

## Sonic Drilling Guide

Drilltechniques has produced this guide to assist those seeking to invest in new sonic drilling equipment from our partners Toa Tone Boring Co. (Japan) and Sonic Drill Corp (Canada)



25 Duntroon St Brendale QLD 4500

[www.drilltechniques.com.au](http://www.drilltechniques.com.au)

Ph: +61 (07) 3889 8943

# What is Sonic Drilling?

Sonic drilling is a method of drilling that uses sonic waves to vibrate at a certain frequency to advance the drill pipe. The frequency is variable and controlled by a skilled operator this frequency is also dependant on the geology. The adjacent picture shows two eccentric masses, these masses counter rotate at very high speeds to generate the sonic vibration and transmit it to the drill pipe.

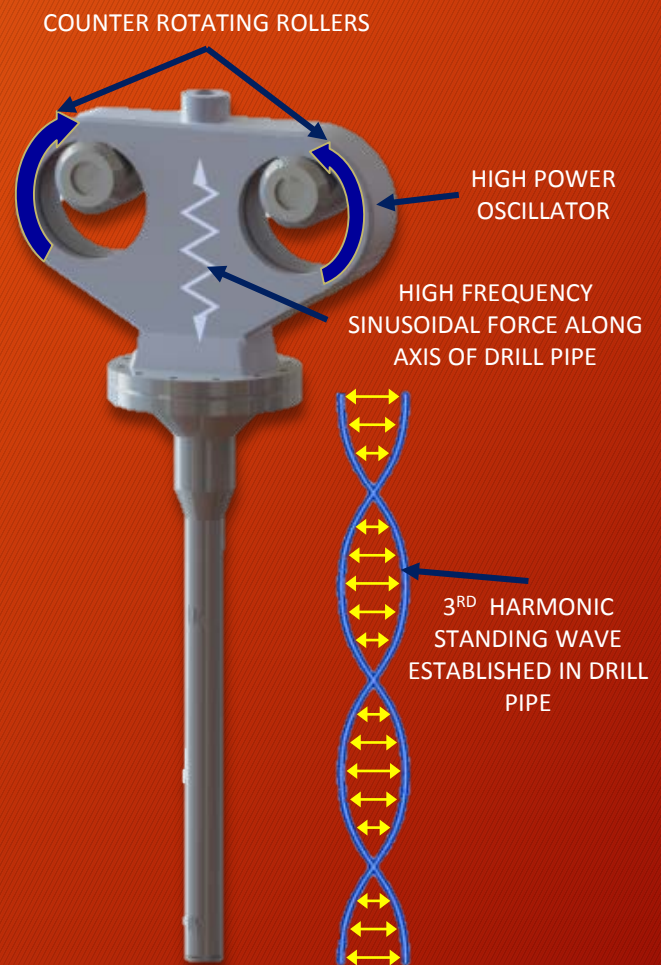
The vibration of the drill string and drill head causes a very thin layer of soil particles around the drill string and drill bit to loose their structure. The structural change of the soil makes it behave more like a fluid powder or paste rather than a rigid mass.

This process is called "liquefaction" and it is this fluid state of the soils that reduces friction on the drill string and bit.

The sonic vibration of the drill string also mitigates the soils sticking to the drill string as it is moving up and down up to 150 times per second.

The benefits of sonic drilling include the ability to collect long continuous samples, the high frequency, vertical movement of the drill string causes the drill to advance in an extremely straight manner and in certain materials the liquefaction reduces (in some cases entirely removes) the need for injecting air or water

## SONIC DRILLING HEAD AND DRILL-STRING



## Toa Tone Boring Co. (Japan)



Toa-Tone Boring was founded by Iwaji Shioda as Shioda Shoten in 1916. The company developed and launched the sale of Japan's first 150 m-class rotary drilling machine in 1926. The company was renamed Tone Boring Co Ltd in 1936. It was the only manufacturer of boring equipment in Japan before the Second World War and was not only one of the leading companies in the boring industry, but it made a major contribution to the development of Japanese industry after the war.

Tone Boring is licensed by the Sonic Drill Corporation to service the Asian marketplace and manufactures the same patented drill head as those manufactured by its developer.

