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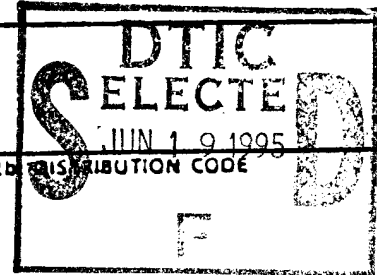
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Final Technical Report on the activities of the Program in US-Japan Industry & Technology Management at Vanderbilt University From October 1991-September 1994. Activities include (1) academic degree program, (2) training accomplishments, (3) internship accomplishments, and (4) research accomplishments.

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VANDERBILT UNIVERSITY



NASHVILLE, TENNESSEE 37235

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October 26, 1994

Dr. Koto White
 Program Manager
 Academic and International Affairs
 AFOSR/NI
 110 Duncan Ave., Suite B115
 Bolling AFB, DC 20332-0001

Dear Dr. White:

We are pleased to report to you on the activities of the Program in U.S.-Japan Industry and Technology Management at Vanderbilt University from October 1992 - September 1994. The activities of the Program from October 1991 - September 1992 were reported earlier and are described in the attachment to this report. This final technical report is submitted as directed in the document entitled "Administration of U.S. Air Force Grants and Cooperative Agreements for Basic Research" signed by the AFOSR and Vanderbilt University on September 30, 1991.

Final Technical Report

1. Academic Program Accomplishments

1.1 Academic Degree Program

The School of Engineering recently created a new Master's level degree for the U.S.-Japan Program : the Master of Engineering in Management of Technology with a Specialization in Japanese Technology Management. Vanderbilt's first graduate to hold this degree (Sara Baylor) was placed for four months in the Department of Commerce's Japan office, before accepting an industrial position. One of our first Ph.D. candidates (Dona Mularkey) began a one-year Science, Engineering and Diplomacy Fellowship sponsored by the American Association for the Advancement of Science within the Department of State in September 1993. She is studying U.S. technology policy and completing her dissertation research while there. Three masters degrees and one doctorate were awarded at the 1994 commencement exercises. There are currently three other masters students and five Ph.D. candidates enrolled in the Management of Technology Program with a specialization in Japanese technology management.

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1.2. Academic Courses

The following set of graduate courses was specifically developed by faculty associated with the U.S.-Japan Program during its initial phase of funding:

MT 392-01:	Japanese Technology Management Practices
MT 392-02:	Total Quality Management
MT 392-04:	Seminar on Intelligent Manufacturing
MGT 595:	Current U.S.-Japan Relations

Most of these courses still retain their special topics catalog number for the new Specialization in Japanese Technology Management concentration of coursework mentioned above, and will be reviewed, changed, and formally instituted as the program matures. These courses have been taken by more than 150 students from diverse engineering disciplines as well as the Owen Graduate School of Management during the last two years.

2. Training Accomplishments

2.1 Symposia/Workshops

In the past three years, the Vanderbilt U.S.-Japan Center conducted nine symposia and workshops in various cities across the country, including Washington D.C., Nashville, Huntsville, Dayton, and Albuquerque. Co-sponsorship with Japanese organizations has given added meaning to these events, and the response has been extremely positive. In particular, the Environmentally Sound Manufacturing Symposium held in Washington, D.C. in March, 1993 and co-sponsored with JETRO was well attended and very well received. MITI and NEDO are two other Japanese organizations with which the Vanderbilt U.S.-Japan Center maintains close working relations and will continue to seek the support of these sources for future symposia.

