

---

# FY 2009 Reports on Research Studies

The Micromachine Center (MMC) conducts surveys on trends in MEMS-related industries and technologies, compiles the data in its annual reports, and distributes these reports to all member companies in the MEMS Industry Forum (MIF) and others involved in the MEMS industry. The Report on Industrial Trends and the report on field-specific “Survey of Technological Trends at Home and Abroad” for FY 2009 have been completed, and a summary of each is given below.

## FY 2009 Report on Industrial Trends (by the MEMS Industrial Trends Study Committee)

The Industrial Trends Study Committee is continuing its research study begun last fiscal year on the types of tools employing MEMS technology (MEMS-Inside) and the uses for these tools (MEMS applications), as well as the state of affairs for MEMS-related businesses. The committee compiled this information into its FY 2009 report on challenges and strategies for the expansion of Japan’s MEMS industry.

### 1. Trends in MEMS Applications

MEMS has already been incorporated as a practical technology in numerous products, including such recognizable devices as airbag sensors for automobiles, controllers for game consoles, and image stabilizers for digital cameras. It is anticipated that applications for various devices in diverse fields will continue to emerge as we see further advances in MEMS/nano-function composite technology, MEMS/semiconductor integrated fabrication technology, and MEMS/MEMS high-integration technology. Through recent trends in MEMS sensors, microfluidic systems, and bioMEMS used in medical and welfare fields, we expect to see an increase in the number of applications of MEMS for medical diagnostics, examinations, and treatment.

### 2. Trends in MEMS-Related Businesses

Companies that make up the MEMS industry are continually expanding into diverse sectors of business. An increasing number of companies involved in electronic, mechanical, precision, and chemical businesses are beginning to file Japanese patent applications related to MEMS and micromachine fields. The number of companies engaged in MEMS devices has also increased since the previous year’s survey, with more and more companies pursuing fields expected to have future MEMS applications, such as MEMS sensors, optical MEMS, and bioMEMS.

### 3. Challenges for the Expansion of Japan’s MEMS Industry

Japan’s MEMS industry is configured of a group of dominant companies that follow a vertical integration model, as opposed to the horizontal division of labor employed in overseas groups, such as STMicroelectronics and foundries for analog devices and MEMS. Japan’s model is less efficient because its technology, expertise, and facilities are scattered, and Japan does not conduct sufficient activities aimed at market penetration and growth for MEMS devices. Thus, in terms of cost competitiveness, which will be an important factor in the future of industrial competitiveness, Japan’s model may be inferior to that used overseas. To strengthen the MEMS industry in Japan, it will be necessary to implement aggressive

activities choreographed by industry and public institutions, such as promoting standardization through collaboration with public institutions and businesses, in order to facilitate Japan in changing its focus from technological and applied development to market growth and mass production.

## FY 2009 Survey of Technological Trends at Home and Abroad (by the MEMS Technological Trends Study Committee)

The object of this survey is to monitor technological trends from the fixed perspective of Transducers (held in Denver, Colorado in 2009), the largest MEMS-related conference worldwide.

### 1. Oral Presentations by Region

Since the Transducers conference was held in the U.S. in 2009, North America accounted for 43% of the oral presentations, a large increase from its 25% share in the previous year. On the other hand, Europe, which accounted for 39% of the oral presentations in the previous year, dropped by more than half to 19% in 2009. Japan had a slight decrease in such presentations from the previous year, but oral presentations for other Asian countries increased from 14% to 19% in 2009.

### 2. Numbers of Presentations by Specific Field

Among the basic technologies, actuators were the most popular, followed by packaging technologies, whose number increased dramatically over the previous conference. Under applied technologies, mechanical sensors occupied the top spot with a considerable increase in number over the previous conference. This topic was followed in popularity by fluidic and biomedical systems, while the number of presentations on chemical/bio sensors was half that of the previous conference.

When looking at the number of presentations by region for specific applied technologies, North America had a large number of presentations on RF-MEMS, power-MEMS, fluidics, and chemical/bio sensors, reflecting a focus on sensor networks, health care, and medical treatment. Europe, on the other hand, gave numerous presentations on image sensors and chemical/bio sensors, reflecting a focus on bio-related fields. Japan had numerous presentations on mechanical sensors and chemical/bio sensors, indicating an emphasis on sensors used in automobiles and consumer electronics. In contrast, Japan’s small number of presentations on power-MEMS suggests that Japan may be lagging behind in the area of energy harvesting.

### 3. Numbers of Presentations for Basic and Applied Fields

At the Transducers conference held the year before last, the proportion of presentations on basic technologies was down, while presentations on applied technologies were on the rise, but this year saw a slight increase in presentations on basic technologies. In general, the proportion of interest in basic technologies is high in European countries, but on the decline in Asia. While Japan and Asia invest relatively heavily in short-term projects, it appears that European countries are conducting longer-term studies with a focus on basic technologies.