

# NSK Ceramic Ball Bearings

## High Precision Ceramic Angular Contact Ball Bearings

High speed, high rigidity and high reliability are all achieved using ceramic rolling elements. **Ceramic hybrid bearings** have many excellent performance characteristics such as heat resistance, extended life, light weight, lower thermal expansion, electrical non-conductance and thus can be used in an infinite number of applications as a new generation material. NSK's early experience of materials and bearing manufacturing led us to utilize one ceramic in particular, silicon nitride ( $\text{Si}_3\text{N}_4$ ), for the rolling elements in ceramic hybrid bearings. These **hybrid bearings** have earned an excellent reputation for ultra high speed combined with ultra high accuracy; a performance combination that is not achievable in bearings with steel rolling elements.

### *High Quality by Selecting the Best Materials*

**Seizure Resistance** *Relative to steel rolling elements, ceramics have a higher seizure resistance.*

**High Accuracy through Manufacturing Technology** *NSK's expertise in the manufacturing of balls and rollers, improvements in the sintering process and the grade of materials used enables NSK to produce higher accuracy balls and rollers.*

**High Rigidity** *Ceramic balls have a Youngs Modulus that is 50% higher than that of steel, making it an ideal material for use in machine tool spindles requiring high stiffness during cutting.*

### **High Speed Performance Characteristics of Balls and Rollers – Ceramic vs Steel Ball Bearings:**

***Lightweight*** - *As the density is 40% lower than that of steel, the centrifugal force from the rolling elements is lower, thus extending bearing life*

***Low Coefficient of Linear Expansion*** - *In applications involving high speed operation, although the temperature of the bearing is high, this low coefficient results in lower preload and lower heat generation.*

***Low Friction*** - *The slip of the rolling element during operation is reduced, resulting in less heat being generated.*