# Spherical bearings smooth solar generation

More than 1,000 high precision plain bearing rod ends are enabling efficient operation of the Andasol solar power plants in southern Spain, currently the largest parabolic trough solar power station in the world.

Dr Arndt Schweigert, head of power generation sector at Schaeffler, explains that the Andasol 1 solar power plant, which went on line in mid-2009, uses a total of 1,248 Elges hydraulic rod ends, from Schaeffler. These support several hundred hydraulically adjustable parabolic troughs, positioning them with millimetre precision for solar capture.

"High precision bearings are required here, so that the power plant can operate at maximum efficiency," says Schweigert. "Moreover, the bearings also have to withstand loads that should not be underestimated," he adds.

In these types of projects, he says, plain bearings are best for the swivel motion, which has to be smooth, without any stick-slip or jolting.

Equally, though, the hydraulic rod ends can support high forces and are also suitable for alternating loads. This means that the 150m-long collector chains on the plant can be adjusted to within one tenth of a millimetre, enabling the troughs to follow the sun.

In this case, the hydraulic rod ends have been fitted with manganese phosphate-coated radial spherical plain bearings, with steel/steel sliding contact surfaces to improve the running-in characteristics and reduce friction.

In brief detail, Schweigert explains that the inner ring of the bearing has a width of 70mm, a cylindrical bore diameter of 110mm, as well as a spherical outer slideway. The 160mm diameter outer ring has a cylindrical outer surface and a concave inner slideway with a diameter of 140mm.

Incidentally, Schaeffler also provided 7,488 environmentally-friendly (lead-free) plain bearing strips for the Andasol 1 plant. These strips have been mounted in the supports between the individual segments of the 150m collector chains, ensuring smooth slewing movements during sun tracking.

## Drives pump up plant power

Swedish power and district heating provider Mälarenergi has increased the energy it can sell by 35GWh/year, following installation of medium voltage drives. System engineer Sven Olof Kindstedt says that Mälarenergi had been using resistors connected to slip-ring motors to control speed, and hence flow, in its district heating pumps. Heat from the resistors was used, but it was expensive.

ABB carried out an energy appraisal, which revealed that significant energy could be saved by upgrading the pump and fan applications with variable speed controls, high efficiency motors and transformers. That system now involves seven ACS 1000s and one ACS 6000, controlling four district heating pumps (4 x 1,765kW), a boiler feed pump (5,750kW), an accumulator pump (800kW), and a fan and pump for a new biofuel boiler.

Kindstedt reports that, since installing the equipment, losses have been reduced and, although Mälarenergi has also cut district heat production from its resistors, higher electrical energy output more than compensates. Also, with differential pressure in the district heating pumps now controlled automatically, system stability has improved and the temperature of the return water dropped – allowing better utilisation of heat.

"Thanks to ABB's technical competence, we have a more efficient operation, improved heat rate and better balance in the district heating network," says Kindstedt.

## Manifolds slash dp level cost

A highly integrated manifold is offering plant engineers a simple means of installing level measurement instrumentation on process tanks and vessels. The approach, developed by the instrumentation products division of Parker Hannifin, involves two single-piece manifolds that integrate all the valves for connecting upper and lower pressure sensing points to a differential pressure transmitter.

What's interesting is that it eliminates a huge amount of weight and size, as well as potential leak paths, compared with conventional hook-ups, fabricated using discrete valves and tubing connections. Called CCIMS level-flange, its manifolds comprise one for the wet leg pressure connection at the bottom of a tank, and the other for the dry leg pressure sensing point, with a flange connection, block-and-bleed valves and balance line connections.

Parker Hannifin claims that the intimate nature of the piping connection aids the performance of the instrument system. It also ensures that the differential pressure instrument is mounted directly adjacent to the process vessel, so helping to avoid the common problem of blockages caused by viscous media, hydrate formation, freezing etc.

Weight and size of the manifolds are also reduced, with a complete assembly, including instrument, extending around 10.4in from the tank – half that of many common approaches. Parker reckons its new equipment reduces installation time and cost by 85%.