



## **Thermatool Harden and Temper Systems**

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# Thermatool: Harden & Temper Systems

Thermatool's innovative approach to processing high grade materials applies proven designs to evolving industry needs.

## HARDEN AND TEMPER FEATURES

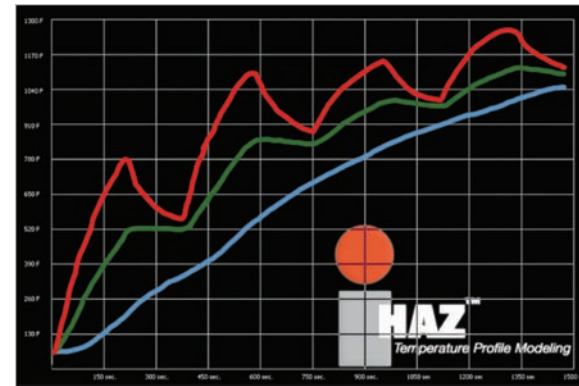
Thermatool's Harden and Temper Systems feature Solid State Induction power supplies, the IHAZ product heating modeling and control system, as well as a high technology modular precision quench system. Effective Hardening and Tempering requires the ability to deliver uniformly heated material to achieve optimum product straightness and minimal quench cracking through the quench. The combination of the latest computerized process controls in heating and quenching has benefited numerous industries that require hardened and tempered product. End users producing OCTG and API Products, food grade tube and pipe, and hardened and tempered bars are able to meet physical material properties demanded in many markets utilizing the Thermatool systems.



Thermatool powers its Heating systems with the rugged, reliable **VIP Series Power Supply**. These power supplies in conjunction with the **IHAZ™** control system are designed for even, through heating and are precisely controllable to guarantee repeatable results.

Thousand of Thermatool induction heating units are utilized throughout the world on various applications, and provide the highest reliability as well as simple operation and maintenance

- Variable Inductance Power Supply (VIP) uses one coil to heat a large diameter range of product without coil changeovers.
- .95 input power factor under all operating conditions.
- Inverter efficiency of 92%.
- SCR/diode inverter system (IGBT's also available)
- Low maintenance costs.
- LOCAL SERVICE AND SPARE PARTS ARE AVAILABLE WORLDWIDE.



## ACCURATE PROCESS CONTROL

Thermatool's state of the art **IHAZ™** technology offers the next generation in induction heating technology for pipe, tube and bar processing. The system provides a validated analytical model to input material characteristics and size, and outputs optimal power levels downloaded to the VIP Power Supplies to control surface to core heating rates. The system combines the analytical model to predict inside temperatures while using external temperature measurement and control to achieve optimal hardening and tempering results.

The **IHAZ™ Temperature Profile Modeling** system provides greater control over the induction heating process with the added benefit of scrap reduction and a better quality heat treatment.

The control system stores modeled temperature profiles for each product. This unique feature enables the individually controlled induction coils to be set at power outputs which will produce a heating affected zone (HAZ) pattern specific to that product, which is essential to the successful processing of specific product chemistries.

In conjunction with closed loop temperature control and real time process feed-back, process repeatability and reliability are built in functions.

## PROCESS MODEL

Modular power supplies and multiple coils with superior process management allow precise and uniform heating control while still providing manufacturing flexibility. The modular power supply concept allows for minimal use of heating power at all times, thereby reducing process costs.



## PRECISION QUENCHING

Thermatool's unique precision quench delivers unparalleled results in the industry. Product straightness is the result of uniform heating followed by precision quenching and can eliminate the need to post heat treat re-straightening. Enhanced metallurgical properties result from programmable control over the quenching process. This is all delivered within a compact equipment footprint. The slot quench rings offer superior control of the hardening process by providing a high velocity, **symmetrical shaped flow of quenchant**. The modular design provides quick change over between product sizes, and precision quenching of large diameter ranges.

