

DANTE Solutions, Inc. is in India!

The last few months of 2019 were productive at DANTE. After many years, DANTE is finally represented in India! Help us in welcoming the two newest members to the DANTE team: DHIO and BSSPL.



DHIO Research & Engineering Pvt. Ltd. Is a collaborative engineering services and R&D company located in Bangalore, India. DHIO has an experienced pool of experts, engineers and scientists with decades of domain experience and expertise in applying state of the art simulation technology to advanced CAE design, analysis, life estimation, and optimization knowledge. DHIO will offer sales and support for the DANTE software in India.



Bhanu Scientific Systems Pvt. Ltd. (BSSPL) is dedicated to providing the latest technology and services to the R&D market in India. BSSPL currently provides simulation tools to Material R&D labs. BSSPL will offer sales and technical support for DANTE customers in the Indian market.

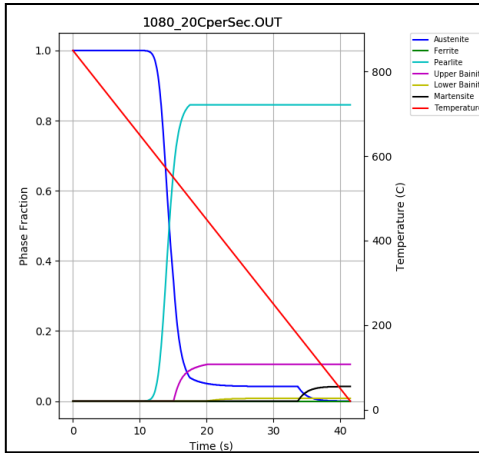
Quick News:

- DANTE Solutions welcomes the following companies to its expanding user group:
 - **Aachen University (Germany)** - **Bosch (Vietnam)**
- Charlie Li began teaching a new class at Cleveland State University. The class, titled *Advanced Manufacturing Processes: Heat Treatment of Steels*, is a Master level Mechanical Engineering class designed to give students a general understanding of steel heat treatment from the aspects of steel making, processing, and applications. The class offers a deep dive in practical heat treatment processes, relationship with other manufacturing processes, and future trends. The class will provide students with the theory and analysis skills needed for roles in the manufacturing industry.
- On April 29, 2020, DANTE Solutions will host the ASM International Symposium, titled *Modeling Thermal Manufacturing Processes*. The Symposium will be held at the Crowne Plaza Hotel in Middleburg Heights. A synopsis of the program is given below. Also, the tentative agenda can be viewed at <https://dante-solutions.com/modeling-symposium> :

Modeling has matured from being a research tool to a production tool for processing of metal components. The presentations in this symposium will discuss applications of analytical modeling of a variety of thermally driven processes that demonstrate current uses of modeling for process design, understanding, and improvement. In addition, the modeling methods for spanning metallurgical length scale and future directions of modeling will be addressed.

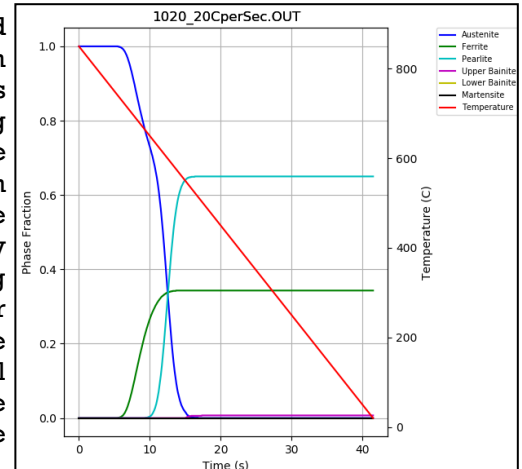
Software Highlights

POINT PREDICTOR UTILITY NOW LIVE!



Phases and temperature obtained for AISI 1080 cooled at 20° C/sec

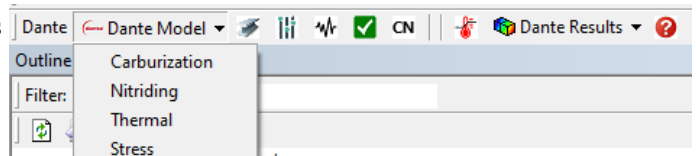
Dan Londrico has updated DANTE's utility software program used for plotting the phases obtained from a constant cooling rate or from time-temperature curves obtained from thermocouple measurements. The utility is a great companion to any heat treat shop, easily allowing users to ensure a proper microstructure is achieved. There is an easy to use interface and all material properties needed for the calculation come directly from the DANTE material database.



Phases and temperature obtained for AISI 1020 cooled at 20° C/sec

DANTE 4.0 is now available for ANSYS!

DANTE 4.0 linked to the ANSYS finite element solver is now available to all DANTE users.



