SIGMATEK

AUTOMATION FOR THE

SMART FACTORY

THE DIGITAL FACTORY IS CALLING

BIG DATA HANDLING AND GLOBAL CONNECTIVITY

The goal of an intelligent factory is to produce small lot sizes in the same quality as larger quantities – and at a competitive price. This requires a lot of know-how in machine automation.

The term "Smart Factory" stands for modern production facilities that can profitably manufacture individualized products even in small quantities, especially in high-wage regions – and with trackable processes that ensure perfect quality.

As a machine manufacturer, you contribute to the implementation of intelligent factories with flexibly applicable machines and systems, ensuring short set-up times and extraordinarily high availability. The increasing, vertical integration of machine data requires new concepts for channeling the connected data streams.

In this challenge, which extends far beyond the current understanding of machine control, we gladly support you as an automation partner. In the future, a wide range of data will have to be collected for higher-level systems and delivered
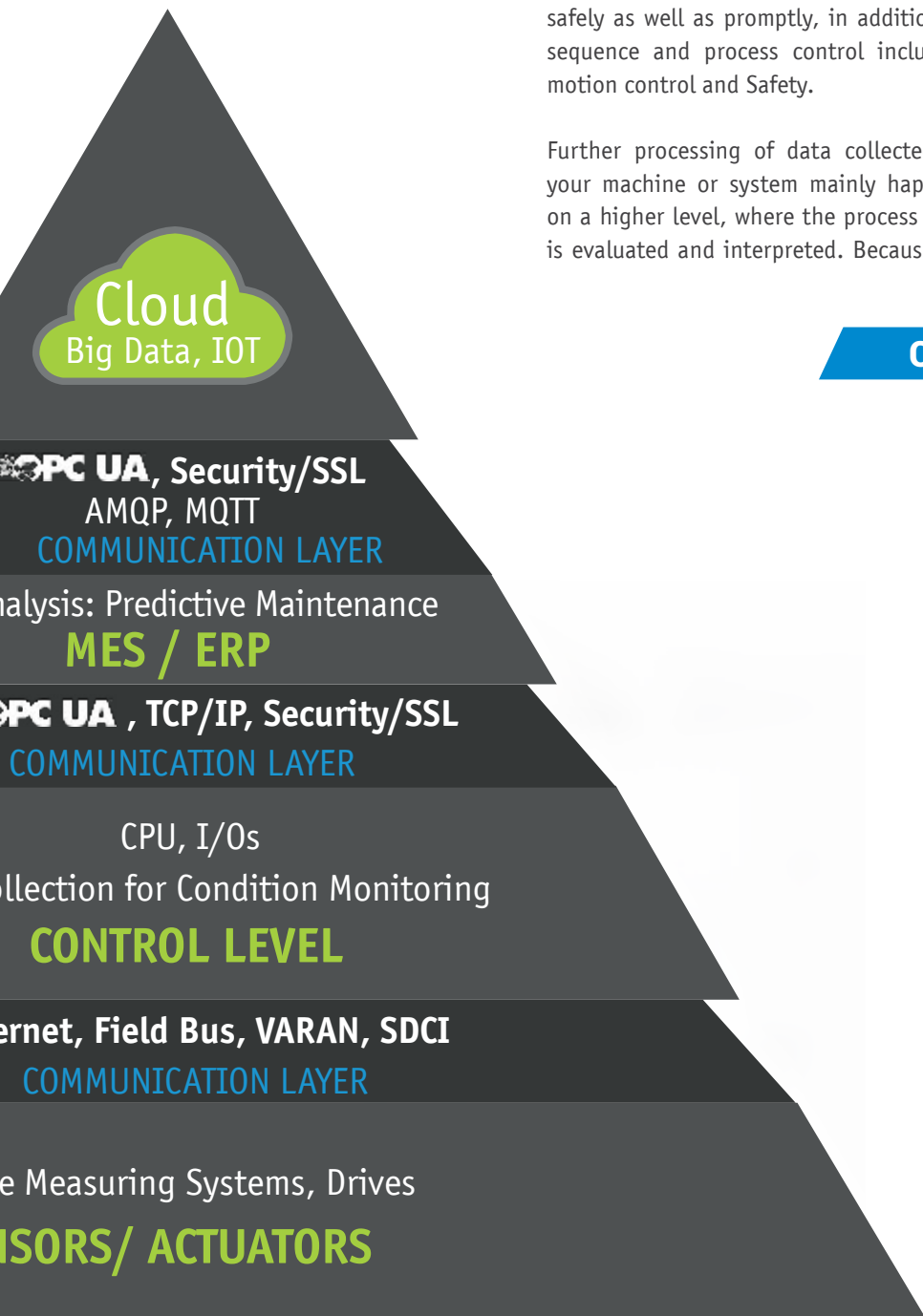
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safely as well as promptly, in addition to sequence and process control including motion control and Safety.

