

Priority Area:
4. Manufacturing Sciences

Coordinators:

(Japanese)
Manabu Kiuchi
Professor
Nippon Institute for
Teikyo Heisei University

(Indian)
Amitabha Ghosh
Director
Indian Institute of Technology,
Kharagpur

India-Japan Cooperative Science Programme

Activity Report in the Area: Manufacturing Sciences

Overview and Future Plan

1.FY2001-2002 Overview

In the fiscal years of 2001 and 2002, four times of Japan-India Joint-Seminars were held in the field of manufacturing science. In 2001, “The 5th Joint-Seminar on Advanced Manufacturing” and “The 7th Joint-Seminar on Advanced Composites” were held in Japan. For these two seminars, many special speakers were invited from Japanese industries. At the sessions they presented papers concerning up-dated topics. Their presentations were very impressive especially for Indian attendants. They could touch with reality and deepen their understanding of present situation of Japanese manufacturing.

In 2002, “The 6th Joint-Seminar on Advanced Manufacturing” and “The 8th Joint-Seminar on Advanced Composites” were held in India. At the paper sessions of these seminars, roughly 20 research papers were presented by academic stuffs of both countries. No attendants were from the Industry. Therefore, serious discussions were made concerning each paper and useful suggestions and advices were given to every presenter. Very effective exchange of knowledge and information was done and the objective of the Joint-Seminar was completely performed.

2.FY2003-2004 Future Plan

Two series of the joint-seminars will be continued in the fiscal years of 2003 and 2004.

In 2003, “The 7th Joint-Seminar on Advanced Manufacturing” and “The 9th Joint-Seminar on Advanced Composites” will be held in Tokyo. The detail of schedule is not fixed yet. But the duration of the seminar will be from Feb. 16th(Mon) to 21st (Sat),2004. Furthermore, speakers will be invited from manufacturing sectors as many as possible. They are expected to give the newest information concerning Japanese manufacturing industries.

In 2004, the both of joint seminars will be organized by Indian team. The time and place will be decided when Japanese and Indian teams meet together at the next Joint seminars.

3.Summary

Through the fiscal years of 2001 and 2002, the collaboration program between Japan and India were promoted energetically in the field of manufacturing science. On the bases of continuing two series of seminars, researchers of both countries had deepened mutual understanding more widely than before. The main results obtained in these two years relying upon past ten years can be summarized as follows.

1. The variation of topics presented at the seminars is expanding. This means that the seminars are extending the boundaries of manufacturing processes and technologies about which Japanese and Indian researchers discuss together and exchange knowledge and information. Through such exchange of information, the researchers of both countries are expanding their research domains and activities.
2. The total number of researchers of both countries who joined the series of seminars is steadily increasing. This means that this collaboration program has effectively contributed to the widening of multi-lateral relationships among Japanese and Indian researchers. The widening of relationships is inducing the widening of collaborations among them.
3. It should be pointed out that the number of young researchers who joined the seminars is increasing. The increase of participants in young generation can be expected to result in further future-oriented

expansion of collaboration.

4. It can be concluded that Japan-India exchange/collaboration program in the field of manufacturing science is getting the fruits steadily. It has provided every attended researcher with precious opportunity to innovate and extend their research works on variety of manufacturing processes and technologies that are essential for further development of both countries.

This program is able to contribute to further development of collaboration between Japan and India and will become a very valuable channel between two countries to promote and support cooperation of researchers of both countries in the field of manufacturing science. The role of the program is becoming more and more important. In this sense, the program should be continued as long as possible.

Modes of Cooperation:

1. Seminars
2. Visiting Scientists for Information Exchange

Report

1. Seminars

FY2001

Seminar No.1

Title: The 5th Japan-India Joint Seminar on Advanced Manufacturing Systems

Objectives:

The seminar aimed to promote the exchange of knowledge and information necessary and useful for advancement and innovation of R & D activities in the field of “Manufacturing Science” in Japan and India. “Manufacturing Science” covers analysis, design, simulation, realization, test and evaluation of manufacturing processes, machines, tools, materials and systems. It is the fundamental for all of societies as well as industries. This seminar’s objective was to contribute to the enhancement of R & D activities for the future of industries in both countries.

