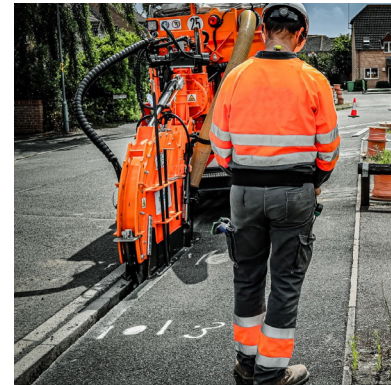




NARROW & MICRO TRENCHING

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Narrow and Micro Trenching (also known as slot cutting) are innovative methods for installing microducts with minimal disruption and a cost-effective alternative to conventional installation in open trench. Under the right circumstances the technique is a low-impact deployment method in which ducts are laid into a slot-cut trench, typically no wider than 100mm and between 120-300mm deep, that may extend for many kilometres. While it is not a trenchless construction method, it does minimize disruption without damaging existing infrastructure in the road. The trench is then reinstated, often making it difficult to even notice that works have taken place.

Using this method can save considerable time in fiber deployment, as well as using fewer resources, and can have a reduced environmental impact, with less material removed from trenches or transported to the site for backfill. Traditional construction methods typically cost in the order of £75-125 per metre and a single installer team will typically complete 50-100m per day. Narrow and Micro Trenching use approximately one hundredth of the material needed to backfill the trench and where the technique is appropriate, it is up to 30 times faster and typically only 1/3 of the cost of traditional installation.



Narrow and Micro Trenching are the fastest, most compliant methods to deliver FTTX solutions in the United Kingdom. It is an attractive installation method to expand broadband infrastructures quickly and inexpensively. This technique will allow much more fiber deployment to take place, bringing much needed increased capacity and greater reliability to rural areas.

A Micro Trench installation is fast, affordable and non-invasive, perfect for cost-efficient projects and municipalities where a shallow installation is acceptable. Narrow Trench installation is deeper and wider, where municipalities or terrain conditions require a greater depth. Narrow Trenching is commonly used for backbone fiber applications and utility installations.

It should be noted that Narrow and Micro Trenching may not be suitable in all types of roads, and any deployment will depend on the composition of the road and the location of existing buried infrastructure. This is because there is greater risk of plant being damaged, and in certain road types (such as concrete and evolved roads), it may not be possible to reinstate the road in a manner that preserves the long term integrity of the road structure. Consent is normally required from the highway asset owner to install the fiber network, and an acceptable form of reinstatement must usually be agreed in advance of the works.



1. CUTTING THE SLOT



Cutting the surface with a special cutting machine. Depending on the type and size of the machine, the material is removed either directly or afterwards. Once you have cut the trench ensure that it is free of any debris, water or sharp edges. If the bottom of the slot is rough, fill it with sand to an even depth of at least 1 inch and then compact it.

2. INSTALLING THE MICRODUCTS/BUNDLES



Choice of cutting width for the slot should be selected to be slightly wider than the width of the ducts. Lay the microduct into the slot on top of the compacted sand, making sure that it is flat and firmly bedded.

3. REINSTATEMENT OF SURFACE



The trench is filled with backfill material and the road closed again. Therefore reinstatement materials that can be easily applied, achieve full strength and become permanent very quickly. Fiber optic cables can then be blown at any time and as required. If necessary the ducts can be accessed for localised repairs afterwards again.



Traffic flow is uninterrupted throughout work

Fast backfilling and reconstruction



Time efficient as networks can be built up to 30 times faster than using conventional techniques

Less surface renewal needed



Less overall costs compared to traditional installation methods

Reduction of material costs and vehicle movement



Less manpower needed

Minimal disturbance to residents

APPLICATION

Narrow/Micro Trenching is ideal for:

- Roads with a significant depth of bound construction and well defined road base, binder course and surface course layers
- Smooth asphalt roads, the edge of the carriageway or outside of rolling tracks and drainage channels

Narrow/Micro Trenching is not appropriate for:

- Concreted, paved and with considerable damage to the substance of the traffic areas
- Roads with existing ducts running across or in parallel / road crossings / house connections
- Motorways or motorway-like roads
- Direct connections to individual premises in footways (depends on local conditions)

One of the key differences between traditional and Narrow/Micro Trenching techniques is the material used for backfill. Rather than just sand, micro trenches require additional backfill media, such as hot polymer, elasto-polymer or grout to restore the surface. Consequently, the duct must be able to cope with the potentially high temperatures of the restorative material.

Additionally, it has to be flexible enough to cope with corners on the route, crush resistant and sufficiently tough to cope with the pressure of the roadway above. Ensure that you invest in microducts that meet all of these criteria - failures add to costs and time.