A full list of all the symposia/workshops conducted by the Vanderbilt U.S.-Japan Center follows:

- *Comparisons of U.S.-Japan Management of Technology* - Symposium, Nashville, TN, November, 1991
- *Japanese Management Methods* - Symposium targeted for Army and NASA, Huntsville, AL, February, 1992
- *Understanding Japan: Profitable Opportunities for Tennessee* - Symposium, Nashville, TN, May, 1992
- *Paradigm for Success in a Global Environment* - Symposium held at Wright Patterson Air Force Base, Dayton, OH, July, 1992
- *Quality and Response - Time Management* - Executive seminar targeted for Army and NASA, Huntsville, AL, October, 1992
- *U.S.-Japan Cooperative Research Opportunities* - Joint symposium with the University of New Mexico, targeted for DOE, Albuquerque, NM, November 1992
- *Japanese Culture and Business Practices* - Seminar held at Wright Patterson Air Force Base, Dayton, OH, January, 1993
- *Environmentally Sound Manufacturing* - Symposium, Washington, DC, March, 1993

•*Toward Clean and Intelligent Manufacturing - Workshop,*
Nashville, TN, November, 1993

All of the symposia conducted to date by the U.S.-Japan Center have provided a number of seats at no charge to government employees and military representatives. More than 500 representatives from DOD, DOE, NASA, EPA, OTA, NSF, Department of State, and DOC have attended. DOD attendance was especially high at symposia held in cooperation with the Air Force Institute of Technology at Wright Patterson Air Force Base. DOE attendance, particularly from Sandia and Los Alamos National Laboratories, was notable at the symposium held in Albuquerque in conjunction with the University of New Mexico. Under the new subcontracting agreement between Vanderbilt, University of Tennessee Space Institute, and University of Alabama in Huntsville, MT courses, symposia, and seminars will now reach a broader range of DOD, DOE, and other government institutions.

2.2 National Technological University (NTU) Distance Education Broadcasts

The Distance Education portion of Vanderbilt's program is designed to provide information about our activities to remote learners at government laboratories and military installations throughout the United States. During the initial grant period, the National Technological University (NTU) was selected for broadcasting a prototypical course about our U.S.-Japan research efforts. NTU was chosen primarily to demonstrate how Vanderbilt and the University of Wisconsin/NTU centers could collaborate in the future in distance education. This course, entitled "Implementing a Successful Total Quality Management Initiative," was broadcast over the NTU network on Monday June 14, 1993. A total of 20 sites including USAF/Rome Laboratory and Robins AFB, and DOE/Sandia and Lawrence Livermore Labs were reached with more than 180 participants enrolled.

3. Internship Accomplishments

No amount of classwork or seminars can replace the experience of a personal visit to Japan, and it is in this area that the Vanderbilt program plays an important role. In the Summer of 1992, Vanderbilt sent nine engineering and MBA students to Japan for Summer internships with government or industry hosts. Several interns, drawn from DOD and industry, continue to experience payoffs from this in their professional careers; for example, an intern from the USAF returned to Japan in 1993 to negotiate and oversee a government-to-government data exchange agreement.

In 1993, the group of thirteen interns - composed of five students in engineering, four students in management, two law students studying Japanese intellectual property law, one student in education, and one engineer from a firm in Memphis - spent three weeks to two months in various Japanese organizations such as NISTEP (National Institute for Science and Technology Policy),

Agawa Law Firm, AIST's Mechanical Engineering Lab and firms such as Nippon Steel and Bridgestone. They all received an intensive language and cultural training course at Vanderbilt prior to their visits. Multi-media education aids, such as computerized language training, videos, and books were made available to the interns as well.

The interns traveling to Japan in 1993 were of two types: those who applied independently for an internship, and those who were nominated by a faculty member as a research assistant. Eight of the 13 interns traveled to Tsukuba Science City where they stayed for a week before traveling to Tokyo for internship visits. During the week in Tsukuba, they visited several Japanese government and industry laboratories. They also met on- and off-campus with Japanese students and faculty from the Intelligent Robotics Laboratory at Tsukuba University to get a first-hand look at the Japanese university system, and to experience Japanese culture in a somewhat more relaxed environment than Tokyo. Two interns stayed for approximately two months at the Mechanical Engineering Lab as part of research teams in the areas of robotics and the Ecofactory, a national project on environmentally conscious design and manufacturing. A second category of interns traveled to Japan with faculty members. These two-to-three week internships focused primarily upon the Japanese business/technology management practices. In all cases, these students work with their faculty sponsors before and after the trip as a part of their degree requirements.

