Five Steps to the Smart Factory

With its wide range of possibilities, Turck Cloud Solutions offers the right implementation for users to pursue Industry 4.0 development – including encrypted data transmission, consistent data retention and the option for hosting by Turck or in the private cloud

It is said that data is the oil of th 21st century. Many companies have understood that data has a value that they can monetize, just like a raw material. Facebook, Google and Co. provide their services free of charge but they are in no way without cost. Today users now know that their data is the currency by which they pay for the services of these Internet giants.

Only someone who collects data can also use it
Not only end consumers produce data today. Large amounts of data are produced every day in industry – data that can have a high usage value when evaluated properly. Machines and plants are continuously producing data that today largely remains unused.

   This does not have to continue as Turck has now developed a cloud solution that can put an end to this situation. The cloud saves production data both for monitoring and remote maintenance tasks, as well as for optimizing and analyzing the production processes. The special feature here is that users decide themselves where the data is to be stored and whether it is to be transferred to the internet. The data is also encrypted for communication. To put it another way, customers can thus ensure that nobody steals their oil.

Five steps to smart production
The proprietary cloud platform offering is another step for Turck and its customers on the way to an intelligent, integrated and self-learning production process in line with Industry 4.0. The flexible offer is divided up into five steps.

Step 1: Supply of pure user data for the operation of machines and plants
The digital and analog sensor data enable a PLC or other controller to operate a machine or plant.

QUICK READ

Whilst there are wide range of cloud services available for private and business users, the special requirements of industrial customers in the automation sector have hardly been covered by these services so far: Turck's Cloud Solutions now provides automation specialists with a cloud solution precisely tailored to these requirements and other locally or externally. The encrypted communication maximizes data security, and additional functions such as data analysis or the monitoring of production processes provide the user directly with real benefits. The new offering represents another consistent step by Turck on its journey toward Industry 4.0.
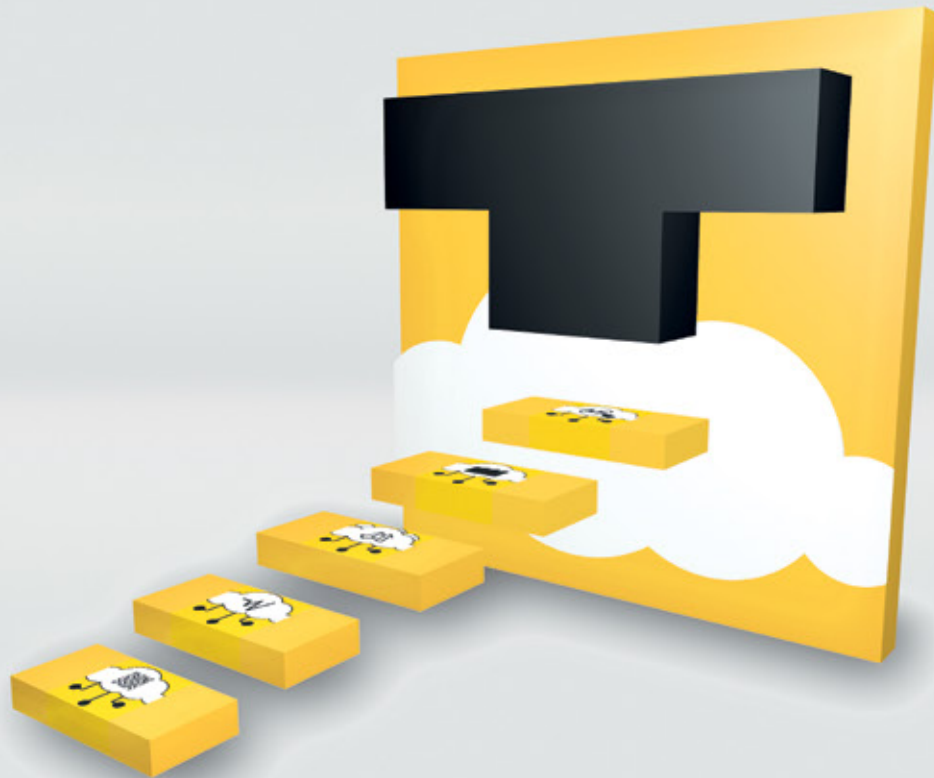
Step 2: Generation of additional data in the sensors and fieldbus modules

The second step covers the generation of additional data no longer required for the actual control of a machine. Sensors, for example, and many other devices supply additional data as well as the process data, such as temperature, degree of contamination, operating hours or other values containing meta information about a device. With the increasing spread of IO-Link in particular, a channel was created to transfer additional acyclical data to the controller. This data has recently been used increasingly for diagnostic tasks or for predictive maintenance. In this way, users can determine the degree of contamination on their ultrasonic sensor, or whether a shaft monitored by a rotary encoder is no longer running smoothly.

