

# SIEMENS



## Tailor-made solution for secured remote access

**Kubota employs management platform for the IP-based remote maintenance of plants**

The control engineers of the Kubota Baumaschinen GmbH have equipped two production lines for the manufacture of mini excavators and wheel loaders with a management platform for the remote access and security modules, which centrally manage the production network and protect it against unwanted access. Using IP-based communication and encrypted channels, the service team can reliably and securely perform remote maintenance on plants and machines.

The Kubota Baumaschinen GmbH is part of the Japanese Kubota Group headquartered in Osaka. The construction machinery division is one of its main pillars and has made the company one of the world's leading manufacturers of compact excavators. Mini excavators and wheel loaders produced at the Zweibrücken (Germany) site are destined for the European, North American and Australian markets. The technological commitment by the factory not only underscores the importance of the site, but also provides proof of the synergy of Japanese technology and German precision.



The construction machinery division is one of Kubota's main pillars and has made it one of the world's leading manufacturers of compact excavators. The construction machinery manufacturer primarily produces mini excavators and wheel loaders at the Zweibrücken (Germany) site.

The demands made on the production planners are high: Continuous expansion of the production capacities requires a fast adaptation of the production lines. "In order to solve these challenges, the two production lines are designed for a flexible production and a quick change of the vehicle components," explains Marco Ibarzabal, employee of the Kaizen engineering department at the Kubota factory in Zweibrücken. "We manufacture the key components of the commercial vehicles ourselves. For mini excavators, this ranges from crawler chassis and articulated joints to front blades and booms to steel parts and vehicle trim." As arguments for the high level of in-house production, Ibarzabal states the optimal control over the quality, the flexibility as well as the high value added per employee.

Until a few years ago, the degree of automation in the production was low. There was not much automation technology and many processes still ran manually. As a result, transparency in the production was limited. With some plant sections no longer being state-of-the-art, the company management was prompted to modernize the production lines. "With the formation of the Kaizen engineering department, we began to retrofit the plants with automation technology and to completely update individual com-



Marco Ibarzabal works in the Kaizen engineering department of the Kubota Baumaschinen GmbH in Zweibrücken.

ponents. Controllers were replaced, new drives fitted, control cabinets modernized, and touch panels installed for the visualization of the processes," elaborates Ibarzabal. He is proud to point out that complete production lines are now being developed and built in-house.

#### **Security concept for automation systems**

In companies, the availability of IP addresses is usually limited. Also at Kubota, the growing production environment led to a limitation. For the Kaizen engineering department, this meant finding an alternative that ensured smooth communication despite the continuous expansion. Ibarzabal comments: "We wanted a solution that protects our automation network via a firewall and virtual private network, and supports security concepts for our automation systems." For the automation specialist, it was important that the solution permits the secured access to all plants from a central location. User management and connection management should also be efficiently handled by the new application. Secured connections should allow authorized users to query communication-enabled plants and to perform changes, e.g., to determine whether the production is running trouble-free.

With SINEMA Remote Connect, the Siemens experts presented a solution that precisely met the expectations of the Kubota managers. As central management platform, the server application supports the configuration of VPN connections and endpoints as well as a central user management for the plant access with a clear user interface. In addition, SINEMA Remote Connect makes it possible to define the communication relationships in the form of groups – and thus to individually specify the approvals for users and machines. In this way, connections can be quickly and easily permitted or prevented.

Machines and plant sections in the production are connected to the production network via SCALANCE S615 security modules. The security modules serve for both the network separation by means of a firewall, and the secured remote access via VPN. The SCALANCE modules are configured using a web interface, which supports users with a wizard during the commissioning. With just a few clicks, key parameters are set and VPN connections established. The VPN connections as well as the user and device profiles are likewise centrally managed by a web interface. Via an https connection, the server – on which SINEMA Remote Connect runs – is configured and the participants of the VPN network maintained. New participants can be created in just a few steps and their communication relationships be conveniently set up by assigning them to individual groups. The access by the service personnel to the plant takes place securely via a SINEMA RC client.



Compact automation technology optimally integrated in the control cabinet: The SCALANCE S615 security module together with the SCALANCE XC108 Industrial Ethernet managed switch and the SIMATIC S7-1500 controller.