Seminar Coordinators:

(Japanese)

Manabu Kiuchi

Professor

Department of Information Engineering

Teikyo Heisei University

(India)

Dr. Amitabha Ghosh

Director

Indian Institute of Technology, Kharagpur

Period: 2-9 September 2001

Place: Tokyo, Japan

Accomplishment Status:

At the seminar, 16 papers were presented. The title of them were as follows,

- Mass Production of AI Suspension parts using FSW for Automotive Industry
- Fracture Prediction in Metal Forming Processes

- Eccentric and Oblique Axis Spinning Technology
- Culture of Manufacturing Organizations, a Comparative Study
- Development of Layered Manufacturing System Using FDM-ECD
- Present and Near Future Perspectives of Contact Pattern Measurement
- Prediction of Porosity Contents and Examination of Porosity Formation in Al-4. 4%Mg DC SLAB
- Development of the Injection-Press Molding for Plastic Body Panels
- An Approach for Predetermined Land Wear Monitoring in Turning
- Current State of the Art in Multi-Axis Control Machining
- Development of HVM630 High-Speed Machining Center Using Linear Motors
- High Precision Control of Circular Trajectory by Disturbance Cancellation
- Three Dimensional Massively Parallel Structures
- Torsion Strength of Assembled Camshaft by Shave Joining and Main Influencing Factors on It
- Prediction of Quench Distortion on Steel Shaft with Keyway by Computer Simulation
- A New Mathematical Model to Simulate Flow of Mushy/ Semi-Solid Alloys

The most important point of this seminar was that some special speakers were invited from Japanese industries. They presented their experiences and results concerning updated manufacturing processes and products. They introduced various newest topics in machine tool industry, automobile component industry, material industry and machine building industry. They provided the precious knowledge and information to all of the attendants concerning the noticeable products of advanced Japanese industries.

As the result, the attendants could refresh their knowledge and elevate their potential for future oriented R & D activities.

Program

3 September (Mon)

- 9:00- 9:10 Opening Ceremony
- 9:10- 9:50 Development of Layered Manufacturing System Using FDM-ECD
- 9:50-10:30 Present and Near Future Perspectives of Contact Pattern Measurement
- 10:30-10:50 Coffee Break
- 10:50-11:30 Prediction of Porosity Contents and Examination of Porosity Formation IN AI-4.4%Mg DC SLAB
- 11:30-12:10 Mass Production of AL Suspension Parts Using FSW for Automotive Industry
- 12:10-13:30 Lunch
- 13:30-14:10 Fracture Prediction in Metal Forming Processes
- 14:10-14:50 Eccentric and Oblique Axis Spinning Technology
- 14:50-15:10 Coffee Break
- 15:10-15:50 Culture of Manufacturing Organisations, A Comparative Study
- 15:50-16:30 Development of the Injection-Press Molding for Plastic Body Panels

4 September (Tue)

- 9:00- 9:40 An Approach for Predetermined Land Wear Monitoring in Turning
- 9:40-10:20 Current State of the Art in Multi- AXIS Control Machining
- 10:20-10:40 Coffee Break

10:40-11:20	Development of HVM630 High-Speed Machining Center Using Linear Motors
11:20-12:00	High Precision Control of Circular Trajectory by Disturbance Cancellation
12:00-13:20	Lunch
13:20-14:00	Three Dimensional Massively Parallel Structures
14:00-14:40	Torsion Strength of Assembled Camshaft by Shave Joining and Main Influencing Factors on It
14:40-15:00	Coffee Break
15:00-15:40	Prediction of Quench Distortion on Steel Shaft with Keyway by Computer Simulation
15:40-16:20	A New Mathematical Model to Simulate Flow of Mushy/Semi-Solid Alloys
16:20-17:00	Round Table

List of Participants

From Japan:

Manabu Kiuchi	Professor, Teikyo Heisei University
Yoshimi Ito	Professor Emeritus, Tokyo Institute of Technology
Junichi Endo	Professor, Department of Mechanical System Engineering, Kanagawa Institute of Technology
Makoto Murata	Associate Professor, Department of Mechanical Engineering and Intelligent Systems, University of Electro-Communications
Jun Yanagimoto	Associate Professor, Institute of Industrial Science, University of Tokyo
Shinichi Warisawa	Lecturer, Department of Mechanical Engineering, University of Tokyo

From India:

Amitaba Ghosh	Professor, Indian Institute of Technology, Kharagpur
V. Radhakrishnan	Professor, Department of Mechanical Engineering, Indian Institute of Technology, Madras
Sanat Kumar Mukherjee	Vice-Chancellor, Birla Institute of Technology-Mesra Ranchi
Sudipot Mukherjee	Associate Professor, Department of Mechanical Engineering, Indian Institute of Technology, Delhi
Nallagundla Venkata Reddy	Assistant Professor, Department of Mechanical Engineering, Indian Institute of Technology, Kanpur

Seminar No.2

Title: The 7th Japan-India Seminar on Manufacturing Science of Advanced Composite Materials
(The 7th ACM MFG. Sci. Seminar)

Objectives:

The seminar aimed to promote the exchange of up-to-date knowledge and information necessary for activation and innovation of R&D on “Recent Movements of ACM Manufacturing Science” in both countries. The scope and topics of the seminar are (1) Composite Materials (FRP, MMC, C/C, etc.), (2) Production System, (3) Testing & Evaluation, (4) Applications, (5) Fastening & Joining, (6) Parts & Performance, (7) National Project, (8) Industrial Situation, (9) The Others, as the past six seminars.

Seminar Coordinators:

(Japanese)
Terufumi Machida
Professor
Engineering School
Tamagawa University

(India)
N.K. Naik
Professor
Indian Institute of Technology, Mumbai

Period: 3-8 September

Place: Tokyo, Japan

Accomplishment Status:

Since the beginning of collaboration program, the seminar has seen fruitful joint works to establish the novel science & technology for the 21st Century. Seven Japanese scientists (formal) and five Indian scientists were invited to present the results of recent work and to discuss with the audience. All delegates have sufficiently achieved the given purpose through beautiful presentations and especially, Indians experienced the useful inspection tours to Japanese Institutions and Plants. The exchanged information has been really suggestible for the progress of science and technology. Also the colleagues really deepened the mutual understanding and relationships. They wanted the next seminar to be held in India in 2002.

Program**3 September (Mon)**

9:00- 9:30 Opening Address

9:30- 11:45 Session1

- 1) Tensile Fatigue and Strength Improvement Behavior of Laminated Carbon-Carbon Composite
- 2) Ballistic Impact of Carbon/Carbon laminated Composites at a High Temperature
- 3) Three-Dimensional Five-Axis Braided Composites: Jamming Condition and Mechanical Performance

12:00-13:30 Lunch

13:30-15:00 Session2

- 4) Development of Titanium Aluminide Composites by Reactive Processing
- 5) A Study on Direct Selective Laser Sintering of a Powder Mixture of Iron and Graphite

15:00-15:30 Coffee Break

15:30-17:00 Session3

- 6) Adding Value to Joining and Complex through Plasticity Technology
- 7) Mechanism of Chip Formation during Machining of Al/SiCp Composites

18:00-20:00 Reception

4 September (Tue)

9:00- 9:30 Meeting

9:30- 11:45 Session4

- 8) Fabrication Processing of MMC and the High Strain Rate Superplasticity
- 9) Radial Pressure Welding of Tube by PCR
- 10) Spray Forming of Composite Materials Based on Liquid Immiscible Alloys