Step 3: Integration in the systems of established cloud suppliers

Major IT, telecommunication and technology companies, such as Telekom or Amazon, as well as major software specialists like SAP, IBM or Microsoft, are already offering cloud services on the market. The transfer of data to these clouds from production is now already possible using edge gateways and other solutions, such as Turck's multiprotocol fieldbus devices. Thanks to the multiprotocol Ethernet technology, Turck's I/O modules and systems can send data to

edge gateways in parallel with user data (via Profinet, Ethernet/IP and Modbus TCP), which in turn either evaluate it themselves or send it to the cloud systems of the established suppliers.

Turck intends to equip its product portfolio gradually with OPC UA and MQTT communication options. These standard protocols allow components to be integrated flexibly, quickly and easily in any cloud. Beside block I/O modules and modular I/O systems, these protocols will also be available in Turck HMIs and PLCs.

The cloud systems of the major IT suppliers have given little consideration so far to the special requirements of industrial production and automation. Although a lot can be configured and adapted, this can be inflexible, tedious and difficult in particular cases, as well as ultimately being expensive. The communication routes to the major suppliers are also often not encrypted. Turck provides an answer here with its cloud solution that is tailored to automation requirements.

Step 4: Tailor-made for industrial automation

At this year's Hannover Messe, the Mülheim automation specialists are presenting for the first time the Turck Cloud Solutions, its own proprietary cloud solution tailored to meet the requirements of automation and industrial requirements. The benefit of this solution is the fact that Turck with its Kolibri protocol, which is

Turck Cloud Solotions offer tailored solutions for users in the automation sector

»The cloud systems of the major IT suppliers have given little consideration so far to the special requirements of industrial production and automation – Turck's answer to this is a cloud solution tailored to automation requirements.«

part the technology buyout of Beck IPC, offers fully encrypted communication with the cloud. In comparison, communication via MQTT for example is often not encrypted and can therefore be more easily read when the line is tapped.

Kolibri is also a slim-line protocol that can be integrated easily in any standard industrial hardware without causing any performance bottlenecks. Unlike the cloud services of IT suppliers, the Turck cloud automatically shows additional information on the particular devices, without any additional configuration information being necessary. The configuration of other relevant data for transfer to the cloud can be carried out simply in the Turck solution by placing a tick at the relevant device. The function is supported by all Codesys 3-based Turck controllers: Turck will first implement the cloud on its IP67 compact PLC, the TBEN-L-PLC, and later also in the TBEN-S and TBEN-L I/O modules, as well as the HMIs of the TX series.

Where is the data stored?
Turck Cloud Solutions enables the user currently to choose between four different cloud storage options: The right solutions are provided for the customer to enable hosting either by Turck or by the users themselves. Turck also offers solution options specially tailored to customer requirements.

OPC UA AND MQTT

OPC UA is a global standard for integrative communication across all levels of the automation pyramid. The standard was developed in close collaboration between science and industrial companies – including Turck. MQTT stands for Message Queuing Telemetry Transport. The protocol was developed for communication between machines and is also suitable for connections with delays or with a limited bandwidth. MQTT servers store the entire data content of the clients – in industrial automation this is mostly from sensors or actuators.

The most convenient variant is to have the cloud hosted by Turck. For this, the company works together with major IT center operators, who can ensure the necessary 24/7 support and also the appropriate data security and system performance. This saves the customer from having to think about the necessary infrastructure and support. Turck takes care of this for the customer as a service provider and thus reduces the initial investment in terms of time and costs. As Turck's cloud solution is primarily hosted on servers in Germany, data security is guaranteed in accordance with German and European data protection laws. On request, customers can also use a server site of their choice, such as in Asia or in the USA.

