



Tracking a star to power a planet

SKF solutions for the solar industry



The Power of Knowledge Engineering



The SKF portfolio of solar tracking solutions can help boost energy efficiency and profitability.



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Here comes the sun

As the world turns to renewable energy, solar power is emerging as a major player

Solar energy is the largest potential source of renewable energy. The amount of solar energy reaching the surface of the planet is so vast that in one year it is nearly twice as much as the energy that will ever be obtained from all of Earth's non-renewable resources of coal, oil, natural gas and mined uranium combined.*

Meeting the challenges

The task of transforming this tremendous potential into a reliable source of profitable and affordable power for the planet comes with many challenges:

- Harsh natural environments stress equipment
 - Wind causes backlash
 - Dust contaminates components
- Accurate tracking is required to optimize output

SKF solutions can help component manufacturers and solar farm operators improve reliability and energy output

For solar energy OEMs and end-users, the need to generate as much power and as much profit as possible from the sun is ever increasing. Whether you're manufacturing or using photovoltaics (PV), concentrating photovoltaics (CPV), or concentrating solar power (CSP) solutions, SKF's engineering innovations in capturing the sun's energy can help meet this critical need.

Maximize productivity and profitability from sunrise to sunset with SKF

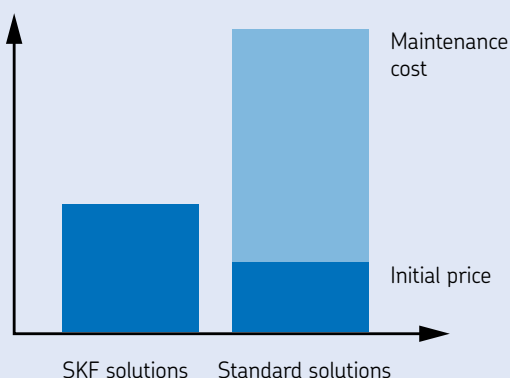
OEM benefits

- Design assistance, simulation and testing of new systems
- Single source for all tracking components in motion (actuators, rotary drives and bearings)
- Enhanced reputation for long service life in the field
- Increased customer satisfaction and reduced warranty work
- Global manufacturing and logistics footprint
- Capability to manufacture large volume

End-user benefits

- Virtually maintenance-free
- Severe environment resistance
- Limited backlash in high wind conditions
- Fully integrated solutions
- Reduction of levelized cost of energy (LOCE)

Reduced total cost of ownership



SKF solar solutions are designed for accurate tracking in harsh environments, are virtually maintenance-free and reduce total cost of ownership.

* Source: Stanford University's Global Climate & Energy Project

Improve solar tracking performance and

Using the SKF Solar Hub for the azimuth function can typically provide an increase in efficiency of 15-20% relative to a fixed installation. The SKF Solar Hub integrates a self-locking gearbox, bearings, lubricant, and robust sealing solution in a housing for optimal performance in severe outdoor conditions. In contrast to the traditional drive, the SKF Solar Hub provides a virtually maintenance-free, reliable, and cost-effective way to track the sun. On site, the SKF Solar Hub is designed to be a bolt-in solution requiring minimal time to install in the field, saving time and expense.



Combining robust design, easy installation, virtually maintenance-free operation and reduced downtime, the SKF Solar Hub can help to reduce solar power generation costs while increasing productivity and profitability.



This offer is part of the SKF BeyondZero portfolio of products, services and solutions designed to help our customers reduce environmental impact. To learn more, visit www.beyondzero.com

reliability with the SKF Solar Hub



SKF solar tracking solutions are designed to provide accurate tracking and minimize backlash in all kinds of weather.



By minimizing maintenance and maximizing power generation, SKF Solar Hub users can achieve lower levelized cost of energy.

Benefits of the SKF Solar Hub:

- Designed for 20-year life
- Virtually maintenance-free
- Minimal backlash for accurate tracking
- Higher stiffness increases power generation
- Built for severe environments
- Higher load and torque carrying capabilities
- Optimal grease for longer service life
- Lubricated, sealed and assembled for extended service life
- Minimized footprint to reduce size and overall cost

SKF Solar Linear Actuators maximize solar

Virtually maintenance-free solutions for precise tracking

To help improve the efficiency of solar energy capturing solutions, SKF designed its Solar Linear Actuators: CASD series. The system accurately tracks the sun and increases efficiency by 15–20% with a 1-axis tracking system, and 30–40% with a 2-axes tracking system, compared to a fixed solar installation.

