



The Japan Society for Precision Engineering

Introduction of JSPE Young Engineer Awards 2012

1. Satoshi Matsuyama (Osaka University)

Development of Hard-X-ray Imaging Optics Based on Four Aspherical Mirrors

This achievement involves the development of imaging optics that operates in the hard X-ray band with a 50-nm resolution capability and a 12- μm field of view. This was achieved by constructing four aspherical mirrors with a figure error precision of 2 nm and arranging them with precision. Previously, there have been no imaging systems capable of achieving a resolution capability of less than 500 nm in the X-ray band without achromatic aberration. This technology, however, holds the potential to realize a high-resolution X-ray microscope free from achromatic aberration. Therefore, the JSPE Young Engineer Award is presented for this achievement.

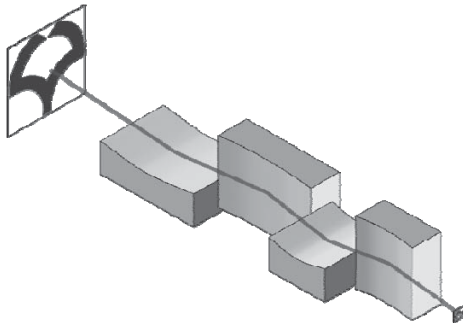


Fig. 1 Schematic of the imaging optics

2. Yuichi Higuchi (NTT corporation)

High-Dispersion Grating for the Next-Generation Optical Telecommunications Device

This achievement involves the development of a grating coated with a dielectric film in the field of total internal reflection immersion gratings, used for multiplexing and demultiplexing wavelength-division-multiplexed signals. The proposed grating achieves both high dispersion and low polarization-dependent loss. Moreover, it is demonstrated to be suitable for use as an optical telecommunications device; this is achieved by realizing a fine-pitch grating using silicon

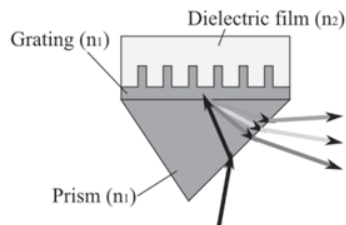


Fig. 2 New IG coated with dielectric film

fabrication technology, and devising a structure in which a dielectric layer is formed on the grating in order to optimize the refractive-index difference between the grating and the dielectric layer. This result holds potential for application towards the next generation of ultra-small-size wavelength-selective switches and optical-channel monitor devices. Therefore, the JSPE Young Engineer Award is presented for this achievement.

3. Hidehito Watanabe (Union Tool Co.)

Study on High-Speed Micro Drilling of Printed Circuit Boards

This achievement has clarified the chip evacuation behavior and drilling mechanism of microdrills used for performing ultra-high-speed drilling on printed circuit boards. Previously, drilling using microdrills relied on the experience and skill of highly trained technicians, but the present achievement has determined the drilling conditions required to prevent drill breakage and provided guidelines on drill profile design. At the same time, it has provided a scientific explanation for drill behavior at high speeds. Therefore, the JSPE Young Engineer Award is presented for this achievement.

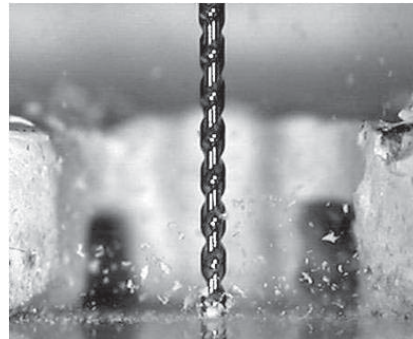


Fig. 3 Photograph of chip evacuation during drilling PCB

4. Hidekazu HARA (Misuzu Ind. Co.,Ltd), Takahiro TOKUMOTO (Sanko Medhikku Co.,Ltd)

Development of Complete Inside of the Body Laying Underground Microinfusion Pump

This achievement relates to the development of a miniature pump that has stabilized flow-rate accuracy and is totally implantable in small laboratory animals in the field of pharmaceutical and food products development. Moreover, the key element of the pump, a micro tube, having an accuracy of $\pm 100 \mu\text{m}$ was previously developed; however, the accuracy optimization efforts and the development of a mold have increased this accuracy to $\pm 20 \mu\text{m}$. Further, the miniaturization of the pump has made it possible to implant it inside the body, and this technology holds the potential for application in a medical pump, such as a micro pump used in an artificial pancreas. Therefore, the JSPE Young Engineer Award is presented for this achievement.

Introduction of The 34th Machine Tool Engineering Foundation Award

[Paper Award 2012]

Improvement of Vibration Damping of Linear Roller Guides Using Grease Lubrication Film

Hirofumi ITAGAKI, Masaomi TSUTSUMI and Hideaki IWANAKA

J. JSPE, Vol.78, No.2, pp.168-172

This paper describes a linear roller guide system designed for improving the vibration damping by using grease lubrication film. This linear roller guide has a very narrow gap between the carriage and top surface of the guide rail, as compared to conventional types for gaining moderate amount of friction force of the thin film of grease that

provides the feed drive system with higher damping. In this study, the friction characteristics of the linear roller guide were measured and mathematically modeled in order to investigate the friction characteristics of the thin film of lubricants and the influence of friction on the dynamic behavior of the feed drive system. In the measurement of friction force, two kinds of grease with different consistencies and viscosities of base oil are filled into the narrow gap. Step responses in microscopic displacement region were measured and simulated in order to evaluate vibration damping of the feed direction. As the results, it was confirmed in both experiment and simulation results that the grease flow characteristic affects the nonlinear friction characteristics and the step response of the feed drive system.

15th International Conference on Precision Engineering (ICPE 2014)

23(Wed.) - 25(Fri.), July 2014

Organized by The Japan Society for Precision Engineering

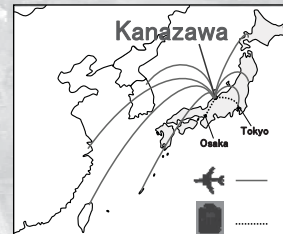


The conference will be held at Hotel Nikko Kanazawa and Ongakudo Hall, Kanazawa, Japan.

Conference Topics

ICPE 2014 focuses on the following topics.

- High precision machining
- Non-conventional machining
- CAD/CAM technology
- Machine tools and control
- Medical devices
- Green manufacturing
- Advanced moulding and forming
- Other related technologies
- Tribological systems
- Measurement engineering
- Design engineering
- Service engineering
- MEMS/NEMS
- Precision devices
- Mechatronics/Robotics



Kanazawa is located in the middle of Japan

Important Dates

Please refer to <http://icpe2014.jspe.or.jp/>

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Kanazawa castle



Ongakudo Hall (Plenary session)

Photo credit: Kanazawa