17th IMEC

The 17th International Machine Tool Engineers' Conference

Exploring Emerging Technologies of Manufacturing Innovation

Oral Session

November 20th (Sun.) / 21st (Mon.), 2016

Venue: Reception Hall A, Tokyo Big Sight

Poster Session

November 17th (Thu.) - 22nd (Tue.), 2016

Venue: East Hall 8, Tokyo Big Sight

Organizers:Japan Machine Tool Builders' Association, Tokyo Big Sight Inc.

On the hosting of the 17th International Machine Tool Engineers' Conference

Over many long years since the first time it was held in 1984, The International Machine Tool Engineers' Conference (IMEC) hosted by the Japan Machine Tool Builders' Association has contributed to the development of machine tool technology. This year too, we hope to draw together under a single roof technicians, researchers, users and dealers from Japan and overseas, and share the latest information on machine tool technology through oral and poster sessions.

The overall theme of the 17th IMEC will be "Exploring Emerging Technologies of Manufacturing Innovation," accompanied by a keynote session entitled "World-leading New Technology for the Future" and three further technical sessions. These three sessions will be composed of "Key Technology for Smart Factory," "Development and Applications of Advanced Composite Materials," and "New Machining Technologies for Manufacturing Process Innovation." All of the sessions have been structured so that the technical topics will be of profound interest to technicians and researchers who are involved in machine tool technology. The following is a simple introduction to each of the sessions.

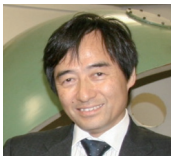
World-leading New Technology for the Future
Amidst much talk of strengthening the international competitiveness of the manufacturing sector, a great deal of attention is being paid to Japanese automobile technology, high-speed railway technology and outer space development technologies, all of which Japan leads the world in. This session will feature introductions given by renowned specialists in their fields about linking new technology to the future through the latest in internal combustion engines, Shinkansen technology and future space development.

Key Technology for Smart Factory
In recent years the manufacturing industry has witnessed the dramatic progress of digitization and networking typified by Industrie 4.0 and the Internet of Things (IoT), and the manufacturing environment including that of machine tools is in a state of huge changes. This session will report on the latest research results and elemental technologies regarding machine tool technology, present concrete examples, and introduced the future trends for a wide spectrum of industrial sectors inside and outside Japan.

Development and Applications of Advanced Composite Materials
The demands of customers regarding the functions and structures of machine tool are becoming increasingly sophisticated. One of the key technologies essential in thoroughly improving the performance of machine tools is application technologies for structural materials. This session will introduce the latest research and development into composite materials, energy-saving manufacturing processes, and research results, usage case studies and future issues from materials features to a wide range of industrial applications.

New Machining Technologies for Manufacturing Process Innovation
In order to construct the manufacturing environment of the future, it will be essential to create new processing techniques and the machine tools that will make a reality of them. This session will feature reports on processing simulations to enable the optimization of processing, composite processing technologies for processing-resistant materials, additive manufacturing, and research results regarding new machine tools, as well as elemental technologies relevant to these areas.

We expect the 17th IMEC to provide a forum where lively exchanges of information will take place between all the participants, the oral session presenters and poster session presenters, and also hope that the Conference will lead to the further progress of the manufacturing industry.



Hidenori SHINNO, Prof. Dr.
Chairman of Organizing Committee of 17th IMEC, JMTBA
Laboratory for Future Interdisciplinary Research of Science and Technology
Tokyo Institute of Technology

Outline

Name

The 17th International Machine Tool Engineers' Conference (IMEC)

Aim

IMEC is the international conference led by the industrialists. This conference aims at promoting level up of worldwide machine tool engineering by information exchange with participation of worldwide researchers, engineers, users and dealers related with machine tool.

Structure

Two sessions of the 17th IMEC are as follows:
The first one is oral session for real example and the trend of engineering development in the industry, using technique by the users and the topics having special attention;
The second one is poster session widely announcing the results of advanced research and development on machine tool by poster format.

Organizers

Japan Machine Tool Builders' Association, Tokyo Big Sight Inc.

Supporting Organizations

■ Overseas
euspen (European Society for Precision Engineering and Nanotechnology)
KSMTE (Korean Society of Manufacturing Technology Engineers)

■ Domestics
The Japan Society of Mechanical Engineers, The Japan Society for Precision Engineering, The Japan Society for Abrasive Technology, The Robotics Society of Japan, The Institute of Electrical Engineers of Japan, The Institute of Electronics, Information and Communication Engineers, Japan Welding Society, The Society of Instrument and Control Engineers, SME Tokyo Chapter, Machine Tool Engineering Foundation, Japan Society for the Promotion of Machine Industry, Advanced Machining Technology & Development Association, Machine Tool & Related Products Committee*, Japan Forming Machinery Association, The Japan Machinery Federation, Japan Machine Tool Importers' Association, Japan Die&Mold Industry Association, The Japan Society for Die and Mould Technology, Japan Foundry Society, Inc., The Society of Japanese Aerospace Companies, Japan Auto Parts Industries Association, Society of Automotive Engineers of Japan, Inc., Japan Management Association, The Japan Electrical Manufacturers' Association, The Japan Society Of Industrial Machinery Manufacturers, The Japan Bearing Industry Association, Japan Robot Association, The Japan Welding Engineering Society

