Scanning Induction Hardening of Truck Axle

DANTE Solutions, Inc.

Problem Statement:

Scanning induction hardening process of Truck Axle made of AISI 1540 is modeled.

Process needs to be improved to reduce distortion and obtain favorable residual stresses.

Process Description:

Power distribution modeled by Flux is mapped and imported into DANTE.

One single tooth sector is modeled with cyclic symmetric boundary condition.

Polymer spray follows by inductor heating.

Benefits:

Induction heat into the axle is optimized to reduce residual tension under the surface.

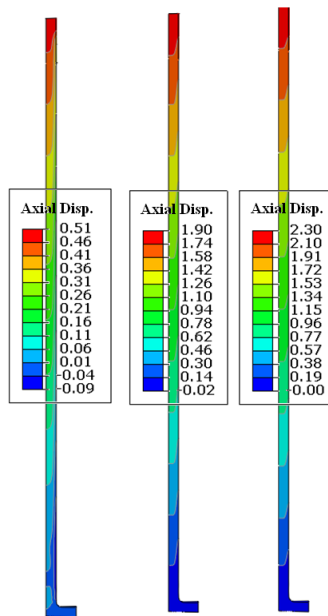Surface compression is enhanced with optimum case depth.

Spray severity is designed to reduce distortion.

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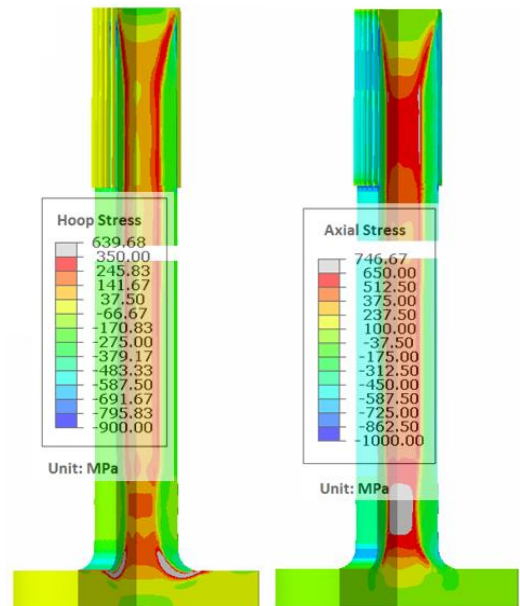
Website:
www.dante-solutions.com
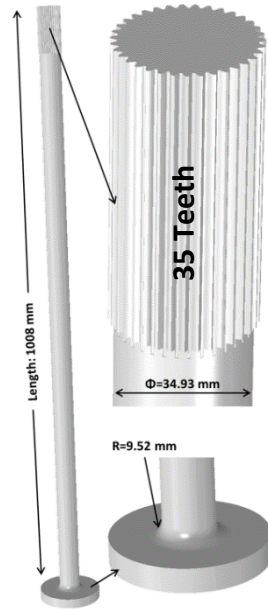
Geometry of the Truck Axle with Splines
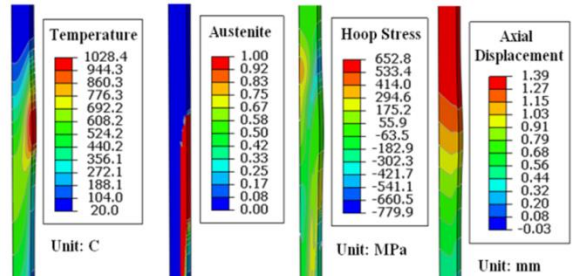
In-process temperature, phase transformation, stress, and displacement

Effect of Spray Severity on Axial Distortion (Unit: mm)
(Low to High from Left to Right)

Residual Stresses