Kobra Formen GmbH, 08485 Lengenfeld, Germany

From product trend to technology development – an overview

The impetus for new products and further product development frequently comes from practical experience. In the course of their innovation activity, companies orient themselves to customer requirements. The goal is development of a product or service that meets the expectations of the target group more precisely than the competition's products. The identification and assessment of customer expectations and the implications of development requirements for the company are central issues that Kobra Formen GmbH also takes into consideration in the course of their research and development activity. The following article deals with this topic on the basis of examples from the concrete products industry and gives insights into Kobra's innovation management.

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Increasing wear resistance

Customer requirement

Economical and sustainable work in the manufacture of a product is only possible with suitable machines and tools. In the production of concrete products using vibration technology, the mould is subject to high mechanical stress. A durable tool is indispensable for mass production and the demand for the greatest possible wear resistance in the concrete block mould is therefore understandable.

Development requirements

The mechanical stress on the mould tool can certainly be reduced by the correct machine settings, but not prevented. The wear-resistance of the steel material must therefore be increased.

Innovation

Kobra has developed hardening processes matched to the particular mould type. The basis is different heat treatments of the material that alter its structure by means of a tested temperature-time progression which produce the desired hardness properties. Nitrating (Optimill nitro™) and carbonising (Optimill carbo™ and Optimill carbo 68 plus™) are possible in Kobra's in-house hardening facilities

Basically, both procedures involve the separation of carbon from the material structure by heating. Through sudden cooling (quenching), the elements are prevented from remixing. At this point in the process, the steel is certainly very hard, but also extremely brittle, so further processing for mould construction would be impossible. The required material properties are therefore only established in the next step of tempering. The steel has a harder surface and a depth of hardness that is suitable for use in the machine. The core has an optimal toughness for further processing.

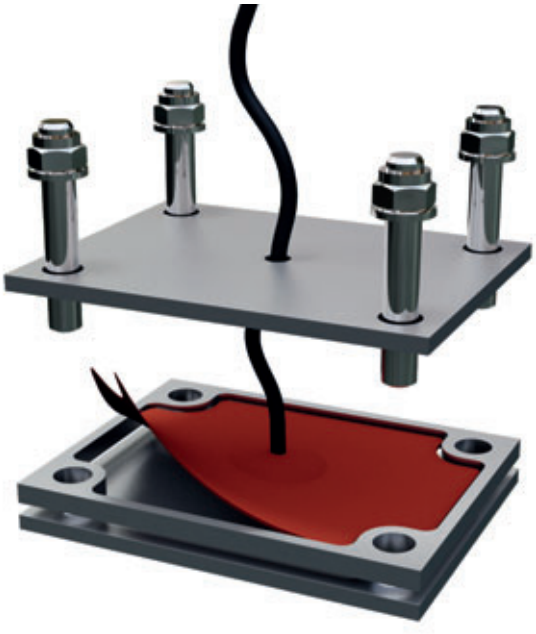
Result

Thanks to standard application of the hardness grades most suitable for a particular concrete block mould, comprehensive high wear resistance can be achieved with significantly extended mould stability.

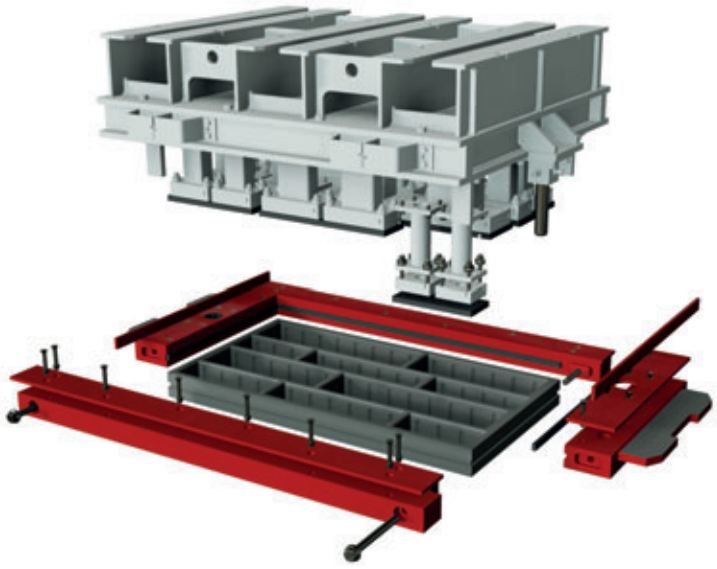
Shortening of the amortisation period

Customer requirement

Increasing wear resistance and shortening the amortisation period are interlinked. The



A modularisation example – the Boltline3™-mould



Picture of a Hotshoe™-heating element

investment associated with a concrete block mould is amortised most rapidly by problem-free use. In practice, this means the fewest possible failures, repairs or downtimes.