***Machine Tool & Related Products Committee**
Japan Machine Accessory Association, Japan Precision Machine Association,
Japan Gear Manufacturers Association, Japan Fluid Power Association
Japan Grinding Wheel Association, Japan Cutting & Wear-resistant Tool Association
Industrial Diamond Association of Japan, Japan Precision Measuring Instruments Manufacturers Association,
Japan Optical Measuring Instruments Manufacturers' Association, Japan Testing Machinery Association

Organizing Committee

Chairperson	Prof. Dr. Hidenori SHINNO, Tokyo Institute of Technology
Co-Chairperson	Prof. Dr. Tojiro AOYAMA, Keio University
	Mr. Tetsuro Shibukawa, Chubu University.
Co-Organizer	Prof. Dr. Mamoru MITSUISHI, The University of Tokyo
	Dr. Atsushi IEKI, Okuma Corp.
Members	Prof. Dr. Masanori KUNIEDA, The University of Tokyo
	Prof. Dr. Tsunemoto KURIYAGAWA, Tohoku University
	Prof. Dr. Keiichi SHIRASE, Kobe University
	Prof. Dr. Atsushi MATSUBARA, Kyoto University
	Prof. Dr. Takashi MATSUMURA, Tokyo Denki University
	Prof. Dr. Hiroyuki SASAHARA, Tokyo University of Agriculture & Technology
	Ms. Masako SUDO, FANUC Ltd.
	Mr. Yoshio WAKAZONO, JTEKT Corp.
	Mr. Norio MORI, Makino Milling Machine Co., Ltd.
	Mr. Koichi AMAYA, Matsuura Machinery Corp.
	Mr. Akihiro SAGO, Mitsubishi Heavy Industries Machine Tool Co., Ltd.
	Dr. Makoto FUJISHIMA, DMG MORI SEIKI Co., Ltd.
	Mr. Takashi SAWAZAKI, Sodick Co., Ltd.
	Mr. Atsuhi TADA, Toshiba Machine Co., Ltd.
	Mr. Yasuhiko SUZUKI, Yamazaki Mazak Corp.
Advisors	Emeritus Prof. Hisayoshi SATO, The University of Tokyo
	Emeritus Prof. Yoshimi ITO, Tokyo Institute of Technology
	Emeritus Prof. Toshimichi MORIWAKI, Kobe University
	Emeritus Prof. Shinji SHIMIZU, Sophia University

Overseas Advisors

Prof. Christian Brecher, WZL RWTH Aachen (Germany)
Prof. Ekkard Brinksmeier, University of Bremen (Germany)
Prof. Erhan Budak, Sabanci University (Turkey)
Prof. Berend Denkena, Leibniz University of Hannover (Germany)
Prof. Fritz Klocke, WZL RWTH Aachen (Germany)
Dr. Wolfgang Knapp, Engineering Office Dr. W. Knapp (Switzerland)
Prof. Bert Lauwers, K. U. Leuven (Belgium)
Prof. Jun NI, University of Michigan-Ann Arbor (U.S.A.)
Prof. Mustafizur Rahman, National University of Singapore (Singapore)
Prof. Alexander Verl, University of Stuttgart (Germany)
Dr. Jwu-Sheng Hu, Industrial Technology Research Institute (Taiwan)
Prof. Kazuo Yamazaki, University of California-Berkeley (U.S.A.)

Overseas Committee Members

Mr. Richard L. Simons, Chairman, AMT (U.S.A.)
Mr. Shane Infanti, Chief Executive Officer, AMTIL (Australia)
Mr. Luigi Galdabini, President, CECIMO (Europe)
Mr. Chen Huiren, President & CEO, CMTBA (China)
Mr. Parakramsinh G. Jadeja, President, IMTMA (India)
Mr. Jong-Hyeon Shon, Chairman, KOMMA (Korea)
Mr. Michael Hauser, President, SWISS MEM (Switzerland)
Mr. Alex Ko, Chairman, TAMI (Taiwan)
Mr. Massimo Carboniero, President, UCIMU (Italy)
Dr. Heinz-Jürgen Prokop, Chairman, VDW (Germany)

I. Oral Session

Oral session conducts productive discussions among participants, also mainly consists of the speech for the results of advanced research and development on machine tools in the world to aim at innovative advancement of the machine tool in the future.
This time, Oral session is held under the theme "Exploring Emerging Technologies of Manufacturing Innovation".
*Official languages: English and Japanese (with simultaneous interpretation service)

Date	November 20th (Sun.) - 21st (Mon.), 2016
Venue	Reception Hall A (Ground floor), Tokyo Big Sight
Maximum Number of Participants	300 (on a first come, first served basis.)
Main Theme	Exploring Emerging Technologies of Manufacturing Innovation Keynote Theme: World-leading New Technology for the Future Technical Theme 1: Key Technology for Smart Factory Technical Theme 2: Development and Applications of Advanced Composite Materials Technical Theme 3: New Machining Technologies for Manufacturing Process Innovation

Registration Fee : 10,000 Yen for One day, 20,000 Yen for Two days, per person (including tax)
"Proceedings" Fee is separately, 10,000 yen (including tax)

Deadline for Application : November 4th (Fri.), 2016

Method for Registration :

1: Please access and apply to the IMEC Website (http://www.jmtba.or.jp/english/events/1543) for registration or Please fill out the attached application form and send to Secretary of IMEC by Telefax or E-mail.
2: Payment (through a bank transfer) is due upon receipt of invoice.
3: To notify of the completion of registration, you will receive a "Registration Card"
4: Please submit the "Registration Card" to the registration desk on the day of IMEC.

