



Inspired by the Ice Age

Geomachine | 2024



ESTABLISHED: 1984

MAIN MARKET AREAS: Finland, Sweden, Norway

MACHINES DELIVERED: over **750** to over 10 countries

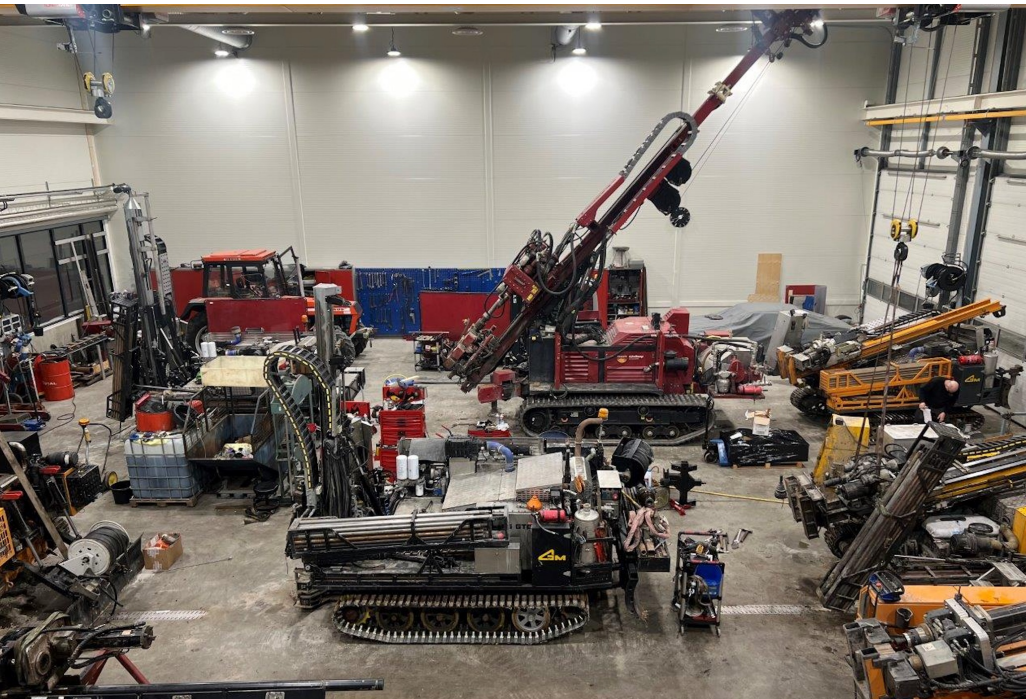
PRODUCT RANGE: equipment for soil research, mineral exploration and well drilling

INTELLIGENT SOLUTIONS: data logging software, vane equipment, electric drill rig, fleet management

COMPLETE SERVICE: machine design, manufacturing, service

SUPERIOR EQUIPMENT: versatile, reliable performance for the world's most challenging conditions, namely soil layers formed by the Ice Age

PTO teknikk AS



PTO teknikk AS ble stiftet i 2002

Vårt hovedfelt er innenfor hydraulikk og radiostyring.

Vi utfører:

- Salg
- Service
- Reparasjon
- Oppbygging
- Ombygging
- Sertifisering
- Sakkyndig virksomhet



Smart machine delivery

Geotechnical
soil research
and stabilization

Geological
prospecting

Geothermal
well-
drilling

Digital services

After markets

GM2000 New era of geothermal drilling

Evolving market needs

- Deeper and larger diameter holes drilled in bed rock are needed for new applications like **large volume geothermal wells**, carbon sinks, hydrogen storages, and Lithium extraction.
- The requirement is to drill in hard bed rock (with DTH) down to 2000-meter-deep energy wells or up to 500 mm diameter for 200 m deep storage holes.
- Less workforce available and cost of work is high; modern rigs are made for two people crew, while traditional rigs require 5-6 people, at least.
- Available land area is limited especially in urban areas

One 2000 meter deep well provides the same energy amount as 60 traditional 300 meters deep wells!