SKF Solar Linear Actuators offer significant improvement over conventional maintenance-intensive solutions. They have been designed for a 20-year service life and are virtually maintenance-free, which eliminates downtime for part changes or relubrication. The robust design of the actuators feature a sealed protection tube for better reliability and increased drive protection, and their high static-to-dynamic-load ratio permits solar power generation even during high wind conditions.

 Limit backlash and precisely track the sun with SKF Solar Linear Actuators CASD-60.



SKF Solar Linear Actuators integrate a screw with gearbox, motor, bearings, lubricant, seals, limit switches, hall sensors and a circuit board – all of which are protected in a sealed housing for optimal performance even in extreme conditions.



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ar energy power generation



 American solar company, SolFocus, has improved performance with SKF Solar Linear Actuators CASD-60.

SKF Solar Linear Actuators provide:

- Robust design for 20-year life
- Increased reliability and service life
- Lower solar system lifetime costs
- Virtually maintenance-free operation
- Limited backlash
- Faster, easier installation
- Sealed protection tube to prevent contamination
- Customized attachment points and strokes

SKF solutions to overcome the challenges



Improve tracking with high performance TX spherical plain bearings

Available in either through-hardened or stainless steel, TX spherical plain bearings are characterized by an improved PTFE fabric, stronger, more efficient seals and optimized contact surfaces. They operate with no lubricant, are virtually maintenance-free and provide excellent frictional behaviour. Other benefits include:

- Increased wear-resistance and service life
- Increased load carrying capacity
- Protection against bearing contamination with LS-heavy-duty seals

SKF filament wound bushings



Generally used for trough mirror support, SKF filament wound bushings feature high strength glass fibre backing combined with a sliding surface made from PTFE and polymer fibers. The backing and sliding surfaces are embedded in an epoxy resin matrix. They provide:

- Compact and cost-effective design
- Reduced maintenance costs
- Excellent resistance to corrosive media, including salt water and chemicals
- Excellent electrical insulation



Composite bushings

Generally used for trough mirror support, PTFE/POM composite bushings are available as straight and flanged bushings, trust washers and strips – always in two sliding materials. They offer very good sliding properties and wear resistance.

Environmentally friendly PTFE composite strips can be mounted in the supports between the individual segments of the collector loops of a solar trough field. They provide smooth slewing movements during the tracking of the sun.

SKF also provides robust rod end housings equipped with spherical plain bearings and highly effective LS heavy-duty seals on both sides. These plain bearings allow precise positioning of the parabolic troughs and avoid stick-slip movements at start up. They are insensitive to dust and sand and are not susceptible to wind gusts.



SKF slewing bearings

Typically used in single pole trackers, SKF slewing bearings are compact, economical replacements for multi-bearing configurations. These large-sized bearings, specifically designed to accommodate oscillating movements, are comprised of an inner ring and an outer ring – one of which usually incorporates a gear.

of the solar industry



SKF Y-bearings and units

Suitable for 1 axis trackers, SKF Y-bearings and Y-bearing units are ready-to-mount and ready to use solutions, which enable initial alignment errors to be compensated for. The assortment includes a wide range of housing designs and materials, and a variety of Y-bearings with locking mechanisms and seals. They are available as plummer block, flanged, and take-up units. Benefits include:

- Increased productivity
- Reduced maintenance cost
- Reduced lubricant leakage with less environmental impact
- Increased bearing life

SKF tapered roller bearings

The tapered form of the raceways makes these bearings particularly suitable for accommodating combined radial and axial loads. SKF tapered roller bearings provide optimum stress distribution over the roller/raceway contacts and provide:

- Increased operational reliability
- Reduced sensitivity to misalignment
- Extended maintenance intervals
- Reduced operating costs
- Reduced energy consumption



Customized bearing solutions

SKF can design completely customized solar solutions by utilizing any combination of our five core competencies. These include bearings and units, seals, lubrication systems, mechatronics and services. Components will be provided by working with our manufacturing facilities or with approved suppliers.

