

## 전기저항용접의 파형제어에 관한 기초연구

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### Preliminary study of waveform control in ERW process

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#### Abstract

Electric Resistance Welding (ERW) process is the most efficient process to manufacture the linepipe. To develop the high performance ERW linepipe using the high strength and the high alloy steels, the modulation of input power waveform such as sinusoidal waveform is introduced because the conventional ERW technology is not sufficient enough to produce the high quality linepipe due to its strength and high alloy contents (high Ceq). In this article, the material used for the experiment was API X60 with 8.2mm thickness, and ERW simulator at POSCO was used to develop a waveform control system for the power modulation. The frequency of power modulation was varied from 50Hz to 150Hz with the fixed amplitude of  $\pm 2\%$  power. The non-modulated power input and the modulated power input cases are conducted to demonstrate the variation of the narrow gap length and the arcing frequency due to power modulation. From results of the non-modulated power input case, the excessive power causes the longer narrow gap length and the low arcing frequency due to the large heat input and the strong electro magnetic force that increase the weld defect. On the contrary, the small narrow gap length and the high arcing frequency reduce the weld defect. After modulating the power input with 50Hz and 100Hz at the fixed power, the arcing frequency increases, but the narrow gap length does not change much. The high arcing frequency prevents the formation of weld defect because the sweeping frequently cleans the oxides on the narrow gap edges. As a result, the manufacturing window can be expanded by the power modulation that provides the stable ERW process for the quality improvement of the linepipe made from the high strength/high alloy steels.

Keywords: Power modulation, narrow gap, arcing frequency, ERW