- 12:00-13:30 Lunch
 13:30-15:00 Session5
 11) Ceramic Coatings for Oxidation Protection of C/C Composites
 12) Studies on Simplistic Manufacturing Techniques for Advanced Composites Product Development
 15:00-15:30 Coffee Break
 15:30-17:00 Session6
 13) Brief History of Collaboration and Future Plan
 14) General Discussions
 17:00-17:10 Closing Address by Coordinator

List of Participants

From Japan:

Terufumi Machida	Professor, Engineering School, Tamagawa University
Hiroshi Hatta	Professor, Institute of Space and Astronautical Science
Ken Goto	Assistant, Institute of Space and Astronautical Science
Hideaki Kasano	Professor, Takushoku University
Kenji Morii	Professor, Graduate School, Division of Engineering, Osaka Prefecture University
Tsunemichi Imai	Senior Research Scientist, National Institute of Advanced Industrial Science and Technology
Toshihiko Mori	Associate Professor, School of Engineering, Nagoya University
Takuya Aoki	Researcher, National Aerospace Laboratory

From India:

N.K. Naik	Professor, Indian Institute of Technology, Bombay
R.M.V.G.K. Rao	Professor, National Aerospace Laboratories
S.S. Joshi	Assistant Professor, Indian Institute of Technology, Bombay
P.K.Mishra	Professor, Indian Institute of Technology, Kharagpur
S.N. Ojha	Professor, Institute of Technology, Banaras Hindu University

FY2002

Seminar No.1

Title: The 6th Japan-India Joint Seminar on Advanced Manufacturing

Objectives:

The seminar aimed to promote the exchange of knowledge and information necessary and useful for advancement and innovation of R & D activities in the field of “Manufacturing Science” in Japan and India. “Manufacturing Science” covers analysis, design, simulation, realization, test and evaluation of manufacturing processes, machines, tools, materials and systems. It is the fundamental for all of societies as well as industries. This seminar’s objective was to contribute to the enhancement of R & D activities for the future of industries in both countries.

Seminar Coordinators:

(Japanese)

Manabu Kiuchi

Professor

Department of Information Engineering

Teikyo Heisei University

(India)

Dr. Amitabha Ghosh

Director

Indian Institute of Technology, Kharagpur

Period: 30 November -7 December 2002**Place:** New Delhi, Mussorie, India**Accomplishment Status:**

The following 12 papers were presented at the seminar.

- Mushy/Semi-Solid Metal Forming Technology-Present and Future
- Rapid Product Development of Freeform Shapes using Reverse
- Active and Passive Contributions of Production Technologies to Society of Near Future
- Modeling and Analysis of Abrasive Water Jet Cutting Process
- Application of Capacitive Displacement Transducer to the Measurement of Die Deformation in Forging
- Realization of a 1-D Massively Parallel Binary Structure
- Kindly Deep Drawing for Environment Using High-Pressured Water
- Shape Realizing Ability of Machined Parts Accounting for Machine Tool Quasi-Static Errors
- Design Concept for a Circulatory Manufacturing System for a Sustainable Society Using Genetic Product Information
- Some Issues in Thermo-Fluid Modeling of a Laser Surface Alloying Process
- Product and Process Design System for Deep Drawing of Cylindrical Cups
- Edge Rounding Method by Means of Water Jet for Cylindrical Rollers of Bearing

The papers deal with various new manufacturing, testing and measuring technologies as well as principles. Mushy/semi-solid metal forming, reverse engineering for rapid product development, application of water jet cutting, measurement of die deformation, methodology of product and process design, parallel binary structure, evaluation of machine tool errors, circulatory manufacturing system, environmentally conscious deep drawing and relationships between manufacturing technology and society.

The seminar had a limited number of attendants (15 persons) from the academic sectors of both countries. All of discussions, therefore, were made mainly from the fundamental and scientific viewpoints. Due to the situation like this, the session could deepen the understanding of the problems very effectively. Exchange of serious comments and criticisms could generate future oriented precious advices and proposals to each other. Consequently, every person could elevate his consciousness to aim more extensive communication with others relating to each one's R&D activities.

