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Fundamental shift in installation practices for concrete manholes across the United Kingdom

A combination of prefabricated chamber rings and multistage in-situ concrete casting has been standard building practice in UK until now. This was a hugely time-consuming process that involved making the channels in the manhole as well as creating an in-situ concrete base in addition to the precast components. On top of the initial effort needed to provide and use the concrete at the construction site, this conventional procedure also, more importantly, leads to significantly longer completion times for each manhole. The precast concrete plants only provided standard building components such as chamber rings and cover slabs. Most of the concrete was delivered from the ready-mixed concrete plants to be able to manufacture the additional concrete layer for the channels and, more importantly, the concrete surround around the entire structure, measuring up to 150 mm thick. Europe has since been using a monolithic manhole base with precision-fit channels and sufficient wall thickness – this innovation has led British manufacturers to question the conventional costly and time-consuming process. Thanks to their Perfect manhole base manufacturing system in operation at their site in Leek/Staffordshire, the CPM Group has paved the way for implementing a modern approach that uses innovative precast concrete. It was very well received among all companies from the building site logistics sector even in its very first year on the market. Not only was this positive for the CPM Group, it was also a deciding factor when it came to Stanton Bonna using the Perfect system at their Ilkeston, Derbyshire site to also manufacture formwork-hardened individual bases for DN1200 and DN1500 mm manholes.

■ Christian Weinberger, Schlüsselbauer Technology GmbH & Co KG, Austria ■

CPM Group, the pioneer in manufacturing individual precast concrete bases in Great Britain

The CPM Group operates various production plants at four sites across Britain (Lanarkshire, Somerset, Staffordshire and Yorkshire). As a member of the Concrete Pipeline Systems Association (and therefore also of the British Precast Concrete Federation), CPM is constantly striving to improve the efficiency of manufacturing and installation methods.

The industry has recognised the need to drastically improve manhole construction for some time now. Following a detailed review of the Perfect System seen at the Bauma 2007 trade fair, a decision was made to set up the Leek/Staffordshire site for producing these precast monolithic components, which are manufactured to be precision-fit to meet frequently changing demands of a construction site. This step forward was far more than just another addition to their product range for the very successful company, which provides civil engineering and tailored solutions across the country. More importantly, the introduction

of the Perfect manhole base changes the entire process related to the component, from ordering to planning and from manufacturing to delivery. This not only involves ensuring compliance with the relevant standards and high-quality production, but this also means assuming responsibility for the entire structure.

Stanton Bonna, prime example of implementing Perfect base manufacturing

Another member of the Concrete Pipeline Systems Association, Stanton Bonna adopted a different approach to implement the



Perfect manhole bases in the loading area at the CPM site in Staffordshire



Immediately after demoulding, the manhole bases are loaded onto pallets at Stanton Bonna

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Perfect manhole bases not only offer perfectly shaped channels for the most complex structures, they also boast integrated seals.



Hot wire saw technology provides simple methods in the manufacturing of individual manhole bases.

manufacturing method as quickly as possible. As part of the Bonna Sabla Group, one of the largest European manufacturers of prefabricated concrete components for drainage engineering, Stanton Bonna was able to draw on many positive experiences with the Perfect system at other production sites across Europe, working closely together to organise day-to-day manufacturing. The channel mouldings are essentially delivered entirely preconfigured to the site in Ilkeston, Derbyshire where they are formwork-hardened using self-compacting concrete. This reliable manufacturing process turned out to be exceptionally easy for Stanton Bonna.

On the day after the moulds are cast, the component is demoulded by opening up the two-piece exterior mould. The component is then lowered onto a pallet using turning equipment also provided by the Schlüsselbauer company. Following visual checks, the production label showing all the project data is affixed to the exterior of the concrete manhole base and the component is moved to a storage site.

Standards and construction site practices for manhole construction in Great Britain

The conventional method of constructing manholes in Great Britain involved the following steps: Firstly, all inlet and outlet pipes are set in an insitu concrete base. Secondly, risers are lowered on the base to form the required height of the manhole structure. This step usually involves manually applying another layer of concrete on the ground to build the berms and channels to meet British standards. Formwork is erected around the entirety of this as yet incomplete structure and is then filled with in-situ concrete – usually 150 mm thick. Finally, the upper section of the manhole is made using prefabricated risers of smaller diameter, and not with manhole cones.

The final height of the component, dependent on how the manhole surface is used, is achieved with adjustment rings. This traditional method has been standard building practice in Great Britain to date and is therefore included in British Standards.

