

Masa GmbH, 56626 Andernach, Germany

# Flexible interface between block making factories and ERP systems

The future production requirements will bring high demands in terms of efficiency, variability and sustainability. The use of latest information and communication technologies should lead to unification of systems within industrial production. The technical foundation for this are intelligent and digital connected systems. In Industry 4.0, people, machines, plants, logistics and products communicate and interact directly with each other. The importance and awareness of global digitalization trends has been present for building material manufacturers for some time. Such change is pushing acceptance to use digital planning instruments. Masa GmbH supports its customers in the digital transformation with the development of a special API (Application Programming Interface).

Andernach, June 24<sup>th</sup>, 2020, 11:00 a.m. CEST: Masa GmbH starts with its first webinar of the Masa 4.0 series in the specially established "Studio Room". Microphones, light and cameras are installed. This is a new development for all participants. After a short welcome by the Managing Director Frank W. Reschke, the initial excitement of the presenters quickly subsided and the two experts Rudolf Buyna and Michael Dolon confidently guided the participants through the 30 minutes webinar. With their extensive knowledge they explained the growing importance of Enterprise Resource Planning (ERP) in the building materials industry/concrete block production and



Masa Studio

presented the Masa API as a tool for the transfer of master data as well as consumption and production key figures.

## Enterprise resource planning (ERP) in the building materials industry/concrete block production

Enterprise resources such as capital, employees, operating resources, materials as well as information- and communication technology must be planned, controlled and managed punctually and in coordination with requirements. The purpose is to ensure both an efficient, operational value-added process and a continuously optimized control of entrepreneurial and operational workflows. ERP systems are used to support the resource planning of the entire company.

### Various processes are considered in the customer's ERP system:

- Order processing**  
 In order processing, a distinction is made between sales orders and production orders. The sales order created in the ERP system can trigger several production orders or further processes. Each order is assigned an identification number.
- Production planning**  
 In production planning, the orders directly determine the material and personnel demands. They also influence the processing time in conjunction with production scheduling and the expected time for the final products coming off the line onto the storage patio.
- Material and operating resources**  
 The master data maintenance of material and operating resources is carried out in the ERP system. This is where the availability of raw materials and other consumables, such as packaging materials or transport pallets, is controlled and monitored.
- Availability of personnel**  
 The availability of personnel required for the order is checked against the personnel qualifications and qualified operator shift availability.
- Inventory management**  
 In the section of inventory management, the stock level is to be considered. If necessary, demand information is process integrated.

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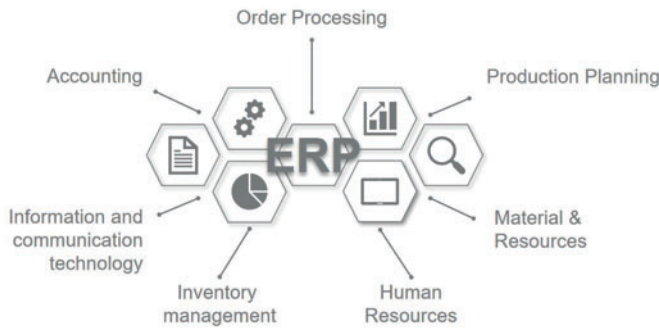
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The ERP system supports different business resource planning.

- Information- and communication technology**  
 The document flow is coordinated via IT. In the case of several production sites, internal coordination also plays a major role, e.g. in order to make the best possible use of multiple site resources.
- Accounting**  
 The accounting is supplied with the corresponding data from the ERP system in conjunction with cost accounting, controlling and auditing, among other systems.

