Patcharin Naemjan 2011: Enhancement of Boriding Process on AISI 440C Stainless Steel Using Direct Current. Master of Engineering (Materials Engineering), Major Field: Materials Engineering, Department of Materials Engineering. Thesis Advisor: Mr. Patiphan Juijerm, Dr.-Ing. 96 pages.

Martensitic stainless steel AISI 440C is used in a high-loading condition. Thus, its surface should be modified to enhance performance. Boriding process provides a hard iron-boride layer on the surface, however, the layer thickness is related to a coating time. The direct current should be a method to improve the diffusion rate of the boriding process. Therefore, the stainless steel AISI 440C will be borided using pack method with and without direct current (I = 5.5 A) at temperature range of 1123 - 1223 K for 2 - 6 h. The coated layers were characterized by optical microscopy with Image analyzer and X-ray diffraction. The hardness values of the layers were measured using Vickers microhardness tester. It was found that double phases (FeB and Fe_2B) boride layer formed on the stainless steel AISI 440C with and without direct current. The hardness of boride layers on this steel were about 2000 HV. At direct current of 5.5 A, the value of boride layer thickness and diffusion coefficient were higher than in the boriding process without direct current. Moreover, the activation energy in boriding process with direct current was lower than that in the convention boriding process.

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