A special function of the SINEMA RC client is the so-called address book function. Since all machines are set up with identical subnets, an address conversion must be performed. With SINEMA Remote Connect, this conversion automatically takes place in the background when the user activates the 1:1 NAT function in the SINEMA RC client. Like an address book, the user can then select the plant to which a connection is to be established, and work directly with the real addresses of the plant. This function facilitates the remote maintenance of multiple identical systems and avoids errors during the remote access. With an established VPN tunnel and active address conversion, users can work remotely as though they would be directly on-site at the plant. Besides the TIA Portal employed at Kubota, other software applications, such as remote desktop, can be used for the maintenance and diagnosis of the plants. Access from the production network without an active VPN tunnel is possible via NAT routing of the security modules. Kubota

utilizes this function, e.g., to grant management personnel on-site access to the HMI devices. Unauthorized access is reliably blocked by the firewall.

### Configuration of the automation systems with the TIA Portal

"During the past 24 months, eight new plants were constructed and put into operation," says Marco Ibarzabal. "Each of these plants is equipped with a SCALANCE S615 and integrated into the production network. In the coming weeks, the existing plants will also be connected to the network via Scalance S. They are presently still operating with separate IP addresses." According to Ibarzabal, the conversion effort is relatively low and only takes a few hours – including the configuration of SINEMA Remote Connect and SCALANCE. To this end, only the additional routers must be installed in the control cabinets. After adapting the IP addresses, loading the software into the controllers and setting up the machines in SINEMA Remote Connect, the connection is established – which completes the commissioning.

The creation of the software for the operation and control of the production systems is tasked to the Kaizen engineering department and takes place via the TIA Portal. The seamless integration of the SIMATIC controllers into the engineering framework enables a consistent data storage. Ibarzabal explains: "The TIA Portal offers the advantage of integrating all components on one platform: PLC, HMI, distributed I/O, drive technology and safety. The range of services of the engineering framework ensures that we quickly achieve the desired results that optimally solve our tasks. Moreover, the uniform operation simplifies the use of overarching functions and shortens the commissioning times." Users from the various production areas and also maintenance staff access the controllers of the plants as well as other devices (such as code reading systems, IP cameras or HMI panels) in the plant network via SINEMA RC clients.

SINEMA Remote Connect and SCALANCE S615 provide for a secured communication infrastructure in Kubota's production network. When it comes to the automation, the construction machinery manufacturer also relies on Siemens: The SIMATIC S7-1200 and S7-1500 controllers solve the automation tasks. The drive technology of the plants and machines has been implemented on the basis of Sinamics and Simotion. The SITOP PSE200U selectivity module supplements the SITOP PSU8200 power supply to split 24 V DC into several junctions and monitor the load current. Additional switching technology is based on components from the Sirius product portfolio. SIMATIC HMI panels perform the visualization tasks at the machine level. And with SIMATIC MV340 code reading systems, the parts identification and error evaluation in the paint shop are planned as the next automation step.



Various Siemens devices in the control cabinet: Also installed besides the SCALANCE S615 security modules are the SITOP PSE200U selectivity and diagnostic module as well as the SITOP PSU8200 24 V DC power supplies.

## 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 only form one element of such a concept. For more information about industrial security, please visit <http://www.siemens.com/industrialsecurity>

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## Identification for future error detection

Kubota control engineers also handle the error detection in the paint shop. After the metal parts of the excavators and wheel loaders have been welded together, sandblasted and cleaned, they move through the paint shop on workpiece carriers. In the future, it is planned to optically label the workpiece carriers prior to the paint treatment. OCR stickers will then tell the pickers with which parts to populate the rack. The actual state of the parts carrier is carried along on a heat-resistant RF680T transponder mounted to the frame. After passing through the drying oven, the RFID tag is read out again and the worker is shown on a monitor, which parts should hang on the rack. On the basis of the continuous tracking of the parts in the paint shop, the plant operator can immediately recognize whether the required parts are all present and have been correctly processed. If an error is detected, the picker can reorder the respective part directly by touching the image on the touch screen. For the future, a combination of identification system – comprised of reader and antenna – and handling robot is also under consideration.

The captured data could then be directly transmitted to a robot, which automatically populates the rack.

For Kubota, the gradual expansion and automation of the production lines are steps towards digitalization and Industrie 4.0 – making it possible for the company to run cost-effective and customer-specific production processes. An important aspect in this context is the networking of separate production processes to realize an end-to-end data flow from the production planning to the finished product. This is because key performance indicators are generated that can be used to optimize processes and that serve as the basis for predictive maintenance. "With SINEMA Remote Connect, we have created a reliable foundation for the expansion of our production networks. And with SCALANCE S615, we have installed a solution for parameterizing and efficiently managing the IP addresses of the plants and machines. At the same time, the security-related aspects are covered," states Ibarzabal. The results so far leave no doubt that the Kaizen expert achieves his goals.