

1  
2  
3  
4  
5  
6  
7

**Title : Times New Roman 12pt, Bold**

Authors : **(Times New Roman 10 pt, Bold)**<sup>1</sup>, (Times New Roman 10 pt)<sup>2</sup>...

Affiliations 1- (Times New Roman 10 pt)

Affiliation 2 - (Times New Roman 10 pt)

1  
2

3 (All headings should be prepared using **11 pt Times New Roman, bold**)

**Abstract**

Each paper must be accompanied by a maximum 200 words abstract, written as a single paragraph, having 3 cm left and right margins. The abstract should be a self-contained, capsule description of the paper including the motivation, problem statement, approach taken, results and conclusions. Abstract should be prepared in 12 pt Times New Roman. Place it with a distance of at least 9 - 12 cm from top of the page.

**Keywords:** Maximum 6 words separated by commas, Times New Roman 11 pt.

---

<sup>1</sup> Corresponding Author Email (Times New Roman 10 pt)

### **Introduction (Page 2)**

Please use Times New Roman 12 pt and single line spacing for the body text. The full paper should be formatted in single column with margins as specified on this template (3 cm on left, right and bottom and 3.5 cm on top).

### **Paper Length**

The submitted paper, including figures and tables should not exceed 6 pages. Please contact the Scientific Committee Chairman in case you need more than 6 pages.

### **Introducing Variables and Symbols**

You may not give a list of symbols at the beginning/end of your paper. Please introduce each variable or symbol right after its first appearance.

### **Tables**

Tables must be placed at the end of the paper. Each table must have a number and a caption in 12 pt Times New Roman. The caption should appear on top of the table. Tables may be placed at the end of the paper. All quantities in tables should be accompanied with appropriate units. Place each table with one line spacing from its preceding and following texts.

### **Figures and Drawings**

Figures and drawings may be placed at the end of the paper. Drawings must be clear and sharp. Letters, numbers, and legends in illustrations should be large enough and legible. Each figure must have a number and a caption. Captions should be placed below the figures and should be in 12 pt Times New Roman. Make sure that all figures are referred to in the text.

### **References**

References should be cited as [n] in the paper where “n” is the reference number. The reference list should be written in 10 pt Times New Roman. Reference list should appear at the end of the paper (before tables and figures) and the references are to be numbered in the order they appear in the paper. Only references, which are cited in the paper, should be included. For each reference, adequate details should be given according to the following examples. If you are indicating a document published in Persian language, please add the expression ‘(in Persian)’ at the end. Here are some examples:

#### **- Journals**

Use the standard abbreviations for journal names given in the international standard ISO 4. Give the volume number, the year of publication and the first page number.

#### **[Example]**

[1] A. Najafizadeh; J. J. Jonas, The Strain Dependence of Post-Deformation Softening during the Hot Deformation of 304H Stainless Steel, ISIJ Int., 3(2006), 1.

**- Conference Proceedings**

Give the title of the proceedings , the editor's name if any, the publisher's name, the place of publication , the year of publication and the page number.

[Example]

[2] Y. Chino, K. Jwni and S. Asai , Proc. Of 3rd Int. Symp. On Electromagnetic Processing of Materials, ISIJ, Tokyo , (2000),279.

**- Books**

Give the title, the volume number , the editor's name if any, the publisher's name, the place of publication, the year of publication and the page number.

[Example]

[3] W. C. Leslie : The Physical Metallurgy of Steels, McGraw.Hill , New York,(1981),621.

[4] U. F. Kocks, A. S. Argon and M. F. Ashby, Progress in Materials Science , Vol. 19 , e.d. by B. Chalmers, Pergamon Press Oxford(1975),146.

## **Vibrothermography Technique for the Inspection of Rolled Strip Steel**

**Abbasali Saboktakin**<sup>1</sup>, Afshin Taheri<sup>2</sup>, Yaser Tayyebnia<sup>2</sup>

<sup>1,2</sup>Esfahan Steel Company, Esfahan, Iran

### **Abstract**

The damages in the continuous casting slabs can be developed during rolling technology. Vibrothermography is a promising technique that uses ultrasonic elastic waves to locally stimulate defects on solid. This technique allows for defect selective imaging using thermal waves that are generated by ultrasound waves. This paper presents finite element modeling of vibrothermography to obtain a comprehensive understanding in defect caused by rolling technology. We developed Finite element model for a subsurface defect subjected to ultrasonic waves.

**Keywords:** Hot & cold rolled strip, Rolling, Undersurface Defects, Vibrothermography.

---

<sup>1</sup> [Abbasalian@gmail.com](mailto:Abbasalian@gmail.com)

## References

- [1] B. P. Bhardwaj, “Handbook on Steel Bars, Wires, Tubes, Pipes, S.s. Sheets Production with Ferrous Metal Casting & Processing”, 2014, Nir project consultancy service,.
- [2] T. Wu D., G. Busse, “Lock-in thermography for nondestructive evaluation of materials”, 1998, *Revue Generale De Thermique* Vol.37(8), p.693–703.
- [3] A. Saboktakin-Rizi, S. Hedayatrasa, X. Maldague, and T. Vukhanh, “FEM modeling of ultrasonic vibrothermography of a damaged plate and qualitative study of heating mechanisms,” 2013, *Infrared Physics & Technology*, vol. 61, pp. 101–110.
- [4] X. Han, L. Favro ,R. Thomas, “Recent developments in sonic IR imaging”, 2003,in *Review of Progress in Quantitative Nondestructive Evaluation 22*, Vol. 657 of AIP Conference Proceedings, edited by D. O. Thompson and D. E. Chimenti, American Institute of Physics, Melville, NY, p. 500–505.
- [5] A. Gleiter, G. Riegert, T. Zweschper, “Ultrasound lockin thermography for advanced depth resolved defect selective imaging”, 2006, *European Conference on Nondestructive Testing, ECNDT Conference Proceedings (Berlin, Germany)*, p. 25-29.
- [6] X. Han, Y. Islam “Finite- element modeling of acoustic chaos to sonic infrared imaging” 2005, *Journal of Applied Physics* Vol.98(1), article 014907, 4 pages.
- [7] M. Eslami M., B., “*Thermal Stresses: Advanced Theory and Applications*”, 2008, Springer, Berlin, Germany.
- [8] ABAQUS user manual.