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Best, a.s. commissions a second production system for manufacturing individually milled monolithic concrete manhole base sections

Prinzing first introduced its Primuss System for manufacturing monolithic manhole bases with variable channels and connections to the general public at bauma 2010. The milling robot exhibited at Prinzing's stand carried out a nonstop simulation of milling channels and connections in such a monolithic concrete manhole base section. This advanced, rapid technology drew the attention of trade show visitors and thoroughly impressed the management at Best, a.s., a Czech company. This initial contact at the trade fair has resulted in the commissioning of the first Primuss production facility in the Czech Republic. The system was installed at Mohelnice, their production site in Moravia. It, or rather the end products, have enjoyed strong demand right from the outset and Best, a.s. has been able to speak of successfully launching this new product on the market. Best, who have seven production facilities in the Czech Republic, took the decision of fitting out another facility with a Primuss manufacturing system with a view to offering Primuss manholes comprehensively throughout the nation. The new plant was installed during the winter months of 2012/2013 at their Chlumec nad Cidlinou production site situated in the vicinity of Prague in the centre of the country. By mid-February 2013, the Prinzing technicians had completed their installation work and the new facility was ready for operation.

■ Mark Küppers, CPI worldwide, Germany ■

Best, a.s. is the biggest manufacturer of concrete goods and precast concrete components in the Czech Republic. The company was founded on a greenfield site immediately after the fall of the communist regime in 1990. Today, Best occupies a dominant position on its home market, where it generates its main turnover.

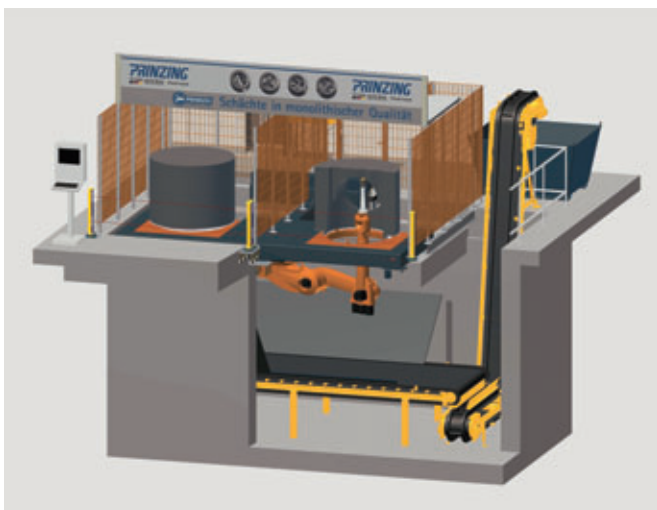
Besides this, it exports concrete products quite frequently to Germany, Austria, Poland and Slovakia. Its seven production sites with a total of 24 production facilities can be found covering almost all of the Czech Republic. There is an additional large warehouse close to Prague.

Best was founded by Tomas Brezina, who still remains the company's sole owner up to the present time. The firm has approximately 500 employees of its own and another 500 persons are engaged in the service sector on a permanent basis. Best has belonged to the 100 most important companies in the Czech Republic for some years now and receives this accolade every year. Last year, Best even managed 4th place coming in only three places behind Skoda, an automobile manufacturer known on a global scale.

The main focus of manufacturing at Best is on concrete goods for gardening and landscaping work, plus the production of pre-

cast components. The market for precast manhole components is in continual growth, since the Czech Republic's infrastructure is in very great need of modernisation. Best has also been able to make great inroads into this sector.

No other civil engineering products had been previously produced at the new Primuss production site – just mainly concrete paving blocks, palisades and masonry blocks. A fresh era began with the commissioning of the Primuss production line in this facility. A new factory bay, now housing the Primuss manufacturing unit, was built onto a production hall, in which only palisades had ever been manufactured. The tracks of



Graphical illustration of the milling bay



In Mohelnice, the blanks are manufactured on an Atlas machine



The channel and connections are milled fully automatically; the drill holes for the climbing stirrup are also set in place

the existing concrete bucket conveyor were lengthened accordingly so that the new production line could also be supplied by the current mixing plant.

Primuss already in operation in six European countries

The Primuss manufacturing system has already been able to gain numerous customers for itself during its still young history. Monolithic concrete base sections are manufactured using this Prinzing technology in a total of 11 concrete production facilities in six European



Milling bay with two processing points

countries. Customers appreciate the advantage that concrete blanks can be produced and channels milled successively within a short interval of time. In fact, only a few hours are needed from receiving an order to the finished end product. Besides these short production times, the minimum human resources requirements are a decisive factor with this production line.

Primuss manhole base sections can be produced from zero-slump concrete as well as from self-compacting concrete. With the former, the blanks are produced by machine - as at Best for example with an Atlas or Tornado from Prinzing - and transferred to the milling centre after a defined hardening time. With the latter, the manhole base section blanks are poured in moulds, in which they partially harden. These blanks are then stripped of their formwork and are processed by a milling robot as soon as their specified strength has been attained.

Channels and connections can be milled individually using this automated Primuss machine. There are almost no limits to channel design.

