Production Efficiency Through the Evolution of Connectivity Systems

The Spanish company Industrias Químicas del Ebro, S.A., a production leader in the field of inorganic chemistry, has been seeking to improve its industrial network infrastructure due to the fact that existing infrastructure failed to meet the necessary connectivity and security requirements to comply with current standards, with the additional aim of connecting the OT and IT sides. The biggest challenge was the full migration of a flat, unmanaged network, which had been growing in a linear structure for years. Siemens and its partner, Gotor Comunicaciones, put forward a solution that included a complete upgrade of the existing network, creating a structure consisting of several aggregate networks covering all areas of production in its Zaragoza plant.

Industrias Químicas del Ebro S.A. is an industrial company from the Aragon region, working in the basic inorganic chemistry sector and specializing in the research, development, production and marketing of silicates, silicas, and derivatives. With 65 years of activity, it is a European benchmark in the sector; its positioning in highly competitive markets has enabled its continuous growth while remaining true to its roots, maintaining a long history marked from the outset by a firm commitment to innovation as a key element of its strategy of sustained and responsible growth. This commit-

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ment has enabled the company to open its markets and diversify its business lines to supply a wide range of sectors in countries around the world, with exports now accounting for 50% of its sales. All this development has been backed by significant investment that has made it possible to expand its production facilities and constantly update its technology.

Better connectivity, higher productivity

Plant expansions have come alongside an increasing number of connected machines and devices. This connected aspect has posed a major technical challenge for the maintenance department. "At IQE we had a very large and flat network. Over time, we came to have many machines and many connection points. The connectivity requirements were originally very low and there was no proper plan in place for such an industrial-scale network. More and more devices were included in this network until we saw fit to take a new approach to our connectivity infrastructure," explains Pedro Ruiz, Project Manager at IQE.

As a result, we face a sizeable challenge ahead: Our brief was to develop a robust, secure and structured industrial communication network that would guarantee the connectivity, remote access, scalability and flexibility necessary to support new digital technologies. During the implementation phase, we had to ensure the continuity of

Pedro Ruiz and Javier Serrada discussing the project

> **Advantages of the project for the IQE customer**
> - Reduced operating costs
> - Streamlined processes
> - More efficient production
> - Time-saving, so staff can focus on more important tasks
> - A more stable and secure industrial network ready for the future
> - Compliance with Industrial Cybersecurity Standards

the company's industrial processes, trying to cause as few interruptions to production as possible and not to affect production planning. In addition, we wanted the new network to increase productivity and adapt to present and future market trends in terms of security and digitalization so that we could continue to expand as efficiently as possible. In addition to the demands and preferences originally presented to us, we also faced challenges posed by local conditions. For example, the original idea of changing all device IP addresses proved to be impossible, as each machine was supplied by different vendors that did not allow any modifications to be made to their systems. On top of that, the network had to be structured to suit the various areas of production in order to minimize the risk of an incident.

Faced with this situation, the new network and its implementation had to be planned with tremendous care. That is why we turned to our telecommunications consultant, Gotor Communications, and through them to Siemens and its long experience in this field. "We planned it in such a way that full connectivity would be guaranteed even if new challenges arose and changes were made to the facilities. We have built a connectivity highway towards digitalization that paves the way for the future," says Pedro

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(from left to right): Juan Carlos Pozas (Siemens), Javier Serrada (Gotor Comunicaciones), Pedro Ruiz (IQE), Sergio Tello (Siemens) and Jose Luis Doñoro (Siemens) during the final checks made on the project

Ruiz Juste. Together, we carried out a comprehensive study of the connections between devices in different areas to fully understand the production process and design a suitable network. "The most difficult part of the project was changing the network architecture while the plant was in operation or in the brief window of time when production could be stopped," explains Javier Serrada, CTO of Gotor Comunicaciones. The migration process was separated into five phases in order to have as little impact as possible on production. The excellent planning was an obvious factor in helping the entire project run smoothly.

