

Schlüsselbauer Technology GmbH & Co KG, 4673 Gaspoltschhofen, Austria

Modern manhole base production system meets high requirements in Czech Republic

Company Betonika plus s.r.o., located in the town of Luzec nad Vltavou, 25 km north from Prague, is one of the strongest and biggest concrete plants in Czech Republic. The range of products includes both goods for the civil engineering as well as ready-mixed concrete. Concrete pipes, manholes, manhole base sections, reservoirs and slot gutters are produced here in large quantities. In August 2007 in the progress of the technical development and ongoing innovation of production plants a new production system for manhole bases was commissioned. Decision makers at Betonika plus s.r.o. chose the industrial production system Perfect, manufactured by the Austrian company Schlüsselbauer Technology GmbH & Co KG.

■ Mark Küppers, CPI worldwide, Germany ■

Betonika plus s.r.o. was founded in the beginning of the 1960s as a public enterprise in order to supply the building site of the subway in Prague with special concrete elements. In the following years the product range was extended beyond precast elements for subway construction. Pipes, manufactured at that time in the common spinning technology, became the emphasis of the production. In 1994 the enterprise was finally privatised and could continue its business with the new name "Betonika plus s.r.o.". The enterprise owns a 14,5 hectare area, which is used for production and storing. Depending on seasonal requirements Betonika plus s.r.o. employs 85 up to 90 people. Product volumes of ready-mixed and precast concrete depend on the respective demand. In average, production

of approximately 30.000 m³ of ready-mixed concrete in the year faces 16.000 m² of precast concrete production. Precast concrete would be normally delivered up to 230 km, whereas ready-mixed concrete would be delivered for around 35 km.

New manhole production plant for new tasks

Betonika plus s.r.o. has a 20% market share in the manhole base production in Czech Republic. In the past manhole bases were manufactured in a conventional way and in the end they were additionally lined with ceramic tiles for protection of inverts produced in a secondary step.

Now the Perfect production system allows to produce monolithic manhole bases in one pour. The advantage of this way of production is high individuality – number, diameter and rack of the required pipe con-

nections as well as height of outlets can be adapted after any request – and first of all the certain higher steadiness, which arises as a result of the continuous concrete quality for the entire product.

The new Schlüsselbauer manhole base production system, the only one in Czech Republic, was immediately involved into an important building project within a short time. New manhole bases, supplied by Betonika plus s.r.o., were used for the retrofit of the famous Charles Bridge in the heart of Prague. Further big projects, as, for example, the construction of a motorway around Prague will be executed with the Perfect production system. In co-operation with road construction companies Betonika plus s.r.o. manufactures manhole bases and manhole rings as well as pipes for a new motorway. Monolithic production of man-



Betonika plus s.r.o. offers a wide range of products for civil engineering.



Manufacturing of monobases in one pour on the PERFECT system is the emphasis of Betonika plus s.r.o.



Manufacturing on the PERFECT system has nearly no limits – number, diameter and racks of pipe connections as well as height of outlets can be adapted after any request.

Manhole base for a shift in direction of a pipe system.

hole bases by Perfect production plant allows Betonika plus s.r.o. to meet the highest requirements, including exposure level XF 4 (with high saturation of defrosting substances in water) set by the direction of the motorway construction. Concrete manhole bases, produced on the Perfect system, even supersede the quality level of manhole bases with ceramic tiles. The alternative, which would mean lining with plastic, is too expensive. Monolithic manhole bases in one pour are unrivalled.

The industrial production system Perfect

The industrial production system Perfect includes not only production of concrete manhole bases but also the complete production cycle from details of acceptance to delivery of precast concrete. Once set product specifications will stay all the time visible from an order confirmation and single steps in production till the assembly on building site. The achievable process reliability is a basic criterion in the production of individually moulded manhole bases. At the beginning of each production the product parameters have to be determined: Based on definition of numbers, bending, gradient and diameter of inlets and outlets an exact configuration of the base section can be set. The required software has also been developed by the Austrian manufacturer Schlüsselbauer. Following to product approval by an employee in the sales department (after confirmation from the customer if necessary) these data are fed into the manufacturing process. Throughout the whole process each product is fitted with a label, which indicates all parameters of the specific manhole element. This label also contains information about customer's name and construction site as well as concrete grade characteristics.

