

## Heat Treating Evaluations



- Metallurgy and applied mechanics
- Rockwell hardness testing
- Microhardness testing
- Materials characterization
- Metallography
- Peer review
- Failure analysis
- Corrosion analysis
- Scanning Electron Microscope (SEM)
- Post-weld heat treatments (PWHT)
- Case hardening treatments
- Decarburization analysis
- Ductility heat treating evaluations
- Third-party analysis
- Litigation support

Metal alloys are often heat-treated to obtain certain physical properties such as hardening or softening a metal to alter its strength or ductility. There are many types of heat treatments for all types of metal alloys. Several of the more common treatments include quenching, annealing, tempering, normalizing, case hardening, precipitation hardening, and carburizing. During the heat treatment process, the metal is brought to specific temperatures to manipulate the grain structures in the metal, which in turn alters the mechanical properties.

The metallurgy laboratory in WJE's Janney Technical Center specializes in assessing heat treatments for all metals by creating metallographic specimens for examination in a metallographic microscope or scanning electron microscope. In the case of carburizing or case hardening, the depth of the heat treatment from the exterior surface can be measured and microhardness testing can be performed to assess that the proper hardness was achieved.

When performed incorrectly, heat treatments can lead to material failure in certain applications. WJE's metallurgy and applied mechanics engineers routinely assist in failure analyses relating to incorrect or unintentional heat treatments of metals. When an experienced metallurgist receives a failed component, they utilize background information, service history records, metallographic samples, and hardness data to convey a narrative of what happened and preventative measures that can be taken in the future.

