Petition

A Full MEMS Technical Division in ASME

Proposal

To apply a full technical division status of MEMS (Microelectromechanical Systems) in ASME (American Society of Mechanical Engineers) International.

Introduction

1. Microelectromechanical Systems (MEMS) are defined as a miniature device or an array of devices combining electrical with mechanical, optical, chemical and/or biological components fabricated via integrated circuit or other similar manufacturing techniques. A MEMS subdivision was established in 1998 based on ASME by-law B5.8.5. It states "A technical subdivision may become a technical division upon action by the Council of Engineering after three years' operation and upon achieving a membership of at least 300 and having developed an appropriate organizational structure. When the merits of technical division status outweigh the requirement of operating as a technical subdivision for three years to establish the viability and need, the Board of Governors by a unanimous affirmative vote of those attending may reduce the time requirement."

2. We propose the new MEMS division to be reviewed by the technical group of System and Design based on ASME by-law B5.8.6. It states, "The technical group operating board shall review the operation, level of activity, and success of the technical program of each technical division and technical subdivision within the technical group."

Rationale

1. MEMS has been a field since late 1960s and has been drastically growing in recent years. If the petition is granted, ASME will be the first professional organization that has a formal MEMS division.

2. The new MEMS division will achieve the following objectives.
a. facilitate interaction and discussion among the MEMS community and generate opportunities for collaboration to spawn creativity.
b. identify the needs and problems of the MEMS community and bring together appropriate people to address them.
c. provide a platform to generate standards and guidelines for MEMS processes and technologies.
d. educate and inform engineers and scientists in various fields of the ongoing developments in the MEMS field.
e. train new multi-disciplinary MEMS researchers for furthering the field.

3. MEMS is a multi-disciplinary field, the new division will attract new memberships in other disciplines and industry (such as EECS, Material Science, Chemical Engineering ...) to join ASME.
4. Many areas on mechanical engineering are applying or investigating MEMS devices and sciences. The new MEMS division will work together and strengthen other existing divisions in ASME (such as Dynamic System and Control, Heat Transfer, Fluids Engineering, Applied Mechanics, Bioengineering, Design Engineering, Electrical and Electronic Packaging, Manufacturing Engineering ...).

Scope

1. MEMS activities in ASME can date bake to 1990 when the first MEMS Symposium in ASME Winter Annual Meeting is held at Dallas.

2. The MEMS subdivision has grown in the past few years and constantly maintained at least 300 primary members and having developed an appropriate organizational structure.

Projected Programs

1. Journals: Technical journal is one of the very important elements for all technical divisions in ASME. Since 1992, an IEEE/ASME Joint Journal of Microelectromechanical Systems has been publishing MEMS papers. The new MEMS division will continue to help, work and coordinate the operations of the MEMS Journal.

2. MEMS Conferences/Workshops: Table I list 6 major MEMS conferences and workshops currently running in the world. ASME has been the joint sponsor for only one MEMS Workshop. The new MEMS division will jointly sponsor and participate other conferences/workshops to attract more memberships. Furthermore, there are dozens of other MEMS conferences/workshops in the world that are not listed in Table I. The new MEMS division will approach those conference/workshops for joint sponsorship.

Table I: Six Major MEMS Conferences/Workshops in the World

Name	Sponsors	Frequency	Attendance
International Conference on Solid-State Sensors and Actuators	IEEE	Every two years	>1000
International Micro Electro Mechanical Systems Conference	IEEE	Every year	>500
Solid-State Sensors and Actuators Workshop	Transducers Foundation	Every two years	>500
MEMS Symposia in ASME International Mechanical Engineering Congress and Exposition	ASME	Every year	>500
Micromachining and Microfabrication	SPIE	Every year	>300
Eurosensors	European MST	Every year	>500

3. MEMS Symposium Organized by ASME: Since 1990, 14 consecutive MEMS Symposia were held during the ASME Winter Annual Meetings or International Mechanical Engineering Congress and Expositions. In 2003, MEMS is one of the four tracks in IMECE and MEMS symposia have contributed 28 sessions. The new MEMS division will continue to work and coordinate with other technical divisions in ASME to jointly promote MEMS research.
4. Other Programs: The new division will form the administrative committee to execute the above programs. Other programs will also be planned to promote and educate the MEMS research in ASME, including MEMS short courses, MEMS satellite conferences, MEMS newsletters, MEMS www internet information center and MEMS study groups both nationally and internationally.

Plans

1. To ask the ASME Council on Engineering at the Summer Annual Meeting to discuss and approve this petition.
2. The MEMS executive committee will continue to promote and execute the projected programs and follow other ASME by-laws to operate the MEMS technical division.

