

Reaching the unreached in Burkina Faso

Friends in Action – a UK-based charity – successfully drilled wells across West Africa last year, using a newly acquired truck-mounted Dando Multitec 9000 rig. In a small Burkina Faso village where previous well-drilling attempts were unsuccessful, residents' lives were changed instantly when a borehole reached a high-pressure underground aquifer. Thomas Way of PT DrillSys Indonesia reports.

“Sometimes it’s only when you turn up at a village that you learn how bad the situation really is,” Friends in Action (FIA) Driller and Project Manager Mark Collier said, describing his experiences in water-well drilling in Burkina Faso. The group began work last year in a village called Dora, a very arid area in the northwest. “When we started speaking to the local elders, they told us that contractors had attempted to drill twelve wells in the past but only one had produced any water,” he said. “When you are greeted with a story like that your heart sinks and you begin to prepare for the worst.”

Friends in Action began drilling in Dora with a new rig – a Dando Watertec 9000. The bore was dry until it reached approximately 75 meters. The team was discouraged and the drilling was very challenging and slow, until at approximately 80 meters when they broke through to a large water flow of at least 25,000 liters per hour. “The local people were singing, dancing, and crying,” Collier said. “The aquifer flow was under such pressure it was rising 50 feet into the air as we drilled, ... raining down on us all.”

Landlocked in West Africa, Burkina Faso remains one of the poorest countries in the world and rates 183 out of 186 countries on the United Nation’s Human Development Index in 2013. Almost a quarter of the population lack access to safe water and 12,000 children under the age of

5 are estimated to die annually from waterborne diseases. According to the World Health Organization, 80 percent of all diseases in the country are caused by unsafe water.

FIA, a United Kingdom – registered charity and Christian missionary organization, has had a permanent team in Burkina Faso for the last five years. Their focus is predominantly on the provision of water to some of the communities in the most impoverished and drought-stricken parts of the country, with the mission of “Reaching the Unreached.” In 2013, they purchased a new truck-mounted water-well drilling rig from UK-based Dando Drilling International to extend their capabilities.

“Since purchasing the (Dando) Watertec 9000, we have had our most productive year ever,” says Collier. In 2014, FIA drilled approximately fifteen wells in the eastern province of Gnagna, and another fifteen to twenty in the west-southwest region of Comoe. The team also brought the rig down to the Ivory Coast for two weeks, successfully drilling in that area as well as a number of wells in other remote parts of Burkina Faso. While the charity has made progress, Collier acknowledges that there is still an enormous need for well drilling in the country.

With their Dando rig Collier estimates they can mobilize and drill 35 to 40 sites per year, yet he has requests for 70 wells per year from some of their partner organizations, and a current to-do list of more than 200 wells per year.

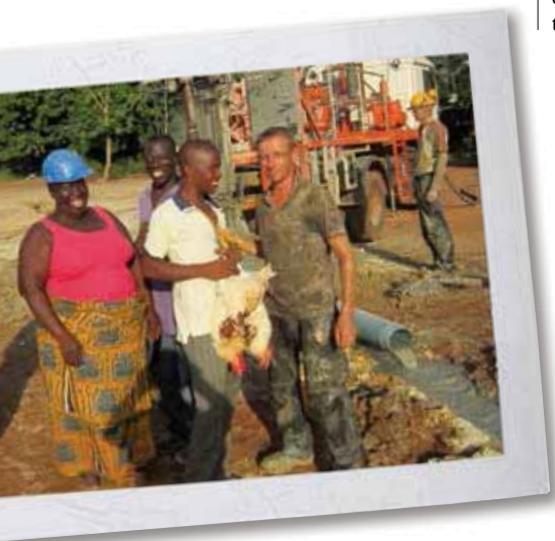


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Mark Collier, FIA Project Manager

Compounding the need for new wells, the geology is not always favorable and he estimates that most for-profit drill contractors only achieve an approximate 50-percent success rate. The FIA drill program, however, achieves an average of 75 percent successful, productive well installations – largely due to planning and good equipment, he said.

Collier, a qualified geophysicist, carefully researches sites using satellite imagery and



geological maps along with a thorough survey of the location. The team often conducts resistivity work, and in some locations they use low-frequency or magnetic surveying equipment. However, ascertaining the location of a good aquifer is only the start and Collier believes that, overall, problematic geology and drilling conditions prevent contractors from getting to depth.

Most of the wells in Burkina Faso are drilled to between 80 meters and 100 meters from the surface. Beyond that depth the success rate drops considerably and the FIA team maintains a cut-off of 105 meters – at which point they usually abandon the borehole. The geology tends to consist of 12 meters to 15 meters of overburden followed by harder metamorphic or igneous rock. These conditions were what primarily determined FIA's choice of rig when they decided to upgrade their old equipment in 2013.

The truck-mounted Dando Multitec 9000 rig they eventually chose was well suited for the terrain. With 10,000 kilogram-force of pullback, the rig is ideal for drilling well beyond 300 meters. However, as Collier explains, “Our experience drilling day-in day-out demonstrates that the extra power is (also) useful to get out of trouble when the drilling gets difficult, and for when longer sections of casing need to be installed. This is one of the reasons many contractors in the area have such low success rates.”

