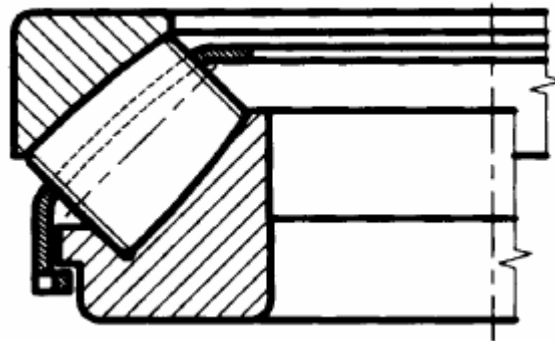


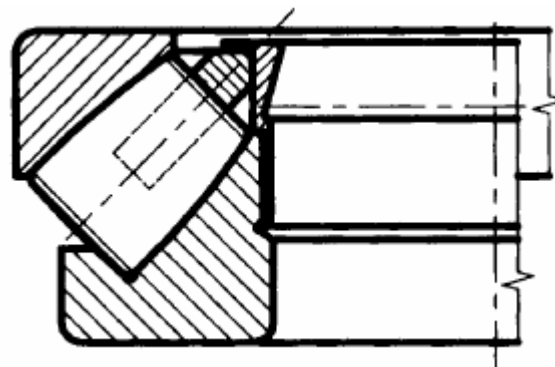
Innovation of ZKL Spherical Roller Thrust Bearings

Spherical roller thrust bearings rank among the most elaborate roller bearings. Provision of optimum shapes and correlative positions of all functional surfaces on bearing rings, rolling elements and cages structurally and technologically makes great demands on manufacturers of which only the topmost are able to cope with.

In return, the properties of these bearings offer to designers several significant specifics for which they are preferred against other types of roller thrust bearings. First of all, they have high load-carrying capacity thanks to linear contact between raceways and rolling elements and therefore they are applied wherever high axial forces are acting on the bearing. Their another advantage lies in capability to accommodate also a considerable force acting in radial direction in addition to axial force. This is allowed by size of contact angle between the direction of load transfer from one ring to another and the rotation axis. And finally, another important property of these bearings is their alignment ability permitting thus to compensate the shaft deflection and misalignment to the housing.



Spherical roller thrust bearing structure



New Execution

One of traditional manufacturers of spherical roller bearings engaged also in production of spherical roller thrust bearings is ZKL Brno, a.s. In order to keep its

competitiveness the company decided to adopt principal innovations of manufacturing assortment.

Having finished successive sale introduction of double-row spherical roller bearings of 222 and 223 series in execution with symmetrical spherical rollers and steel sheet cage under designation EW33J, which started in year 2002, at present ZKL is gradually releasing the serial production and sale of individual types of spherical roller thrust bearings of 294 series in new execution EJ.



Precision made ZKL bearings gain world recognition

Properties

The existing offer of roller bearings of this series was built on execution with machined brass cage guided by bush. The guiding bush along with bearing shaft ring, cage and rolling elements forms an inseparable unit. These bearings bear suffix M. Use of these bearings requires feed of sufficient quantity of oil into the area of cage sliding guide in the bush. Oil lubrication of spherical roller thrust bearings in particular is generally recommended. Bearings fitted with steel sheet cage are allowed to be grease lubricated provided they operate under lower speed and load. The new design brings higher utility parameters of bearings. Transition to technologically more elaborated execution of bearings with cages pressed of quality steel sheet has also positive effect in respect of substitution of non-ferrous metals which is being adopted also by further large roller bearings manufacturers.

Interchangeability

The innovation solves also further aspects of usability of subject bearings. While the connecting dimensions of other types of standard roller bearings are given by international standards and thus selection between various alternative manufacturers and bearings execution depends just on their delivery terms and technical parameters, the dimensions of spherical roller thrust bearings are unified by international standards in respect of principal mounting dimensions only. In all other dimensional data these bearings may differ between various executions and sources of manufacture, which may prevent simple replacement by individual other make of bearings without design adjustment of mounting. This is the reason why the

assignment conditions in development start by ZKL stipulated that such new bearings should be interchangeable in a maximum extent with identical bearings of largest world renowned manufacturers.

