


# PipeLine

Compendium 2008





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**Print : Ernst Ploetz, Druck- und Verlagshaus GmbH**

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January - December 2008

# PipeLine



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## French Highway Secured in Tailor-Made **HOBAS®** Fashion

The French highway network spans almost 12000 route kilometers, 60% of which are administered in a concession system by private companies such as APRR (Autoroutes Paris-Rhin-Rhône). Thousands of metal culverts have been installed along the roads to channel water. More than 50% of these are steel circulars or arches. After being in service for 30 to 40 years, these culverts have reached their maximum lifetime and are at risk to collapse any time causing road ruptures as approximately 20 years ago: Road embankment, paving and culverts needed to be repaired immediately which required an expensive construction of temporary diversions for both water and traffic. As a consequence, the highway companies conducted an extensive inventory. First surveys provided a better overview. It seemed that a significant number of the steel constructions (corrugated galvanized iron culverts) and a number of concrete culverts showed serious defects. Consequently, all 6 highway companies introduced a compulsory rehabilitation program in accordance with the technical specifications by the French Water Act of 1992.

On this account HOBAS GRP Pipe Systems have contributed to the security upgrade of the constructions and highways. Thanks to its environment-friendly characteristics and its

Year of Construction  
**2007**

Duration of Construction  
**8 months**

Length of Pipe  
**685 m**

Pressure Class  
**PN 1**

Stiffness Class  
**SN 5000, SN 10000**

Diameter  
**DN 1200 - DN 2400, NC-Line ID 2880x1800**

Installation Method  
**Relining and open installation**

Application  
**NC Line®, WaterLine®**

Client  
**APRR (Autoroutes Paris Rhin Rhône)**

Contractor  
**DLE – Eiffage TP**

Advantages  
**hydraulic properties,  
long lifetime,  
light weight**



exceptionally long lifetime properties HOBAS GRP is an ideal material that fulfills all requirements. It should also be noted that the HOBAS Solutions for this project are based on trenchless technologies which permit works without traffic disruptions.

The described project is located on Highway A31, which connects the town Beaune and Luxembourg and is part of the APRR network. APRR is a subsidiary of the Eiffage Group, the seventh largest building and concession company in Europe, and is in charge of the second most important French highway network with 1800 km.

This project is noteworthy for its dual purpose:

- to rehabilitate damaged metal pipes that were for some parts severely corroded;
- and to extend the road by one lane in each direction.

Moreover, the rehabilitation involved a group of not less than 11 large-scale hydraulic constructions, 9 of which were originally elliptical, one was circular but strongly buckled, and one was in the shape of an arch. The total length of installed pipe adds up to 685 m.

HOBAS participated in the public tender by APRR. An overall solution was developed considering the geometry of each channel and grouping the constructions by size. This led to the proposal of 4 different and individual NC Line® profiles plus one circular CC-GRP Pipe OD 1720 for the rehabilitation of 9 elliptical constructions. Standard CC-GRP HOBAS Pipes were suggested for the remaining circular constructions and for the arch NC Line® panels of ID 2880x1800. Apart from this, an alternative solution proposed sliplining HOBAS NC Line Arches and HOBAS CC-GRP Pipes using both flush couplings and standard FWC couplings.

APRR opted for the latter proposal. The mixed technologies confirm the adaptability and flexibility of HOBAS Products. Thus, 635 m of pipes ranging from DN 1200 to DN 2400 have been installed between May 2007 when first deliveries were made and end of November 2007. Slightly more than 50 m of HOBAS NC Line® profiles completed the lot.



“Works were accomplished more easily thanks to the simple handling and jointing of HOBAS Pipes”, explained Civ. Eng. Norbert Cheminot, site manager of DLE EIFFAGE TP, contractor in charge of pipes installation and specialist for trenchless technologies. “Working on highways without disrupting the traffic is always a challenge. The HOBAS Solution required less heavy equipment, and turned the usually complex storage and handling into easy installation.”

HOBAS Pipe Systems were clearly the right choice for this project. They are a clever made-to-measure technical solution combining standard CC-GRP Pipes with arch-shaped NC Line® panels, and offer an exceptionally long lifetime under constant mechanical loading. The highway companies appreciate the products’ hydraulic properties despite a small reduction in dimension, and a low roughness coefficient thanks to the smooth liner surface, maximizing the flow rate and minimizing maintenance. “It was very important for us to find a rehabilitation solution that meets the terms of the French Water Act, something that would not affect the hydraulic condition of the existing pipeline and offer a long life-time.” Said Mr. Casey a technical member of APRR’s area staff. “The solution also allowed an open installation for the part where the roads were enlarged.”

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## Reconstructed & Extended with HOBAS®

According to EU wastewater regulations and based on development plans for the city Ústí nad Labem, Czech Republic, it was found necessary to reconstruct but also extend the wastewater network. The project was subdivided into several construction units and was realized in 2004 to 2006 as one of the ISPA projects in the Czech Republic.

### Sewer Z2

The sewer Z2 starts at the crossroads Na Predmostí, where it links to the Z1 sewer, a DN 600 HOBAS CC-GRP SewerLine® that had been established in 1998. Z2 was planned to take the same route as the old sewer it would replace. 710 m HOBAS CC-GRP SewerLine® DN 1000 were installed to handle the sanitary waste of a city district with approximately 28000 inhabitants. A linear underground structure was designed for the line that runs through the historical city centre paralleling the river Labe on its left side in about 200 to 300 m distance.

### Masarykova Street I, sewer capacity extension

Another part of the project was dedicated to the extension of the existing sewer capacity in Masarykova Street and the removal of the storm water overflow chamber OK2. The existing sewer outlet was newly connected, so that sewage is now pumped into the gravity sewer leading to the Ústí nad Labem wastewater treatment plant. The original non circular line running below the overflow chamber was replaced with a larger HOBAS CC-GRP DN 1600 SewerLine®, further slightly smaller non circulars above the OK2 were substituted with CC-GRP DN 1400 Pipes. The length of the extended section adds up to 413 m.

### Masarykova Street II, sewer capacity extension

Further extensions were conducted after the assessment of the existing sewer. Non circular lines DN 400/600 and DN 500/750 had served for over 100 years and had come to the end of their lifecycle, and two overflow chambers OK7 and OK8 in Masarykova Street located closely to each other did not fulfill their purpose. A total length of 797 m had to be reconstructed. Various diameters of HOBAS CC-GRP SewerLine® ranging from DN 600 to DN 1000 were utilized to replace the antiquated egg-shaped line and to extend its capacity.

### Separation of Strábrnický Brook

The design deals with the redirection of the Strábrnický Brook which used to feed the old sewer and storm water system of the municipal area Severní terasa directly to the river Labe. The brook now runs through the HOBAS DN 1100 storm water overflow sewer under the newly constructed overflow chamber.

### Žukovova Street, sewer reconstruction

The ultimate part of the project handled the reconstruction of the sewer in Žukovova Street on the right side of the river Labe. The reconstruction was conducted due to the exceptionally bad condition of the lower part of the pipeline under a railway crossing. A new 316 m HOBAS CC-GRP DN 1000 SewerLine® was installed on the former route.

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Year of Construction

**2006**

Length of Pipe

**2.6 km**

Pressure Class

**PN 1**

Stiffness Class

**SN 10000**

Diameter

**DN 300 - DN 1600**

Installation Method

**open cut**

Application

**SewerLine®**

Client

**SVS a.s. Teplice**

Constructor

**SSŽ a.s., establishment**

**Ústí nad Labem**

Advantages

**fast installation of large diameters,  
corrosion resistance**

## Monumental Microtunneling in Verona, Italy

The problem of flooded buildings located below street level after heavy rainfalls is finally solved thanks to the construction of a new storm water sewer. The project was promoted by Acque Veronesi, the water management department in charge of 70 municipalities of Veneto.

Constructions consisted of the installation of approximately 200 m of HOBAS CC-GRP SewerLine® DN 900. The line runs from Prato Santo Street to Lungadige Matteotti straight into the Adige, the river which crosses downtown.

The first part of the pipeline was laid in an open trench utilizing short 3 m pipes where the road was relatively wide. The second part of the pipeline was microtunnelled due to the remarkable installation depth of 4 m, a high groundwater level and the presence of old buildings along the pipeline route. Open trench was not an option in this case for the longer construction time would have meant more disruption for inhabitants, tourists and traffic.

Year of Construction

**2007**

Duration of Construction

**2 weeks**

Length of Pipe

**210 m**

Pressure Class

**PN 1**

Stiffness Class

**SN 10000, SN 32000**

Diameter

**DN 900, OD 960**

Installation Method

**Open trench, microtunnelling**

Application

**SewerLine®**

Client

**Acque Veronesi S.p.A.**

Constructor

**Impresa Serpelloni S.r.l.**

HOBAS Sales Rep.

**Roberto Deversy**

Advantages

**hydraulic properties, long lifetime,**

**light weight**



Design Engineer Luca Comitti at Acque Veronesi suggested microtunneling, an installation method the water management department chose for the first time. This premier, Verona's delicate buildings and monuments and sceptic public authorities made a successful implementation imperative.

Fortunately, the installation was awarded to Impresa Serpelloni a reputable contractor of the area specialized in no-dig techniques. Serpelloni and Acque Veronesi did not take any risks and decided to change the pipe material originally planned for the project. They switched to a reliable material that requires the least amount of equipment on site coupled with shortest installation times: HOBAS CC-GRP Pipe Systems.

Although the line is fairly short and the works took only a couple of weeks, the project was highly acknowledged by designers and authorities of the region. It proves that even seemingly difficult projects can be easily handled when the right decisions have been made. The local authorities were impressed by the small work site and the fast installation.

HOBAS proved its reliability and precision. The CC-GRP DN 900, SN 10000 Pipes were produced by HOBAS Pipe Austria, whereas the Jacking Pipes came from HOBAS Pipe Germany. Simply perfect, they were even admired by some competitors.

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## Bigger Does Not Mean Better in Werkendam, NL

The sewer system of the municipality Werkendam in the Netherlands covers different drainage regions, one of which is Vervoornepolder that has a combined sewer system and is situated in the east of Werkendam. The municipality decided to extend the line utilizing HOBAS® CC-GRP SewerLine® and ShaftLine® for a new sewer retention system.

The sewer of Vervoornepolder used to have four overflow channels. One of them was already equipped with a retention tank. However, calculations regarding sewer capacity showed that a new overflow was necessary. To minimize surcharges, the sewer would have had to be extended at various points. Unfortunately, this was not possible for the lack of soil coverage and inclination. Another option was a retention cellar yet this solution would not have met the required capacity. Plans had to be reviewed which led to the conclusion that it would be best not to extend the old sewer but to install a new retention system including new overflows in the surrounding.

The new retention system incorporates a pumping unit that pumps all wastewater into the old sewer if necessary. The line runs through four overflows between the old and the new sewer. With this system, the retention sewer is only active in cases of heavy rainfall. During dry weather conditions or light rainfall the wastewater runs through the old sewer. This creates following advantages compared to an extended sewer system:

- During dry periods the flow rate is higher in smaller sewers so that deposits are kept to a minimum.
- Less mud is stirred during heavy rainfalls and the overflowing wastewater is therefore cleaner.

