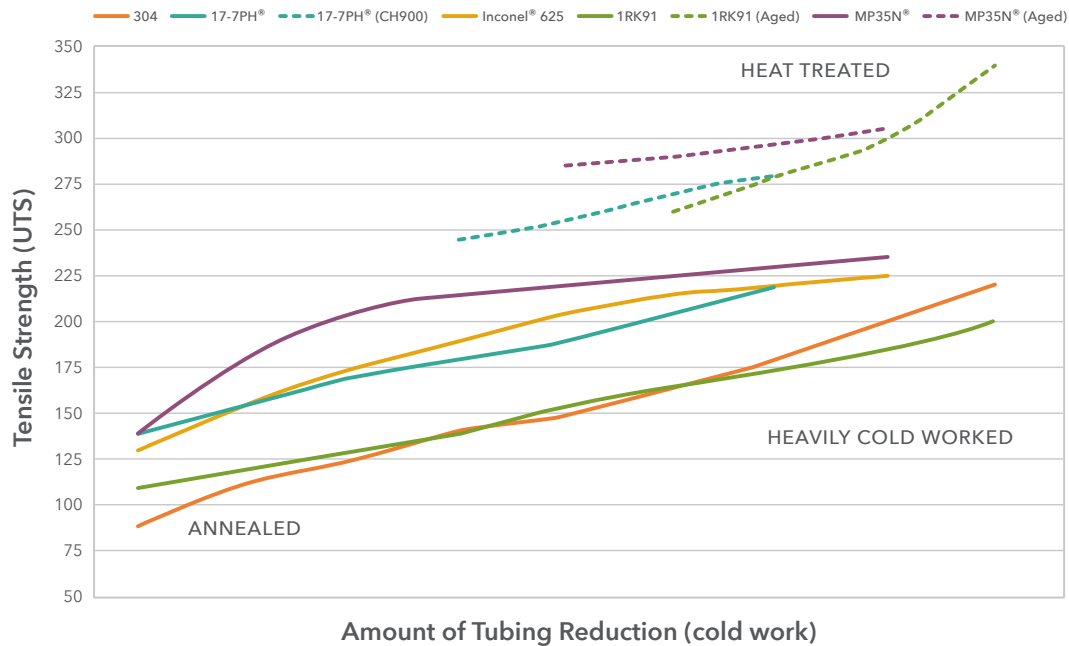


Metal Alloy Strength Comparison



Most of the tubing produced today uses 304 stainless steel as the alloy of choice due to its great combination of strength, ductility, price, and availability. 304 is a great starting point for many designs as it works for most applications. However, this alloy may not be optimal for the application and may require specialized processing to deal with the shortcomings of the material.

EXAMPLE: Instead of adding expensive laser cutting or taper grinding to 304 tubing to increase its flexibility, consider a higher strength alloy such as MP35N. Higher strengths enable thinner walls (increasing flexibility) and may reduce downstream processing costs.

The strength of 304 material can be manipulated through processing. If the 304 material (or other listed alloys) is reduced or cold worked, it will increase in strength. The amount of strength can then be optimized for the given application.

EXAMPLE: Tubing used for a wire crimp can be customized so there is enough strength to constrain the wire while ensuring there is enough malleability (elongation) to eliminate cracking.

The chart above shows some common alloy alternatives to 304. For some applications, 304 material will not have the right combination of properties or even the capability to reach certain properties. Alternative alloys can be cold worked to strengths equal or greater than that of 304. This increased strength can allow for increased performance in many applications.

EXAMPLE: Biopsy needles are often long and need to maintain a high degree of stiffness so they do not deflect during use. Higher strength alloys enable stiffer needles with thinner walls. The reduction in wall thickness will provide a smaller profile to the needle (or allow for a larger ID if the OD is fixed).

Some of these alloys can be heat treated to further increase their strength, and this customizable feature can be used creatively to aid fabrication. Tubing can be drawn to a temper that allows for efficient processing, and then the finished component can be heat treated to specification. Alternatively, tubing can be supplied in the heat-treated condition eliminating this step downstream.

EXAMPLE: Flaring tubing can often lead to cracks or defects if the incorrect temper is specified. With heat-treatable alloys, the tubing can be drawn to a lower strength, flared and then heat treated to regain the needed strength for the application.