Design and Construction

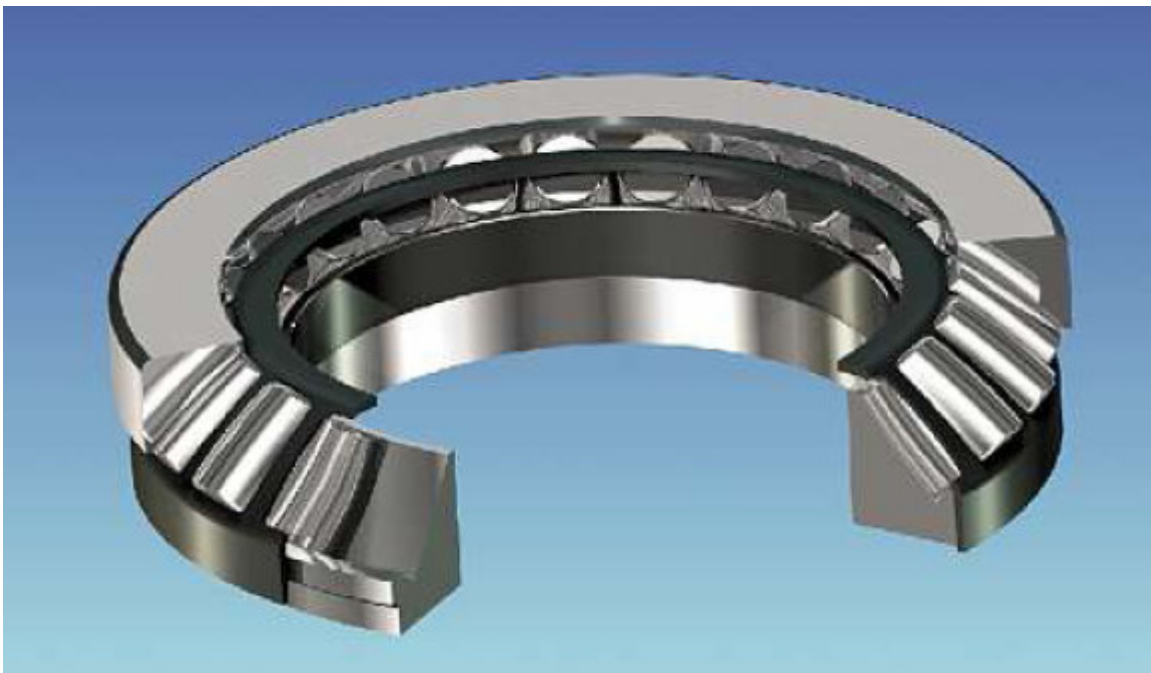
New execution of spherical roller thrust bearings of 294EJ series is characterized by pressed steel sheet cage. The inner design of new bearings has been optimized with the aim to obtain maximum basic dynamic and static load ratings with high limiting speed frequency. Great emphasis has been laid on enhanced reliability, reduction of energetic losses and thus lower heat generation and vibrations. The bearings allow the misalignment up to 3°.

The design and manufacture of bearings of innovated series 294 with steel sheet cage has been successfully dealt with up to the dimensional type 29464ERJ.

The bearings are fully comparable with world renowned competitive products not only by their dimensions but also by their utility parameters. Verification of theoretical parameters has been made by endurance tests of selected types by research and development company ZKL – Vyzkum a vyvoj, a.s., where the construction of these bearings also took place. The Czech Ministry of Industry and Trade offered a special grant for development of innovated spherical roller thrust bearings series in frame of its science and research support program.

Vladimir Zikmund, Eng.

Photo: ZKL



Partial cutting of 3D model of bearing: Spherical roller thrust bearing ZKL in EJ execution