

It's the filling that counts

Concrete products need to meet quality requirements regarding the design, format, surface texture, strength and resistance that will withstand time, to satisfy customer demands. Only consistently high quality concrete products will lead to customer satisfaction. A very important factor influencing the quality of products is the filling of the filling box and the mould. Errors during filling are nearly impossible to be compensated for in the subsequent compaction process.

In principle, the entire production process for concrete products is complex. In addition to the optimal filling, many other factors influence the subsequent quality of the final product. Depending on the concrete product, there are a variety of different challenges to be mastered. Assuming suitable raw materials, for example, the concrete quality and homogeneity produced in the concrete mixers is just as essential as the transport of the fresh concrete to the block making machine. Here, among other things, segregation processes must be avoided since segregation leads to different and therefore unfavourable distribution of volume weights and stone structures on the production board. It must also be ensured that the concrete is processed quickly and continuously.

However, these topics, which are also independent in themselves, will not be considered in the following. Instead, the focus is placed primarily on the filling of the filling box and the mould.

Reproducibility as a quality-determining feature during dosing

The following applies in principle: The concrete quantity in the filling box must be adapted to the material requirement in the mould. If the quantity of concrete in the filling box is too low, the mould will not be filled completely. Too much concrete also has a negative effect, as the concrete can no longer move freely or is pre-compacted by too many filling box movements. As a rule of thumb for an optimal quantity of concrete, a look at the oscillating grate helps. This should still be covered with concrete after the mould has been filled and the filling box has moved backwards.

For dosing the correct amount of concrete into the filling box, Masa equips the block making machine either with a silo flap below the concrete silo or a dosing belt (optionally available for models of the XL and XL-R series), depending on the requirements.

Proven and classical: Silo flap below the concrete silo

In the case of the block making machine equipped with silo flaps, the amount of concrete in the filling box can generally be controlled by means of dosing angles or laser level measurement. However, based on many positive customer testimonials and the many years of experience of its own commissioning engineers and process technicians, Masa sees a clear



Section through the machine silo, top view machine silo, top view mould: Unfavourable distribution of the fresh concrete in the silo of the block making machine or on the production board.

advantage in the first variant and therefore equips the block making machines in the main mix filling box with dosing angles as a standard.

When using dosing angles, the machine operator can set the amount of material to be dosed product-specifically by selecting the appropriate position, length, and number of dosing angles. This allows for a consistent and repeatable quantity of concrete to be accurately dosed. The positioning of the silo outlet must be taken into account: this should be located centrally above the dosing angles so that the material flow is limited by the angles. The concrete is then distributed in the filling box with a distribution cycle from the oscillating grate. When using dosing angles, it's important to regularly clean this area of the machine to ensure consistent results.

If the filling box is equipped with laser level measurement, the parameters can be saved product specifically, but there are certain limitations when using the silo flap. The material can flow differently from batch to batch, and the reaction time of the silo flaps need to be taken into consideration. Another influencing factor that can only be calculated to a limited extent is the different flow behaviour of the material from the concrete silo. In addition, the positioning of the laser must be considered. The laser must be positioned in such a way that it can measure the amount of concrete even when the flap is open. However, this means that the measurement is only



The number, length and positioning of the dosing angles have a direct effect on the material flow and thus enable exact dosing and repeatability.

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The quality of your products is significantly determined in the mixing process already.

„My milestone allows you to produce block products with excellent surfaces.“

Marc Blin, Industrial Mechanic, Masa Andernach

www.masa-group.com

At Masa, we think of nothing but concrete – and how to shape it for the building materials industry. The machines we design and build are used for the production of concrete blocks, pavers, landscape products, as well as sand-lime bricks, aerated concrete blocks and panels. In other words, we are real concrete heads with a passion for reliable, high-performance machines.



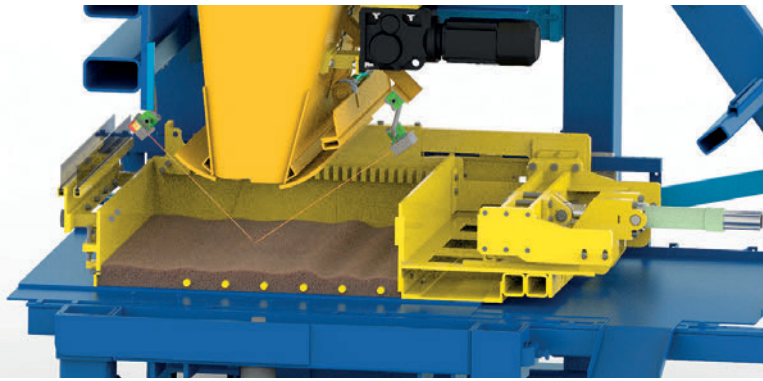
One of our smart concrete heads, Marc Blin, pays attention to minimum tolerances in his daily work in our mixer assembly, so that the equipment keeps our Masa promise of reliability and longevity. His precise work reduces wear in the mixer on the one hand and enables excellent surface appearances of your products on the other.

