

## 인텔리수트를 이용한 마이크로 미러 구동기의 해석과 디자인

권기남<sup>†</sup>(홍익대 원) · 박승호\* · 김영민\*(홍익대) · 최영기\*\*(중앙대) · 이준식\*\*\*(서울대)Analysis and Design of Actuators for Micro Mirrors  
Using the Intellisuite

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**Key Words:** Micro Actuators(마이크로 구동기), Electrostatic Force(정전기력), Thermal Expansion(열팽창), the Intellisuite(인텔리수트)**Abstract :** Micro actuators are essential to microelectromechanical systems of movable components such as micro mirrors, optical switches, and micro robots. Optimization of their dynamic properties is conducted using the Intellisuite, a commercial software. Actuators for driving micro mirrors are classified into those using electrostatic forces and using thermal expansion effects. Electrostatic actuators using torsional springs are designed to avoid plastic deformations at large tilting angles for a  $400 \times 220 \mu\text{m}^2$  mirror made of nickel. It is shown that a local plastic deformation occurs, if voltages imposed on the mirror becomes greater than 550V. In addition, polysilicon thermal actuators of length,  $200 \mu\text{m}$  and thickness,  $2 \mu\text{m}$ , with a  $40 \mu\text{m}$  long flexure and a  $15 \mu\text{m}$  wide cold arm deflect up to  $13 \mu\text{m}$  at the tip around 10V.

## 흡착컵을 이용한 이송 메커니즘의 개선

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## Development of Suction Mechanism for Conveying

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**Key Words:** suction cup(흡착컵), vacuum generation(진공 생성), stepping motor(스테핑 모터) grabbing time(흡착 시간).**Abstract :** Suction system plays a main role in transferring products or parts when manufacturing with its simple and stable grabbing properties. In order to maintain taking objects, the system should generate sucking force continuously, but usual suction mechanism is composed of multi-suction cup with one air compressor. Consequently, only a malfunction of suction cup can cause the damage to products. To prevent this, new suction mechanism was proposed using permanent magnet last year. The proposed mechanism activates each suction cup separately, therefore the grabbing stability was enhanced. But that also had demerits, namely, high load to actuator, bad influences to products caused by magnet, and low efficiency due to the sucking speed. So we propose more simple, stable and efficient method to give actuation to each cup using step motor not with magnets. With experiments, the development of lifting ability and stable suction performance are shown.