Development requirements

The physical structure of the mould tool must be designed to ensure maximum trouble-free operation through fast, uncomplicated exchange of non-conforming components.

Innovation

Kobra's technologies are based on a single-part concept that permits the combination of different basic technologies and mould features. For example, moulds for the production of large format products incorporate Boltline3™ technology that makes absolutely dimensionally-accurate products with 90° angularity possible. The mould insert consists of individual walls that are separately milled, hardened and rigidly bolted together. Production of the insert is also optionally available with a vibration function for improved compaction. The bolted frame allows easy removal of the mould insert. All frame parts can be separately exchanged and are reusable.

Singlebolt™ - individual stamps are processed in the upper section of the mould. They are also attached to the superimposed load by bolted connections. In addition, every tamper shoe can be replaced individually. Thus, Boltline3™ consists of defined assemblies and parts that can be individually repaired, reconditioned or reused.

Result

The Kobra modular system allows rapid exchange of spare parts, resulting in an increase in mould service life or the use of individual mould parts in new moulds. Furthermore, ecological aspects can be taken into consideration with these technologies, because the separate exchange and reuse of components contributes to reduction of the CO_2 balance.

Textures and embossings

Customer requirements

With the development of constantly new block systems, the demand increases for finer textures and embossments. Their precise execution can be problematic in the production process. The still-moist concrete cannot adequately retain the modelling defined by the tamper shoes – crumbling that blurs the structure occurs at the moment of mould release.

Development requirements

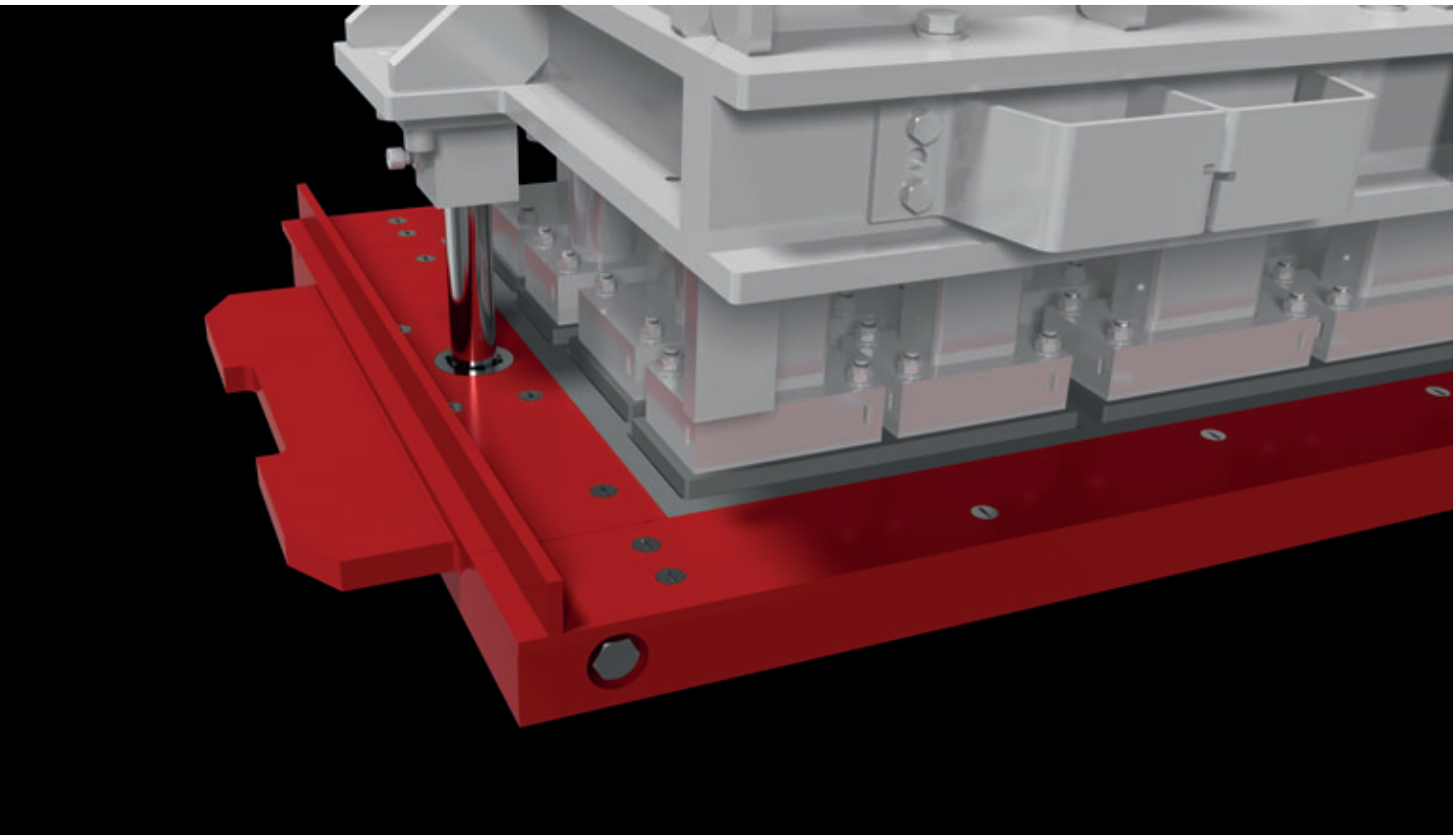
The concrete block mould must have a functional feature that retains modelling of the block surface beyond the moment of mould release and prevents adhesion of facing concrete to the tamper shoes.

