

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 a lot size of 1 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.

As an automation partner, we support you in this challenge which extends far beyond the current understanding of machine control. In addition to sequence and process control, including motion control and Safety, a wide range of data must be

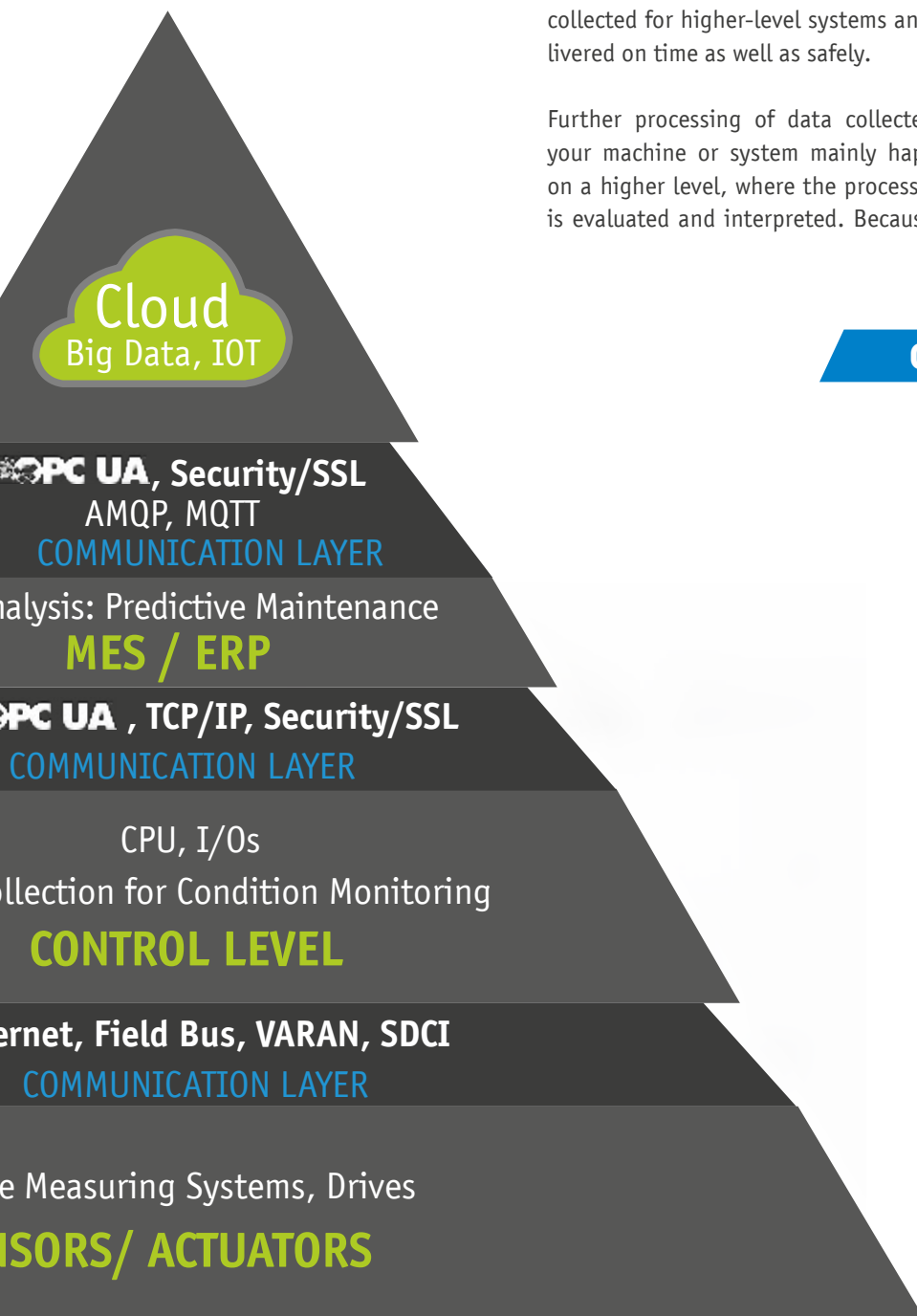
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collected for higher-level systems and delivered on time as well as safely.

