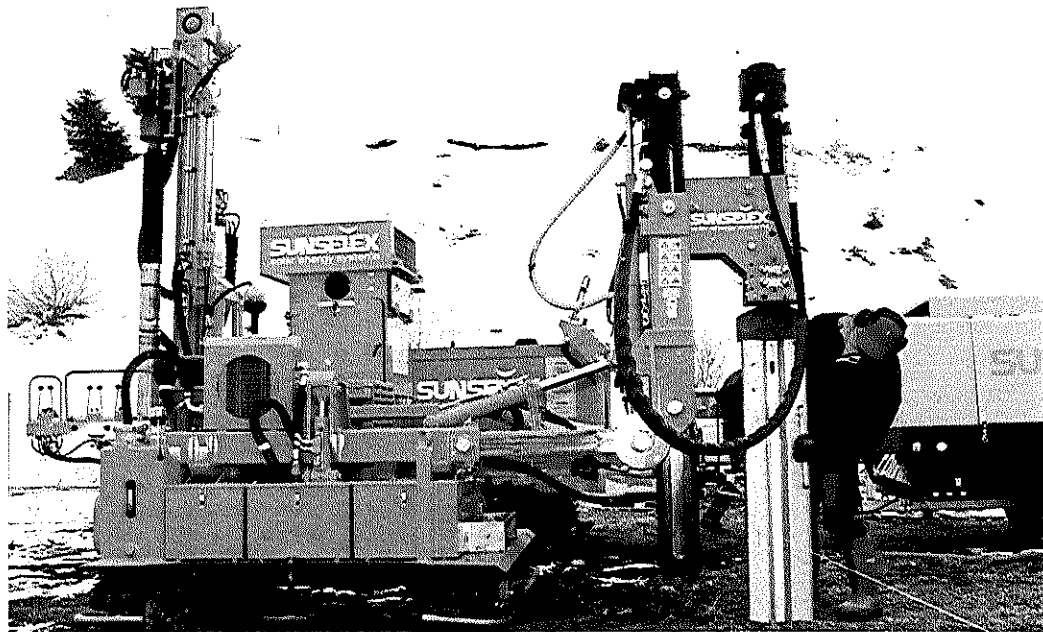


Photos: Sunselex



The HR21 drives a 30-centimeter wide steel profile during a test. A Sunselex employee measures the results with a spirit level to confirm the result.

## Big Mama is tough

**Solar plant construction:** Within a short time, Sunselex has become one of the largest solar plant construction firms in the world. The mid-sized company in Munich distinguishes itself especially in ramming steel foundations, even under difficult ground conditions, and assembling substructures. At the same time, it's expanding its range of services – from site preparation to plant maintenance – and accelerating international business.

It's typical April weather in Allgäu, Bavaria – big snowflakes obstruct the view. A cold wind blows over the grounds of Sunselex's training center in a former gravel pit near Kaufbeuren, but Peter Reckziegel, a machine operator, hardly notices. "We're used to the cold in this area," the 39-year-old says, smiling. He's concentrating on a keyboard of levers. The 4.5-meter tall drilling arm's black rubber cuff heads downward until it rests on the snow-covered ground. More than 30 centimeters thick, the drill bit begins rotating on its axis, first slowly, then faster and faster. The nine-ton, bilious green tracked vehi-

cle and the compressor carriage hanging from it start trembling. But the vibrations and volume stay at a minimum – today, "Big Mama," as Reckziegel lovingly calls the specialized machine, has easy work. Within minutes, the steel drill bores a 1.5-meter deep hole in the fairly loose earth.

"Big Mama" can be a lot tougher: with a compressor capacity of more than twelve bar, it can bore holes up to 2.5 meters deep and 30.5 centimeters wide in granite, large lime stones, asphalt, and concrete – terrain conditions often found when constructing solar farms on rocky substrate in southern Europe or on con-

version sites. "Then it can get really loud; you need hearing protection," Reckziegel emphasizes. An integrated vacuum device limits the dust. The residue



April weather in Allgäu.

can be collected and put into the drilled holes to pack them in preparation for the ramming of the steel foundations for the solar modules' supporting frames. Up to 100 holes can be drilled in a day. "Thanks to the new machine, we're able to drill a large number of wide, deep holes even faster – even in unfavorable terrain conditions," Reckziegel says. Sunselex just received the latest version of "Big Mama," costing about 250,000 euros, from a supplier at the end of February. The drilling rod and compressed air supply were strengthened according to the company's specifications and the metal chain undercarriage was improved to make the machine even more efficient and capable of handling any terrain. Over the next few days, the machine will stay at the training grounds in Kaufbeuren so new employees can familiarize themselves with its operation. The rock-drilling unit is originally from the geothermics field, where it was designed for slower drilling and deeper holes. "Our first step was to optimize the machine for the faster drilling and longer continual use necessary for constructing outdoor PV plants," Reckziegel recalls.

