

## Special Edition Jacking

### Contents

- 1 | HOBAS® Goes XXL, PL
- 3 | Jacking HOBAS Pressure Pipes in Venice, IT, and in Southern Australia, AU
- 4 | Beneath the Rhine, Around the Bend, ... CH
- 6 | Nature Conservation Comes First, DE
- 8 | Everything Runs Smoothly in Krefeld, DE | Curved Jacking in Warsaw, PL

## HOBAS® Goes XXL Pipes De 3000 Jacked under Warsaw, PL

3 meters are a little more than the average ceiling height of an apartment, yet one can hardly be speaking of something "average" when talking about a 3 m pipe diameter – this has, however, become routine for HOBAS...

The wastewater treatment plant Czajka is situated on the right river bank of the Vistula River in Warsaw, Poland, and treats 80% of the Polish capital's effluents. The project to establish the collector leading to the plant was broken down into three sections. The first is 5714 m long and was realized with HOBAS Jacking Pipes De 3000 (DN 2800) which were installed along the right side of the Vistula, whereas 1400 m De 3000 pipes are laid within the second part and on the left river bank. The pipelines meet in the third section where two lines DN 1600 are inserted in a 4.5 m diameter concrete tunnel traversing beneath the Vistula.

The contractors Hydrobudowa 9, PRG Metro and KWG (all belonging to the PBG Group) worked as consortium on the first project section. One of the challenges that had to be faced is the high ground water level that lies around 1 to 2 m below the surface and therefore reaches 4 to 8 m or 3 floors above the pipe top. Piles were set up around the thrust pits and jet-grouting was added to prevent too much water from pouring in. Only this way was it possible to reduce the volume of 200-300 m<sup>3</sup>/h (= up to 2000 bath-tubs of water) to 20-30 m<sup>3</sup> which are constantly pumped out.

Worthwhile mentioning is the 840 m long part of the first section where the pipes were supposed to be jacked from both ends meeting in the middle. However, installations with HOBAS Pipes can be conducted so precisely that the section could be jacked with one single drive and from one side only. The smooth and even outer surface and high stiffness (SN 50000 und 64000) of the relatively light-walled HOBAS Pipes were significant for this success.

Despite the small friction and low forces needed to jack HOBAS Pipes, the contractor followed the project plan and erected an intermediate station every 100 m. None of these but the last was put into service to make sure that also the last drive at 1200 tons (11,772 kN) would run smoothly. Even higher jacking forces would have been possible on the HOBAS Jacking Pipes, in this case up to 19,539 kN. After completing the works the intermediate stations were replaced by HOBAS Tangential Shafts and reused for different sections in the project.





## Jacking HOBAS® Pressure Pipes Under the Lido of Venice, IT

The sewage treatment plant in Fusina near the Lido of Venice collects and purifies the water which has hitherto flowed directly into the lagoon and polluted it. The treated water is sold as industrial water, and surplus clean water is channeled into the sea. In addition, 10 km of pipes have been installed running from the sewage treatment plant to the Lido and for a further 10 km out to sea. In order to pass under the Lido and to install pipes in the very special ground conditions, HOBAS Pressure Jacking Pipes De 1720, PN 6, SN 140000 have been used.

In fact, concrete pipes containing an inner steel pipe were planned for the 350 m section, but the time-consuming welding work needed for each pipe and the risk of corrosion led the building owners to seek for alternatives. They found these in the HOBAS Products. The corrosion resistant GRP pipes can withstand the jacking forces with no problem, while possessing outstanding hydraulic qualities that are otherwise only achievable in pipe jacking projects by using 2 different pipes. The building owner was thus able to "kill two birds with one stone" and carry out the project with 1 pipeline, using HOBAS.

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The tunneling progressed at an average of 3 m per hour, the separator processed 84 tons of soil per hour (=42 m³/h) and a 3 m long pipe took roughly 0.5 h to be jacked. An interesting fact is that the preparation (disassembly and reassembly of electric cables, slurry pipes and hydraulic hoses) took 40 to 60 minutes. Considering this and including the breaks for the workers one can say that an average of 10 pipes could be put into the ground per day. At this speed it was possible to accomplish the first sections weeks ahead of schedule and the contractors' expectations were certainly exceeded. Even heavy snowfalls and temperatures reaching -15°C had no effect on installing the HOBAS Pipes.