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

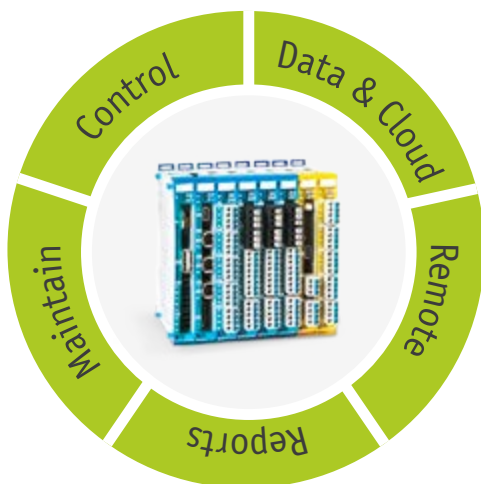
Processing of production and system information is being expanded from IT to machine automation. Data must be collected directly at the machine, recorded, compiled and sent as upstream to the overlying data storage. Downstreaming data also provides new possibilities: The transparent availability of large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

Data, data, data - in the Smart Factory, efficient data collection and intelligent data handling combined with consistent connectivity is increasingly important.

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 the 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 – whether it is a tree, star or line structure.

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 as well as exchanged. The clarity and sustainability of the software is therewith maximized.





HIGH AVAILABILITY: PREDICTIVE MAINTENANCE

Condition monitoring and predictive maintenance are essential factors in the Smart Factory. 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 higher-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 control 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.

CONNECTIVITY FROM THE SENSOR UP TO THE CLOUD

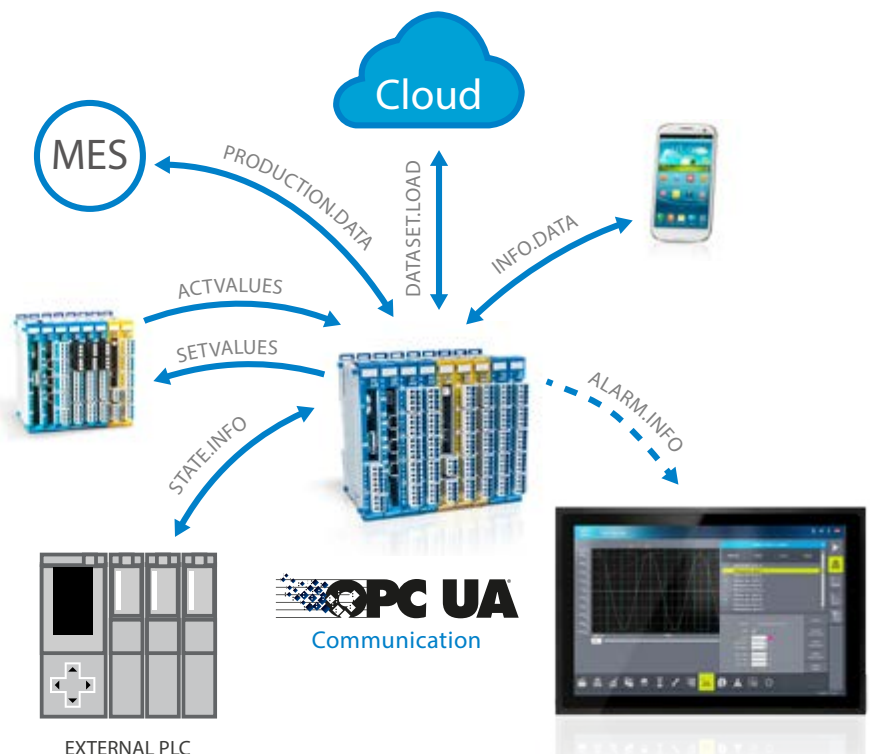
The advancement of digitalization requires open, and at the same time safe communication between components and systems. Additionally, flexible machine concepts 4.0

demand increased, safe data exchange with higher-level systems into the IT level of a company or the cloud.



THE STANDARD: OPC UA

With OPC UA, process data can be exchanged 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 SIGMA TEK systems, the OPC UA client as well as the server function can be implemented very easily.