In summary, Vanderbilt has conducted a very successful Summer Internship Program where the emphasis is on placing a limited number of carefully screened and selected participants into "personalized" host situations developed by the Vanderbilt Program Director's personal contacts in these organizations. A complete listing of 1992, 1993 and 1994 interns and their Japanese hosts follows:

Summer Internships - 1992

- Sara Baylor (ME Student) - NISTEP. Currently with Copeland Corp., Sidney, OH
- Steven L. Cornelius (Teledyne Brown Engineering and MS Student) - Hitachi
- Rudolf O. Ernst (Senior in EE) - Nippon Steel, Bridgestone
- Connie Flatt (Corps of Engineers) - Hitachi, MELCO, Toshiba
- Richard A. Lane (Saturn Corporation) - Hitachi, Fanuc, GM Japan
- Marc Mueller (MS Student) - Laboratory for International Fuzzy Engineering Research, OMRON. Currently with Toshiba America Consumer Products, Lebanon, TN
- Sean O'Brien (MBA Student) - Bridgestone, NKK. Currently with Health Care Microsystems, Torrance, CA
- Robert B. Peerman (Northern Telecom) - NISTEP, Komatsu, and other small/medium-size manufacturers
- Eugene J. Sanders (Arnold Engineering Research Center, USAF) - Mitsubishi Heavy Industries.

Summer Internships - 1993

- Kathleen Buckley (JD Student) - Patent Offices, Hitachi, Ricoh
- Margaret Curtin (PhD Student) - Mechanical Engineering Lab, AIST
- Brad Federman (MA Student) - MITI, Various small/medium-size manufacturers. Currently with Humana, Inc., Louisville, KY
- Emlei Kuboyama (JD Student) - Gibson, Dunn & Crutcher, Sony; Hitachi Software Engineering, NEC, NTT, Fuji Xerox
- Thuan Le (MBA Student) - Various small/medium-size manufacturers. Currently with Citibank, New York, NY
- Pablo Martinez (MS Student) - Tokyo Electron, OMRON, Laboratory for International Fuzzy Engineering Research. Currently with HUBLink, Inc., Columbus, OH
- Jeffrey Mayer (MBA Student) - Bridgestone Corporation
- Robert Peerman (Northern Telecom) - Various small/medium-size manufacturers
- Mathew Peterson (MBA Student) - Nippon Steel Corporation
- Warren Sharp (PhD Student) - Saitama University, NISTEP
- Sandy Swain (PhD Student) - Mechanical Engineering Lab, AIST
- Robert Swain (Smith & Nephew Richards) - Kyocera Corporation, Asahi Glass, Kyoto University, and Nara University

Summer Internships - 1994

- Mark Cambron (Grad. Student - EE) - Robotics Research, Mechanical Engineering Laboratory, Electrotechnical Laboratory, and others
- Dan Gallagher (MT Student) - NISTEP, Japan Small Business Research Institute
- Moenes Iskarous* (PhD Student - EE) - Robotics Research
- Ashraf Saad* (PhD Student - EE) - Software Development

*Funded other than AFOSR

A detailed reporting of the 1992 and the 1993 Summer Internship experiences appears as Center Publications No.12 and No.18.

4. Research Accomplishments

Vanderbilt proposed several areas of research in its initial proposal, many of which have been completed, reported in various symposia or workshops and written up for publication. They are summarized in the next few sections.