Further processing of data collected by your machine or system mainly happens on a higher level, where the process data is evaluated and interpreted. Because for product optimization, business as well as application and machine data are required. Ultimately, the artistry lies in creating the right correlation, defining process figures and introducing measures for optimization. This area is the job of the specialists in your client's companies.

CHALLENGING DATA STREAMS

Processing of production and system information is being expanded from IT to machine automation. Data must be collected directly at the machine, recorded, compiled and sent as upstream to the overlying data storage. Downstreaming data also provides new possibilities: The transparent availability of large data volumes enables the required information to be filtered and sent directly to the machine.

For you, the topic of data handling includes an additional operating dimension: In the future production companies will expect more from you than the supply and initial start-up of machines and systems according to a defined specification. A clear verification of connectivity, availability and productivity of the delivered machine or system is required. Since these performance indicators are not only dependent on the system itself, but essentially on the peripheral systems as well – such as the intralogistics for loading and transporting – there is clearly a vital interest for seamless documentation and recording of all machine information and production data.

Cloud
Big Data, IOT

OPC UA, Security/SSL
AMQP, MQTT
COMMUNICATION LAYER

Analysis: Predictive Maintenance
MES / ERP

OPC UA , TCP/IP, Security/SSL
COMMUNICATION LAYER

CPU, I/Os
Collection for Condition Monitoring
CONTROL LEVEL

ernet, Field Bus, VARAN, SDCI
COMMUNICATION LAYER

e Measuring Systems, Drives
ISORS/ ACTUATORS

Data, data, data - in the Smart Factory, efficient data collection and intelligent data handling combined with consistent connectivity is increasingly important. This especially applies for emerging technologies, such as artificial intelligence.

# FLEXIBLY AUTOMATE MACHINES

MODULAR, OPEN AND FUTURE PROOF

A flexible control architecture, open interfaces and communication standards that make big data handling easy and safe are success factors for machines and systems in the networked, digital factory.

One thing is clear: Even as a manufacturer of complete automation solutions, we cannot provide ready-made automation solutions 4.0 – with machines used for flexible and networked production, there are numerous variables which must be individually adapted.

We support you with an extremely compact, modular and scalable control architecture, which today already masters the newest

communication protocols and is therewith perfectly equipped for the modern data integration in Smart Factories.

This enables you to flexibly design your application processes and integrate your machine into an intelligent production structure with other machines, robots and handling systems, which then communicates with higher-level areas.
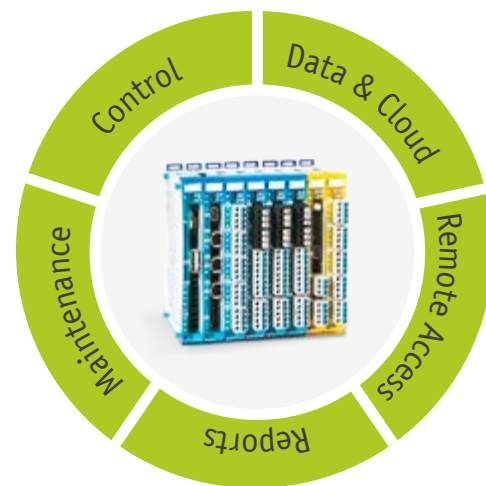
FLEXIBILITY THROUGH MODULARIZATION

