WATER HAMMER DRILLING SYSTEM

- **NEW CONCEPT!!**
- **NEW WATER HAMMER!!**
- **POWERFUL & DEEP HOLE DRILLING!!**
- **DRILLING RECORD**

  Liverpool, UK - Geothermal Drilling - 2009
  Stockholm, Sweden - Jet Grouting Site - 2008
  London, UK - Geothermal Drilling - 2009
  Korea, Geothermal 6", Hard Granite 430m - 2012
  Korea, Geothermal 8", Hard Granite 2505m - 2012
  Korea, Geothermal 8", Hard Granite 3505m - 2013

D&B
HANJIN D&B
Drilling Equipments Co., Ltd.
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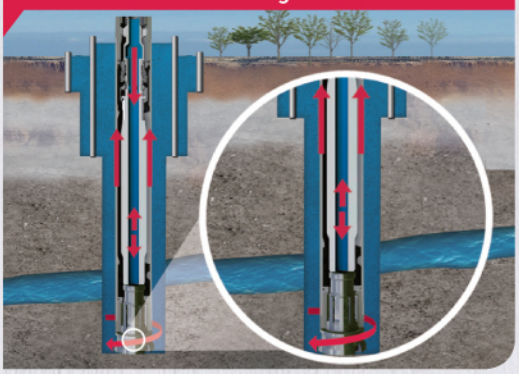
WHAT IS THE WATER HAMMER?

- *Water Hammer Drilling Process*

1. Water Hammer Insertion

Rig operation/water hammer connected & water pump running

2. Water Hammer Drilling & Head rotation



Drilling start. Hammer bit hitting by reciprocating motion with up and down between valve and piston