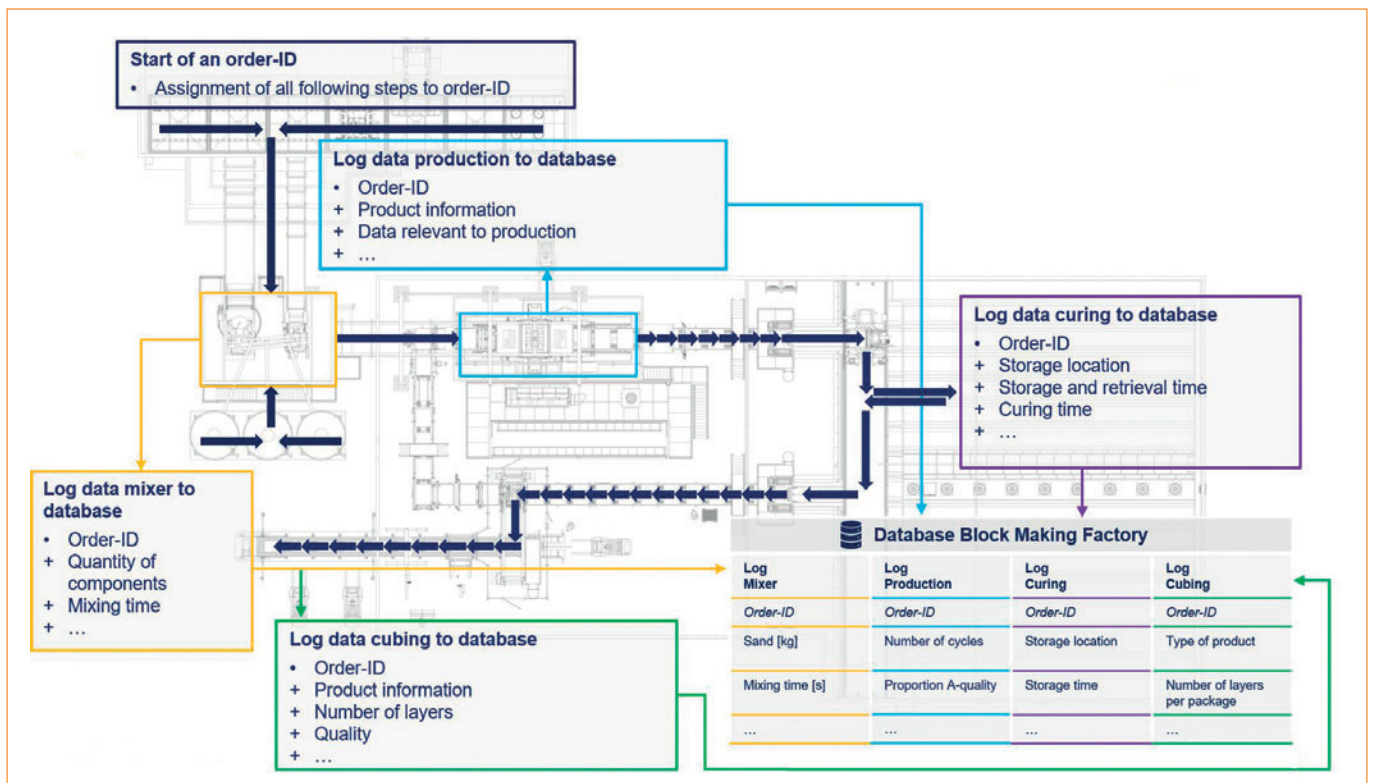
ERP systems are increasingly used in concrete block production. A prime benefit supporting this is the ever-increasing product variety. Given the market constantly demanding new developments, product properties such as sealing, colour blending, and a growing range of moulds, all which lead to an increased administrative effort. Simultaneously well-known

products must continue to be available. In addition, there are more and more corresponding product lines, e.g. for surface coverings and wall elements. Another reason are the custom-based production orders, which are often in small quantities and have short delivery times. In addition, an ERP system can be used to quickly and easily determine whether a product is available in the warehouse. Also, order-related cost awareness should not be neglected. By means of cost monitoring per order, the processing time, the scheduling of employees, the availability or procurement of material and many other data inputs can be monitored in real time.