The retention sewer was fully designed by the municipality of Werkendam. One of the most important criteria for the choice of material was its weight. The soil around Werkendam contains high levels of peat which makes it prone to subsidence. The choice therefore fell on HOBAS®

Year of Construction

**2006**

Duration of Construction

**6 months**

Length of Pipe

**930 m**

Pressure Class

**PN 1**

Stiffness Class

**SN 5000**

Diameter

**DN 300 - 1200**

Installation Method

**Open trench**

Application

**SewerLine®, ShaftLine®**

Client

**Municipality Werkendam**

Constructor

**van Herwijnen**

Advantages

**easy and short installation,  
storage capacity,  
chemical resistance,  
low maintenance**



CC-GRP SewerLine® and ShaftLine® since not only the products' weight but also their smooth inner surface is highly advantageous for the application. Mud is prevented from depositing during reverse pumping from the new retention sewer into the existing one.

Reducing costs and inconvenience by short installation times:

- Light weight pipes; DN 1200=154 kg/m; DN 1000 =109 kg/m; DN 800=70 kg/m.
- Flexible FWC Couplings with rubber gaskets keep installation times short.
- Groundwater drainage is limited or can be avoided for HOBAS Pipes are easily laid.
- There are no delays during cold weather periods because HOBAS Pipes are promptly installed also at temperatures below 0°C.
- There is no need for heavy equipment such as telescopic cranes. A light mobile crane does the job.

Hydraulic advantages:

- HOBAS CC-GRP Pipe Systems are completely leak tight.
- Pipe cleaning is not or hardly necessary due to the smooth inner surface of HOBAS Products.
- Less sedimentation due to the very low roughness coefficient ( $k=0.01$ ) of the inner pipe surface;
- No blind areas, with references to the well functioning cleaning pumps, no 90 degree angles like in other sewer storage system.

Resistance:

- HOBAS CC-GRP Pipe Systems are completely corrosion resistant to sewer gas and aggressive sewer fluids.
- They are furthermore abrasion resistant and easily pass the Darmstadt Test according to DIN 19565.

Other advantages:

- Comparably thin pipe walls (DN 2200 = 35.3 mm);
- HOBAS® Couplings are guaranteed leak tight up to -0.8 bar;
- Compactness of the basin;
- A complete system solution was provided including manholes;
- HOBAS Products are compatible with and connectable to other materials (concrete, clay pipe, PVC, etc.);
- They have a lifetime minimum of 50 years.

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## HOBAS® Bridging Old and New Zagreb

The approximately 1 million inhabitants of Croatia's capital Zagreb can count themselves lucky to have high quality drinking water that is drawn from wells around the city area. It is hence the city council's utmost concern to retain the quality and to therefore preserve the river Sava and the groundwater reservoirs with a new Zagreb Wastewater Treatment Plant (ZWWTP). A 5.9 km HOBAS SewerLine® DN 1000 now transports all wastewater from New Zagreb (200,000 inhabitants) in the south across the river Sava to the treatment plant in the north-east of Zagreb. The facility including all supporting structures was constructed by Zagrebacke Otpadne Vode (Zagreb Wastewaters).

The complete pipeline consists of three major sections. MCP Culinecka is the first running from the treatment plant to the so-called Homeland Bridge. This part was accomplished by open cut installation with well compacted gravel sized 0 – 16 mm. The utilized HOBAS Manholes are T-Pieces DN 1000/800 covered with stainless steel blank flanges. Flexibility regarding Maintenance or repair works is given with mechanical couplings that join the manholes to the pipeline so that they can be easily disconnected and taken out of their concrete housing any time if necessary.

The second section is the 900 m long Homeland Bridge that carries a road and tramway and furthermore holds 5 parallel pipelines DN 1000 inside the construction. Four of the pipelines are for potable water and one is a HOBAS CC-GRP Sewer Main for New Zagreb's wastewater. The 1 km long HOBAS SewerLine® is installed on stainless steel supports with 5.85 m clearance. Since the only fixed point lies in the center of the bridge, thermal dilatations are carried out to both sides with the bridge moving up to 50 cm. KRESTA compensators are utilized here to absorb these movements – a demanding task considering the relatively large diameter, the pressure and line movement.

An important fact for the right material choice was the magnetic field created by the tramway rails which can influence close paralleling lines such as the sewer main. HOBAS CC-GRP Pipe Systems are non-conductive, corrosion resistant, show hardly any thermal expansion and



Year of Construction

**2005-2007**

Length of Pipe

**5.9 km**

Pressure Class

**PN 6**

Stiffness Class

**SN 5000, SN 10000**

Diameter

**DN 1000**

Installation Method

**Open trench,  
on supports in bridge, in concrete casing**

Application

**SewerLine®;  
BridgeLine®**

Client

**Zagrebacke Otpadne Vode**

Constructor

**Monter Strojarske Montaze,  
Hidrocommerce, Vodo-  
tehnika, Hidrocommerce**

Hobas Sales Rep.

**Eduard Hesky**

Advantages

**long lifetime, corrosion resistance, light weight,  
hardly any thermal expansion, excellent longitudinal  
stiffness, System solution for  
different applications**

have a long service lifetime. Apart from this, the products' low weight put less load onto the bridge and facilitated pipe handling inside the construction. These are advantages that convinced the client to choose HOBAS CC-GRP from other available materials.

Another 4 km of HOBAS CC-GRP BridgeLine® DN 300 – 400 as well as Fittings were installed for drainage of the Homeland Bridge.

The third and ultimate section of the line leads from New Zagreb to the Homeland Bridge. This 3 km long section runs through a water protection area with Zagreb's springs so that the high quality pipes needed to be placed into a watertight concrete channel.

Concrete supports hold the line every 5.8 m where it is fixed with stainless steel straps. An 8 mm thin EPDM layer was applied between support, strap and pipe to allow small longitudinal movement due to temperature variations and to evenly distribute the pipe weight on the supporting areas.

The longitudinal stiffness of HOBAS CC-GRP Pipes was a time and money saving property



for it minimizes the number of necessary supports. Easily jointed push-to-fit couplings contributed to the savings since no welding is required for HOBAS Products.

All sections of the pipeline were tested with up to 9 bar pressure. This was quite demanding for the manholes because the DN 800 blank flanges fixed on the tees without additional support had to withstand a force of 477 kN (equivalent to 48 tons).

Pressure tests on the pipeline inside the bridge were also hard to conduct because the bridge temperature kept changing causing the length of bridge to constantly vary. With a reduction in length the pressure inside the closed pipe increased.

The project was highly demanding for all parties involved. However, HOBAS Specialists were present during all stages consulting the design engineers on a number of details. HOBAS Site Advisors helped the contractor during pipe installation, deliveries were made in time and flexibility was proven when changes on site occurred so that the project could be successfully finalized. The outstanding properties of CC-GRP Pipe Systems certainly gave HOBAS a head start but the 50 years experience and the expertise of the HOBAS Site Advisors holds the greatest advantage of all.

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# HOBAS® for the Future Capital of Culture

Year of Construction

**2007-2008**

Duration of Construction

**5 months**

Length of Pipe

**596 m**

Pressure Class

**PN 1**

Stiffness Class

**SN 5000**

Diameter

**DN 300 - 1200**

Installation Method

**Open trench**

Application

**SewerLine®**

Client

**Pécs Waterworks PLC.**

Contractor

**Platina-Bau Co.Ltd.**

Advantages

**high corrosion**

**resistance, high flexibility, easily  
withstands heavy traffic loads**

With approximately 170,000 inhabitants Pécs is the 5<sup>th</sup> largest city of Hungary. Located in the south-west of the country and with numerous universities and cultural heritages it will be European Capital of Culture in 2010. The early Christian Necropolis of the former Roman provincial town Sopianae dates back to the 4<sup>th</sup> century and is enlisted as UNESCO World Heritage since 2000.

In 1970 Pécs established a concrete sewer main running through the water meadow Tüskésrét. A reconstruction plan was set up in 2000 to replace the old 2.7 km collector which had corroded considerably over the years. The reason for this was the high rate of iron sulfate in the groundwater due to the disposal of waste from a brown coal fired thermal power plant. Ash and slug had been deposited in the area since 1958 burdening the environment considerably and rendering the groundwater into an aggressive medium which gradually destroyed the old line.

This was the main reason why the Pécs Water Company Ltd. chose the highly corrosion resistant HOBAS CC-GRP SewerLine System. It was furthermore important to find a material that would withstand the heavy truck traffic loads from the industrial road under which the line was installed.

In 2001 and 2006 about 1.5 km of HOBAS SewerLine Pipe were laid in the prior reconstruction stages on the upper track of the main collector. Fortunately the autumn was dry and the groundwater level was far below the level of around 3 m that was assumed in a preliminary study.

Finally, between September 2007 and January 2008 the construction company Platina-Bau Co. Ltd. installed further 569 m HOBAS SewerLine Pipe Systems DN 800 by open trench. The contractor connected HOBAS Sanded Couplings to the Manholes for a better grip. Since the depth of trench varied between 4.5 and 5.8 m the usual 6 m standard pipes were delivered in 3 m long sections. Thanks to the centrifugal casting process of HOBAS CC-GRP Products it was also possible to cut the 6 m pipes directly on site when necessary.

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## Poland Drives HOBAS® Pipes Round the Bend

An impressive pipe project in Poland's capital Warsaw is expected to be completed mid summer 2008: To relieve the down-town sewer collector and to transport wastewater to the new treatment plant "Czajka", astounding 3.3 km large diameter (up to OD 2160 mm) HOBAS CC-GRP Jacking Pipes are installed by remote controlled jacking (microtunneling) and were literally driven around several bends.

Trenchless technologies are the most convenient and reasonable way to install a pipeline in a city where traffic and buildings above ground but also dense infrastructure below ground need to be considered. Numerous microtunneling projects have been successfully implemented with HOBAS CC-GRP Jacking Pipe Systems in Warsaw before. These projects along with project requirements such as installation depths up to 10.6 m convinced the municipality, waterworks and designer to once again opt for a trenchless solution. Furthermore, the installation method per se saved on pumping costs as the line was partly established up to 2 m below groundwater level.

