This research aims to study significant parameters and determine the optimal parameters in the Anisotropic Conductive Film (ACF) bonding process for Head Stack Assembly (HSA) in hard disk drives by considering the important quality characteristic, which is the peel force of ACF film. The ACF bonding process has been recently developed to replace the Ultrasonic Trace Bonding process because it can significantly reduce the cycle time and failure of the bonding. According to a case study plant and literature, it was found that the parameters that significantly affected the process efficiency included (i) bonding temperature, (ii) bonding time, and (iii) bonding weight. In this research, a 2-level Factorial design of multiple responses, including mean peel forces at 4 heads and standard deviation of the peel forces, was employed to optimize the parameters in the ACF bonding process for HSA.

According to the experimental analysis, it was found that the optimal parameters were set at the bonding temperature of 170 ºC, the bonding time of 5 seconds and the bonding weight of 6 kg, where the predictive values of maximum mean of the peel force at HD_0, HD_1, HD_4 and HD_5 were 40.40, 40.37, 44.21, 39.85 g_f, respectively, and minimum standard deviation of the peel force was 3.952 g_f. These values were in the target range of the case study factory. According to the confirmation experiments, it was found that 95% confidence intervals of the maximum mean of the peel force at HD_0, HD_1, HD_4, HD_5 and minimum standard deviation of the peel force was correspondent with the predictive values and target range of the case study factory.

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