Following the "Internet of Things" approach, we focus on distributed intelligences in our automation solutions, which enable modularization of the machine. A decentral structure can be configured significantly more diverse, so that specific requirements can be flexibly met in different topologies. The application is divided into functional units, which are

equipped with the appropriate computing power. Each CPU controls a clear function unit in the machine and exchanges information with the neighboring controllers as required. Modern networking technology and standardized interfaces enable this distribution without communication and performance loss. For you as a machine manufacturer, this has the advantage that

no computing power must be reserved in "fat PLCs". Engineering is also simpler, since the software is divided into smaller units that can be combined as desired.

HIGH AVAILABILITY: PREDICTIVE MAINTENANCE

Intelligent sensors combined with modern control systems make it possible to collect or monitor condition data from components, machines and systems in real time (condition monitoring). Examples of this are vibration, temperature or power. Predictive maintenance uses this data to predict the development of the machine condition and plan service intervals. For this purpose, the data are evaluated in a higer-level system (MES, ERP, Cloud) and compared with stored data or key figures.

Predictive maintenance should contribute to increasing the availability of the machine. For you, as a machine manufacturer, this opens new service business fields.

▲ The S-DIAS system provides modules for measuring energy consumption, current, voltage, temperature and vibration. For the connection of smart sensors a module with SDCI master interfaces (I/O link) is available.

REMOTE ACCESS
BROWSER BASED OVER VPN

Secured remote maintenance options increase the availability of your machine. With our "Remote Access Platform" (RAP) in combination with the "Remote Access Routers" (RAR) or the operating system extensioin "Embedded Remote Access" (RAE), you have many possibilities. Your technicians can simply create a secure VPN connection with the desired machine through a central interface. So the machine or system visualization can be operated through VNC. You are able to perform software updates, debugging and maintenance as if you were directly on-site. With "Cloud Logging", you can call machine data from the PLC automatically, send them safely to the cloud and access these via dashboards. With the "SIGMATEK - Remote Access" (RAA) app, machines and systems can even be monitored and maintained via smartphone or tablet.

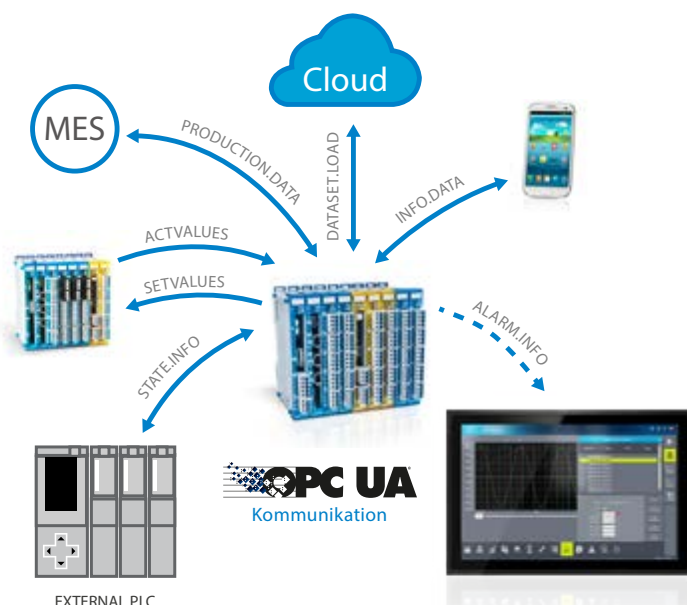## CONNECTIVITY FROM THE SENSOR UP TO THE CLOUD

The advancement of digitalization requires open and at the same time, safe communication between components and systems. Additionally, flexible machine concepts 4.0 require safe remote access options and increased data exchange with higher-level systems that extend into the IT platform of a company or the cloud.