**Prerequisites for communication between ERP system and block making plant**

As a basic prerequisite for connecting the customer's ERP system to the block making plant, a data flow within the factory must be assured. Data records created at various points in the production process are stored with the order ID and transported digitally as a data telegram throughout the entire process. Within a concrete block production plant this can be, for example:

- Dosing and mixing plant**  
 Order ID; recipe data for raw materials, cement, ...; main or face mix; time stamp
- Machine and wet side**  
 Order ID; recipe data; product information; mould data; time stamp (when produced); information of quality control; coating; washing out; ...



Exemplary data transfer in a Masa concrete block making plant



- **Finger car and curing**  
Curing time according to product parameters; storage place; time stamp of storage; time stamp of removal from storage; ...
- **Dry side, cubing and cube transport**  
Order ID; processing information; packaging information; data for labels; ...

In Masa concrete block making plants, modular control software has been used for many years for uniform operation and plant component visualizations. The software is available in Basic, Advanced and Professional versions. Depending on the selected version, it includes tools for visualization, product data management, production data acquisition or mould management, or offers comparison functions for product recipes or automatic recipe change. Machine and plant data are collected in a database and can be used by external systems. The linking and evaluation of these data becomes the real challenge.

**The Masa API: Basics and network structure**

The shown data transfer is the foundation for data transfer into an ERP system, realized by the API. All production-relevant

data from the plant environment can be made available and evaluated via readily programmed modules. The API is to be understood as a collection of pre-programmed functions that make specified data retrievable. These can be called up by the customer's ERP system.

Michael Dolon emphasized a decisive advantage during the webinar: "We program the visualization systems and user interfaces with our own application developers. This enables the system to access and evaluate all data generated in the plant. Furthermore, the system is created to adapt to customer needs".

The major priority is given to the availability and function of the entire plant. Even if the connection to the ERP system should be disrupted, no data will be lost and the plant is able to continue production. For this purpose, the Masa system uses its own subnet for the plant control system which gives the possibility to buffer data. The diagram below shows an example of a network structure and describes how the plant is decoupled via a separate switch which provides the connection to the outside world. For further security, the access to the plant control is protected by a secure Remote Ethernet Device with firewall.



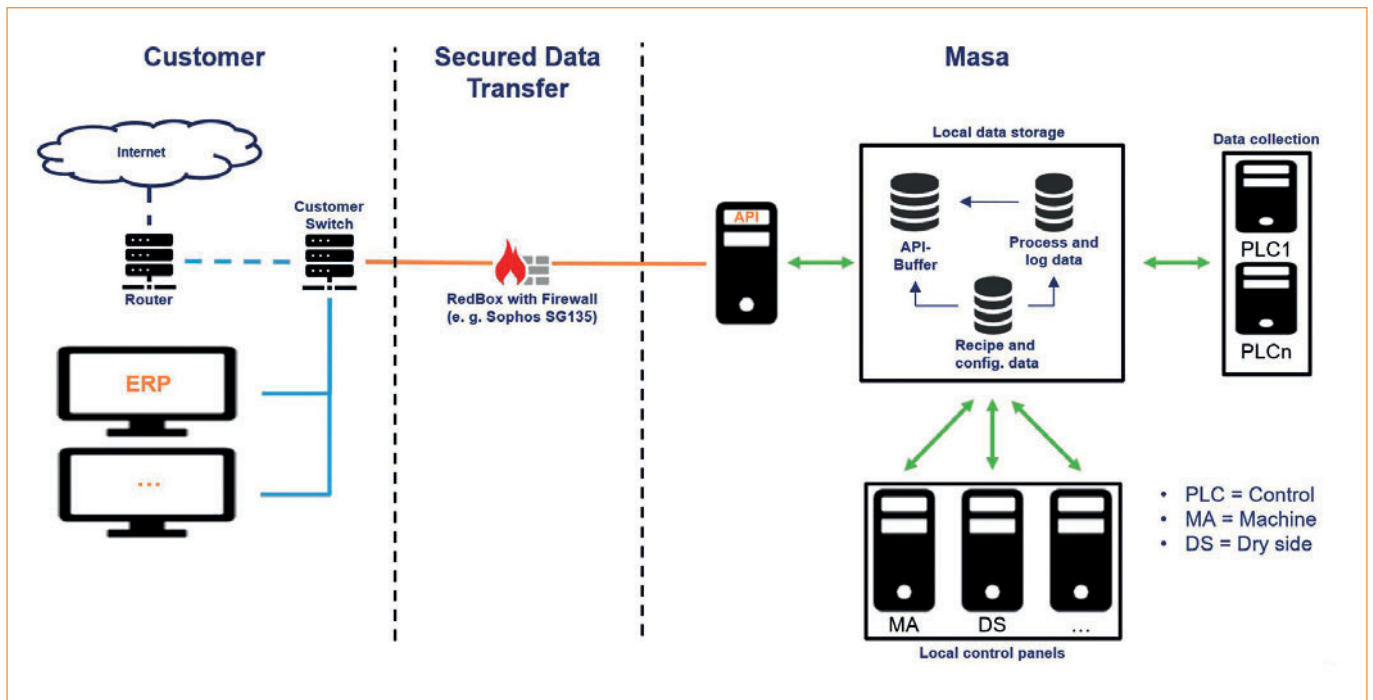
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Exemplary network structure

