

# Solar power and water purification

Electron Technologies (Pty) Ltd, with a 40-year history in South Africa's electrical industry, has added a new solar power division to its company. *MechTech* talks to Dudley Filippa, sales and marketing manager for the new division about its new product offerings and in particular about an innovative water purification solution we spotted at the Green Building expo at Vodaworld.



Dudley Filippa, sales and marketing manager for the newly established solar power division of Electron Technologies.

**E**lectron Technologies (Pty) Ltd – known as ‘Electron’ – has been a provider of electrical products and services since its establishment in Braamfontein in 1967. Skills include electrical design, project management, software configuration, panel manufacture and site installation – and the provision of customised, integrated turnkey solutions. It manufactures a range of standard and purpose-built switchboards – up to 1 000 V – and is an independent, private, family business, currently 20% black owned, with offices in Johannesburg, Durban and Cape Town, providing services throughout southern Africa, Africa and the Middle East.

“The electrical side of Electron has been in existence for 40 years,” Filippa says. “Then, about six months ago, our managing director Andreas Bohnsack, decided to add the solar side as a natural extension of the original business. He called me in and showed me a very thick folder of research he had done on solar technologies,” he adds.

Bohnsack expressed his commitment

to solar power immediately by spending R100 000 on his Parkmore home – to become Electron Solar Power’s first customer. The house was fitted with a four kVA system consisting of 12 photovoltaic panels capable of powering all of the lighting, TVs, computer, security systems and fridge. “Kettles and hair dryers are also no problem if you use them for short periods,” explains Filippa, “but you shouldn’t use electric heaters or tumble dryers, or stoves. With solar powered electricity, you have a limited supply every day, so you need to become aware of how much power you are using every time you switch something on.”

Electron Solar’s sister company, Energy Options, has recently installed a 15 kVA system in a house in Cape Town, which enables complete independence from Eskom. “We are far behind the rest of the world though,” confirms Filippa, as he shows us a stadium in Switzerland powered by 5 000 photovoltaic panels – delivering 700 000 kWh per year – equivalent to the annual electrical consumption of 300 households. At 40 SA cents per

kWh, a system this size will provide R280 000 worth of free electricity every year.

“Most of the work we do, though, is installing alternative solutions in rural areas where Eskom electricity is not readily available,” says Filippa. “Our main products are solar-powered electricity systems using photovoltaic panels from Europe, inverters from the US and batteries. The batteries are the weakest link in the system,” he advises, “and we provide for the full range, from lead acid batteries with a five-year life to tubular batteries with up to 1 000 amp-hours of capacity and a 20-year life.”

## Solar-powered water purifier

Our discussion turns towards the Nañade solar-powered water purifier that Electron Solar has just begun distributing as part of its solar-powered range. “This product is very new in South Africa,” Filippa tells us. “We secured the agency six weeks ago. I am very excited about it and although we have only just started to promote it, we have already had very positive feedback from the likes of NGOs and charities supporting rural development,” he exclaims.

Nañade – a subsidiary of the Dutch power supply innovator, Nedap – claims that the lack of safe drinking water is responsible for 8 000 global deaths a day and about one child every eight seconds. In response to this need, it has used high-end technology to develop an affordable, reliable, and easy to install and maintain system that can provide free and safe drinking water for up to 250 people per day – from the natural resources available in rural areas.

“The key to the success of this project lies in the combination of the know-how of experts – in power supply, solar power and UV-disinfection systems – the choice of well proven, rugged equipment and the dedication of development team members,” says Nañade.

“The great thing about this product is that it is portable,” adds Filippa. “You can transport it to where there is a need, fill it with water and it is effective immediately, delivering up to 2 000 litres of clean drinking water every day directly from solar power – or twice that amount if you install a battery.”

The central technological principle is the 28 watt UV reactor tube – with a life expectancy of 8 000 hours – which, ac-

According to test results, has a 95-100% kill-rate on bacteria, protozoa and viruses. This same UV technology is currently being employed in large cities such as Rotterdam, Amsterdam and New York, as it obviates the need for chemical treatment, which is now increasingly unacceptable internationally. UV treatment preserves the natural taste of the water and is one of the few cost-effective alternatives to liquid chlorine disinfection. Ultrasonic and ozonation disinfection also show a good deal of promise but these technologies are particularly energy-intensive and are not yet cost-effective for most applications.

