The Japan Society for Precision Engineering

Introduction of JSPE PRIZES 2018

1. Shinji SHIMIZU (Professor Emeritus, Sophia University, MAMTEC)

Professor Shimizu has made many contributions to the accuracy and sophistication of machine tool technologies by proposing evaluation schemes for thermal distortion in machine structures. He has been involved in the establishment of the Japanese Industrial Standards (JIS) and the international standardizations for tooling interfaces for machine tools through collaborations between academia and the industry. He has also demonstrated leadership in international technical exchanges in the machine tool industry as the chair of the Committee of International Machine Tool Engineers' Conference (IMEC).

He has encouraged future machine tool technologies for new researchers and engineers in the machine tool field by publishing many books and holding seminars supported by academic societies. He presented a future roadmap for the machine tool industry by establishing the "Machine Tool Industrial Vision 2020" as the chair of the committee when the Japan Machine Tool Builders' Association marked their 60th anniversary.

After his retirement, from 2014, he became Professor Emeritus, at Sophia University and he is now working on consultations for research, development, and education in the machine tool field, as the representative of MAMTEC (Machine tool & Manufacturing Technology Consulting).

He has made many contributions to the progress of academic research, technology, and education in precision engineering for machine tool research and development.

2. Kiyotaka SHOBUDA (Mazda Motor Corporation)

Mr. Shobuda served as a key manager for production technology of the Mazda Motor Corporation, and held positions such as the deputy manager of the main plants and the technical division director, and has been a major contributor to the development of Mazda's manufacturing capabilities. In addition, as the president of an overseas production subsidiary, he has made great contributions to manufacturing (MONOZUKURI) strategies in globalization by utilizing his extensive experience to promote innovative technologies regarding production, logistics, product quality, and brand quality. He managed the "Mazda MONOZUKURI Innovation" that began in 2006 and was a person of merit for the "World Car of the Year" and "World Car Design of the Year" awards.

He also provided support, from the standpoint of industry, as the chief of the Chugoku-Shikoku branch of the Japan Society for Precision Engineering (JSPE) and was a councilor for the JSPE. In particular, he contributed considerably to assist young researchers, graduate students, and undergraduate students. He also worked on educational activities for the development of technology for mid-level young engineers through lectures on production technology. He has disseminated Mazda's manufacturing spirit in various fields by contributing to the industry-academia world.

The activities and contributions of Mr. Shobuda in academic societies and industry greatly contributed to the development of manufacturing technologies in Japan, and in particular, his contributions in the field of precision engineering are extremely significant.

Introduction of JSPE Technology Awards 2018

1. Research and development of fast and precision controller design for positioning devices with strain wave gearing

Makoto IWASAKI (Nagoya Institute of Technology), Masafumi YAMAMOTO and Yoshifumi OKITSU (Harmonic Drive Systems Inc.)

Research and development have focused on how to design practical controllers to realize fast and precision motion performance for positioning devices with strain wave gearing. In the controller design, modeling and compensation for nonlinear properties (friction, flexibility, and angular transmission error, and so on), mechanical vibration suppression, and auto-tuning functions for controllers have been especially targeted to provide a wide variety of the required positioning specifications in industrial applications, such as robots or machine tools. The figure below illustrates an example of the products of the actuator on strain wave gearing and the drivers with the proposed controller.

Fig 1. Actuator with gearing and driver

2. Development of the sensing of cutting force and adaptive control machining technology

Tomoaki ENOMOTO, Kazuya HAYASHI, Masahiko MASUDA, Hideyuki FUJIWARA and Hiroyuki MORIMOTO (Mazda Motor, Ltd.)

In high-efficiency machining, which is the continual and biggest issue of aluminum cutting technologies, we have been pursuing increases in the feed rate, cutting volume, and cutting speed. To achieve these, we have developed cutting tools and machines.

For further higher efficiency, we developed adaptive control machining technology. Against conventional cutting under fixed machining conditions, the technology selects the most appropriate machining condition by sensing changes in the cutting force from changes of the machining state due to the influences of the change of materials to be cut, the abrasion of the cutting tools, and so on.

We introduced this technology into machining centers for mass-production machining and improved productivity by 35%.
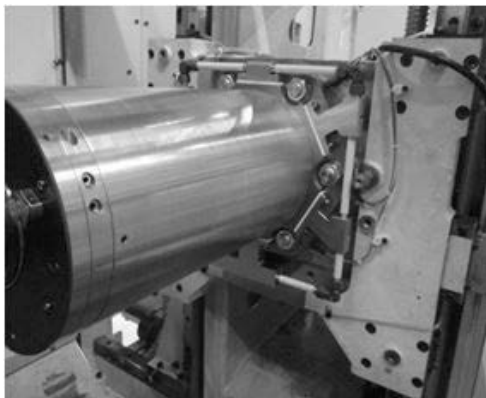

Fig 2. Sensing main axis

3. Development of noncontact and high-precision rotary encoder systems with self-calibration

Nobuyuki ISHII, Shigeki EGUCHI, Yusuke KIMISAWA, Seiya OKOSHI and Kayoko TANIGUCHI (Magnescale Co., Ltd.)

There is a demand for an encoder that can detect an angular motion with high resolution and accuracy surges to enhance the preciseness of angular motion axes on CNC machine tools. Self-calibration methods already introduced for this purpose, require a large number of heads, and therefore, they are not practical. The new "VEDA-method" is a self-calibration method that reduces the head quantity to six but enables non-contact calibration to the 30th order error elements with the combination of a high resolution and a diffraction grating rotary scale. The new encoder achieves an accuracy of ± 0.06" at all 2^{36} points per cycle with almost no effect on the rotating structure.

Fig 3. A rotary encoder system with VEDA-method

ASPEN 2019

8th International Conference of Asian Society for Precision Engineering and Nanotechnology

- Date : November 12-15, 2019
- Venue : KUNIBIKI MESSE ,
  Shimane Prefectural Convention Center,
  Matsue, Japan

Important Dates

Abstract submission	Apr. 30, 2019
Notification of abstract acceptance	May 30, 2019
Extended abstract submission	Jul. 15, 2019
Notification of final acceptance	Aug. 31, 2019
Early registration	Sep. 15, 2019
Conference	Nov. 12-15, 2019

(Nov.12: Welcome reception, Nov.15: Technical tour)