

GeoDrilling International



Sonic drilling

Top tips, benefits and rigs

Geothermal drilling

Introducing new incentive schemes and technology

United Kingdom

From Cornwall to Lincolnshire: drilling around the country



 **TERRA SONIC**
INTERNATIONAL
EQUIPMENT MADE BY SONIC DRILLERS FOR SONIC DRILLERS

Efficient to the core

At a time when safety, cost-effectiveness, efficiency and environmental stewardship are in demand, sonic drilling presents itself as a beneficial solution for many drilling applications. Terra Sonic International details the seven primary benefits that sonic drilling offers

Resonant sonic drill head

“Sonic drilling has less impact on the environment, reduced project time associated with collection and removal of waste, and less cost associated with the disposal”

SPEED

The speed at which the drill string is advanced with sonic drilling is (in most formations) two to three times faster than conventional drilling. The increased speed is attributed to the very nature of sonic drilling, which uses continuous and sustained vibratory energy in the drill string created by the sonic drill head.

This energy excites the soil very near (less than 0.25in) the string, causing the local solid material to fluidise. Once fluidised, the friction between the drill string and the surrounding formation is dramatically reduced, allowing for rapid drilling rates. It is important to note that a key to effective sonic drilling is the ability to vary the frequency of the vibration.

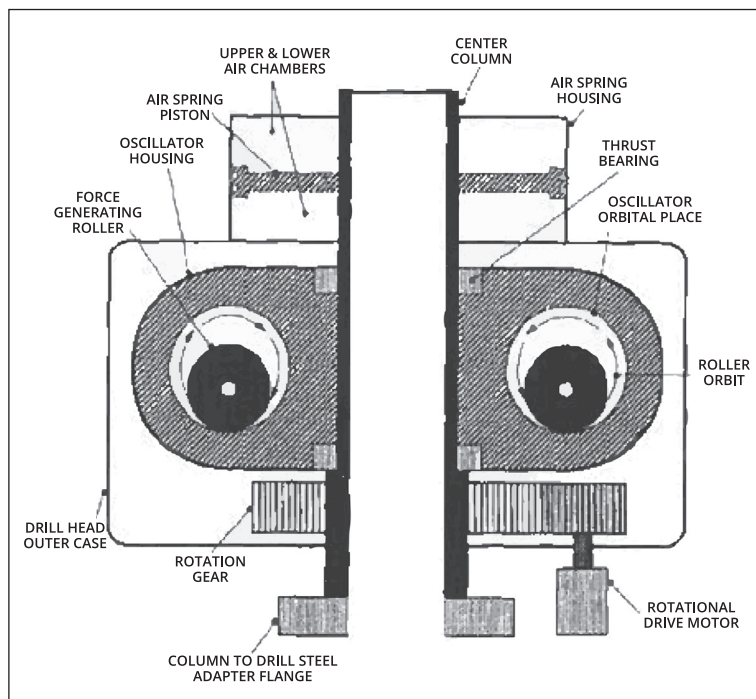
As the drill string length increases, the natural frequency of the sonic head-generated vibration reduces, requiring the head to oscillate at a different frequency to yield best results.

CONTINUOUS CORE SAMPLES

Sonic drilling can provide nearly in-situ core samples. As the core barrel is advanced through the formation, the vibration in the barrel created by the sonic head fluidises particles near the

barrel, allowing it to pass easily through most formations; this results in very little disruption of the sample in the barrel itself.

The resultant sample is a very pure representation of the formation. Once the core barrel and sample are extracted, the sample can be easily removed from the core barrel by energising the barrel via the sonic drill head.



Terra Sonic services

Terra Sonic International (TSI) manufactures sonic drill rigs, from compact crawler rigs and full-size ATVs to truck-mounted rigs, and provides sonic drilling services. This combination ensures that the rigs are built from the ground up with direct feedback from those that do the actual drilling. It is critical that sonic drilling incorporates sonic-specific tooling due to the nature of the resonant energy pulsating through the drill and casing string. TSI manufactures tooling that has been field-tested and is optimised for the sonic method based on TSI's own experience.

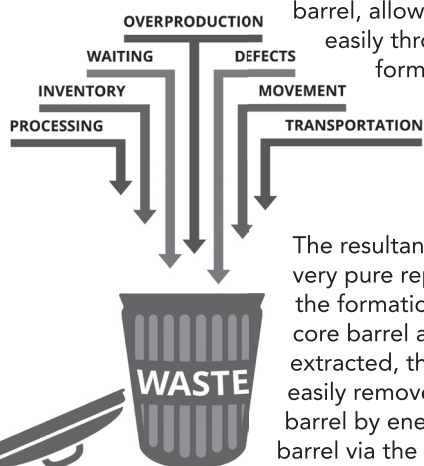
The vibratory energy created by the sonic head dramatically reduces the friction between the barrel and sample, allowing the sample to separate cleanly.