For the consequent section, pipes were jacked beneath the main road of the district Białoleka. An open trench would not have been possible here since the construction works would have impaired the traffic on this important 6-lane road (3 lanes in each direction). The pipeline route runs beneath the middle, the green line, of the road and a single drive over 910 m broke the record of longest single drives in the project. 2 curved stretches with 450 and 900 m radii are part of the section and were realized with 1 m pipes - the angular deflection being well held within the couplings. The 450 m radius was implemented over a stretch of 100 m and a laser to measure the inclination of the pipeline was utilized on straight sections, in curves this was done with the help of a gyroscope and water level.

Within the second part of the project, the contractors Sonntag Baugesellschaft mbH and POL-AQUA laid 1400 m HOBAS Pipe De 3000 almost unnoticed by the population and also via jacking on the left side of the Vistula.

To go XXL with OD 3000 pipes for Czajka, HOBAS Technicians had developed a centrifugal facility which rotates up to 75 km/h. The mold together with the heaviest pipe available result in an impressive rotating 45 ton mass, which by the way equates to 2 fully laden 18-wheelers. HOBAS once again lives up to the motto: **HOBAS® Make things happen.**

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Year of construction  
**2009 - 2010**  
Construction time  
**21 months**  
Total length of pipeline  
**5.7 km**  
Diameter  
**De 3000**  
Pressure Class  
**PN 1**  
Stiffness Class  
**SN 40000 - 64000**  
Installation method  
**Jacking**  
Application  
**SewerLine®**  
Client  
**Waterworks Warsaw**  
Contractors  
**PBG Group:**  
**Hydrobudowa 9,**  
**PRG Metro and KWG;**  
**Sonntag Baugesellschaft mbH, POL-AQUA**  
Advantages  
**Tailor-made solution,**  
**comparably light walls**  
**and weight, easy instal-**  
**lation and corrosion**  
**resistance**

## HOBAS® Jacking Pipes Expand the Sewer Network in the North of Melbourne, AU

In Melbourne, Southern Australia, HOBAS Jacking Pipes have been jacked at depths of 15 to 19 meters. The high groundwater level and difficult ground conditions presented just as much of a challenge to the construction company as the small depth of coverage to the stream bed located above the pipeline and the settlement area along the pipeline route.

Thanks to the low weight of the HOBAS Pipes, a small fork-lift was more than sufficient to move the products. The outstandingly well-coordinated deliveries, simple connecting process due to the pre-assembled HOBAS Couplings, as well as the superb technical support given by HOBAS Experts inspired the construction company; the installation work and the expansion of the sewer network therefore progressed fast and smoothly.

During transportation, HOBAS Pipes can be nested inside one another, thus saving costs and protecting the environment - much to the liking of Mother Nature!

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## Beneath the Rhine, Around the Bend, ... Jacking HOBAS® Pressure Pipes in Basel, CH

Novartis is one of the leading suppliers of innovative pharmaceutical products. The group operates in more than 140 countries worldwide and is strongly rooted in Switzerland.

Currently, the company is turning the industrial complex of the St. Johann Areal in Basel with its research and production facilities, office buildings and the international head quarters into a state-of-the-art center for research, development and management.

