

Steel

Correctly choosing between *Hot Roll* and *Cold Roll*

Background: The difference between the two is the temperature at which they are processed. Hot Roll is processed above the re-crystallization temperature. Its grains reform after the rolling process and it is left in a stress-free state. Cold Roll is processed below the re-crystallization temperature. Its grains remain flattened and elongated, leaving the material in an anisotropic state and full of cold work.

First: Decide what factors are important in your fabrication process.

Then: Choose your material based on the chart below.

	Hot Roll Characteristic	Cold Roll Characteristic
Factor		
Layout Orientation	The material characteristics are identical in all directions.	Care must be exercised in layout. The grains of the material are deformed during the rolling process and stay deformed. The material will be stronger with the grain than against the grain.
Price	Less expensive	More expensive
Strength	Weaker	Stronger
Weldability	Excellent for welding	Weldable, but the material will take on the properties of hot roll wherever it is welded
Machinability	Experiences no warping when machined	The removal of too many residual stresses, such as when a large face is fly cut, will throw the material out of equilibrium and cause deflection and warping.
Dimensional Tolerance of Stock	Fair. Deviations from the stated size are present due to surface scale and thermal shrinkage.	Good. It is not as accurate as ground stock, but better than Hot Roll.
Surface Finish	Fair to Poor. The surface of the material will be covered with carbon scale.	Good. Not as good as ground stock, but much better than Hot Roll.