Conference Secretary :

Secretary of IMEC, Technical Department,
Japan Machine Tool Builders' Association (JMTBA)
3-5-8, Shibakoen, Minato-ku, Tokyo 105-0011, Japan
Tel: +81-3-3434-3961 Fax: +81-3-3434-3763
E-Mail: IMEC17@jmtba.or.jp URL : http://www.jmtba.or.jp/english/events/1543

Cancellations :

If you want to cancel your registration, please inform the Secretary of IMEC immediately in writing for refund of the registration fee. The cancellation will be processed based on the date when your cancellation notice is received after Nov. 4.
All refunds will be made after the conference.

(date received)	(rate of refund)
on and before Nov. 11	·····50%
after Nov. 12	·····0%

Program for Oral Session Day1: November 20th, 2016 (Sun.)

09:10 ~ 09:20	**Opening Address** Mr. Yoshimaro Hanaki, Chairperson of Japan Machine Tool Builders' Association Prof. Dr. Hidenori Shinno, Chairperson of IMEC Organizing Committee
Keynote Session	**World-leading New Technology for the Future** Chairperson: Prof. Dr. Hidenori Shino, Tokyo Institute of Technology Co-Chairperson : Mr. Tetsuro Shibukawa, Chubu University
09:20 ~ 09:30	Chairperson's Address
09:30 ~ 10:20	Keynote Speech : **Forefront of Internal-combustion engine development** Mr. Mitsuo Hitomi, Managing Executive Officer, Mazda Motor Corporation (Japan)
10:20 ~ 10:40	Coffee Break
10:40 ~ 11:30	Keynote Speech : **Innovative Technologies in Tokaido Shinkansen during 50 years(safety and evolution)** Dr. Masaki Seki, President, Futaba Railways Industries co.,Ltd. (Japan)
11:30 ~ 12:20	Keynote Speech : **Solar System enabled through Round Voyage Technology** Dr. Junichiro Kawaguchi, Professor, Senior Fellow, Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency (JAXA) (Japan)
12:20 ~ 12:30	Q & A for Keynote session
12:30 ~ 12:45	Awards ceremony for the Poster Session
12:45 ~ 13:30	Lunch Break
Technical Session 1	**Key Technology for Smart Factory** Chairperson: Prof. Dr. Tojiro Aoyama, Keio University Co-Chairperson: Ms. Masako Sudo, FANUC Ltd.
13:30 ~ 13:40	Chairperson's Address
13:40 ~ 14:30	Keynote Speech : **Networked Production – Challenges and Potentials for Manufacturing** Prof. Fritz Klocke, Fraunhofer IPT and WZL RWTH Aachen (Germany)
14:30 ~ 15:15	Speech : **Platform for smart factory with IoT technology and activities with CNC and Robots** Mr. Hiroshi Noda, FA Business Division Vice General Manager, Fanuc Corporation (Japan)
15:15 ~ 15:35	Coffee Break
15:35 ~ 16:20	Speech : **Machine Tool 4.0** Dr. Makoto Fujishima, Senior Executive Officer, Manufacturing/Development /Quality HQ, In charge of Electrical Circuit/Control, DMG MORI SEIKI Co.,Ltd. (Japan)
16:20 ~ 17:05	Speech : **Trends and Directions in the Internet of Things and Industrial Internet** Mr. Sky Matthews, Watson IoT Division, IBM (U. S. A.)
17:05 ~ 17:15	Q & A for Technical Session 1

Program for Oral Session Day2: November 21st, 2016 (Mon.)

Technical Session 2

Development and Applications of Advanced Composite Materials

Chairperson: Prof. Dr. Mamoru Mitsuishi, The University of Tokyo
Co-Chairperson: Mr. Yasuhiko SUZUKI, Yamazaki Mazak Corp.

09:00 ~ 09:10	Chairperson's Address
09:10 ~ 10:00	**Keynote Speech :** Innovation of Carbon Fiber Production Process and Application to Industrial Products Prof. Kazuro Kageyama, Department of Technology Management for Innovation, School of Engineering, University of Tokyo (Japan)
10:00 ~ 10:45	**Speech :** The latest developments of the CFRP technology Prof. Yuji Kageyama, Graduate School of Engineering, Kanazawa Institute of Technology (Japan)
10:45 ~ 11:05	Coffee Break
11:05 ~ 11:50	**Speech :** The feature of the CFRTP「CABKOMA」and the application fields. Mr. Teruhiro Okuya, Director of R&D Dept., KOMATSU SEIREN Co.,Ltd. (Japan)
11:50 ~ 12:35	**Speech :** The automation technology of trimming and drilling processes for aircraft CFRP parts Mr. Haruhiko Kakimoto Manager, Metallic Section, Production Engineering Department, ShinMaywa Industries, Ltd. Aircraft Division (Japan)
12:35 ~ 12:45	Q & A for Technical Session 2
12:45 ~ 13:45	Lunch Break

Technical Session 3

New Machining Technologies for Manufacturing Process Innovation

Chairperson: Prof. Dr. Takashi Matsumura, Tokyo Denki University
Co-Chairperson: Mr. Yoshio Wakazono, JTEKT Corp.

