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## **CERAMIC BEARINGS**

Rolling bearings are known to mankind for a long time. It is believed that the first experience of the application of rolling elements used to reduce friction by builders of the Egyptian pyramids. Leonardo da Vinci's also used bearings in his drawings of the helicopter. In the 17th century Galileo proposed the use of bearings with separator. Rolling bearings are the best way to reduce friction because they are used wherever friction is present from the indoor fan to aeronautics, from movies to cars and machines.

Bearings are made of steel corresponding to expected characteristics. Nevertheless, there are working conditions where conventional metal bearings can not provide the appropriate specifications. Therefore, it was decided to use other materials. Such material became the ceramics ( $\text{Si}_3\text{N}_4$ ). Conventionally, ceramic bearings can be divided into three groups:

- *Mixed* when only rolling elements are made of ceramic, inner and outer ring are made of steel and a separator is made of synthetic materials with a low coefficient of friction.

- *Fully ceramic* when rolling elements and rings are made of silicon nitride.

- *Bulk* that are used as common layers in steering bushings.

Ceramic bearings feature many advantages compared with metal ones:

- High corrosion resistance makes it possible to work in harsh environments without corrosion.

- Lightweight, ceramic bearings are 40% lighter than metal reducing centrifugal force at high speeds.

- They have more strength to help smaller wear of layers during rotation.

- Chemical resistance, high dielectric properties and lack of magnetism allow to work in the petrochemical and nuclear industries and in installations with high electrical insulation as well.

Actually, ceramic bearings have disadvantages: fragility, high cost and low range. These properties allow you to use ceramic bearings in high-speed spindle units, gas and jet turbines, in precise navigation devices in the aerospace industry, for medical equipment and other industries.

## **REFERENCES**

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