

Future of Bearing Business



Shuuji MIYAWAKI*

1. Introduction

JTEKT Corporation began operations in January 2006, having as its four product divisions steering, driveline components, bearings, and machine tools. Of these, I believe that because of synergy that can be achieved through efforts with each of the other product fields, the field of bearings presents us with the greatest opportunity to contribute to customers on a new level through such means as providing revolutionary new products and reducing development lead time. My thinking on how to seize this opportunity through product technology development, manufacturing technology development and manufacturing innovation in the field of bearings is outlined below.

2. Approach to Product Technology Development

Although overall demand for bearings has increased in recent years particularly as a result of surging demand in BRICs nations (Brazil, Russia, India and China), competition in the international bearing market has intensified because of performance improvements being achieved by makers in developing countries and the overall trend among customers toward global purchasing.

In order to secure our top-level position in the global bearing market, we must work steadfastly and speedily to develop products excelling in environmental friendliness, safety and feeling; raise quality levels; provide products with performance meeting the expectations of customers; and achieve dramatic cost reductions. Also, we not only must promote the creation of units and modules but also must develop element technologies in such areas as materials, lubrication, analysis, measurement and control as fundamental technologies with speed and based on high targets. We must efficiently and effectively mesh application technology with the fundamental technology supporting it as we pursue the development of product technology.

In the field of tapered roller bearings (TRB), we have already achieved the world's top position. A description of the transition of TRB technology is given below.

*Executive Director, General Manager of Bearing Business Operations Headquarters

Starting from the late 1970s, automotive wheel bearings shifted from TRB to ball bearings and then to unit bearings, and for our company there was a shift in TRB application from wheel bearings to differential transmissions. At that time, there was friction-induced heat generation, performance decline resulting from pre-load loss and excessive play caused by initial wear, etc., and many efforts were required to resolve these problems.

At that time we developed the LFT bearing (low friction torque tapered roller bearing) as a new product, and in regard to manufacturing technology we developed a cone (an inner ring) rib grinding machine, rib crowning super-finishing machine, roller end grinding machine, etc. for machining such bearings. I believe our decision to focus on LFT bearings enabled great advances and led to our development of current TRBs and their technology.

The expectations of customers today are much higher than they were in those days. One example of new technology we developed in order to meet such expectations is illustrated in **Fig. 1** below, a super-low friction torque tapered roller bearing with only one-fifth the torque loss of standard bearings. Through application of original technology in the areas of design, lubricant control and long-life heat-treatment technology, JTEKT by means of this new product has succeeded in significantly improving fuel efficiency and reducing CO₂ emissions of automobiles.

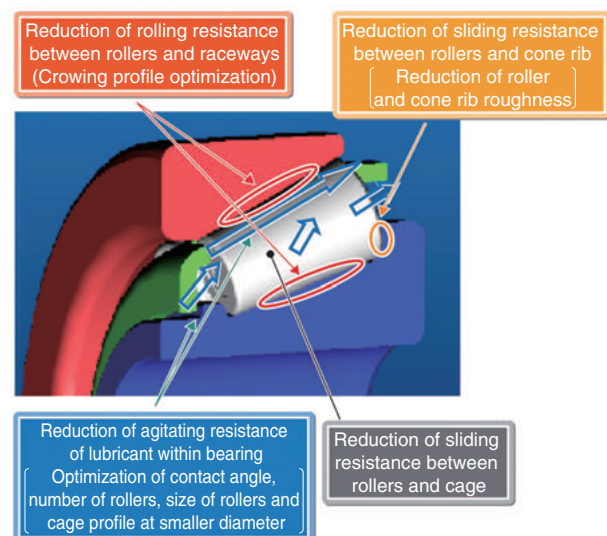


Fig. 1 Super-low friction torque TRB

Similarly, in the field of industrial equipment bearings we have developed such products as extreme-environment (EXSEV) bearings for use in semiconductor manufacturing equipment, which must operate in super-clean environments, and superlarge slewing rim bearings (Fig. 2) for the melting furnaces of intermediate waste treatment facilities, which contribute to environmental improvement.

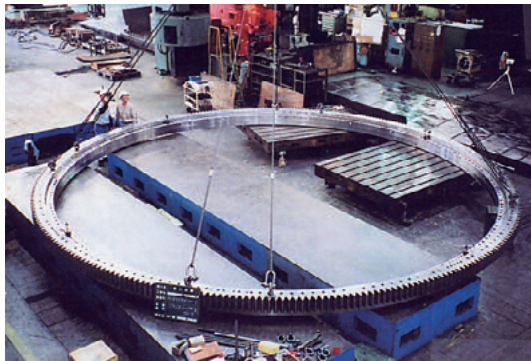


Fig. 2 Superlarge slewing rim bearing

Regarding fundamental technology, examples of CAE contributing to development efficiency are shown in **Table 1**.

Table 1 Examples of CAE innovation

Analysis field	Examples of CAE technology innovation
Optimum weight reduction analysis	Shape optimization analysis of hub unit bearing considering strength and stiffness of surrounding components
Analysis of shaft system stiffness	Multi-shaft stiffness analysis of automotive transmission considering shafts and housing
Dynamic analysis of shaft system	Dynamic analysis of shaft of turbo machine considering surrounding components

We will continue pursuing the development of advanced bearing technology based on the fundamental bearing technology cultivated until now with the aim of providing customers with new value while also fulfilling the role of providing fundamental technology for JTEKT's other three product divisions. Moreover, we will strengthen our global network of R&D bases with the aim of more effectively pursuing development activities on a worldwide basis in partnership with customers and providing timely, suitable technical proposals.

3. Approach to Manufacturing Technology Development and Manufacturing Innovation

In recent years the cost reduction demands of customers have intensified. Suppliers simultaneously are being required to raise quality, lower prices, and shorten lead times. In Japan, companies in 2007 will begin suffering an exodus of experienced employees as the baby-boom generation reaches retirement age, and there will be difficulty securing sufficient engineers to support globally expanding production networks. Such situations demand that we give full attention to the task of maintaining and improving manufacturing capability.

Regarding manufacturing technology, we will aim to develop equipment that is easy for workers to use and expand the use of innovative production lines such as "fishbone" lines. Specifics plans are as follows.

- 1) Grasp more accurately how customers use our bearings and participate in customers' product planning activities.
- 2) Carry out manufacturing technology exchanges with other JTEKT product divisions in the form of exchanging human resource and technology to enable the achieving of synergy.
- 3) Promote SE (Simultaneous Engineering) activities such as identifying and resolving serial production issues in the prototype stage.
- 4) Promote overseas plant management that blends with and makes use of local culture and characteristics and improve overseas plant manufacturing efficiency.
- 5) Through complete implementation of just-in-time production and *jidouka* (automatic abnormality detection), raise a workforce able to lead production worldwide.

In addition, our design, manufacturing technology and plant functions will work determinedly as a single team through PPI (Product & Process Innovation) activities to achieve dramatic product and process changes and continue providing customers with products meeting their expectations. We also will strive to construct a supply chain that pursues optimization in all stages including development, purchasing and manufacturing and untiringly seek to achieve world-leading manufacturing innovation.

Lastly, through such means as promoting the optimal utilization of global manufacturing bases without drawing lines between the four product divisions and nurturing management capability through personnel exchanges, JTEKT will continue its quest to provide customers with innovative technology and attractive products, achieve same-level quality throughout the world, improve the profitability of all group companies, and contribute to society on a continual basis.