Sunselex has also commissioned a number of further developments for the bilious green HR 21, sitting nearby in the snow flurry. The hydraulic ramming crawler was originally used in road construction. Sunselex is currently using a dozen of them. For solar farm construction, the chain drive was made to handle more kinds of terrain, the motor was designed to be more resistant to cold and heat, the durability of drivers was improved, and the tower's lifting height was increased to four meters to ram longer steel posts for module frames. One of Reckziegel's colleagues is placing the profile, which is just over two meters high, under the special machine's hammer. He slowly brings the driver down until it rests on the top edge of the trapezoidal steel plank. The second machine operator uses a spirit level to take a measurement and slightly adjusts the plank until it's completely level. The hammer starts up, metal strikes metal, and a menacing sound fills the icy air. Millimeter by millimeter, the approximately 30-centimeter wide steel profile sinks into the ground. "The usual, smaller diameters make going into loose ground like this much faster," Reckziegel explains. On the other hand, wider beams,

### SUNSELEX'S SERVICE PORTFOLIO

#### Geological surveying

Site study by commissioned geologist; report with description of ground conditions, necessary ramming depths, and horizontal and vertical capacity of ramming profiles; test ramming.

#### Measurement services

Measurement and marking of ramming points, cable trenches, construction and supply roads, inverter housings, transformer stations, and fence supports by commissioned surveyor.

#### Site preparation

Planning of plot, packing of surfaces, clearing of vegetation; collection and removal of cleared vegetation; establishment of construction and access roads and storage area.

#### Security fence

Delivery and erection of fence with gateways and elements to prevent climbing.

#### Security guards

24-hour security during construction; entry and exit checkpoint for employees, contractors, and suppliers.

#### Organization of construction site

Provision of construction, storage, and office trailers, sanitary facilities, and site power supply; provision of equipment, vehicles, and machines appropriate for site conditions under consideration of accident prevention regulations.

#### Substructure

Delivery and erection of support structure or elevated track for crystalline and thin-film modules with foundation on steel posts rammed in ground; inclination angle and module configuration according to clients' specifications, load assumptions according to DIN 1055.

#### Ramming foundations

Delivery and ramming of steel posts (ramming foundations) for substructure; steel posts hot-dip galvanized with a layer at least 55 millimeters thick in compliance with DIN EN ISO 1461 and with a length of up to four meters; ramming in soil classes 3-5 according to DIN 18300.

#### Rock drilling

Creation of drilled holes with special rock-drilling machine for ramming of steel posts in soil classes 6-7; dust from drilling collected during process. The drilled holes are then filled with the collected drilling granulate or with cement. In accordance with DIN 1045, Asphalt and cement surfaces can also be drilled.

#### Electrical installation

Electrical installation of all solar power plant components, including all necessary earthwork and excavation.

#### Video surveillance system

Delivery and erection of poles for surveillance cameras with infrared motion detectors, including all wiring and earthwork.

#### Supervision of incoming goods, logistics

Oversight of all incoming components; unloading and documentation, including construction site logistics.

#### Waste removal

Collection, loading, and removal of packing materials for all components necessary for construction of solar power plant, for example wooden pallets, sheeting, tightening straps, and metal waste.

#### Technical documentation

Technical documentation, daily construction report, and project progress reports with photo documentation.

#### Maintenance

Maintenance and supervision of materials and components used in construction. Cleaning and site upkeep, maintenance of fences, roads, and buildings.

like the ones Sunselex is currently testing for a customer, can carry larger frames with more modules, thereby lowering costs for solar farms.

A few meters farther on, new prototype frames from two manufacturers are set up to test an optimized cable attachment and adjustability. A whole troop of Sunselex technicians in red overalls is on the other end of the training grounds, assembling five ten-row module frames from Hatikon and Schletter. Several men push the pur-

lins in and then drive in the security wedges by hand. A fine touch is needed to insert the First Solar thin-film modules, which are hoisted up by two technicians. The rubber clamps of the module frames' crossbars are then connected to the modules.

"Continuously improving our expertise and our service portfolio and keeping a close eye on the market" are the reasons CEO Heinz Lofner gives when asked about the most important success

factors for Sunselex. The Allgäu native has borne responsibility for the fate of a number of companies set on his broad shoulders: as a corporate consultant, he counseled a good dozen businesses in the steel industry in the last few years, including Leitramm, which became well known for guard rails. Along with a former Leitramm CEO, the experienced businessman set off about two years ago on a new path – photovoltaics. He founded Leitramm Solar near Munich in early 2007. Lofner invested in three hydraulic ramming crawlers and had them retooled for PV plant construction. "Our core idea was to position ourselves as PV plant builders," he says. The founding employees numbered 30, most of them technicians from the Leipzig area.

#### Ready for internationalization

The project managers were able to secure the first big contracts within a few weeks: a 1.8-megawatt ground-mounted array near Regensburg and a 1.3-megawatt farm in Murcia, Spain. In March 2007, Lofner and his team were already able to catch quite a big fish: Juwi-Solar contracted Sunselex to erect a 40-megawatt ground-mounted array in Waldpolenz Energy Park in Brandis. By the end of 2008, in a number of construction stages, 7,000 holes had been drilled in the partly asphalted subsoil, over 37,000 foundations had been rammed into the ground, and 12,200 frames and 559,000 thin-film modules had been set up – not to mention the supervision of incoming goods, logistics and waste disposal – all fields of work that Lofner says are "becoming more and more important for our portfolio." After all, the mid-sized company based in Munich built its range of services step by step, from site preparation to array operation and maintenance. Within a few months, dozens of domestic and foreign contracts were secured, and the number of permanent employees rose to 300. New branches in Madrid and Bolzano in Italy were opened in 2008.

