Induction Heating of Inner Rolling Bearing Ring in ANSYS

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Aim of this paper is to explain capability of ANSYS to model induction heating of inner rolling bearing ring. This physical problem requires simulation of the interaction of three physical fields. First field is harmonic low-frequency electromagnetic, second transient thermal and third static structural analysis. The skin effect requires the fine mesh in areas near boundary of modeled ring in the vicinity of inductor. MFS concept is used to couple these three physical fields. Main result of this analysis is the thermal field history in inner ring. This analysis is used to obtain sensitivity data for appropriate shape and size of inductor to austenitize required domains of inner ring.

Keywords: Induction heating of inner ring, ANSYS APDL, Thermal field

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References

[1] PELAGIĆ, Z., NÁGEĽ, M., ŽMINDÁK, M., RIECKY, D. (2015). Wear Simulation Modeling by Using the Finite Element Method. In: *Manufacturing Technology*, Vol. 15, No. 2, pp 191-195. J. E. Purkyne University in Usti n. Labem. Czech Republic.

[2] BREZNIČAN, M., FABIAN, P., MEŠKO, J., DRBÚL, M. (2013). The Simulation of Influence of Quenching Temperature on Properties of Bearing Rings. In: *Manufacturing Technology*, Vol. 13, No. 1, pp 20-25. J. E. Purkyne University in Usti n. Labem. Czech Republic.

[3] BULIN, R., HAJŽMAN, M. (2014). On the Modelling of Contact Forces in the Framework of Rigid Body Dynamics. In: *Manufacturing Technology*, Vol. 14, No. 2, pp 136-141. J. E. Purkyne University in Usti n. Labem. Czech Republic.

[4] KRYNKE, M., SELEJDAK, J., BORKOWSKI. S. (2012). Diagnosis and damage of bearings. In: *Manufacturing Technology*, Vol. 12, No. 13, pp 140-144. J. E. Purkyne University in Usti n. Labem. Czech Republic.

[5] (2011): Release 14.5 documentation for ANSYS, SAS IP, Inc

[6] GUR, C. H. - PAN, J. (2009). *Handbook of Thermal Process Modeling of Steels*, Taylor & Francis Group, LLC.

[7] HONG, C. P. (2004). Computer Modelling of Heat and Fluid Flow in Materials Processing, Institute of Physics Publishing, London

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