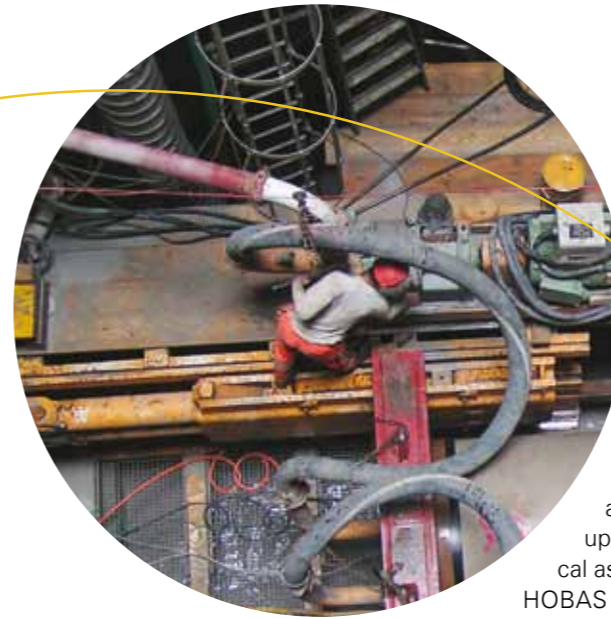
Novartis' strategic aim regarding sustainability is to reduce the energy consumption of the new buildings to a third of the former premises. Due to the area's development as well as alternative energy systems, the need for cooling water will increase over the coming years. Purified water from the river Rhine is used for this purpose.

The total capacity of the present purification plants for general service water on both sides of the Rhine will cover the increasing demands of the area over the next 10 to 15 years. However, both plants first had to be connected due to altered technical requirements. This was realized with a pipeline running under the Rhine.

The engineering company Rapp Infra, who was in charge of the project, had first intended a double pipeline where a pressure line would run inside a reinforced concrete jacking pipe. Since HOBAS CC-GRP Pipes can be produced to unify both, pressure and jacking properties, Rapp Infra was soon convinced by the economic advantage and shorter construction time.

A further advantage was that the Swiss constructor Implenia dealing with jacking installation has already worked very closely with Product Managers and Technicians at HOBAS Switzerland and Germany and was thus already acquainted with the specialists' proficiency and the products' advantages.

Following thorough research and comparison of the various bids, HOBAS received the order and delivered the first jacking pipes mid-April 2009. Jacking and receiving pits for the pipes were excavated and retained by concrete bored pile walls. The main jacking pit was no less than 32 m deep. This great depth was required to avoid underground water courses (high groundwater table of over 20 m) and putting the Rhine water



at risk. The pipeline runs under the Rhine with a safety margin of 6 m between the top edge of the HOBAS Pipe and the bottom edge of the river bed.

At this depth, it was possible to drive through one horizontal soil layer whereas traversing different formations beneath the Rhine would only have posed additional risks for what was already a highly complex project. As the receiving pit lay at a depth of 28 m, the pipes were driven four meters uphill over the length of 433 meters – another critical aspect that was easily overcome with the help of HOBAS products.

Another requirement regarding installation was the curved jacking route. The reason for this was the border between Switzerland and France. If they had jacked in a straight line, they would have crossed the border into France. They therefore pushed the pressure jacking pipes in a curve with a radius of 1000 m.

In this project in Basel, pressure jacking pipes with the pressure class of PN 10 and an outside diameter of 1499 mm were used. As if all these incredible challenges were not enough, building contractor Implenia installed some 24 to 30 m of jacking pipes per day and completed the project in record time of one and a half months.

Without the excellent work by Implenia and outstanding cooperation and coordination between sales representatives, engineering, production and shipping departments in the various HOBAS organizations such top performance would not have been achieved. All parties involved can be truly proud of their contribution and satisfied with this unprecedented reference project.

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Year of construction  
**2009**  
Construction time  
**1.5 months**  
Total length of pipeline  
**433 m**  
Diameter  
**De 1499,**  
**Wall thickness 79 mm**  
Pressure class  
**PN 10**  
Stiffness class  
**SN 160000**  
Installation method  
**Jacking**  
Application  
**WaterLine®**  
**(Cooling water pipeline)**  
Client  
**Novartis Basel,**  
**Switzerland**  
Contractor  
**Implenia AG,**  
**Switzerland**  
Advantages  
**Jacking beneath the**  
**Rhine with high ground-**  
**water level, pressure**  
**jacking pipes, very short**  
**installation time, flexible**  
**logistics**



## Nature Conservation Comes First Eco-Friendly Pipe Jacking Through the Hexbach Valley with HOBAS Products, DE

Blue sky, lush green, the twitter of birds – and then an articulated six-wheeler rumbles past. You balance on makeshift boardwalks next to a building site barrier, while behind it a pneumatic hammer fully lives up to its name. Ever feel they don't go together? – We agree! Which is why HOBAS Products can also be installed trenchless, without disturbing people or the environment in any way.