The competition was tight and material prices for sure did not speak for GRP. HOBAS undoubtedly convinced in different respects such as offering extensive experience, know-how and reliability in curvilinear jacking. As so often, a second more thorough glance showed that the higher material costs were considerably outweighed by savings through, for instance,

Year of Construction  
**2006 - 2008**

Duration of Construction  
**ongoing**

Length of Pipe  
**3.5 km**

Pressure Class  
**PN 1**

Stiffness Class  
**SN 5000**

Diameter  
**DN 300 - 1200**

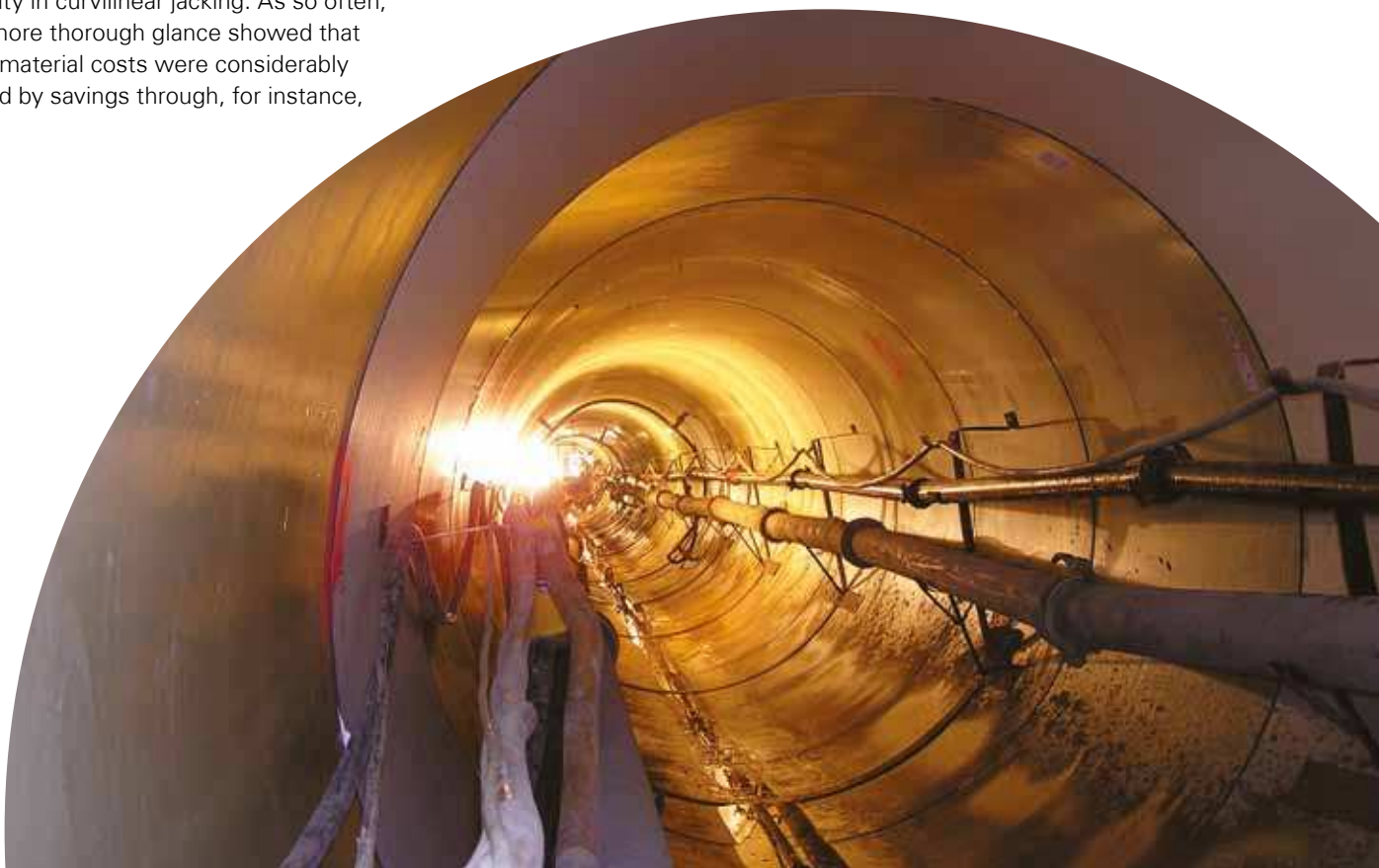
Installation Method  
**Jacking, open trench**

Application  
**SewerLine®**

Client  
**Warsaw Waterworks**

Constructor  
**PRG Metro**

Advantages  
**simple & precise installation,  
smooth inner surface,  
consistent outer diameters,  
variable pipe length**



a 30% reduction of extracted soil thanks to smaller consistent outer diameters of the comparably thin walled CC-GRP Pipes. Construction sites and construction equipment could be kept small and to a minimum, for pipe size and weight surely mattered also in this case. Fast assembly and small curve radii were further cost saving advantages that spoke for HOBAS, not to mention the high corrosion resistance, long life expectancy of the products, low maintenance costs, etc.

The 3.3 km line runs in 4.7 and 10.6 m depth and includes 6 curves with 200, 300 and 600 m radii, the longest curve being 124 m at an average gradient of 0.063%. Sand and clay are the main soil components on the route and a part of the pipeline is assembled below groundwater level. HOBAS Poland delivered CC-GRP Jacking Pipes in 1 m, 1.5 m and 3 m lengths for the different radii and straight sections. Since the absolutely leak-tight flush HOBAS Couplings incorporate a certain angular deflection, smaller curve radii are achieved by utilizing shorter pipe sections. Although not absolutely necessary, HOBAS Experts recommended the use of wooden rings between the pipes in curved sections in order to guarantee a perfect fit. An intermediate station that was run in the curve was a novelty that required a special design for the consequent station as for the steel pipe of the intermediate station itself.

Challenges such as a clearance of only 0.6 m between the pipeline and subway were easily overcome. Precise planning and the relatively small outer diameter of HOBAS Pipes were imperative for this remote controlled jacking project. A single jacking drive over 500 m was the technical highlight of the project. No wonder: The close and well functioning cooperation between HOBAS Organizations is indispensable in every regard and allows drawing from a large pool of technical expertise for top quality customer solutions.

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## HOBAS® in Transylvania - It's Not a Myth!

Year of Construction  
**2006 - 2007**

Duration of Construction  
**15 months**

Length of Pipe  
**716 m**

Pressure Class  
**PN 1**

Stiffness Class  
**SN 5000**

Diameter  
**DN 400 - 1000**

Installation Method  
**open trench, relining**

Application  
**SewerLine®**

Client  
**Aquaserv Tg. Mures**

Constructor  
**INSPET Ploiesti**

Advantages  
**light weight,  
easy & fast installation,  
high quality and  
long lifetime**

Sighisoara, located at the Tarnava River in Romania, has been dubbed "the Pearl of Transylvania" for its picturesque landscape and medieval citadel. The citadel is considered the most beautiful and well-preserved in Central and South-Eastern Europe and is listed as UNESCO World Heritage. However, set on a hill, its precious walls and towers were highly endangered due to instable soil.

It seemed that under these conditions, the town's original, relatively heavy reinforced concrete sewer was no longer suitable. Soil instabilities under slopes and narrow streets lined with historical 12<sup>th</sup> century buildings such as the turret clock and Vlad Dracula's birth place, to mention only a few, asked for a highly durable lightweight product, that is easily aligned and joined for a fast installation. On the initiative of Aquaserv Tg.Mures and the town hall, Sighisoara obtained EU funds through the SAMTID (Small and Medium Town Infrastructure Development) program



that supports the rehabilitation and modernization of the water supply and wastewater systems.

A new pipeline route close to the former sewer now accommodates a broad range of HOBAS CC-GRP SewerLine® Pipes from DN 400 to 1000, PN 1, SN 5000 which were installed by open trench. The pipes were delivered by HOBAS® Pipe Systems Romania within a very short period of time so that construction works could be taken up promptly. The contractor was amazed by the ease with which HOBAS® Pipes are jointed and realized that pipe installation proceeded faster than the trench could be prepared.

The second part of the sewer was relined. Open trench was not an option in this case because of the old delicate buildings and for the longer construction time which would have been more disruptive for inhabitants and tourists. The designer along with the local authorities and contractor were unwilling to take any risks and chose relining.

The project was highly acknowledged by designers and local authorities. They were impressed by the small work site and the fast installation. Moreover, conducting different installation technologies confirmed the adaptability and flexibility of HOBAS Products.

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## Clean Water for the Baltic Sea

Kaliningrad with its half a million inhabitants is a Russian exclave situated at the Baltic Sea between Poland and Lithuania. Given this relatively large number of inhabitants it is understandable that the lack of a water treatment plant is a great concern to the public as well as to surrounding countries. Daily over 250,000 m<sup>3</sup> of wastewater flow into the Baltic Sea polluting seawater and the Polish and Lithuanian coasts. Construction works for a wastewater treatment plant had been planned in the 70's. However, investments were ceased after the collapse of the Soviet Union and the project was brought to a halt.

20 years later, the Swedish government offered support for the city to continue the construction that would cost estimated 54.5 million euros. Yet it is only now that the actual construction could be initiated due to technical requirements and Russian laws.

The for the greater part concrete line that was established in the past has corroded with time although it has never been used. A first step toward the new treatment plant was therefore its rehabilitation.

Light weight and leak-tightness of the complete system were, amongst others, decisive criteria for OOO Meba, the prime contractor, to award HOBAS Pipe Poland the contract of 2 km HOBAS SewerLine® Systems in September 2007. With a roughness factor  $k \leq 0.01$  mm, the almost mirror like lining of the pipes allowed a decrease in nominal diameter retaining the same hydraulic properties. A further advantage that spoke for HOBAS were several reference projects successfully conducted with Baltic contractors in Lithuania, Latvia and Estonia and last but not least the technical assistance of HOBAS Engineers.

Deliveries from HOBAS Pipe Poland already started in September 2007 and were completed in January 2008. For the larger part, the HOBAS CC-GRP SewerLine® Pipes are dimensioned DN 2000, PN 1, SN 5000; the rest being DN 1200, PN 1, SN 5000 - all in all an order worth over 1,245 TEUR.



Year of Construction

**2007 - 2008**

Duration of Construction

**7 months**

Length of Pipe

**2,180 m**

Pressure Class

**PN 1**

Stiffness Class

**SN 5000**

Diameter

**DN 1200, 2000**

Installation Method

**open trench, relining**

Application

**SewerLine®**

Client

**OOO Meba**

Constructor

**Robert Struzynski**

Advantages

**easy installation, light weight,  
thin walls, tightness of the  
whole system**

The original collector leading to the planned treatment plant runs through the suburbs of the city and consists of a 1 km circular DN 2500 and a 1 km rectangular 2500 x 2500 mm line.