4.1 New Product Development in Software

Software, not hardware, development has become the key element in fielding new products for civilian and military use. This

research project, headed by Prof. Gary Scudder of the Owen Graduate School of Management, is a part of multi-national (United States, Japan and EC countries) comparative study being conducted to define methods of speeding up software product development. Several firms in the United States and Japan, including Hitachi, NEC, NTT, Fuji Xerox, MHI, and Sony, participated and the results have been published as a U.S.-Japan Center report. (Center Publication No. 22)

4.2 Human Resource Development

Training and re-training to meet the dynamics of technological and economic change is critical to future competitiveness and to U.S. defense conversion to commercial markets. Research conducted by Dr. David Kerns has investigated methodologies utilized by Japanese high-technology companies to maintain and enhance the technical competence of their engineers and technical managers. (Center Publication No. 16)

4.3 Innovation in Small- and Medium-Size Companies

Japanese manufacturers devote about two-thirds of their expenditures for research and development to manufacturing processes; in contrast, U.S. manufacturers devote a comparable portion to product development. The decentralization of large Japanese manufacturers appears to make the small manufacturer vital to successful process innovation. Dr. Larry LeBlanc of Vanderbilt's Owen Graduate School of Management and Dr. Robert Nash of Vanderbilt's Management of Technology Program conducted research about specific process innovations achieved by small- and medium-size manufacturers operating in the United States and Japan. The results have been published. (Center Publication No. 23)

4.4 U.S.-Japan Collaboration in Advanced Robotics and Manufacturing

Advanced robotics and manufacturing technology is a key to America's competitiveness. Vanderbilt faculty members Drs. Kazuhiko Kawamura, Gautam Biswas and Alan Peters visited Japan last Summer, and two interns visited MEL and several corporate labs to learn about and set up collaborative arrangement in R&D management of flexible manufacturing, fuzzy engineering and advanced robotics technology. Continuing research efforts are being made to compare U.S. and Japanese practices in this field, involving Vanderbilt's Intelligent Robotics Lab, Tokyo Denki University, Teledyne Brown Engineering, MITI's Mechanical Engineering Lab (MEL), and the Bridgestone Corporation. (Center Publication No.10)

4.5 Clean and Intelligent Manufacturing

Intelligent manufacturing incorporates artificial intelligence along with sophisticated database management and distributed processing techniques to create a computer-based integrated system that can respond efficiently in dynamic situations. The United States and Japan are currently cooperating on research activities in intelligent manufacturing through the international

Intelligent Manufacturing Systems program. A research trip to Japan in June, 1993 established relations with Japanese universities, industry labs, and government facilities in this field. Several technical papers on Intelligent Manufacturing have already been published by the investigators, Drs. Gautam Biswas and Kazuhiko Kawamura. (Center Publication No. 5 and No. 26)

4.6 Industrial Ecology and Ecofactory

The concept of industrial ecology in the United States and the Ecofactory in Japan will establish the next generation of manufacturing technologies and factory operations designed to contribute to solving global environmental problems without impairing the economic progress in industrial and developing nations. This is also consistent with the EPA's Design for the Environment Program. Vanderbilt has been working on this concept with Dr. Niwa of Saitama University and Dr. Sato of the Mechanical Engineering Lab. One Vanderbilt intern spent five weeks during the Summer of 1993 at MEL working on the Ecofactory project. A report is available from the Center. (Center Publication No. 18)

4.7 U.S.-Japan Industrial Behavior in Environmentally Sound Manufacturing

In 1993, Dr. Mark Cohen of Vanderbilt's Owen Graduate School of Management and a research assistant visited NISTEP and Saitama University to collect information on environmental regulations and practices in Japan. By analyzing an extensive NISTEP survey on industrial environmental behavior in Japan and comparing it with similar surveys in the United States, interesting conclusions were drawn about the environmental behavior of manufacturers in the two countries. A report summarizing the initial results is available from the Center. (Center Publication No. 20)

4.8 Management and Transfer of Dual-Use Technology

In 1993, the U.S.-Japan Technology Forum, a major research program on U.S.-Japan dual-use technology cooperation, began to focus on attempts of U.S. defense firms to make defense conversion. These conversion and clean-up efforts were the subject of frank discussions among thirteen American and eleven Japanese CEO and board members from large firms at the forum. Vanderbilt has again funded this effort for 1994, and continued support is expected through 1996. This research will strengthen Vanderbilt's efforts in environmentally sound design and manufacturing and is headed by Dr. James Auer (Director of VIPPS' U.S.-Japan Forum) and Center Fellow Gerald Sullivan (Member of Advisory Committee, U.S.-Japan Center). Proceedings are published annually as a part of the Center Technical Report series.