3. Separating System

1st cleaning by desander with rock fragments and soil materials on the surface

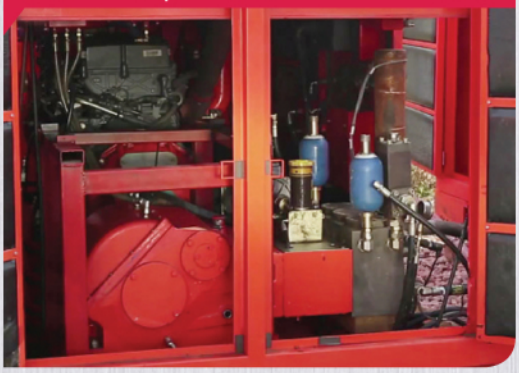
4. Purification System

2nd cleaning by purification system for suspended solid and fine particles

5. Water Tank

Inflowing clean water by purifier system into water tank

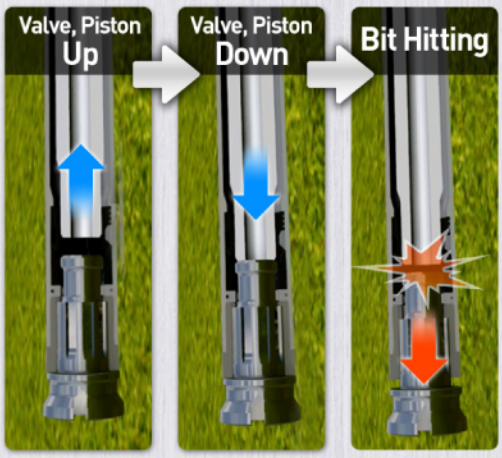
6. Water Pump



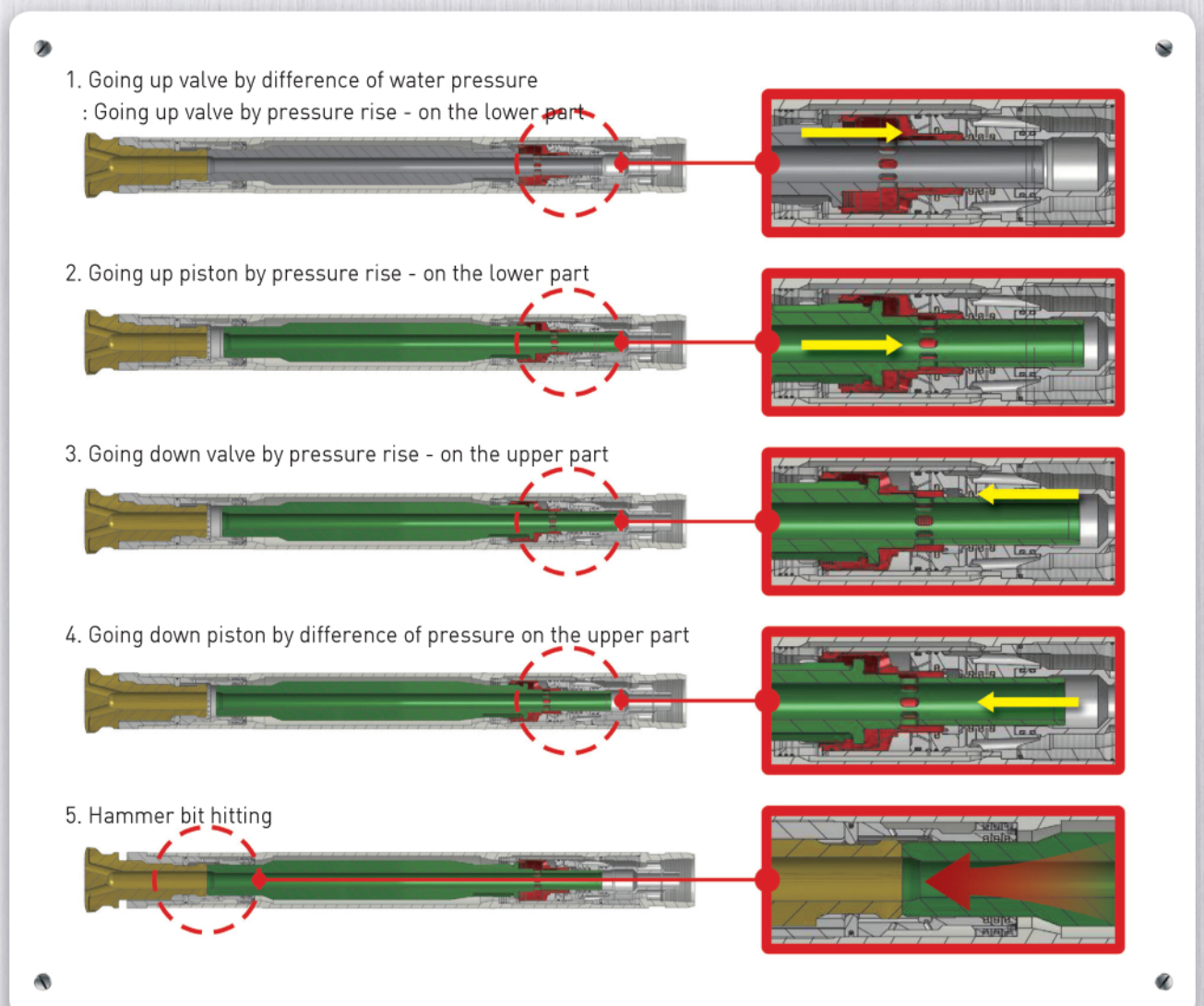
Water supply to drill by high pressure water pump

