

# Steel is superior to iron for construction argumentative essay examples

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Steel as a building material in many ways replaced the outdated iron.

Until the 70s of the 19th century, the dominant structural material has been cast, but in its stead came shortly steel. By the beginning of the 20th century, production of iron and steel is almost equal. In this part of the cast iron is processed into steel. The value of iron as the final product has fallen sharply and the value have increased significantly.

Since the 70s of the 19th century to the present day steel is a basic construction material industry and it is safe to predict that it save its leading role in the future.

Steel is an alloy of iron with carbon and other chemical elements. This alloy is an iron base (solvent), and other elements - impurities dissolved iron. The impurities can have on the properties of steel, both positive and negative effects, so they are divided into useful and harmful. Useful impurities mainly affect the properties of crystals (grains), and impurities degrade intercrystalline ( intragranular ) communications. In steels most brands of the main useful impurity is carbon. These are called carbon. The carbon content in carbon steels usually is 0. 05-0. 50 %, but can reach > 1% ( to 2. 14 % theoretically ) . In the carbon steels as useful admixture can also contain manganese ( 0. 3-0. 6 %) and silicon ( 0. 15-0. 3 %). The content of harmful substances, which are usually sulfur, phosphorus, oxygen and nitrogen, limit hundredths and thousandths of a percent.

Introduction steel elements in the specified amounts, called doping, eliminates these disadvantages of carbon steel , to improve its mechanical properties, as well as for certain specific physicochemical properties , which

has no carbon steel. Such a steel alloy called. The influence of alloying elements on the properties of steel varied, so adding them in specific amounts and combinations, you can get steel with different properties: high strength and toughness at normal and high temperatures, good resistance to the action of aggressive media, special electrical, etc. The positive effect of carbon and alloying elements on the properties become more fully manifest only after appropriate heat treatment, provides the required structure. Physical and mechanical properties that determine its quality, i. e., the degree of fitness for a particular purpose, or the ability to meet customer requirements, can be divided into two groups. The first group includes the properties that define the process ability of steel, i. e., its ability to be subjected to some treatment (pressure, cutting, thermomechanical, etc.) for delivery of finished products. The second group of properties that determine the ability of steel to provide reliable and durable service in the finished product. Since steel inherently has a high adaptability, most often to improve the quality requirements associated with the need to improve its ability to provide reliable and long in the finished product, and this ability is generally determined by the mechanical properties (strength, durability, etc.), much less - electrical properties, heat-, scale and corrosion, acid, etc.

In some cases, improved properties to determining workability of steel. For example, the most important requirement for steel used for the manufacture of body parts and other vehicles - is its formability, i. e. manufacturability. Cases when the steel should have both good mechanical (service) properties and good process ability. These steels include, for example, the bearing.

Terms of the bearings are very complex. Bearings must have good mechanical properties - high strength, elasticity and durability. But the manufacture of bearing steel exposed a complex and costly process (primarily mechanical), so that the workability of (technological) are also important.

The division of the chemical elements are alloy steel, useful and harmful to some extent, is conditional. Thus, most of the carbon steel grades - useful impurity, and in the electrical, corrosion-resistant steels - harmful impurities. Chrome, nickel, and some other elements improve the properties of many alloy steels, but they are some steels harmful impurities. Sulfur, phosphorus and nitrogen, which are harmful for most steel alloy, in some cases used as alloying elements.

The present level of technology and machinery steel can be cleaned by metal contaminants to safe their residual contents therein and administered in any useful metal impurities in the desired quantities, thereby obtaining steel with almost any desired properties. This contributes to the preservation of steel as the primary material of construction.

Is not an exaggeration for a long time the prevailing view that the beginning of the development of modern civilization , in fact, coincides with the beginning of the Iron Age , i. e. with human use of iron (in modern terminology , steel ) tools that now our civilization is in the future will be held at the steel.

With respect to the past and the present validity of this assertion is beyond doubt , as with stone and bronze tools a person could achieve very little progress , and now all of a powerful and diverse manufacturing household

appliances, responsible buildings and structures, vehicles, and much more, form the material basis of modern civilization consist essentially of steel. This is even truer for military equipment.

In the future, the role of steel as the most important construction material also continues, because it is not a worthy competitor. Thus, even though aluminum contained in the crust than iron, but not significantly inferior to iron complicated and expensive extraction from natural materials, and strength at ordinary particularly elevated temperatures. Titanium and its alloys have the best service properties than iron and steel, but titanium content in the earth's crust is extremely small and its extraction from natural raw materials is difficult and expensive. Therefore, titanium and its alloys due to their excessive cost and scarcity are used in limited amounts, ie in addition to steel. A similar role is played by many other materials: non-ferrous alloys (Mg, Al, Ni, Cu, etc. ) , engineering plastics , metal , various composite materials, etc. The role of these materials is also important, since in some cases they are replacing steel is not possible.

In the history of the industry for a long time when the production of metals was small, they did not limit the consumption of smelting, i. e. what was done, found consumption. However, with the expansion of production to an enormous size volumes of steel products began to depend on consumption. This is especially true for the production of steel in the world in the XX century.

## **Example: Bridges Building**

Arch bridge made of natural stone could withstand the severity of centuries of men and horses, carriages and carts. But when the new means of communication - the railway - the beginning of conquering the world, immediately determine limitations former bridge-building techniques. Train weight, speed, and do track caused quite unusual demands made in the construction of new railways. Carriageways of the road running through the hilly terrain, writhing as he ran down from the mountains into the valley, crossed by relatively small bridges of the river and re- looped on the slopes to overcome the next hill. On the rail track, on the contrary, there should be no big climbs or steep descents. Therefore, the railroad cut open landscape, the borer tunnels, and mountains and crosses the valley at high viaducts. For each stream, each cross road, every ravine need a bridge, as well as their need so much, they should be inexpensive and can withstand super heavy loads. At first they thought to build railway bridges of the same material, which came on the rails and locomotives. But during the heyday of the first railway construction, around 1850 , stainless steel was still a thing of rare and expensive. Because at first, most European countries and the U. S. preferred to use wood or stone. The exception was the United Kingdom, at the time the world's largest producer of iron.

In iron production for millennia was time-consuming and give small quantities of metal . A true " Iron Age" began only in 1735 in a steel plant in the English town of Kolbrukdale on the River Severn managed to get a coveted metal in a blast furnace with coke ( coal degassed ) - cast iron . Only now possible to its mass production.

There, in Kolbrukdale , in 1779 came the first bridge in the world of metal, blast furnace was built by Abraham Derby and engineer Joseph Wilkinson . The bridge connects the banks of the River Severn, as a historical monument, he is now under state protection. Cast iron - material is brittle, and, like a natural stone, it can withstand a force of compression. Therefore, the creators used the bridge arch structure already tested. Details of arches span 21 m have been cast in the factory Derby. At the construction site was to just collect them.

The first attempt to build on the English model cast-iron bridge in Germany has taken 15 years later, a graph on his property, is located in Lower Silesia. Two years later cast parts has been completed, but they are not able to collect.

In the end, Earl invited the equipment from England , and he just barely built a small bridge with a 11 -meter span .

Some of the many small iron bridges built on the model of Colebrooke - deylskogo , eventually collapsed because the arch did not survive . The era of large bridges occurred only after learned of pig iron to produce iron and steel. Steel and wrought iron much more viscous than cast iron materials and also withstand tensile stresses. Thus , the bridges of all shapes and types of construction - and suspension bridges on chains and steel cables , and arched of riveted steel profiles , and friends since the wooden bridge frame structures - began to build the new material : steel.

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