13:45 ~ 13:55	Chairperson's Address
13:55 ~ 14:45	**Keynote Speech :** The Application of a Technological Milling Simulation to the Manufacturing of Titanium Aircraft Structural Parts Dr. Tobias Surmann, NC-Programming Division, Premium AEROTEC. (Germany)
14:45 ~ 15:30	**Speech :** Blue Arc™ Technology and the Machine Tool Characteristics for Successful Implementation Mr. Michael Petracci, Ventures Licensing Division, GE (U. S. A.)
15:30 ~ 15:50	Coffee Break
15:50 ~ 16:35	**Speech :** Additive Manufacturing in Aerospace Mr. Paolo Gennaro, Strategy and Product Leadership Division, GE Avio S.r.l (Italy)
16:35 ~ 17:20	**Speech :** Gear cutting technology by universal machine tools that gear skiving function is added Mr. Hiroyuki Nakano, Office Manager, Machining & Process Engineering Office, Machine Tools &Mechatronics Engineering Dept., JTEKT Corporation (Japan)
17:20 ~ 17:30	Q & A for Technical Session 3

Abstract of Speech

Keynote Session Exploring Emerging Technologies of Manufacturing Innovation

Keynote Speech : "Forefront of Internal-combustion engine development"

Mr. Mitsuo Hitomi, Managing Executive Officer, Mazda Motor Corporation (Japan)

Mazda has been developing the internal-combustion engine in line with the improvement road map we drew. The purpose of this speech is to explain the technical essence of SKYACTIV GE and DE which are the 1st commercialized engines produced from the development, and also to encourage a correct understanding of the engine by presenting a view of the currently widespread downsizing turbo and the engine displacement. Secondly, I will explain how much improvement we expect as a goal of the road map to demonstrate that we will achieve the EV level well-to-wheel CO2.
Finally, I will present a problem by introducing our case study results which shows what needs to be done to significantly reduce the CO2 by electricity.

Keynote Speech : "Innovative Technologies in Tokaido Shinkansen during 50 years (safety and evolution)"

Dr. Masaki Seki, President, Futaba Railways Industries co.,Ltd. (Japan)

In October 2014, the Tokaido Shinkansen marked its 50th anniversary of service since its commencement as the world's first high speed rail. It has transport an astonishing 5.8 billion passengers safely, stably, punctually, comfortably and rapidly since its start. The market area connecting 3 major cities of Tokyo, Nagoya and Osaka, which covers 60 % of Japan's population and GDP, has played a vital role in developing Japanese economy and culture. The innovations of the Tokaido Shinkansen are based on several technological developments. Safety and punctualities are supported by such as Automatic Train Control system for crash avoidance, seismic reinforcements and derail protection as earthquake countermeasures, maintenance and life extension of structures supporting trains, etc. The weight reduction technologies of cars are indispensable for speed advancement. Cruising control technologies such as a body inclining system improve comfort to ride. High frequent time table for mass transportation of 410 thousand passengers every day was achieved by accumulation of continuous improvement. Development and adoption of low energy type rolling stock make the Shinkansen a further greener transportation mode. The superconductive maglev train system will play an important role in future transportation of Japan. This lecture introduces these innovative technologies.

Keynote Speech : "Solar System enabled through Round Voyage Technology"

Dr. Junichiro Kawaguchi, Professor, Senior Fellow, Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency (JAXA) (Japan)

The space development started in 1950s, and has been performed for sixty years by now. And it made even human access to the other celestial body, the moon.
The human has now opened the door to the other world and we have plunged into the another Age of Discovery in solar system scale. Human will exploit the new voyage routes to the planets and asteroids, and try to utilize resources in the solar system. There will appear a new space infra-structure, the Deep Space Port constructed at the Sun-Earth Lagrange points, L1 or L2. It will serve as a traffic relay port function connecting the commuter transports from the ground with round trip voyager ships propelled by nuclear power to asteroids belts for potential mines. It also serves as a dwelling facility including refining works, docks and yards with laboratories. The Deep Space Port is a kind of city on orbit.
How such future age happens and what technology enables them. The talk will also emphasize the significance of the space exploration that has ushered the space development so far, and will convey the exploration spirit to the next generation, so that they can advance and extend the space development in future.

Technical Session 1

Key Technology for Smart Factory

Keynote Speech : "Networked Production – Challenges and Potentials for Manufacturing"

Prof. Fritz Klocke, Fraunhofer IPT and WZL RWTH Aachen (Germany)

Digitization and industrial networks are becoming more and more popular in manufacturing. The initiative is driven by industry and science in equal measure. In Germany this campaign is known under the synonym Industrie4.0. The initiative is focused on a consequent networking of all industrial business activities along the value chain. If this will be realized to a high degree production processes change essentially. Therefore Industrie 4.0 actions should be discussed in this whole constitution framework. Nevertheless this presentation will only put focus on actions, which can be carried out on the shop floor. This includes modelling, sensors, and process strategies. Men-machine interfaces do help to include rule based experience knowledge. Technology applications (Tech Apps) might be a new feature to provide added value to the customer. It is less a question of whether the manufacturing industry can utilize the opportunities arising, but rather the statement: Industrie 4.0 offers a lot of opportunities which can be utilized to develop unique market positions.

Speech : "Platform for smart factory with IoT technology and activities with CNC and Robots"

Mr. Hiroshi Noda, FA Business Division Vice General Manager, Fanuc Corporation (Japan)

It is said that IoT technology will lead to a great improvement of production, that is a Smart factory, by collecting and analyzing the huge information from the machine tools, robots, peripherals, sensors, and operators. This vision requires the collaboration between the devices including operator (Edge) and factory network with information processing capacity in which the information is concentrated (Fog). Information from the factory is huge and based on real-time, that is why calculation on Fog is more important rather than that on Cloud in the field of production.
The key points are 1) The method to handle the huge data, such as Deep Learning, 2) Safety and high speed network, and 3) Open platform on which the knowledge of many engineers and operators can be installed. CNC and Robots collaborate aggressively with such a platform and realize a new type of function, control, and operation.
This paper describes FIELD system (FANUC Intelligent Edge Link & Drive system) which is the OPEN Platform for smart factory with IoT technology, and introduces the activities as an application of CNC and Robots.