Basic Understanding Power Driven Hammer

- *Water Hammer*

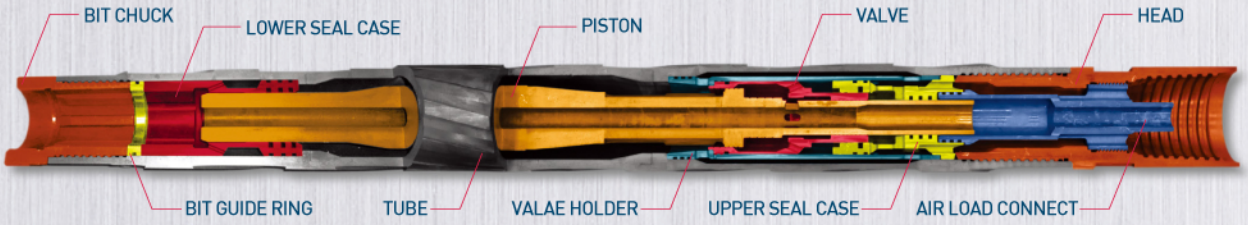


1. Valve·Piston Up: Going up·Water hammer, Cleaning Drill Cuttings after 1 Cycle of Drilling
2. Valve·Piston Down: Gong Down·Valve by difference of water pressure on the top of hammer part
3. Bit Hitting Speed: 10 ~ 15 times/sec



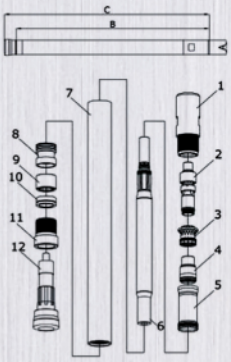
WATER HAMMER CONFIGURATION

• Sectional view



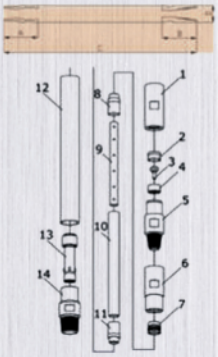
• Water Hammer

No.	DESCRIPTION
1	Connection Sub
2	Cut-off block
3	Upper seal case
4	Valve
5	Valve Guide
6	Pistion
7	Tube
8	Lower seal case
9	Bit Guide ring
10	Bit Guide ring A
11	Bit Guide Chuck
12	Hammer Bit



• Accumulator

No.	DESCRIPTION
1	Rod adaptor
2	Valve seat
3	Valve
4	Valve housing
5	Air Rod Coupling
6	Rod adapter
7	Air seal case
8	Hose coupling
9	Hose inner tube
10	Rubber hose
11	Hose coupling
12	Air tube
13	Air Rod Adaptor
14	Head



