



SIEMENS



Reference



## Operation without Supervision with “Remote Supervision”

Secured remote access supports non-supervised operation of distributed waste heat power generation systems

A manufacturer relies on high-performance industrial routers and a new management platform for the design, administration and remote access via secured tunnel connections (VPN) in order to guarantee operators of waste heat power generation systems smooth operation without supervision of their systems. A German steel processor, for example, efficiently and reliably converts its waste heat from automatic batch annealing into electricity – without having to supervise the operation itself.

DeVeTec GmbH, based in Saarbrücken, has implemented processes to convert waste heat from a wide variety of industrial processes into electricity.

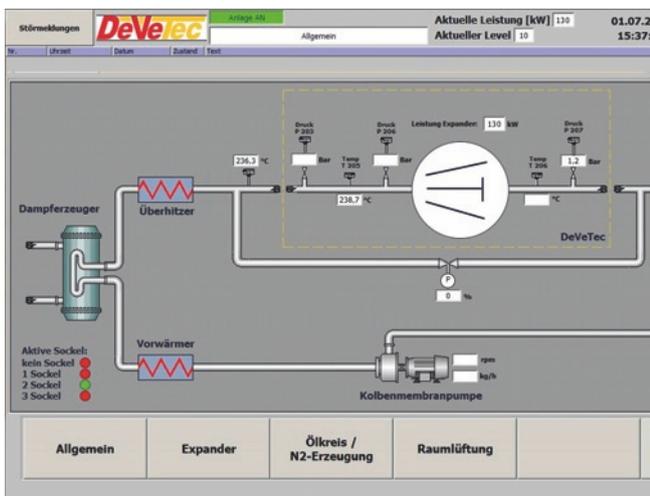
With its ORC (Organic Rankine Cycle) steam expansion engine the company has developed a globally unique waste heat power plant, parts of which have been patented, which directly generates usable electricity and useful heat from waste process heat. Unlike turbines, the speed-independent motor can be used very efficiently for a wide range of applications,

as well as for discontinuous waste heat flows, fluctuating temperatures (250 to 700 °C) and with various ORC media. The cold-rolled steel strip manufacturer BILSTEIN (see box) has been profiting from this since late 2014. Based in Hagen, this company operates a modified DeVeTec system to utilize the waste heat from the cooling process of the world’s first fully automatic batch annealing system in an innovative way – and is therefore supported by the Environment Innovation Program (UIP) of the German Federal Ministry of the Environment.

Contrary to the standard solution with flue-gas evaporators, the waste heat is transferred through a thermal oil system to the ORC fluid bioethanol. The fluid is compressed by means of a feed pump and conveyed in a loop. The energy from the waste heat source is transferred in a heat exchanger to the fluid, whereby vaporizes and overheats it.

In the motor, the thermodynamic energy of the steam is converted into mechanical rotational energy and electricity is produced in the generator. The expanded steam flows into a condenser where it cools and liquefies. In the process, the residual heat is extracted and converted into useful heat.

The system, which is installed in a container, starts up automatically in steps once the activation operating conditions have been reached and feeds into the mains after it has been synchronized with this.



On-site visualization on a SIMATIC IPC477D

### Reliability is a precondition for operation without supervision

To ensure a smooth and reliable operation without supervision, DeVeTec has equipped its systems with extensive monitoring and safety sensor equipment and controls the operations via a fail-safe SIMATIC S7-300F controller from Siemens. Communication operates fail-safe via PROFINET and the PROFISAFE protocol. The position controller SIPART PS2 from Siemens ensures high control accuracy at the steam infeed valve. The valve then controls the speed of a V12 motor.

A SIMATIC IPC477D Panel PC is installed for operator control and monitoring on site.

In addition, the manufacturer has complete remote access to all its systems. In order to monitor an increasing number of globally distributed systems at all times, the Saarland-based company recently began using SINEMA Remote Connect from Siemens.

This is a new management platform for the configuration, establishment, management and secured implementation of multiple remote access connections via Virtual Private Network Tunnel (VPN).

You can use this tunnel to access the systems quickly, conveniently, selectively and in accordance with the current security standards for industrial networks, even when these systems are linked to networks outside the company. This allows important process and system data to be read, archived and analyzed. When necessary, control parameters can be adjusted via WinCC Sm@rtClient using the HMI system.

### Convenient and secured remote access

SINEMA Remote Connect is a server application which is usually installed at the system manufacturer (OEM). The software enables a centralized and easy management of secured tunnel connections, for example, between service technicians and installed, distributed machines and systems. Data is transmitted IP-based between the nodes independently of any specific application. Direct access to the company network in which a machine or system is integrated is hereby avoided and the network settings of the existing nodes are not adversely affected.

The service technician and the machine undergoing maintenance separately establish a connection to the SINEMA Remote Connect server. After successful, certificate-based authentication, communication between the nodes is enabled by the server.

„The export and import of any created OpenVPN configurations and certificate is also very simple. For example, it is possible to securely integrate a mobile data terminal within a few minutes, as experience has shown,“ according to Tobias Schneider, systems programmer at DeVeTec.



A SCALANCE S615 security module (above) is the link between the plant and SINEMA Remote Connect; this module is easily integrated into existing networks and protects the lower-level parts of the system against unauthorized access.