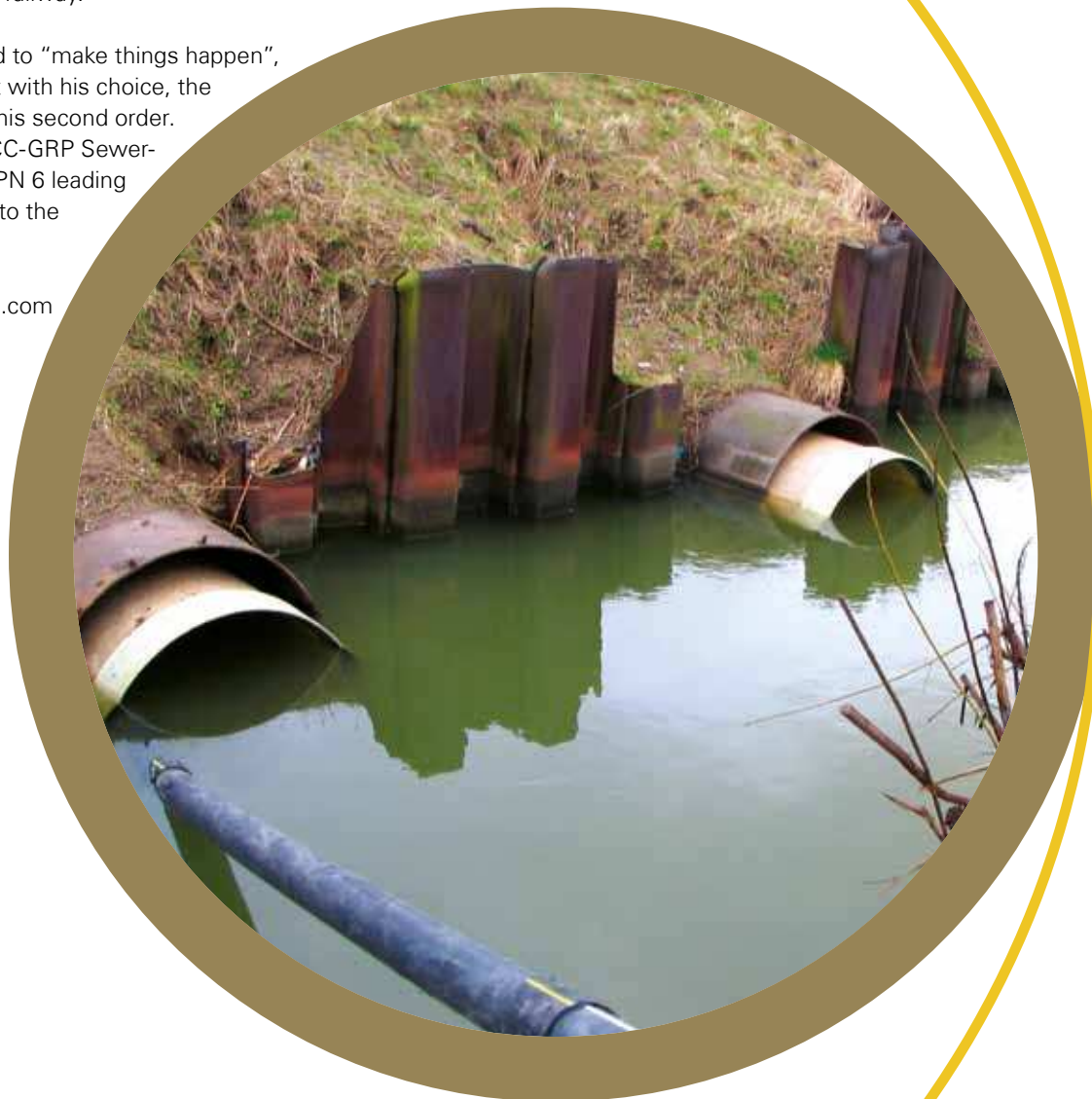
To install the new HOBAS SewerLine® the rectangular channel was uncovered, whereas open cut and relining was chosen for the circular line. High groundwater levels (above the pipe top) along the river Sapies and soil consisting of sand and clay created some concern. Due to these difficult site conditions HOBAS Site Engineers were on the spot ensuring a flawless installation. To the constructor's advantage, only simple site equipment and little manpower were necessary despite the mentioned difficulties. The pipes were lowered into the trench from which the water had been removed and were then placed and assembled in the right descending grade. After filling the trench with sand and gravel the bedding was compacted and finally covered with concrete plates to prevent the pipes from buoying up.

To rehabilitate the circular concrete line HOBAS CC-GRP Pipes were simply slipped inside on special steel rails provided by the constructor. The annular space between host and HOBAS Pipe was subsequently grouted.

The last pipes delivered by HOBAS were finally installed toward the end of March 2008: Smaller diameter DN 1200 pipes were utilized to rehabilitate 3 paralleling culverts into which the sewer main divided to fit under a railway.

HOBAS once again proved to "make things happen", as its motto says. Content with his choice, the contractor already placed his second order. This time it is for 3.9 km CC-GRP Sewer-Line® Systems DN 1000, PN 6 leading from the pumping station to the treatment plant.

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## The Door to Inner Switzerland

Year of Construction

**2007-2008**

Duration of Construction

**1 year**

Length of Pipe

**10,448 m**

Pressure Class

**PN 1**

Stiffness Class

**SN 2500 - 10000**

Diameter

**DN 200 - 400**

Installation Method

**On supports**

Application

**TunnelLine®**

Client

**Baudirektion Kanton Zürich**

Contractor

**Marti Tunnelbau AG, Bern**

**Ed. Züblin AG, Stuttgart**

**Marti AG Bauunternehmung, Zürich**

Advantages

**fire-retardance, chemical resistance,**

**custom-made fittings, fast service,**

**technical support,**

**smooth inner surface**

Highway N 4.1.6 is a very busy road through the Swiss region Knonaueramt. The Islisberg tunnel, the so-called "door to inner Switzerland", is the most complex part of this highway, and functions as important connection of the region. Its construction started in February 2002 and the opening of the road is planned for 2010.

The 4.95 km long tunnel consists of 2 sections each of which hold a 7.75 m wide road and 1 m banquetts on each side. An accessible service channel dimensioned 3.20 x 2.05 m runs below the road. For safe tunnel drainage and along with other tunnel equipment, it holds a 10.4 km HOBAS CC-GRP TunnelLine® System of DN 200 to DN 400, SN 2500 to 10000.

The pipe delivery for the relatively narrow service channel was well planned by HOBAS. The comparably light CC-GRP Pipes were packaged to perfectly fit through the channel where they could easily be unloaded by 2 men. To provide an optimal drainage, the pipes were brought into a constant gradient and assembled with the help of a small crane. In addition to the standard HOBAS Couplings that are readily mounted on one end of each pipe, mechanical couplings were installed at two points of the line. They were necessary since the pipeline was built beginning from both sides of the tunnel. Furthermore they can be easily opened for pipe inspection.

Drainage systems for tunnels need to be designed according to strict requirements. For instance, the high mineral contents diluted in the ground water often lead to incrustations on the pipe surface resulting in a loss of hydraulic properties. HOBAS CC-GRP TunnelLine® Systems are specially equipped with a smooth liner giving mineral deposits hardly a chance. For maintenance, they can be easily cleaned with a simple low pressure water jet. Short pipe sections DN 200 running in opposite direction to the line were installed for this purpose. Special, leak-tight cleaning and inspection openings designed by HOBAS Engineers are used to ease future pipe inspections via camera insertion. They can be effortlessly opened and closed with no extra tools.





Another important pipe property is flame retardance. Thanks to the HOBAS Centrifugal Casting Process pipes can be produced to significantly reduce the fire hazard in tunnels. The high content of hardly combustible materials (e.g. glass fibers, mineral reinforcing material) adds to this property. Sewer gas which can lead to explosions in cases of flying sparks are prevented from leaking into the tunnel with 90° bends. These were installed where the drainage pipe from the road enters the pipeline in the service channel.

The decision for HOBAS Products was made during the planning stage of the project. The technical support by HOBAS (e.g. draft of the drainage, hydraulic sizing, pipe statics, design of a safety concept, ...) and prompt adaptations of fittings easily convinced the contractor. As a system supplier, HOBAS offers a broad range of products and HOBAS CC-GRP TunnelLine® Systems fulfill the strict safety requirements. This was very important in this project as dangerous goods and chemicals will be transported through the tunnel.

The client is highly satisfied with the cooperation and support HOBAS offered and looks back to a successfully accomplished project.

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## Berlin Takes Off with HOBAS®

The Airport Berlin-Schönefeld is currently being reconstructed and extended to become the new international airport BBI (Berlin-Brandenburg International). From 2011 on, the complete air traffic will be concentrated in the south-east of the city allowing the inner city Airports Tegel and Tempelhof to be closed down step-by-step. With the establishment of new giant air fields, a solution for an extensive pressured drainage system had to be found as well. HOBAS CC-GRP Pipe Systems ranging from DN 600 to 1600 were chosen for this purpose.

The Airport Schönefeld has boomed over the past years and welcomed not less than 6.3 million passengers in 2007, almost a quadruple compared to five years ago. Low budget flights leading to attractive destinations all over Europe make Schönefeld interesting for tourists as well as business people. Around 20 million passengers are expected for 2011. A capacity extension to 40 million people per year is possible. The costs for implementing this mega project will sum up to around 2 billion Euros. 445 million will be spent alone on airside buildings and clearways. Investments in road and train connections, as well as multi-story parking lots, hotels and conference centers add to the given sum.

As with every airport project, it is a special challenge to assure unobstructed airport traffic during the entire construction period. The air-



port area will span a total of approx. 1470 ha – this corresponds to 2000 soccer fields. The optimal discharge of rainwater is therefore a top priority. Apart from the airstrips further extensions for additional open space and parking lots are planned which also require professional drainage.

This high-performing airport sets just as high demands on its future pipe systems: High loads incomparable with those of road traffic and aggressive substances such as kerosene and anti-freeze, which are employed especially during the cold season, had to be considered choosing the right pipe material. After extensively comparing the options, the client decided for HOBAS CC-GRP SewerLine® Systems.

Particularly their hydraulic performance, their ability to bear high static loads and their corrosion resistance were substantial criteria. Reaction forces resulting from internal pressure work on the bends and are overcome with locked sections and ground anchors.

Year of Construction  
**2008**

Duration of Construction  
**5 months**

Length of Pipe  
**8,000 m**

Pressure Class  
**PN 6 -10**

Stiffness Class  
**SN 10000**

Diameter  
**DN 600 - 1600**

Installation Method  
**underground laying**

Application  
**SewerLine®**

Client  
**Flughafengesellschaft BBI**

Constructor  
**Arge Umwelttechnik und Wasserbau, Ermsleben and TRP-Stahnsdorf**

Advantages  
**hydraulic and static characteristics,  
tailor-made solutions,  
technical support**

The first pipes, produced by HOBAS Pipe Germany, have already been installed in April 2008. The contractor consortium is highly satisfied with the technical support of HOBAS which includes the elaboration of line and installation plans as well as installation support and pressure tests on site by HOBAS technicians. To keep construction times as short as possible logistics are carried out in close cooperation with all parties. A total of 8 km HOBAS SewerLine® DN 600 1600 with pressure classes PN 6 to PN 10 are expected to be installed by September 2008. Due to the easy handling of HOBAS CC-GRP Pipes and an installation rate of 120 m per day, pipe laying could be finalized even before the estimated completion.

HOBAS has experience on the airfield: Successfully implemented projects such as the drainage system of airport Munich and the rehabilitation of the sewer system at Schiphol Airport in Amsterdam prove the static advantages and durability of HOBAS products. Furthermore, the reputation of HOBAS secured HOBAS Benelux in the Netherlands the position as preferred supplier of pipe systems for Schiphol Airport. Airport Berlin-Schönefeld yet again sets example for the reliability and competence of HOBAS as professional partner for airport projects.

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# HOBAS® Twin-Line Soothes Bratislava's Growing Pains

In 2004 the city Bratislava, Slovakia, started to redevelop the area near the railway station in the district Nove Mesto. Two administrative buildings were established and the planning of two further significant constructions have been made in the last years. These developments as well as the growing urban population required a reevaluation of the existing sewer capacity.

The Water Company of Bratislava, who was in charge of finding the optimal solution to the results of reevaluation, decided to reconstruct and to extend the existing waste water system. They proposed to have the old DN 2600/1650 concrete pipeline cleaned and recommended its rehabilitation with HOBAS® CC-GRP SewerLine® Systems DN 1400. HOBAS products were chosen due to their hydraulic performance, the proven leak tightness of the system and the relatively low weight of even large profiles.

In order to extend the network's capacity, the Water Company of Bratislava decided to build a second line running along the same route and functioning as twin system. Calculations by the project team showed that HOBAS® CC-GRP Pipes DN 2000 would ideally fulfill future demands.