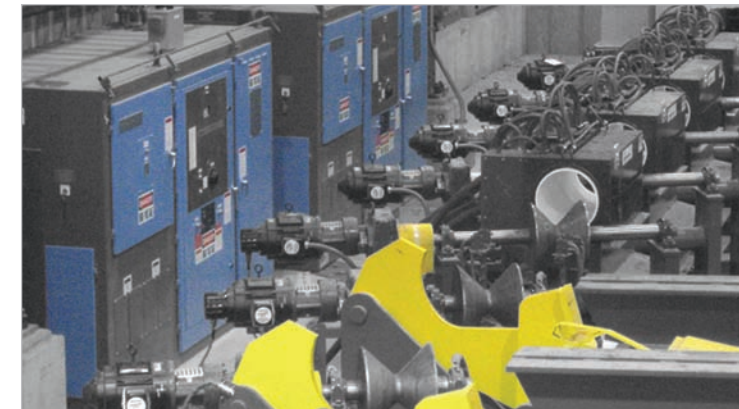
**Variable speed turbine pumps** are provided to allow precise control over the quench rate, and bounce-back temperatures are programmable for large bar diameters. The quench ring profile prevents scale "clogging" experienced in nozzle type quench barrels. Maintenance is simplified and minimized. Sealed containment boxes are provided to minimize over spray and water loss.



## SYSTEM FLEXIBILITY

Longer "soak" times require extended hold times for heavier wall products and bar applications. In those situations, Thermatool will size the induction pre-heating to provide through wall heating prior to gas furnaces in order to produce difficult product chemistries while enabling a more effective use of furnace and plant footprint. This "hybrid design" or combination of induction and gas permits a greater flexibility in product offering and production capacity.

All Thermatool Harden and Temper systems feature lean manufacturing principles in system layout design. Small batch processing, and quick line change-over, are provided by a fully automated computer controlled process.



## MATERIAL HANDLING SYSTEMS

Thermatool provides complete material-handling systems that are engineered for specific products and processes. Whether for a Greenfield site, or fitting in an existing facility, Thermatool will engineer and build a handling system to promote the efficiency of the process. These systems are designed to be modular, and are customized through the specific combination of many standardized components to best serve our customer needs.

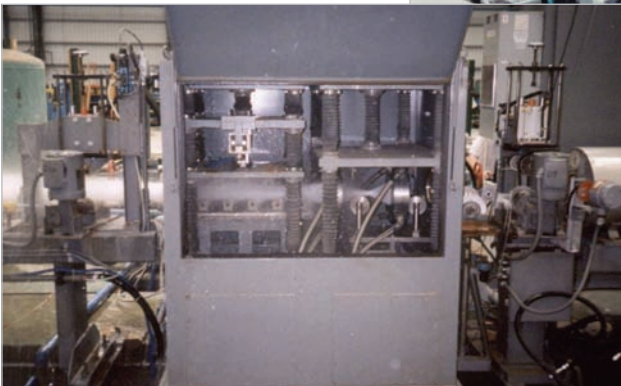
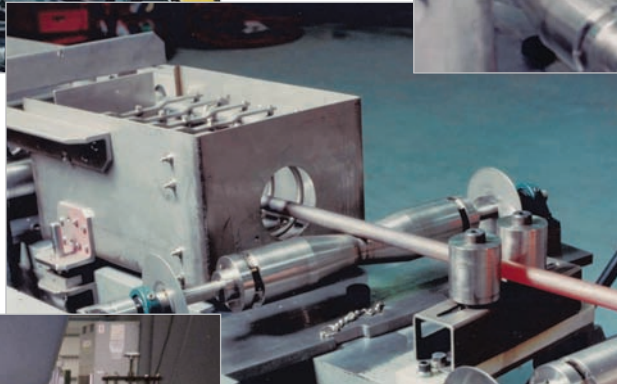
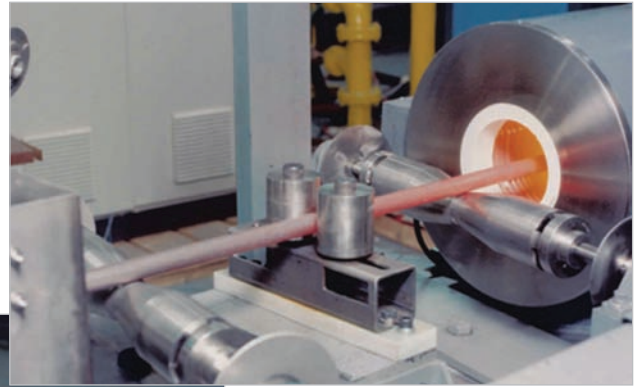
Our standard systems can process 10, 20 or 30 tons per hour for the following applications:

- **Austenitizing:** Utilizing VIP series medium frequency inverter systems.
- **Quench:** Utilizing Thermatool's precision quench system.
- **Tempering:** Utilizing VIP induction, gas or electric furnaces.



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