

Flexibility and precision in high-performance production

SKF solutions for material joining technologies



SKF design knowledge at your service

Carbon dioxide (CO₂) is the chief greenhouse gas that results from human activities and causes global warming and climate change.

CO₂ reduction, stated in EU and US legislations, brings, among other actions to reduce the weight of the means of transportation.

Body-in-white engineers are striving to reduce weight by integrating and joining aluminum or thinner gauge steels alongside conventional steels.

The weight challenge is also shared as every kilo saved on the vehicle can translate to an extra kilo of payload (for the same laden kerb weight).

Spot welding

The automotive industry is a major user of industrial robots, with an average of 300 welding robots operating on an assembly line.

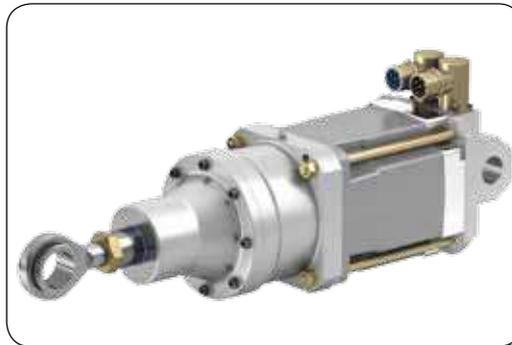
The majority of these robots use pneumatic actuation devices to grip and weld designated points on the car chassis.

Using a specialized mechatronic design, SKF has developed a compact electromechanical actuator for the robotic welding process that requires only a fraction of the energy needed by the pneumatic process, and offers a range of benefits:

- Faster welding cycle speeds than pneumatic
- Better quality through greater control of the process
- Greater flexibility in adapting to changes in the line
- Reduced maintenance costs
- Less noise

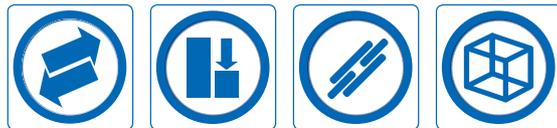
Researches in automotive assembly procedures reveal also an evident need for technologies that offer high flexibility for an easy process changeover, high precision, reduced total cost of ownership and low environmental impact.

SKF is stepping forward to provide new technologies, products and services to meet these challenges with enhanced environmental performance.



SKF technology involved:

- SKF compact electromechanical cylinders with integrated motors and options like force measurement, water cooling and automatic lube.
- SKF inverted roller screws.



Clinching

The clinching technique has become increasingly popular in the automotive industry, due to the use of alternative materials that are difficult or impossible to weld. Although clinching stations generally use pneumatic cylinders, the electromechanical process is frequently introduced to bring greater control in terms of load, speed and position. Electromechanical systems offer increased joining quality and greater flexibility during assembly line changes; much lower energy consumption and less maintenance costs.

SKF can partner clients in designing custom clinching stations, to provide:

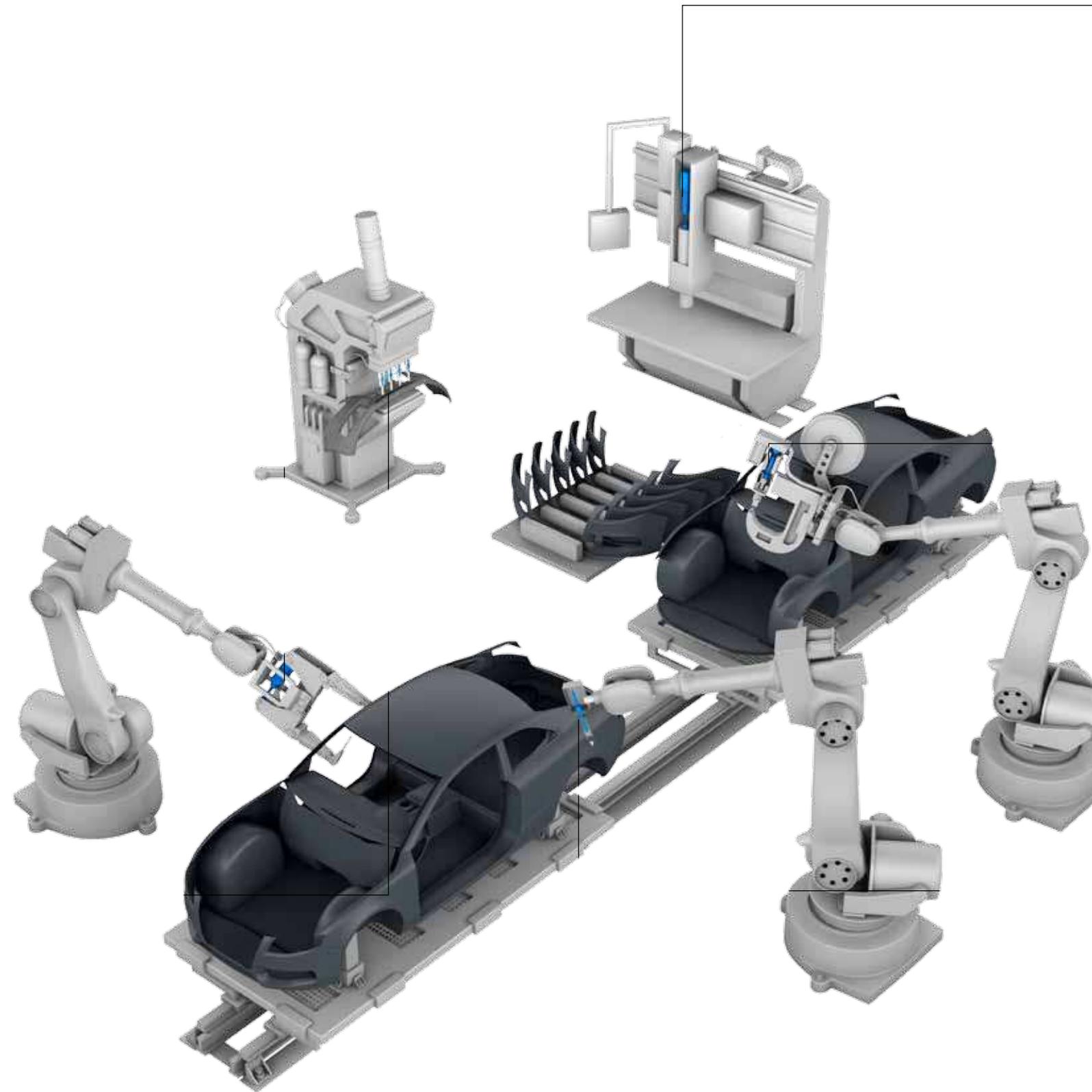
- High speed for short cycle times
- Small leads for direct drive
- Consistent performance over lifetime
- Long life expectancy and robustness
- Lower energy consumption
- High dynamic performance

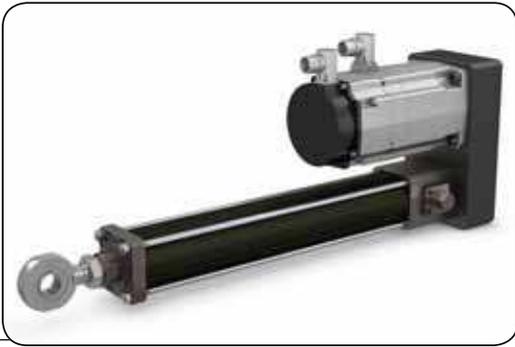


SKF technology involved:

- SKF planetary roller screw with integrated gears.

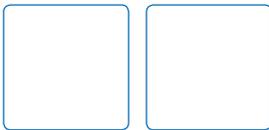






SKF technology involved:

- SKF light electromechanical cylinders
- SKF planetary roller screw with support bearings



SKF technology involved:

- SKF electromechanical cylinder
- SKF inverted roller screw
- SKF planetary roller screw with integrated gear.



SKF technology involved:

- SKF planetary roller screw



Riveting

Riveting is widely used in automotive joining processes where low weight and high strength of the car chassis are critical factors; multi-sheet metal alloy layers are preferably riveted to avoid deformation and changes in material properties.

