

## No bend too sharp: Swietelsky-Faber installs Brandenburger pipe liners with bends of up to 90° in Augsburg

Augsburg is one of Germany's oldest cities and with approximately 280,000 inhabitants it is the third largest city and economic powerhouse in Bavaria. Three rivers run through Augsburg: the Lech, the Wertach and the Singold. The [Singold](#), which has its source in [Ostallgäu](#), leads into an intricate network of artificial streams and canals in a district of Augsburg. The large number of [canals in Augsburg](#) – most of which flow through the [Lech Quarter](#) in the [Old Town](#) – means the city is full of bridges; Augsburg's 500 bridges even outnumber the bridges in [Venice](#). As the oldest city in Bavaria and the second oldest in Germany, Augsburg is able to look back on a long tradition. Despite this or precisely because of it, it is necessary to think outside the box when it comes to the rehabilitation of drainage systems. The construction project in Augsburg was focused on hand-masoned sewers built in the 20th Century. After 102 years, it was necessary to rehabilitate these DN 700/1200 and DN 800/1200 oval profile sewers.

According to information from the Augsburg water works, the mixed water collection drain had to be completely and sustainably rehabilitated with a pipe liner. As part of the planning work for the "Wertach Vital" construction project the banks had to be levelled and the base of the river had to be raised by approximately 1 m. The waste water sewer was found to have significant calcium build-up, even though there was hardly any groundwater infiltration at these locations. The planners of the construction project from the engineering company Riwa assumed the water table could rise significantly after the alteration of the riverbed. This would cause groundwater to infiltrate the wastewater system and increase the static stress on the old pipe. Using a pipe liner would ensure that the host pipe was sealed and statically stabilised. Swietelsky-Faber put forward an alternative proposal. Due to the bends of between 45° and 90°, the Augsburg water works' call for tenders specified steam-cured felt liners. The alternative proposal envisaged using a [GFRP](#) pipe liner instead of a needled felt pipe liner, and provided a price advantage. Trust and cooperation between the employer and the employee is required to assign and carry out innovative alternative proposals. The company Swietelsky-Faber from Saaldorf-Surheim was commissioned with this construction project and took the opportunity to test the limits of people and technology.

The conditions in the densely populated residential area of Pfersee required the use of cutting-edge rehabilitation systems, efficient in terms of time and energy consumption. For this construction project, Swietelsky-Faber employed the trenchless [sewer rehabilitation](#) system using the Brandenburger [GFRP](#) liner BB<sup>2.5</sup> and took advantage of state-of-the-art technology from the company ProKASRO. When the section of the sewer in the Körnerstraße and Lutzstraße area was constructed in 1912, the builders could never have imagined the possibilities and limits of trenchless rehabilitation today. Therefore, the sewers to be rehabilitated as part of this construction project were not laid straight but have multiple bends with different radii. This not only posed a challenge for Swietelsky-Faber but also enabled Brandenburger to test the limits of their products. The construction project spanned 1,120 metres and involved 19 installation sections, of which 7 posed particular challenges for the team from Swietelsky-Faber. In each of these 7 rehabilitation sections one or more 45° to 90° bends with radii ranging from 12.5 m to 20 m had to be cured. 1.12 km of liner was installed at the construction site within 30 workdays. In addition, 150 ports were opened and integrated and 28 shafts were coated with [GFRP](#) plates and UP resin. Achieving all of this in such a short time was made possible by the high transparency and flexibility of the liner, Swietelsky-Faber's experience and professionalism and the use of the ProKASRO UV system and the 8 x 1000 watt main light.

This installation provided proof that modern [GFRP](#) liners are also suitable for rehabilitating pronounced bends.