The image shows two overlapping windows from the SINEMA Remote Connect system. The background window is the server application, titled 'SIEMENS SINEMA Remote Connect'. It features a navigation menu on the left with options like 'System', 'Fernverbindungen', and 'Benutzerkonten'. The main area displays a table of active devices with columns: Name des Geräts, VPN-Adresse, Entferntes Subnetz, Virtuelles lokales LAN, Status, Standort, Verbindungsart, and Aktionen. The foreground window is the 'SIEMENS SINEMA RC Client'. It shows account details (SINEMA RC URL, VPN Status: CONNECTED), a device list with columns: Name des Geräts, VPN-Adresse, Entferntes Subnetz, Virtuelles lokales LAN, Status, and Standort. Below the device list are NAT configuration options and a 'Beenden' button.

Simple and clear: Image mask for creating, configuring and managing VPN connections in the SINEMA Remote Connect Server application (rear) and address book of the client application (front).

The connection to SINEMA Remote Connect can be established using a variety of media, such as cellular phone networks, DSL, or existing Ethernet networks. In addition, Siemens offers wide range of suitable industrial routes from its SCALANCE series. SCALANCE routers can be conveniently and quickly connected to SINEMA Remote Connect through the autoconfiguration interface by simply entering a few parameters. The connection of lower-level automation solutions is also very easy to implement. In machine and plant building, installations with identical local subnets must also be reachable through remote access whenever necessary. DeVeTec also relies on the functions of SINEMA Remote Connect for this purpose.

Machines that are identical in design can always be clearly identified by assigning virtual addresses. With its „Telephone book function“, the SINEMA RC Client makes operation even easier for the user. The user only needs to click to select the required system and to establish a secured connection without having to worry about addressing or routing issues.

### Permanent VPN connection preferred

The systems manufacturer DeVeTec prefers a permanent OpenVPN connection in SINEMA Remote Connect in order to continuously record and analyze important system and operating parameters, such as temperatures, speeds, performance, and also oscillations.

On the basis of up to 200 data items, the Saarland-based company generates not only meaningful daily trend analyses which, for example, allow conclusions to be drawn about slow-changing system parameters. Stronger oscillations may, for example, indicate that damage is likely to occur to the bearings. Thanks to SINEMA Remote Connect, the manufacturer is constantly informed about the process, can react quickly and, if necessary, conveniently further optimize process using remote functions – for all systems in the field. With this project, DeVeTec initially remotely supported on-site commissioning using a wireless UMTS router from the SCALANCE M product series.

„Even at this stage, it was already clear that far better and deeper insight into the process was available from a detailed trend analysis and that the process could be optimized much faster, and more electricity produced faster as a result,“ reports Tobias Schneider.

During the course of the BILSTEIN project the UMTS device was replaced by a new SCALANCE S615. The security module separates the production network of the steel manufacturer and the local network of the ORC system from each other through its firewall and simultaneously enables remote access via VPN. Information from linked system parts is also available due to the integrated PROFINET communication in the local network of the plant via a SCALANCE X208 switch. Diagnostics data on the thermal oil system may be recorded through the integrated network via the VPN connection.

SCALANCE S615 supports up to 20 VPN tunnels via OpenVPN client. The operator of the plant or authorized partners may also set up a secured remote connection in SINEMA Remote Connect and access the runtime data.

In general, SCALANCE S devices ensure secured access to globally distributed systems, machines and applications. They protect automation cells and all components that do not have their own protective functions, from unauthorized access such as espionage and manipulation. Firewall rules permit device-specific as well as user-specific access control.

## Simple, safe, efficient

„Unlike the predecessor system of a different manufacturer that was only in use for a short period, we are completely satisfied with the options and the simple handling of the Siemens Management Platform,“ says Tobias Schneider to sum up.

The control concept with fail-safe SIMATICPLCs and also the Remote Network with SCALANCE S security modules and SINEMA Remote Connect will be implemented as system standard for all future ORC systems.

The operator BILSTEIN is also satisfied. Christian Hagenkord, project manager and responsible for energy management at the company:

„Electrical outputs of up to around 190 kilowatts have been generated up until now and, viewed over the year, this is an almost 40 percent improvement in the energy efficiency of our annealing plant.“

The cold-rolling plant saves up to 900,000 kilowatt hours of electricity per year and four million kilowatt hours of heating energy and process heat, and reduces its CO2 emissions by around 1,300 tons – without needing to worry about the non-supervised operation of the waste heat power plant.

## 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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## Company profiles in brief

BILSTEIN GmbH & Co. KG is the parent company of the BILSTEIN GROUP. The company based in Hagen-Hohenlimburg is an internationally active manufacturer of cold-rolled strip and operates one of the most modern batch annealing plants in the world. BILSTEIN's extensive product portfolio comprises cold-rolled products for, among other things, bending, punching, drawing, stretching and deep drawing.

DeVeTec GmbH, which is based in Saarbrücken, has developed a heat recovery system for high-efficiency electricity generation from waste heat, which is used, for example, in industrial operations with energy-intensive production processes. The energy gained may be used by the company itself or fed into the power grid.