Program

Nov. 30, 2002 (Saturday)

Arrival of Japanese participants at Delhi

Arrival of Indian participants at Delhi

Dec 1, 2002 (Sunday)

08:30 AM Starting from Delhi

07:30 PM Inauguration at Mussorie

08:00 PM Dinner

Dec 2, 2002 (Monday)

09:00 AM – 09:35 AM Prof. M. Kiuchi

09:30 AM – 10:10 AM Dr. D. R. Prasada Raju

10:10 AM – 10:45 AM Prof. Y. Ito

10:45 AM – 11:15 AM Tea

11:15 AM – 11:50 AM Prof. S. G. Dhande

11:50 AM – 12:25 PM Dr. Y. P. Kumar and Dr. R. Shama(DST)

12:40 PM – 02:00 PM Lunch

02:00 PM – 02:35 PM Dr. S. Chakraborty

02:35 PM – 03:10 PM Prof. J. Endo

03:10 PM – 03:25 PM Tea

03:25 PM – 04:00 PM Dr. N. V. Reddy

04:00 PM Local Visits

08:00 PM Dinner

Dec 3, 2002 (Tuesday)

09:00 AM – 09:35 AM Prof. Y. Murata

09:35 AM – 10:10 AM Dr. P. V. M. Rao

10:10 AM – 10:45 AM Prof. M. Murata

10:45 AM – 11:15 AM Tea

11:15 AM – 04:30 PM Visit to Camp-tea Falls, Picnic at Dhanolti
(Lunch & Tea)

05:30 PM Back to Mussorie

08:00 PM Dinner

Dec 4, 2002 (Wednesday)

09:00 AM – 09:35 AM Dr. S. Mukherjee

09:35 AM – 10:10 AM Prof. S. Warisawa

10:10 AM – 10:45 AM Prof. A. Ghosh

10:45 AM – 11:15 AM Tea

11:15 AM – 11:50 PM Prof. Freeslot

11:50 AM – 05 :00 PM Lunch & Industry visit (Dehradum),

Back to Mussorie

08:00 PM Dinner

Dec 5, 2002 (Thursday)

06:00 AM Mussorie to Haridwar for BHEL visit

08:15 AM Breakfast

09:00 AM – 01:00 PM	BHEL visit
01:00 PM – 02:00 PM	Lunch at BHEL
02:00 PM	Starting from Haridwar to Delhi
08:30 PM	Dinner in Delhi

Dec 6, 2002 (Friday)

Industrial visit and sight seeing in Delhi	
04:00 PM	Departure of Japanese team

List of Participants

From Japan:

Manabu Kiuchi	Professor, Teikyo Heisei University
Yoshimi Ito	Professor Emeritus, Tokyo Institute of Technology
Junichi Endo	Professor, Department of Mechanical System Engineering, Kanagawa Institute of Technology
Makoto Murata	Associate Professor, Department of Mechanical Engineering and Intelligent Systems, University of Electro-Communications
Yoshimi Murata	Associate Professor, Institute of Industrial Science, University of Tokyo
Shinichi Warisawa	Lecturer, Department of Mechanical Engineering, University of Tokyo

From India:

Amitaba Ghosh	Professor, Indian Institute of Technology, Kharagpur
V. Radhakrishnan	Professor, Department of Mechanical Engineering, Indian Institute of Technology, Madras
Sudipot Mukherjee	Associate Professor, Department of Mechanical Engineering, Indian Institute of Technology, Delhi
Nallagundla Venkata Reddy	Assistant Professor, Department of Mechanical Engineering, Indian Institute of Technology, Kanpur
Ramesh Babu	Professor, Department of Mechanical Engineering, Indian Institute of Technology, Madras
Suman Chakraborty	Associate Professor, Department of Mechanical Engineering, Indian Institute of Technology, Kharagpur
V.V.S.N.S. Yugandara Rao P	Project Associate, Department of Mechanical Engineering, Indian Institute of Technology, Kharagpur
D.R. Prasada Raju	Advisor, Scientist-G, Department Science and Technology, government of India
B.N.Mondal	Doctor, Central Mechanical Engineering Research Institute

Seminar No.2

Title: The 8th Japan-India Seminar on Manufacturing Science of Advanced Composites
(The 8th ACM MFG. Sci. Seminar)

Objectives:

The seminar was held as the continuation and extension of the past seminars. Six Japanese scientists, including four new members, and eight Indian scientists discussed on the recent R & D results to extend their own capacity further for the future activity.

