모빌리티 측정을 통한 하드디스크의 Unbalance 검출 및 보정방법

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Measurement Method of HDD Absolute Unbalance Magnitude and Position by measuring the Mobility

Key Words : HDD, unbalance, mobility, acceleration obit

Abstract : The unbalance exciting force induced by HDD of lately getting higher speed is directly influenced by the rotational speed and the mechanical assembly allowance between disk and spindle motor, and which gives rise to the structure borne noise of the personal computer. The absolute unbalance mass of HDD needs to be measured and adjusted by the counter mass to control the unbalance exciting force effectively in the stage of assembling the disk and spindle motor. This study introduces the measurement methods of the magnitude of the absolute unbalance mass and the position of HDD by 2 accelerometers. The absolute unbalance mass can be obtained by the acceleration responses and the mobility of the mechanical part, while the position of the unbalance mass can be obtained by the rotation acceleration orbit.

100 kTPI급 HDD 구현을 위한 Disk Damper에 관한 연구

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A Study on the Disk Vibration Control by Disk Damper for 100 kTPI Hard Disk Drive Design

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Key Words : TMR(Track Mis-Registration), Disk Vibration, Disk Damper, Squeeze Film Effect

Abstract : A practical implementation method of squeeze-film aeroelastic disk vibration damping and its practical design performance are presented to provide a solution method to meet the tight TMR(Track Mis-Registration) design budget of high-TPI HDDs. Most previous research results are mainly based on the component-level study in the 'open-cover state' which is far from the realistic operationg HDD condition. In this study, the squeeze-film disk damping effect is widely investigated under the realistic drive-level condition of 'enclosed-cover state.' It is found that the proper aeroelastic gap(s) between disk(s) and adjacent surface(s) to give significant vibration reduction in the enclosed HDD operating conditions can be achieved not only by classical well-known squeeze-film damping gaps such as very small 0.0x-millimeter level gaps which are not practically implementable in mass-production HDDs, but also by a few 0.x millimeter which is possible for designing realistic HDD design. The various experimental results including drive-level PES are also presented to prove feasibility of the optimal disk damper design for 100kTPI HDDs.