

## Accepted Manuscript

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PII: S0257-8972(17)31295-1  
DOI: <https://doi.org/10.1016/j.surfcoat.2017.12.064>  
Reference: SCT 22982  
To appear in: *Surface & Coatings Technology*  
Received date: 29 August 2017  
Revised date: 9 December 2017  
Accepted date: 27 December 2017

Please cite this article as: Junwei Zhang, Yongzhe Fan, Xue Zhao, Ruina Ma, An Du, Xiaoming Cao , Influence of duty cycle on the growth behavior and wear resistance of micro-arc oxidation coatings on hot dip aluminized cast iron. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Sct(2017), <https://doi.org/10.1016/j.surfcoat.2017.12.064>

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Influence of duty cycle on the growth behavior and wear resistance of micro-arc oxidation coatings on hot dip aluminized cast iron

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## Abstract

The effect of the duty cycle of AC pulsed power on the growth behavior and wear resistance of micro-arc oxidation (MAO) coatings deposited on hot-dipped aluminized high-phosphorus cast iron was investigated. The ceramic coatings were prepared using a constant voltage and various duty cycles between 20% and 45%. The thickness of the coatings was measured using a coating thickness meter and metallographic microscope. With increasing duty cycle, the thickness of the coatings increased and the growth mode changed from inward to outward growth. When the duty cycle was 45%, the coating thickness reached about 65  $\mu\text{m}$ , where the ratio of outward to inward growth was about 74.67%. XRD results showed that the ceramic coatings mainly consisted of  $\alpha\text{-Al}_2\text{O}_3$  and  $\gamma\text{-Al}_2\text{O}_3$ ; with increasing duty cycle, the unstable  $\gamma\text{-Al}_2\text{O}_3$  gradually transformed into stable  $\alpha\text{-Al}_2\text{O}_3$ . When the duty cycle was less than 40%, the roughness of the coating increased slowly with increasing duty cycle; the roughness increased significantly when the duty cycle reached 45% and was about 1.6 times that of the

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