

Grow Your **Geothermal** Business Using Sonic Drilling Technology





Presentation **Agenda**

- **Make Geothermal Profitable**
- **Mini Case Studies**
- **History of Sonic Drilling**
- **How It Works**
- **Worldwide Uses Today**
- **Testimonials**

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Four keys to profitability...



1. Drill quickly, limit the time spent on site
2. Create more opportunities by drilling in areas with tough soil conditions
3. Drill, case, loop and grout in one operation
4. Reduce the cost of site clean-up

Make geothermal profitable...



1. Drill quickly, limit the time spent on site.

- Because of its incredible speed advantage (3-5X faster), sonic drills drastically reduce on-site time.
- Different sizes and options such as track-mounted rigs offer increased accessibility.
- Recently, a test hole at a high-profile university was drilled in just over two hours.

Make geothermal profitable...



2. Create more opportunities by drilling in areas with tough soil conditions.

- Sonic drilling technology can bore quickly through mixed clays, sand, silt, gravel and boulders.
- This ability allows geothermal projects to occur in areas previously excluded.
- No need to swap out rigs because of different soil conditions.

Make geothermal profitable...



3. Drill, case, loop and grout in one operation.

- Sonic drills are the only rigs in the world that can drill, case, loop and grout in one operation.
- The time saved in being able to perform all these functions amounts to significant cost savings.
- Use of a sonic drill for geothermal installations is now a patented technique (patent holder: Ray Roussy).

Make geothermal profitable...



4. Reduce the cost of site clean-up.

- Sonic drills have the ability to drill using no drilling mud. Instead, these remarkable drills can drill with just water.
- Site clean-up costs can be reduced by up to 70% using a sonic drill.

The numbers say it all...

Case #1 – Community College Extension

A geothermal installation at a community college became the setting for a duel between old and new technology.

After encountering extreme soil conditions, a sonic drill rig was brought in as the “rescue rig” for the project.

Conventional Rig	Sonic Drill Rig
Three rigs on site	One rig on site
Two months drilling	Two weeks drilling
18 holes installed	23 holes installed
10 days per hole	1-2 holes per day



The numbers say it all...

Case #2 – University Library Extension

A conventional drill failed at drilling a test hole for a geothermal feasibility study at a university.

A sonic rig was brought in and completed the hole in two hours and 13 minutes, despite drilling through tough overburden conditions.

Conventional Rig	Sonic Drill Rig
Failed	One rig on site
	300 ft. hole
	Two hours+

The numbers say it all...

Case #3 – School Construction

Conventional rigs working on an extensive geothermal field, under a new elementary school soccer field, failed due to delays in drilling through overburden.

The sonic rig was able to complete the project on time – a critical issue for the client solved.

Conventional Rig	Sonic Drill Rig
Too slow	Two rigs on site
	120 holes
	Six times faster



Why choose a sonic...



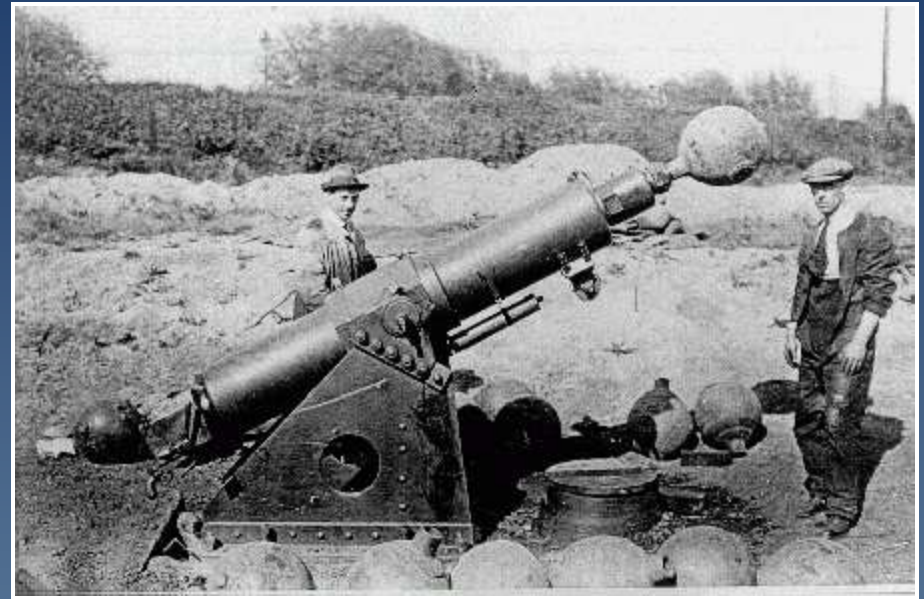
- Drill 3-5X faster
- Buzz through difficult ground
- Drill, case, loop and grout
- Can drill only using water
- Clean up site easier
- Drill to 300 ft. and beyond.