• Assembling process


Valve

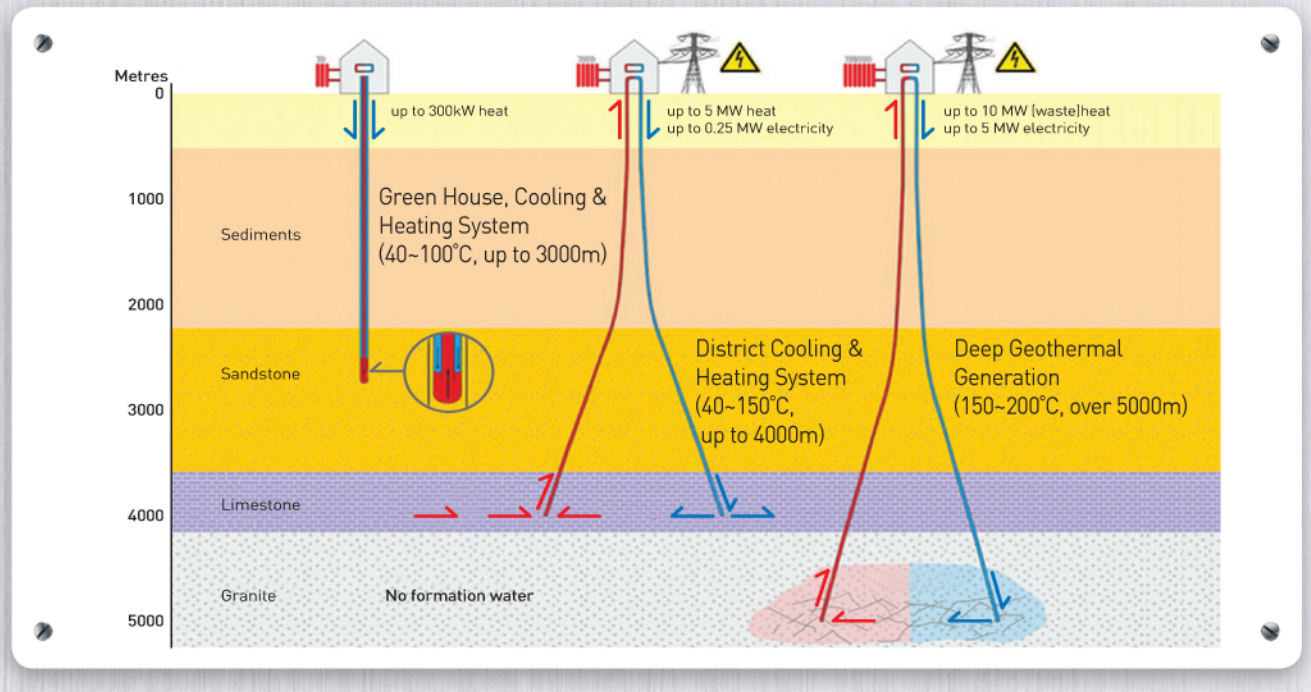

Bit


Hammer + Tube


Hammer + Accumulator

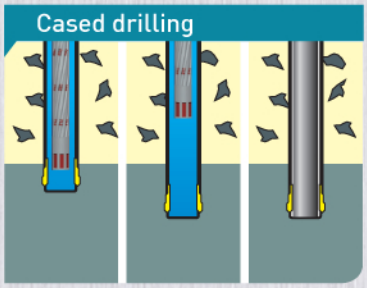
WHERE TO USE

Drilling system Application



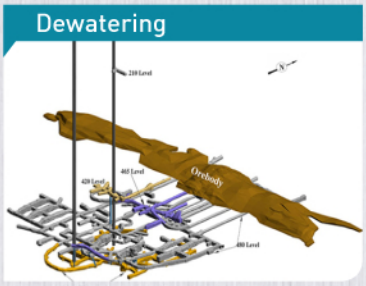
Dewatering

Cased drilling



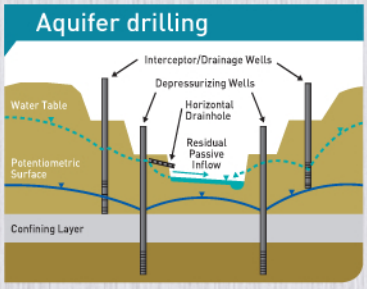
- Soft ground, Boulder in embankment, gravel and sand layer
- Construction area where low level of sound and vibration are required

Dewatering



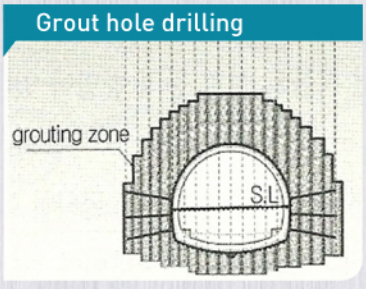
- Tunnel, Slope, Dewatering
- Accurate Deep Drilling using excellent linearity

Aquifer drilling



- Drilling through confined aquifer

Grout hole drilling



- Cement grouting for soft ground
- Dam, Embankment, Tunnel

D&B Water Hammer Specification

	Hol size bit (mm)	Diameter of Tube (mm)	Length (mm)	Total Length with bit (mm)	Weight (kg)	Water consumption at max pressure (lit/min)	Operating pressure (bar)
D&B-35WH	102	88	1997	2080	76	200	120-175
D&B-40WH	115	100	2124	2199	98	300	120-175
D&B-50WH	140	116	2211	2300	138	450	120-175
D&B-60WH	152	137	2506	2596	270	600	120-175
D&B-80WH	203	182	2866	2977	400	800-1000	120-175
D&B-100WH	252	225	3045	3185	480	900-1100	120-175
D&B-120WH	304	265	3130	3300	570	1100-1200	120-175