"The company has been operating under the name Sunselex since February of last year, in part to encourage internationalization," Lofner explains. To this end, he sees his company's future not only in "record arrays" like those in Brandis and Turnow-Preilack near Cottbus, where Sunselex is currently erecting the world's biggest solar farm with 63 mega-

watts, but also in "the middle segment, off-grid applications, and array maintenance." This is especially true for markets such as Spain, where policies now look unfavorably on grid-connected ground-mounted arrays. Lofner sees one of Sunselex's important market advantages in specialization in ramming for solar farms without sealing the sites, since the importance of avoiding soil sealing is becoming more important even in southern Europe. In addition, rock-drilling technology is especially in demand on rocky islands like Sardinia, Sicily, and Corsica, where the company says it has a number of projects in the pipeline. The Sunselex CEO describes the strategy as "continuing to expand in the Italian and Spanish markets via our branches there and using them as a springboard to other regions, like northern Africa." The company is also looking to "distance itself from isolated applications" and "use its own employees to build sustainably in other countries," since entire installation teams, including machines and other equipment, are still brought over the Alps from Germany for

projects in Italy. It's also important to find "a balanced mix of ground-mounted and roof arrays." Up to this point, Sunselex has built 90 percent of its plants as ground-mounted arrays. To this end, further education for roof installation, for example laying sheeting, is currently being

expanded within the firm, and the company is looking for partners with the necessary expertise in other countries, especially for the Italian roof market. Lofner's motto for Sunselex's future: "We can do more than just drilling, ramming, and installing." ♦

Hans-Christoph Neidlein

#### SUNSELEX GMBH COMPANY PROFILE

**Founding:** In January 2007 as Leitramm Solar GmbH. Changed name to Sunselex in February 2008

**Employees:** Just under 300

**Output installed in 2008:** 130 megawatts

#### Reference projects:

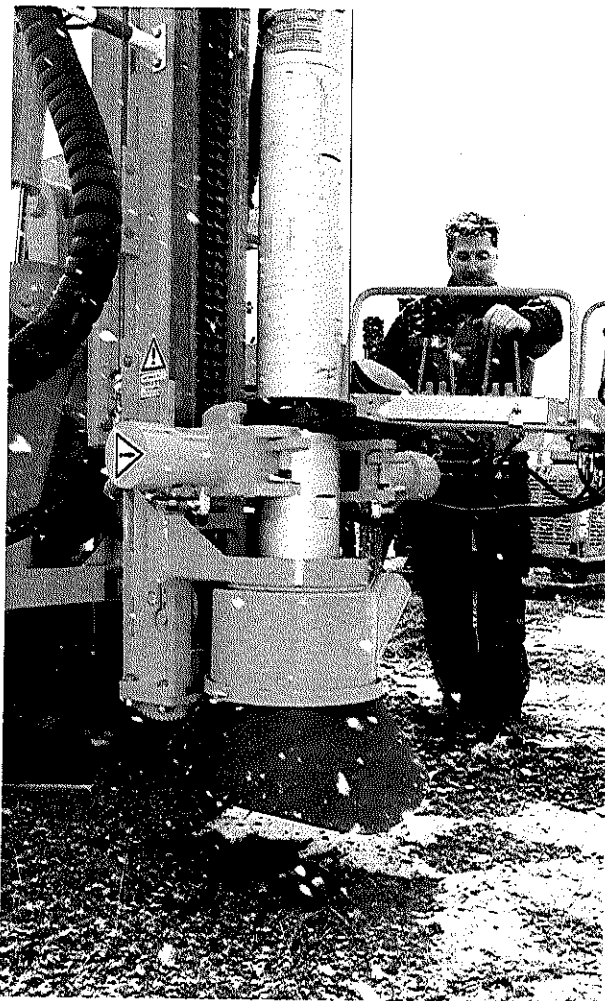
- Waldpolenz Solar Park (Brandis, Germany), 40 megawatts
- Turnow-Preilack Solar Park (District of Cottbus, Germany), 63 megawatts (in progress)
- Helmeringen Solar Park (Germany), 10 megawatts
- Lobosillo ground-mounted array (Murcia, Spain), 14 megawatts
- Victorbur Solar Park (Tenerife, Spain), 2.2 megawatts
- Villacidro ground-mounted array (Sardinia, Italy), 1 megawatt
- Foggia ground-mounted array (San Severo, Italy), 1 megawatt
- Rastatt roof array (Germany), 1.6 megawatts

**Headquarters:** Munich

**Other plant locations:** Kaufbeuren, Germany

**Branches:** Leipzig, Madrid (Spain), Bolzano (Italy)

www.sunselex.com



Peter Reckzelegel concentrates on lowering Big Mama's drilling arm until its rubber cuff meets the ground.

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