Details of "Model Control"	
Definition	
Kinetics Mode Options: (Select Below)	(#): Austenitizing Tempering Vol. Change by Carburizing/Nitriding
Default Phase-Transform Kinetics-Mode	(-8): Equilibrium Inactive Inactive
Kinetics-Mode Table	Tabular Data
Keyword control	
Max. temp change (C) per substep	default
Max. phase change (percentage) per substep	default
Max. carbon change (Wt. frac) per substep	default
Max. nitrogen change (Wt. frac) per substep	default
Latent Heat	On
Hardness Unit	Hardness Rockwell C
Material Directory	default

Upcoming DANTE Software Improvements

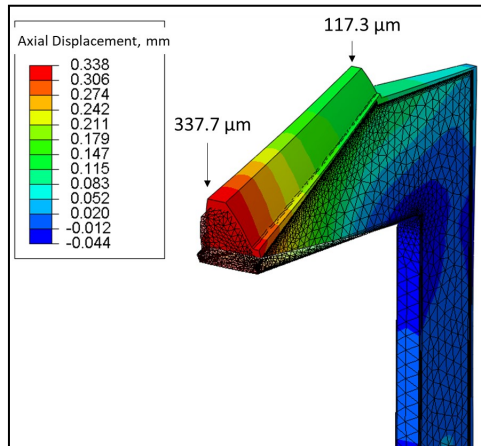
The DANTE software continues to improve on functionality and accuracy. Notable improvements include 4.0 functionality for ANSYS, a new stress relaxation model, carbide size and growth calculations, carbon tracking during phase transformations, precipitation hardening, and continued improvement of the material database through experimental data.

Project Highlights

Correcting Bevel Gear Distortion from Heat Treatment

Problem Statement:

- Nonuniform and excessive distortion of the tooth in the axial direction during oil quenching
- Machining to correct distortion removes residual compressive stresses, damaging the fatigue performance
- Problem not discovered until after production began. Cost to correct at this stage is very high

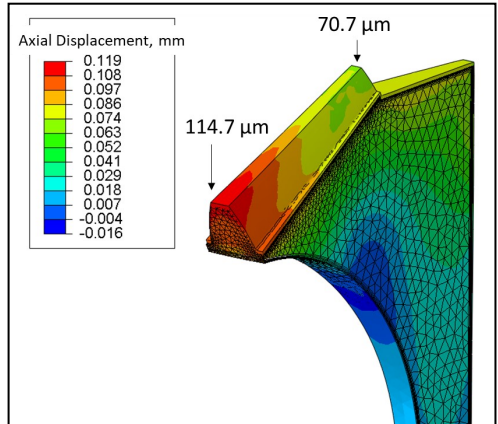


Project Objectives:

1. Change the geometry based on current process parameters to reduce distortion
 - Add material to the heat treat shape to increase stiffness of the gear tooth
 - Material can then be removed after hardening if needed, but compressive stresses in tooth remain for enhanced fatigue performance
2. Change the process based on the current geometry to reduce distortion
 - Use induction hardening, a process which offers better dimensional stability

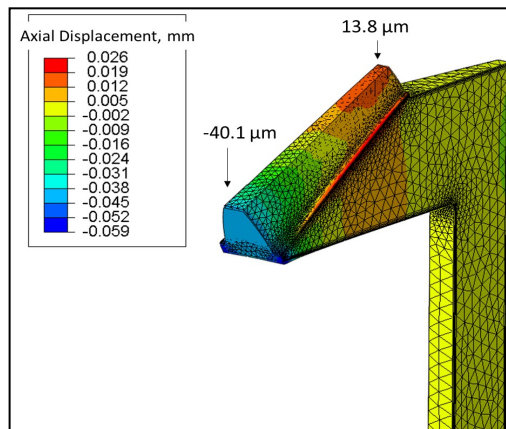
Results: Geometry Change

- Adding material to the gear reduced the overall distortion by 223 μm
- Adding material to the gear reduced the taper by 176 μm
- Less machining of the gear tooth is required, improving fatigue resistance by not machining off the beneficial residual compressive stresses



Results: Geometry Change

- Switching to induction hardening reduced the overall distortion by 298 μm
- Switching the process reduced the taper by 166 μm
- Less machining of the gear tooth is required, improving fatigue resistance by not machining off the beneficial residual compressive stresses



Conclusion

DANTE can be used to successfully alter geometry or processing to reduce distortion

One can view this, and many more, aerospace case studies online at: <https://dante-solutions.com/aerospace>



Since 1982 we have provided engineering services to the metalworking industries, and for over 30 years we have focused on thermal processing. Our range of services has expanded to include several software products, with our DANTE[®] software being the premier package in the world for modeling heat treatment of ferrous parts. In recognition of this, we re-branded ourselves as Dante Solutions, Inc. in January, 2014.

While we use computer analysis tools for most of our work, we are much more than analysts using computer software tools. Our staff includes experts in mechanical and metallurgical engineering. Let us help you improve your heat treatment and deformation processes, use new materials, and develop new products.

For more information, contact us: support@dante-solutions.com