Speech : "Machine Tool 4.0"

Dr. Makoto Fujishima, Senior Executive Officer, Manufacturing/Development /Quality HQ, In charge of Electrical Circuit/Control, DMG MORI SEIKI Co.,Ltd. (Japan)

For the R&D of machine tools, machining methods have been led mainly by machine tool technologies of 5-axis machining centers, multi-machining centers, and others using these machines,however, technology developments in recent years are shifting its focus to system technologies such as IoT and Industry 4.0, and new machining technologies like additive manufacturing, and combine machines, peripherals, control technologies, and applications. In this "Machine Tool 4.0" seminar, the speaker will address how an application can achieve highly efficient machine tooling to drastically reduce machine downtime via industrial Internet and sensing technologies for remote monitoring, remote maintenance, prevention and predictive maintenance.

Speech : "Trends and Directions in the Internet of Things and Industrial Internet"

Mr. Sky Matthews, Watson IoT Division, IBM (U. S. A.)

This session will cover current activities and directions for the Internet of Things (IoT), and compare IoT to the Industrial Internet. I will cover the key activities of the various industry standards and consortiums, such as Industrial Internet Consortium (IIC) and Industrie 4.0. I will also illustrate the key technologies enabling IoT using specific examples of organizations implementing the Industrial Internet and IoT across different industries. IoT and Industrial Internet are projected to enter in to a phase of hyper growth, and we will cover the emerging and future trends driving this growth, and discuss how these trends will impact the manufacturing sector.

Abstract of Speech

Technical Session 2 Development and Applications of Advanced Composite Materials

Keynote Speech : "Innovation of Carbon Fiber Production Process and Application to Industrial Products"

Prof. Kazuro Kageyama, Department of Technology Management for Innovation, School of Engineering, University of Tokyo (Japan)

Carbon fiber is thermally and chemically very stable, lightweight and has excellent mechanical property. It is expanding in various industrial applications, but world supply of carbon fiber in 2015 is only 50,000 tons. It is necessary to increase capacity of carbon fiber production in order to meet the expanding demand. Now, all of PAN based carbon fiber is produced by Shindo process. Shindo process produces excellent performance carbon fiber but has limitation to cost and mass production. Post Shindo process should be introduced to carbon fiber industry for supplying mass productive and eco-friendly carbon fiber products. A Japanese national R&D project started in 2011, and energy saving and high productivity production method for carbon fiber has been developed. Key technologies are new precursor polymer fiber not requiring oxidization, carbonization technology using microwave energy, and plasma surface treatment technology. Future of the innovative carbon fiber and composites and its possibilities in the industrial applications are discussed in this paper.

Speech : "The latest developments of the CFRP technology"

Prof. Yuji Kageyama, Graduate School of Engineering, Kanazawa Institute of Technology (Japan)

Recently, CFRP (Carbon Fiber Reinforced Plastics), which has been established in the aerospace and sports and leisure industry has come to be noted as materials for automotive. Not only lightweight, CFRP unique characteristics such as dimensional stability CO2 measures and safety (increase in the critical speed of rotation, running stability, etc.), are thought to be need increasing in the future. In addition, a number of mass-production molding methods has been researched and developed instead of the AC (Autoclave) molding.
In this lecture I will introduce the adoption situation and future challenges of CFRP for automotive and other industries. In addition, regarding the issues that should be noted in the case of adopting the CFRP to the machine tool, I would like to discuss from the point of view of the importance of the matrix resin of CFRP.

Speech : "The feature of the CFRTP「CABKOMA」and the application fields."

Mr. Teruhiro Okuya, Director of R&D Dept., KOMATSU SEIREN Co.,Ltd. (Japan)

The carbon fiber is suitable for mobility because it's light-weight and strong. But, a major company precedes this field. We begin to develop a wire, building materials and the civil engineering by its does not rust.
It's developed by the thermoplastic material which can be transformed once again because many enterprises were working on CFRP already.
Exactly, Ishikawa-pref. was the system to support development of CFRTP. After that ICC and a COI base install in a prefecture in KIT university. It was adopted by an Local Creation, and it was the system that development by all Japan system can be promoted.
The feature of "CABKOMA" and the application field are introduced today.

Speech : "The automation technology of trimming and drilling processes for aircraft CFRP parts"

Mr. Haruhiko Kakimoto Manager, Metallic Section, Production Engineering Department, ShinMaywa Industries, Ltd. Aircraft Division (Japan)

For aircraft manufacturing, aluminum alloys were used for main structure material. However, the recent development of Composite material, such as CFRP and GFRP, can contribute to weight reduction of airframe structures, resulting in an increase in its usage (or application). Focusing on composite parts manufacturing for aircraft, manual operation was main manner for layup, trimming and drilling because of limited applications. Recently, automated technology has been urging into composite parts manufacturing. This report will introduce the automation technologies for trimming and drilling processes on aircraft CFRP parts.