If you have any questions regarding this report, please do not hesitate to contact me.

Sincerely,



Kazuhiko Kawamura
Director

cc: Mr. Steve Smartt, Office of Sponsored Research
Dean Ed Parrish, School of Engineering
Dr. Sherra Kerns, School of Engineering
Dr. R.S. Goodrich, U.S.-Japan Center
Program File

Attachment: Report from October 1, 1991 - September 1992

VANDERBILT UNIVERSITY



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September 28, 1992

V. Claude Cavender, Jr.
Lieutenant Colonel, USAF
AFOSR/X01
Room 119, Building 410
Bolling Air Force Base, D.C. 20332-6448

Dear Colonel Cavender:

We are pleased to report to you on the activities of the Program in U.S.-Japan Industry and Technology Management at Vanderbilt University from October 1991 - September 1992. This technical report is submitted as directed in the document entitled "Administration of U.S. Air Force Grants and Cooperative Agreements for Basic Research" signed by the AFOSR and Vanderbilt University on September 30, 1991.

The following significant milestones have taken place during this period:

- (1) The Master of Engineering Program in Management of Technology with a specialization in U.S.-Japan Technology Management has been launched. The existing Master of Science and Interdisciplinary Ph.D. programs have been strengthened.
 - Master's candidate Sara Baylor became the first full time student in the degree program in the Fall of 1991. She is working under the guidance of Professor Gary Scudder of Vanderbilt's Owen Graduate School of Management. Both Ms. Baylor and Professor Scudder visited Japan in the summer of 1992, the former as an intern in a Japanese laboratory and as a National Science Foundation fellow and Professor Scudder as a researcher on timing and quality of new product development.
 - In January, a second student, Richard Lane, began the master's program. Mr. Lane began his studies as an engineer at the Saturn Corporation in Smyrna, Tennessee and has transferred to Detroit but is continuing his studies at Vanderbilt. He visited Japan as a program intern and studied robotics and manufacturing.

- In September, Marc Mueller and Lauren Heffelman became full time master's students and Michael Leahy began Ph.D. studies under program auspices. Marc comes to Vanderbilt from officer status in the Navy's nuclear power program and Lauren is with the U.S. Army Corps of Engineers.
- Several part-time industry Ph.D. students are also enrolled.
- A new course, "Current U.S.-Japanese Relations," was taught by Program Co-Director James E. Auer for graduate credit in the Master of Engineering Program in Management of Technology (MT) and in the Owen Graduate School of Management MBA curriculum; 58 masters and Ph.D. candidate students completed the course and more than 20 graduate students who wanted to take the course during the Spring 1992 semester could not be accommodated due to space limitations. The course is being offered again in January 1993.
- Also in the Spring 1992 term, Program Director Kazuhiko Kawamura and Program Coordinator Dona Mularkey taught "Japanese Technology Management Practices," MT 392 to a class of 10 graduate students. The class was held on Saturdays to attract and accommodate students from government and industry. In fact, one student travelled from Huntsville and one from Wright-Patterson Air Force Base to attend the class. Four of the students in this class travelled to Japan as program interns this summer.
- The U.S.-Japan program has become the contact point at Vanderbilt University for the NSF Summer Institute in Japan Program by providing publicity, information to faculty and students, and aiding students in applying to the program. (Dona Mularkey was a 1991 NSF participant, and Sara Baylor was a 1992 participant.)
- Visiting lecturers were utilized this year by the Vanderbilt U.S.-Japan Program by leveraging visits to the U.S. by Japanese researchers during the Spring and Fall semesters. Dr. Fumio Kodama, a visiting professor at Harvard last year, lectured on Japanese high technologies. Dr. Fujio Niwa, professor at Tsukuba University and a researcher at NISTEP who was in the U.S. for a conference in Florida, lectured on the Japanese Science & Technology indicator system. Ms. Fumi Hasegawa, a researcher at Fujitsu lectured on her work on aids for the handicapped and elderly, addressing the application of technology to social needs in Japan. Dr. Michiyuki Uenohara, Executive Advisor to NEC and advisor to the Vanderbilt U.S.-Japan Program, stopped on his way to Princeton where he is Chairman of the Board of