Primuss production line combined with an Atlas manufacturing system in the first facility

In the case of the first Primuss production line in the east of the Czech Republic, Best selected a combination of an Atlas plant and milling robot with a double processing bay. The Atlas manufacturing system is flexible and built up in modules from varying individual



A vertical conveyor belt carries the milled material out of the pit



Blanks are stripped of their formwork immediately for milling

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Once milling the manhole base section has been completed, it is transported out of the processing bay

components, such as feeder, compaction unit, presses and transport system. The system's control unit can be set up, as may be desired, to operate manually or alternatively to run semi-automatically (programme controlled). The Atlas can be employed in manufacturing rectangular elements, pipes up to 3,000 mm, containers and the complete manhole programme – cones, rings and base sections. In this first facility, however, the Atlas is mainly utilised for producing monolithic concrete base sections to be demoulded immediately as blanks without either channel or connections. After attaining a defined early hardening strength, these blanks are then processed by the robot in the milling bay and provided with the required channels and connections.

Primuss production line combined with a Tornado manufacturing system in the second facility

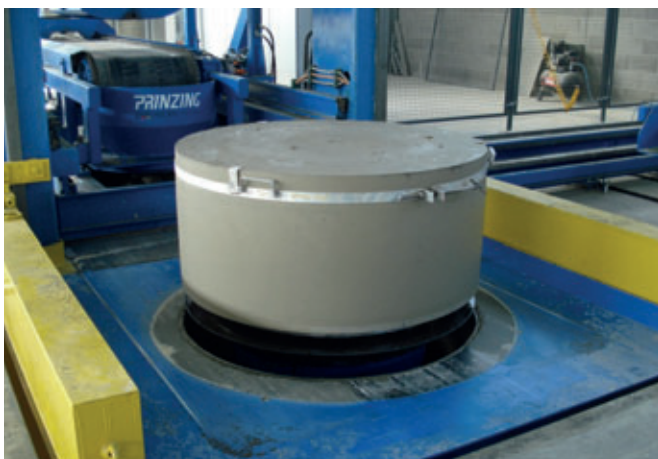
In the case of the second Primuss production line, Best decided on a combination made

up from a Tornado automated pipe and manhole ring machine and a milling robot with a double processing bay. This Tornado machine is in operation throughout the world and its speciality is the production of manhole elements and other related pre-cast concrete components. Within the Tornado series, there are six different size variations available, which means that any requirements can be satisfied. Alongside the complete manhole programme, the Tornado pipe and manhole ring machine can also manufacture small pipes, rectangular elements and palisades. In this instance, Best made a conscious decision for the Tornado in order to be able to produce the appropriate manhole rings and cones matching the monolithic concrete manhole base sections.

Two to four hours in advance of being milled, manhole base blanks are produced on the Tornado for the Primuss manhole base section manufacturing line. The precise time frame between the blank being produced

and the optimum point in time for milling the channel and connections depends on marginal conditions. The concrete recipe and ambient temperature in the intermediate storage area play a decisive role in this case. Production with the low-noise Tornado is carried out below ground. The formwork is stripped out below ground. The demoulded blanks are then removed from the machine with an electric transport carriage and placed into intermediate storage before they travel on the transport carriage to the milling bay. As an alternative, it is also possible to employ a crane robot to take completed concrete products automatically from the Tornado and place them in the storage area.

The Tornado automated pipe and manhole ring machine can accommodate products measuring 150 to 2,500 mm (width or diameter) with component heights from 250 – 1,450 mm. These products, weighing up to 2,500 kg, are normally manufactured in 2 to 4.5 minutes.



Blanks are manufactured on a Tornado machine in the new production facilities



Extremely short retooling times with the Tornado enable different products, such as manhole rings, cones and base blanks, to be produced in one shift



The milling robot works below ground level



Manufacturing manhole cones on the Tornado

The DN 800, DN 1000 and DN 1500 manhole base sections that Best manufactures can all be produced flawlessly on the Tornado. Thanks to short retooling times with the Tornado, the changeover between individual manhole components can take place with no problems at all, so that rings and cones can also be produced at the same time that the milling robot is working.

Partially hardened blanks ready for milling

Once the concrete blanks have attained sufficient strength, they are hoisted over the spigot end from the support cap and brought to the milling bay. As in most production facilities with a Primuss manufacturing line, the milling bay at Best features a centrally located milling robot with two processing points. This solution enables the milling robot to work continuously. Whilst the robot is processing one manhole base, a fresh concrete blank is placed in readiness at the second point. Once the first manhole has been completed, the robot switches immediately to the other processing point and starts milling the connections and channel in the new blank. During this time, the previously completed manhole base is removed and another blank positioned in the processing point. In this way, the robot can work unceasingly and there are no unnecessary downtimes.

The monoliths are set down at the processing point on a revolving fastening ring, as they were produced, on their head. The processing bay is at ground level; the robot is installed under this level. Its swivel range encompasses the blanks' bottom side (for milling the channel) and the rear side (for milling the connections).

