



What is Deep Cryogenic Tempering?

Cryogenic Engineering, Inc. utilizes the process of Deep Cryogenic Tempering. This process employs an advanced computer controlled processing system for reliably treating materials. We utilize a dry process where no liquid nitrogen comes in contact with the items being treated

The cryogenic process is computer profile controlled to within 1/10th of 1° Fahrenheit throughout the entire processing cycle. Items being treated are slowly taken down to -300°F., held at that temperature for a predetermined length of time, then depending on the item, slowly brought up through the processing cycle to approximately +300°F. This painstaking method eliminates the chance of thermal shock and micro cracking.

This treatment, at -300°F for an extended period of time in a dry atmosphere changes the material's microstructure. Retained austenite (a soft form of iron) is transformed into hard martensite. A second result of the deep cryogenic "soak" is the formation of fine carbide particles, called binders, which are released and distributed evenly through the mass of material to compliment the larger carbide particles present before the cryogenic process. These smaller carbide particles help to support the martensite matrix. In addition, the deep cryogenic tempering process creates a denser molecular structure. The result is larger contact surface area that reduces friction, heat and wear.

The Results

- ❑ Increases abrasive wear resistance.
- ❑ Requires only one permanent treatment.
- ❑ Change the items entire structure, not just the surface. Subsequent refinishing operations or re-grinds do no affect permanent improvements.
- ❑ Eliminates thermal shock through a dry, computer controlled process.
- ❑ Increases durability and wear life.
- ❑ Decreases residual stresses in tool steels.
- ❑ Decreases brittleness.
- ❑ Increases tensile strength, toughness, and stability coupled with the release of internal stresses.

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