Seminar Coordinators:

(Japanese)

Terufumi Machida

Professor

Engineering School

Tamagawa University

(India)

N.K. Naik

Professor

Indian Institute of Technology, Mumbai

Period: 30 November- 7 December 2002

Place: New Delhi, Mussorie, India

Accomplishment Status:

All delegates have sufficiently achieved the given purpose through beautiful presentations and useful inspection tours to Indian Institutions and Plants. Especially in this seminar, both delegates were much impressed in that Dr. R. Sharma, Director, International Division, DST, talked about the thought of such the project and present states in India. All members friendly discussed on the useful information for advancement of the ACM manufacturing science and the industries. The leaders agreed that such the substantial collaboration should be continued hereafter and the 9th conference was to be held in Tokyo in middle February 2004. Also the other collaboration such as scientists and academic exchange between Institutions & Universities, and visiting or mailing for transfer of promising technological knowledge will be obtained more often than before.

Program

2 December (Mon)

Opening Address

Session1

- 1) Mechanical Properties of Pre-Coated Metal and its Applicability for Press Forming
- 2) Ballistic Impact Behavior of Composites-Effect of Reinforcement Architecture
- 3) International Collaboration Program of Department of Science and Technology, India

Lunch

Session2

- 4) Improvement by Densification of C/C Composites
- 5) Processing and Characterization of Particulate Reinforced Composite Materials

Coffee Break

Session3

- 6) Small Diameter Drilling of GFRP for Printed Wiring Board
- 7) Technoeconomic Production of Composite Products by Rapid Moulding and Curing Methodologies

Session4

8) High Strain Rate Superplasticity and Blow forming of TiC Particle Reinforced Aluminum Alloy

3 December (Tue)

Meeting

Session5

- 9) Process Modeling and Milling Cutter Development for Machining of DRA Composites
- 10) An Analytical Study on Damage Accumulation in Composite Laminates during Quasi-Static Transverse Loading
- 11) Development of Advanced Composites of Alumina Reinforced with Y-PSZ

Lunch

Session6

- 12) Machining of FRP Composites-Many Trials Few Hits
- 13) Application of SHS Reaction to Freeform Fabrication of IMC-base Composite
- 14) Effect of Buffer Strips on the Static and Dynamic Response of Carbon-Epoxy Composites

Coffee Break

General Discussions

Closing Address by Coordinators

List of Participants

From Japan:

Terufumi Machida	Professor, Engineering School, Tamagawa University
Hiroshi Hatta	Professor, Institute of Space and Astronautical Science
Takashi Ishikawa	Professor, School of Engineering, Nagoya University
Hiroshi Suemasu	Professor, Faculty of Science and Technology, Sophia University
Eiichi Aoyama	Professor, Faculty of Engineering, Doshisha University
Kiyotaka Matsuura	Assistant, Hokkaido University

From India:

N.K. Naik	Professor, Indian Institute of Technology, Bombay
R.M.V.G.K. Rao	Professor, National Aerospace Laboratory
S.S. Joshi	Professor, Indian Institute of Technology, Bombay
S.N. Ojha	Professor, Institute of Technology, Banaras Hindu University
N. Bhatnager	Professor, Mechanical Engineering Department, Indian Institute of Technology, Delhi
Kishore	Professor, Polymer Composites Laboratory, Indian Institute of Science
B. Mondal	Doctor, Central Mechanical Engineering Research Institute
R. Sharma	Director, International Division, Department of Science and Technology

FY2003

Seminar No.1

Title: The 7th Japan-India Joint Seminar on Advanced Manufacturing

Objectives:

The 7th seminar aims to promote the exchange of knowledge and information necessary and useful for advancement and innovation of R&D activities in the field of “Manufacturing Science” in Japan and India. “Manufacturing Science” covers analysis, design, simulation, operation, test and evaluation of manufacturing processes, machines, tools, materials and systems. The objective of this seminar is to contribute to the enhancement of R&D activities for the future of manufacturing industries in both countries.