The four basic elements of the API are secure data transfer, master data synchronization, order management and production data exchange.

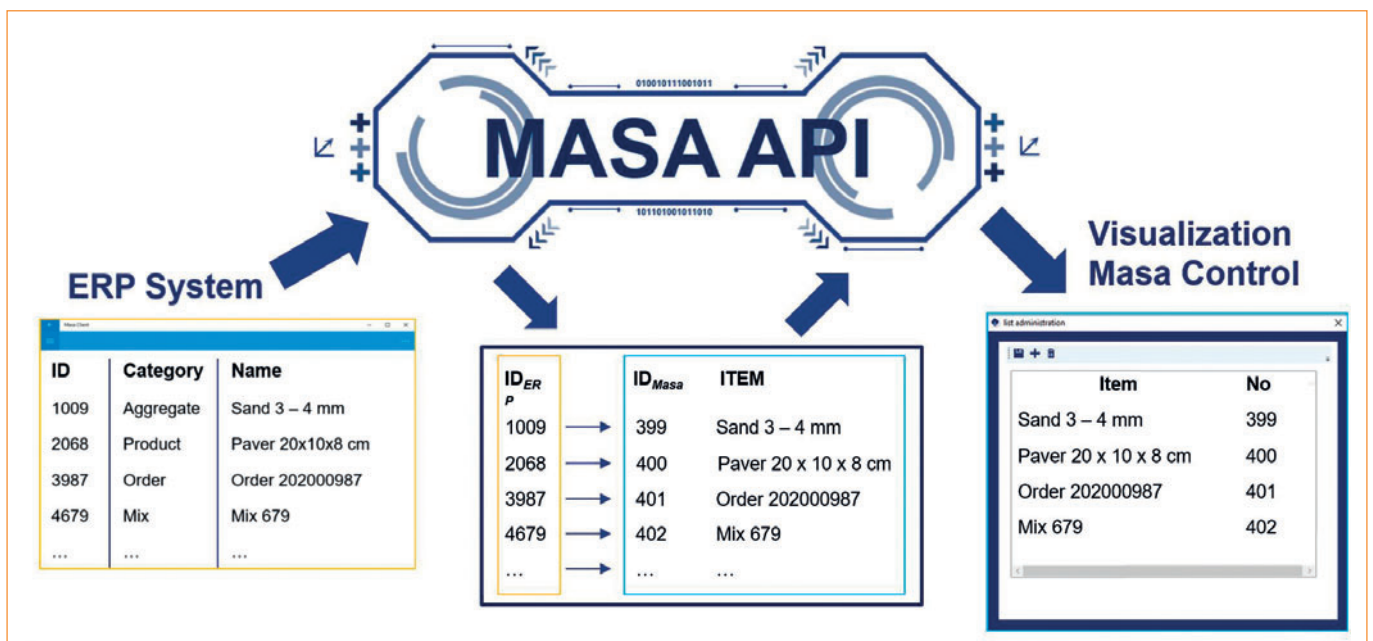
**1) Secure data transfer**

To ensure the security of customer data, even beyond local network boundaries, Masa has integrated an authentication mechanism. This is based on a token transfer method. The authentication server generates a new token with each request. In this configuration, data can

only be exchanged in both directions after the communication channel verification.