Due to the limited space on site the installation was realized trenchless and in tunnels of 1.3 km length. Steel frames were used in these tunnels and as a first step steel host pipes DN 2300 were installed into which HOBAS® CC-GRP Pipes DN 2000 were consequently inserted. The tunnels were prepared with non-mechanized and semi-mechanized drill heads as well as by classic mining. The length of the drilling sections were between 100 and 145 m. As next step, the gap between the host pipe and CC-GRP Pipe was grouted with suitable materials.

The project was completed with 36 HOBAS® CC-GRP Shafts to provide a sewer system that is leak-tight at every point.

Thanks to the ease of installation and uncomplicated handling of HOBAS Products, the experienced construction company Skanska BS, a.s. Prievidza was able to complete the project within 11 months. 2.5 km of HOBAS CC-GRP SewerLine® Systems including shafts and fittings worth 1.4 million Euros were successfully installed to the complete satisfaction of all parties.

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Year of Construction

**2006 - 2007**

Duration of Construction

**11 months**

Length of Pipe

**2,553 m**

Pressure Class

**PN 1**

Stiffness Class

**SN 2500**

Diameter

**DN 1400, DN 2000**

Installation Method

**Relining**

Application

**SewerLine®, ShaftLine®**

Client

**BVS, a.s. Bratislava**

Constructor

**Skanska BS, a.s. Prievidza**

Advantages

**hydraulic characteristics,  
provable tightness of the whole system,  
low weight of even large profiles**

## HOBAS® Through the Best Snow in the World

Everyone in the US is familiar with the popular ski destination Utah. Over 20 million people visit the resorts to enjoy “the best snow in the world” during ski season. But not only tourism is on the rise; Utah has been experiencing significant growth recently and this trend is expected to continue well into the future. As a result, local municipalities are taking a closer look at their current infrastructure.

The South Valley Sewer District (SVSD), which encompasses the southern third of Salt Lake County, is investing roughly 1.9 million Euros in its infrastructure. District municipalities reportedly have more than 4,400 building lots that are not yet connected to the existing system. To solve the problem, relief lines and new facilities including a wastewater treatment plant are being designed and constructed. Since March 2002, SVSD officials have been seeking approval for a treatment plant located in Riverton that will enable them to keep pace with the growth in southwest Salt Lake County.

To transport the sewage to the new facility, additional piping networks are necessary. One



Year of Construction

**2008**

Duration of Construction

**1 year**

Length of Pipe

**1,219 m**

Pressure Class

**PN 1**

Stiffness Class

**SN 5000**

Diameter

**DN 1200, DN 2000**

Installation Method

**open cut, tunneling**

Application

**SewerLine®, ShaftLine®**

Client

**South Valley Sewer District**

Contractor

**Allied Construction and**

**Development,**

**Inc. of Logan**

Advantages

**flexible installation methods, corrosion resistant,  
professional project handling by HOBAS**

of the most recent projects was the Jordan River Outfall Sewer. The primary purpose for this new line was to mitigate the capacity problems with the current DN 1200 line that has been in operation since the early 1980's. The project included approximately 1.2 km of HOBAS CC-GRP Pipe DN 1200 and 16 DN 2000 manholes.

The installation was mostly direct bury with several tunneling installations of HOBAS Pipes through steel casings. On both occasions the pipe installed well and had no problems with visible deflection and joint leakage,” said Bart LaMont, project manager, Allied Construction and Development.

The direct bury portion of the project ranged from 60 cm to 8 m in depth and was installed primarily in sandy material. The embedment specified and utilized was 2.5 cm minus stone with filter fabric to prevent migration of native

soil into the embedment zone. The design engineer at Bowen, Collins & Associates was pleased to receive help from the HOBAS engineering staff to specify the appropriate pipe stiffness rating based on depth and soil conditions. They were also provided with the appropriate pipe zone backfill specification requirements for HOBAS Pipe. During plant tours well before HOBAS Pipe USA was chosen for the project, the HOBAS facility engineers gave detailed explanations on flexible conduit theory, manufacturing capabilities and quality control as well as any concerns or questions related to specific installation.

The Jordan River project required additional planning because of the extensive groundwater that was present. Apart from this, it lies in an area that experienced some H<sub>2</sub>S derogation of the existing concrete pipe and thus chose HOBAS for its H<sub>2</sub>S resistance and water tightness.

The pipe used in this project had an SN of 5000, which is standard for direct bury and tunneling applications. This stiffness allows for routine burying methods with predictable performance that can handle deep covers. HOBAS FWC Couplings were utilized for the Jordan River project installation. The couplings are factory assembled to one end of each pipe for ease of use in the field. The sealing design includes both lip and compression elements so the joint is suitable for both non-pressure and pressure service.

"Allied Construction's experience with the installation of HOBAS Pipe, on both occasions, was very positive from the pre-sales point through the shipping, installation and technical support areas. In our view, HOBAS Pipe has some very positive advantages over many of the other pipes of similar types," said LaMont.

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# HOBAS® Tanks in the Northern Limestone Alps



The inhabitants of Pürgg in Austria are very pleased with their high quality potable water. The picturesque village is set on a small plateau in the south falls of mountainous Rantenstein and runs right up to the ridge of the Totes Gebirge ("Dead Mountains") of the northern Limestone Alps. Pürgg is therefore attractive to both tourists and alpinists.

To ensure the potable water supply for the approximately 1000 villagers an overhead tank holding 120 m<sup>3</sup> of water was established. Difficult access to the site, ISO certification as well as numerous strict quality and hygiene requirements set by the Austrian legislation had to be considered when the water association of Pürgg went about finding the right product. A further important point was trafficability with agricultural vehicles up to a total weight of 30 tons.

HOBAS CC-GRP Potable Water Tanks easily fulfilled all set requirements. Due to the material's low weight they are applicable also in topographicaly challenging terrain. Short production times and a quick installation made the client's decision for HOBAS Products even easier.

The potable water tank consists of 2 parallel water chambers DN 2400 and a prior service and valve chamber of the same size. The water chambers which are connected to the valve chamber are accessible through DN 800 manholes. A stainless steel door allows entering the valve chamber from the front end.

Three trucks delivered the tank elements that were prefabricated at HOBAS Pipe Austria. Six hours later they were assembled and installed in the prepared pit. The absolutely leak-tight tank went into operation after one week and is ever since smoothly providing potable water for the inhabitants.

Thanks to the worldwide unique machining of the pipe segments with the waterjet cutter at the HOBAS Factory in Wietersdorf, Austria, it was possible to produce this custom made tank within three weeks only. Computer assisted steering enabled fast and precise cutting and drilling. Laminating the individual components reduced the production time as well.

Ready to welcome tourists to their quaint little village, the municipality Pürgg is more than happy with the high quality products and professional project management by HOBAS.

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Year of Construction

**2007**

Duration of Construction

**6 hours**

Pressure Class

**PN 1**

Stiffness Class

**SN 5000**

Diameter

**DN 2400**

Installation Method

**open cut**

Application

**ShaftLine®**

Client

**Water Association Pürgg**

Contractor

**equadrat, Weng at Admont**

Advantages

**short installation time,**

**leak-tight system,**

**excellent structural properties**



## HOBAS® WaterLine® through Town, Country, River (CZ)

A part of the Bilina potable water project in the Czech Republic has already been successfully implemented in 1998. About 1 km of HOBAS® CC-GRP WaterLine® DN 500, SN 10000, PN 16 were installed that time. One of the reasons for the client to choose CC-GRP over steel and cast iron was that it is non-conductive and therefore corrosion resistant regarding the magnetic field created by the railway track nearby. Satisfied with the performance of the HOBAS Pipeline, the client again opted for HOBAS CC-GRP Pipe for the Zelenice-Bilina extension project launched in 2004.

The extension project was co-financed by the EU program ISPA and involved the reconstruction of a part of the existing DN 600 potable water main running along the same railway track and from the highway to the river Bilina. All in all 5.7 km of HOBAS CC-GRP WaterLine® Systems DN 500, PN 16, SN 10000 were utilized for the project that was completed in 2006.

Between Libesice u Zelenic and the Ledvice power plant, the line passes beneath roads, along the river Bilina, beneath a camping site, a public pool, a sports ground, gardens and green space until it finally reaches the wall of the trained river. From here on the original steel pipe on suspensions was preserved and the protective pipe around it was exchanged for HOBAS Pipes. The line continues through green space, roads and the train station and ends in a shaft. The section between the station and another shaft, which also connects to the Chlum water reservoir, was already reconstructed in 1999 and reconstruction works could be taken up from that point ending at Ledvice power plant.

The client SVS a.s. Teplice and the supplier HOBAS Pipe Czech Republic were very pleased with the completion of the reconstruction project with CC-GRP WaterLine® Systems and look forward to a long and failure-free service life.

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Year of Construction

**2004-2006**

Length of Pipe

**5.7 km**

Pressure Class

**PN 16**

Stiffness Class

**SN 10000**

Diameter

**DN 500**

Installation Method

**open cut**

Application

**WaterLine®**

Client

**SVS a.s. Teplice**

Constructor

**SMP CZ a.s. Praha**

Advantages

**corrosion resistant, system solution**

## 3 Methods, 1 HOBAS® Pipe System (FR)

The Toulon authorities association for wastewater treatment and sea outlet (SIRTTEMEU) has one of its largest sewer construction sites with HOBAS Pipe Systems on the Mediterranean coast in France. Reason for this is a corroded cast concrete line that takes all wastewater from western Toulon to the new Cap Sicié wastewater treatment plant, best known as the Amphitria. The damages on the line were mainly caused by H<sub>2</sub>S attacks and the pipe has collapsed several times in the past. The association therefore decided to award the Cabinet Merlin Engineering Consultancy in partnership with Enveo with the design and supervision of the reconstruction works that are expected to be completed in 2009.

All construction works were allocated to a SOGEA/SADE consortium. The site is divided into 3 sections of which the 3<sup>rd</sup> and biggest section is approx. 2 km long costing around 16 million

Year of Construction

**2004 - 2009**

Length of Pipe

**about 2.4 km, plus fittings and shafts**

Pressure Class

**PN 1**

### Open Trench

Length of Pipe

**1,470 m**

Stiffness Class

**SN 5000, 10000**

Diameter

**DN 1000, 1200, 1400, 1600**

### Microtunneling

Length of Pipe

**180 m**

Stiffness Class

**SN 40000, 50000**

Diameter

**OD 1280, 1434, 1499**

### NC-Line

Pipe Length

**750 m**

Diameter

**2200/900**

Installation Method

**open trench, microtunneling, relining**

Application

**SewerLine®, NC Line®**

Client

**SIRTTEMEU**

Contractor

**SADE Sud Est / STS, SOGEA Travaux**

**Hydrauliques Sud Est, SMCE**

Advantages

**hydraulic properties,  
leak tight complete system,  
corrosion resistance (H<sub>2</sub>S),  
long service life**



Euros. Assisted by his consulting engineers and the water operator Veolia Eau, the client based his decision on the solutions proposed by the consortium which would ensure an uninterrupted service of the sewer, optimal completion dates, innovative technical solutions and efficient HOBAS GRP piping material in response to a range of required installation techniques.