A recent geothermal drilling project produced this boulder which the sonic drill easily “buzzed” through.

Now, a little history...



First wave transmission rock drill (1913)



Silent sonic gun using compressed liquid and an explosive charge.

The concept of sonic drilling technology was born nearly 100 years ago when Romanian civil engineer George Constantinescu wrote a treatise for the British Admiralty called the *Theory of Sonics*. In May 1918, the Admiralty decided to back sonic development by establishing a new research facility in West Drayton, England.

A little history...

In 1930, another Romanian engineer, Dr. Ion Basgan applied sonic vibrations to the drill pipe string of a conventional drilling rig.

Amazingly, the result was increased drill depth and speed.

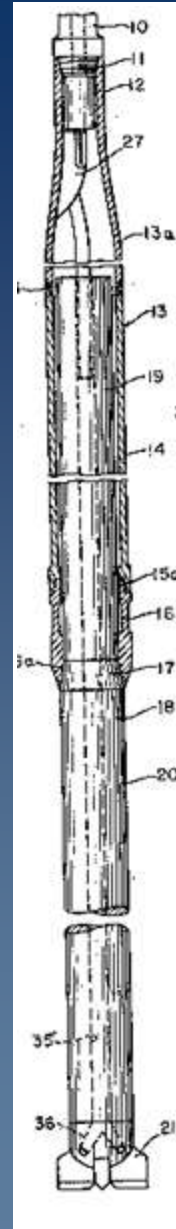


Basgan's sonic drill was used in the Moreni oil fields in 1938.

A little history...

The United States took up the torch of sonic research during the 1940's through the efforts of the Drilling Research Institute (DRI) and American inventor Albert Bodine, supported by the Shell Oil company.

Eventually, Bodine sold his sonic equipment in the early 1970's to the British aerospace company, Hawker-Siddeley, who assigned the next generation of research to one of its Canadian offices.



*Albert Bodine's
sonic earth
boring drill
(1964)*

A technology 100 years in the making...



Ray Roussy was hired for the Hawker Siddeley sonic team and, in 1980, when the project was abandoned during a recession, he left the company to become the only person to continue work on sonic drill technology.

Roussy's persistence resulted in the successful commercialization of a new drilling technology.



A technology 100 years in the making...



Ray Roussy's achievement was formally recognized when his sonic drill won two national awards including being voted "best new drilling technology."

Roussy holds the patents for this revolutionary technology and recently added additional patents that cover using a sonic drill for geothermal installations.



How it works...



Roussy's patented sonic drill head works by sending high frequency resonant vibrations down the drill string to the drill bit while the operator controls these frequencies to suit the specific conditions of the soil/rock geology.

Holes are drilled to the desired depth by rotating and vibrating the casing while keeping the bit face open with high-pressure fluid.

Worldwide use...

Environmental drilling in Canada.



Seismic drilling in the Arctic.



Offshore drilling in the Beaufort Sea.

Despite taking nearly 100 years to perfect, sonic drilling technology is now in use in continents all around the world including Asia, Africa, South America, Europe and, of course, North America.



And now today...



Today, after years of effort, sonic drilling technology is robust, reliable, profitable and award-winning.

Across the planet, it is quickly becoming the drilling method of choice for geothermal installations.

In this application, it is simply the fastest drill on the planet.



What others say...

“Geothermal is booming here and the sonic rig allows us to drill much faster and cheaper which keeps the per-foot costs of drilling down. And, if we hit mixed soils, we don’t have to pull a conventional rig off and try to put something else in there.”

It’s a super machine...and for those people who have never seen one, they are very impressed.”

— **Rene Kroonen**, Conex, Belgium



What others say...

“I’ve worked with Sonic Drilling on at least a dozen geothermal jobs over the past two years. The speed of the drilling is in my opinion unchallenged.

Sonic has made loop insertion simple. With Sonic, they drill to depth, your loop is inserted through the drill rod to the depth of the borehole with no complications and no time wasted.

— **Chris Patterson**, Paradigm Ground Loop Services Ltd., Canada



What others say...

“The sonic gives the ability to drill all the types of soils in the same hole without a lot of trouble. In many cases, we are doing 3-1 what everyone else is doing.

On one site, where we brought our sonic drill in, seven other companies had already tried and failed to produce the needed results.”

— **Daryl Karasch**, Traut Wells Inc., USA



Thank you for your interest.
May we answer any questions?