Invert

The first step in the production of a manhole base section is the exact cutting of inverts

consisting of polystyrene foam (EPS). During the production process this invert is used as a blockout element, defining the shape of the final drain layout. Depending on the type, diameter and position of in- and outlets, different individual elements are required. Several heating wire saws are used to cut the formers. A linear wire on a cutting table is used for exact cut-to-length operation. To connect a main channel part with an inlet a more complex cut is required. To make channel characteristics more optimal for hydraulics, this cut has to be made by the so-called 3D saw, which is equipped with many accordant wires relative to the inlets diameter.

Other saws are made for cutting the berm gradient and definite the outer diameter of each connection. The control unit transfers the required data to the saw in operation. The plant operator sees on a touchscreen which unit has to be cut from which precast part. Finally the units will be glued together using a glue gun.



Accurate length cut

3D-saw for optimized hydraulics in the channel

Joining single parts

Cutting berm and definite outer diameter for connections.



Final addition of an connector with an integrated gasket



Pipe connection with a joint gasket

Integrated gasket

The PERFECT production system allows also casting manhole bases with an integrated gasket. If so gaskets from DS Dichtungstechnik GmbH are already positioned on polystyrene foam parts. The new system for safe integrated connections of the PERFECT system for manhole bases was developed in cooperation between the two companies Schlüsselbauer and DS Dichtungstechnik with the enhanced experience in working with gaskets for different systems (plastic, ductile cast iron, concrete and reinforced concrete pipes). Joint gaskets for other pipe materials are in design. Dense connection systems need a higher compression of the gasket in comparison with the water pressure. More than that, there must be assured an easy assembling on the building site. Because of different setting characteristics of pipe's and manhole bases, shearing forces have to be considered especially around manhole connections. The connec-

tion was designed in a way, that shearing force would not be absorbed by the gasket. Thereby leakage by unwanted influencing forces is impossible. Depending on the type of connecting pipes (concrete, plastics, etc.), integrated gaskets or pallets with block-out rings can be used for respective pipe type and diameter.

Up to 30 manhole bases a day

At Betonika plus s.r.o. 30 steel forms are available for production of up to 30 manhole bases within a day. At present 15 up to 20 manhole bases are produced daily. For each production day steel forms are prepared stationary for production, filled and let on the same position for curing within the factory building.

The mould for a production of monobases consists of two halves and an inner core, which allow to produce a manhole upside-down, i.e. in a position turned by 180 degrees. The prefabricated block-out element

is mounted on top of the inner core and held in place by magnetic devices. Also while preparing the mould, the operator is assisted by the control system, which helps to run the plant. On a small screen the relevant base section is shown as scheduled in the production sequences, it makes it very easy to control the position and the size of the drain.

Casting SCC with concrete pump

Steel forms are filled by a central installed Putzmeister pump with swivelling arms, which was developed especially for the Perfect industrial production system. High flexible swivelling arms allow to reach all forms in the factory building directly from the central location of the pump. Manufactured with self compacting concrete the manhole base production doesn't need any further compacting technology. If required some flue ash for increasing flow characteristics can be added.



The prefabricated block-out element is mounted on top of the inner core and held in place by centring pieces, casting with usage of a central installed Putzmeister concrete pump.



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Manhole bases are manufactured using self compacting concrete, which is pumped into a mould by the Putzmeister pump.



Formwork removal

Next day cured manhole bases are demoulded and placed on the conveyor belt by the Schlüsselbauer turning device. After short cleaning works and final preparations moulds are ready for the next production cycle. In the last production step the invert is pulled out from the manhole base. A conveyor belt transports the cured manhole base out of the factory building. Outdoors the cured manhole base is transported with a fork lifter to an external storage area or right to a truck.



Conclusion

The CEO of the company Betonika plus s.r.o., Eng. Jirí Stróbl is convinced that advantages of the Schlüsselbauer Perfect production system in comparison with other production methods are obvious.

In contrast to other European markets, in Czech Republic 15 different types of pipe connections are in use, and sometimes many of them can be inquired in on single invitation to tender. The Perfect production plant offers solutions full of multiplicity details. The Czech market is demanding and awaiting real variability in connection with good service – a challenge, which Betonika plus s.r.o. can face due to the PERFECT production system.

The Schlüsselbauer turning device turns cured manhole bases after removal of the moulds.

FURTHER INFORMATION

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