THE STANDARD: OPC UA

With OPC UA, process data can be transferred independently of the platform and manufacturer. UA stands for „unified architecture". OPC UA has already established itself as an international standard for communication 4.0. An efficient solution for horizontal M2M, as well as vertical communication between the machine or system with the office and control level (MES, ERP, SCADA) or the cloud is therewith provided. With SIGMATEK systems, the OPC UA client as well as the server function can be implemented very easily.

MES • Cloud • PRODUCTION.DATA • DATASET.LOAD • INFO.DATA • ACTVALUES • SETVALUES • STATE.INFO • ALARM.INFO • OPC UA Kommunikation • EXTERNAL PLC

CLOUD SERVICES

Since the complexity and volume of the data in an intelligent factory are enormous, local data servers and cloud services represent a future-oriented solution. There are options for the long-term archiving and aggregation of data, as well as extensive analysis for optimizing production. The connection to private networks or cloud services, such as those offered by Cisco, Microsoft Azure or Amazon Web Services for example, can be made via OPC UA or other standardized message-based communication protocols such as AMQP (Advanced Message Queueing Protocol) or MQTT (Message Queuing Telemetry Transport).

The PC 521 can retrieve extensive data and parameters from machine systems and store them locally without affecting operation. As an IoT gateway, the compact computer allows an efficient connection to MES, fog and cloud solutions.

DATA SECURITY AND SAFETY

The networking of machines and systems, remote maintenance and software updates via Internet, as well as data exchange with MES or ERP systems up to cloud communication, place increasingly higher demands on data security in the production process. Especially as these are becoming more closely linked with IT security. Here, SSL encryption via VPN ensures the required data security. We have VPN tunneling integrated into our control system, all the way down to the programming port. The internal system communication functions via the real-time VARAN bus, which guarantees data consistency by repeating unconfirmed messages within the same bus cycle.

At SIGMATEK, Safety is seamlessly integrated into the control system. The Safety-oriented data can be exchanged via the system bus, as well as Ethernet TCP/IP networks and even wireless. For this purpose, the Black Channel principle is used.

FLEXIBLY OPERATE WITH WIRELESS SAFETY

In networked production facilities with numerous machines and systems, it is extremely useful to have collected information clearly organized on a mobile and wireless operating interface that is always within reach. Our mobile HGW 1033 wireless panel is available with the Safety functions emergency stop, confirmation button and key switch, which are especially helpful during set-up mode.

The well thought-out wireless Safety solution is also used in automated guided vehicles (AGV), which score in Smart Factories with flexible material transport "just in time".

The wireless handheld operating panel HGW 1033 provides maximum operating freedom.

SIMPLY IMPLEMENT THE COMPLEX: ENGINEERING WITH LASAL

Networked, digital production is associated with increasing complexity. In the future, the software will become even more significant. To implement complex applications so simple that anyone can operate them, provides a decisive added value according to the easy2use approach.

In smart automation solutions, the modularity of the hardware must be reflected in the software. The object-oriented all-in-one engineering tool LASAL supports you with flexibly designed concepts – in all project phases.

Once created and tested, software can always be reused in a toolkit system. In addition, the graphic representation encapsulates the complexity (complexity hiding), so that the user has an overview of the project interconnections at any time.

An advantage of object-oriented programming is that it can be used regardless of the hardware and easily divided into workgroups. To accelerate the engineering even more, modern "Add-Ons" are available for a broad selection of machine functions such as alarm and recipe handling, access rights management, online oscilloscope, Pick&Place, CNC etc. These Add-Ons are function-specific, contain program and display elements and are ready to use. Configuring instead of programming is the motto.

The LASAL VISUDesigner provides a high degree of freedom to create visualization solutions (HTML5, CSS3 and JavaScript).