Since the majority of the drilling is through rock, the rig is set up for down-the-hole (DTH) hammer drilling and airflush as its primary method. However, a large mud-pump was also fitted on the FIA rig for areas where softer geologies make it hard to keep the bore open with air. Using this mud-pump, the charity revisited a number of wells left incomplete due to collapse and successfully redrilled them.

A typical borehole design comprises an initial 254-millimeter hole cased with 203-millimeter plastic pipe. Then a DTH hammer is used to proceed through the rock to depth. Well completion is determined with a minimum of 152-millimeter diameter. More than 80 percent of the holes are pumped by an India Mk-2 hand pump – a locally sourced and sustainable solution since parts can be inexpensive and available nearby, and the pump is easy to maintain. For

FIA, who is in Burkina Faso for the long-term, an important and often challenging part of its operations is ensuring that the water they provide remains sustainable.

Communication can also sometimes be problematic. With over 80 different groups in the population and 70 different languages in the country, FIA has witnessed other (often larger) organizations fail because their water education programs were not properly delivered or understood. In the Gnagna province where the Gourma people reside, language can especially be a barrier. “We often use local language group speakers who can also translate in French or English,” Collier explained. Local partners are able to discern the cultural nuances of the community they are helping, ensuring well-maintenance and aquifer-preservation instructions are understood.

With language differences bridged, Collier believes that giving all parties a vested interest in the well is worth as much as the drilling itself. “Ownership is a buzzword,” he said, “but it is essential that both our partners and the people we are helping have a real motivation to take care of the well.”

Due to FIA's high strike rates and the efforts they make to ensure the well remains operational far into the future, the nonprofit group is in constant demand across the country. In order to meet their target of 70 or more wells next year, they plan to purchase a second Dando Watertec rig and continue with their goal of “Reaching the Unreached” communities of Burkina Faso.

“It can be heart-breaking when you don't find water – having to leave the people in the same position as when you arrived,” Collier said, “but the rewards when you succeed are immeasurable.”

In Dora last year, no one expected FIA to succeed after so many failed attempts to drill previously. After successfully drilling with the Dando rig, they returned a few days later to install the hand pump. During that time, the aquifer water pressure had balanced out to just 1 meter from the surface. “When we installed the pump,” Collier said, “it started to overflow – crystal clear, potable water spilling out on to the dry ground.”

“It's hard to sum up the reaction of the people,” he added. “This was an aquifer with the capability to not only provide household water but to irrigate the land. Some of our own volunteers were in tears seeing the effect the well was having on the villagers and how it would impact the lives of the entire community in (the) future.”

Author's Note

Thomas Way is the marketing and public relations director of PT DrillSys Indonesia, an affiliate of Dando Drilling International. PT DrillSys Indonesia is located in Java, Indonesia.

Far left: Delighted villagers offer livestock to the drill team upon completion of a well.

Middle: Drilling under the rig lights at night offers a respite from the heat.

Left: Water is airlifted to develop a well. For some Burkina Faso residents, this is the first time they have seen clean water from their own village. All photos by PT DrillSys Indonesia

New modular water-well drilling rig design is low-cost, powerful

According to Quentin Dulake, sales manager at Dando Drilling International, the company's dedicated, bigger water-well rigs have an established reputation for deep drilling. “And this won't change,” he said. “However the market itself has changed. Unlike past years, governments and nongovernmental organizations (NGOs) alike are frequently turning to contractors for well-drilling projects rather than investing in their own equipment. These contractors and smaller NGOs – like Friends in Action – still require powerful, reliable, fast-drilling rigs, but they are (also) looking for lower-cost solutions.”

Realizing this, the Dando engineering team decided to tackle the problem from a design standpoint. The first of these models designed specifically for water-well drilling is the low-cost, modular, mid-sized Watertec 9000. Mounted on any robust 4x4 (such as the MAN truck chosen by the FIA team for Burkina Faso), in standard form this rig features a 142-horsepower Caterpillar C4.4 deck engine, a versatile rotary head capable of DTH hammer and airflush drilling as well as regular mud rotary, a 2040-kilogram-force main winch, and a robust open guide table. With 10,000 kilogram-force of pullback, the rig has a theoretical dry-hole capability of over 700 meters, using 90-millimeter rod.

The Watertec 9000 features a modular design that allows the driller unprecedented control over the specification. Although Dando insists on using top-quality components, the customers have choices. For example, they can choose between Caterpillar, Kubota, or John Deere engines; a selection of mud pumps; multiple rotary-head options; a hydraulically deployed mast extension, which allows tripping of 6-meter sections of rod; an on-board rod rack; and a rod loader.

Dando also introduced a new model that is extremely powerful despite its tiny footprint and low price. Capable of drilling water bores to 200 meters, in standard form the Watertec 4000 is mounted on a small 4x4 truck or a trailer, and is powered by a choice of diesel engines including a range of tier 4 silent pack units with power output between 50 horsepower and 100 horsepower. A 2.6-meter working stroke accommodates 2-meter drill rods, and an onboard tool rack can safely carry rods and augers.

The Watertec 4000 is already receiving a steady stream of orders and is being built to forecast on a continuous production schedule in order to keep lead times short.