Seminar Coordinators:

(Japanese)

Manabu Kiuchi

Professor

Department of Information Engineering

Teikyo Heisei University

(India)

Dr. Amitabha Ghosh

Director

Indian Institute of Technology, Kanpur

Period: 16 - 21 February 2004

Place: Japan

List of Participants

From Japan:

Manabu Kiuchi	Professor, Teikyo Heisei University
Yoshimi Ito	Professor Emeritus, Tokyo Institute of Technology
Junichi Endo	Professor, Department of Mechanical System Engineering, Kanagawa Institute of Technology
Makoto Murata	Professor, Department of Mechanical Engineering and Intelligent Systems, University of Electro-Communications
Yoshimi Murata	Lecturer, Meiji University
Shinichi Warisawa	Lecturer, Department of Mechanical Engineering, University of Tokyo

From India:

Amitaba Ghosh	Professor, Indian Institute of Technology, Kanpur
V. Radhakrishnan	Professor, Department of Mechanical Engineering, Indian Institute of Technology, Madras
Sudipot Mukherjee	Associate Professor, Department of Mechanical Engineering, Indian Institute of Technology, Delhi
Nallagundla Venkata Reddy	Assistant Professor, Department of Mechanical Engineering, Indian Institute of Technology, Kanpur
Ramesh Babu	Professor, Department of Mechanical Engineering, Indian Institute of Technology, Madras

Suman Chakraborty

Associate Professor, Department of Mechanical Engineering, Indian Institute of Technology, Kharagpur

Seminar No.2

Title: The 9th Japan-India Seminar on Manufacturing Science of Advanced Composite Materials
(The 9th ACM Seminar)

Objectives:

The seminar aimed to promote the exchange of up-to-date knowledge and information necessary for activation and innovation of R&D on “Recent Movements of ACM Manufacturing Science” in both countries.

Seminar Coordinators:

(Japanese)

Terufumi Machida

Professor

Engineering School

Tamagawa University

(India)

N.K. Naik

Professor

Indian Institute of Technology, Mumbai

Period: 16- 21 February 2004

Place: Japan

List of Participants

From Japan:

Terufumi Machida

Professor, Engineering School, Tamagawa University

Hiroshi Hatta

Professor, Institute of Space and Astronautical Science

Takashi Ishikawa

Professor, Department of Materials Processing Engineering, Nagoya University

Hiroshi Suemasu

Professor, Faculty of Science and Technology, Sophia University

Eiichi Aoyama

Professor, Department of Mechanical Engineering, Doshisha University

Kiyotaka Matsuura

Assistant Professor, Hokkaido University

Katsuhiko Yamaguchi

Professor, Department of Mechanical Engineering, Kyoto Institute of Technology

From India:

N.K. Naik

Professor, Indian Institute of Technology, Bombay

R.M.V.G.K. Rao

Professor, National Aerospace Laboratory

P.K.Mishra

Professor, Indian Institute of Technology, Kharagpur

S.S. Joshi

Professor, Indian Institute of Technology, Bombay

S.N. Ojha

Professor, Institute of Technology, Banaras Hindu University

2. Visiting Scientists for Information Exchange

India to Japan

<u>Name and Affiliation</u>	<u>Research Subject</u>	<u>Main Host</u>	<u>Period</u>
P.K. Mishra Indian Institute of Technology, Kharagpur	Study on the Techniques in the Use of Micro-EDM and Fabrication of Micro-Tools for Micro Drilling/Milling Operations	Takahisa Masuzawa Professor Centre for International Research on Micro Mechatronics University of Tokyo	24 Feb.2002- 10 Mar.2002 (15 days)