Once ducts are in place fiber can be blown, enabling the connection to be up and running quickly. The top surface should be reconstructed with material that meets local road repair regulations. There are many options for backfill material - however, the backfilling of such very narrow trenches requires that the backfilling material must satisfy certain engineering properties as opposed to the traditional earthfills. Cement-based foams, plasticised cement or cure resins are considered to be a good backfill material. After restoration there will be a small, barely visible footprint that will fade over time, minimising any aesthetic issues.



GUIDANCES AND CODE OF PRACTICE

In 2011 an advice note on microtrenching and street works was published by the UK Department for Digital, Culture, Media & Sport in 2011, explaining the technique, giving examples and pointing out regulations for local authorities and communications providers:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/77427/Microtrenching_guidance_NOV2011.pdf

The Scottish Government has officially implemented a new Code of Practice in Scotland, which appears to create a uniform technical standard for “narrow trenching” method of civil engineering (i.e. trenches less than 300mm in width) that could help to speed up the rollout of fiber broadband ISP networks across the country. The new Code of Practice makes changes to Section 130 of the New Road & Street Works Act 1991 and could, in theory, encourage greater use of the technique by broadband network builders, as well as better safeguards across Scotland’s 33 road authorities.

Emtelle have been involved in many Narrow and Micro Trenching projects over the years. Some of these projects are mentioned below:

Bournemouth, England

Total tubes supplied for slot cut = 1070km

Shetland Council, Scotland

Pre-installed subduct with 96 fiber cable

Fiberspan, England, Country Wide

100’s of kilometers installed for private networks

Cardiff University, Wales, UK

Campus Network

Lite Access, Canada, USA, Central America & Malaysia

223km of tube bundle used in projects around the world

American Service Provider FTTH Stanford University

Fiber to the Home

Port of Long Beach, USA

Slot Cutting of large tube bundles

Lite Access, Canada, USA, Central America & Malaysia

223km of tube bundle used in projects around the world

BSE – Contractor for Micro-trenching with Emtelle

Products in the USA

Axtel – FTTH Blown Fiber, Monterey, Mexico

Fiber to the home network

Titan, Ireland, Galway

Micro-trenching for FTT Business, custom made products were manufactured for this customer to suit the required trench width.

ITER -Tenerife, Canary Islands

100km Telecom ring with Blown fiber Tubing

Primetel, Cyprus

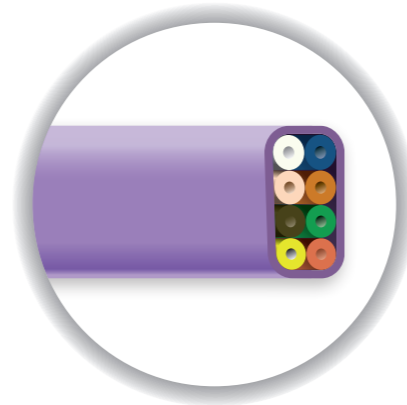
Trunk Network 90km using Micro Trenching, 1km installation per night, including backfill



In general, all FiberFlow microducts and microduct bundles that can be buried in the ground are suitable for installation using the trenching method. Due to their flat design, the Emtelle FiberFlow Vertex and Webflex microduct bundles are specifically designed for use with microtrenching applications. Emtelle has many years of experience in trenching across Europe. We are also happy to recommend installer companies which are specialized in using the trenching method as well as providers of micro and narrow trenching machines.

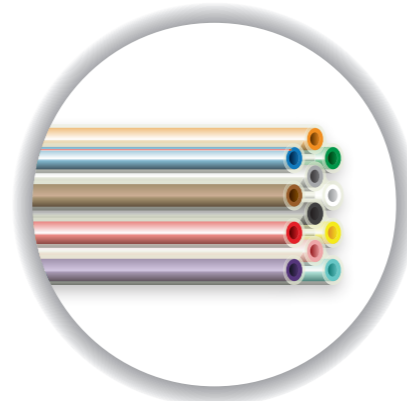
FiberFlow VERTEX™

- * Flat, compact design
- * Direct buried (DB)
- * Available in different versions
- * Available with or without bars



FiberFlow WEBFLEX™

- * Unique microduct bundle with branch structure
- * Flat, compact design
- * Drop without connectors
- * Available as pre-installed version



FiberFlow Vertex designs (furthermore on request)



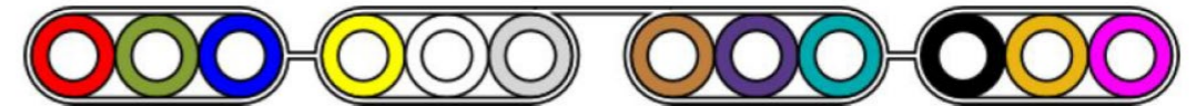
4-way



6-way



8-way



12-way



2+7-way

FiberFlow VERTEX™



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