

Prinzing GmbH, 89143 Blaubeuren, Germany

Machined concrete manhole bases now also at Dolomit in Hungary

The Dolomit Kft. concrete works are based at Gánt, approx. 50 km west of Budapest. The company was privatised in 1990 and has its origins in a gravel works whose products are still sold today across Hungary. In 2002 Dolomit entered the concrete business, which was the beginning of a new era for the company. The company invested in a manhole base production machine and started producing concrete products, mainly for underground construction applications. In addition Dolomit also started to offer ready-mixed concrete. With its high-quality products the company quickly established itself in the market. Special components, including products made of self-compacting concrete, complemented the product range. Recently Dolomit took another big step forward and invested in a new, advanced manhole component production facility. Dolomit has been using the automatic pipe and manhole machine called Tornado for producing its full range of manhole components since autumn 2011. The Primuss milling station enables production of monolithic manhole bases with variable channels. Both new systems were supplied by the company Prinzing based in Blaubeuren, Germany.

■ Mark Küppers, CPI worldwide, Germany ■

In the years after it was privatised Dolomit Kft. expanded quite significantly. The production facility at Gánt now employs more than 50 staff. In addition to gravel extraction the main activities are industrial series production of open and covered street gutters, slabs for drains and, of course, the new

concrete manhole component production. Within its short history as a concrete works, Dolomit also experienced a strong development in the area of special concrete components and even managed to secure orders from abroad. For example, the Gánt facility produced thin fencing elements made of high-strength concrete for a railway project in Holland.

Dolomit Kft. is a certified company and has very demanding requirements when it comes to concrete quality. It can produce products up to concrete strength class C 100/115. It goes without saying that the concrete quality is monitored independently.

Although the young company is not yet one of the big players in the Hungarian market,



Special components made of SCC – another Dolomit speciality



Concrete art – made by Dolomit



Dolomit now offers the full range of concrete manhole products



The concrete manhole bases milled with the Primuss method were very popular right from the start

Dolomit supplies its products to large parts of Hungary and has established a good reputation, particularly as supplier for several railway projects.

Since it established its own concrete production in 2002 the company has been using some of the aggregates from its gravel quarry itself, although the majority is still being sold to third parties. The gravel pit equipment enables full utilisation of the concrete without any residues or waste. Excess concrete quantities and any products that do not meet the high quality requirements are recycled with the gravel pit crushers. The recovered material is then added again to the concrete production.

After the successful entry into the market for precast concrete elements for infrastructure projects in 2002, Dolomit opened up new markets with the commissioning of the Tornado production plant and the Primuss milling station, in which the company can act as full-range supplier for the concrete manhole sector.

Dolomit is the first supplier in Hungary to produce monolithic concrete manhole bases using the Primuss production process. Key decision criteria when it came to choosing the production technology included speed, simplicity and flexibility. For Dolomit a further advantage is the fact that, with the Primuss concrete manhole production unit, the only waste is the milled concrete, which is collected, processed and returned to the production cycle.

With the combination of Tornado and Primuss Dolomit is able to offer the full range of concrete manhole components. Manhole cones, rings and bases are produced with the automatic Tornado pipe and manhole machine. Whilst manhole rings and cones are also produced as stock items, the Tornado machine only produces order-specific concrete manhole blanks for subsequent processing into monolithic concrete manhole bases with the Primuss milling station, where the required connections and channels are produced.

Automatic pipe and manhole machine Tornado

In addition to the already mentioned concrete manhole components, the Tornado machine can also produce related precast concrete elements such as palisades, small pipes, rectangular elements and drains. The manhole steps can be integrated directly during tubing and manhole cone production. To this end the Tornado features an automatic step magazine, and the mould cores for the rings and cones are designed accordingly.

The maximum product dimensions are between 150 and 2,500 mm, the component heights vary between 250 and 1,500 mm. The cycle times for concrete elements, which can weigh up to 6,000 kg, are between 2 and 4.5 minutes. The underfloor Tornado production machine is sound-protected. The products are demoulded in the machine and removed with a forklift truck.

The Tornado machine installed at the Dolomit facility in Gánt is equipped with modular Prinzing automation systems, including a pallet magazine, an automatic pallet cleaning station, an automatic form oil application unit and an automatic pallet inserter.

The base pallets are collected and transferred to the automatic enclosed cleaning station with a forklift truck. The pallets are separated before they pass through the cleaning station. After the cleaning cycle the cleaned pallet is pushed out of the station and replaced with another pallet for cleaning. After the cleaning station the pallets enter the release agent station connected to it, where release agent is applied to the pallets quickly and precisely via a rotating spray mechanism. The pallets prepared in this way can then



Fully automatic Tornado manhole machine from Prinzing



Automatic step magazine for manhole ring and cone production



Manhole mould core for direct integration of manhole steps



Dosing shutters below the concrete reservoir ensure optimised mould filling



Manhole cone during demoulding in the Tornado machine. Dolomit uses the Tornado to produce the full range of manhole products: cones, rings and bases



Raw manhole base blank after demoulding. After a short hardening time the blank can be taken to the milling station.

be pushed into the Tornado machine with the pallet inserter. Short mould exchange times enable economic production with frequent dimension changes, while the infinitely variable height adjustment system enables flexible production of manhole elements.