Innovation

Kobra has established the Hotshoe™ feature in the market. It consists of heated tamper shoes and an integrated control device for temperature regulation. As a release aid, it prevents adhesion to the tamper shoes by drying the facing concrete and supports formation of the block surface. The control compares the target temperature with the actual value measured on the heating element and reheats if necessary. The selected target value is dependent on the specific mould, the proportion of water in the concrete mix and the ambient temperature.

Result

The water-cement content required for the product can be increased without causing surface problems, because adhesion to the tamper



Headguide™ forced centering

shoes is prevented. Better surface quality and finer surface appearance are achieved.

Fog avoidance

Customer requirement

So-called "grey fogs" can arise, especially in the production of white cement products, that impair the appearance of the final product – hence the demand for avoidance of metallic abrasion in the concrete block mould that is in contact with the product.

Development requirements

Among other causes, metallic abrasion is due to inadequate or non-permanent centering of the mould in the machine. The challenge in the development of a corrective feature therefore consists of holding the mould as permanently as possible in the proper position in the machine.

Innovation

In response, Kobra has developed Headguide™ forced centering of the mould. The guide bolt of the Headguide system ensures precise insertion of the superimposed load into the lower part of the mould. With circumferential play of 0.2 mm, the mould can move freely, but remains under continuous control. For example, especially sensitive mini-chamfers are protected on large format products. In addition, Headguide enables absolutely centred and correct installation of the entire mould in the machine and also has a positive impact on customer requirements for the increase of wear resistance and shortening of amortisation time described above.

Result

Wear on tamper shoes and the upper edge of the mould is significantly reduced, and the resulting metallic abrasion is almost completely prevented in the mould.

Improvement of compaction results

Customer requirement

Because of uneven filling, evenness and compaction problems can exist which impact block strength, and cause cracks during mould release, especially with large format paving stones.

Development requirements

The concrete block mould requires an additional function to assist compaction. Since the superimposed load is lowered into the lower section of the mould during the compaction process, the appropriate features must be located in the upper section of the mould. On one hand, the dynamics of the tamper shoes must be increased and the compaction within individual block chambers must be capable of being individually balanced.

