

Dan Tong-in 2012: The Effect of Stress Relieving Treatment Conditions on the Quality of High Tensile Steel Wire in Progressively Drawn Pearlitic Steel. Doctor of Engineering (Industrial Engineering), Major Field: Industrial Engineering, Department of Industrial Engineering. Thesis Advisor: Mr. Pornthep Anusornnitisarn, Ph.D. 176 pages.

This study was aimed to determine the effects of processing condition of stress relieving processes on the quality of high tensile steel wire in progressively drawn pearlitic steel. The hot rolled high carbon steel wire rods, grade SWRH 82B for producing pre-stressed concrete wire and the final commercial product (Pre-stressed concrete wire: heavily cold drawn) were received from wire products company. Stress relieving treatments were also carried out in order to relieve the residual stresses accumulated after the cold work. The heat treatment temperature, tension ratio and time exposure to heat, which are the parameters of stress relieving treatments, were changed. Stress relieving treatment experiments were performed under two differing analysis methods, namely the Classical and Taguchi methods. The stress relieving treatments were determined by changing the heat treatment temperature, tension ratio and time duration and by observing the effect of these changes on tensile strength, yield strength, elongation, and relaxation behavior of the quality of pre-stressed concrete wires. The heat treatment temperature had a very strong effect on elongation. The value of elongation is about 5.73% when the temperature and other parameters are at the lower limits, and it is about 6.78% when the temperature and other parameters are at the higher levels. The tension ratio had a profound effect on relaxation. The value of relaxation is about 6.67% when the tension ratio and other parameters are at lower levels, and it is about 3.75% when the tension ratio and other parameters are at higher levels. The process parameters, heat treatment temperature, had a negative effect on elongation at 375C°

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