

Kobra Formen GmbH, Lengenfeld, Germany

Modularity as the key to efficiency, automation and sustainable concrete block manufacturing

■ Andreas Gebauer, Kobra Formen GmbH, Germany

The demands placed on modern concrete block production facilities have changed fundamentally in recent years. Shorter lead times, mounting cost pressures, a shortage of skilled workers and greater demands for flexibility are posing new challenges for manufacturers and suppliers alike. Automation, sustainability and digitalisation have been growing in importance at the same time. For mould manufacturers, this development means far more than simply designing a precisely engineered mould. Systems solutions are called for that not only ensure high product quality but also take into account the entire life cycle of a mould. High availability, excellent mould tool utilisation rate, reparability, modular design and rapid maintenance are now key factors in a concrete block production facility's cost-effectiveness. Added to this, there is an increasing focus on efficiently exploiting in-house manufacturing capacity. It was precisely with these issues in mind that, more than 25 years ago, Kobra developed its design philosophy, one that is now more relevant than ever.

From wear part to system philosophy

Moulds usually have to be sent to a workshop in their entirety when they show signs of wear. Kobra, however, adopted a different approach at an early stage. The idea was not to replace the entire mould or carry out costly repairs but rather replace only those components that actually show signs of wear. This line of thinking gave rise to the Kobra Boltline™ design method.

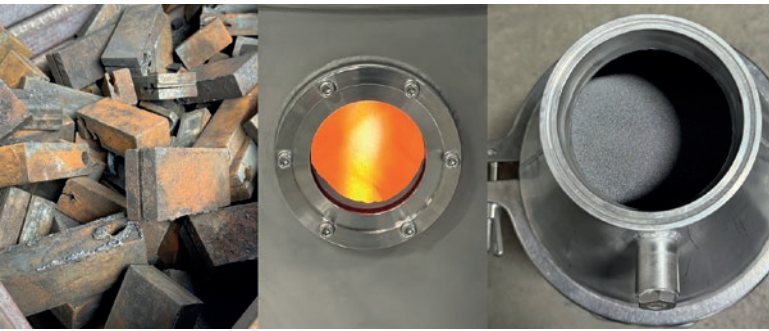
This concept's potential was demonstrated with just the very first high-sided moulds. Optimised material filling, shorter cycle times and longer service life significantly improved cost-effectiveness. Even more crucial, however, was the ability to replace entire sets of wear parts without having to purchase a new mould. This aspect alone makes it possible to reduce replacement investment costs by more than 30 per cent – without taking into account any additional gains in productivity resulting from greater output and reduced downtime.



Kobra Formen GmbH – construction of two additional halls began in August 2026



Kobra Carport – 180 covered parking spaces and 778 kWp of PV capacity



From steel offcuts to raw material for 3D additive manufacturing - in-house and using renewable energy

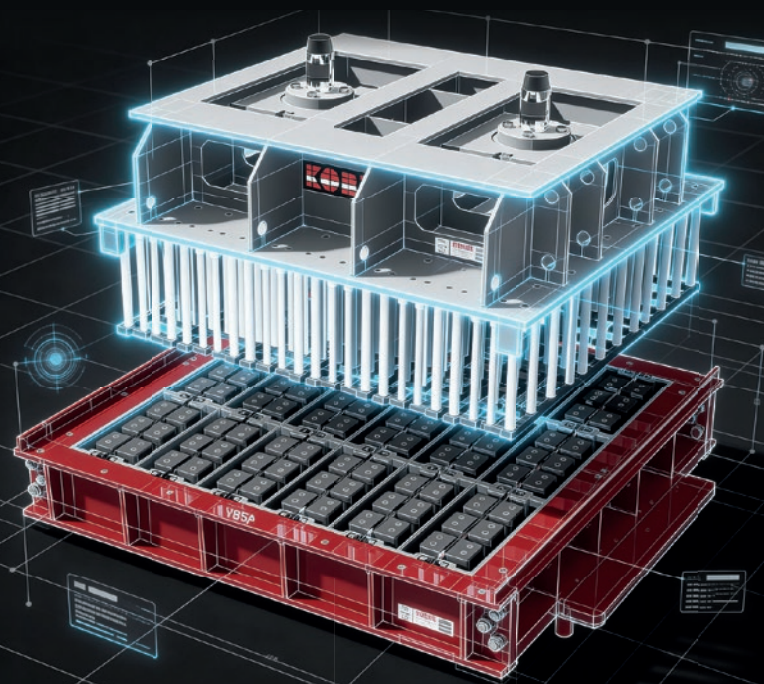
The real added value, however, lay in another aspect. For the first time, the mould had become a maintenance-friendly system.

In the years that followed, this modular construction principle was rigorously applied to other mould types. High-sided, solid block, paving block and, finally, hollow block moulds all benefitted from the same basic design idea. This approach is particularly evident in today's hollow block moulds.