Depth (meters)	300	1500	2000
Energy (kWH/Year) per well	25500	950000	1530000
Energy consumption of 50m2 apartment (energy class b/c)	5100	5100	5100
Apartments per year	5	186,3	300



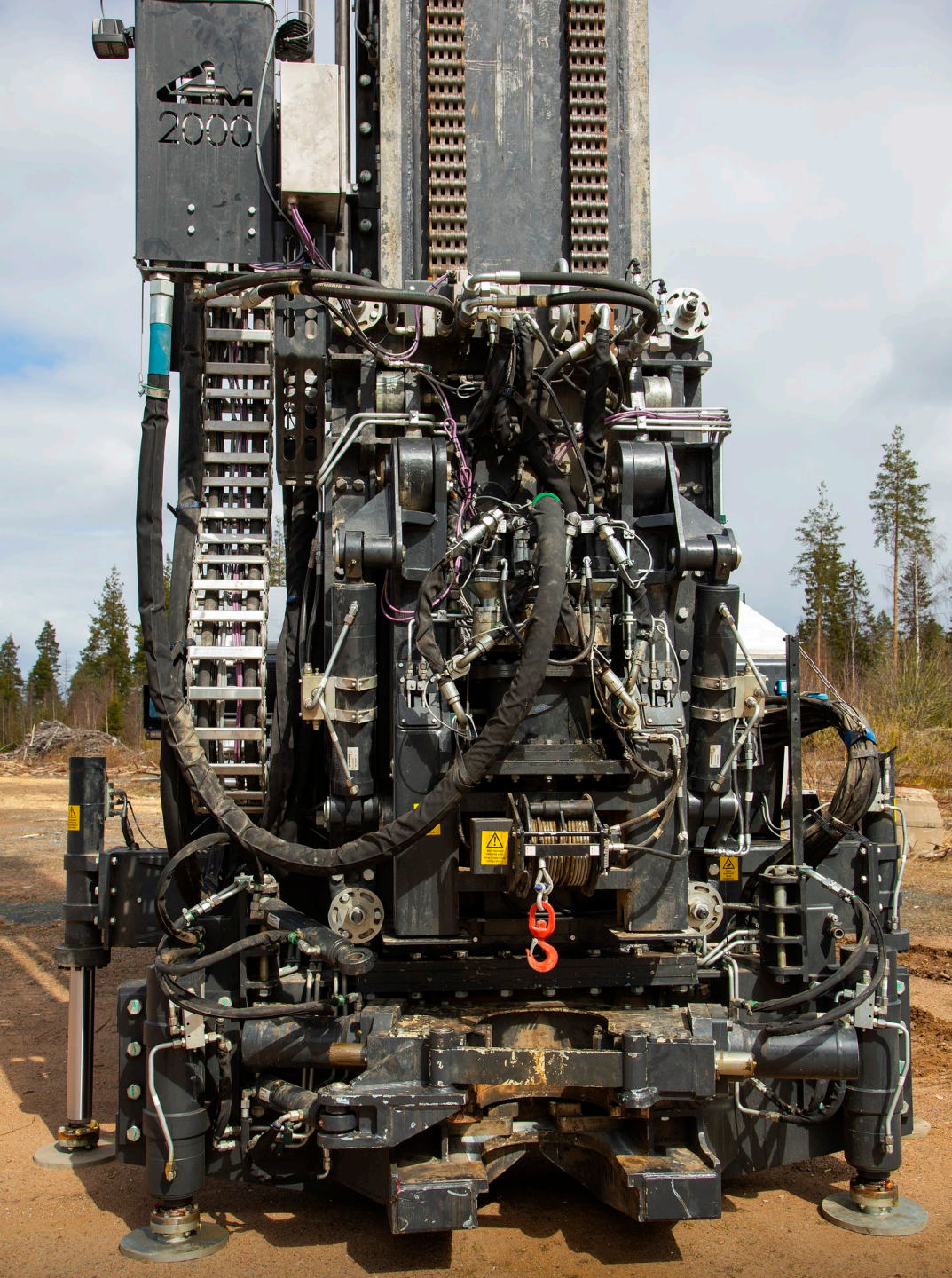
Read more: <https://geomachine.fi/en/a-2000-meter-deep-geothermal-well-has-been-completed-at-lounavoimas-waste-to-energy-plant/>