Safety is the foundation

Based on an analysis of the plant and its processes, an aggregate network was created at each stage of the migration process, connecting the control systems of each area. The aggregate network itself allows future IP addresses to be accommodated while maintaining the original IP addresses of existing devices. To ensure connectivity, these five aggregate networks are connected through a network backbone to provide redundancy.

It was only thanks to this approach that we were able to optimize processes and minimize downtime during production.

The industrial switches of the SCALANCE XC200 family were used for the creation of the aggregation rings and the SCALANCE XM400/XR500 layer 3 switches for the two backbone rings were redundantly connected to each other, creating a large redundant network with convergence times in the event of failure of less than 200 ms. The integration of the aggregation rings with the backbone was carried out following the

Pedro Ruiz, project manager at IQE

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Network Topology Screen in SINEC NMS for Monitoring

SCALANCE SC646-2C pair segmentation principle, allowing high availability of secure connectivity both locally and remotely. SCALANCE SC600 industrial firewalls, which monitor inbound and outbound traffic, allow us to block traffic to our control systems as needed. This approach helps resolve issues much faster, as employees can also connect quickly from anywhere else in the facility or remotely and securely via SINEMA Remote Connect. This leads to less downtime, saves on travel costs and increases safety.

Manually managing and configuring multiple network devices can be time-consuming and is also prone to errors. We therefore opted to use SINEC NMS to gain the level of control we needed. This is a centralized tool used to monitor a wide range of devices in a network, taking care of the configuration and management of these devices. Thanks to this, we now have the ability to configure any element within the new network infrastructure. SINEC NMS allows us to perform large-scale firmware updates, regularly back up equipment configurations and make any extensive configuration changes. Everything is centralized, therefore saving time, allowing staff to focus on more important tasks.

In the words of Pedro Ruiz Juste: "We believe that the constant monitoring of all connected devices on a network will become essential in the near future. The digitalization process is going to carry on even further

and having these tools helps us in this task. We also have to do everything we can to safeguard the continuity of production, both in terms of functional operability and protection of the data generated."

Excellent cooperation, successful project
From the outset, the collaboration between IQE, Siemens and Gotor Communications, at the time the plan was developed, was the key to the project's success. This partnership ensured a full understanding of IQE's industrial processes, making it possible to develop an optimal solution that meets the latest technical standards in terms of process optimization.

This project has enabled a radical change in the existing OT and IT network infrastructure without giving rise to incidents, maintaining the original communications between devices and performing a migration without the need to alter the production schedule. In addition to this, an innovative network architecture was introduced, allowing independent processes to be isolated from other unrelated areas through segmented aggregation networks, thereby strengthening the security of the industrial network.

Being able to securely connect from anywhere or manage infrastructure from a single location not only increases security, but also helps resolve issues quickly, saving time and travel costs. At the same time, this allows employees to focus on more important tasks.

With this refreshing of its systems, IQE has benefited from a more secure, available, and reliable network, primed for any digital transformations that may arise in the future.

"Thanks to the effective cooperation based on the trust placed in the proposed solution, IQE now has a more resilient and future-oriented industrial network, while simultaneously being able to minimize operating

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costs," sums up Javier Serrada. Regarding the factory's increased efficiency, he explains: "If an e-mail is slow to reach us, this is something that can be tolerated. In production, however, this problem can lead to unwanted machine downtime. Thanks to the new industrial network infrastructure, with advanced management and monitoring, it is possible to avoid these situations and ensure higher production efficiency."

Siemens Product List

- SCALANCE XC200 (Layer 2 switch)
- SCALANCE XR300 (Layer 2 switch)
- SCALANCE XM400 (Layer 3 switch)
- SCALANCE XR500 (Layer 3 switch)
- SCALANCE SC600 (security)
- SINEMA Remote Connect (connectivity management tool)
- SINEC NMS (Industrial Network Device Monitoring and Management Tool)

Security information

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept. For more information about industrial security, please visit

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