As early as 2010, the entire core assembly was systematically converted to bolted connections. Since then, it has been possible to replace both individual cores and complete core holders entirely without any grinding or welding work. On top of this, the entire core assembly was structurally decoupled from the mould frame. This decoupling significantly reduces vibration stresses and extends the service life of the entire mould. Damaged components can be replaced quickly and directly at a concrete block production facility. A well-equipped maintenance team requires only standard tools and a stock of frequently needed wear parts to carry out this work. This represents a decisive competitive advantage for many factories: downtime caused by production stoppages is substantially reduced, the need for external repairs is eliminated, and tool availability is improved appreciably.

Block mould system instead of individual tools

The continued development of this construction method led to the current Kobra block mould system in 2019. Its basic principle is as simple as it is effective. An identical mould frame can accommodate different block formats. Mould inserts, cover plates, slats and all wear parts can be replaced independently of one another. Depending on requirements, blocks ranging in size from 4 inches (10 cm) to 12 inches (30 cm) can be manufactured. The mould height can also be varied between 220 and 245 mm. This creates a genuine modular block mould system, meaning that a new block dimension no longer automatically requires a completely new mould. This modular concept lowers investment costs, simplifies stock management and, at the same time, enhances production flexibility.



QUALITY

Service | Innovation | Partnership

We manufacture molds for every challenge - for every concrete block and every type of machine.

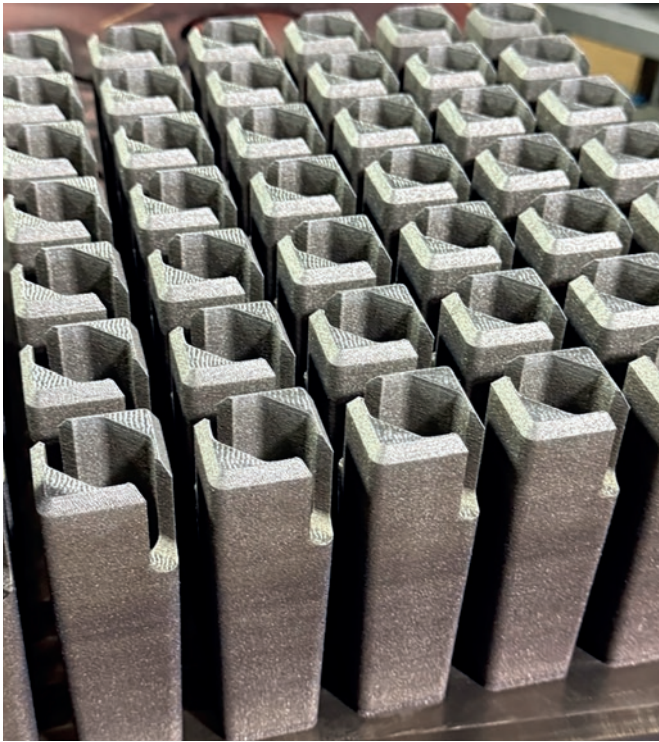
Creative mold design begins with the creation of uniqueness and diversity.

We combine conventional manufacturing methods with innovative 3D printing processes in mold production.

MAKING THE IMPOSSIBLE HAPPEN. LEARN MORE.

TECHNOLOGY SYMPOSIUM





3D-printed components for lawn paving



The lid has been lifted – the possibilities offered by AM manufacturing are significantly broadening the horizons for concrete block products

Modularity does not stop at hollow blocks

The modular principle has now been applied to almost all product ranges. Today, Kobra Boltline systems are employed for everything from bricks and block steps to cobblestones, flagstone slabs and large-format paving systems, as well as for mixed timber decking. Large-format slab moulds follow the same principle. Their inserts can be integrated into various interchangeable frames as stand-alone modules using precise plug-in connections. Companies with multiple production facilities or different types of machinery can particularly benefit from this flexibility.

Mould frames are often designed to accommodate the maximum possible demoulding dimensions for a particular machine. Different mould inserts then allow for the greatest variety of block formats to be manufactured using a limited number of base frames. Modularity means not only easier repairs but, above all, maximum investment security.

Design becomes a factor in productivity

In addition to modularity, numerous design details have a direct impact on cost-effectiveness in a concrete block production facility. The patented Kobra Headguide™ centring system ensures precise superimposed load guidance whilst protecting the delicate chamfers on the tamper shoes. The result is uniform block chamfers, less waste and a significantly longer service life for wear parts, since the tamper shoes in the block bed are guided in such a way as to avoid direct contact between wear parts.

With Kobra FlexShoe™, the tamper shoes are given a defined range of movement during compaction. This results in a more uniform distribution of density within the concrete. Variations in compaction – and the hairline cracks that often result from them – are substantially reduced.

