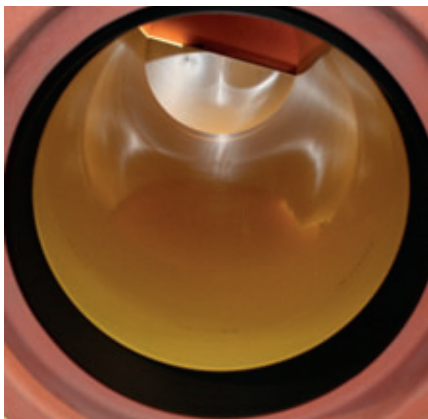


Schlüsselbauer Technology GmbH & Co KG, 4673 Gaspolthofen, Austria

Durably resistant pipeline system for sewer systems

The state of the art pipeline construction – determined by innovative concrete products – was the focus of Schlüsselbauer's bauma presentation. The Perfect Pipe pipeline system, which was designed by Schlüsselbauer for the canalization of wastewater, industrial water and surface water, is distinguished by the constant, highly static resistance of a concrete pipe combined with the durable corrosion resistance of a plastic inliner. The high resistance for which rigid pipes are generally known over long periods of time can be further increased with Perfect Pipe thanks to the use of innovative fluid concrete or by means of the geometry of a base pipe with a middle notch at the bottom. It goes without saying that the pipe can be equipped with project-specifically adapted reinforcement. However, the innovation which is crucial for use in wastewater disposal can be found in durably lining the pipes with a thin-walled polyethylene (PE) inliner. Acid resistance in the range of pH 1 to pH 14 is thus attained.



The lining of concrete pipes with inliners and the plastic connectors ensure universal corrosion resistance in the range from pH 1 to pH 14.

The new inliner is built in with a resource-saving minimal wall thickness of less than 2 mm necessary for manufacture and operation. The inliner is reliably connected to the concrete by a multitude of newly developed anchors on the reverse of the inliner. This ensures that the liner is firmly connected to the concrete even in the event of alternating temperatures during the storage and transportation of the pipes.

Tests conducted for first-time authorisation of the system in Germany yielded a pull-out force of over 250 N per anchor. In addition to circular concrete pipes, other pipe geometries and concrete pipes without a lining can be manufactured with the same production equipment.

The use of fluid concrete or self-compacting concrete also enables reduction of the wall thickness customary in conventional pipe manufacture in many cases. This enables absolutely impermeable products to be manufactured with reduced use of materials, which also subsequently lead to cost

optimisation by reduced capital commitment at the warehouse and lower freight costs per running metre of pipe. Numerous new developments were accomplished in the area of manufacturing technology for the production of new concrete pipes – regardless of whether or not inliners are used. In addition to relevant external forms and highly-automated processing technology, the development of an innovative maintenance-free shrink core was predominantly crucial for the successful introduction of this manufacturing procedure.

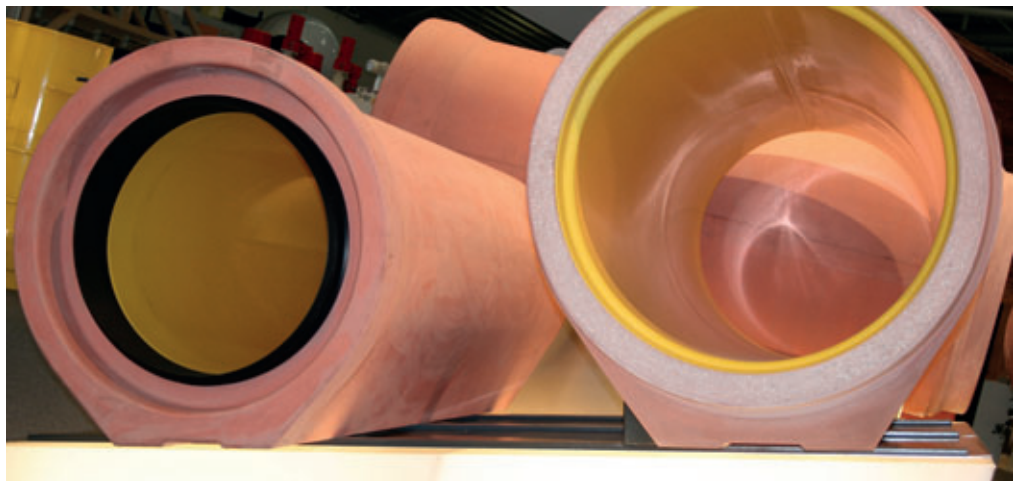
Perfect Pipe as a concrete jacking pipe with a plug connection for efficient micro-tunnelling

