TECHNICAL INSIGHT

NSK

PRODUCT AND APPLICATION ENGINEERING INFORMATION

A PUBLICATION OF NSK AMERICAS

MATERIALS FOR BEARINGS

Ensuring Reliability and Durability

The reliability and specific properties of bearing components such as rings, rolling elements and cages are largely determined by the materials used. These materials have to be capable of withstanding loads and must also be tailored to specific applications. NSK supplies bearings made from a range of materials and is also a leading developer of high-purity steel which delivers long-term durability.

MATERIALS FOR RINGS AND ROLLING ELEMENTS

Rings and rolling elements must first and foremost be able to cope with high pressure and friction. The materials used therefore need to have the following general characteristics:

	Material properties needed for rings and rolling elements	Material properties needed for cages
High level of resistance to fatigue	X	
High level of hardness	X	
High level of resistance to wear	X	X
High level of dimensional stability	X	X
High level of mechanical strength	X	X

Other requirements – such as resistance to heat and corrosion – depend on the specific application in question.

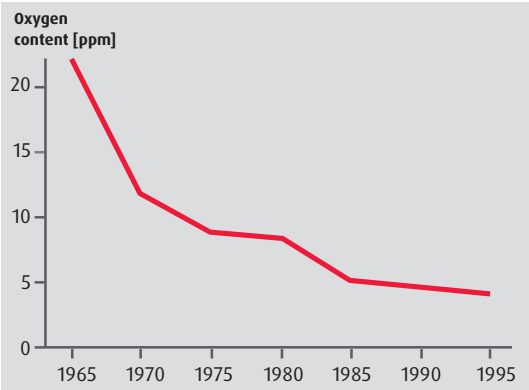
Through-hardened chromium steel is primarily used for rings and rolling elements. This is the right choice for the majority of applications. If the components will face heavy shock loads, they are usually made from surface or case-hardened steels such as chromium steel, chromium-molybdenum steel or nickel-chromium-molybdenum steel. These types of steel are more resistant to shocks than standard, through-hardened bearing steels because they have a softer core which absorbs forces. This can prevent bearings from breaking due to surface damage.

NSK uses case-hardened bearing steels which are refined in a vacuum and only contain minimal impurities in the form of oxygen, nitrogen and hydrogen compounds. Investigations have shown that ultra pure steel combined with suitable heat treatment considerably increases bearing fatigue life.

As a pioneer in the further development of materials technologies, we aim to constantly improve the functionality and strength of bearings and to develop suitable materials for specific applications.

Bearings can be dimensionally stabilized for higher temperatures to cater for specific requirements.

Oxygen Content of NSK's Ultra Pure Steel



Oxygen content is an indicator of steel's impurity. By improving its manufacturing processes, NSK has been able to considerably reduce the oxygen content of its steel, which extends bearing service life.

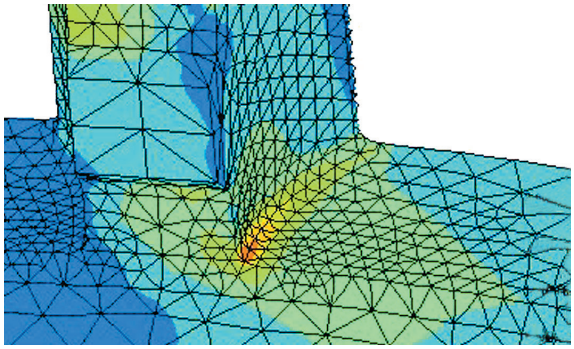
MATERIALS FOR CAGES

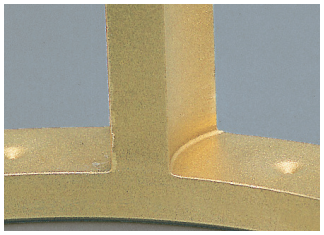
Cages are primarily subject to tension and compressive loads along with sliding friction around the cage pockets and guide lips. For this reason, the materials used for cages need to have the following properties:

- Resistance to wear
- Dimensional stability
- Mechanical strength

Pressed sheet steel cages for bearings are most commonly made from low-carbon steels. Depending on the intended application and environment, either brass or stainless steel may be used. Solid cages are manufactured from special brass or unalloyed steel. NSK offers cages made of laminated fabric, polyamide, L-PPS, PEEK or other materials for specific applications.

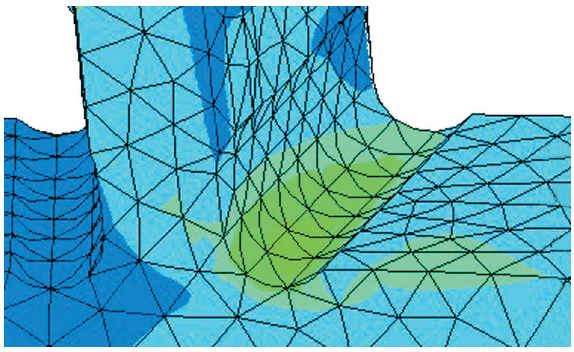
M-Series

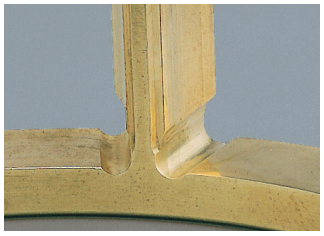




Maximum stress:
210 MPa

EM-Series





Maximum stress:
110 MPa