### Pipe Jacking Through a Sensitive Area

In the Hexbach valley, a landscape conservation area in Essen, increasing building development and soil sealing meant that the sewer running through this area was no longer able to carry away the masses of effluents and rainwater which arose in the event of heavy rain. An accumulation of water in the sewer system and flooded cellars were the results, thus creating an urgent need for action.

The Municipal Utility Essen (Stadtwerke Essen AG) resolved to renovate the sewer and, within the framework of this construction project, installed HOBAS CC-GRP Jacking Pipes De 2047 for the very first time through an area that is classified as sensitive from a landscape-ecology point of view. A new sewer line which banished all memory of past deficiencies was installed along a length of 2.1 km by means of pipe jacking, while respecting the strictest environmental protection measures possible.

### Subdivision into Three Jacking Sections

The first section, with a jacking length of 452 m, ran 75 m straight ahead out of the double jacking pit constructed in sheet piles and then, with a radius of 600 m, around the curve for a length of 377 m. Along the entire section, the pipe was jacked on a downhill gradient of 0.65 % with a maximum force of 3970 kN (5800 kN would have been allowed).

The construction pit of the second, 840 m long jacking section was located right next to an old potable water pipeline, which first had to be secured before being able to proceed with the work. The pipe jacking process was begun at the end of May 2007. First, the pipe ran in a straight line for 104 m, then in a curve with a 600 m radius for 98 m, straight again for another 75 m

and finally ended in the receiving pit via a curved segment with a radius of 550 m. This segment has a gradient of 0.7 % and was jacked uphill.

The third section consisted of a 300 m long curve with a radius of 1000 m and a straight section 196 m long, and ran in a downhill gradient of 1.3 %. In addition to the three jacking sections described above, the respective house connections all along the section were joined up to the newly installed interceptor sewer using a closed construction method.

### The Advantages of HOBAS Products

Thanks to their smooth outside surface, HOBAS Products create comparatively little friction, particularly when restarting after a stop. In addition, compared to reinforced concrete jacking pipes, CC-GRP Jacking Pipes with the same inner diameter, have a smaller outer diameter and can therefore often be jacked using a smaller machine, while at the same time reducing the amount of excavated material. The walls of the pipes used in this project, which had an outer diameter of 2047 mm, were 82 mm thick. "This made it possible to reduce the excavated soil by more than 30 %. The resulting lower costs of transporting soil and pipes have proved to be significant aspects in protecting the Hexbach valley nature conservation area," explains Hans-Georg Gottschol, of the Municipal Utility Essen (Stadtwerke Essen AG).

### Environmental Protection Is Our Top Priority

Throughout the work, consultations were held with ecologists from Landscape Planning and care was taken to carry out the pipe jacking in harmony with nature. "The jacking and receiving pits were constructed in areas free of trees. Protective sheets (geomembrane mats) were laid under the building site equipment areas to avoid any mixing of the soils. The above ground work (building a construction road, etc.) was done outside the birds' breeding and nesting seasons", says Gottschol, outlining the package of measures for preserving the landscape conservation area.

HOBAS Products are designed to last for a service life of 50 years and more and thus guarantee the city of Essen and its people safe, maintenance-free functioning. – In order that you, too, can have peace of mind and enjoy nature.

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Year of construction  
**2007 - 2009**  
Total length of pipeline  
**2.1 km**  
Diameter  
**De 2047**  
Pressure class  
**PN 1**  
Stiffness class  
**SN 64000**  
Installation method  
**Jacking**  
Application  
**SewerLine®**  
Client  
**Stadtwerke Essen AG**  
Constructor  
**Wilhelm Epping Special  
Underground  
Engineering GmbH**  
Advantages  
**Little excavation mate-  
rial in green zone, minor  
strain due to trans-  
portation, corrosion  
resistance, light weight,  
smooth inner and outer  
pipe surface**



