Choosing the Correct Steering Tool

This presentation will cover the 3 most common locating tools in our industry. We will discuss the pros and cons of each tool. We will also discuss when it is best to use each tool and why. The goal here is to better inform the industry that all 3 methods are very dependable in the right situation. We want to show that it is not good for the industry to limit to just one tool but each one has its place for success.

Walk Over Tool- Utilizes a Transmitter or Sonde to send out a signal in multiple frequencies from the drill head to the surface. Then, a receiver box is used on the surface to pick up the signal in order to locate the drill head. The receiver will give you an inclination, clock position of the bend and a temperature of the drill head. There is no recording of the left and right as this is noted on the ground.

Wireline- utilizes a probe that is inserted into a stainless joint of pipe. It sends and receives all the data through a 10-gauge wire that is installed inside of the pipe as you drill. This wire is connected to an interface that is connected to a computer translating all the data received. The position of the drill head is recorded at each survey which includes both depth and left/right. This tool has 2 forms of locating.

- **Calculated-** this uses the data received from the probe directly, which includes an inclination and azimuth. This calculation is based on the mathematics of survey to survey on the difference of each number change over the course length.
    - Example – if you start drilling a joint at 90 degrees and finish the joint at 91 degrees and the joint length is 31' feet. It will determine that you travel 31' at 1 degree of build. The same would be true with the azimuth.

- **Wire Grid Tracking-** This method requires the user to survey out the entire crossing placing points that the grid wire will be tied to called corners. Theses corners will be recorded using away distance form entry, left or right of center line of entry, and elevation difference from entry. These corners will be entered into the computer to form the grid. When the user is ready to take a survey of the drilled joint, he will apply an electrical current to the wire (DC or AC depending on the tool). They will first apply a forward current which is clockwise around the grid and then a reverse current which is counterclockwise around the grid. The amount of current entered in each direction will be entered into the computer to let the program know what was applied on top of the ground. The probe will send back how much it received, and this will allow the program to locate its position within the magnetic grid that was applied to the ground.

Gyro- this tool uses a Gyroscope inside of the tool itself which gives it great accuracy on its left/right data. The tool does not require a grid wire placed on the surface. With it not using a grid wire or a secondary locating system, this leaves the depth portion of the locating as calculated. Just like the wireline tool, this tool also receives its signal up a 10-gauge wire that is installed in the drill pipe as you drill.

Now that we have reviewed each tool, we can discuss the pros and cons of each tool. Each tool that we are talking about today has its place in the industry and is efficient in its proper place.

Walk Over Tool- this tool is very useful for your shallower crossing's and road bores. This tool is the fastest way to install any crossing. This tool can be challenging to use on larger pipe due to the fact it does not track left/right which makes it tougher to calculate compound radius. It is best utilized on 100,000 lbs. rigs and down.

Walk Over Pros-

- this tool by far is the fastest locating tool
- this tool is the easiest to learn
- user friendly
- quick set up
- cheaper to operate

Walk over Cons-

- Restricted by depth
- Does not record left/right
- Can be sensitive to interference (has greatly improved with the multiple frequencies added)

Wireline Tool- this tool will allow you to go as far and deep as needed. It is very accurate if it is under a grid wire and can have secondary tracking. For years, his was the only tool we had for longer, deeper crossings and performed very well during then and now.

Wireline Pros-

- Secondary tracking
- Depth not an issue
- Accuracy under grid the best
- Distance not an issue

Wireline Cons-

- Time consuming
- Difficult to learn
- Magnetic interference on Azimuth if not under grid wire
- Depth based on calculated data if no grid wire
- Cost

Gyro Tool- this tool is very similar to the wireline tool. It changed the industry for crossing large water bodies due to its accuracy of its Azimuth without a grid wire. Without a doubt, this is the go-to tool for crossing any water bodies or dense wooded areas that require lots of clearing.

Gyro Pros-

- Azimuth most accurate without a grid wire
- Depth not an issue
- Distance not an issue

Gyro Cons-

- Time consuming
- Depth based on calculated data
- Difficult to learn and cannot buy in house
- Cost

In this presentation, we hope to inform that all 3 of these tools are valuable assets in our industry. We use all 3 every day in our business. It is just important to realize each one has its place and to know when to use each tool. Every crossing is unique just as each one of these tools are unique. When we match the right tool to the right job, our chance of success goes up.