Product Information
Vibratory Ploughing

Introduction

Distribution of utility services is accomplished using two general systems: Overhead and underground Gas, Water and Sewer have historically used the underground technique. Telephone, Cable TV, Electrical Services, and now Fibre Optics are often being specified for underground installation. This trend is due to the development of new materials and technology in cable types and construction as well as the obvious protection from the elements.

Installing underground utilities has been done by either trenching or cutting into soil with a kind of ripper blade known as ploughing. Early ploughing of cable was accomplished by pulling a ripper blade with a cable laying section on the back through the ground using brute force. This often required connecting several crawler tractors together to get enough of draw pull. This configuration often tore up the work site and required substantial restoration in addition to involving multiple pieces of equipment. However, this method was usually more economical than opening a trench, installing the utility, and restoring to original site condition.

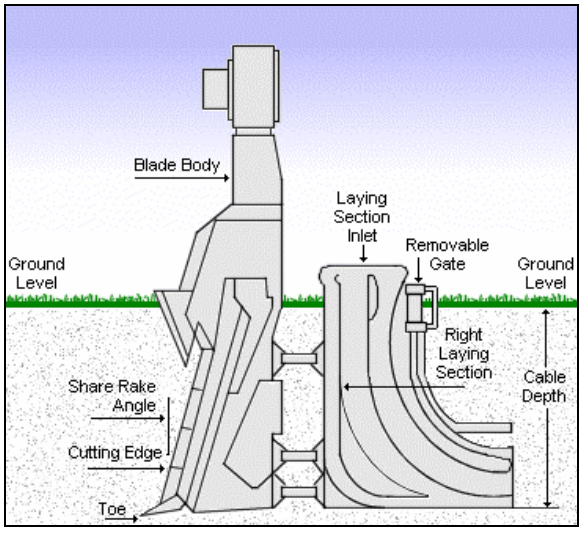
In the past 20 years the method of applying vibration to the ripper blade has become more advantageous. By shaking the blade, usually up and down, the soil will cut easier thus requiring less force to pull the blade.

Ploughing conditions:

Soil Type	Description	Ploughing
Sandy	Loose and granular soil, individual grains can be seen.	Exellent
Clay	Fine textured soil which forms hard lumps or clods when dry	Fair
Loam	Having a relatively even mix of sand, silt and clay	Good
Stony	Any of above types with a considerable amount of pebbles	Fair

Ploughing performance is effected by factors e.g., a high clay soil will plough easier with a high moisture level than when it is dry and rigid. Moisture loosens the soil and acts as a lubricant, allowing the share to pull easier. Soil compaction relates to how much air and moisture is mixed into the soil. Highly compacted soil such as found under a graveled road will require more force to cut through.

Plough share features



Blade body: The main backbone of the plough share.

Share Rake Angle: The amount of angle the share cutting edge lays back from vertical.

Cutting Edge: The leading edge of the share body which does the soil cutting. Usually sharpened to a dull point and with added hard surface welds, which will extend life.

Toe: Lowest and most forward part of the share body.

Laying Section: Attached to the trailing edge of the share body into which cable or others is installed.

Removable Gate: Installs into the back of the laying section and allows easy feeding of the cable through the laying section at the start and finish of a job.

Radius: The Minimum bending radius of the cable to be installed.

Cable Depth: The discharge location of the laying section determined hoe deep the cable will be installed. It is generally several centimetres above the toe depth.

Each of the above mentioned share components has an effect on how well the share will perform in given soil conditions.

Gildestr. 15
48317 Drensteinfurt, Germany
http://www.lancier-cable.de

Tel.: +49 (0) 2508 / 99378-0
Fax: +49 (0) 2508 / 99378-10
eMail: mail@lancier-cable.de

The following is a description of how the before mentioned share components will affect productivity.

Share Body: The thicker the body material the more force is required to pull it through the soil. Thin share blades pull easier. Depending on the width of the laying section, different strips can be fixed on to the sides of the share.

Share Rake Angle: The closer to vertical the cutting edge, the more tendency a share will have to coming out of the ground as it is being pulled. The more laid back the angle the more a share will pull down into the ground

Cutting Edge: As the edge becomes more blunt, the harder a share will pull through the ground. Hard surfacing welds to the cutting edge will extend the life of the edge and the share.

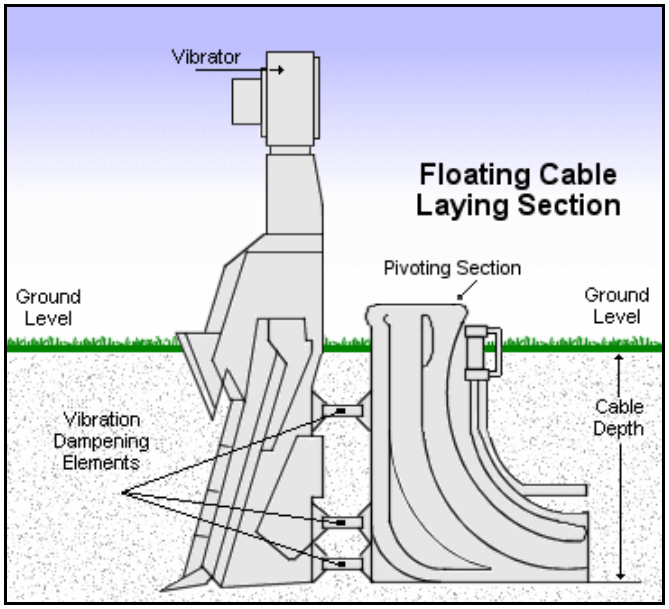
Toe: The size, width and mounting angle of the toe all effect whether a share will ride up or down in a given soil. Backhoe teeth will cause a simple and easy replacement

Laying Section: Wider laying sections to accommodate larger diameter cable pull harder than narrow sections for smaller cable

Radius: Larger diameter cable generally requires minimum bending radius. The larger the bending radius, the longer the cable curve radius will be. Big laying section length causes more side surface area to drag through the soil requiring more draw pull force. Smaller bend radius generally pull easier

Cable Depth: The deeper the ploughing depth the larger the draw bar required. Generally, installing cable 120cm deep requires much more than twice the draw bar pull than to install cable at 60cm deep

Pivoting section: There is one special point to the plough share design. It is the floating cable laying section which allows the share assembly to hinge on the back side as it is pulled around corners. Also incorporated into the pivot hinge are vibration dampening elements which allow the laying section to float while the share body goes up and down with the vibrator. This isolated laying section provides added protection for delicate cable.



Vibrator: The last major component which affects plough productivity is the speed and amount of vibration that is applied to the share blade.

The vibrator consists of counter-rotating eccentric weights. The faster the weights rotate, the more force they produce.

The benefit of vibratory ploughing over static ploughing is that with the help of the vibrator's force, the toe and cutting edge of the share lift fracture the soil before the share body and laying section are pulled through by the tractor.

As the operator does not have to adjust the vibrator, he can concentrate on the ploughing only.

The harder the ground the slower the ploughing speed will be.

If the ground conditions are soft the operator can accelerate the speed to optimise the performance given by the plough.

Plough Offset: Many job sites require installing a utility up close to an obstruction (building, fence line etc). To accomplish this the plough can swing to the side of the machine and steer the plough share in the direction of travel. This offsets the machine from the plough share and allows the machine to pass by the obstruction. This feature also makes ploughing around corners much easier.

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