**2) Master data synchronization**

Data of material components, compound recipes, and products are created as master data in the ERP system. Master data is generated in the ERP system as the leading system and is assigned an ID there. For example, a raw material newly created in the ERP system; followed by creating a listing in the database of the plant auto-



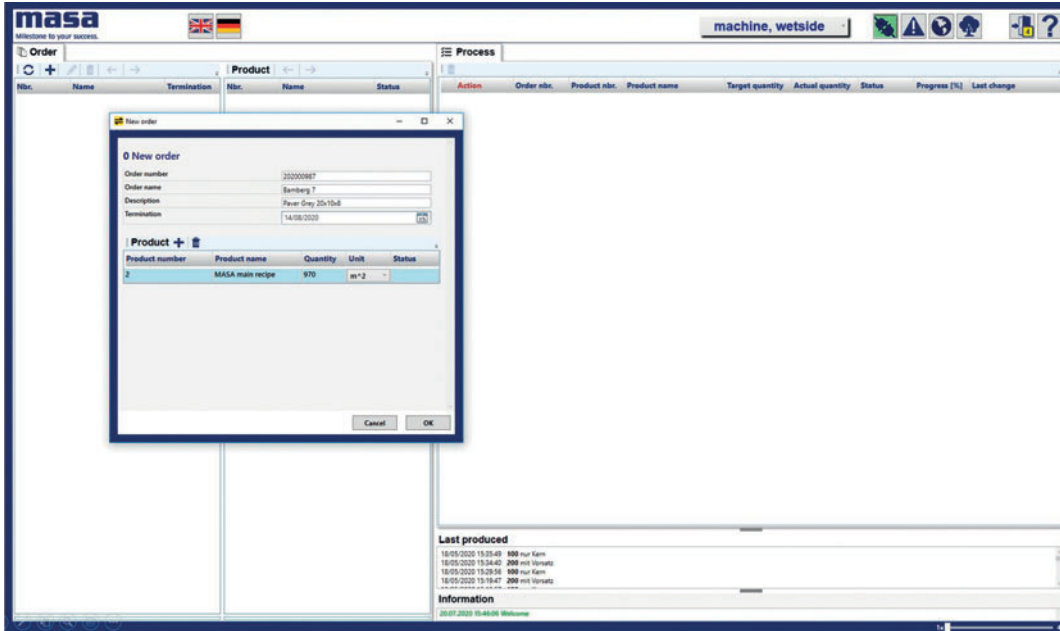
Schematic illustration of the automatic master data management