Trustees, NEC Research Institute for Advanced Management Systems, and Chairman, NEC Research Institute, Inc. in the U.S. to lecture on corporate R&D in Japan. In addition, Mr. Robert Cutler, in Nashville in his capacity as an advisor to the U.S.-Japan Program, lectured on U.S. and Japanese Technology transfer practices.

- (2) The U.S.-Japan Center for Technology Management has been established as a joint venture of the Vanderbilt School of Engineering and the Institute of Public Policy Studies to administer the Program's non-degree and research agendas. The Center conducted a number of non-academic activities during the first year.
- A paper entitled "Transfer of Dual-Use Technology from Japan through Reciprocal Equity Investments," co-authored by Dona Mularkey, Jim Auer, and Kazuhiko Kawamura was delivered at the Portland International Conference on Management of Engineering Technology (PICMET '91) by Dona Mularkey in October 1991.
 - A kickoff symposium, "Comparisons of U.S.-Japan Management of Technology" attended by 75 senior government, business and academic leaders, was held at Vanderbilt on November 4, 1991.
 - In December 1991, the Commission on U.S.-Japan Relations for the Twenty-First Century published a study on Japanese investment in Tennessee written by Dona Mularkey under the direction of Jim Auer.
 - In January 1991, the Center published the report of the Second U.S.-Japan Technology Forum, a meeting of 20 senior American and Japanese businessmen who met in Nashville in May 1991 to discuss dual use technology transfer and impediments thereto including differences in intellectual property procedures, etc. Copies were mailed to AFOSR and others on the Center's mailing list.
 - Jim Auer, Bill Ferrari, and Mr. Gerald Sullivan, Fellow of U.S.-Japan Center for Technology Management, spoke at the national meeting of the Association of Japanese Business Studies (AJBS) held in Denver in January.
 - A symposium, "Japanese Management Methods: Opportunities for America?" was held at the Space and Rocket Center in Huntsville, Alabama on February 5, 1992 co-sponsored with the National Management Association. An audience of 85 government and industry representatives attended.
 - Center Administrator Bill Ferrari visited Japan from March 17 - April 17 as one of 15 international executives

participating in a Japan Economic Foundation intensive program on Japanese government, culture and business environment. He participated in lectures by distinguished professors from a variety of educational institutions, key members of MITI, the Industrial Bank of Japan and JETRO, and he visited several major manufacturing firms throughout Japan. Mr. Ferrari extended his visit to introduce Vanderbilt's U.S.-Japan Program to the Keidanren (a key group of major Japanese business leaders), the Agency for Industry and Science and Technology Policy (AIST) of MITI, and to the National Institute of Science and Technology Policy (NISTEP) of the Science and Technology Agency of Japan.

