



# CDメカニズムにおける ディスククランプ機構の最適化

## Optimization of Disc Clamping Structure in CD Mechanism

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In this case study of the optimization of the disc clamping structure of an optical disc player, the generic functions were considered to be the relation between power consumption and rotational speed, which is a work quantity, and the relation between power consumption and time. Dust was taken as a noise factor, because the interiors of players in which the clamping mechanism fails due to excessive wear frequently show visible accumulations of dust, which is a factor causing wear. The key point in this study is the comparison of an evaluation by the S/N ratio with the results of life tests. When life tests were performed under the optimized conditions on actual equipment, it was confirmed that wear to the clamp mechanism was greatly reduced. The gains of the S/N ratio before and after the tests were found to be nearly identical, and the gain was reproduced in a confirmation test. A further result obtained was near-perfect agreement between the gain of the S/N ratio and the estimated life, showing the possibility of dispensing with repeated life tests and greatly reducing the number of man-hours of development work.

**Key words :** compact disc, disc clamping structure, electricity evaluation, comparison experiment, life examination, standard S/N ratio, Taguchi methods, abrasion, mine dust

### 1. はじめに

従来、車載用CDメカニズムにおけるCD再生時にディスクを保持するためのディスククランプ機構の評価は、ディスク回転時間を信号にクランプ摩耗量を出力とする評価法を用いていたが、結果を得るまでに500~1000時間の長期間を要していた。

そこで本研究では、ディスク回転時の経過時間と

スピンドルモータの消費電力、および、印加電圧（回転数）と消費電力の関係を基本機能とするエネルギー変換による機能性評価とパラメータ設計により、評価期間の短縮と利得の再現性のある設計条件の最適化を行い、要素技術の標準化をはかることができた。さらに本研究では、従来の寿命試験による摩耗量評価と消費電力評価の対比実験を行い、電力評価によるパラメータ設計で最適化した条件が摩耗量評価による寿命試験でも優位である結果を得た。これにより、両評価方法は対比が取れることを実証

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