



シミュレーションを用いた機能性評価による ブレードクリーニングシステムの開発

*Development of Blade Cleaning System based on Functional Evaluation
Using Simulation*

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The project reported here concerned a cleaning system for a photosensitive drum used in electrophotography. The goals were to formulate a new approach that would yield both cleaning performance and long life and, by following this approach, to obtain an excellent cleaning system. The approach taken was to use parameter design to suppress variations in blade normal force due to stick-slip motion of the front edge of the cleaning blade, thereby enabling the normal force to be reduced. The input was the static blade normal force, the output was the dynamic blade normal force, and the upper and lower limits of the amplitude were taken as noise factors. Control factors such as the shape and hardness of the blade were selected and an L_{18} experiment was carried out. As a result, parameters effective for suppressing normal force variations were found, and reduced vibration under the optimal conditions was confirmed. A 26 % drop in friction also became apparent during in-system confirmation, demonstrating the effectiveness of the new approach.

Key words : S/N ratio, quality engineering, Taguchi methods, photoreceptor, electrophotography, simulation, cleaning, blade, stick-slip, friction, abrasion

1. はじめに

近年、オフィス機器の業務プロセスへの導入の高まりを受け、複写機の信頼性向上や耐久性向上の要求が一層強くなってきている。これらの市場要求にこたえるため、マーキングエンジンの長寿命化が強

く求められている。マーキングエンジンは、感光体、クリーニングブレード、帯電ロール、現像ロール、転写ロールで構成されており（図1）、その中でも短寿命である感光体のクリーニング部分（感光体とクリーニングブレード）の改善が課題であった。

感光体とクリーニングブレードの寿命は、それぞれ、感光体表面層の膜厚減少率（感光体の摩耗率）、クリーニングブレードの感光体接触部の厚み減少率

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