Innovation

The Kobra module system is the combination of bolted one piece stamps (Singlebolt™) and rubber-mounted tamper shoes (Flexshoe™). Mounting plates equipped with shock absorbers and stop surfaces prevent uneven lifting of large tamper shoes from the block and ensure circumferential tamper shoe play. The compaction in the block field is supported by exploitation of the vibration dynamics during the production process.

Result

The combination of Singlebolt and Flexshoe functions as a compaction aid, prevents cracks in the product surface and ensures uniform block heights.

Profiles on all sides

Customer requirement

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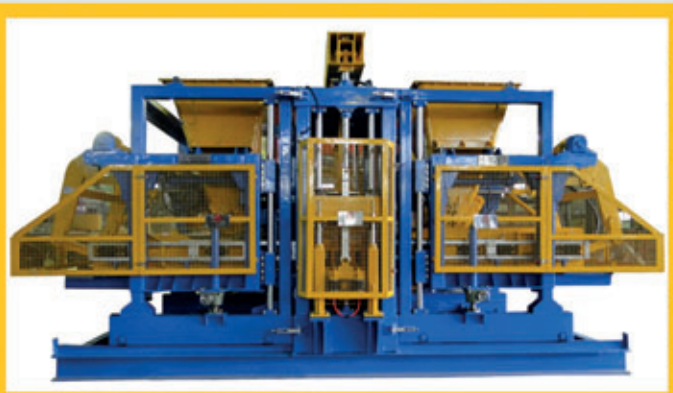

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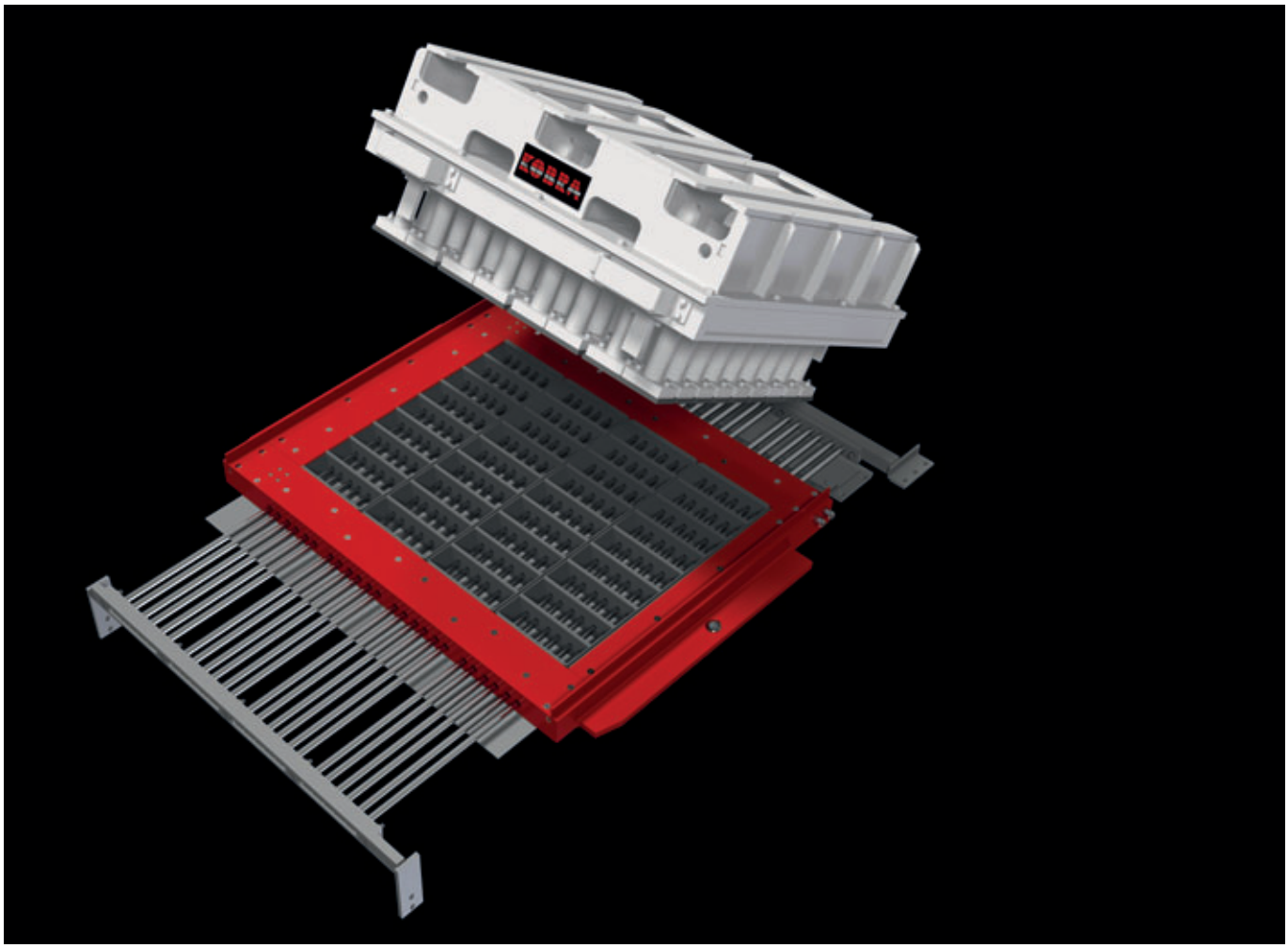
HONCHA BLOCK MAKING MACHINE INTERNATIONALLY APPROVED