High production rate is the key to success

- GM2000, drilling productivity is maximized through
 - DTH technology
 - 9 m Drill Rods with automated handling
 - 60 ton lifting capacity
 - Drilling automatization and Weight-on-bit control
- Short set up time
 - Modular structure, self erecting
 - Short hole to hole time
- Downtime is minimized through
 - GM Weight-on-Bit drilling control
 - Reliable components
 - Preventive maintenance program



Drilling a 2000 meters deep well the operational drilling time is less than 200 hours. Two thirds of the time goes to changing of rods and one third to actual drilling. In the next version of rod handling, we are targeting to half the time for rod changes. Also diamond coated carbides in the drill bit can double the lifetime of a bit.



**Integrated solution makes it easy to
operate and get support**

**Geomachine integrated
geothermal solution**

DTH Drilling

GM2000

**Operating system
and IoT**

**GMair35
(2-3 pcs)**

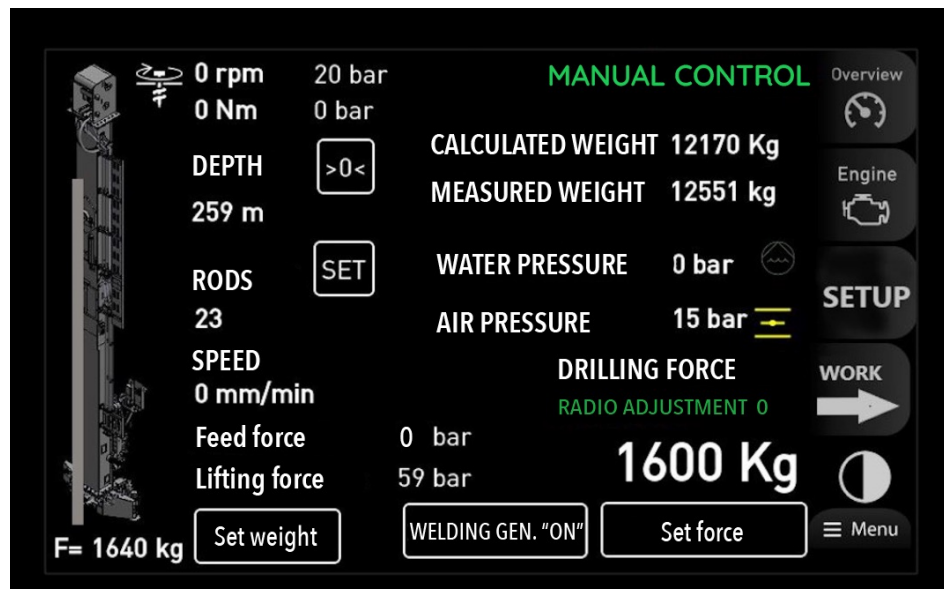
GMair80

Air Compression

Intelligence

From a driller to a process controller

- With GM2000 drilling process is automated.
- Drilling value monitoring keeps the driller constantly aware of the needed drilling parameters – even when the work occurs several hundred meters deep.
- GM2000 is operated with CAN-bus control system. System enables automated drilling with GM Weight-on-Bit (WoB) control.