The Kobra HotShoe™ system has also become the established standard for large-format products and embossed surfaces. Heatable tamper shoes prevent concrete adhesion even with wet facing concrete. At the same time, surface quality is improved and waste during subsequent shot-blasting is reduced appreciably. The block's smooth, seamless surface not only improves its curing properties, but also has a noticeably better haptic quality. All these developments share the same aim: to generate a high level of process reliability and make manufacturing as efficient as possible.

Additive manufacturing is transforming mould-making

Increasing modularisation is at the same time placing new demands on manufacturing processes. Additive manufacturing provides a targeted and highly efficient solution for complex components. Standardised connecting elements and complex functional components have to be manufactured to a high standard of precision in a cost-effective manner. To this end, Kobra has specifically developed its AM/3D division to complement conventional machining.

Nowadays, complete cores for hollow block moulds are created using the AM process. This frees up capacity in the

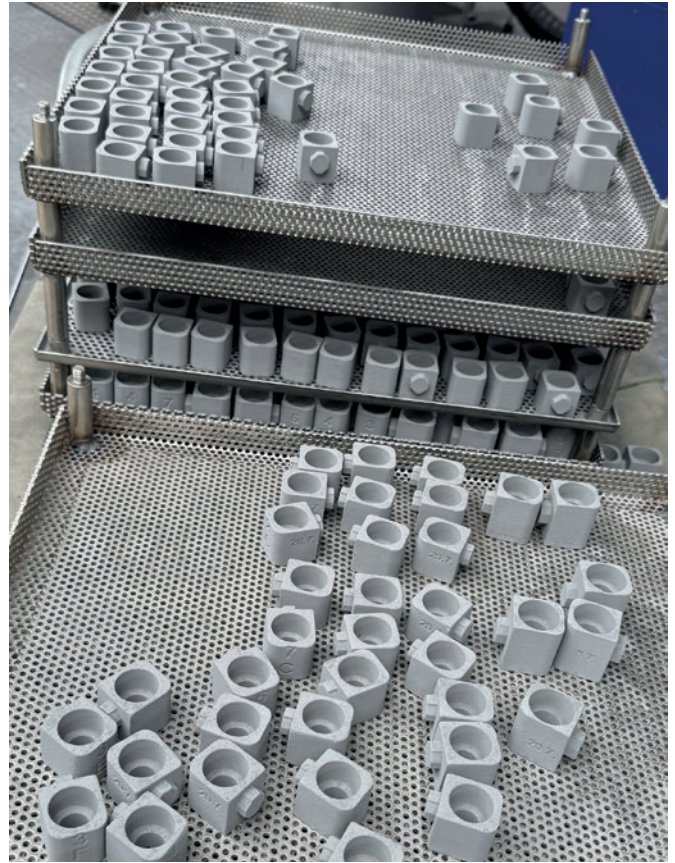
cutting, shaping and welding departments. It additionally shortens production times and enables variants to be manufactured more cost-effectively.

The key issue here is not which technology is more advanced. Rather, the departments dealing with design, production planning, research and development, as well as 3D/AM, are called to work closely together to determine which manufacturing process represents the best solution for each individual component from both a technical and economic perspective. It is this combination of traditional metalworking with new manufacturing technologies that constitutes the real innovation.

Automation begins right from the design stage

Modular components also form the basis for automated manufacturing processes. Standardised components reduce the number of variants, simplify assembly processes and improve repeatability in production. Replacement parts can also be manufactured and stocked independently of complete moulds.

Small components manufactured using one of several in-house 3D/AM technologies



 French Manufacturer of Automated Equipment for the Concrete Industry

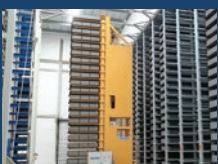
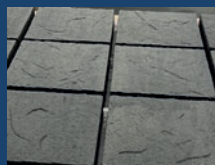
TURN-KEY PLANTS

«HIGH PERFORMANCE» vibrating presses
STATE-OF-THE-ART handling systems
TAILOR-MADE robotic solutions



