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When we think about engineering, usually drawings or equations or symbols are come to our minds. But topic of this writing is not about any of them. We are gonna talk about "The most widely used basic engineering materials". Let's start with material types. Engineering materials divided into: metals, non-metals or elements, compounds, mixtures. Metals are the most commonly used class of engineering material. Metal alloys are especially common, and they are formed by combining a metal with one or more other metallic and or non-metallic materials. The combination usually occurs through a process of melting, mixing and cooling. The goal of alloying is to improve the properties of the base material in some desirable way. Metal alloy compositions are described in terms of the percentages of the various elements in the alloy, where the percentages are measured by weight. Ferrous alloys have iron as the base element. These alloys and include steels and cast irons. Ferrous alloys are the most common metal alloys in use due to the abundance of iron, ease of production and high versatility of the material. The biggest disadvantage of many ferrous alloys is low corrosion resistance. Carbon is an important alloying element in all ferrous alloys. In general higher levels of carbon increase strength and hardness and decrease ductility and weldability. Pure aluminum is soft and weak but it can be alloyed to increase strength. Pure aluminum has good corrosion resistance due to an oxide coating that forms over the material and prevents oxidation. Alloying the aluminum tends to reduce its corrosion resistance. Nickel alloys have high temperature and corrosion resistance. Common alloying ingredients include copper, chromium, iron. Common nickel alloys include Monel, Inconel, Hastelloy. Copper alloys are generally characterized as being electrically conductive, having good corrosion resistance and being relatively easy to form and cast. While they are a useful engineering material, copper alloys are also very attractive

and are commonly used in decorative applications. Titanium alloys are light, strong and have high corrosion resistance. Their density is much lower than steel, and their strength to weight ratio is excellent. For this reason, titanium alloys are used fairly commonly, especially in the aerospace industry. One primary downside of titanium alloys is the high cost. Polymers are materials that consist of molecules formed by long chains of repeating units. They may be natural or synthetic. Many useful engineering materials are polymers, such as plastics rubbers, fibers, adhesives, and coatings. Polymers are classified as thermoplastic polymers, thermosetting polymers and elastomers. Ceramic are solid compounds that may consist of metallic or non-metallic elements. The primary classifications of ceramics include glasses, cements, clay products, refractories and abrasives. A composite material is a material in which one or more mutually insoluble materials are mixed or bonded together. The primary classes of composites are particule composites, fibrous composites and laminated composites. Particule composites are created by adding particles of one material to a matrix. The particles will typically account for less than 20% of total material volume. The particles are added to improve upon some shortcoming of the matrix material. A fibrous composite is a material in which fibers of one material are embedded within a matrix. The fibers carry most of the stress and the matrix serves to hold the fibers in place and to transmit stress between the fibers. The fibers can be short and randomly oriented or they can be long and continuos.