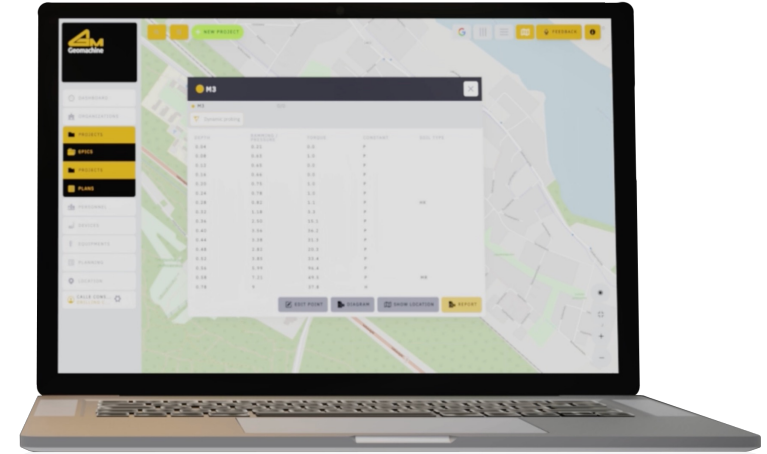


- WoB keeps the drill bit pressure against the ground at predefined target level optimizing the drilling speed and minimizing the wearing and damages of drill string.
- All the operations can be controlled and adjusted remotely with Scanreco controller.

Geomachine's aim is to change the role of the operator from a driller to a process controller.

GM2000 brings the measurement technology used in ground investigations to well drilling

- With GMTracker drilling parameters and rig performance are constantly monitored and data is stored to a cloud service for later analysis.
- Operator can report own observations and the progress of the drilling.
- Information across multiple sites can be analyzed enabling continuous learning and performance improvement.



- **Increases productivity**
- **Prevents breakdowns**
- **Reduces parts wearing**
- **Brings down operative costs**

GM Tracker monitoring include e.g.:

- Weight on bit
- Feed and rotation speed
- Feed / lifting force
- Torque
- Air valve position
- Fuel consumption
- Water pump pressure

Note: Air pressure, air volume and compressor fuel consumption can also be logged in case GM compressor units are in use.