Water tightness and the minimum compressive strength must also be inspected, in line with BS EN 1917 (Concrete manholes and inspection chambers) and BS 5911-3 (Concrete pipes and ancillary concrete products, specification for unreinforced and reinforced concrete manholes and soakaways) standards. The structure is expected to have a service life of over 100 years. Stanton Bonna demonstrates the benefits of the new customised component using a video clip on the company's website showing an entire manhole structure being built.

Planning and responsibility of the prefabricated concrete manufacturer for the manhole structure

Both CPM and Stanton Bonna take full responsibility for the manhole structure in terms of planning and designing the manhole base, including the precision-fit channels and pipe connections. This responsibility includes ensuring that production complies with the relevant standards, taking quality control into consideration (internal



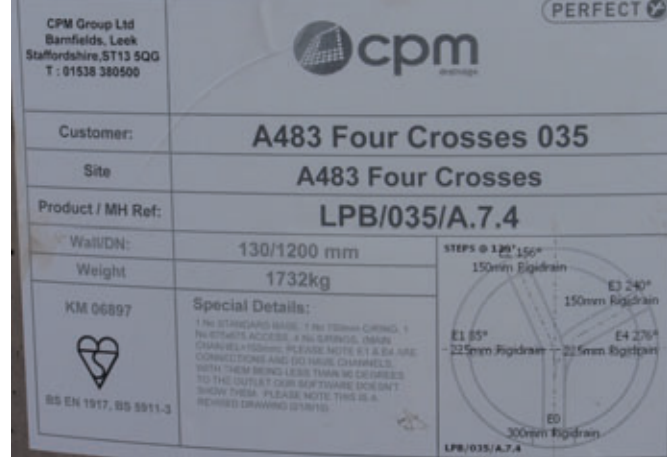
There are no limits in terms of planning freedom – all negative channel mouldings can be individually adjusted.



The EPS channel parts are positioned in steel moulds where they are then cast using self-compacting concrete.



CPM manufactures monolithic Perfect manhole bases in a dedicated production hall.



Clear self-adhesive labels with all the relevant project data accompany the component at all stages, from planning and manufacturing to the construction site.

and external monitoring), as well as ensuring that the project is well executed in terms of planning and implementation. In most foreign markets, such a move would be rejected by manufacturers of prefabricated components. For the UK manhole construction sector, this approach does however create an opportunity to drive forward technological advances and transform a side venture in precast manufacturing into an attractive business area for the leaders in modern manhole base production. From the very beginning, CPM was convinced that this approach could well create a shift in the market away from the time-consuming and costly conventional manhole construction method. This approach could also achieve above average exposure for the innovation, build trust and strategically push forward marketing, project by project. The highest trained engineers support the local construction industry from preliminary planning

to order processing and implementation at the construction site. The Perfect manufacturing system supports engineers to implement all details specified by the client thanks to the planning freedom that it offers.

In addition CPM have now engineered a Perfect Manhole Take-off Tool and Base Configurator that is downloadable from their website. This enables clients to produce their own schedules and makes the whole process even faster.

Conclusion: Easy and understandable process in day-to-day manufacturing

The Perfect manufacturing process impressed those in charge at CPM and Stanton Bonna primarily due to the ease of implementation. In the Perfect software each channel is planned individually and this plan is then integrated into the corresponding manhole structure. After the component has been approved, the individual construction steps for the area to be cut are displayed step-by-step. The simple user interface even allows the engineer to simultaneously create several negative channels made from EPS. A display on each hot wire saw allows the procedure to be clearly visible and enables correct classification of the individual components.

As soon as all inlet components are processed and bonded together using hot glue, the final cutting work is completed with the berm and outer radius. The negative channel is now ready to insert into the corresponding steel mould and finally cast. The flexibility of the Perfect system proved effective in Great Britain in particular because the pipe connection channels permitted here are very varied. In terms of channel design, there are no limits to the Perfect

manufacturing technique, even for pipe connection configurations that are extremely complex in practice. CPM Commercial Director, Paul Cartwright, emphasised: "The Perfect system is perfect for us! What's more, our products fulfil the highest requirements for BS or EN standards. The entire manhole can be checked for water tightness and to ensure it fulfils the prerequisites of the BS EN 1917."

FURTHER INFORMATION



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Construction companies and clients interested in the work are informed of the benefits offered by precision-fit precast concrete components at CPM.