Masa GmbH (concrete block)
Masa-Str. 2 | 56626 Andernach | Germany
+49 2632 9292-0

Masa GmbH (sand-lime + AAC)
Osterkamp 2 | 32457 Porta Westfalica | Germany
+49 5731 680-0



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Measurement of the concrete quantity by laser

taken at an angle against the cone of material that is building up. The measurement result is therefore an estimate, and does not reflect the exact filling level inside the filling box.

Furthermore, the time losses that occur when fine dosing is set (short opening and closing of the silo flap) must also be considered. In addition, possible adhesions on the silo walls, which can occur in connection with fine dosing, cause an increased cleaning effort.

Further possibilities of the block making machine with silo flap

With a large board machine (e.g. 1400 x 1300 mm), it is essential for block production, for example, that a correspondingly large quantity of concrete is filled evenly into the filling box.

Here, the control of the Masa block making machine offers the option of either moving the filling box with an open silo flap or opening the silo flap twice with different positioning of the filling box.

**Variable and first-class:
Dosing belt under the concrete silo as a high-end solution**

However, the higher the demand for product quality, the more a high-end solution should be considered in this area as well. Masa is convinced that an ideal premium component is required for the ideal filling of the filling box: the dosing belt. The dosing belt, which is optionally available for the XL and XL-R series, opens a multitude of possibilities. For Masa, from a technical point of view, it represents the machine concept that enables the plant operator to adjust the filling of the filling box most variably and optimally to the respective product requirement: Analogous to equipping the machine with a silo flap, the concrete can be batched whilst the filling box is not in motion. One of Masa's standardised accessories is the laser level measurement in the filling box, which, in combination with a dosing belt, delivers significantly more accurate and unbiased measurement results, as the laser measurement is taken almost directly from above in this solution.

The dosing belt also shows significantly better values in terms of reaction time relative to the classic silo flap. The shut-off of the dosing belt is faster. The dosing belt is frequency-controlled and can thus be infinitely adjusted in speed. The various adjustment options for the belt speed allow variable fine metering. The dosing process can be carried out with much more repeatability overall, even with short cycle times. As a result, this means that the produced premium concrete products have a very high reproducibility with regard to their texture, a decisive quality feature for the end customers.

Similar to the machine variant with silo flap, the filling box can also be moved during filling. The objective is the same: an even distribution of the concrete from front to back in the filling box. But the required, uniform concrete height can be influenced much better and thus set more precisely by the combination of filling box speed, dosing belt speed, and size



Dosing belts enable variable and optimal filling of the main and face mix filling box

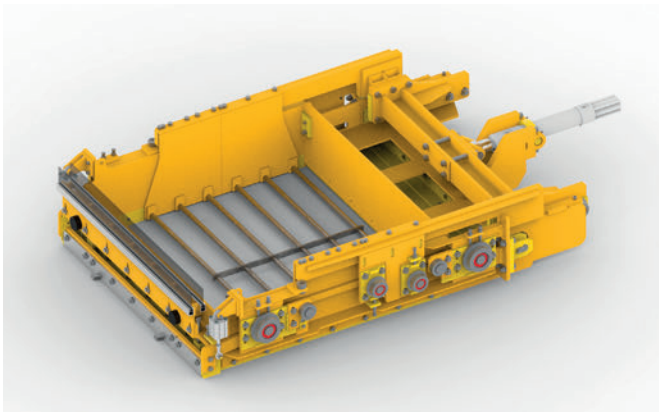
of the opening at the silo outlet. By adjusting the parameters accordingly, in the case of belt dosing, it is also possible to distribute the concrete with small filling quantities.

Homogeneous filling due to optimised oscillating grate

Probably one of the most important developments in recent years to improve the filling process was the oscillating grate with external guiding.

In the course of consistent and continuous adaptations of the Masa block making machines to the respective current product requirements, the Masa engineers also changed the positioning of the guiding elements. In previous oscillating grate designs, these were located inside the filling box. As is well known, the concrete in the middle of the material silo has a different flow behaviour than at the silo walls. The resulting cone of material is now negligible, as the current type of design ensures a much more uniform distribution of the concrete in the filling box and thus an absolutely repeatable, homogeneous filling of the entire mould. Concretely, the optimisation has an effect especially on the more even distribution of the concrete also at the outer filling areas.

For the oscillating grate drive, in addition to the conventional version with linear cylinder and two limit switches, Masa also offers a variant with distance sensing (only for the XL-R model series), in order to be able to adjust the stroke variably, or a variant with hydraulic motor (for the XL and XL-R model series), which enables a faster oscillating movement.