By trusting SKF to manage the complete process, you can benefit from SKF's expertise and knowledge to provide you with an optimal custom solution to meet your specifications. Other advantages include:

- Pre-assembled solutions which integrate components into a single solution, with a single point of contact
- Compact and cost-effective design
- Reduced time and costs related to administration and oversight
- Stringent SKF quality control processes which confirm that all bearings meet your specifications

Supporting customers from design to manufacturing

SKF Engineering Consultancy Services

Our engineers employ proven SKF processes for design optimization, design verification and general troubleshooting. These processes involve a systems approach and close cooperation with your engineers. This, together with our unique tools and competences in dynamic simulations, material science and lubrication, delivers the right design from the start. We also offer support in finding out the root cause of problems in the field. As an engineering partner, we can provide solutions and knowledge in the areas of bearing technology, analytical modelling and virtual testing.

Your single source for solar tracking components

As the world leader and innovator in rotating equipment technology for more than 100 years, SKF has a unique understanding of how machine components and industrial processes are interrelated in every major industry worldwide. This knowledge – coupled with our expertise in sealing solutions, lubrication systems, linear motion, machinery maintenance, mechatronics, and services – enables us to deliver real-world solutions that help maximize mechanical performance over the entire life cycle of an asset.

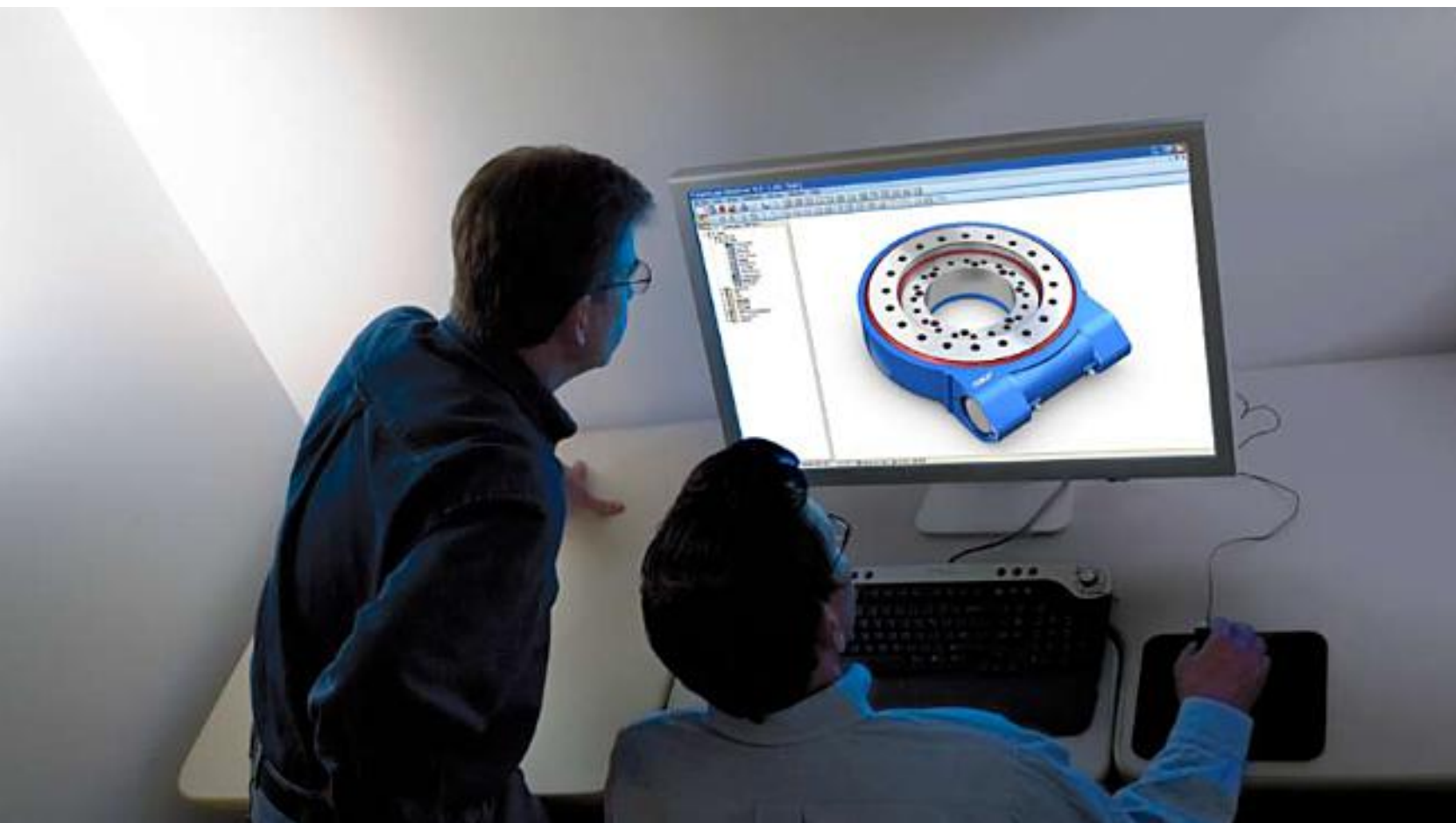
As a result, SKF can be your single source for solar tracking components including linear actuators, rotary drives, bearings and related technologies and services.



