	TRENCHLESS TECHNOLOGIES INFORMATION CENTRE	
	TRENCHLESS TECHNOLOGY GUIDELINES	SECOND EDITION
	ON-LINE REPLACEMENT OVERVIEW	NEW VERSION JUNE 2005

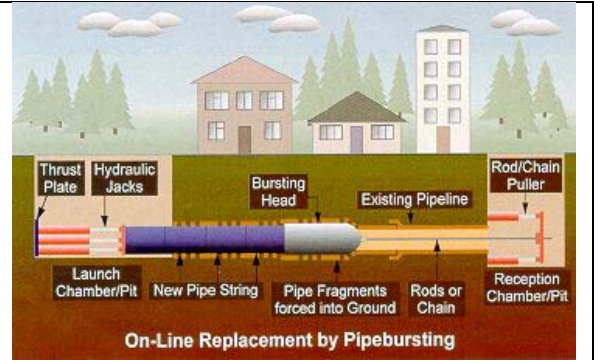
On-Line replacement technologies use the existing pipe as a route for installation of its replacement. The available technologies can be classified as follows:

Operation	Type	Pipe Material	Technique
Existing pipe destroyed	In situ pieces left in ground	Brittle pipes	PIPE BURSTING
		Ductile pipes	PIPE SPLITTING
	Pieces removed	Most Inc reinforced	PIPE EATING
Existing pipe extracted		Lead and some Plastic	PIPE EXTRACTION
Existing pipe retained as conduit for new		Any	SLIPLINING

The inclusion of Sliplining in this group is open to question. If the annulus between the host pipe and the liner is not grouted the liner is structurally independent from the existing pipe and can be considered as a true on-line replacement. If the annulus is grouted, the liner can transfer internal pressure loads to the host and is interactive. It might then be considered as a fully structural renovation technology as described in Section 5.

PIPE BURSTING

The most commonly used method of on-line replacement is pipebursting. Pipebursting is referred to in certain countries as 'pipe cracking'. In its earliest forms pipebursting comprised the use of percussive tool (usually a modified impact mole) or a hydraulic expander to break out the existing pipe with a new pipe being pulled or jacked in behind. Using the correct equipment the original pipe size can be increased to a certain extent for increasing the capacity of the new system. More recently however there has been a significant shift away from these systems towards those that rely entirely on axial jacking or pulling forces acting on a tapered bursting head.



PIPE SPLITTING

Non-brittle pipe materials such as stainless steel collars, ductile iron saddle clamps or polyethylene repair sections may present problems to some pipebursting systems. If such materials are encountered, the burster may continue to operate without making forward progress. Whilst high rates of success in dealing with non-brittle materials are claimed for certain pipebursting techniques, an alternative approach is a system which uses a cutting and expanding head with the ability to cut through the wall of a ductile pipe or fitting. The head is pulled through the pipeline by a hydraulic rod system, and slices open the old pipe while pulling in a new pipe string behind it. The technique can be used in pipes made from steel, ductile iron, repaired cast iron, asbestos-cement, PVC and polyethylene, and has been used to install diameters of up to 305 mm under suitable conditions



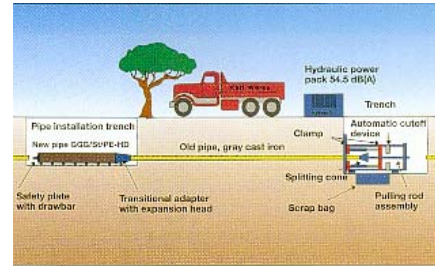
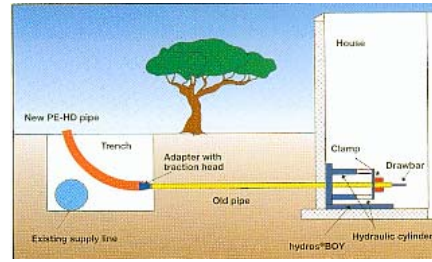
PIPE-EATING AND REPLACING

Microtunnelling equipment, described elsewhere, can be used for the trenchless replacement of undersized or damaged sewers, as well as for new installation. The 'pipe eating' process is suitable for the replacement of clayware, concrete, asbestos cement, GRP and even reinforced concrete pipes, with the new pipe being jacked in behind.



PIPE EXTRACTION

These systems pull or push the existing pipe out of the ground and insert a new pipe into the void created.



SLIPLINING

Possibly the simplest technique for renovating non-man-entry pipelines, sliplining basically entails pushing or pulling a new pipeline into the old one. The concept of using the 'hole in the ground' by installing a new pipe within the old is long established, and there are reports of clayware pipes being winched into old sewers and culverts many decades ago.

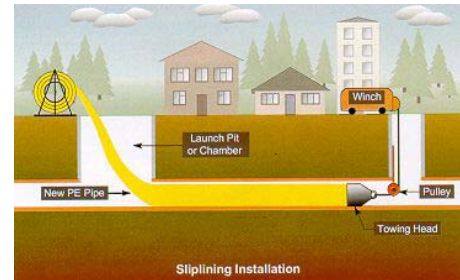


Diagram courtesy of Steve Vick International Ltd