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SCHAEFFLER TECHNOLOGIES GMBH & CO. KG, SCHWEINFURT

Andasol: Spanish solar power plants rely on Schaeffler precision products – Schaeffler Group Industrial expands focus on renewable energy

## Bearing Technology Ensures the Efficient Use of Renewable Energies

Bearing technology from Schaeffler Group Industrial ensures the high-precision operation of the Andasol solar power plants in Spain, thus enabling them to achieve their maximum level of efficiency. More than thousand hydraulic rod ends from ELGES – Schaeffler Group Industrial’s plain bearing brand – support several hundreds of hydraulically-adjustable parabolic troughs, positioning them with millimeter precision and helping them to continuously follow the sun.

### Precise sun tracking ensures higher efficiency

Andasol 1 features a total of 1,248 hydraulic rod ends from Schaeffler Group Industrial. These are directly responsible for the plant’s efficiency and economic viability. “High-precision bearings are required here so that the facility can operate at maximum efficiency. Moreover, they also have to withstand loads that should not be underestimated,” Dr. Arndt Schweigert explains. He heads the Power Generation sector management at Schaeffler Group Industrial and develops special bearing supports, for example for solar and hydroelectric power plants. Plain bearings are optimally suited to the slow and precise swivel motion. Here it is especially important that the movements are stick-slip free - meaning without any start-up jolts. At the same time, the hydraulic rod ends can support high forces and are suitable for alternating loads. Thus the 150-meter long collector chains can be adjusted at a precision of tenths of a millimeter, allowing them to follow the sun on its daily path from east to west.

The hydraulic rod ends are equipped with manganese-phosphated radial spherical plain bearings with steel/steel sliding contact surfaces. This special surface treatment improves the running-in characteristic and reduces friction. The inner ring of the spherical plain bearings has a width of 70 millimeters and features a cylindrical bore of 110 millimeters as well as a spherical outer slideway, while the 160-millimeter outer ring has a cylindrical outer surface and a concave inner slideway with 140 mm diameter.

7,488 environmentally-friendly strips from our range of metal polymer composite bearings complete Schaeffler’s contributions to Andasol 1. Mounted in the supports between the individual segments of the 150-meter collector chains, they ensure smooth slewing movements during sun tracking.

Premiere for solar-thermal power generation in Europe

Sunny Andalusia in southern Spain is endeavoring to support itself with renewable energies and wants to cover part of its power demand with the help of the sun. To this end, three solar power stations, identical in construction and size, are being built that are the first solar-thermal power stations in Europe. Known as Andasol 1, the world's largest parabolic trough power station went on line in mid 2009. The climate-friendly 50-megawatt facility covers the power demand of some 200,000 people and saves about 150,000 tons of carbon dioxide. Andasol 2 is currently in its test stage, while Andasol 3 is still under construction. The three solar power plants were initiated and developed by Solar Millennium AG based in Erlangen, Germany.

The Andasol power plants consist of three main components, the largest and visually most stunning being the solar field with a collector area of over 510,000 square meters – the size of about 70 soccer fields. In addition, there is a conventional power plant section as well as a heat accumulator which ensures that the plants can supply electric power even after sunset or when it is cloudy.

The main element of a parabolic trough power plant is the solar field which provides steam for the conventional steam turbines. It consists of numerous parallel rows of solar collectors that are arranged on a north-south axis and follow the path of the sun from east to west. Each collector unit is equipped with its own solar sensor and a hydraulic drive in order to enable mirrors to track the sun.

The trough-shaped parabolic mirrors concentrate the solar radiation and focus it onto an absorber pipe in the focal line of the collector. This pipe contains a heat transfer medium, which is a temperature-stable synthetic oil in a closed circuit that can be heated to temperatures of up to 400 degrees Celsius. This hot oil is then pumped to a power block where it flows through a heat exchanger. The following process is similar to the steam cycle used in conventional power plants: The steam generated in the heat exchanger is used to drive a turbine connected to a generator. The steam in the turbine condenses back into water which is re-circulated once again.

#### Stepping up in the field of regenerative energies

Schaeffler Group Industrial is systematically stepping up its activities in the field of regenerative energies. For more than 30 years now, the Schaeffler Group has been successfully involved in the wind turbine sector and is an important development partner of all wind turbine and wind turbine gearbox manufacturers worldwide. In addition, the newly established Power Generation sector management handles all activities related to solar, wave and tidal power stations. It also deals with dams, conventional energy generation and energy transmission. "We consider regenerative energies as a strategic growth sector and we will systematically expand this business. Solutions from Schaeffler make a decisive contribution to the economic efficiency and reliability of these new technologies," emphasizes Robert

Schullan, President of Schaeffler Group Industrial.

The Schaeffler Group's Industrial Division supplies INA and FAG-branded rolling bearing and plain bearing solutions as well as linear and direct drive technology to about 60 different industrial segments via its market-driven global organization and application engineering. The product portfolio includes over 225,000 products, their sizes ranging from miniature bearings with diameters of just a few millimeters, used for example in dental drills, to large bearings having outside diameters of several meters, needed for example in wind turbines.

With approx. 61,000 employees at more than 180 locations worldwide and consolidated sales of €7.3bn (2009), the Schaeffler Group is a leading global bearing manufacturer and automotive component supplier.

Solar Millennium AG, based in Erlangen, Germany, is engaged in the field of renewable energies with a special focus on solar-thermal power plants with capacities of between 50 and 250 megawatts. The company covers all important business sectors along the value chain for solar-thermal power plants, from project development to technology and the turn-key construction of power plants all the way through to the operation and ownership of such facilities. Solar Millennium AG initiated and developed the Andasol power plants.

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Thousands of hydraulic rod ends from Schaeffler Group Industrial have gone into the Andasol solar power plant. Here they support several hundreds of hydraulically adjustable parabolic troughs, positioning them with millimeter precision and helping them to continuously follow the sun. (Photo: Schaeffler Technologies)

- Pressefoto "00016812.jpg"

The Andasol power plants are the first solar-thermal energy power plants in Europe. Andasol 1 is currently the largest parabolic trough power station worldwide. The climate-friendly 50-megawatt facility covers the power demand of some 200,000 people and saves about 150,000 tons of carbon dioxide. (Photo: Solar Millennium)

- Pressefoto "00016813.jpg"

(Photo: Solar Millennium)

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Schaeffler Group med varemerkene INA, FAG og LuK er en av verdens ledende produsenter av rulningslager og lineærprodukter, så vel som en renommert leverandør til bilindustrien av presisjonskomponenter, systemer i motor, transmisjoner og chassisdeler. Konsernet står for global kundenærhet, innovativ dyktighet og høyest mulig kvalitetsnivå. I 2010 hadde konsernet en omsetning på til sammen ca 9,5 milliarder Euro ut fra 180 steder i mer enn 50 land. Med globalt 67.500 medarbeidere er Schaeffler Group en av de største familiebedriftene i Tyskland og Europa.

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