

# ReFlow

## Flow Enhancement Rehabilitation Cabling

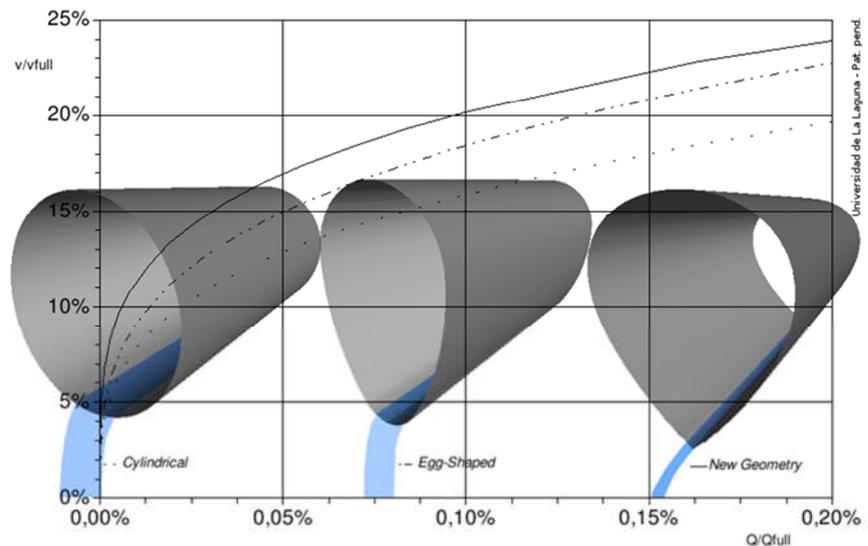
The low flow rates in sewage pipes cause sedimentation of solids and other problems derived from the lack of water aeration and generation of hydrogen sulfide, namely metal corrosion and concrete attack by sulfate.

It is well known that an inner section with pointed bottom gets faster flow rates for flows which are much smaller than the one for full section.

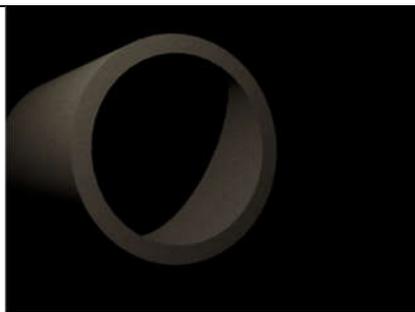
Pipes with inner section defined by some algebraic curves of degree greater than two obtain similar advantage over the ovoid in terms of speed for very low flows as the ovoid obtains from circular pipes with same capacity, slope and roughness.

Rehabilitation of damaged pipes by installing a liner inside is a definitive solution for cracks and leaks, and the polymeric resin the new inner layer is made of is practically immune to chemical attack, but if the inner shape is the same, the sedimentation issues may persist.

This innovation consists of the rehabilitation of sewer pipes by using the trenchless method known as Cured-in-Place Pipe (CIPP), inserting previously a mould that changes the shape of the inner section in such a way that water speed with very low flow is enhanced. This mould is placed in the bottom of the pipe and it provides several ducts that can accommodate electrical cables and optical fiber cables



### The concept



#### Pre-existing sewer pipe needing a rehabilitation

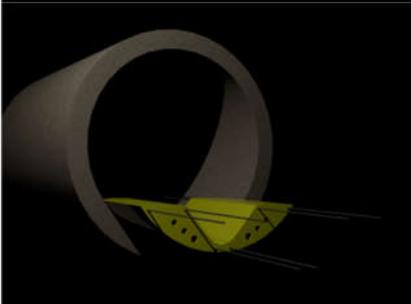
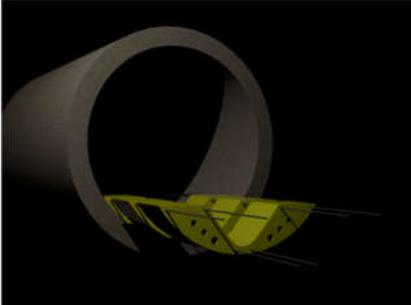
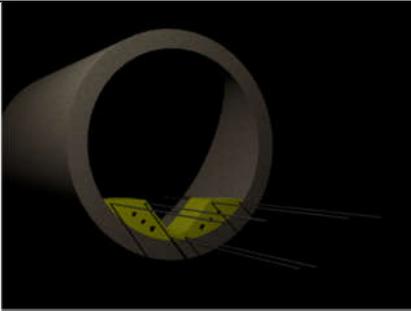
(hydraulic, structural or non-structural)

It could be circular or egg-shaped, whatever material.



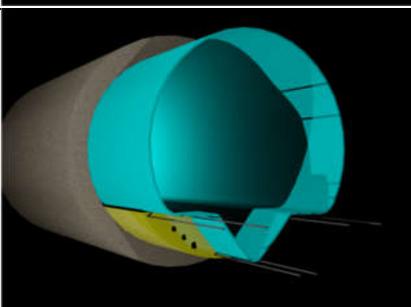
#### The mould

The mould represents the “heart” of the **ReFlow** concept. It implements an enhanced elliptical section that allow to increase the speed of the water at low flow. At the same time the mould allows to create several conduits for cable laying.



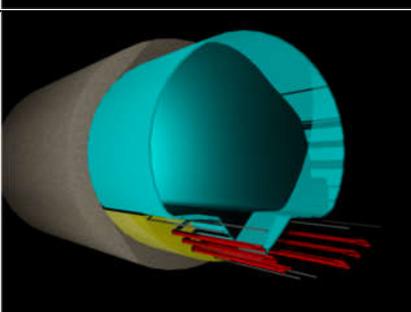
### **Moulds assembly**

Moulds assembly takes place by using pulling & pre-tensioning polymer fiber cables, lied in specific conduits created in the mould. Those cables permit to pull and pre-tension several hundreds of moulds creating a single mould having the same length of the host pipe to be rehabilitated.



### **CIPP rehabilitation**

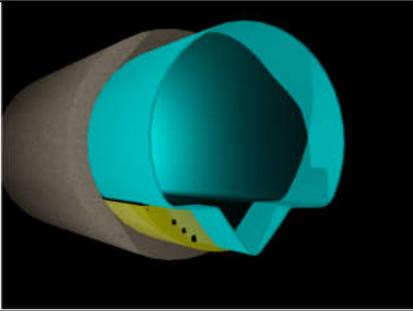
The hydraulic (structural or non-structural) rehabilitation of the host pipe is carried out by using a CIPP (Cured In Place Pipe) trenchless method. Once the process has finished, a new pipe lays inside the host pipe, close-fitted to the internal wall of the host pipe and the mould.



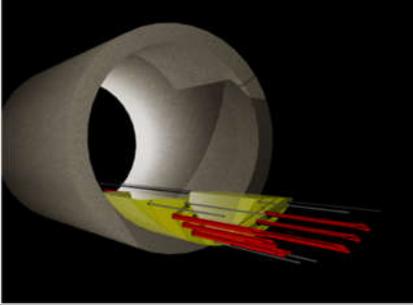
### **Laying of the product cables**

The new conduits, created by assembling the mould, permit to lay product cables, like fiber optic cables, electrical cables, or other kind of cabling.

## The final result



On one hand the **ReFlow** concept allows to obtain a rehabilitated sewer pipe with an enhanced hydraulic profile that increases the speed of water at low flow (in other words, when the sewer works with low demand) preventing sedimentation and other undesirable effects of low speed.



On the other hand the **ReFlow** concept allows to use sewer pipes as cabling infrastructures, with no extra-costs.