Technical Session 3 New Machining Technologies for Manufacturing Process Innovation

Keynote Speech : "The Application of a Technological Milling Simulation to the Manufacturing of Titanium Aircraft Structural Parts"

Dr. Tobias Surmann, NC-Programming Division, Premium AEROTEC. (Germany)

High cost pressure in the aircraft industry demand for a machining at the border of process reliability. Because of complex shapes of modern integral components it cannot be intuitively predicted, where this border is exceeded. Purely geometric milling simulations which help to avoid collisions and to validate the NC-code cannot be utilized to analyze problems which result from forces and process dynamics. Therefore, technological machining simulations which are capable of computing process forces and tool vibrations along arbitrary NC-programs are needed.
The challenge for such a milling simulation is to be capable of computing process forces and tool deflections or vibrations respectively even for very large parts at a high accuracy. Even if it is not possible to predict every surface artifact in advance, such a simulation can help to analyze errors and give advice on how to correct them. This reduces the number of quality inspections for new parts until they reach their final production state.
A further big opportunity of a milling simulation is also the active optimization of NC-programs. Especially the very time consuming machining of titanium can be accelerated by adjusting the NC-program itself in a way that each cut is performed with the ideal cutting parameters i. e. slightly beneath the border of process reliability, but never above. This paper will deal with the milling simulation system NCChip which was further developed into a mighty tool for the industrial usage and it will show examples of its successful employments in the aircraft industry.

Speech : "Blue Arc™ Technology and the Machine Tool Characteristics for Successful Implementation"

Mr. Michael Petracci, Ventures Licensing Division, GE (U. S. A.)

The most revolutionary new machining process officially unveiled this year for cutting tough super alloy materials is GE' s Blue Arc™ technology. Mitsui Seiki, GE' s machine tool partner in the development of this exciting new roughing technology, introduced us to the high-speed electro erosion (HSEE) technology two years ago at IMTS 2014. At IMEC 2016, Mike Petracci will bring us up to date with regard to how manufacturers can now integrate Blue Arc into their operations, the benefits of Blue Arc in a production environment, and its applications -- particularly in aerospace structures, jet engine components, and power generation parts.
Mr. Petracci will share specific examples of how certain nickel-based super alloy and titanium alloy components are being made in a fraction of the conventional milling time and with less stress from a single piece of metal. He will show exactly how and why cutting tool costs are significantly saved. He will describe the requirement to use a less heavy-duty machine tool with a smaller footprint that also wastes less material and generates a much smaller amount of dust and contaminants in the air. In addition to saving time and capital equipment costs, Blue Arc also saves electricity; plant energy usage is reduced.
Mr. Petracci will also review the details of the Blue Arc process itself and how it works. Fundamentally, Blue Arc is a controlled thermal metal removal method driven by an electrical potential between a tool electrode and a workpiece. Each thermal event results in bulk material removal.

Speech : "Additive Manufacturing in Aerospace"

Mr. Paolo Gennaro, Strategy and Product Leadership Division, GE Avio S.r.l (Italy)

Users of additive manufacturing are increasingly applying the technology for production applications rather than simple prototypes. This change is driving the supply chain to respond, resulting in the delivery of greater competiveness, quality, standardization, and innovation. Mr. Gennaro will look at how these changes are affecting the supply chain and how AvioAero is working to meet current and future needs. One of the world's most challenging applications is the production of turbine blades made in titanium aluminide (TiAl) for jet engines.

Speech : "Gear cutting technology by universal machine tools that gear skiving function is added"

Mr. Hiroyuki Nakano, Office Manager, Machining & Process Engineering Office, Machine Tools & Mechatronics Engineering Dept., JTEKT Corporation (Japan)

Gears are an important machine element and used in many products. However, special purpose machines are mainly used as manufacturing equipment and high quantity production that requires heavy equipment investment is presupposed. Recently a new competitive production system including gears that can respond to changes is required for Monozukuri in Japan due to diversification of customer needs and various environmental changes.
In this lecture, I introduce two contents. First content is the gear skiving method as the latest gear cutting method. Second content is an elemental technology and machining examples of gear skiving center GS300H/GS700H that were developed to implement the skiving method.
Generally gear portion often needs machining at datum level, deburring and boring in addition to gear cutting. And manufacturing a product requires various machines.
Then, gear portion can be machined through integrated processes by adding the gear skiving function to universal machine tools. And offering flexibility and allowing lower cost of manufacturing gears can be implemented.

Ⅱ. Poster Session

Poster session conducts discussions and technical exchange among researchers and engineers of machine tools by widely announcing the results of advanced research and development on machine tool from universities, technical colleges, public laboratories by poster format. In this session, all visitors of JIMTOF have an opportunity to discuss directly with presenter of poster session.
Briefing Assistants of each exhibitor shall provide explanations about research contents on 1 to 4 pm, November 19 and 20, 2016.

Period Six days from November 17th (Thu.) through 22nd (Tue.), 2016,

Venue East Hall 8, Tokyo Big Sight

Participants The participants shall be limited to the teaching staff members and researchers of universities, technical college, public laboratories, etc.

Applicable theme for the poster session:

Research and development themes in the area as follows:

- Machine tool and elements (design procedure, thermal deformation, structural analysis, spindle design, feed drive system design, etc.)
- Machining technologies and machining phenomena (cutting, grinding, special machining, Additive Manufacturing, micro machining, chattering, etc.)
- System and control technology (CNC, CAM, Intelligent System, etc.)
- Tools, Tooling System for machine tools (Tools, Accessories, etc.)
- Measuring and evaluation technology (surface condition, configuration, performance evaluation technology, accuracy evaluation, monitoring technology, sensor technology, etc.)
- Production system and their components (FMS, Robotic Cell and technology related with FA)
- Other technology related with Machine tools

Briefing Assistants:

Briefing Assistants of each exhibitor shall provide explanations about research contents on 1 to 4 pm, November 19th and 20th, 2016.