The milled material falls on a wide conveyor belt situated beneath the robot's working range. The belt runs continuously during the

milling process transporting the milled material out of the pit. Downward sloping panels on the pit's side walls cause any concrete material falling down to slide onto the conveyor belt. No milled material can collect in the pit; everything is evacuated. At the end of the wide conveyor belt, the milled material is transferred to another conveyor setup vertically that transports the milled material from the pit level to the hall's ground level. The milled material is collected there and can, for example, be fed back into the concrete production line.

Milling the channel and pipe connections with a special cutting tool

In a typical Primuss system, the robot first begins by milling the channel. A special, spherically shaped milling head with PCD cutting tools cuts away the concrete in layers until the channel is formed in its final shape. The robot's movements follow a sequence, which is governed by programme.

Only when all channels have been completed does the robot commence with the connections. The milling tool is first automatically changed for this purpose. The robot travels to the tool storage unit, deposits the milling head precisely in the mounting provided and removes a new tool, a side milling cutter. These steps all take place fully automatically without the machine operator being involved.

The side milling cutter is carefully positioned with its disc revolving on the monolith. The robot's milling process always runs from the outside towards the inside and its feed motion is automatically regulated. The concrete's actual hardened state is also automatically determined by its resistance and the rotational speed adapted accordingly. The milling tool cuts away layers from the outside inwards, until it meets the channel. In order

to make another connection, the manhole base section is turned on the fastening ring until the robot's arm is in exactly the right position. Now, work can begin on milling the next connection.

Milling cycle times, of course, vary in relation to the channel's complexity and dimensions of the manhole base. Some 5 to 7 minutes are needed for less complicated monoliths; very complex channel formations with a number of pipe connections require a greater amount of time accordingly. This results in excess capacity with the Tornado, which can be made good by producing other components in the manhole programme.

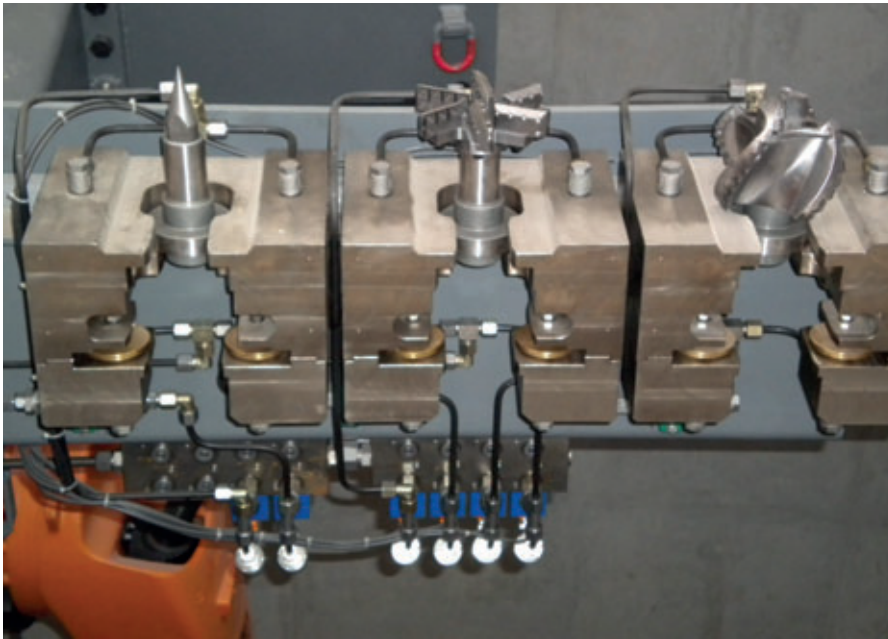
Straight into storage after milling

Once all milling work has been completed, the manhole base section is lifted from the processing bay and brought again into intermediate storage to harden. Any residual milled material, which, rather than falling into the pit, might have collected in the pipe connections, is simply swept off with a hand brush.

After they have attained sufficient strength, the manhole base sections are released from their support cap and turned 180°. Sealing rings can now be set in place, if desired.

Great satisfaction with the Primuss System despite economically challenging times

In 2012, Best produced just on 2,200 monolithic concrete manhole base sections with its first Primuss manufacturing line clearly missing its target goal of 5,000 manhole bases. The blame is in no way to be found with any lack of acceptance for these new high-tech products. The economic crisis has also made itself felt in the Czech Republic and municipal coffers are empty. Contracts are not being concluded in any



The tool changer with up to six milling and drilling tools



Practically unlimited design possibilities; even spigot ends can be milled

quantity, which would otherwise be necessary for renovating the sewage system. In spite of this, the Primuss manufacturing line has paid off and there has been a continuous growth in interest for the products in the whole of the Czech Republic. Best perceives another advantage in entering the market with such a modern product. The quality aspects of its concrete products provide a convincing argument for the decision makers in public bodies. Concrete pipes play an entirely secondary role in the Czech Republic. If confidence broadly grows in concrete for waste water applications - a matter whose success is demonstrably possible with such high-class special products -, it could bring about far-reaching consequences for the concrete industry in the Czech Republic.

FURTHER INFORMATION

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