In addition to various pipe geometries for open trench, Perfect Pipe is also well suited to being used as a jacking pipe for the non walkable nominal width spectrum up to DN1200. In these new lined concrete jacking pipes, the pipe connection is manufac-

tured with plastic connectors, in the same way as the pipes for an open trench. These connectors are furnished with two seals which reliably seal the universal corrosion-resistant lining system. The resistant concrete pipe is ideally suited to jacking, even in geodetically difficult conditions. This increases efficiency in the manufacture of durable pipelines in the micro-tunnelling procedure and in their operation in multiple respects. The pipes, including the inliner, can be manufactured in any length and provided in accordance with the actual pipeline length. The plastic inliner not only protects the concrete structure. It also facilitates maintenance in respect of camera inspection and cleaning.

Increase in output and quality in the manufacture of concrete pressure pipes

Schlüsselbauer also presented a whole range of innovations for concrete pressure pipe manufacture. The use of concrete



The cross-section of a base pipe – here with a middle notch for ideal load transfer – means trench back-filling is no longer a problem.



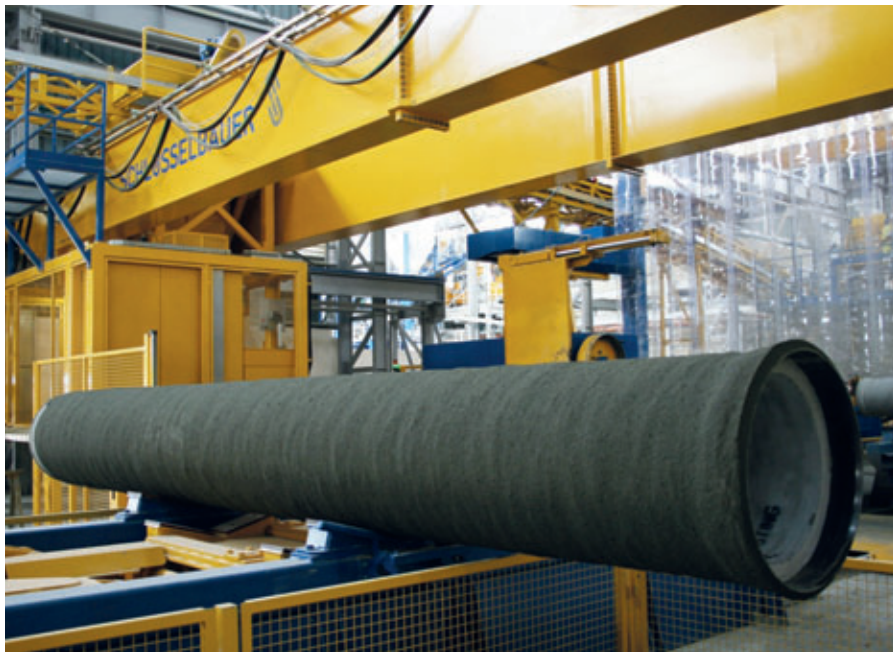
Micro-tunnelling with lined concrete pipes – increased efficiency in pipe jacking due to connectors for those nominal widths where walk-in into the pipeline system is not permitted.

pipes with internal steel cylinders and wire pre-tensioning has been proven worldwide for decades. Only the manufacturing technology was barely further developed over a long period. Schlüsselbauer first equipped a pressure pipe manufacturing facility with new production technology in 2004 (report in CPI 1/2006). Since this time, various components of such a manufacturing facility have been further or newly developed on an ongoing basis. For example, the working speed of the wire pre-tensioning and winding facility was increased many times over. Furthermore, welding, tes-

ting and handling components were further developed. Consequently, it was not just the production capacity which could be considerably increased compared to old facilities. The product quality and universal testing of the same also attain a completely new level with the new developments accomplished – for example, in the manufacture of tested, dense steel cylinders. Ultimately, this innovative overall concept was accomplished in pressure pipe manufacture in the Sultanate of Oman (report in CPI 1/2013). In what is probably the most modern concrete pipe facility nationally, concrete pressure pipes of the dimensions DN600 – DN1400 are manufactured in addition to concrete pipes and rectangular profiles for gravity sewer systems.