Conference Secretary:

Secretary of IMEC, Technical Department, Japan Machine Tool Builders' Association (JMTBA)
3-5-8, Shibakoen, Minato-ku, Tokyo 105-0011, Japan
Tel: +81-3-3434-3961 Fax: +81-3-3434-3763
E-Mail: IMEC17@jmtba.or.jp URL : http://www.jmtba.or.jp/english/events/1543

List of Participants and Research Theme

A. Machine tool and elements

- **Mitsuishi Sugita Laboratory, Department of Mechanical Engineering, School of Engineering, The University of Tokyo**
  Design of the CFRP-elastomer composite of high stiffness and damping capability
- **Moronuki Lab., Tokyo Metropolitan University**
  Surface Functionalization through Micro-structuring and Material Deposition
- **Suwa Research Group, Setsunan University**
  Estimating Power Consumption in Machine Tools Based on Specific Energy Consumption
- **Mosan's laboratory, Kanazawa Institute of Technology, Graduate School of Engineering, Graduate Program in Mechanical Engineering.**
  Development and performance evaluation of desktop machine tool with CFRP pipe frame
- **Precision Measurement and Manufacturing Laboratory, Dept. of Micro Engineering, Kyoto University**
  Evaluation of Position and Direction Dependencies of Machine Tool Stiffness
- **Precision Machining, Mechanical Systems Engineering, National Defense Academy**
  Study on wheel cover safety for grinding machines
- **Murayama Lab., Department of Mechanical Engineering, Tokai University**
  A study of a small NC machine for the construction of "Tabletop Size of the Factory"
- **Shinno-Yoshioka Group, FIRST, Tokyo Institute of Technology**
  Tool servo system driven by giant magnetostrictive element for milling process
- **Ultra-Precision Machine System Laboratory, Department of Mechanical Engineering, Kanagawa University.**
  Study on thermal stability of water hydrostatic spindle

B. Machining technologies and machining phenomena

- **Sasahara lab., Tokyo University of Agriculture and Technology**
  A newly developed woven metal wire tool with electrodeposited diamond grains and its application in CFRP core drilling
- **Sasahara lab., Tokyo University of Agriculture and Technology**
  Wire and arc-based additive manufacturing -Fabricating high specific strength component and cooperative system for additive manufacturing with machining-
- **Kunieda Laboratory., Department of Precision Engineering, The University of Tokyo**
  The Simulation of Electrochemical Machining Process
- **Kunieda Laboratory., Department of Precision Engineering, The University of Tokyo**
  Micro Electrochemical Machining
- **Natsu Lab, Graduate School of Engineering, Tokyo University of Agriculture and Technology**
  Electrochemical Machining with Application of Electrolyte Suction Tool
- **Natsu Lab, Graduate School of Engineering, Tokyo University of Agriculture and Technology**
  Influence of Machining Conditions on ECM Equivalent Circuit's Parameters
- **Tsuchiya lab. Institute of Industrial Science, University of Tokyo**
  Mirror polishing of pearskin surface using double-layer fixed abrasive tool
- **Adachi Lab., Dept. Mechanical Engineering, Chubu University**
  Deep hole internal grinding technology using novel internal grinding spindle with a large length-to-diameter ratio
- **Precision Engineering Lab. Osaka Institute of Technology**
  Research on the Surface Properties by Turn-milling Process
- **Kuriyagawa, Shimada & Xu Lab./ Mizutani Lab, Department of Mechanical Systems Engineering, Graduate School of Engineering, Tohoku University**
  Fabrication of micropatterns by ultra-precision cutting

■ **Manufacturing Process Laboratory, Tokyo Denki University**
Micro machinings of thin wires

■ **Manufacturing Process Laboratory, Tokyo Denki University**
Cutting simulation in drilling of CFRP/Ti alloy stacks

■ **Takeuchi Laboratory, Chubu University Department of Mechanical Engineering**
5-Axis Control Finishing Suppressing Tool Wear

■ **Takeuchi Laboratory, Chubu University Department of Mechanical Engineering**
Dexterous Machining of Unstable Thin Plate

■ **Enomoto Lab., Department of Mechanical Engineering,, Osaka University**
Development of CBN cutting tool with textured flank face for high-speed machining of Inconel 718

■ **TANABE Labo., Nagaoka University of Technology**
Forced Cooling Using Strong Alkaline Water

■ **Precision Machining and Mechanism Lab., Nagaoka University of Technology**
Precise machining technique aided by ultrasonic oscillation for difficult-to-cut materials

■ **Nano precision manufacturing laboratory, Department of mechanical engineering, School of engineering, Tokyo Denki University**
Nano precision technology for ultrahigh precision optics manufacturing

■ **Innovation Center for Production Engineering, Chubu University**
Texturing of Ti Surface for Dental Implant

■ **Innovation Center for Production Engineering, Chubu University**
Surface topography and dielectric properties of polished PMN-PT single crystals

■ **Manufacturing process and functionality assessment lab., Sophia University.**
Development of a novel shell shaping method with CFRTP

■ **Precision Engineering Laboratory, Sophia University**
Simulation method of ground surface roughness based on working surface profile of grinding wheel

■ **Nontraditional Machining Laboratory, Graduate School of Natural Science and Technology, Okayama University**
Development of Curved Hole Drilling Method by EDM with Suspended Ball Electrode