BETTER WELL CONSTRUCTION

The old adage “when all you have is a hammer, everything looks like a nail” can be applied to conventional drilling (the hammer) and the vast diversity of the terrain (the nail) in which drilling is to be accomplished – unless you consider the method

of unconventional sonic drilling.

Conventional drilling will get the hole in the ground by sheer brute force, but will the borehole and its integrity be ideal? Not when the formation determines how long it will take to get to the desired depth, how straight the path will be to get there and how prone the hole is to collapse. While the formation will always affect the effectiveness of any drilling operation, the nature of sonic drilling is such that the borehole will be straighter due to



the physics involved in how the resonant energy of the drill string overrides the media it is going through. The continuous casing process ensures hole collapse is a non-issue.

Finally, the borehole size itself will be as close as possible to the diameter of the overall drill string since the hole is straight and true.

WASTE MINIMISATION

In the past decade, consideration of the environmental impact of any process has taken its rightful place centre stage. Any liquid used in the drilling process, and often the cuttings, are considered hazardous waste that must be treated as such through proper collection and disposal.

It is therefore important that the cuttings generated and the use of fluids is kept to a minimum. Sonic drilling does not necessarily require the use of liquids (water or mud) for drilling and the solid cuttings brought to the surface are minimised.

This result is up to 80% less investigative derived waste (IDW) compared to conventional drilling. This means sonic drilling has less impact on the environment, reduced project time associated with collection and removal of waste, and less cost associated with the disposal.

SAFETY AND EFFICIENCY

Sonic drilling can be safer and more efficient than other drilling methods for many reasons. As already discussed, the hole is going to go in straight and true with minimal process waste.

Lean principles are not often discussed on the drill site; however, that does not mean they do not apply.

One aspect of lean is addressing the seven forms of waste (defects, overproduction, transportation, waiting, inventory, movement and processing) since any given process will add waste or add value. In addition, it has been shown that higher productivity while incorporating lean



principles leads to improved safety.

The process waste or IDW generated on drill site is minimised by the sonic method. Therefore, there will be less movement and processing associated with collection and disposal, resulting in far fewer opportunities for safety issues. Using the best sonic technology in the market place will minimise waiting with respect to equipment breakdown issues, dealing with incomplete or defective core samples, and boring more holes to compensate for those that do not meet the specification.

NO REFUSAL

Raising children is a topic of much discussion and volumes have been written over the years in an attempt to describe how to handle every situation. However, once you have kids, you rapidly find out that no two are the same and no child has ever had the same characteristics as your own.

How does this relate to sonic drilling? Every formation and job site poses its own challenges. Once drilling starts, the personality and disposition of the formation will dictate the kind of day you are going to have.

With sonic drilling, you can often drill deeper and through a variety of terrains, especially cobbles, boulders, hard layers/

lenses and heaving sands while maintaining fast and safe drill rates.

Furthermore, with newer, more reliable sonic drilling equipment that incorporates variable-frequency technology and the latest robust head designs, the various formations can be overcome quickly, ensuring a productive project.

FLEXIBILITY AND REDUCED RISK

In addition to the advantages outlined above, sonic drilling gives you the ability to collect discrete water samples and inject remediation fluids. It can also create angle wells or multi-cased wells without leaving the casing in the ground and can shift to split spoons, Shelby tubes and/or coring.

Perhaps most importantly in terms of safety and effectiveness, sonic drilling significantly reduces the risk for cross-contamination of aquifers or isolated zones.

One of the most common complaints about utilising sonic drilling for a project is that the cost of the technology drives up the price for the entire project.

It is true that a drill rig with sonic technology may represent a greater initial investment, but the overall project costs are reduced and the results are often improved compared to conventional drilling. ♥

The TS1 150CC sonic drill rig

“A drill rig with sonic technology may represent a greater initial investment, but the overall project costs are reduced”

DRILL WITH CONFIDENCE. **DRILL WITH TERRA SONIC.**

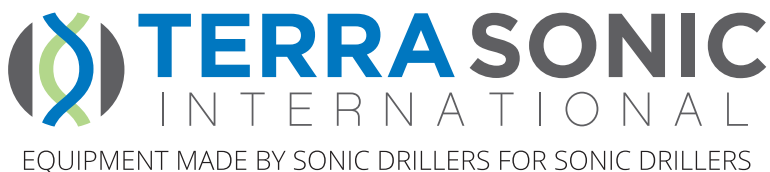


Terra Sonic International Designs and Manufactures the Most Reliable Sonic Drilling Equipment in the World

Our expert personnel bring over 200 combined years of experience to every Sonic Rig we build. Terra Sonic International Sonic Drill Rigs ensure:

- Near In Situ Core Samples
- Eliminates Investigative Derived Waste
- Industry-Leading Coring Productivity
- Plumb Boreholes through Varied Lithology
- Unparalleled Safe Operating Parameters

To learn how Terra Sonic International can help you work more safely, more efficiently, and more cost-effectively, visit our website: www.terrasonicinternational.com



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