 EFFICIENCY, VERSATILITY & INNOVATION

www.quadra-concrete.com



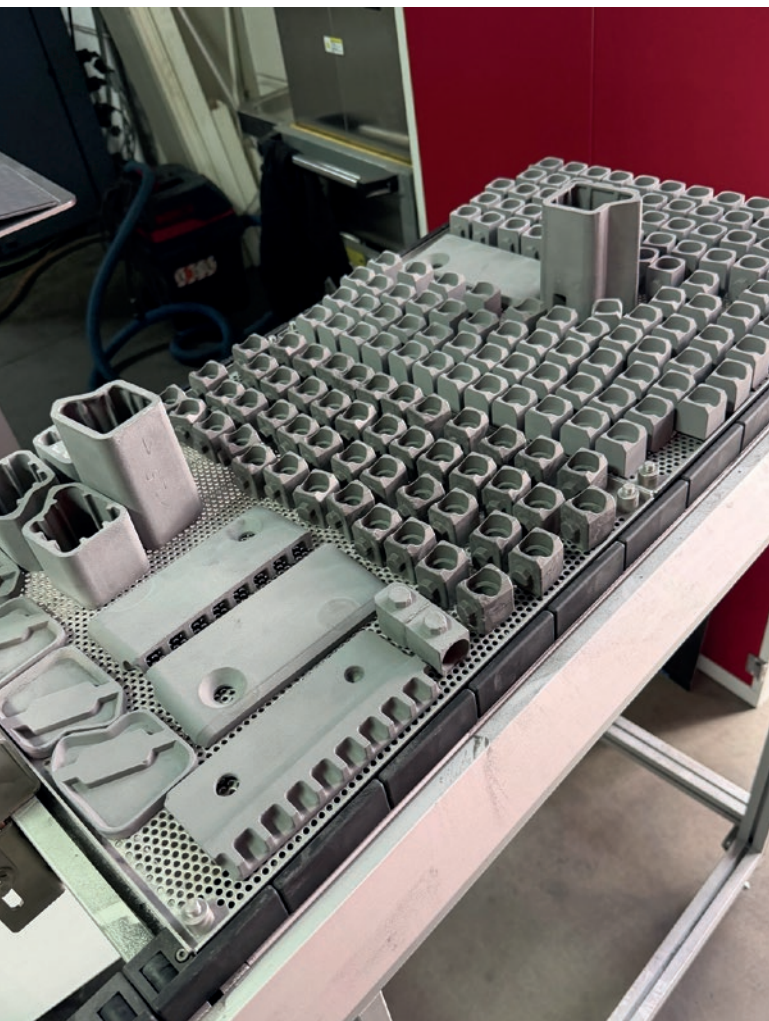
QUADRA
40 route de Findrol
74130 Contamine-sur-Arve
France
Tel. +33 4 50 03 92 21



ICC NORTH AFRICA
28-29 OCTOBER 2026

BIG 5 DUBAI
23-26 NOVEMBER 2026

BAUMA CHINA
24-27 NOVEMBER 2026



3D-printed components being prepared for curing

The high level of standardisation further facilitates the rapid implementation of prototypes and design alterations. As a result, customer requirements can be incorporated into new developments much more rapidly than was the case just a few years ago. It means that automation begins not just at the machine stage, but right from the design phase of individual assemblies.

Closed-loop economy as an integral part of manufacturing
New opportunities for the sustainable use of resources can also be opened up by integrating additive manufacturing. Offcuts from sheet metal working and steel residue from production can be processed in-house, remelted and converted into steel powder for use in additive manufacturing. This creates a closed-loop material cycle that reduces transport distances and keeps high-quality raw materials within the company. The energy required for this comes overwhelmingly from the company's own photovoltaic systems, which have a total capacity of around 1.3 MWp. Electricity is sourced exclusively from renewable sources. Active energy and procurement management ensures that both environmental and economic considerations are given equal weight. Sustainability is thus not viewed as a stand-alone measure but as an integral part of modern manufacturing.

The future is built on evolution

In parallel, Kobra is investing in further expanding its production capacities. From the end of 2026, two new production halls will provide space for additional automation in the areas of additive manufacturing, paint finishing, and packaging and dispatch. Substantial investments are concurrently being made in staff training. Additive manufacturing complements traditional machine work and enlarges the company's existing expertise. Apprentices are already gaining additional qualifications in additive manufacturing – an approach that is being further developed in collaboration with the Chamber of Industry and Commerce (IHK) and which opens up prospects for future apprenticeship programmes. It means that mould-making remains a highly skilled craft. New technologies do not replace experience – they enhance its possibilities.

Conclusion

Developments in mould-making clearly show that productivity nowadays goes far beyond pure mould engineering precision. Modular design, standardised components, automated manufacturing processes, additive technologies and sustainable material cycles are all interlinked and together form the basis for manufacturing concrete blocks cost-effectively. Real added value is not generated by individual innovations, but by their interaction. A mould is thus transformed from a traditional tool into a long-lasting, low-maintenance, versatile production system. This is precisely where crucial competitive advantage is found today – both for mould manufacturers and concrete block production facilities. ■



Kobra sponsored the free download possibility of the pdf of this article for all readers of CPI. Please check the website www.cpi-worldwide.com/channels/kobra or scan the QR code with your smartphone to get direct access to this website.



FURTHER INFORMATION



Kobra Formen GmbH
Plohnbachstraße 1
08485 Lengenfeld, Germany
T +49 37606 3020
info@kobragroup.com
www.kobragroup.com