High-frequency vibrating drilling ranks as a 21st- century engineering method that evolved from many different drilling methods which existed in the 20th century. The company acquired the licence for the high-frequency vibrating drill in 2002 and started the manufacture and sale of the drill in Asian markets as well as in Japan.



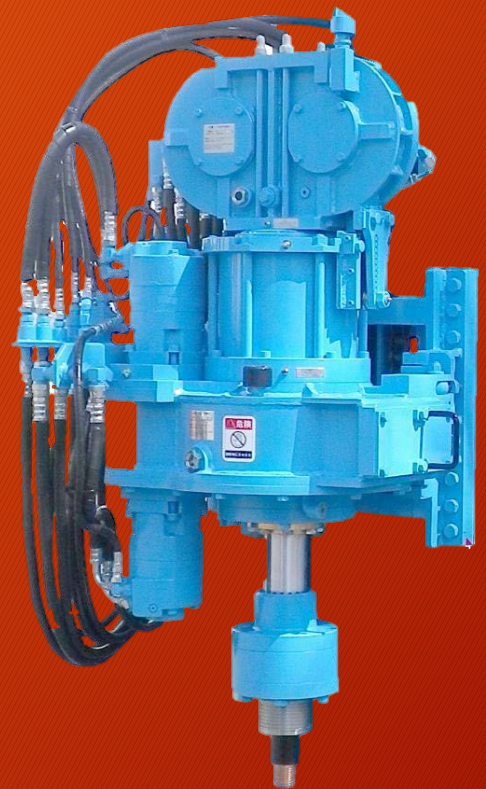
A TONE EP26 SONIC HEAD MOUNTED ON A DRILLTECHNIQUES SOLD AND SERVICED COMACCHIO GEO 305 TRACKED RIG OWNED BY LANDTEST

# Toa Tone Boring Co. (Japan)



## EP-26N DRILL HEAD TECHNICAL SPECIFICATIONS

Vibration Unit	
Type	Hydraulic motor driven
Max. frequency	4,000 cpm (67Hz) at 37 L/min.
Max. vibration force	38 kN
Flow rate for motor	37 L/min.
Operating pressure	13.7 MPa
Air Damper	
Type	Natural aspiration
Rotation Unit	
Type	Hydraulic motor driven
Rotation speed	0 - 159 min <sup>-1</sup> at 95 L/min.
Torque	3.395 kN-m at 20.6 MPa
Flow rate for motor	95 L/min
Operating pressure	20.6 Mpa



### DRILLING APPLICATIONS

- Environmental Investigation
- Geological Investigation
- Underground Geothermal Hole
- Monitoring Well

25 Duntroon St Brendale QLD 4500

[www.drilltechniques.com.au](http://www.drilltechniques.com.au)

Ph: +61 (07) 3889 8943

# Toa Tone Boring Co. (Japan)



## SP-50 DRILL HEAD TECHNICAL SPECIFICATIONS

Vibration Unit	
Type	Hydraulic motor driven
Max. frequency	4,000 cpm (67Hz) at 70 L/min.
Max. vibration force	65 kN
Flow rate for motor	70.4 L/min.
Operating pressure	17.5 MPa
Air Damper	
Operating pressure	0.7 MPa
Air flow rate	Min. 8 L/min at 0.7 Mpa
Rotation Unit	
Type	Hydraulic motor driven
Rotation speed	Low: 0 – 36 min <sup>-1</sup>
	High: 0 – 62 min <sup>-1</sup>
Torque	Low: 4.2 kN-m
	High: 2.1 kN-m
Flow rate for motor	101.2 L/min
Operating pressure	20.1 Mpa
Weight with water swivel	Approx. 520 kg



### DRILLING APPLICATIONS

- Environmental investigation
- Monitoring well
- Geological investigation
- Underground geothermal heat exchange hole
- Water well

25 Duntroon St Brendale QLD 4500

[www.drilltechniques.com.au](http://www.drilltechniques.com.au)