Trench sheathings were utilized for open trench installation since the line had to be assembled in major narrow depths, restricted by the existing collector and close structures. Another part of the line was microtunneled and a third part was solved with a HOBAS NC Line® System installed in a gallery. The construction works were assigned to different parties of the consortium according to the required installation technique. The Melun special division of SADE is installing the NC Line® whereas SOGEA Travaux Hydrauliques and SADE Marseille teams mainly deal with the open trench section. The line microtunneled below railway tracks was given to the specialized subcontractor SMCE. Thanks to the flexibility and easy handling of HOBAS CC-GRP and NC Line® Systems all required installation techniques could be conducted with one material only. The products' optimal chemical resistance, their high mechanical and hydraulic properties and quasi self-cleaning effect convinced the consortium in all points.

HOBAS France provided a series of special components, manholes, non-circular pipes, connections and special fittings to suit the challenges of the project. A safe discharge of up to 2000 m<sup>3</sup>/h during the frequent storms at the Mediterranean coast, the uninterrupted service of the line and a temporary bypass of DN 600 running through the gallery were to



be ensured. Customized fittings with leak-tight yet flexibly applicable sealing stoppers developed by the HOBAS France Technical Department solve the problem of transition from the old to the new pipeline with almost no service interruptions.

Apart from providing an ideal and environmentally sound system solution for the implementation of this rather demanding project, HOBAS also helped in keeping inconveniences caused by construction works in residential areas to a minimum: The combination of different installation methods and made-to-measure HOBAS Pipe Systems allowed a fast and safe installation without heavy site equipment. One can already say that this project is a complete success for everyone involved, directly as well as indirectly.

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## Groningen (NL) Sets on **HOBAS®** CC-GRP Pressure Jacking Pipes

Environmental aspects and future-oriented thinking lead the municipality of Groningen in the Netherlands to extending their existing sewer main sized DN 1000 and DN 1200. The gravity sewer main could not cope with high flow rates occurring during e.g. heavy rainfall. To prevent sewage from overflowing and polluting nature the authorities decided to convert it into a closed pressure system. With this and its extension by 2.4 km HOBAS CC-GRP Sewer Systems a capacity of 3000 m<sup>3</sup>/h will be achieved so that the line would easily cope with future needs as well as the connection of a further village.

Preparations for the project were made in 2004. Since the line crosses a busy part of the town Groningen HOBAS proposed the utilization of CC-GRP Pressure Pipe Systems which can be installed by open as well as trenchless construction. Being the only supplier of GRP pressure pipes which can also be jacked the local engineers decided for HOBAS CC-GRP placing an order worth 1,222,000 Euros for the complete line. This included 5 jacking sections with HOBAS CC-GRP Jacking Pipes DN 1000 to 1500 and Pressure Pipes DN 1000 and 1600 m DN 1200 as well as flanges, elbows, reducers and tees with stainless steel locked joints. Five different contractors were assigned to complete the job and a sixth will rehabilitate the pumping station in two years.

Several obstacles along the pipe route, such as roads and a channel, were overcome by microtunneling. Due to the requirements by the road authorities two jacking sections running beneath the

Year of Construction

**2006-2007**

Length of Pipe

**2.4 km**

Pressure Class

**PN 1 and 6**

Stiffness Class

**SN 5000, 320000**

Diameter

**DN 1000 - 1500**

Installation Method

**open cut, jacking**

Application

**SewerLine®**

Client

**Municipality Groningen**

Contractor

**5 different constructors**

Advantages

**unique GRP pressure jacking, corrosion resistance, light weight, complete pressure system by one manufacturer, long lifetime, low maintenance costs**



highway were realized with covering pipes which were also delivered by HOBAS Benelux, the HOBAS CC-GRP Pressure Pipes were consequently inserted. The largest with an outer diameter of 1500 mm was utilized beneath highway A7.

The three other microtunneling sections were implemented with in this field unique CC-GRP pressure jacking pipes PN 6 and flush FWC couplings. These run beneath a gas pipeline, a main road, several streets and a navigable channel where the installation was conducted in 12 m depth.

A 275 m long section with CC-GRP pressure jacking pipes of 1280 mm outer diameter was jacked in a curve radius of 1300 m. The contractor decided to install an intermediate station which according to safety standards is required for jacking with over 4000 kN. Due to the smooth and non-absorbing outer surface of HOBAS Pipes their light weight and constant outer diameter, the maximal jacking force did not exceed 1800 kN. The intermediate station was therefore never in operation.

Thanks to innovative HOBAS CC-GRP Pipe Systems and the constant support of HOBAS Experts, all involved parties look back to a smooth and unobstructed implementation, Groningen is prepared for future needs and Mother Nature can breathe a sigh of relief.

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## Green Energy for Bella Italy - Not Without **HOBAS®**



The trenchless installation of approximately 60 m HOBAS CC-GRP Pressure Jacking Pipes under highway A4 through Lonato (Brescia, Italy) was recently completed within one week only. Most importantly, this was conducted with no traffic disruptions.

The described section is actually part of a 650 m long HOBAS CC-GRP penstock DN 1600 and DN 1500 running to a hydro power station that is built for Idroelettrica m.c.l., an energy company belonging to the Consorzio di Bonifica Medio Chiese.

Studio Frosio in Brescia, a renowned engineering office specialized in hydro power stations was responsible for the construction which was planned with the following key data:

Net head (to generator)	8.76 m
Average flow rate	3.12 m <sup>3</sup> /sec
Maximal flow rate	4.30 m <sup>3</sup> /sec
Output	300 kW

The engineers who already knew the advantages of HOBAS CC-GRP due to projects in the past, based their decision on three major requirements: to minimize friction loss (the nominal head was only 10.3 m), to underpass the highway A4 by jacking withstanding also the constant traffic loads and to have a material that is resistant to corrosive substances.

HOBAS CC-GRP Pipe Systems with their mirror-like inner pipe surface grant a K-factor below 0.01 which ensures an optimal flow rate. High stiffnesses and compression can be achieved with the production process, namely centrifugal casting. This makes HOBAS CC-GRP gravity as well as pressure pipes suitable for trenchless applications such as jacking and microtunneling. No extra protection that is easily damaged or worn during installation is necessary since HOBAS CC-GRP Pipe Systems are highly corrosion resistant.

The penstock consists of a first short section DN 1600 laid in open trench, further 60 m with the same outer diameter run below the highway. A reducer on the other end of the jacking section switches to a 250 m long DN 1500 pipe that finally leads to the power house. Two tees were installed along this section for future access.

Apart from one bend that was necessary in the first part where the route takes a sharp curve, the pipeline was installed without bends. Changes in direction were achieved by taking advantage of the ability of HOBAS FWC couplings to allow an angular deflection.

Year of Construction

**2007**

Length of Pipe

**650 m**

Pressure Class

**PN 2**

Stiffness Class

**SN 10000, 64000**

Diameter

**DN 1500, 1600**

Installation Method

**open cut, jacking**

Application

**WaterLine®**

Client

**Idroelettrica m.c.l. Scarl  
(Consorzio di Bonifica  
Medio Chiese**

Contractor

**ATI Faccetti Costruzioni SpA,  
Zeco SpA, Pato s.r.l**

Advantages

**hydraulic characteristics, withstands  
heavy traffic loads, corrosion resistance**

To bear the heavy traffic loads the line generally required a stiffness of 10000 N/m<sup>2</sup>, whereas the jacking section asked for SN 64000 to suit a jacking force of 4.821 kN (applied on less than 40% of the part). PN 2 was chosen for the complete line.

With an optimal exploitation of the given low head HOBAS contributed to environmentally friendly production of energy. The advantage of such "green sources" is remarkable. Based on EU research, a comparison of energy input and emissions of a hydro and a thermal power plant run with oil and at an annual production of 2,000,000 kWh shows:

Emissions	Hydropower Plant	Thermal Power Plant
SO <sub>2</sub>	0	20.8 t p.a.
CO <sub>2</sub>	0	1,530 t p.a.
NOx	0	4.9 t p.a.
Partikel	0	2.1 t p.a.
Methan	0	2.7 t p.a.

In this case 383 tonnes crude oil can be saved per year when power is generated with water.

The figures prove the importance of small hydro power stations and an increase in numbers of hydro plants can be observed over the past years. A list of reference projects shows that HOBAS CC-GRP Pipe Systems have characteristics most suitable for this environmentally friendly application.

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## HOBAS® for a Blue Danube

In Hungary's capital Budapest 600,000 m<sup>3</sup> of water run into the Danube daily, 51% of which are completely untreated. This does not only endanger the area's wildlife but also conflicts with the objectives of the Sofia Convention in 1993 to protect and sustainably use the Danube.

Already in 1974, a program with the working title „Sewage Treatment and Disposal for the capital Budapest“ was set up envisaging the establishment of 4 waste water treatment plants in Budapest. The first is the Budapest Central Sewage Treatment Plant (BKSZTT) that was planned to be built on the Danube's island Csepel.

The project is financed by the EU from the design to construction and a first feasibility study was made by a consortium lead by the Swedish engineering company SWECO in 2002. Latest technologies will increase the efficiency of biological treatment by three times and enable 92 % of waste water to be treated biologically. With a planned maximal capacity of 900,000 m<sup>3</sup> per day, it is the largest sewage treatment plant in Hungary and the 2<sup>nd</sup> largest in Europe. It will easily cope with the current 350,000 m<sup>3</sup> sewage coming from the area's main. This covers approximately half of Budapest's storm and waste water originating from households and industry.



Year of Construction  
**2008**

Length of Pipe  
**2 km**

Pressure Class  
**PN 1, PN 6**

Stiffness Class  
**SN 5000**

Diameter  
**DN 1200, 1400, 1800**

Installation Method  
**above ground on suspensions, open cut**

Application  
**SewerLine®**

Client  
**Central Waste Water Treatment**

Constructor  
**Plant Csepel  
Csepel 2005 FH Consortium (OTV France, Hídépítő  
Zrt, Alterra Kft., lead by Degremont S.A.)**

Advantages  
**light weight, corrosion resistance, chemical resistance, resistance against aggressive substances, simple installation and handling**

Located on a floor space of 29 ha in the north of Csepel, the sewage treatment plant lies between km 1641 and 1642 of the Danube. A bypass with short pipes and a loose collar joint was installed in the plant building for an inductive flow meter. HOBAS CC-GRP Pipes were selected for this thanks to their relatively light weight, distinguished chemical resistance, and excellent hydraulic characteristics. The line consisting of three standard length (6 m), one 4.5 m and one 1.5 m long HOBAS CC-GRP pipes was fixed on suspensions. A connection pipe with a mechanical coupling was inserted prior to the flow meter.

HOBAS CC-GRP Pipe Systems are absolutely leak tight, long lasting, have excellent hydraulic and long-term static properties. Their handling and installation is remarkably easy due to their light weight, simple push to fit couplings and compatibility with other materials.

These advantages and numerous industrial projects successfully realized with HOBAS in the past, convinced the client to utilize HOBAS CC-GRP pipe systems for further parts of the treatment plant: A twin line DN 1200, SN 5000, PN 6 leads to the plant from the west and another two parallel pipelines DN 1400, SN 5000, PN 6 come from the east adding up to a total length of around 2 km.

Budapest Central Sewage Treatment Plant is the biggest environmental investment in Europe. No efforts and costs were spared concerning architecture and landscaping, so that the plant, which will be commissioned in 2009, harmonously blends in with its surroundings.

