Difference Between Hot-Rolled Steel and Cold-Rolled Steel

What is steel made of?

Steel is one of the most important metals in engineering, construction, infrastructure, and in maintaining the sustainability of the structures built with it. It is regarded as the future of sustainable growth both in the economy and the environment, as it can be recycled over and over without any loss of its properties.

Steel is an alloy of iron with small components of carbon, manganese, silicon, phosphorus, and oxygen. It is manufactured via blast furnace route and electric arc furnace route. There are over 3000 grades of steel that differ in chemical & physical properties and its applications.

The price of steel is quite volatile and has been fluctuating a lot due to the effects of coronavirus. The steel price depends on the brand and product, for example, Jindal GC sheet price list will be different from that of TATA and JSW. The retail price of hot-rolled coil increased by 1.43% and cold-rolled coil by 1.69% in June due to resuming of industrial activities.

A material grade may have the same composition but differ in qualities that are achieved during the processing methods, namely - hot-rolling and cold-rolling.

Hot-rolled and cold-rolled steel are not grade specifications, but they can come in different grades. Their difference lies in the manufacturing process and applications.

Hot-Rolling Method:

As the name suggests, the hot-rolling method is the process of heating a huge piece of flat metal, called a billet, and then running it under a series of rollers. The metal is heated beyond its recrystallization temperature, which is approximately 927° Celsius (1700° Fahrenheit). It will be glowing brightly at this point.

The heating of the metal above its recrystallization temperature makes it easier to mould it in desired shapes and form. The metal becomes more malleable and shrinks slightly when it cools down, so there is less control over its size.

Cold-Rolling Method:

This is a process followed by hot-rolling, where the hot-rolled steel is re-rolled further at room temperature. The steel is cooled with oil and rolled to a specific thickness depending upon its usage and properties. The rolling thickness of stainless steel differs from mild steel. Using oil in the process reduces deformation and wear of the metal, giving it a shiny, oily surface.

During this process, steel will not shrink, therefore there is complete control over its size and shape. Precise shapes can be made through a series of further processes that involves breakdown, semi-finishing, sizing, and semi-roughing. Turning, grinding, and polishing are other further processes to produce more refined steel products.

Difference Between Hot-Rolled Steel and Cold-Rolled Steel:

- Hot-rolled steel is produced by heating the metal at high temperature whereas cold-rolled steel is just hot-rolled steel re-rolled at room temperature.
- Hot-rolled steel can be identified by scaly surface finishing (which can be removed with acid-bath pickling, grinding, and sand-blasting). Cold-rolled steel can be identified by its shiny, oily surface.
- Hot-rolled steel bars have blunt, rounded edges and corners. Cold-rolled steel bars have sharp edges and corners.
- Hot-rolled steel shrinks during the process whereas cold-rolled steel doesn't.
- Cold-rolled steel has lower carbon content compared to hot-rolled steel.
- **Uses of Hot-rolled and cold-rolled steel:** Hot-rolled steel is used in construction, railway tracks, parts of train cars, doors, pipes, etc. Cold-rolled steels are used in home appliances, roof/wall systems, water heaters, metal furniture, in aerospace structures, etc.
- Examples of cold-rolled steels are CRCA sheets, GC sheets (available in hot-rolled too), bars, stripes, rods, etc. Hot-rolled steel examples: structural steels like I-beams.
- Hot-rolled steel price is lower than cold-rolled steel. The CRCA sheet price differs from HRCA sheets depending on the brand.

Is Cold-Rolled Steel Harder than Hot-Rolled Steel?

Cold-rolled steel is 20% harder and stronger than hot-rolled steel because of strain-hardening. During the cold-rolling process, the steel is compressed for higher tensile strength with lower

density.

What is Easier to Weld - CR Steel or HR Steel?

Hot-rolled steel can be welded and bent at a sharper angle which makes it ideal in the construction of buildings and railway lines. Cold-rolled steel may crack when bent at the same angle. Hot-rolled steels are used where precise shapes, forms, and tolerances are not a priority.

Resource: https://www.evernote.com/shard/s335/client/snv?noteGuid=9fa1dada-3f1d-f81e-a9d3-5db25833bfad&noteKey=7e3e127352fd381fa6bc52d160b3df24&sn=https%3A%2F%2Fwww.evernote.com%2Fshard%2Fs335%2Fsh%2F9fa1dada-3f1d-f81e-a9d3-5db25833bfad%2F7e3e127352fd381fa6bc52d160b3df24&title=Difference%2BBetween%2BHot-Rolled%2BSteel%2Band%2BCold-Rolled%2BSteel