Filling box with new and old oscillating grate in comparison

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Universal and yet special: Other machine-related influencing variables

The Masa block making machines, especially the XL and XL-R series, are universal machines and can produce the complete range of high-quality concrete building materials such as pavers, kerbstones, concrete slabs, masonry and hollow blocks or elements for gardening and landscaping.

They owe this characteristic not least to some of the machines' equipment features, which are explained below and also influence the quality of the end product.

Vibration

A harmonious and evenly distributed amplitude over the vibration table is important both for an even filling of the mould and for the subsequent compaction of the concrete. This is because uneven vibration causes the mould to be filled with more or less material in certain areas, depending on the amplitude of the generated vibration. In addition, the concrete tends to migrate if the vibration is stronger in one area - similar to a vibrating trough.

Significant factors influencing the amplitude are:

- Mass of the vibration table
- Mass of the mould
- Mass of the concrete
- Spring constant of the vibrating elements (rubber buffers). The spring constant describes the ratio of the force acting on the spring to the resulting deflection of the spring.

A symmetrical and torsionally rigid design of the proven, one-piece vibration table results in an even distribution of mass and an even input of impact energy when the impact bars bounce against the production board.

The quality and condition of the vibrating elements are extremely important. As part of Masa's quality management, this quality is therefore checked at the beginning, which enables a harmonious amplitude to be achieved in the end.

Regular inspection of the vibrating elements is essential in order to detect early deviations from the standard values or damage. With the timely replacement of vibrating elements that no longer comply with the standards, the system operator can avoid the uneven vibration and the associated loss of quality in the products.

The Masa vibration analysis can be optionally installed on the machine for this purpose and thus supports the plant operator in the control.

Last but not least, exact angular synchronisation (servo vibration) or exact mechanical adjustment of the vibrator weights (frequency-controlled vibration) is important to avoid horizontal force components of the vibration. Only vertical vibration forces are desired that ensure an exact up and down swing of the vibration table.

Filling box and mould guidance

If the mould vibrates freely in the mould bearings, disturbing influences such as friction cannot affect the vibration. The mould guidance should therefore be set with minimum tolerance.

Masa designs mould bearings that also guide the mould in the direction of production, thus avoiding unwanted horizontal movements. Furthermore, this design also allows the compaction head to enter the mould accurately, thus reducing wear on the mould and the compaction head plate.

Masa takes another influencing factor into account in the design of the block making machine: The continuous filling



One-piece vibration table with vibrating elements and impact bars

box rails are designed in such a way that the filling box can move in a positively guided "free-floating" manner above the mould without its weight influencing the vibration during the filling process.

Pneumatic pressure-regulated air bellows hold the mould in the mould bearing. The air pressure can be individually adjusted to the mould and can be optimally set separately for the filling and compacting process.

Following the trend: Developments for special concrete products

Overall, there has been a considerable change in the product portfolio in the concrete block industry in recent years. For example, depending on the market, the trend is currently more towards large-format products. Masa has taken these market changes into account with various further developments on the block making machine and especially on the filling box. The additional equipment and options offered for the universal block making machine thus open a range of possibilities for the production of products with special requirements and challenges. This can be demonstrated in more detail with the following four exemplary product groups:

- Thin-walled wall building materials
- Concrete products with large volumes

- Slabs with large dimensions
- Pavers with/without chamfer

Read more about this soon.



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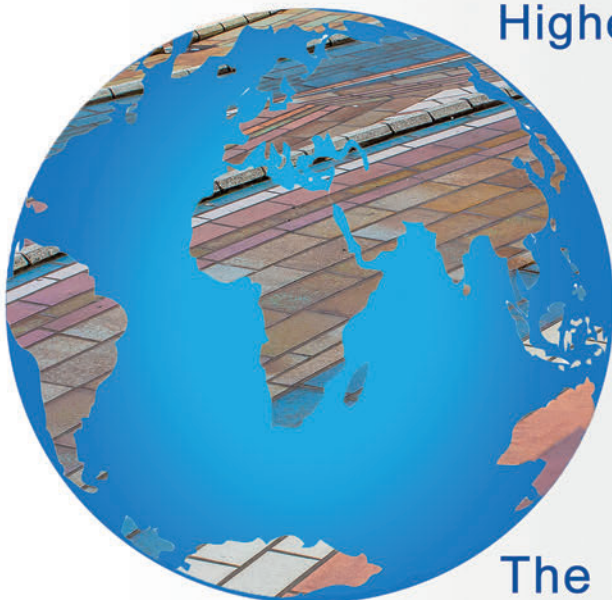


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Milestone to your success.

Masa GmbH
 Masa-Str. 2, 56626 Andernach, Germany
 T +49 2632 92920
info@masa-group.com
www.masa-group.com



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