Flexibly adapted
The customer can also use the cloud hosted by Turck in two versions: Firstly as a cloud with a Turck look – particularly suitable for smaller OEMs and end customers wishing to use the cloud service themselves. Alternatively, the cloud can also be implemented in the corporate design of the customer. This customer portal can also be functionally adapted to the needs of the customer. The customer portal is primarily designed for OEMs wishing to offer their customers a machine with a cloud option, which is required to be recognizable as a product of the OEM.
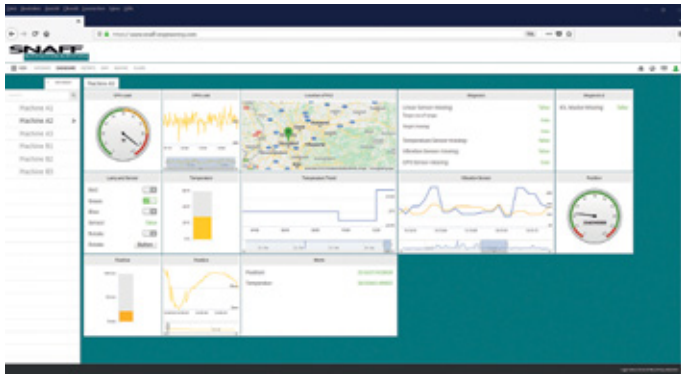
Turck cloud on-premises
The on-premises variant of the cloud is hosted directly on the customer's site, so that they have complete physical control of all data and processes. This solution can be implemented on the customer's hardware if the appropriate server landscape can be provided and the IT department can provide the necessary support. This installation is normally carried out in a suitable IT environment with air-conditioned server rooms and cannot be carried out directly in the production environment.
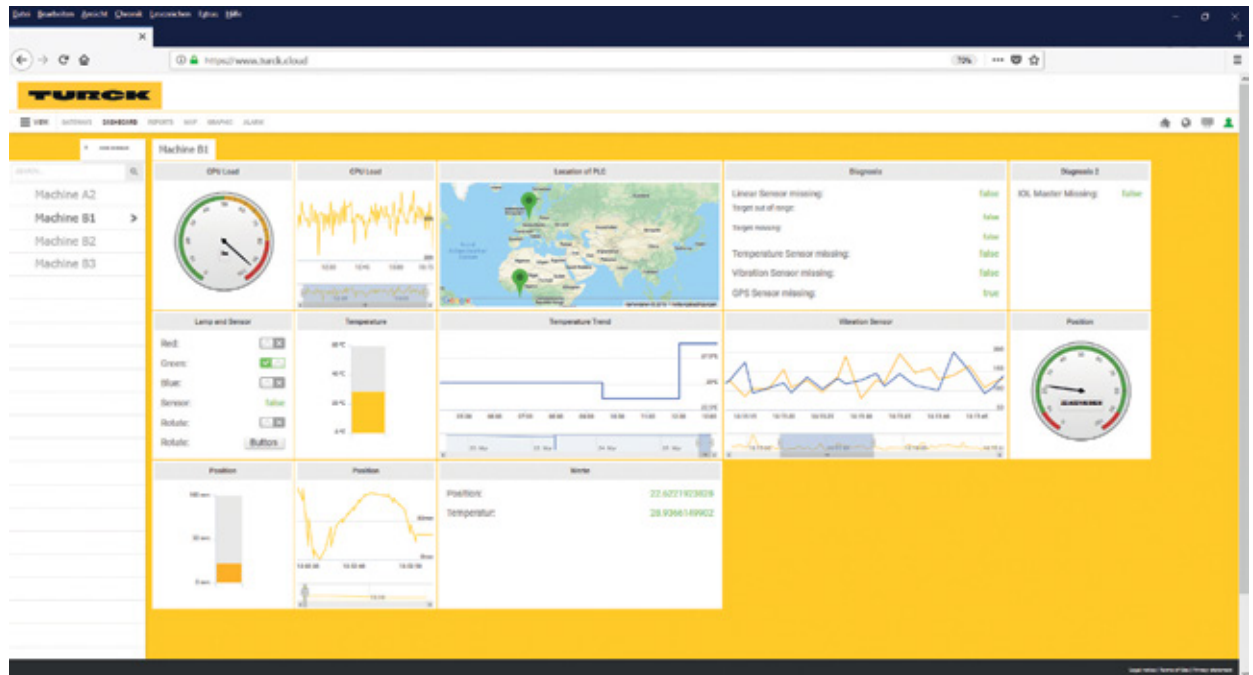
The benefit of this solution is the fact that customers do not have to connect their private cloud to the internet, but can establish a local connection to their

Smart data, clearly organized: The dashboard of Turck Cloud Solutions shows the actual machine data and states at a glance; the user-interface can also be customized if required

servers from the production area. This solution can be a way for customers with security concerns to enjoy the benefits of cloud-based intelligence without having to store the data externally.

For customers who require the on-premises solution but do not have their own IT center, Turck has developed state-of-the-art industrial on-premises server solutions. These do not require fans or moving data carriers and can therefore be installed as IP20 versions directly in the control cabinet or as a future IP67 variant directly at the machine in the field. The on-premises cloud can also be opened for worldwide access in order to open them, for example for other customers or other corporate sites.

Step 5: Cloud applications tailored to industrial processes
Turck will gradually expand the applications and functions implemented on its cloud platform. Frequently required analytics functions such as long-term evaluations, sensor behavior or log book functions can then be used without having to configure them manually.

Self-learning algorithms will also have a role as part of the further development of functions. The machine will then learn on its own what is correct (normal) and incorrect (deviant). This estimation will become increasingly more precise the longer operation continues. If the machine registers, for example, a higher temperature value at a sensor, it will know if this is due to the weather or seasonal sunlight, or another reason such as wear.

If the solution to the problem is documented by the software, it will be one day possible to suggest a remedy in addition to the diagnostics or notify the right technician directly via smartphone.

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