

**Roger Davey, Senior Design Engineer of Ocmis Irrigation (UK) Limited, examines the procedures involved in installing a successful irrigation system, and asks...**

# Can you dig it?

Below: Varying stages of work as the Ditch Witch R100 – a 120 horsepower vibratory moleplough installs 125mm High Performance Polyethylene and Signal Cables

Factors influencing the choice of irrigation systems and companies that supply these systems often overlook the importance of the type of method used to actually place the product in the ground. After investing, or intending to invest, heavily in the irrigation equipment how many times has the golf club been let down by poor and shabby

installation techniques? The following is intended to give an overview of the various methods that can be employed whilst installing an irrigation system.

Ground conditions will bear the most influence, ie. sand or rock, clay or flint. However, the client must ensure that the supplying contractor has assessed his ground condition and is recommending a method which will leave his course in a state with minimal disturbance and disruption.

Pipe depth for installation should generally follow guidelines as laid down by local bylaws. Depths of installation, regardless of pipe diameter, should ensure a minimum of 600mm cover above the barrel of the installed pipe to natural finish grade for mainline and 450mm cover above barrel of the installed pipe for lateral pipelines sprinkler feeds.

## **Vibratory Moleplough**

The vibratory moleplough is designed to install pipe causing minimal disturbance. Vibrating moleplough blades are available in various sizes & specifications. Depths of up to one metre can be achieved and pipe sizes of up to 225mm may be installed with larger specialist machinery such as the Ditch Witch R100.

The principal of operation is very simple, however the blade technology is fairly primitive and it has been the responsibility of individual companies to tailor blade design to suit different ground conditions encountered on each golf course, eg. a links course mole blade would be substantially different than an inland clay course, due to the thin fine turf (prevent ripping) and drag co-efficient.

The mole blade is shaped with a bullet at the bottom and this bullet is sized according to the pipe diameter. Vibrations from a

hydraulic shaker box located on the top of the blade cause the leg to move up and down at speed enlarging the hole formed by the bullet. The pipe is connected behind the bullet by a flexible connection and is drawn through the subsoil in the bullet hole without being under tension. Cable is laid into position through a chute at the rear of the blade just above the pipe.

The ability to mole large pipes, (110mm, 125mm, 160mm and 225mm diameter) ensures that minimal turf scarring occurs. The mole lines should be rolled soon after pipe installation to close the slot, and re-knit turf.

Older moleploughs did not have the vibrating feature; this action has two advantages:

- i) Dissipates heave.
- ii) Eases the sub soil and improves bullet penetration.

Basic moleplough technology is simple however, the craft of installing pipes effectively and efficiently lies with the company and individual key blade designs, and good mole blade design will guarantee consistent pipe depth.

## **Trenching**

Possibly the quickest method of installing pipelines, although not necessarily the cleanest. However, the trenching option may be the only method of installing pipe, for example the ground may be excessively hard or contain sharp stones that would damage moled pipelines.

Turf removal prior to trenching is an option. Turf may be cut and lifted by mechanical means, thus ensuring that 'scar formation' is minimal, this is however fairly costly and time consuming and does not prevent the risk of trenchline subsidence.

Inevitably the excavation of a trenchline leads to large amounts of ground disturbance. Topsoil and





This page: Close ups of the mole blade on a Ditchwitch R100



subsoil become mixed together, grass cover is demolished and reinstatement becomes a 3-5 year project rather than immediate.

Trenchlines over a period of time will settle and may require dressing.

However, an excavated trenchline allows the inspection of the pipe and cable, ensuring that depth is uniform and jointing procedures are good. Trenches in general should be excavated to give a minimum of 50mm clearance either side of the pipe and cable snaked along the trench with approximately one metre of slack for every 100 metres.

It is imperative that the initial 150mm of backfill spoil is selected. If ground conditions are abrasive or rocky this initial backfill and indeed the trench bed, may need to be of imported sand or finings. Remaining soil should be placed back into the trenchlines in 150-200mm layers and compacted thoroughly, the trenchline being left slightly proud.

Trenchline compaction should be carried out by mechanical means;

ideally a vibrating trenchline compactor which can travel freely along the trenchline.

#### Boarding

Should conditions dictate, it may be necessary to carry out trenching or moling procedures whilst operating machinery on boards. These boards are usually one metre wide by approximately 3 metres long and prevent any tyre slip damage to the fine turf area. This operation is entirely optional, yet can give assurance in particularly sensitive turf areas.

#### Pipe Jointing Method

Pipes that may be installed fall into 2 basic classes, either Medium Density Polyethylene or UPVC. Jointing techniques for each differ immensely.

MDPE pipe may be jointed by either compression couplers or electrofusion equipment. It is common on pipe sizes up to 90mm to utilise compression fittings; sizes

above this will be jointed by electrofusion fittings. Compression fittings rely upon mechanical compression of rubber sealing rings to provide a watertight joint.

This type of joint is very simple and quick to install and also very reliable. Electrofusion fittings fit either onto or over the pipe, at which point they receive an electrical current which heats the coupling to form an 'as one' bond with the pipe.

UPVC pipes are generally coupled together with glue although larger pipes, 3" plus, may be jointed using mechanical 'O' ring seals. A glued PVC joint must be left to dry and cure before testing. Advances in pipe and jointing technology are outdated the traditional PVC pipes and the installation of MDPE is now the way ahead within the industry.

#### Flushing

It is imperative that as any work proceeds, installed irrigation pipes are flushed with clean water. This prevents the clogging and later failure of solenoid valves and sprinklers.

#### Isolation Valve and Solenoid Valve Boxes

Valve boxes should be installed on level ground, approximately 1-2 cm below grade and installed so as not to place pressure on underlying pipes or wires. Decoders where housed in solenoid valve chambers, should be clipped to the side of the chamber. Turf should be removed prior to excavation works and reinstated around the installed chamber.

#### Sprinkler Heads

The turf surrounding each sprinkler head should be removed and heads installed on triple swing joint risers. Backfill surrounding the sprinklers should be set in place by hand and turf reinstated, sprinklers should be installed just below grade. It may be desirable on a new build

project to leave the sprinklers 50mm proud and adjust the level to grade after a period of 6 - 12 months.

#### Signal Cable

Cable being either snaked at the bottom of the trench or laid in through the mole leg. At regular intervals the cable should be tested to ensure that damage has not occurred, tests used should include resistance to earth and continuity. It is recommended that cable joints are twisted, soldered and immersed in an approved joint containing a silicon based grease compound such as a DBY joint or equivalent.

Each joint should be housed in a chamber for future maintenance or identification purposes.

#### As Laid Plans

Pipe and cable routes should be clearly marked and identified on a set of as installed plans. All pipes should be clearly indicated together with sizes and cable joint positions identified. As Laid plans will be provided to the club at the end of the completed project.

All projects must conform to relevant Health & Safety policies and CDM Regulations. This is an area which must not be forgotten and a subject matter all of its own. However, any company of repute will be capable and able to produce full risk assessment, safety plan development and quality assurance necessary to comply with current legislation.

Quite clearly, the installation of the irrigation equipment is in itself as complex as the operation of the product. The quality of installation is very often reflected in the price offered, the overriding factor being damage limitation to both irrigation equipment and golf course. It is therefore just as important to study the type of proposed installation technique as it is the type of product offered.

