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**Railway industry**

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Virgin Trains

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Planetary roller screws

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Tapered bearing units (TBUs)

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## Bearing technology enhances passenger comfort

The Pendolino, operated by Virgin Trains, is allowing passengers to travel comfortably between London and Manchester in 1 hour 53 minutes, thanks to SKF bearings and planetary roller screws.

The trains are equipped with SKF axleboxes designed for overall economy, reliability and comfort while meeting the highest market demands for quality. SKF is continuously developing and improving their design – making changes to enable the axleboxes to meet increasing demands and making tests to select the best sealing arrangements. New materials and improved manufacturing methods are also being developed in close co-operation with customers, with the aim of producing a specific box for each application.

SKF designers have access to computer programmes for mapping temperature and stress distributions in order to evaluate axlebox designs. With SKF's advanced Finite Element Modelling programmes the strength of the axlebox is evaluated under exact working conditions. Evaluation of the calculated design is then performed with prototype axlebox housings using fatigue test rigs at the Railway Test Centre at SKF's Engineering & Research Centre (ERC).

Included in the design of the Pendolino are Tapered bearing units (TBUs) sealed against the aggressive environment of rail applications. The TBUs can be used on all types of rail vehicles: high-speed trains, locomotives, freight cars, passenger coaches, commuter cars and light rail vehicles, and the product range has now been enhanced by the introduction of the Compact Taper Bearing Unit (CTBU) that incorporates an improved sealing system and design features that offer longer maintenance intervals and improved performance. The CTBU will be the bearing unit of choice for new rolling stock designs in future.



Virgin West Coast Pendolinos use electro-mechanical actuators fitted with SKF planetary roller screws for the tilt mechanisms. Although electromechanical solutions are more expensive, they are more reliable and maintenance is easier and less costly than hydraulics. Indeed the future prognosis is that there will be almost no new tilting trains using hydraulics.

Planetary roller screws are selected for tilting trains and active suspensions because they are the only high efficiency screw in which the motion of the rolling elements is controlled at all times. With no recirculation (as in a ball screw) or weak points in the nut body and many strong contact surfaces, they offer exceptional reliability in aggressive vibrating environments.

The Pendolino tilting trains are now cleared for travel at 125 mph on parts of the London to Manchester route, and can potentially reach up to 140 mph. Further improvements to the route in future could see further reductions in journey times.



*Plantery roller screw*

### **SKF (U.K.) Limited**

T: 01582 490049

marketing.uk@skf.com

www.skf.co.uk

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