An interesting side note: Over 500 artefacts and graves from the Bronze, Iron and Árpád Age have been discovered during construction works. These findings show that the island Csepel was already inhabited 5000 years ago. HOBAS with its reliable products once more contributed in mainting a habitat for man and wildlife.

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## HOBAS® Twins at International Airport Sarajevo

With no less than 500,000 passengers per year, International Airport Sarajevo (IAS) is the most important airport in Bosnia & Herzegovina. Since the airfield was modernized and enlarged, the existing DN 800 concrete drainage system, which had been built in 1965, no longer met the set requirements and needs. The IAS management therefore initiated the reconstruction of the airport drainage system setting highest demands on security. The tendering terms for suitable piping material stipulated tight quality demands in accordance with EU airport standards. HOBAS CC-GRP Pipe Systems meet all of these. They show an optimal hydraulic performance, they are able to bear high static and dynamic loads, are highly corrosion and abrasion resistant, ensure easy handling due to the products' light weight and have a long operational lifetime.

These characteristics and the fact that several Airport drainage projects in the past such as Berlin Schönefeld, Schiphol Airport in Amsterdam, Airport Munich, to name just a few, have been implemented successfully with HOBAS Products convinced the client.

The drainage system was realized in several phases and with a HOBAS CC-GRP SewerLine System DN 1200, PN 1, SN 10000. Two paralleling 594 m long lines were installed and included 16 HOBAS CC-GRP tangential shafts and two DN 1200 bends.

Year of Construction

**2008**

Length of Pipe

**1.2 km**

Pressure Class

**PN 1**

Stiffness Class

**SN 5000**

Diameter

**DN 1200**

Installation Method

**open cut**

Application

**SewerLine®**

Client

**International Airport Sarajevo**

Contractor

**Mibral**

Hobas Sales Reps.

**Fedor Draušnik,**

**Pejo Krištic,**

**Eldin Telacevic**

Advantages

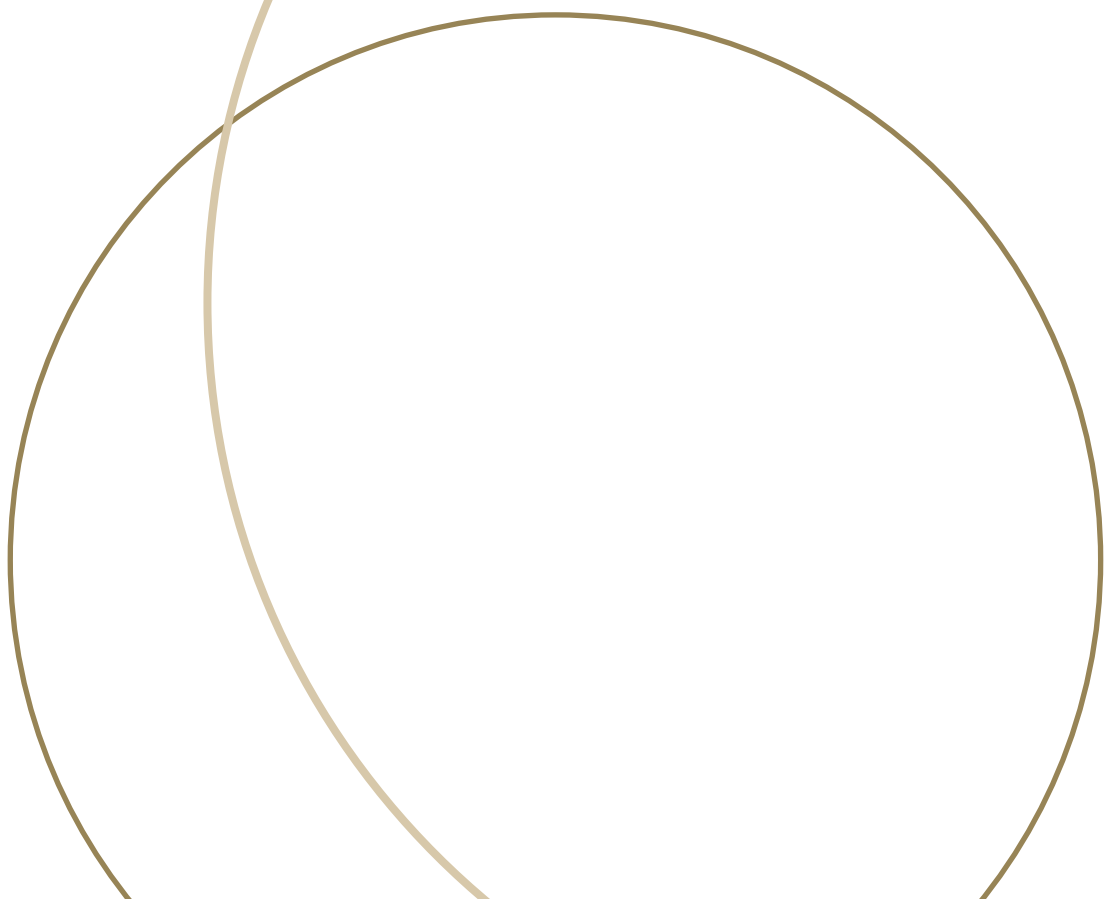
**long lifetime, corrosion & abrasion resistance, hydraulic properties, withstands high static & dynamic loads, light weight**



The first pipes produced by HOBAS Pipe Austria were installed in March 2008. They were easily aligned and connected despite a high level of ground water and the open trench was consequently covered with gravel sized 4 – 16 mm. The line lies in some places only 50 cm below the surface which is possible thanks to the stability of HOBAS CC-GRP Pipes and their ability to withstand high static and dynamic loads.

Due to the easy handling of HOBAS CC-GRP pipes, the installation could be finalized two months before the project's deadline. The technical support provided by HOBAS Bosnia & Herzegovina concerning the design and installation of tangential shafts and pipelines as well as the final inspection impressed the client. And the IAS drainage project once more illustrates the expertise of HOBAS as reliable and professional partner for airport projects.

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# 100 Years Modern Water Supply in Stara Zagora, BG

Year of Construction

**2007 - 2008**

Length of Pipe

**2 km, 18 shafts**

Pressure Class

**PN 1**

Stiffness Class

**SN 10000**

Diameter

**DN 800, DN 2000**

Installation Method

**open trench**

Application

**SewerLine®, ShaftLine®**

Client

**Municipality Stara Zagora**

Constructor

**Stanilov - Tace Consortium**

Advantages

**system supplier,  
simple and fast installation,  
competent project support  
by HOBAS experts**

On October 3<sup>rd</sup> 2008 the town Stara Zagora celebrated 100 years of modern water supply. The first networks, however, were built long before 1908: Stara Zagora with its 120,000 inhabitants is situated in central Bulgaria and is known for its ancient Roman water supply system. During the town's recovery and rise from the ashes of arson and pillage during the Russian-Turkish liberation war in 1877-1878, ancient relics dating back to the 6<sup>th</sup> century B.C. were found and preserved for the public. Amongst these were findings such as clay pipelines and aqueducts which were built during the Roman times and which already then carried water over great distances for the town's supply.

The 100<sup>th</sup> anniversary of modern supply provided an opportunity for both, reflection on what had been achieved so far and taking stock of present major projects. Over the last 4 years large-scale replacement and expansion projects of water supply and sewer systems have been carried out. In fact, all sewage collectors with diameters over DN 700 and all water supply lines with diameters over DN 400 were conducted with GRP. A recent project under the name "Main Collector I" ensures the transportation of waste water to the collector of Stara Zagora's waste water treatment plant. It is the first step of the investment in the rehabilitation of the town's sewer network. For this project, 2 km of HOBAS CC-GRP SewerLine® DN 2000, SN 10000 were delivered by train from HOBAS Czech Republic and further 380 m DN 800, SN 10000 came from HOBAS Pipe Romania.

The main collector consists of two paralleling DN 2000 pipelines, a road drainage, 18 shafts for inspection and an overflow, not to mention auxiliary facilities such as road links, intersections with the railway, etc. The main technical challenge, however, was the limited width of the pipe trench and the small clearance (approx. 60 cm) between the two lines. Already in the design phase had HOBAS experts proposed a technical solution for pipe laying and backfilling, which was gladly accepted and laid down in the design. Thanks to the regular visits by HOBAS site advisors throughout the construction works, a risk of pipe buoyancy in the ferroconcrete casing running under railway lines was recognized and averted with an appropriate technical solution. HOBAS also shared its valuable international expertise when it came to testing the line after its successful installation.

The pipeline was officially inaugurated on October 24<sup>th</sup> 2008 in the presence of Bulgarian ministers, the Mayor of Stara Zagora, the District Governor and lots of guests and friends. The project's contractor Stanilov OOD represented by its Executive Director officially thanked HOBAS Bulgaria for the excellent collaboration and support throughout all stages of the project.

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## Minsk Is Well Treated with HOBAS®



Belarus' capital Minsk has been booming over the past few decades and its number of inhabitants has in fact almost doubled since the 1960s. It is therefore understandable that facilities such as the waste water treatment plant that was established in 1964 could no longer keep up with the rapidly growing demands. The extension of the given maximal capacity of 470,000 m<sup>3</sup> water per day became absolutely essential.

Thus, an additional pipeline discharging up to 100,000 m<sup>3</sup> waste water was designed and realized in 2005 for the industrial area of Minsk. A second line with the same capacity followed one year later. In order to find the suitable pipe material, the project engineers thoroughly compared the different characteristics of possible alternatives and finally decided to utilize HOBAS CC-GRP SewerLine® systems. Parameters such as hydraulic characteristics, life-time and corrosion resistance clearly spoke for the top-quality products.

Apart from the second line, HOBAS GRP products were also installed for the water treatment plant itself to connect various mechanical and biological parts of the facility and to transport the biologically activated sludge. HOBAS System Poland delivered the SewerLine® DN 2000, SN 5000 in 2007 and the contractor Minskvodostroj completed the unobstructed installation of 428 m within 2 months only. Thanks to the easy assembly and light weight of HOBAS products, the installation time and construction costs of the relatively large diameter line could be kept to a minimum.

The client as well as the contractor are pleased with the advantages HOBAS CC-GRP pipe systems provide and are moreover highly satisfied with the successful cooperation in this first move toward a modernized waste water treatment plant in Minsk.

