

Heat Treatment

Whilst West Yorkshire Steel can offer help and advice on steel specifications, we recommend contacting a heat treatment specialist for full consultation on hardening processes available for individual specifications.

Heat treatment will alter the physical and mechanical properties of a steel through a controlled process of heating and cooling.

Popular heat treatment processes include the following:

- Hardening & Tempering
- Case Hardening
- Martempering
- Induction Hardening
- Through Hardening
- Nitriding

- Precipitation Hardening
- Vacuum Hardening
- Tufftriding
- Normalising
- Stress Relieving
- Annealing

For a tool steel to perform effectively a component when machined will usually require heat treatment. This will enable the tool to develop the characteristic properties required for a high hardness with good wear, abrasion and impact values, which vary with each specification. Refer to our tool steel page where we offer specification data sheets on our more popular specifications.

Tool Steel Heat Treatment

When hardening a tool steel component requires preheating (to avoid cracking and unnecessary distortion of the component), then it is raised to its final hardening temperature. An important point is the great necessity of having the tool steel uniformly heated through or as generally termed "well soaked". To achieve a high hardness the steel then requires rapid cooling. The name given to this process is "quenching". Dependant on specification the steel may be quenched in oil or cooled in air or inert gas. The steel is now extremely brittle and under great stress. If used in this condition the steel would probably shatter and it is possible the steel may even crack if left for any time in this condition. Therefore, as soon as the steel is quenched it requires tempering immediately. The tempering temperature is dependent on what hardness is required for the component. The steel is heated to the required temperature and held at this temperature for a minimum of one hour per 25mm of thickness (minimum 2 hours) and then allowed to cool. Certain tool steels require a double tempering. Certain steels can be given surface treatment, such as nitriding, when required.

For a steel hardening and tempering colours refer to the following pages for [Hardening & Forging Temperatures](#) and [Tempering Temperatures](#)

For further reference refer to our [Steel Hardness Conversion Chart](#)

Hardening & Tempering

Heat treatment temperatures, including rate of heating, cooling and soaking times will vary due to factors such as the shape and size of each steel component. Other considerations during the heat treatment process include the type of furnace, quenching medium and work piece transfer facilities. Please consult your heat treatment provider for full guidance on heat treatment of individual steel grades.