Hydraulic concrete block mould

use of profiles on all sides is also increasing, but cannot be implemented with a standard mould.

Development requirements

Mould assemblies must be developed that allow profiling on the front and sides of the concrete block. This is implemented with mechanical movement mechanisms that must be integrated into the lower portion of the mould.

Innovation

Kobra has developed hydraulic/pneumatic and mechanically movable moulds that enable, for example, production of blocks with side profiles. The general function provides for movable components in the mould. The filling of the mould is influenced in defined areas by targeted displacement of the concrete, thus controlling the block volume. Forming of the concrete after retraction of the slide bar produces absolutely uniform compaction of the product. For example, this technology is suitable for inset kerb stones or targeted pre-profiling of tall kerb stones to obtain a uniform facing layer.

Result

This makes almost every specific customer request for block formats with profiling implementable.

Production on multilayer machines

Customer requirement

The production of paving stones with multilayer machines takes place for reasons of cost effectiveness and handling, because the production process can be completely automated. However, there is a problem with stones falling out that disrupts the process and reduces product quality.

Development requirements

A safety function for stones in the chambers must be developed for the moulds that supports the production process without impeding the mould release procedure.

Innovation

Depressions in the walls or a stone chamber tapering toward the lower edge of the mould gives the stone a grip while the mould rises from the production board. Depending on product type, Kobra has developed different variants of the Multigroove™ system that are suitable as options for production on multilayer machines as well as moulds using a draw-plate for products that require under-profiling.

Result

Multigroove has already been successfully used for years and demonstrably improves the stone's grip during production.

Individual project business

Customer requirement

Individual layouts of concrete blocks are frequently required in comparatively small quantities for project business. Collaboration with designers and engineers who develop the mould around the desired stone is necessary for product development and production feasibility.

Development requirements

Implementation of customer wishes must take place while taking the production requirements in the concrete block plant and the architectural project specifications into consideration.

Innovation

In the Kobra stone and design department, usable 3-D stone models can be created on the basis of customer's sketches, photographs or pictures. The process ensures that the end product can not only be produced, but is also stackable and able to be packaged for transport.

Kobra has developed the Replace™ quick change system for small, in which the mould insert is locked into the frame using wedge bracing. This allows the mould to be used for the production of different products by simply exchanging the insert.

Result

With replace, small series of different stone systems can be manufactured with the same mould. This technology closes the circle with respect to the amortisation aspects mentioned above, because only different inserts and not complete moulds are required for production.

The displayed innovations represent examples of Kobra's research and development activity. Close contact with customers worldwide helps to match products to the requirements of the market and continually improve them. In the company's view, execution of customer projects and the individualisation of stone formats will continue to increase in the future. Against this background, Kobra is working on the progressive modularisation of the mould across all assemblies and technologies.

At the bauma 2016 trade show, customers can obtain information about additional developments that affect mould and mould-related service.

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FURTHER INFORMATION

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