- The Third U.S.-Japan Technology Forum sponsored by the Vanderbilt Institute for Public Policy Studies' Center for U.S.-Japan Studies and Cooperation directed by Jim Auer was held May 6-7 at the Vanderbilt Law School. Twenty-one American and Japanese senior business leaders attended and discussed how to readjust research and development to fit different technology needs and how to best cope with reduced defense budgets and reallocation of R&D expenditures. Kaz Kawamura also addressed the Forum to introduce Vanderbilt's Program on U.S.-Japan Technology Management. The report of the Third Forum was issued in September as U.S.-Japan Center for Technology Management publication. A copy has been mailed to AFOSR.
- A two-day seminar, "Understanding Japan: Profitable Opportunities for Tennessee Businesses" co-sponsored with the Tennessee Export Office of the State of Tennessee's Department of Economic and Community Development and the Japan External Trade Organization (JETRO) was held at the Averbuch Auditorium of Vanderbilt's Owen Graduate School of Management on May 18-19. More than 100 members of the business and academic communities participated in the seminar useful for summer researchers to Japan as well as would be Tennessee and neighboring state exporters.
- An intensive Japanese language course was held in Nashville from June 1-5. Seventeen students took part, including many of the faculty and graduate students who went to Japan as program interns. A second session on a once per week basis for five weeks commenced September 14th and has drawn 13 students from a broad cross section of university faculty.
- Professor John Bourne completed a research report entitled "Quality Tools: A Study of Japanese and Other Tools and Methods for the Improvement of Quality." This research was jointly sponsored by the U.S.-Japan Program and Northern Telecomm, Inc.

- "Paradigm for Success in a Global Environment," a symposium co-sponsored with the Air Force Institute of Technology and the National Management Association, was held at Wright-Patterson Air Force Base in Dayton Ohio on July 21. Another 100 plus audience from various commands at Wright Pat as well as a number of the local business community recruited by the NMA attended and participated in the discussions which emphasized concurrent engineering.
 - In September, Dean Edward A. Parrish of the Vanderbilt School of Engineering formally encouraged faculty participation in National Technological University's (NTU) distance education program. The U.S.-Japan Center for Technology Management is a leading supporter of NTU involvement on the Vanderbilt campus.
 - "Quality and Response Time Management," a symposium co-sponsored with Vanderbilt's Owen Graduate School of Management, will be held in Huntsville, Alabama on October 8-9 for a select number of industry and academic participants including faculty from Vanderbilt's ROTC units.
 - Professor Gautam Biswas and Program Coordinator Dona Mularkey are writing a research paper on intelligent manufacturing which will describe approaches in both the U.S. and Japan.
 - A technical Japanese course will begin in October to teach students and professionals who wish to review and read technical reports and literature.
 - A symposium, co-sponsored with the new AFOSR grantee University of New Mexico and Japan's New Energy Development Organization (NEDO), will be held in Albuquerque, New Mexico on November 2 exposing American researchers from Los Alamos and Sandia National Laboratories to the opportunities available through joint research programs with Japan, particularly in the fields of electronics and energy.
- (3) A Summer Research and Internship Mission of six Vanderbilt faculty and ten graduate students visited Japan for two to three week periods during June and August. Most of the faculty and students stayed at the Totsuka campus of Meiji Gakuin University. The Provost of Meiji Gakuin and Dr. Kawamura agreed to study further cooperative efforts between Vanderbilt and Meiji Gakuin.
- Program Director Kaz Kawamura visited several corporations, government agencies and universities to

discuss future internships and collaborative research. He also attended the Second International Conference on Strategic Research and Development Management to discuss the Vanderbilt Program. He also visited the newly-opened AFOSR office in Tokyo.

