

Rota-Sludge Manual Drilling

Providing affordable water access with human power

Product Sheet

Rota-sludge manual drilling has proven to be a successful, low-cost alternative for machine drilling and hand digging wells. Drilling shallow water wells by hand reduces the price of a well by a factor of 4 to 10, enabling rural people to have access to water independently through the private sector.

Context

Drilling with the Rota-sludge method is a sustainable and relatively simple start-up business for local entrepreneurs. It requires low initial investment and is easy to understand. In many countries it is being used to make affordable tube wells of up to 35m for drinking and irrigation water.

The Rota-sludge technique is based on the simple sludging method. By adding a bit and rotational motion to simple sludging, the Rota-sludge method is able to drill through sediment formations such as clay and sand, and in some cases even harder unconsolidated formations such as weathered sandstone and laterite. A motorized version of the Rota-sludge has recently been developed, enabling drilling teams to reduce labor costs and drilling times.

Technology

Manual drilling must (a) break or cut the formation, (b) remove the cut soil from the hole, and (c) provide support to the walls of the hole to prevent collapse during drilling. Rota-sludging uses water circulation to bring the cuttings to the surface. Drill pipes are moved up and down by human power. On the down stroke, the impact of the drill bit loosens the soil at the bottom. On the returning upstroke the top of the pipe is closed by hand (acting as a valve), drawing the water up through the pipe with suction and transporting the cuttings to the surface. On the next down stroke, the hand (valve) opens the top of the pipe and the water flows into an adjacent pit. There the cuttings separate from the water and settle out, while clean water flows from the pit back into the well. As all this happens, the assembly is rotated, moving the bit like a drill against the bottom. The borehole stays open by water pressure. Thickeners (additives) can be added to the water in order to prevent the tube well collapse and reduce loss of working water (drilling fluid) into the surrounding soil, without the need for casings.

Advantages: The technique is easy to learn with good trainers. It can progress quickly with a good team in the right situations, producing low-cost wells.

Disadvantages: To prevent collapsing, fluid-drilled boreholes must be kept full of water during the entire process. It is also limited to depths of about 35m.

Limitation: Coarse gravel and other highly permeable materials (cracks in the formation) cause loss of working water and cannot be drilled.

The facts

Application	Without rotation: Unconsolidated formations: Sand, silt and clay. With rotation and drill bit: stiff clays, soft sandstone and weathered laterite.
Range	Rota-sludging can be used up to 35 meters.
Costs	Costs of 30 meter bore holes vary from about US\$ 100 – 2500, depending on quality, application, geology and country.
Speed	2-6 days for a 30 meter bore hole, depending on geology, tools, logistics and experience of the drilling teams.
Equipment	Equipment is very cheap and can be produced and repaired locally.
Countries	Main application in India, Bangladesh, Nepal, Madagascar, Tanzania and Chad, with more planned.

Support

PRACTICA assists NGOs and governments with the design and implementation of manual drilling projects. This includes feasibility and mapping studies, hands-on training and technical support to the local private drilling sector (technical capacity building) and guidance of the implementing organizations to scale up their water supply programs. We can help you get broader water access for cheaper, while building local technical and managerial capacity.



The experiences

The Rota-sludging method has proven its wide applicability in many different countries. Examples include:

- **India**, where the simple sludging method has been developed and widely used to make shallow wells for irrigation purposes (>100.000 wells).
- **In Nicaragua**, where PRACTICA developed the Rota-sludge method to penetrate harder soil layers, now being used to train teams in, among others, Madagascar, Tanzania, Ethiopia, Zambia, Chad, Senegal, Liberia and Niger.
- **Madagascar**, where PRACTICA trained and professionalized drilling teams for MedAir. These are producing 750 sustainable water points over 4 years.

PRACTICA Foundation develops and disseminates low-cost appropriate technology in water and renewable energy in developing countries. We focus on technology that responds to local cultural contexts, can be locally produced and maintained, and leverages existing market systems.

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