Optimization of photolithography process for a LGP molding stamper

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Abstract

This study focuses on optimization of the photolithography process for a light guide plate molding (LGP)
stamper. Taguchi method, the back-propagation neural networks (BPNN) and genetic algorithms (GA) was used to
develop a photolithography process optimization system. In the first phase of this study, Taguchi orthogonal array
was employed to arrange the experimental work, to calculate the S/N ratio, and to determine the initial process
parameter settings. The control factors are heaters temperature, heaters time, roller temperature, exposure energy,
and development speed. We conduct Taguchi orthogonal table experiments to identify the quality characteristics
meet the objectives of process parameter combination. In the second phase, Taguchi experimental data were
employed to build BPNN quality predictor, and then we used ANOVA analysis to select control factors. Finally,
the quality predictor was combined with GA to find the best combination of process parameters. The experimental
results showed that the best parameter combination effectively control the quality, stability and cost savings.

Keyword：Light Guide Panel Stamper; Photolithography Process; Taguchi Method; Back-Propagation Neural