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Year of Construction

**2007**

Length of Pipe

**428 m**

Pressure Class

**PN 1**

Stiffness Class

**SN 5000**

Diameter

**DN 2000**

Installation Method

**Open trench**

Application

**SewerLine®**

Client

**IOOO Katron**

Contractor

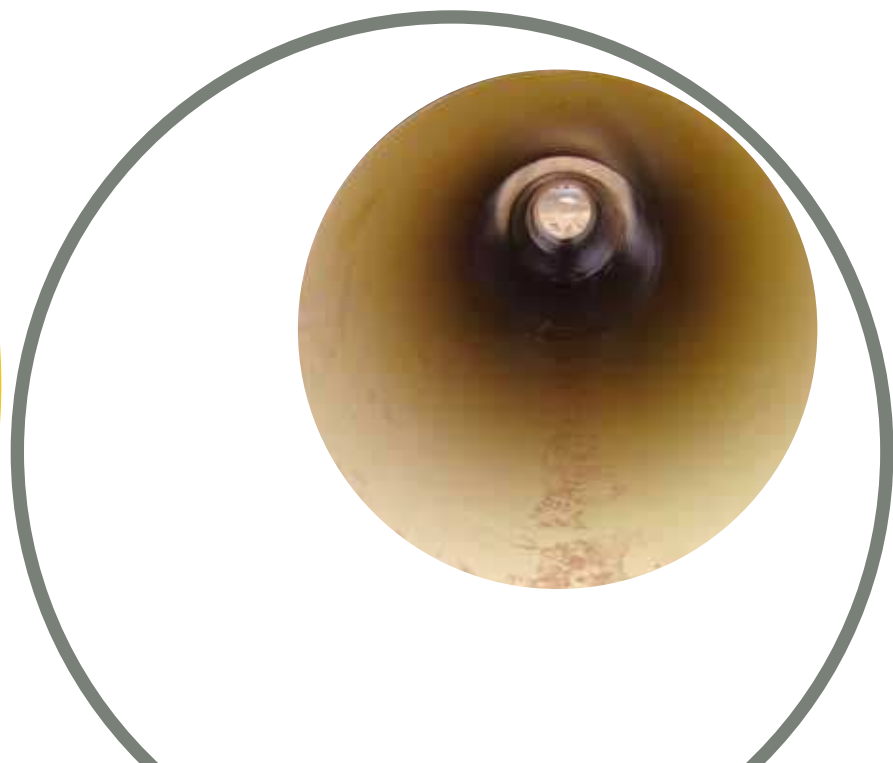
**Minskvodostroj**

Hobas Sales Reps.

**Rimantas Gruodis**

Advantages

**long lifetime, corrosion resistance, abrasion resistance, excellent hydraulic characteristics, simple and fast assembly despite large diameters**



## Green Line for Green Energy



The Maggia valley in Swiss Tessin is a renowned tourist magnet. Situated in the far south of Switzerland at the Italian border, the region enjoys a warm southern climate. The beautiful scenery and culinary delicacies add to the appeal and yearly draw thousands of visitors from home and abroad to the Maggia and the Lake Maggiore.

In line with nature and for over 100 years, the Swiss have been taking benefit of the river Maggia to run power stations. Numerous power houses set up along the river perfectly blend in with the natural environment and produce green energy.

One of them is situated in Ponte Brolla. The station was established in 1903, it was renovated in 1957 as well as in 1970 and ever since landmarked. In the course of a complete renovation in 2008, the proprietor commissioned the Maggia engineering company Azienda Elettrica Ticinese to protect not only the historically landmarked riveted frame bridge from corroding, but also to redo the sand catcher, the intake construction, steel pipes and the powerhouse including the turbine.

Year of Construction

**2008**

Length of Pipe

**108 m**

Pressure Class

**PN 6**

Stiffness Class

**SN 5000**

Diameter

**DN 1600**

Installation Method

**above ground**

Application

**HydroLine**

Client

**Power Plant Ponte Brolla**

Constructor

**Azienda Elettrica Ticinese**

Advantages

**green dye to blend in with natural surroundings, light weight, safe and simple mounting, excellent hydraulic properties, technical support during installation, flexibility, range of fittings**

Esthetics played a major role in bridge renovation. The top quality pressure pipes by HOBAS were dyed green to harmonize with the surroundings. Further requirements for the pipe material, such as light weight, safe and simple mounting and excellent hydraulic properties, were met by HOBAS pipe systems. The additional technical advice offered by HOBAS, reliable references, flexibility and the wide range of fittings made reaching a decision easy for the client. A total of 108 m HOBAS HydroLine pipes DN 1600, SN 5000, PN 6 were hence delivered in standard 6 m length.

All 18 pipes were flown onto the bridge by helicopter and lowered with millimeter precision. Three tons were the maximal allowable helicopter load.

Since HOBAS CC-GRP pipes are relatively light, and one of the 6 m DN 1600 pipes weighs 1,8 tons only, the transportation to the bridge could be finalized within 1.5 hours. Thanks to the technical support from HOBAS experts the constructor was able to fix the pipeline to the bridge in record time.

The new vertical Francis turbines are now fed with 6 m<sup>3</sup> water per second through two paralleling HOBAS pressure pipes. This results in an energy output of 3.7 MW at a head of merely 42 m. The client, the engineering office and the constructor are enthusiastic about the quality of HOBAS pipe systems and are convinced that the renovation of the old power station at the Maggia was an important contribution to sustainable environmental protection.

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## Almost as Long as the Yangtze...

Yiwu is a city of around 1 million people in the greater area of the Yangtze delta. It was founded during the Qin dynasty around 200 B.C. very close to Hangzhou, the capital of the province Zhejiang. As trading area of Shanghai it is today known as one of the most influential economic areas in China.

Due to the region's leapfrog development over the last years, the maximum capacity of the local sewer system was soon reached. Apart from this and despite the city's large scale investments in the network, the line was in such bad condition that the groundwater was threatened to be polluted. It was therefore absolutely essential to establish a new main leading to the local treatment plant. 12.6 km HOBAS SewerLine® were installed for this purpose in the Yiwu district Choujiang. The undertaking was quite challenging, since the soil in the coastal area of the South China Sea was weak and therefore difficult for installation.

The project was conducted in three parts. 2.3 km HOBAS CC-GRP pipes DN 1200 to 2000 were installed for the first part, the second section consisted of 2.9 km DN 800 to 2000 and the third and longest part was established utilizing 7.4 km HOBAS pipes DN 800 to 2000. The complete line was built with gravity pipes and a stiffness of SN 15000. This

Year of Construction

**2008 - 2009**

Length of Pipe

**12,612 m**

Pressure Class

**PN 1**

Stiffness Class

**SN 15000**

Diameter

**DN 800 - 2000**

Installation Method

**open cut**

Application

**SewerLine®**

Client

**City Yiwu**

Advantages

**light weight, high stiffness,  
simple cost effective installation  
also in large depths,  
absolutely leak tight, corrosion resistant**



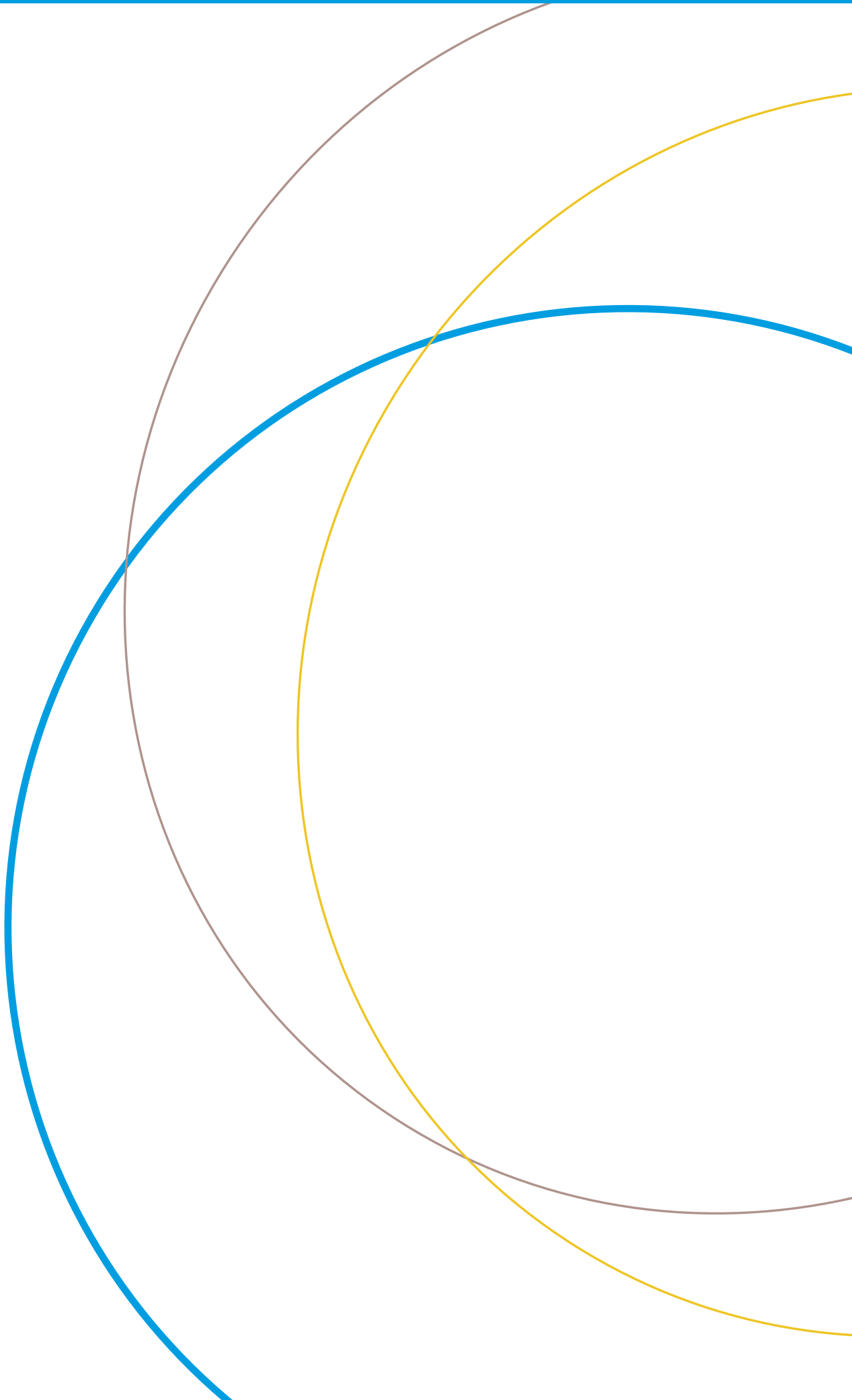


enabled a cost efficient installation in great depths and weak soils. A maximal trench depth of no less than 18 m and an average depth of 7 m were required for the project. The extra-strong HOBAS pipe proved to be an intelligent and flexible solution that also ensures long-term stability.

Several reasons let the municipality Yiwu decide for HOBAS centrifugally cast, glass fiber reinforced pipe systems. The mentioned weak soil conditions, for instance, would have made the use of heavy equipment elaborate. However, CC-GRP pipes weigh a lot less than other materials and are easily installed without special equipment. Also the additional challenge posed by a road nearby the pipe route was overcome due to the easy handling of HOBAS Pipes. The installation had to be quick, space-saving and flexible at this point to avoid any traffic disruptions. No problem with HOBAS. Leak tightness was a further important criterion for the right material choice: the groundwater should not be endangered. HOBAS pipes and couplings run through stringent short and long term tests and are provably leak tight. Corrosion resistance was yet another crucial factor in the decision making process. Pipes are often exposed to external influences especially in coastal areas. HOBAS Pipe Systems are highly corrosion resistant and therefore easily withstand environmental influences.

Ground was broken for this demanding project in July 2008. It shall be finalized and commissioned beginning of 2009. HOBAS is the sole provider of centrifugally cast GRP pipe systems in the Chinese market supplying clients with the material as well as planning and installation expertise. This package already proves to yield fruit in this project for all involved parties are highly content with product choice and cooperation.

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**HOBAS Group Worldwide**

HOBAS manufactures and markets HOBAS CC-GRP Pipe Systems. The HOBAS network includes HOBAS production facilities and sales organizations in Europe and throughout the world.