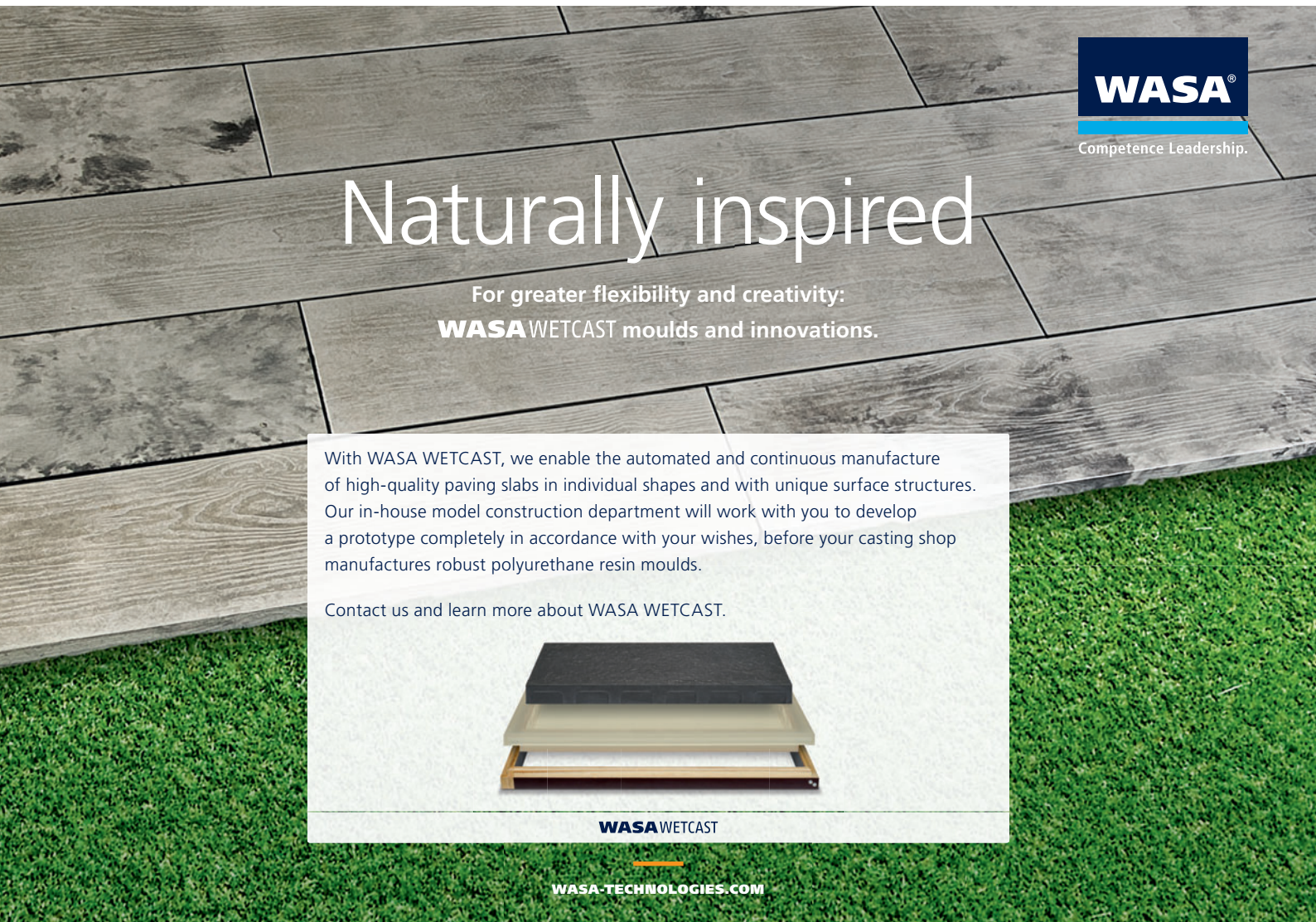
matically via the API. The raw material also receives an ID there. These two IDs are assigned to each other by cross-references. Only by this assignment the consumption can be recorded later in the ERP system. This process is then applied in a corresponding manner for the products, the mixtures and orders.

### 3) Order management

By connecting the ERP system via Masa API, the order is created in the ERP system and automatically transferred - the manual creation is therefore no longer necessary. The order is the central point to record consumption values and to carry out a corresponding order costing in



*Order management in the in-house developed plant visualization*



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**WASA WETCAST**

**Batch**

Category	Example
Order number	202000987
Order name	'Bamberg 7'
Product number	'222'
Product label	'Paver 20x10x8cm'
Mix number	'879'
Mix designation	'Main color red'
Time stamp	March, 01 <sup>st</sup> 2019 10:35:22

**Batch-Details**

Aggregate number (1)	'3'
Aggregate name (1)	'Sand 3 - 4 mm'
Quantity of aggregate (1)	500 kg
Aggregate number (2)	'27'
Aggregate name (2)	'CEM II/A-S 42.5 R'
Quantity of aggregate (2)	200 kg
Aggregate number (3)	'15'
Aggregate name (3)	Color red
Quantity of aggregate (3)	20 l

