

# Hot Rolled vs. Cold Rolled Steel, What's all the Fuss About?

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Theoretically, the only difference between hot rolled and cold rolled steels is that hot rolled steel is rolled to its final dimensions while hot enough to scale (over 1700 degrees F) while cold rolled steel is rolled to its final dimensions well below scaling temperatures.

So----- If you are making ½" square hot rolled steel, you have to estimate what the final size will be after the product cools, whereas you can finish the cold rolled steel to much closer tolerances right in the sizing rollers and that is what you get. There are some other things to consider, too:

-The finished tolerances on hot rolled steels are looser than on cold rolled. Not only the plus or minus tolerance from nominal size, but the "square-ness" of the product. And, I can tell you from personal experience that there's a lot of trapezoidal A36 out there. So, if you need a specific size and you are going to go to a "surplus" place, bring your ruler, square and micrometer to make sure you get what you need.

- I have been told that, in order to get the cold rolled steel to come out with a nice finish, they might use "cleaner" ingots from which to roll the product. This means that you'd get fewer slag or carbon inclusions with cold rolled steels.

-Note that I haven't talked about the chemistry of the steel at all. You can get cold rolled or hot rolled 1045 and you can perform either process on C1018. But since we often talk about using "mild" steels, the two steels that we end up having around most often are C1018----which is quite often sold in cold rolled form and A36 which is always hot rolled.

-One other difference that may be of interest to the blacksmith is that if you buy "1018" cold rolled steel", you can be pretty sure that it has close to a 0.18% carbon content and few other impurities. But the spec for A36 can let the carbon content go as high as 0.29% and it can contain many more impurities. More carbon makes it harder to forge.

-You generally have to pay about twice as much money for cold rolled steel as for hot rolled steel, for reasons which are probably obvious from the above.

So far, you are probably feeling that, in dealing with mild steels, cold rolled steel is clearly the better stuff to have if you can afford it. Well, yes, usually, but---- since the hot rolled steel IS rolled while hot, it has a chance to normalize after the last rollers, so it is pretty much stress free when you get it. But machinists who usually buy cold rolled steel, often have the stuff twist and warp on them as they machine the first side or two. This is because the cold rolled steel actually work-hardens in the rolling process.

For blacksmiths, this isn't much of a problem, since we are usually going to heat it up and reform it anyway.

There is also an in-between finishing hot rolling process called "P & O" (Pickled and Oiled). In this case, the hot rolled steel is pickled in acid to remove the mill scale and then oiled to keep it from rusting. The cost is somewhere in between that of regular hot rolled and cold rolled.

Finally, in my experience, the more popular (to the steel yard) sizes of mild steel usually come in both cold and hot rolled. I buy hot rolled whenever I can for blacksmithing. Except if I'm going to put a LOT of work into a piece. Then I buy cold rolled steel to minimize the possibility of having a crack appear in the shaft of my fancy flesh fork after about an hour of forging and an hour of filing and chasing. But in some sizes, for instance 1/4" square, the steel yards in our area only carry it in cold rolled, at twice the price of hot rolled---- so if I want any of that for S-hooks and for nails, etc., I'm stuck with the higher priced stuff--- unless I want to order a ton or two to get it in hot rolled form!