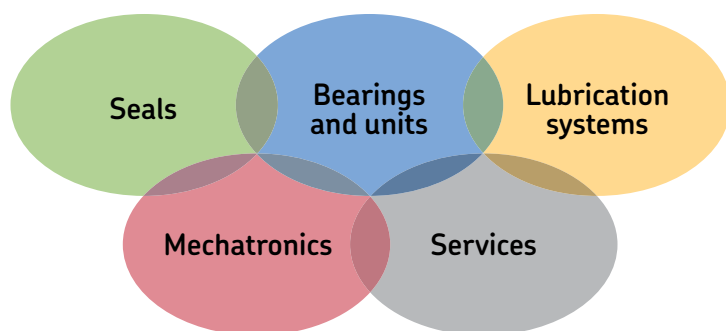
Solar manufacturing solutions

Offering components, design and development support, and worldwide sourcing, SKF can benefit solar manufacturers with:

- **Design assistance, simulation and testing of new systems**
- **Improved quality through manufacturing efficiency**
- **Enhanced reputation for long service life in the field**
- **Increased customer satisfaction and reduced warranty work**
- **Offerings include:**
 - SKF magnetic bearings
 - CASM actuators for industry automation
 - Compact cross tables



*See inserts for more details
about SKF solutions for the solar
industry.*



The Power of Knowledge Engineering

Combining products, people, and application-specific knowledge, SKF delivers innovative solutions to equipment manufacturers and production facilities in every major industry worldwide. Having expertise in multiple competence areas supports SKF Life Cycle Management, a proven approach to improving equipment reliability, optimizing operational and energy efficiency and reducing total cost of ownership.

These competence areas include bearings and units, seals, lubrication systems, mechatronics, and a wide range of services, from 3D computer modelling to cloud-based condition monitoring and asset management services.

SKF's global footprint provides SKF customers with uniform quality standards and worldwide product availability. Our local presence provides direct access to the experience, knowledge and ingenuity of SKF people.

SKF BeyondZero

SKF BeyondZero is more than our climate strategy for a sustainable environment: it is our mantra; a way of thinking, innovating and acting.

For us, SKF BeyondZero means that we will reduce the negative environmental impact from our own operations and at the same time, increase the positive environmental contribution by offering our customers the SKF BeyondZero portfolio of products and services with enhanced environmental performance characteristics.



For inclusion in the SKF BeyondZero portfolio, a product, service or solution must deliver significant environmental benefits without serious environmental tradeoffs.

The SKF Solar Hub and SKF Solar Linear Actuator are included in the SKF BeyondZero portfolio because they improve energy efficiency and enable increased renewable energy generation.

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PUB 74/S2 13783 EN · June 2013

Printed in Sweden on environmentally friendly paper.

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