- Co-Director Jim Auer lectured to several business groups and visited with American Embassy Tokyo, MITI, Ministry of Foreign Affairs and Defense Agency officials. He also was a U.S. delegate and paper presenter at the U.S.-Japan Cultural Council (CULCON) meeting restarted this year as called for in January by President Bush and Prime Minister Miyazawa in the Tokyo Declaration.
- Program Coordinator Dona Mularkey accompanied interns to Japan and built contacts for future intern placement at various firms in Japan. She also visited Tokyo University, the Japan Patent Office, and the Intelligent Manufacturing Systems Promotion Center to study international cooperative research in intelligent manufacturing.
- Professor David Kerns, chairman of the Vanderbilt Electrical Engineering Department and director of the MT program visited Hitachi, Sony, Mitsubishi Electric, and Toshiba studying human resources management.
- Owen Graduate School of Management Professor Larry LeBlanc visited the National Institute of Science and Technology Policy and the Komatsu Corporation studying innovation in small and medium-sized companies.
- Assistant Professor of Electrical Engineering Alan Peters visited Nippon Steel Corporation studying technology management of intelligent robots.
- Professor of Management Gary Scudder visited Nippon Electric Corporation, Nippon Telephone and Telegraph, Hitachi and Sony studying new product development time.
- Master's Intern (MT) Sara Baylor visited NTT, Sony, and Hitachi with Professor Scudder continuing her research in comparing new product development time -- specifically in software development in the U.S. and in Japan. She stayed two months in Japan under a program jointly sponsored by the National Science Foundation and the Japan Science and Technology Agency.
- Master's Intern (MT) Steve Cornelius, who works for Teledyne Brown Engineering in Huntsville, Alabama, assisted Dr. Kerns in conducting research on human resources development in Japanese companies. He

conducted a series of interviews with employees and managers at Hitachi concerning training.

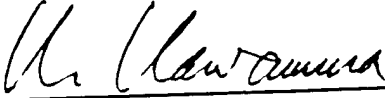
- Master's Intern (MT) Connie Flatt, a project manager for the Army Corps of Engineers, also assisted Dr. Kerns in his study of in-house training of engineers at Japanese high-tech companies.
- Electrical Engineering Senior Rudi Ernst, who assists Dr. Kawamura in his robotics laboratory, visited Nippon Steel and Bridgestone to study how Japanese companies are managing new technologies such as robot vision.
- Master's Intern (MT) and Saturn engineer Richard Lane visited Hitachi, Fanuc, Yanase and GM Japan to study robotics and manufacturing. He extended his stay on his own by several days because it was so professionally and personally rewarding. He is already planning on returning next year.
- Master's Intern (MT) Marc Mueller visited the Laboratory for International Fuzzy Engineering Research, the Omron Corporation and the Teijin Corp.
- Master's Intern (MBA) Sean O'Brien studied the integration of marketing, design and production at the Bridgestone Corporation.
- Master's Intern (MT) Robert Peerman, working with Professors LeBlanc and Nash, visited several suppliers and subcontractors at top small and medium sized Japanese manufacturing firms.
- Doctoral Intern (MT) Eugene Sanders is chief of the Aeronautical Systems Division, Director of Aerospace Flight Dynamics Test at the Arnold Engineering Development Center. He visited Mitsubishi Heavy Industries to study wind-tunnel testing methodology, facilities and related issues.

Second Year Focus - In addition to continuing the degree and non-degree program elements begun in the first year, efforts are underway to aid in the creation of a direction for future activities to be based on joint or collaborative R&D between the United States and Japan. This cooperation is visualized as emphasizing the synergistic relationship between protection of the environment and the development of advanced manufacturing technology.

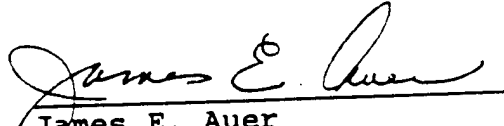
In summary, the Vanderbilt Program in U.S.-Japan Industry and Technology Management has started from almost a zero base and fostered a number of new degree and non-degree programs which have

been well received on the Vanderbilt campus and throughout the Southeast U.S. as well as in Ohio. A major concern remains about the ability to continue initiatives underway following the end of AFOSR funding in 1993. The program plans to apply for continuation of funding from AFOSR in 1993 and will pursue other efforts to achieve a self-sustaining status.

Regards,



Kazuhiko Kawamura
Director



James E. Auer
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