SKF cylinders with roller screw technology increase riveting speed and therefore productivity.

By using full-ground 60 Hrc steel satellite roller screws, we offer superior shock resistant product performance

The following benefits are achieved by using SKF products:

- High linear speed
- Less energy consumption
- High dynamic robot performance

Glueing

Adhesives will be the key to building lighter, safer, more efficient vehicles in the future.

Adhesive bead is ideal for sealing insulation and is also used for noise reduction at various points on the car body. SKF electromechanical solutions for the glueing process are compact and energy-efficient.

SKF can partner clients in designing electromechanical glue guns, to provide:

- Greater control in terms of load, speed
- Quality of mixing process of the silicon components
- Consistent performance, long life expectancy and robustness
- Energy cost saving

Why choose the SKF roller screw technology?



SKF compact electromechanical cylinder



SKF light electromechanical cylinder



SKF planetary roller screw



SKF inverted roller screw

Industries are increasingly converting their actuation needs from traditional pneumatic and hydraulic technologies to electromechanical solutions and SKF, a leader in this cutting edge know-how, has been developing expertise in the field of roller screw technology for more than sixty years.

The SKF electromechanical application based on the planetary roller screw, with its high load capability, easy integration and control, and its positive environmental impact are ideally designed to suit the changeover.

Compact design

The streamlined design of SKF planetary roller screws eliminates recirculation and contact between the rolling elements to provide high rotational speed ($N \times d$ up to 160 000) and high acceleration (up to 12 000 rad/sec^2). The rollers are guided through a timing mechanism that avoids preload torque when changing rotational direction and ensures smooth running, without pitting of the rolling elements. The small lead (up to 1 mm for the inverted roller screw) increases precision and requires a less powerful motor, allowing for direct drive with smaller and lighter kinematics. The compact, light-weight design also makes it possible to build smaller robots and machines, while maintaining the high dynamic load capacity and reducing the overall footprint.

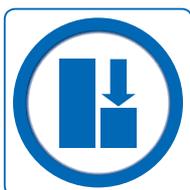
Reliability and durability

SKF planetary roller screws are made from full-ground 60 HRC steel to be reliable, durable, resistant to shock and have a very low noise level. Downtime due to maintenance is reduced because the lack of recirculation and contact between the rollers means no weak points in the nut, less fatigue and high-shock resistance. The timing mechanism can work even in dirty conditions and with poor lubrication and the nut is easy to remove and reassemble.

Whether the need is for accuracy, flexibility, energy-saving, reduced weight or speed, SKF planetary roller screw technology is the solution.



High dynamic performance



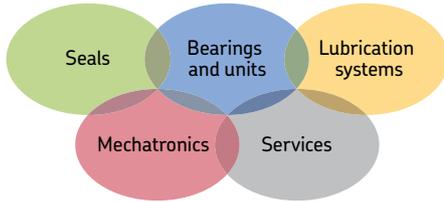
Less energy consumption



Consistent performance



Light and compact



The Power of Knowledge Engineering

Drawing on five areas of competence and application-specific expertise amassed over more than 100 years, SKF brings innovative solutions to OEMs and production facilities in every major industry worldwide. These five competence areas include bearings and units, seals, lubrication systems, mechatronics (combining mechanics and electronics into intelligent systems), and a wide range of services, from 3-D computer modelling to advanced condition monitoring and reliability and asset management systems. A global presence provides SKF customers uniform quality standards and worldwide product availability.

© SKF is a registered trademark of the SKF Group.

© SKF Group 2013

The contents of this publication are the copyright of the publisher and may not be reproduced (even extracts) unless prior written permission is granted. Every care has been taken to ensure the accuracy of the information contained in this publication but no liability can be accepted for any loss or damage whether direct, indirect or consequential arising out of the use of the information contained herein.

PUB 55/P2 13837 EN · June 2013

Printed in Italy on environmentally friendly paper.

Certain image(s) used under license from Shutterstock.com