The use of an 80 watt PV solar panel for direct use in daylight hours, or the optional addition of a simple lead-acid car battery – charged from the PV-panel for night-time use – makes the system independent of both fossil fuel and electrical power networks. “The water passes through the UV-reactor while it is being tapped out. You purify the flowing water so that lamp-life translates directly into 8 000 hours of access to clean running water,” Filippa explains.

We ask about maintenance. “It’s absolutely minimal,” he responds, “all you need to do is keep the PV-panel clean and wash out the

cloth filters when they get too clogged. Naïade has succeeded in creating a water purification unit, which can be installed, operated and maintained by people with no technical education or background,” he says.

The materials chosen, as well as the technology used, have been intensively tested for use in remote and tropical areas. The unit does not use any moving parts and the filter bags clear the water mechanically of all particulate larger than a nominal 10 microns. After clogging, the filters can be easily removed, washed or replaced.

The cost? “Around R40 000,” Filippa tells *MechTech*. That equates to a capital cost of R160 per person based on 250 people using each system, and there are no significant running costs at all. If the 8 000 hours translate into 2 000 days’ use – based on four hours per day pouring time – the water purifier gives a per person, per day, cost of just eight SA cents.

Filippa’s outlook for the future? “If you look at what is happening across the globe, I believe we should be using solar much, much more,” he says. “Solar may be expensive up-front, but after that there are no running costs – and you can use up a capital cost



The Naïade solar-powered water purifier that Electron Solar has just begun distributing as part of its solar-power range. The system uses mechanical cloth filters and a UV reactor to produce safe drinking water for rural populations.

like R40 000 buying diesel for a generator or chemicals for a water purification system, very quickly.” □

## Self levelling machine expands machining capability

DCD-DORBYL Heavy Engineering Ver-eeniging has acquired a self levelling machine that will expand the machining capability for the size and quantity of large diameter shells that the company can manufacture.

“With the increased market demands, the size of mills and scrubbers has increased dramatically and this has meant that, in some instances, the size of mill shells has outgrown the capability and capacity of the already large boring machines which DCD-DORBYL owns and operates,” says marketing director Sias Booysen.

“It has been essential to find another way of machining the shells, specifically the large diameter shell flanges. The limiting factors from a machining viewpoint are the diameter, the height and the mass of the shell,” Booysen adds.

As these machines can take larger mass, diameter and height, the company is no longer restricted by the size of the vertical borers. “Apart from the large investment in the purchase of a new vertical borer, there are also extended delivery lead times. This means you could buy a new machine at a huge investment to cater for demand but if you are only able to operate it in 18 months time the problem is exacerbated,” he says.

“Add to this the fact that there would still be limitations with regard to mass, diameter and under the bridge height of components which can be machined. This self levelling machine, however, can be configured and therefore has an expandable capability. It is modular and can be built up from modular components to accommodate any size of component. In essence, it is a mobile transportable modular machine,” Booysen adds.

He points out that the self levelling machine will not replace vertical borers per se but for the specific applications for which it is being used, it competes very favourably and, in some instances, overtakes the conventional vertical borer. The self levelling machine follows a reference plane electronically. Utilising the strength of the item being machined for support, it is possible to minimise the structural strength and weight of the machine. This eliminates the need for self-supporting rigid portable machines that require considerable time and engineering effort for their installation.

The machines consist of a milling head, mounted in a rigid box fitted with wheels, connected to a central pivot system point mounted within the fabrication or casting being machined. On large diameter jobs, a scanning laser can be mounted on the central

pivot system. The laser targets interface to the scanning laser plane and control wheel height to maintain the milling cutter position parallel to the laser plane.

The main advantage of the use of a laser is that the machining diameter is limited only by the target’s ability to interface with the laser source, allowing accurate machining of diameters beyond 45 metres to be machined.



DCD-DORBYL’s newly acquired self levelling machine.