Study on Noncontact Support and Transportation of a Thin Steel Plate

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Abstract

Cold-rolled steel sheets, such as steel plates for automobiles, are conveyed on rollers to undergo many processes, such as rolling, plating, coating and drying and ultimately, the steel plates are rolled as products. In this type of continuous-web handling system, production lines are generally constructed for the purpose of improving production yield and productivity while suppressing energy loss, coating nonuniformity and flaws as much as possible. However, these problems have conventionally been tackled via experience-based techniques accumulated at each production site and systematic approaches to cope with these problems have not been sufficiently developed. Under such circumstances, a new method involving the application of electromagnetic technology is under consideration for improving the surface quality of steel plates of which deterioration of which has been observed in the conventional contact conveyance system. In this thesis, we discuss four aspects concerning the electromagnetic levitation control of a sheet steel which authors are researching recently, that is, effective use of permanent magnets, noncontact horizontal positioning control, conveyance control, and elastic vibration control for the thin steel plate with free edges.

Keywords: *Electromagnetic Levitation, Steel Plate, Handling System, Permanent Magnet, Elastic Vibration*