D&B Hammer Bit Specification

DIAMETER(D)		No. x Buttons diameter			Remark
		GAUGE	FRONT	CONE	
77mm	2.5 inch	8 x 16	4 x 16	3 x 16	
102mm	3.5 inch	8 x 16	4 x 16	3 x 16	
115mm	4 inch	8 x 16	4 x 16	3 x 16	
127mm	5 inch	8 x 16	4 x 16	3 x 16	
152mm	6 inch	8 x 16	4 x 16	3 x 16	
216mm	8 inch	8 x 16	4 x 16	3 x 16	
252mm	10 inch	8 x 16	4 x 16	3 x 16	
305mm	12 inch	8 x 16	4 x 16	3 x 16	

D&B Water + Air Mix Pump Specification

- D&B water Pump

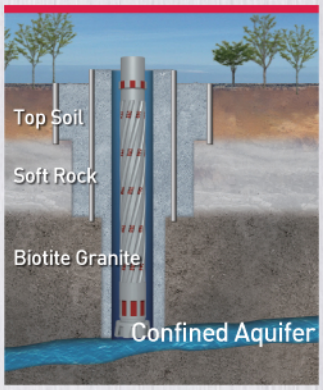
	2.5~4"	5~6"	8"	10~12"
Engine	D4DD	D6GA	D6HA	D6CA
Water Pressure (bar)	0~200	0~200	0~200	0~200
Water Volume (L/Min)	300	420	800	2400

- D&B Air Compressor

	20bar	25bar	30bar	35bar
Engine	D6CC	D6CC	D6CC	D6CE
Pressure (bar)	20	25	30	35

What is the Water Hammer Drilling Benefits?

Aquifer penetration Drilling



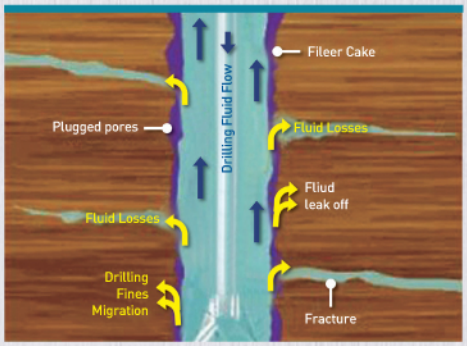
Confined Aquifer


Water Hammer drilling

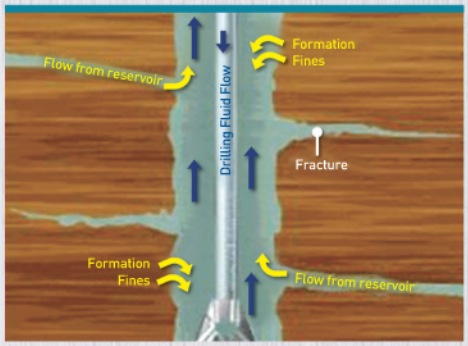

Water outflow

- Possible to use general drilling rig (no need to use additional rigs)
- No wate of fuel consumption
- Stable drilling speed regardless of geological condition
- No aquifer pollution

