

Research Studies and Standardization Activities

1. Survey of Industrial Trends

In the current fiscal year, the Micromachine Center (MMC) has conducted surveys on trends in MEMS applications and trends in MEMS-related businesses for the purpose of studying trends in the MEMS industry.

As part of its efforts to research trends in businesses, the MMC visited some prominent MEMS-related companies in the U.S. in November of last year. A comparison of the MEMS industries in Japan and America reveals that in Japan MEMS business is generally handled by one branch of a large general company, while in the U.S. numerous venture companies are emerging alongside the large manufacturers to handle the commercialization of MEMS. The goal of this survey was to identify problems in Japan's MEMS industry by analyzing factors in the success of these venture companies and comparing how large companies in Japan and the U.S. approach MEMS.

The MMC visited the following companies for this survey: A.M. Fitzgerald & Associates, a MEMS product development consultant; SiTime Corporation, a venture company for MEMS oscillators; WiSpry, a venture company for RF-MEMS; Freescale Semiconductor, Inc., a large manufacturer of automotive sensors; Issys Sensor Systems, a venture company for MEMS and microfluidics applications; Sand9, Inc., a venture company for MEMS oscillators; and DALSA Corporation, a large MEMS foundry.

This survey covered all the traditional steps in product development from the initial idea to the final product, including research, technological development, prototyping, and commercialization. Only those products that clear all the hurdles encountered in the above steps reach commercialization. When examining the development steps employed at the companies we visited for this survey, it is clear that their approaches differ in many aspects, but a few of the venture companies shared common approaches and methods of exploiting the infrastructure. During the idea and research stage, the companies first conducted sufficient research to identify and predict market needs before designing a suitable product based on these needs. In the steps from technological development to prototyping, the companies require development funds and an infrastructure for device trial production, but it is not difficult to obtain assistance in the form of government funding or venture capital. In the U.S., venture companies can take advantage of the infrastructure in place at universities, where they can find MEMS trial production lines suitable for prototyping (taking the form of indirect assistance from state and federal governments). These companies also have access to the wealth of accumulated technologies at the universities.

Similarities were also seen in the approaches of major corporations in Japan and the U.S. For example, major firms tend to develop applications based on the element technologies that they have accumulated over the years and to form alliances with other companies in order to develop new businesses.

The details of this survey will be compiled in the FY2010 Report on Industrial Trends to be issued at the end of this fiscal year. For a brief report on the survey's findings, please visit the Web site "<http://beanspj.cocolog-nifty.com/mems/2010/11/h22mems-a6dc.html>."

2. Standardization Activities

The Subcommittee on MEMS (SC 47F) of the Technical Committee on Semiconductor Devices (TC 47) under the International Electrotechnical Commission (IEC) is responsible for reviewing MEMS international standardization. The SC 47F was invited to the IEC General Meeting held in Seattle from October 6 to 10, 2010 for TC 47-related committee meetings and working group conferences.



View of Seattle

A total of twenty-five SC 47F-related participants attended the General Meeting, including eleven from Japan, eight from Korea, two from China, and one each from Germany, the United States, Finland, and Brazil. Some key members from China were not present because their visas were not issued in time.

Four drafts of standard were up for review by the subcommittee. The subcommittee members determined that the "bend- and shear-type test methods of measuring adhesive strength for MEMS structures" proposed by Japan would proceed to CDV (Committee Draft for Vote), after reaching agreement on a revised draft in response to fifteen additional comments from Korea. The subcommittee discussed comments on the second CD (Committee Draft) on "test method for linear thermal expansion coefficients of MEMS materials" proposed by Korea, including one comment from Germany, thirty-six from Japan, and ten from Korea. However, since the allotted time was insufficient for presenting a revised draft in response to the comments, it was decided that a third CD would be drawn up. The subcommittee reviewed fifteen comments from Germany, eighteen from Japan, and eight from Korea regarding the CD on "forming limit measuring method of metallic film materials." Revisions incorporating the comments were approved, and the document was advanced to CDV. A New Work Item Proposal (NP) on "bulge test method for measuring mechanical properties of thin films" received thirty-two comments from Japan and five from Korea. The document was advanced to the CD stage after revisions incorporating the comments were approved.

During the SC 47F conference, Korea gave a presentation on two future work items: a method of measuring Poisson's ratio of thin films, and a test method for measuring thin film properties on a flexible substrate.

At the TC 47 conference, the committee discussed a proposal from Korea to establish an incubation working group aimed at studying standardization for new fields, such as energy harvesting and human body communication interfaces. The committee agreed to establish an incubation advisory group.



Conference Room