**MASA API**

**OGS Change/Entry production order**

Prod. order	Batch	Batch	Prod. city
152982 / Pfleiderer rot 42x43	Batch 1	3000000	155,26 km
	Batch 2		200,26 km

Production data exchange via Masa API between database of the block making plant and customer's ERP system

**Production**

Category	Example
Order number	202000987
Order name	'Bamberg 7'
Product number	'222'
Product label	'Paver 20x10x8cm'
Mold ID	'8891'
Start of production	March, 01 <sup>st</sup> 2019; 08:00 am
End of production	March, 01 <sup>st</sup> 2019; 12:00 pm

**Production data**

Produced quantity	970 m <sup>2</sup>
Cycles	900
Downtimes	32 mins
• Wetside blocked	5 min
• Main mix material not available	9 min
• Face mix material not available	12 min
• Production pallets not available	6 min

**MASA API**

**OGS Confirm work process**

Document	Serial no. / MMS	Receptor	Product	Wk. order	PLANT/NO/VERB
130112448	152982 /	Receptor	30000000	44 Receptor	
Produced qty. from previous work order			Wk. order	45 Anlage 1	
Equip. plan time	000:20	Product. plan time	001:40	Yield/Proc. plan	2000,000
Equip. actual time	000:05	Product. actual time	001:20	Act. yield/Pr.	1150,000
Difference	000:05	Difference	000:20	Diff.	850,000

the ERP system. A data telegram runs with every production pallet, this enables that a reference to the order can be made at every single position in the block making plant.

#### 4) Exchange of production data

The exchange of production data is event driven. Such an event can be a new order, a dosed material, a new product or a shift change. Thus, corresponding evaluations for shift, product, or order reference can be generated in the ERP system. In addition, it is possible to transfer the data in a time-triggered manner in order to realize a possibly required faster update within the ERP system. The data structures have been developed with the company OGS, an experienced manufacturer of ERP systems in the building materials industry.

Andernach, June 24<sup>th</sup>, 2020, 12:00 p.m. CEST: The webinar is over, the virtual webinar room is closed. Masa experts Rudolf Buyna and Michael Dolon are extremely satisfied with the course of the webinar. Both experts were able to discuss how the Masa API helps the customer to connect the Masa block making plant with a customer's ERP system via the programming interface. The questions of the participants were answered in detail. In the subsequent online survey, the webinar was perceived as very positive.

Following the success of the German webinar, Masa will also be offering the opportunity to participate in the Masa API webinar in English, Spanish and Russian in the coming months. For this purpose the team of experts has been extended accordingly.

#### Share knowledge - increase knowledge

Masa is already planning further webinars, that customers can continue to benefit from effective knowledge transfer via events in virtual space. Among others, the focus will be on Masa Online Support and Masa Smart Service.

All Masa experts will be at your disposal after the webinar to answer any further questions about the Masa API. The video recordings of the webinars can be viewed in the Masa channel of CPI.



Did you miss Masa's last webinar?  
Watch the recording of the event.





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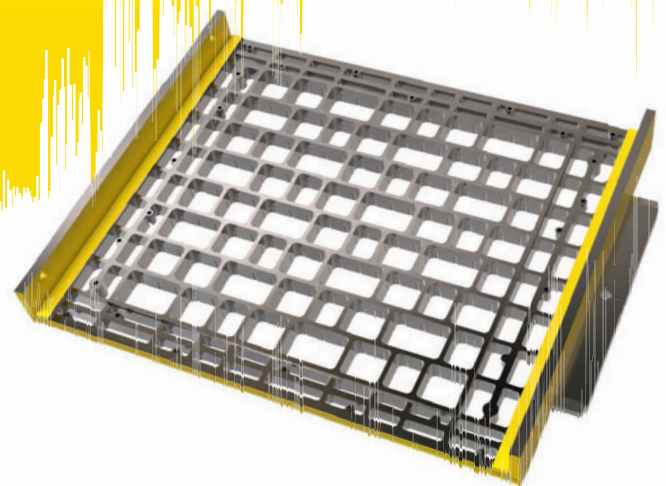
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