

Tawatchai Yongnate 2011: Application of Engineering Experimental Design for Quality Improvement: Case Study of Steel Billets Production Factory. Master of Engineering (Industrial Engineering), Major Field: Industrial Engineering, Department of Industrial Engineering. Thesis Advisor: Associate Professor Pichit Sukchareonpong, D.Eng. 160 pages.

This research aims to study the process of steel billets. The factors that affected efficiency (y_1) and the ratio of raw materials for steel scrap were selected. With a set level of each factor affecting the efficiency (y_1 : % Yield Recovery) and energy consumption per production billet 1 kg. (y_2 : kWh/kg), the experiments were designed using the extreme vertices design with 2^2 factorial design and were then tested by steel billets manufacturing experiments the 120 obtained experimental results were collected and analyzed statistically. The “single composite response or simultaneous multiple response optimizer” models were then used to find the most appropriate response of y_1 and y_2 .

Analyzing experiments to improve model statistics of y_1 and y_2 found that the quadratic model was the ratio of scrap $x_1 = 0.5409$, $x_2 = 0.2298$, $x_3 = 0.1373$, $x_4 = 0.0920$, and the factors process both at low levels $TTT = 60$ minutes and $TT = 1,600$ degrees Celsius is $y_1 = 96.4599\%$ and $y_2 = 0.3023$ kWh/kg but the experiment to confirm the results of 34 trials found that the average of $y_1 = 89.97\%$ and $y_2 = 0.5264$ kWh/kg and standard deviation was 2.387% and 0.05027 kWh/kg, respectively, and statistical hypothesis testing to compare the production with no ratio of steel scrap determination and no set level of process variables which $y_1 = 82.79\%$, and $y_2 = 0.4698$ kWh/kg, standard deviation, 2.979% and 0.03784 kWh/kg, respectively, concluded that efficiency increased, but energy consumption per production steel billets that does not meet the target, statistically significant at the 0.05 level. However, even the use of energy consumption will not be targeted, but do not affect the cost of production compared with production efficiency to be. Therefore, the ratio of steel scrap and process setting factors can still be used.

Student's signature

Thesis Advisor's signature