

**Steel** is an [alloy](#) that consists mostly of [iron](#) and has a [carbon](#) content between 0.2% and 2.1% by weight, depending on the [grade](#). Carbon is the most common alloying material for iron, but various other alloying elements are used, such as [manganese](#), [chromium](#), [vanadium](#), and [tungsten](#).<sup>[1]</sup> Carbon and other elements act as a hardening agent, preventing [dislocations](#) in the iron atom [crystal lattice](#) from sliding past one another. Varying the amount of alloying elements and the form of their presence in the steel (solute elements, precipitated phase) controls qualities such as the [hardness](#), [ductility](#), and [tensile strength](#) of the resulting steel. Steel with increased carbon content can be made harder and stronger than iron, but such steel is also less [ductile](#) than iron.

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Alloys with a higher than 2.1% carbon content are known as [cast iron](#) because of their lower [melting point](#) and good [castability](#).<sup>[1]</sup> Steel is also distinguishable from [wrought iron](#), which can contain a small amount of carbon, but it is included in the form of [slag inclusions](#). Two distinguishing factors are steel's increased [rust](#) resistance and better [weldability](#).

Though steel had been produced by various inefficient methods long before the [Renaissance](#), its use became more common after more-efficient production methods were devised in the 17th century. With the invention of the [Bessemer process](#) in the mid-19th century, steel became an inexpensive [mass-produced](#) material. Further refinements in the process, such as [basic oxygen steelmaking](#) (BOS), lowered the cost of production while increasing the quality of the metal. Today, steel is one of the most common materials in the world, with more than 1.3 billion tons produced annually. It is a major component in buildings, infrastructure, tools, ships, [automobiles](#), machines, appliances, and weapons. Modern steel is generally identified by various grades defined by assorted [standards organizations](#).

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