Petitioner

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Supplementary Information - MEMS

Membership Growth

1. The MEMS subdivision was established in 1998 and the total number of memberships[1] has grown rapidly to be more than 300 as shown in Figure 1[2].
2. A slower growth rate is observed in 2003 and this could be the result that the MEMS subdivision has reached out to the majority of the mechanical engineers since its establishment and it is time to move beyond to reestablish the high growth rate.
3. We petition to upgrade the MEMS subdivision to a full division to approach conference/workshops listed in Table 1 of the petition (currently, only the ASME IMECE MEMS symposium is sponsored by the MEMS subdivision) and other MEMS related meetings for joint sponsorships/participations to further the base of our membership.

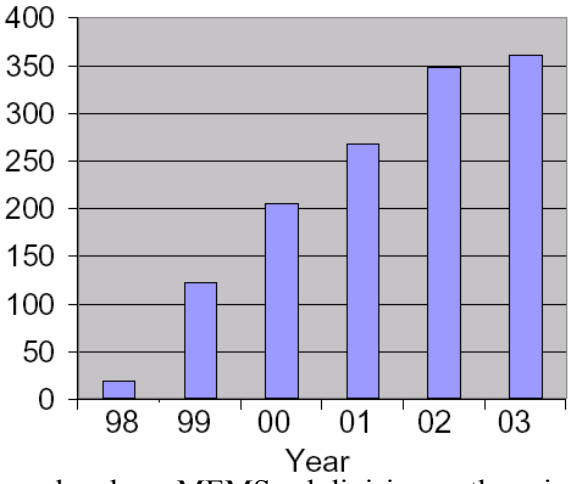

Figure 1, ASME members who chose MEMS subdivision as the primary technical division in their membership since 1998

A Strong MEMS Division

ASME needs more interdisciplinary and interindustrial activities and a full MEMS division can take the leadership role in the area of small systems.

1. **ASME/IEEE Joint Journal of Micromechanical Systems** – The journal is ranked 7th among more than 100 IEEE journals in annual citation rankings[3] and is clearly the best journal in the field of MEMS. The MEMS subdivision has strong representation in the journal. For example, A.P. Pisano (UC-Berkeley, past subdivision chair) is the president of the journal coordinating committee. L. Lin (UC-Berkeley, current subdivision chair), T. Kenny (Stanford, past subdivision secretary), C.J. Kim (UCLA, past subdivision journal coordinator), and D. Cho (Seoul National University, founding member of the subdivision) are all current subject editors of the journal. The MEMS subdivision has successfully pushed several very important changes for the journal. (1) The subscription fee for ASME members has been lowered to be the same as IEEE members. ASME members used to subscribe to the journal for more than $40 per year while IEEE

[1] Definition - ASME members who chose MEMS subdivision as their primary technical division
[2] Source – ASME membership department, starting on November 1988 when the MEMS subdivision was established
[3] http://www.theinstitute.ieee.org/inst_art.jsp?isno=10031&arnumber=10031_10w.newscitationrpt&section=5

members only pay less than $20 per year - this could have direct impact on the recruitment of MEMS researchers as ASME members. (2) Each individual author's ASME membership status in the journal is now properly marked. The joint journal used to only mark the IEEE membership status.

2. **MEMS Conferences –** The five major MEMS conferences in the world as listed in Table 1 of the petition (except the ASME IMECE MEMS symposia) are concentrating only on MEMS research such that the attendance numbers[4] could be better figures as MEMS researchers who could join the MEMS division over time. On the other hand, ASME IMECE MEMS symposia are part of the ASME Congress that attracts thousands of researchers and it is difficult to count the number of MEMS researchers in the Congress. However, it is clear that the MEMS division should explore memberships in the international MEMS conferences where most of the participants are not ASME members yet. One near-term plan is to co-sponsor the InterPACK 2005 (The Premier Pacific Rim conference on Electronic, Photonic and Microsystem Packaging) with the EPPD division in ASME to branch out our conference activities. We petition to upgrade the MEMS subdivision to a full division to be able to take active roles in other related MEMS conferences nationally and internationally.
3. **MEMS Education** – ASME will have its 4th Annual MEMS Technology Seminar this April at Los Angeles and several of the key MEMS subdivision members are the key directors/instructors for this activity (L. Lin – UC Berkeley, Steve Bart – NSTI, Abe Lee – UC Irvine). This and similar activities within ASME can attract memberships and participations outside the mechanical engineering discipline. The upgrade of the MEMS subdivision to a full division could only strengthen its position to sponsor activities like this and others for the growth of the ASME society.

[4] These numbers are typically released in the opening of the conferences and were gathered based on the individuals who attended these conferences. For example, the petitioner attended the 17th International Conference on Micro Electro Mechanical Systems, Masstricht, Netherlands, January 25-29, 2004 and that total number of the attendance was about 600.