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 Queue Telemetry Transport).



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

Mobility during operation is a great advantage, especially in networked production. SIGMATEK offers a wireless handheld operating panel for future visualization tasks. In modern 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 equipped 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

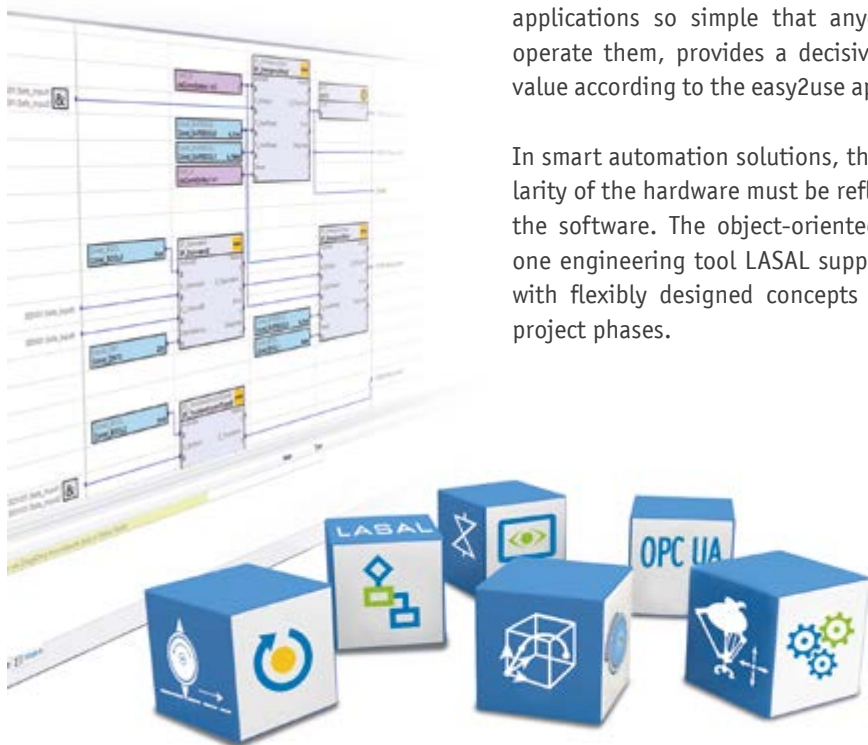
The demands that networked, digital production places on machines and systems is closely linked with increasing complexity. In the future, the software will therefore gain importance. To implement complex applications so simple that anyone can operate them, provides a decisive added value according to 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.

LASAL also provides a finished component for implementing OPC UA.



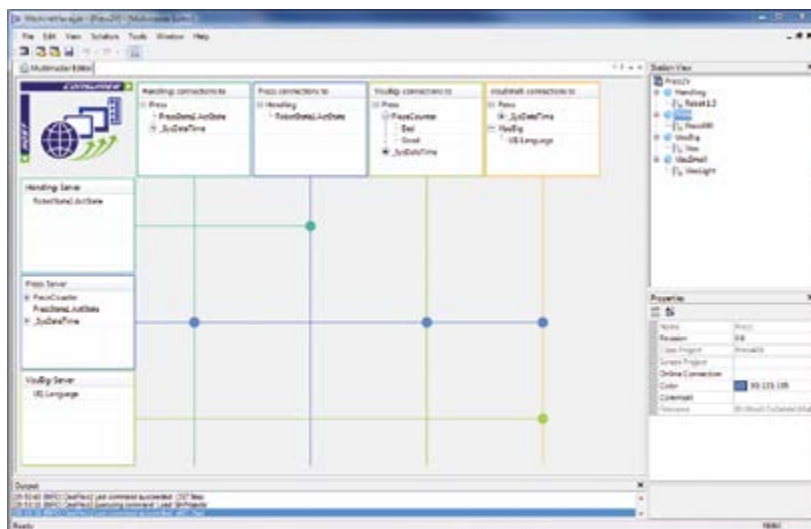
MACHINE MANAGER: OVERSEE ENTIRE SOLUTIONS

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 bi-directional 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 SIGMA TEK CPUs.



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