

Sonic drilling, how does it work ?

Sonic drilling is a soil penetration technique that strongly reduces friction on the drill string and drill bit due to liquefaction, inertia effects and a temporary reduction of porosity of the soil.

Liquefaction

When you use a sonic drill head, the entire drill string is brought to a vibration frequency of up to 150 Hz. This causes a very thin layer of soil particles directly surrounding the drill string and bit to loose structure. Instead of a stiff mass, the soil behaves like a fluid powder or paste. This fluidization, or liquefaction, dramatically reduces friction.

Inertia

In addition to the liquefaction the soil simply is not able to stick to the drill string, because it is moving up and down some 150 times per second.

Compaction

The vibrations of the drill bit cause the soil to loose structure, changing it to a higher density with a lower porosity. In this way the soil opens up for the drill string to advance. When you retrieve the drill string after drilling, the suction and some vibration will cause the soil to regain much of its old lower density, and water will be able to flow freely again.

The effect

The liquefaction and inertia effects enable you to collect very long and continuous samples. Due to the vertical high-frequency movement the drill string stays extremely straight, with a diversion of no more than a few centimetres over the full length of the bore hole. In alluvial material, vertical vibrations are generally enough to drive down a drill string for many meters without the injection of any water or air.

When you are drilling in hard formations, liquefaction cannot take place. In such cases you can combine vibration with rotation, and use rock drill bits to cut the material. In order to keep the temperature of the drill bit down and lift the cuttings, foam injection is the best solution, but you can use water or air as well.



What makes it so valuable for you?

Our Sonic drilling technique brings you:

- High efficiency with extremely fast penetration speeds in alluvial material
- Rock fracturing and penetration of concrete and other high density layers
- A small, light-weight rig with exceptional power output
- The possibility to drill at severely polluted sites with very limited smearing
- High quality samples in dry and saturated soil layers
- Lost cones or bits for well installations, cold-heat exchange systems and seismic explorational drilling
- The possibility to use pre-pack monitoring wells with pre-shaped bentonite collars or BentoBlocks without grouting
- Easy retrieval of drill string and casing using sonic vibrations
- Low noise level compared to hammering with probe rigs
- Less wear and tear of rod threads compared to hammering
- Tiltable drill head for easy sample handling
- AquaLock sampler for either continuous or discrete sampling
- A wide choice of CoreBarrel samplers



Overview Sonic Systems	Techniques	Maximum frequency	Output dynamic force	RPM	Torque clockwise / counter clockwise	Formations
SmallRotoSonic (SRS)	Rotation & vibration	0-150 Hz	100 kN	100	1.200 Nm @ 150 bar / 1.400 @ 172 bar	All
CompactRotoSonic (CRS)	Rotation & vibration	0-150 Hz	150 kN	120	2.650 Nm @ 185 bar / 3.000 Nm @ 210 bar	All
MidRotoSonic (MRS)	Rotation & vibration	0-150 Hz	227 kN	140	5.605 Nm @ 240 bar / 7.200 Nm @ 310 bar	All
LargeRotoSonic (LRS)	Rotation & vibration	0-150 Hz	227 kN	92	8.900 Nm @ 275 bar / 10.000 Nm @ 310 bar	All