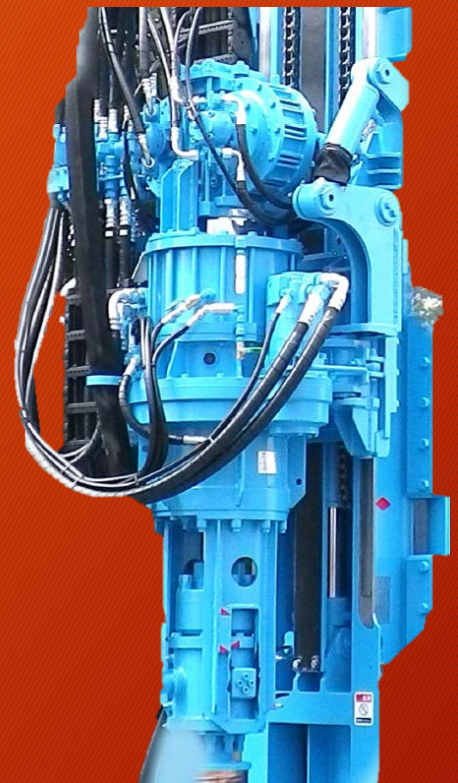
Ph: +61 (07) 3889 8943

# Toa Tone Boring Co. (Japan)



## SP-8000 DRILL HEAD TECHNICAL SPECIFICATIONS

Vibration Unit	
Type	Hydraulic motor driven
Max. frequency	4,000 cpm (67Hz) at 70 L/min.
Max. vibration force	78.4 kN
Flow rate for motor	123.7 L/min.
Operating pressure	20.1 MPa
Air Damper	
Operating pressure	0.7 MPa
Air flow rate	Min. 8 L/min at 0.7 Mpa
Rotation Unit	
Type	Hydraulic motor driven
Rotation speed	Low: 0 – 27 min <sup>-1</sup>
	High: 0 – 54 min <sup>-1</sup>
Torque	Low: 5.4 kN-m
	High: 2.7 kN-m
Flow rate for motor	82 L/min
Operating pressure	17.5 Mpa



### DRILLING APPLICATIONS

- Environmental investigation
- Monitoring well
- Geological investigation
- Underground geothermal heat exchange hole
- Water well

25 Duntroon St Brendale QLD 4500

[www.drilltechniques.com.au](http://www.drilltechniques.com.au)

Ph: +61 (07) 3889 8943

## Sonic Drill Corp (Canada)



The Sonic Drill Corporation (SDC) is an award-winning designer, manufacturer and supplier of innovative sonic drill heads, and tooling. In addition to holding numerous patents on the revolutionary technology of sonic drilling, Sonic Drill Corporation has invested more than 30 years in sonic research and development, making it the industry pioneer.

As a result, SDC drilling equipment has earned the reputation of being three to five times faster (depending on soil conditions) than conventional drills, proving their worth on numerous projects in six continents around the world. Today, Sonic Drill Corporation 50K drill head, remains the industry leader as the most reliable and field-proven choice for fast, cost-effective drilling in any type of overburden material.



THE SONIC DRILL CORPORATION 50K HEAD MOUNTED ON  
A DRILLTECHNIQUES SOLD AND SERVICED COMACCHIO  
900P TRACKED RIG OWNED BY COFFEY PTY LTD IN  
OPERATION IN NEW ZEALAND

# Sonicor Drill Head Specifications



## Sonicor 50K

- Drill head type
  - Hydraulically driven rotary head with vibration.
- Oscillator output force (max) :
  - 50,000 lbs force (222 kn)
- Frequency (max):
  - 150 hz
- Rotation torque:
  - 5,250 ft-lbs [7110 kn-m] forward / 7,000 ft-lbs [9,480 kn-m] reverse
- Rotation speed
  - 160 rpm standard (higher speeds available with optional rotation motors)



## Sonicor 33K

- Drill head type
  - Hydraulically driven rotary head with vibration.
- Oscillator output force (max) :
  - 50,000 lbs force (222 kn)
- Frequency (max):
  - 133 hz
- Rotation torque:
  - 5,250 ft-lbs [7110 kn-m] forward / 7,000 ft-lbs [9,480 kn-m] reverse
- Rotation speed
  - 160 rpm standard (higher speeds available with optional rotation motors)