



MATERIALS FOR ROLLING BEARINGS

Generalities

Due to various operating conditions and intricate aspects of deterioration phenomena, direct connections between mechanical characteristics and materials used for bearing manufacturing have been ascertained. Experimental studies proved that the following characteristics have to be considered, when appreciating the quality of bearing steels: rating life and contact fatigue loading, hardness at environment temperature and high temperatures, coefficient of expansion, tenacity, corrosion resistance and metallurgical conversion characteristics.

In case of normal applications and operating conditions, only the first two characteristics are of importance, the other being of importance only in case of bearings used for special applications.

Material behavior when being loaded at fatigue contact is difficult to be estimated due to the complexity of the factors involved while hardness can be estimated by classic methods.

These led to the selection of some steels, which are able to satisfy the main demands of normal and special operating conditions. The steels that meet the requirements for rings and rolling elements manufacturing are the following:

Chrome-alloy bearing steels

Steels with high carbon content 1 % and with chrome 1.5% according ISO 683-17 have been chosen for bearing rings and rolling elements.

Table 1 shows the chemical content of bearing steels used in Romania.

Table 1

Standards	Symbol	C	Si	Mn	P max.	S max.	Cr	Mo
		%						
ISO 683-17	100Cr6	0.93-1.05	0.15-0.35	0.25-0.45	0.025	0.015	1.35-1.60	max.0.10
	100CrMnSi6-4	0.93-1.05	0.45-0.75	1.00-1.20	0.025	0.015	1.40-1.65	max.0.10

Case - hardening steels

Although case-hardening steels are not usually selected for bearing manufacturing, for certain applications they can be successfully used.

These steels are generally recommended for large-sized bearings and where bearings are operated under shock, loads and vibrations.

Bearings manufactured of case-hardening steels are less liable to casual failure due to the ductile and soft core of these steels.

The case-hardening bearing steels used and the chemical content are according ISO 683-17.

Bearing cages

Bearing cages are of great importance for bearing design.

The main purpose of the cage is to prevent immediate contact between two neighboring rolling elements and to guide them on raceways. Where bearings are of separable design, the cage also serves to retain the rolling elements when one bearing ring is removed during mouting and dismounting.

Considering the cage manufacturing technologies, they can be classified as follows:

-Pressed cages of steel sheet, low carbon content, for extra-deep drawing.

-Polyamide cages are used for some small and medium-sized bearings due to the following

properties:

- low density
- high elasticity
- low wear at sliding movement
- low inertia moment