## Everything Runs Smoothly in Krefeld, DE

In summer 2000, the city of Krefeld in Germany expanded the capacity of a combined sewer. The plan was to install the 318 m long section by means of pipe jacking. In order to ensure the greatest possible degree of corrosion resistance, the customer chose HOBAS CC-GRP Pipes De 2400 (pipe wall thickness 76 mm, SN 32000, maximum jacking force 9460 kN) for the new pipeline. The first 282 meters ran at a depth of 6.5 to 7.5 m, partly parallel to a railway line and under a city center side street. First, 120 m were pipe jacked in a straight section; the subsequent 160 m were jacked using 2.9 m long pipes in a curve radius of 1500 m. An average jacking force of 6500 kN, i.e. only 70 % of the allowed pressing force, was used in the work on the entire section, including the curve. The remaining 36 m posed quite a challenge as well: at a depth of 4 to 7 m, the pipeline crossed a very busy highway, of which the traffic could of course not be disrupted.

Yet it is not just during installation that HOBAS Products showed what they were made of: compared to concrete pipes with the same inner diameter, 30 % less excavated soil and, in all, 650 m<sup>3</sup> less earth needed to be removed. **HOBAS® Make things happen.**

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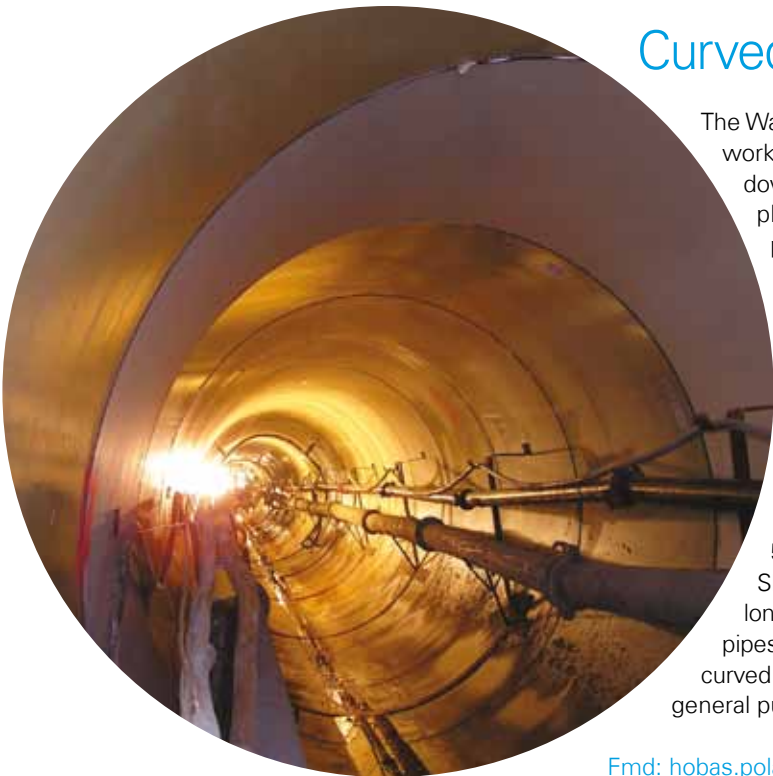


## Curved Pipe Jacking in Warsaw, PL

The Warsaw water supply companies expanded the sewer network with a 3.5 km long sewer line DN 2000, which connects a downtown district to the new Czajka waste water treatment plant. To successfully cope with the 0.063 % gradient, the pipeline had to be installed at depths of 4.7 to 10.6 m. The new sewer crossed the Warsaw underground railway at a distance of only 60 cm, a stretch of mainline railway and also several other sewers. Both this fact and the often very narrow streets were crucial reasons for working with curved pipe jacking with a minimum radius of 300 m and HOBAS CC-GRP Jacking Pipes.

The project "kicked off" in October 2006. The pipeline was subdivided into 15 sections; the longest of these was 543 m long and had a curve with a 400 m radius. Pipes SN 32000 were chosen for the straight sections, and 1.5 m long pipes with an allowed jacking force of 3600 kN or 1 m pipes with an allowed force of 3000 kN were employed in the curved sections. And all this went almost unnoticed by the general public...

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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.

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