



Ground Forces

Unearthing Your Options in the Vertical Geothermal Drilling Equipment Market By Darren Swolley

Vertical geothermal drilling is a developing and maturing market. With government incentives, a weak heating and air conditioning industry and an uneven economic recession, contractors are looking for ways to diversify their services portfolio, so perhaps vertical geothermal loops are an option for crews.

There are three basic types of drill rigs and several brands and variations of drilling rigs that you will see in the market today. Drilling started with “cable tool” rigs, which raise and drop a “bailer” with a bit on the bottom slowly hammering through ground material. These rigs are not used very often for geothermal because they are very slow. Then you have what is referred to as a “table drive” drill rig which is a weighted drill stem system with a rotating table near the driller that uses gravity, cables and chains to feed the drill stem into the hole. These rigs do well in soft soils, but not as well in the harder materials as they have limited down pressure to put on the drill bit. This type of drill also has limited ability to drill as you are coming out of the hole and these drill rigs tend to be very large.

Then we come to the “top head” rotary drive drill rigs. They have a feed system that pushes the drill stem into the ground as you are rotating it and circulating either air or mud. These drill rigs have more control over the down feed and retract force of the drill stem. Most new rigs today are top head drive drill rigs.

Getting into the vertical geothermal drilling market can be a complex, yet very rewarding endeavor. There are many things to consider that most people don't ever look at until after they have started. Many people look to minimize their investment by buying the cheapest drill rig they can find.

Often buying a used drill equals you buying someone else's problems. Unless you can find a factory refurbished one, a new drill is a better option considering the overall picture.

What you may not realize is that a lot of the drills on the market today are rigs that were designed for geotechnical and environmental type drilling or water well drilling. The water well drilling rigs are typically rather large and heavy. Most of the geotechnical and environmental drilling rigs on the market today are not set up with any mud pumps to do wet rotary or air rotary drilling.

Most geothermal drillers use mud rotary because it is the most economical method of drilling as long as the soil conditions allow. There have been many advances over the last few years in new drill bit development. This has allowed the use of mud rotary in many soil conditions that might not have been previously considered suitable for mud rotary. There are many places, such as those with hard rock, that using a down-the-hole hammer or air drilling is the best method. No one has ever invented one drill and one drill bit that can do everything, so often several methods must be utilized.

The geothermal industry basically consists of two different types of jobs that require different types of drilling rigs. First is the commercial geothermal job, which consists of schools and buildings and typically have lots of holes and wide open spaces to work in. This type of drilling rig is bigger and geared toward high production as this is a competitive market to be in. Second, you have the residential housing market that typically has limited space to work in. The residential market has really changed how the geothermal drill rigs are made today. You need to have a drill rig that is small

enough to get into someone's yard, yet powerful enough to get the job done and be productive doing it. This is where contacting a reputable drill rig manufacturer can make all the difference.

When you start looking at drills, you will see many different options as far as the carrier the drill rig is mounted on. When choosing which one would fit you the best, you should consider a few things. Trucks are versatile as they can be moved from jobsite to jobsite easily. However, the size of a truck is important, as big, heavy trucks do not fit into backyards or go across driveways and sidewalks very well. Trailers can be a less expensive option as many times you are able to use an existing truck that you have and the truck is not permanently attached to the drill. The tracked carrier option is great for rough terrain, but can really tear up an existing lawn. Remember this type of carrier needs to be transported from site to site on a fairly large truck and trailer. Most tracked drills do not come with a mud pump or air compressor so make sure you look at this when making your decision.

Weight of the geothermal drilling equipment is also important. When drilling, you need to put "down pressure" onto the drill bit and without enough controlled weight, it could make for a long day's work. On the other hand, if you have too heavy of a drill, you will tear up the customer's property. You should talk to the drilling equipment manufacturer and discuss all of these things to try and find a workable balance.

Other things to consider are what the drilling laws and licensing requirements are for your area. Many times vertical drilling has different requirements than horizontal drilling. Something people don't consider is the rest of the equipment that is needed to do geothermal drilling. You will need support type equipment like a mini excavator or a backhoe loader to dig the geothermal lines into the house or building. You will need a grouter to mix and pump your grout into the hole through a pipe from the bottom up once the geothermal loops are installed. This will fill the voids in the hole between the loop and the borehole. Some of you may have construction businesses and you may already have a lot of this equipment. Below is a general list with some considerations you should look at:

1. Geothermal Drill Rig (Mud Rotary/Air Rotary – Truck, Trailer or Tracks Mounted)
2. Support Truck or Trailer
3. Mini Excavator or Backhoe Loader
4. Grouting Equipment
5. Tooling
6. Grout and Drilling Mud
7. Geothermal Loops
8. Geothermal Pipe and Fittings
9. System Purging Equipment
10. Heat Fusion Tools

Many drilling equipment manufacturers offer on-site training with years of in-the-field drilling knowledge. This can really help you get started on the right foot. The drills on the market today may be able to drill geothermal holes, but doing them in a timely manner and allowing the end-user to turn a profit are two different things.

Since the geothermal industry has grown so much over the years, there have been a lot of companies that have started manufacturing drills to get in on the geothermal boom. A lot of these companies used to build drills designed to drill small and shallow water wells in third world countries or for



The only rule of thumb in geothermal installation is that no two jobs are alike. You will need a toolbox full of solutions to solve each project, including mud mixers, grouts and drilling fluids.

the do-it-yourself homeowner. These types of drills are not generally geared for day-in and day-out high production. Remember to do your homework when looking at different types of geothermal drilling equipment and look for a company that is knowledgeable, has a good reputation and can provide the service and support for your business.

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