Activities of the Micromachine Center in Fiscal 2001

I. Investigation and Research on Micromachines

1. R&D on a Micro-Fluid System for the High Speed Measurement of Dioxins (Commissioned by the New Energy and Industrial Technology Development Organization [NEDO])

This project applies a branch of micromachine technology called micro-fluid system technology to methods for analyzing dioxins in exhaust gas. The goal of the project is to develop micro-fluid element technologies. Research in Fiscal 2001 included the examination of micronized dioxin pre-treatment systems and micro-device specifications; and the testing and evaluation of unit operation devices (absorption, extraction, and condensation) and cooling and temperature distribution measuring devices (regarded as structural requisites in micro-fluid systems). R&D was also conducted in areas related to processing technology, such as microchannels and micro-fluid connectors.

2. Investigation and Research into the Applicability of Basic and Sprout Technologies in Other Fields to Micromachine Technology

This joint study between industry and academia is aimed at encouraging the establishment of theories in micro and nano science and engineering and probing for technological seeds necessary for promoting the merging and application of micro and nanotechnologies. Research on the following two themes was begun in 2001.

(1) Research Related to Cell Manipulation

Discussions will be held among specialists in a diversity of fields focusing on the methodology, significance, and future direction of cell manipulation, at the same time as technology streams are merged and integrated. Thus formulated, this new national research project proposal will aim to raise the curtain on nanotechnology, the next challenge in the field of micromachine technology.

(2) Research Related to the Field of Nano-Optics

A committee to examine research in the field of nano-optics was established and is ready to begin its investigative activities.

3. Research on Constructing a System for Evaluating the Micromachine Market

To upgrade statistics on micromachine technology based industries, a survey of market research, data/sampling, and evaluation methods was conducted.

4. Investigation of R&D Trends in Micromachine Technology in Japan and Abroad (Collation and Analysis of the Latest, Detailed Information from within Japan and Overseas)

5. Research into the Concept of Foundry Network System Micro-/Nano-Production Technologies (Commissioned by the Mechanical Social Systems Foundation)

This research forms the foundation for the industrialization of micro-/nano-technologies; thus, the potential of foundry network system micro-/nano-production technologies has been examined, an investigative committee established, and the following objectives achieved.

(1) Demonstration of the significance of micro-/nano-production technologies and the necessity for industrialization and foundry services.

(2) Survey of the situation regarding foundry services overseas and the industry-government-academia relationship in Japan

(3) Questionnaire conducted regarding demand for foundry services

(4) Reconfirmation of the primary purpose of foundries from the results of the survey on the current situation of foundries and issues identified.

(5) A concept proposed for a foundry network system (FNS) that is consistent with the current situation in Japan and which is also necessary if Japan is to continue leading the world in this field.

(6) Presentation of the practical roles required of industry, government, and academia in FNS.

6. Research Relating to Functional Expression and Process Technology in the Field of Micro-/Nano-Fusion (Commissioned by the New Energy and Industrial Technology Development Organization [NEDO])

In this research, surveys were conducted in relation to Micro-/Nano-Fusion Functional Expression Technology, a new technology for use in the new functional expression fields, such as process technology. As part of this research, a workshop, R&D in the Field of Micro-/Nano-Fusion, was held.

7. Research Related to the Creation of Systems Incorporating Next-Generation Micromachine Technology (Commissioned by the Mechanical Social Systems Foundation)

This research project was begun in Fiscal 2000. This survey has thus far shown that the application of micromachine technology in national projects conducted before and during Fiscal 2000 have enabled the achievement of significant results in the technological and industrial fields. In addition to focusing particular attention on certain fields, through this research we have been able to clarify the practical role required of government, academia, and industry and to formulate strategies for R&D in the micromachine technology field.

II. Collection and Provision of Micromachine Information

Information and documents on micromachines in universities, industries, and public organizations both in Japan and overseas have been collected, combined with survey results compiled and documents produced by MMC, and made freely available in the MMC library.

1. Maintenance and Expansion of the MMC Library

2. Publication of a Micromachine Periodical

3. Publication of a Newsletter

4. Database Construction and Data Management System Operations(indexed full-text retrieval)

III. Exchange and Cooperation with Worldwide Organizations Involved with Micromachines

1. Providing Research Grants for R&D on Micromachine Technology (3 new themes and six themes carried over from FY 2000)

2. Participating in the 7th Micromachine Summit and Holding Overseas Seminars

(1) Participated in the 7th Micromachine Summit (Freiburg, Germany: April 30 - May 2, 2001)

(2) Held European Seminars in Finland and Greece in June 2001

(3) The 7th International Micromachine Symposium (October 31 - November 1, 2001) held at the Science Hall, Science Museum in Kitanomaru Park, Tokyo

IV. Standardization of Micromachines

1. Research and Development for Standards "Standardization of Quality/Characteristic Measurement/Evaluation for Micromachine Materials" (Commissioned by the New Energy and Industrial Technology Development Organization [NEDO])

The three-year plan for the standardization of quality/characteristic measurement/evaluation for micromachine materials reached its final year in 2001. Round robin testing (RRT) was conducted in the tensile testing of various types of thin-film materials, which was the final objective of the project. This completed the R&D conducted to obtain the technological data required for submitting proposals for international standardization.

2. Investigation and Research into Micromachine Standardization

The Micromachine International Standardization Forum, organized mainly by the standardization committee, was established on the Internet as a method for promoting international standardization initiatives. As the standardization of evaluation standards for measurement WG has been promoted in the International Standardization Forum, an abstract (in English) is being prepared for inclusion in the MCC Technical Report "Measurement Evaluation Methods for Micromachine Technology." The specialist term WG was also coined following Forum discussions.

V. Dissemination of Information and Education about Micromachines

1. Publication of a Public Relations Quarterly Magazine "MICROMACHINE"

2. Transmission of Information via the Internet (website : http://www.mmc.or.jp/)

3. Organization of the 8th Micromachine Drawing Contest

4. Micromachine Seminars held in Japan (in Akita on September 14, 2001, and in Hiroshima on February 8, 2002)

5. Seminar presenting the results of "Research on the Applicability of Emerging Technology in Other Fields to Micromachine Technology in FY 2000" (held on July 16, 2001)

6. Workshop presenting the results of "Research Subjects for the 7th Micromachine Technology Research Grants (FY 1999)" on September 11, 2001

7. The 12th Micromachine Exhibition (October 31 - November 2, 2001) held at the Science Museum in Kitanomaru Park, Tokyo