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| **MATERIAL INFORMATION** |

**5.1.3 Types and properties of steel**

Steel materials consist mainly of iron and carbon alloy. However, the presence of only carbon element in its composition causes its properties to be limited. For this reason, alloying is made with elements such as Al, Cr, Mo, Ni, Mn, Si, V and W along with carbon element in steels. The following properties are given to steels by alloying with various elements.

1. Increased strength
2. Increased magnetization
3. Increased hardness ability
4. Increased hardening by heat treatment
5. Satiety increases
6. Small granual structure wins
7. Increased corrosion resistance
8. High temperature resistance increases
9. Gains cold and hot forming
10. Machining compliance improves
11. Spillability increases
12. Malleability increases
13. Gains weldability
14. Nistrulation is applied

In practice, the characteristics of steel varieties are given below.

**General building steels:** These steels are divided into three groups, taking into account their calmed or unconstructed properties. During steel production, oxygen in the structure inhibits the homogeneity of chemical compositions of steel. If homogeneity in the structure of steel according to the place of use is important, oxygen should be removed from the structure. The process of removing oxygen from the structure is called deoxidation method. The steels that are applied the deoxidation method are called calm steel, and the steels produced without the deoxidation method are called non-calm steel. In short representations, the letter (R) indicates that steel is calm steel, and the letter ( U ) is non-calm boiling steel.

Considering all these properties of structural steels, they are divided into 3 groups;

1. quality (general-e.g. St 42-1)
2. quality (medium value-e.g. St 42-2)
3. quality (high value-e.g. St-42-3)

General structural steels increase tensile strength and hardness with increased carbon content, while hot and cold forming, weldability and machining properties decrease.

General structural steels are non-alloy and are manufactured as sheet metal, rods and various empty and filled profiles. In general, steel construction is used in structures, greenhouses, machinery and food industry.

**Stainless steels:** They are steels that resist corrosion with the effect of chromium and nickel, which are 12-26% contained in the content. They also withstand high temperatures.

Stainless steels;

1. Stainless sheet metal and rods
2. They are divided into 2 groups: stainless steel castings

Stainless sheet metal and rods are divided into 3 martenzitic, ostenitic and ferritic according to their internal structure. Martenzitic ones are materials with high mechanical strength and least resistance to corrosion. Their hardness can be increased by heat treatment. It is used in bearing bearings and cutting elements. They are low-ni content steels with 0.4% carbon in their structure.

Ostenitic ones are highly resistant to corrosion, high in satiety. They're not magnetic. These materials are used in the petrochemical and food industry. There is 8% Ni and 18% Cr.

Ferritic ones, good corrosion resistance, mechanical strength is not good. Magnetic materials that are not suitable for heat treatment. Kitchen utensils are used in the manufacture of tanks and warehouses.

Stainless steel castings are divided into 2, corrosion resistant and high temperature resistant. Corrosion resistant ones are used in the manufacture of elements such as valves and pumps. Those that are resistant to high temperatures are used in places such as turbines and furnaces.

**Tool steels:** Tool steels are high alloy and high carbon ratio steels. They are used for the forming of metal and non-metal materials. They are grouped by place of use. Tool steels used as woodworking, basin, guide, ream, etc. are called carbon tool steels. These steels contain 0.16 -1.40% C and very little Cr and V. Tool steels used as milling gravel, lathe pens, etc. are called high speed tool steels. These steels contain 4% Cr, some contain Mo and W. They are highly resistant and wear-resistant materials. Sheet metal cutting shears, staples, tool steels used as primers are called cold tool steels. These materials, which are high strength and wear resistant at normal temperatures, contain Mn, Cr and W.

Hot sheet cutting shears, tool steels used as hot forging molds, are called hot process tool steels. These are temperature-resistant, wear-resistant materials and contain Cr, W and Mo elements with a low carbon ratio of 0.3 – 0.5%. Tool steels suitable for impact use such as chisels, staples and hammers are called impact tool steels. They contain elements such as Si, Cr and W along with up to 0.5% carbon.

**Machine making steels:** They are high strength and high-strength quality steels.

**Concrete steels:** They are special quality steels used in structural engineering.

**5.1.4. Cast iron materials and properties**

White cast iron is very hard, crunchy and brittle, as it is predominantly cementitis. Formatted through casting.

Gray-country cast iron is crunchy and has low strength. Easy to dump and machin.

Spherical-sphero casting is cast iron, where graphite particles are in spheres.

Steel casting is obtained by pouring into the molten steel mold. It's hard to dump.