Perfect – synonymous with high-quality individual concrete manhole bases

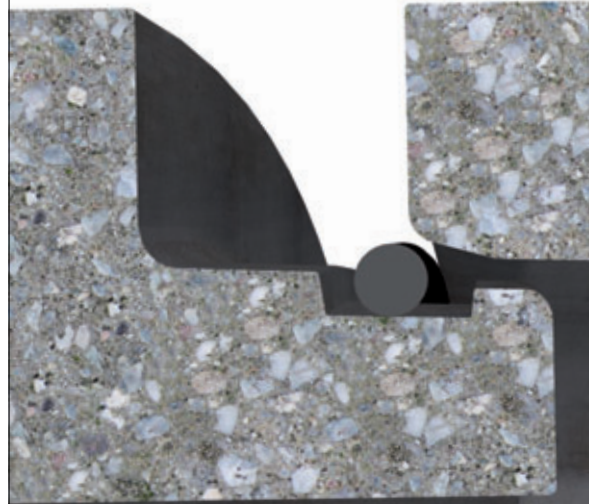
In addition to the innovations in concrete pipe manufacture, the established technology for the manufacture of individual and wet-cast manhole bases was a central element of Schlüsselbauer's bauma presentation. Since bauma 2004, this pioneering technology for manhole manufacture has been an impressive component of the trade fair participation of the Austrian company. A multitude of Perfect manhole base manufacturing facilities have successfully started operation in Europe and North America in



Pretensioned concrete pressure pipes with internal steel cylinders are absolutely impermeable and ideal for operating pressures of up to 25 bar.

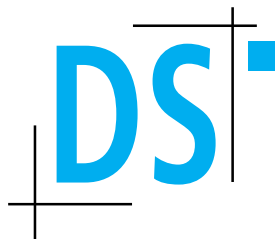


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Lise-Meitner-Straße 1
48301 Nottuln, Germany

Phone: +49 (0)2502/2307-0
Fax: +49 (0)2502/2307-30
Mail: info@dseals.com

www.dseals.com



The manufacture of steel cylinders under controlled conditions is a central element of concrete pressure pipe production.



The speed and precision of wire pre-tensioning for pressure pipe production were increased by Schlüsselbauer's current new developments.



The most state-of-the-art concrete pipe facility in the Sultanate of Oman was opened by Amiantit Oman Concrete Products LLC in Autumn 2012.



Now synonymous with high-quality, custom-made, wet-cast concrete manhole bases – Perfect.

the last few years. In the meantime, Perfect concrete manhole bases are synonymous with perfectly fitting, high-quality and cost-effective manhole bases on an international scale. In addition to the signal-red manhole bases made of high performance concrete, manhole bases, covers, etc. of the same quality of concrete are already being manufactured by several European manufacturers.

In addition to the planning liberty of the engineers responsible, what is striking about the production of Perfect manhole bases is first and foremost the product quality which is already apparent from the flaw-

less concrete surfaces and the low material consumption on the shaping EPS components. All channel geometries necessary for ideal hydraulics in wastewater disposal and even those necessary for dumpsite manholes can be accomplished with Schlüsselbauer's Perfect technology in the nominal manhole widths DN600 to DN1500. The comparatively small volume of EPS recycleate ensuing after demoulding of the channel can be used again in EPS production or otherwise without a problem. Any type of fluid concrete can be used with regard to concrete quality.

FURTHER INFORMATION

SCHLÜSSELBAUER 

Schlüsselbauer Technology GmbH & Co KG
Hörbach 4
4673 Gaspoltshofen, Austria
T +43 7735 7144
F +43 7735 714456
sbm@sbm.at
www.sbm.at
www.perfectsystem.eu