Thermal Processing Technology Center (TPTC)

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Illinois Institute of Technology

Application of new thermal processing technology will improve quality and reduce costs for industry

A National Science Foundation Industry/University Cooperative Research Center since 2001

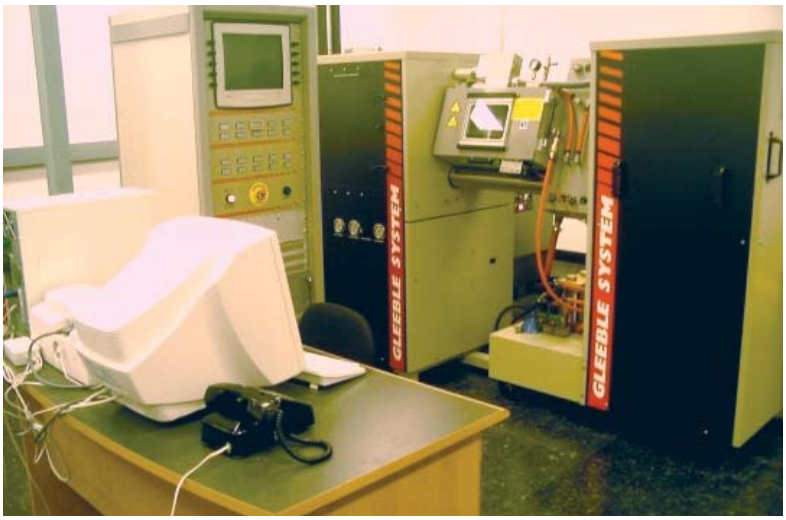
Partner Institutions:

- *IIT Research Institute*
- *Los Alamos National Laboratory*
- *National Institute of Standards and Technology*

Center Mission and Rationale

Thermal processing of materials is an essential part of most manufacturing processes. The TPT Center was established to advance the technology of thermal processing of materials. The main objectives of the Center are to:

- Conduct basic research and related developmental activities for the use of thermal processing technology in materials processing and manufacturing
- Provide timely and effective technology transfer between the Center and its industrial participants
- Promote education and training in thermal processing technology.



The latest model Gleeble 3500, recently installed in the Thermal Processing Laboratory. The equipment permits sophisticated simulation of thermo-mechanical processing of materials.

Research Program

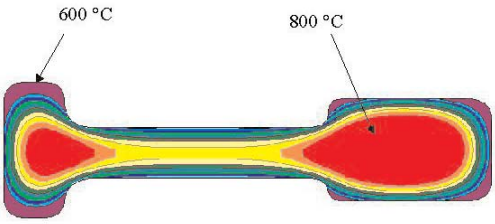
Faculty and students from the departments of mechanical, materials, and aerospace engineering conduct research for the TPTC in six major areas: ferrous metals, non-ferrous metals, ceramics, powder materials, modeling and simulation, and sensors and controls.

The Center's milestone achievements include:

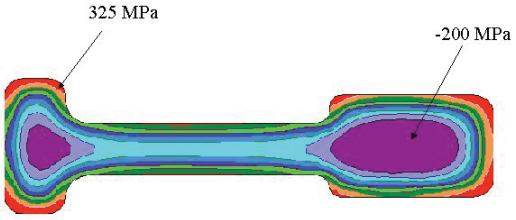
- Award of a State of Illinois Technology challenge grant to support the Center
- Award of a Center for Heat Treat Excellence project on distortion of heat treated parts
- $1.25M donation for research infrastructure development.

The Center has exceptional facilities and equipment for thermal processing and characterization of materials. The equipment available includes:

- Gleeble System 3500
- Scanning and Transmission electron microscopes
- X-ray diffractometer
- Controlled atmosphere integral quench furnace
- Eight gas furnace atmosphere analyzer
- 1800ºC vacuum furnace
- Cryotreater
- Coordinate measuring machines
- Dilatometer
- Endothermic gas generator
- Quench tank with heater
- Quench press
- 1.5 KW laser with machining workstations



Finite element modelling of the temperature profile in an IN718 turbine disk during quenching from the solution treatment temperature.



Finite element modelling of the residual stress profile in an IN718 turbine disk after quenching from the solution treatment temperature.

View of the IITRI heat treat facility used for large-scale thermal processing tests of materials and equipment.

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