LASAL also provides a finished component for implementing OPC UA und MQTT.
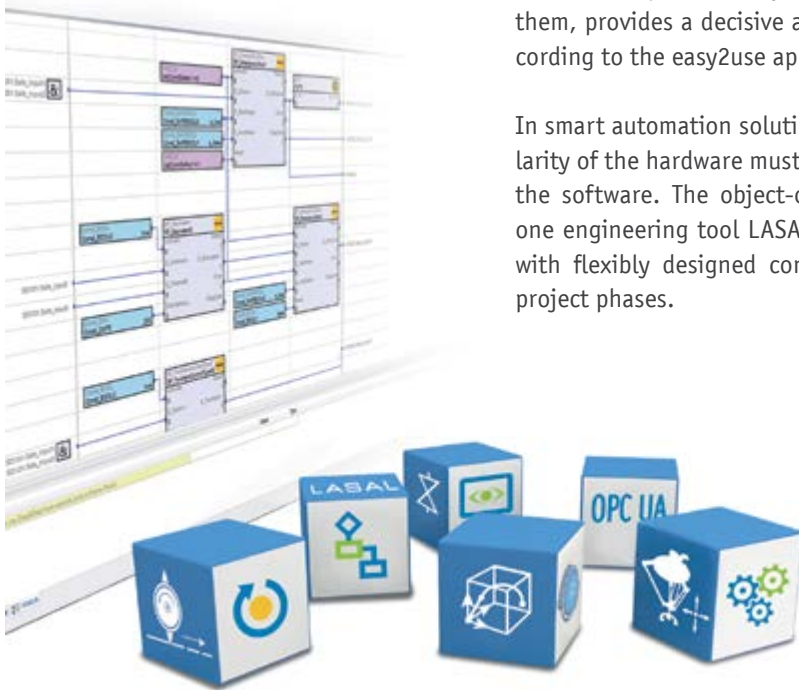
MACHINE MANAGER: OVERSEE ENTIRE SOLUTIONS

The LASAL Machine Manager acts as the central management and overview platform for multi-CPU solutions. Here, the user sees the different CPUs, including their connections to one another. With the extremely intuitive to operate software interface, the bidirectional transfer of data between CPUs is easily configured with a mouse click. Who can exchange data with whom can therefore be quickly understood. Online connections can be defined centrally.

The Machine Manager is not only used to oversee projects, it manages the entire infrastructure for the control programs of a machine. The data flow can be channeled with external system components

in the machine configuration and with higher-level systems. For this purpose the

OPC UA communication protocol is used, which is supported by all SIGMATEK CPUs.
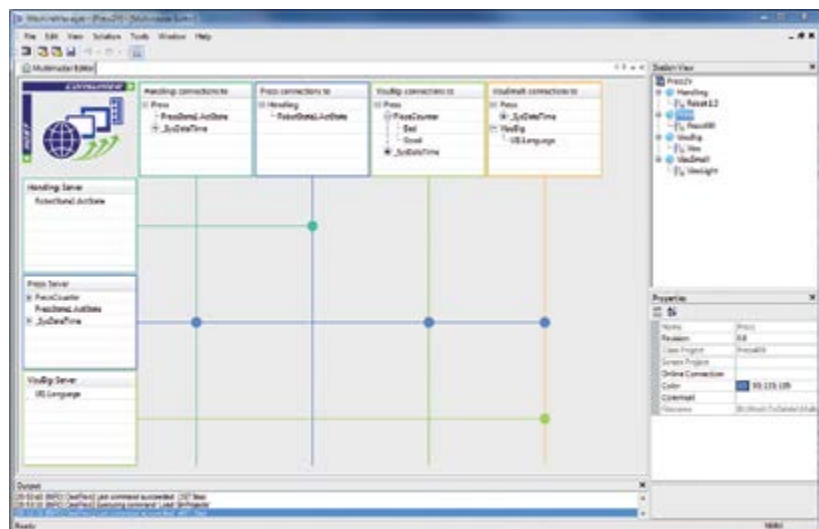
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