The concrete for the Tornado machine is produced by the same mixer that also mixes the concrete for the manhole base production machine. The concrete is taken to the new production hall with forklift trucks. In an external area the concrete is tipped into a container, from where it is taken to the Tornado machine via a conveyor belt.

From the concrete reservoir in the Tornado the concrete is then transferred via dosing flaps to a conveyor belt, which delivers it to the mould. The earth-moist concrete is continuously compacted with a high-performance vertical vibrator with amplitude and frequency control. The high-performance vertical vibrator can be used for products between 100 and 6,000 kg without manual adjustment of the unbalanced masses. The concrete manhole blanks for the Primuss production process are produced upside down, i.e. the manhole base is poured last. Once the mould is filled, a load is imposed on what will subsequently be the manhole base, and compaction continues.

The fresh concrete components are then retrieved from the basement level of the plant and are ready for removal. The concrete monoliths are taken to the hardening area by forklift truck, where the blanks remain until they have reached the required early strength for milling.

Primuss milling station with two workstations and a high degree of automation

Dolomit Kft. uses a milling station with two workstations installed at floor level. The workspace of the robot installed at basement level is behind (for the connections) and below (for the channels) the concrete manhole monolith. The station is enclosed. A conveyor belt system in the basement removes the milled material from the working area of the Primuss machine.

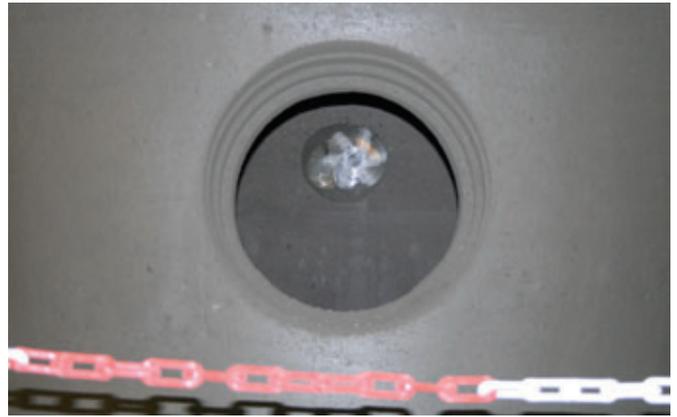
Depending on the composition of the mixture, the concrete blanks may reach adequate strength after only 60 minutes. The blanks are



Removal of base blank from the Tornado machine



Primuss milling station with two workstations



Circular milling of the pipe connections

then lifted off the support cap and taken to the milling station with a forklift truck. While milling takes place at one of the workstations, a finished manhole monolith is replaced by a new blank at the second workstation. This ensures that the robots can mill continuously, without disruption through changeover operations.

At this point the concrete manhole elements are still upside down and are placed on a rotatable ring. First, the robot moves into the manhole blanks from below for milling the channels. Using the spherical milling head with PCD cutting tools the concrete is then removed layer by layer, until the channel has reached its final form. The concrete waste falls onto chutes in the working pit and from there onto the conveyor belt at the base of the pit.

Once the channels have been milled, the robot automatically changes its tool and starts milling the pipe connections. A side milling cutter is used for this purpose, which is also equipped with PCD cutting tools. The milling cutter slowly works itself into the concrete along circular paths. The feed is

automatically controlled by the robot. The hardening state of the concrete is taken into account to ensure gentle milling.

Once a pipe connection is complete, the robot arm moves back and the manhole element is turned to the next position via the fixing ring, at which the next connection is then milled as scheduled. The robot gradually processes all steps until the manhole monolith is complete. Depending on the complexity the concrete manhole bases may be finished in only a few minutes, although large components with several connections and larger channels may, of course, take longer.

Once the milling tasks are completed, the robot moves back, changes the milling head from the tool magazine and starts milling the channels at the second workstation. A forklift truck removes the finished manhole element and takes it to the storing area for further hardening. Once the required strength has been reached, the manhole bases are lifted off the pallet and turned. In a final step seals are applied, if required.

All the data for the robot are supplied by the system software. Once the product parameters such as diameter of the connections, inclinations, angles etc. have been entered in the clearly structured input mask, the computer carries out all the calculations required for the respective concrete manhole base. The computer calculates the travel paths for the robot, and the robot then automatically operates accordingly. ■

FURTHER INFORMATION

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Once a connection has been milled, the robot arm moves back and the manhole is automatically turned to the next milling position.



The milled material falls directly into the working pit, from where it is continuously removed by a conveyor.



Removal of milled manhole base from the Primuss machine