

This paper is published at Journal of International Journal of Metalcasting.

DOI: 10.1007/s40962-023-00980-4

Shakeri, B., [Erfan Heidari](#), Boutorabi, S. M. A. (2023)

Effect of Isothermal Heat Treatment Time on the Microstructure and Properties of 4.3% Al Austempered Ductile Iron

Abstract:

This study aimed to investigate the effect of replacing silicon with 4.3% aluminum on the kinetics of the bainitic transformation and its effect on the physical properties of cast iron with a chemical composition of 3.4% C, 4.3% Al, 0.32% Si, 0.04% Mg. First, the samples were prepared to the same dimensions followed by austenitization for 2 hours at 900 °C; Then, austempering was performed on the samples at four temperatures i.e., 375 °C, 400 °C, 425 °C, and 450 °C (high-temperature region) for different periods (1–512 min). Microstructural studies were performed by both optical and electron microscopes and it was found that with an increase in the austempering temperature, the thickness of the bainitic ferrite plates increased from 0.31 µm at 375 °C to 0.63 µm at 450 °C and a coarser microstructure was obtained. The results of this study showed that the austempering transformation in Al-alloyed ductile iron will result in the formation of an ausferritic structure.

Keywords: ductile aluminum cast iron, untransformed austenite, bainitic ferrite, ausferrite, processing window

[Erfan Heidari](#) Contact Info:

☎ +98 9121237533

✉ erfan.heidari@mst.edu

[Erfan Heidari](#) Available at :

Google scholar: <https://scholar.google.com/citations?user=cs7MW3gAAAAJ&hl=en>

ORCID: <https://orcid.org/0000-0001-8619-6347>

ResearchGate: <https://www.researchgate.net/profile/Erfan-Heidari-4>

Web of Science: <https://www.webofscience.com/wos/author/record/JCN-7367-2023>

ZENODO: <https://zenodo.org/deposit?page=1&size=20>

Bepress : <https://works.bepress.com/erfan-heidari/>

Figshare: https://figshare.com/authors/Erfan_Heidari/17028147

Linkdin: <http://www.linkedin.com/in/erfanheidari>

SSRN: https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=6178326