Microtunnelling

Building infrastructures and power supply systems underground, while life above continues unaffected.
Comprehensive Microtunnelling Solutions

A reliably functioning infrastructure which meets the needs of both private citizens and the economy is an essential foundation for modern living spaces. Rising demands, higher expectations and stricter requirements are some of today’s major challenges. Microtunnelling is the trenchless alternative for building and maintaining utility tunnels without affecting life above ground.

Microtunnelling is the most environmentally friendly and sustainable solution for building underground utility lines. The figures at the left show the fields of application.

Advantages of Microtunnelling
• Life above continues unaffected while building or renewing infrastructures underground
• No traffic jams. Only one access and one exit shaft are needed for drive lengths of up to more than 1,500 m
• Minimises environmental, economic and social impacts
• Massive reduction of CO2 emissions by saving up to 70% of road transport compared to trenched methods

Microtunnelling is characterised by
• Trenchless construction
• Remotely controlled tunnelling
• Very accurate installation
• No need for dewatering (e.g. groundwater level)
• Capability to construct multi-curve sections, including sharp curves and transition curves
• Minimised excavated material — minimised disposal

Implenia’s contribution
• We are familiar with all soil conditions, all around the world
• We have the experienced, skilled staff and all the equipment needed to carry out your trenchless project — from a single source
The Technical Solution

Implenia’s Microtunnelling methods range from slurry pressurised, mechanical earth pressure balance systems to pilot auger boring and other cutting-edge methodologies. Implenia never cease to adopt new systems to suit our current and future clients.

Pipe jacking – a smart method
The pipes are not only the means of transmitting the jacking force from the starting pit to move the tunnel and the machine forward, but also the product and the final lining of the new line. A wide range of pipe materials is available.

Slurry pressurised balance system
These machines are designed as full face Microtunnelling machines. The ground at the face is always supported by pressurised slurry to minimise ground settlement. The soil is mixed with the flushing agent and subsequently transported to the surface through the conveyor pipe by the discharge pump. The basic design of this machine enables deployment in a variety of soils: from silt and cohesive soils through gravel to rock.

Earth Pressure Balance (EPB) shield technology
In Microtunnelling, EPB technology is distinguished by the muck conveyance system. The excavated material is transported by muck skip or by muck pump. A conveyor bucket with a winch system is employed for short tunnels as it is extremely simple and economical. For longer tunnels, rail systems with locomotives are preferred. For the EPB method, no separation plants are needed. The EPB technology is limited to soft, silt ground conditions.

Superior inventory
In its pool of Microtunnelling equipment, Implenia have various types and sizes of machines ranging in inner diameter from 500 mm to 3,000 mm to suit the needs of the client. The possibility of drive lengths of up to 1,500 m and multiple curved alignments, gives clients a wide range of possibilities to choose from.

Curved alignment
Microtunnelling is not limited to straight drives. Implenia can both commence the pipeline and place the project’s axis between obstacles such as foundations and existing underground infrastructures using vertically and horizontally oriented curves or combined 3-dimensional curves.

Long-distance drives
Interjack stations, automatic lubrication systems and the use of lubricants and additives make it possible to increase tunnel length as a function of the pipe diameter up to more than 1,500 m in one drive. For greater drive lengths in different ground conditions, Implenia recommend installing an emergency system to switch the lining system from pipes to segments.

Sustainability
Not only the technology itself is a sustainable construction method. Within the project, Implenia focus on minimising the impact on the environment, the neighbour hood and traffic patterns. Implenia’s high-tech separation plants combined with centrifuges or filter presses, for example, ensure the most environmentally-friendly and resource-conserving drilling process possible.

Comparison of utility line construction methods

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<th>Carbon dioxide emissions</th>
<th>Fine particulate air pollution</th>
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<td>Open-trench construction</td>
<td>CO²</td>
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<td>Trenchless construction</td>
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SLS - LT guidance system
1. Tunneling machine
2. Designed tunnel axis
3. Laser theodolite
4. ELS target
5. Backsite target
6. Reference target

GTS guidance system
1. Tunneling machine
2. Designed tunnel axis
3. Water Tank
4. Circulation pump
5. Pressure sensors
6. Gyro-compass
Full service: Planning, Construction, Operation

Planning and installation
The first task is to study all geographical information and the situation in the surroundings, also evaluating the issues of sustainability and the minimisation of environmental impact. The selection of work methodologies is considered at this stage. In compliance with stringent client requirements, the plan is implemented and installation commences.

Professional project implementation and installation
With expert teams and a professional crew, Implenia offer effective and sound engineering methodology from the very beginning to the delivery of the completed project. After full consideration of client requirements, project implementation and installation utilise the most reliable and suitable construction methods. Implenia nurture a close relationship with clients in order to deliver jobs under ideal conditions and in accord with the client’s needs.

Hassle-free project management
Implenia are ready to serve clients all over the world. With a multinational workforce – from top-level management to skilled crew members – we are able to undertake and handle a project with hassle-free project management. Implenia’s goal is to satisfy the client’s expectations to the fullest extent. We employ multitasking groups equipped with sophisticated equipment to manage and run the project as efficiently as possible, making maximum progress while still ensuring that safety is paramount.

Quality, remarkable service and maintenance
Over the years, Implenia have established a strong and cohesive team and have ensured all equipment is of consistently high quality and performance. No breakdowns or delays which impact the work’s progress or delivery to the client are tolerated.