

Introduction of Young Researcher Awards 2008

1. Yui ENDO

A Development of an Ergonomic Assessment System by Integrating a Digital Hand with a Product Model (1st Report) - An Function of Virtually Evaluating Grasp Stability for Products -

The purpose of this research is to develop a system that can evaluate stability and ease of a person grasping products such as digital cameras without real subjects and physical mockups. In the system, we integrate 3D digital hand models with the 3D CAD models of the product to realize the virtual ergonomic assessment. The system features are the following; i) Geometrically accurate 3D digital hand models with rich Japanese size varieties are used for the assessment, ii) A semi-automatic grasp planning function is installed to efficiently find appropriate grasp posture for the exterior housings geometries of appliances, and iii) "Force-closure" and the "grasp quality" indices can quantitatively evaluate grasp stability for the product.

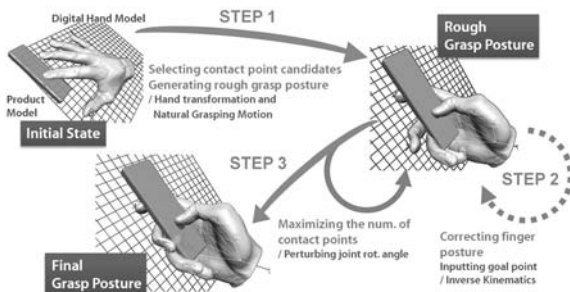


Fig. 1 The algorithm to generate the grasp posture

2. Ryusuke YAMAUCHI

Combinatorial Search for a New Amorphous Alloy as Mold Material for Glass Molding - Evaluation of Crystallization Temperature and Mechanical Property -

New compositions of a Pt-Zr-Ni amorphous alloy as a mold material for glass lens production were searched using a new combinatorial synthesis called the combinatorial arc plasma deposition (CAPD). First, 3,267 thin film samples of 1 mm x 1 mm size were deposited by CAPD. The phase and composition of 883 samples of the thickness more than 500 nm were

evaluated and 312 amorphous samples were found. Secondly, six amorphous samples expected to have a high crystallization temperature (T_x) and a high tensile strength (σ_B) were deposited using a sputtering system because CAPD samples were too small and thin to evaluate mechanical property such as σ_B , Young's modulus, elastic limits and anti-sticking with melted glass. Finally, $Pt_{50}Zr_{36}Ni_{14}$ was found as a new mold material of a high T_x (985 K), a high σ_B (2.12 GPa) and anti-sticking. The new mold material was also expected to have a high resistance to oxidation at a high temperature range of glass molding.

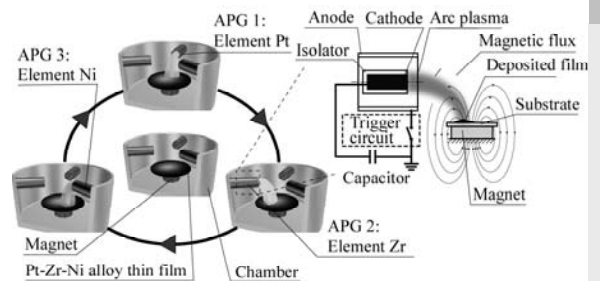


Fig. 2 Principle of CAPD

3. Takashi YAMAGUCHI

Attitude Stabilization Control of Electric Bicycle by Backstepping

Bicycle is high efficiency vehicle and suitable for an improvement of environmental problems from society's perspective. In the practical use, however, it has some demerits. For example it is not always stable. Therefore the motion stabilization is required, and it is necessary to improve the stability of bicycle. This paper proposes a self-sustaining control strategy of electric bicycle motion using acceleration control based on backstepping. In particular, this technique is



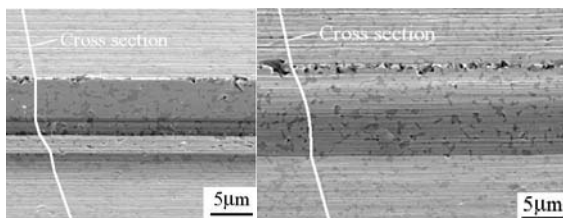
Fig. 3 The appearance of bicycle robot

useful for improvement of running stability in low-speed range. The validity of the proposed method is confirmed by numerical and experimental results.

4. Taichi FUJII

Study on Precision Machining of Glass Lens Mold with Minute Structures - Precision Machining of Glass Lens Mold with Fresnel Shape Applying Complex Machining Process -

In optical devices, the demand of glass lenses with complicated shapes like Fresnel shape is recently growing up for the purpose of improving its heat resistance and optical performances. The study suggests a new machining process for cemented tungsten carbide mold with Fresnel shape, aiming at high precision machining. In the proposed process, the curved surfaces except for sharp edges are at first machined by the conventional grinding method with a disk type metal bonded diamond wheel. Then, sharp edges are created on curved surfaces by fly cutting method with knife edged single crystal diamond tool. Fly cutting method is expected to reduce tool wear due to the intermittent machining process. From fundamental V-microgrooving experiments of WC by fly cutting and shaping, it is clarified that the damage of cutting tool by fly cutting is reduced, compared to shaping. Therefore, complex machining of Fresnel shape by proposed machining method allows sharp edges to create to WC mold. As a result, it is found that the proposed machining method has the potential of producing a high precision glass lens mold with Fresnel shape effectively.



(a) Complex machining (b) Conventional grinding

Fig.4 SEM images of edge part

Introduction of FANUC FA and Robot Foundation Award

[Paper Award 2008]

Fabrication of Three-dimensional Scaffolds for Regeneration of High-metabolic-rate Organs by Selective Laser Sintering Using Water Leachable Filler - Fabrication of Porous Bodies with Fine

Flow Channel Network from Biodegradable Plastic -

Toshiki NIINO, Hiromichi NARUKE, Shunsuke OIZUMI, Yasuyuki SAKAI, Hongyun HUANG
J. JSPE, Vol.73, No.11

Introduction of The 30th Machine Tool Engineering Foundation Award

[Paper Awards 2008]

1. Quadrant Glitch Compensator Based on Friction Characteristics in Microscopic Region

Ryuta SATO, Yoshimichi TERASHIMA, Masaomi TSUTSUMI

J. JSPE, Vol.74, No.6

2. Study on Precision Machining of Glass Lens Mold with Minute Structures – Precision Machining of Glass Lens Mold with Fresnel Shape Applying Complex Machining

Taichi FUJII, Minoru HIRANO, Tetsuro SHIBUKAWA, Tohru ISHIDA, Yoshimi TAKEUCHI

J. JSPE, Vol.74, No.12

Introduction of JSPE Affiliate

The Japan Society of Precision Engineering (JSPE) awarded JSPE Affiliate Membership to 40 young researchers and engineers under age 35 on March 11, 2009 (Fig. 1). This membership is given to prospects who are expected to achieve remarkable academic activities, technical developments, and distinguished accomplishments for academic field of precision engineering or JSPE society.

The Affiliate members are going to play significant roles as young leaders for academic activities of JSPE.



Fig.5 Presentation ceremony of JSPE Affiliate (March 11, 2009).