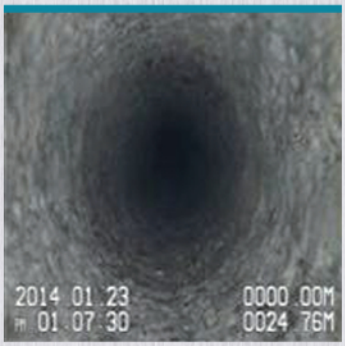
Under Pressure drilling is Possible



Mud drilling



Water Hammer drilling

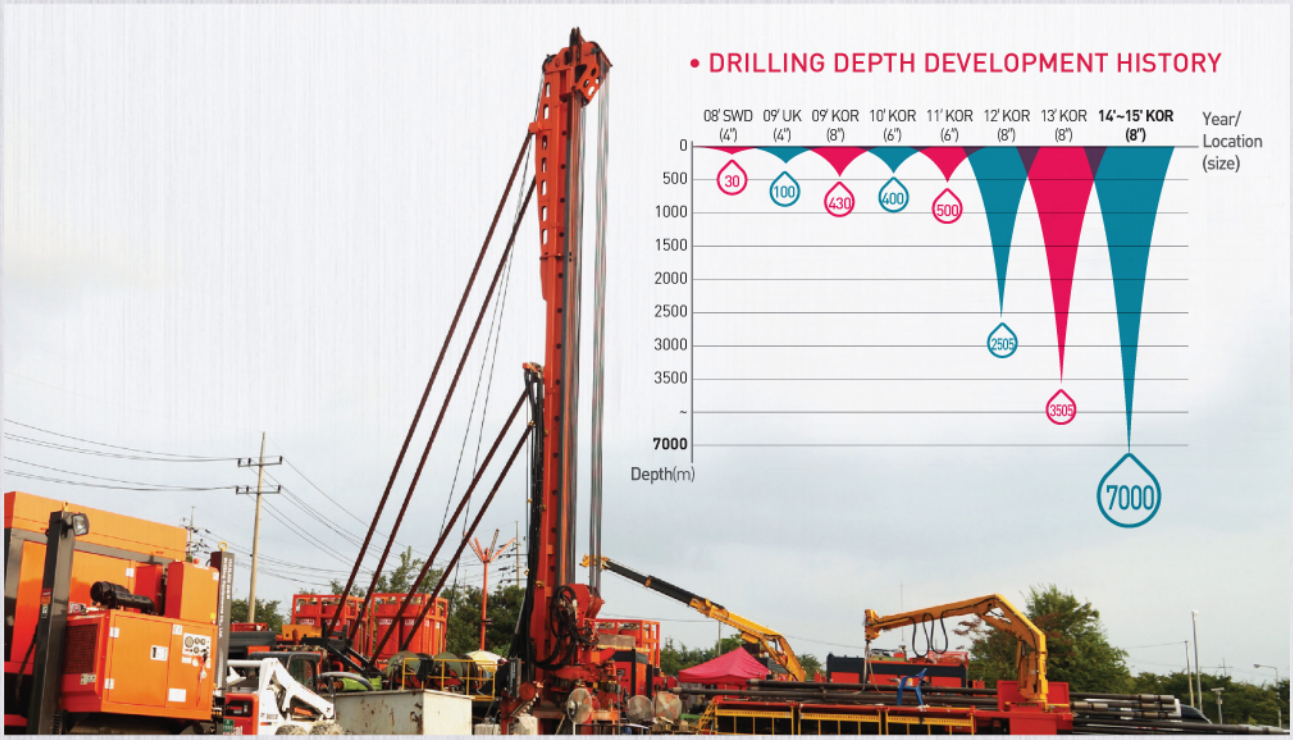


Clean Hole Surface

- Prevention of water outflowing
- Prevention of aquifer pollution
- High efficiency for drill cuttings by fast water circulation
- Longer bit life

RECORD

• Deep Hole Drilling Record [Gwang-ju, Korea, 2014]



• Drilling Performance

- Riverpool, UK
- Bit Size : 4"
- Depth : 100m
- GeoThermal

- Stockhole, Sweden
- Bit Size : 4"
- Depth : 200m
- Jet Grout

- London, UK
- Bit Size : 4"
- Depth : 100m
- Geothermal

- Gwangju, Korea
- Bit Size : 6"
- Depth : 430m
- Ground water

- Sejong city, Korea
- Bit Size : 8"
- Depth : 420m
- Geothermal

- Seoul, Korea
- Bit Size : 8"
- Depth : 500m
- Geothermal & Snow melting

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