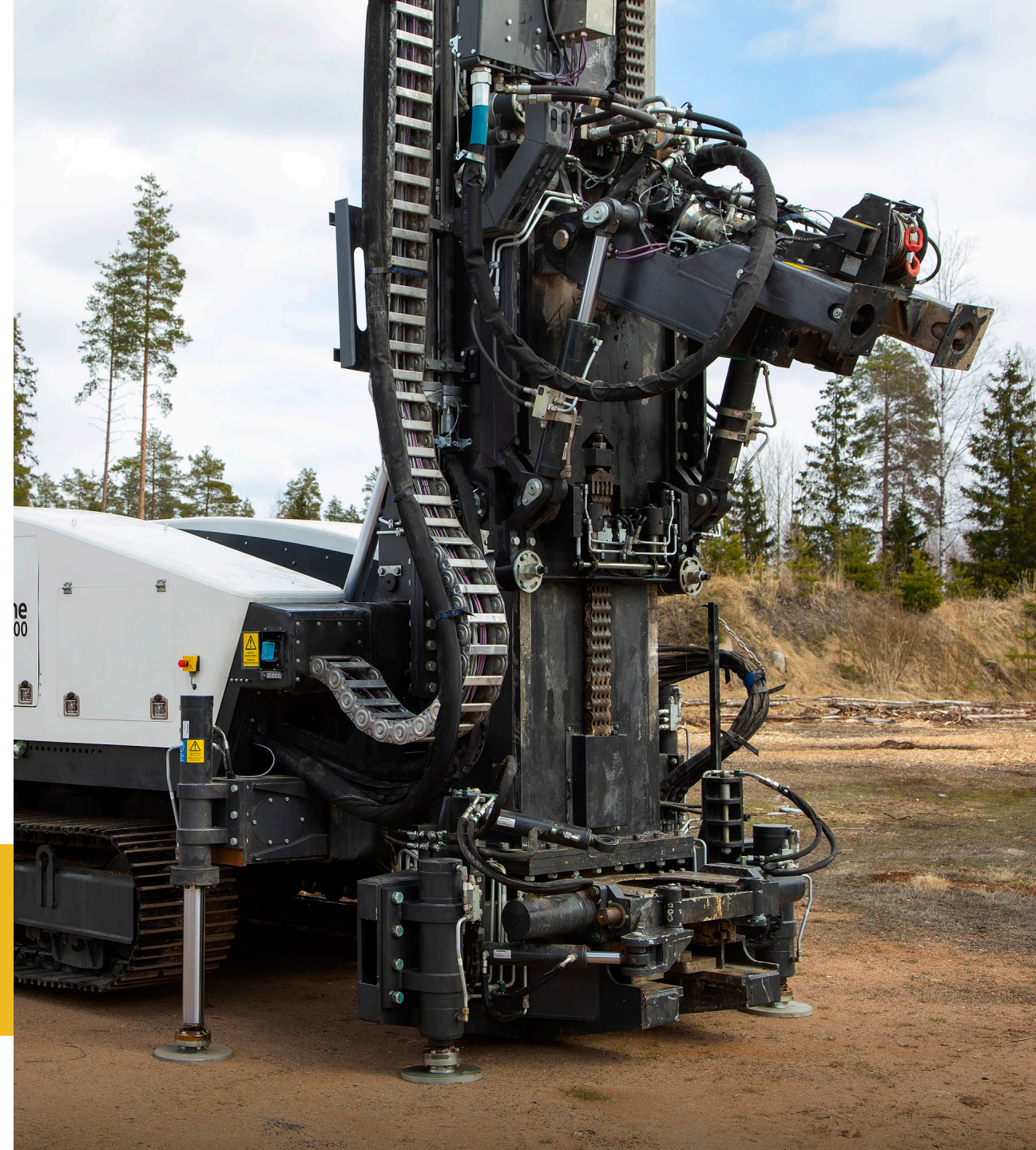
Technology

60 Ton lifting capacity

- The drill mast is designed to provide required lifting force to move the heavy drilling equipment rapidly and accurately.
- The rig penetrates fast even to the hard Scandinavian granite - thanks to the DTH drilling technology.

Lifting capacity	60 ton
Feed force	20 ton
Movement speed of the rotary unit	1 m/s
Rotary head movement range	10.5 m
Mast vertical movement	-0.6 m... +0.4 m
Mast support legs	Hydraulic, 2 pcs with -0.5 m movement
Winch	2 tons

GM2000 is the first DTH drilling rig designed to drill 2,000-meters-deep wells.





Automated drill rod handling

- The tilting rotary head is automated to work together with the feeding table loading and unloading the drill string.
- The opening and tightening of the rod connections are made easy with hydraulic clamp and sliding rod holder.
- All operations are protected with safety radar system.

Rotary head maximum torque	14 kNm
Rotary head maximum RPM	100
Rotary head tilting	90° forward with 30 kNm torque
Opener to release hammer / drill bit	Hydraulic
Safety radars	2-4 pcs
Maximum diameter of a casing pipe	610 mm
Length of a single drill rod	9 m
DTH Hammer	6-12 inch
Drill rod diameter	89-140mm

GM2000 tilting rotary head together with the automated feeding table makes drilling safe, fast, and easy for the operator.

Easy Mobilization and fast set up for drilling

Although GM2000 has the power to drill fast and go deep, it is:

- small in size
- easy to transport
- fast commissioning at site

The main dimensions of the rig are:

- Weight: ~42 tons
- Length: 15,2 m (in transport position)
- Height: 3,7 m (in transport position)
- Width: 3 m
- Crawler track: 600 mm x 3325 mm
- Ground clearance: 350 mm

GM2000 can be equipped also with an electric powerline.



Carriage specifications and standard equipment

Engine*	Cummins B6.7 Stage V
Power	243 kW
Driving force	225 kN
Max driving speed	2,6 km/h
Hydraulic support legs	4 pcs
Hydraulic generator	Dynaset
Water pump	100 bar
Oiler	Automatic
Motor heater	Webasto



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