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Functionality and Precision – Criteria for Moulds in the Production of Mould-Hardened Components

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“Easy to fill and easy to demould” – for the past few decades, user expectations for moulds used to process wet-cast concrete, including self-compacting concrete, have been fully encompassed by these two requirements in the majority of cases. Recent developments such as increasing aesthetic standards, greater consideration of workers’ needs, and – last but not least – the importance of meeting functional quality requirements are driving forward advancements in the concrete casting segment. The bottom line is that these advancements also need to boost the cost-effectiveness of modern mould concepts compared to traditional technology. The quality levels expected from moulds used to produce components for building construction and special civil engineering applications (particularly tunnel liners) have been rising steadily. Meanwhile, the production of components for pipeline construction in general has seen significant developments in recent years.

Two Decades of Groundbreaking Improvements in Quality

In 2004, Schlüsselbauer Technology unveiled a brand new method for producing individual monolithic concrete manhole bases. In a departure from the conventional method for turning out manhole bases, which involved multiple steps and significant manual work, the use of innovative moulded parts and novel processing technology elevated channel production to an industrial level. Making use of self-compacting concrete, which was enjoying a boom in popularity at the time, enabled rapid assembly and filling of casting moulds. Although channel production was the main focus of this innovative development, the mould technology needed to be modernized without delay, not just in order to deliver the required quality enhancements but also to automate the production processes from assembly of the moulds to

*Suitability of
moulds for auto-
mated production
of components
with a batch size
of one*





Component variability on the basis of functional casting moulds



Mould components to optimize product weight and design

demoulding of the products. In the space of just two years, this concept was refined and perfected so that up to 100 different - that is to say, individual - manhole bases could be produced in a single working shift. The suitability of the moulds for automated processes was one of the cornerstones in the strategy for reconciling industrial manufacturing with batch sizes of one.

**Timeless Relevance:
A Design Principle with a 120-Year History**

The mould concept developed by Schlüsselbauer Technology for its Perfect production method of manhole manufacture has evolved over the years to encompass concrete-PE hybrid

pipes, infrastructure manholes, and much more. All of these applications involve the use of casting moulds, which have gained global recognition under the collective name "Perfect Forming Technology". The fundamental requirement for the moulds that bear this name is expressed succinctly by the slogan "Functionality needs the perfect mould." Ultimately, it is the functionality of the concrete components – that is to say, their durability under constantly changing conditions – that dictates whether a mould has actually served its purpose. By as early as the late 19th century, "Form follows function" was already becoming an increasingly recognized principle of building construction, and it would go on to form the backbone of many areas of architecture and consumer goods design in the 20th century. The discussion of this design prin-



A wide variety of moulds for cost-effective mass production of wet cast components



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The Perfect Forming Technology concept used here for components up to an internal diameter of 3000 mm



Different installed parts (gaskets, step rungs, etc.) and individual channels

ceptle was often driven by aesthetic demands that changed with the times. Bringing things back to the world of concrete, this maxim has been applied to the design of highly durable components. While the end product may feature numerous

hidden reinforcement measures, even the basic shape of a component plays a crucial role in its ultimate load-bearing capacity and therefore its durability. And it is precisely this long-lasting functionality – of the components produced and of the moulds used in the process – that is the driving force behind Schlüsselbauer Technology's ongoing efforts to perfect every aspect of production technology, and especially the moulds themselves.

Precast Parts for Civil Engineering in 2024: Component Quality is Key

The era of low aesthetic standards for precast concrete parts that are hidden from everyday view after installation is well and truly over. Any decision-maker who is responsible for the use of funds – be they public or private – wants quality that they can see straight away. Recurring inspections and quality tests after decades of use are essential for continuous monitoring of a component's condition. However, in order to assess its sustainability at the time of installation, a different approach is needed. Even if the functionality of the precast concrete part and of the tool or mould are not fundamentally in doubt, it's never a bad idea to take a closer look at each infrastructure component and the means used to manufacture



Diverse range of applications in civil infrastructure engineering

it. Advancements in mould construction have made it possible to influence product quality in areas that may be of lesser importance to decision-makers at the time of installation. In some cases, we can even take that design principle of “Form follows function” and neatly turn it on its head: “Improved functionality follows perfectly formed moulds.” For each and every project, whether it involves a single mould or hundreds of them in automated mass production, the engineers at Schlüsselbauer Technology are dedicated to maximizing the benefits of the end product and the mould technology.



High-bay racks as efficient, space-saving curing areas for mould-hardened products

Precision: The Linchpin of Component Quality and Production Efficiency

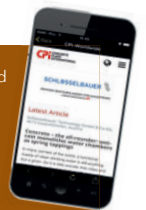
Behind the industrial manufacturing of mould-hardened concrete components you will find production technology that also conforms to industrial standards. Dimensional accuracy and leak-tightness of sewer components, for instance, must be guaranteed to a consistent quality level. Even at the early stage of mixing the concrete, this requires all materials to be checked and measured out precisely, while all the processes up to handover of the required quantity of concrete must be reproducible.

The requirements that are applied to the next stages of production and that are dictated by the design of the precast part have a direct impact on the mould technology. Particular product geometries can be accommodated by high-precision machining in the mould construction phase, while this also allows consideration to be given to ergonomic requirements, optimizing the workspace, and increasing the speed and safety of the process.

Automating the mass production of mould-hardened components requires mould components that have been produced with the utmost precision for the variety of automated work steps involved. This makes it possible to speed up the handling steps for the product and/or mould, thereby reducing the cycle times that are critical for mass production. It goes without saying that ultra-precise production of mould components has a direct impact on aspects of component quality such as leak-tightness, surface finish, and handling properties. Schlüsselbauer Technology has constantly refined its mould concepts over the course of two decades. This has cemented the company’s status as a global supplier of high-precision moulds, both for single production of complex components and for efficient mass production of civil engineering products.



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