a subject dominated by the Aquarius team, with experience in other projects.



“ My practical view of Industry 4.0 is to reduce costs and search for operational efficiency through IIoT and the use of advanced technologies. I also see the autonomous systems, tracing routes and performing autocorrections.”



“ The experience and dedication of Aquarius' team of professionals generated a relationship of trust between companies. Our teams worked together throughout the project.”

— Eduardo Pateis

Industrial Automation Specialist, Copersucar



About GE

GE (NYSE: GE) is the world's Digital Industrial Company, transforming industry with software-defined machines and solutions that are connected, responsive and predictive. GE is organized around a global exchange of knowledge, the "GE Store," through which each business shares and accesses the same technology, markets, structure and intellect. Each invention further fuels innovation and application across our industrial sectors. With people, services, technology and scale, GE delivers better outcomes for customers by speaking the language of industry.

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