■ **Laboratory for Precision Machining and Nano Processing (PMNP Lab), Faculty of Science and Technology, Keio University**
Fabrication of infrared microlens array by ultraprecision diamond turning of single-crystal silicon

■ **Laboratory for Precision Machining and Nano Processing (PMNP Lab), Faculty of Science and Technology, Keio University**
Three-dimensional micro-structure fabrication of PCD by micro- EDM utilizing interfacial carbon diffusion

■ **Manufacturing Systems Laboratory, Faculty of Mechanical Engineering, Institute of Science and Engineering, Kanazawa University**
Reduction of sputtering and thermal deformation in selective laser melting

■ **Sakai- Shizuka laboratory, Department of Engineering, Shizuoka University**
Development of High productivity Cutting Technique by using Nitrogen Atmosphere

■ **Cats laboratory, Graduate school of Engineering, Chiba University**
Estimation of fracture surface pattern of glass sheet during wheel cleaving using high-speed polarization measurement

■ **Manufacturing Engineering Lab., Graduate School of Natural Science and Technology, Okayama University**
High Quality and High Efficiency Dry Grinding of CFRP Using Dry Ice Particle Blasting

■ **Manufacturing Engineering Lab., Graduate School of Natural Science and Technology, Okayama University**
Development of an intelligent grinding system considering thermal deformation of the workpiece during grinding process

■ **Kakinuma Lab., Dept. of System Design Engineering, Keio University**
Ultra-precision machining of optical materials

■ **Yoshioka Group, School of Engineering, Tokyo Institute of Technology**
Titanium Coloring Machining by Laser Irradiation

■ **Ishida & Mizobuchi Laboratory, Tokushima University**
Through-Hole Drilling of Quartz Glass Plate by Cavitation Aided Ultrasonic Vibration using Electroplated Diamond Tool with Straight Face Port

■ **Goto Lab., Faculty of Science and Technology, Department of Mechanical Engineering**
Electrochemical Machining of Sintered Carbide

■ **Itoh Lab., College of engineering, Ibaraki University**
Fabrication of Hybrid Structure Grinding Wheel Using PELID and 3D Printer

■ **Dr. Jun Shinozuka Laboratory, Department of Mechanical Engineering, Yokohama National University**
Influence of the tool-chip friction property on high-speed cutting mechanism

■ **Ogawa Laboratory, Faculty of Science and Technology, Ryukoku University**
Shape formation after laser hardening for high precision microcutting edge

■ **Ninomiya Laboratory, Department of MECHANICAL Engineering, Nippon Institute of Technology**
Machining of cemented carbide by combined use of EDM and grinding with a rotary PCD segment tool

■ **OONO Laboratory, School of Science and Engineering, Teikyo University**
A fracture free cutting for the freeform machining by the edge serrated tools

■ **Photonics for Material Processing Lab., The Graduate School for the Creation of New Photonics Industries**
Development of PCD micro end mills formed by ultrashort pulse laser

C. System and control technology

■ **Shinno-Yoshioka Group, FIRST, Tokyo Institute of Technology**
Surface texture assessment based on analysis of laser speckle

■ **Ultra-Precision Machine System Laboratory, Department of Mechanical Engineering, Kanagawa University.**
Evaluation of power consumption for NC machine tool motion and cutting

■ **Morishige Lab., Dept. of Mechanical Engineering and Intelligent Systems, The University of Electro-Communications**
Development of Machining Interference that Aims for Rapid Prototyping by Cutting

■ **Nakamoto Laboratory, Tokyo University of Agriculture and Technology**
Proposal of Cutting Procedure Based on Topology Optimized Workpiece Shapes

■ **Man machine Lab., Faculty of Mechanical Engineering, Institute of Science and Engineering, Kanazawa University**
The Present and Future of Open CAM Kernel "Kodatuno"

■ **Manufacturing Lab., Graduate School of Science and Engineering, Saitama University**
Process planning system for multi axis controlled machining based on geometric calculation with ultra-parallel computing technology

■ **Computer Integrated Manufacturing Systems Lab., Department of Mechanical Engineering, Graduate School of Engineering, Kobe University**
Development of Innovative Intelligent Machine Tool based on CAM-CNC Integration Concept

■ **Computer Integrated Manufacturing Systems Lab., Department of Mechanical Engineering, Graduate School of Engineering, Kobe University**
Finished Surface Evaluation Method based on Human Visual Characteristics

■ **Ultraprecision Engineering Research Group, Department of Mechanical Science and Engineering, Nagoya University**
Development of an intelligent cutting process identification technique utilizing model-based simulations

■ **Hibino Laboratory, Department of Industrial Administration, Faculty of Science and Technology, Tokyo University of Science**
Production Management Method Using Simulation to Evaluate Productivity and Energy Consumption in Production Line Consisting of Machining Systems

■ **Hibino Laboratory, Department of Industrial Administration, Faculty of Science and Technology, Tokyo University of Science**
Cooperation Simulation to Simultaneously Evaluate to Production Line Operation including Machining and Feed of Computer

D. Measuring and evaluation technology

■ **National Institute of Technology, Sasebo College**
High Speed Measuring of a Grinding Tool Surface Topography by a Voronoi Diagram

■ **Kakinuma Lab., Dept. of System Design Engineering, Keio University**
Sensorless cutting force estimation technique and its application

■ **Yoshioka Group, School of Engineering, Tokyo Institute of Technology**
Influence of angular error in multi-axis machine tool on estimation of machining force by disturbance observer

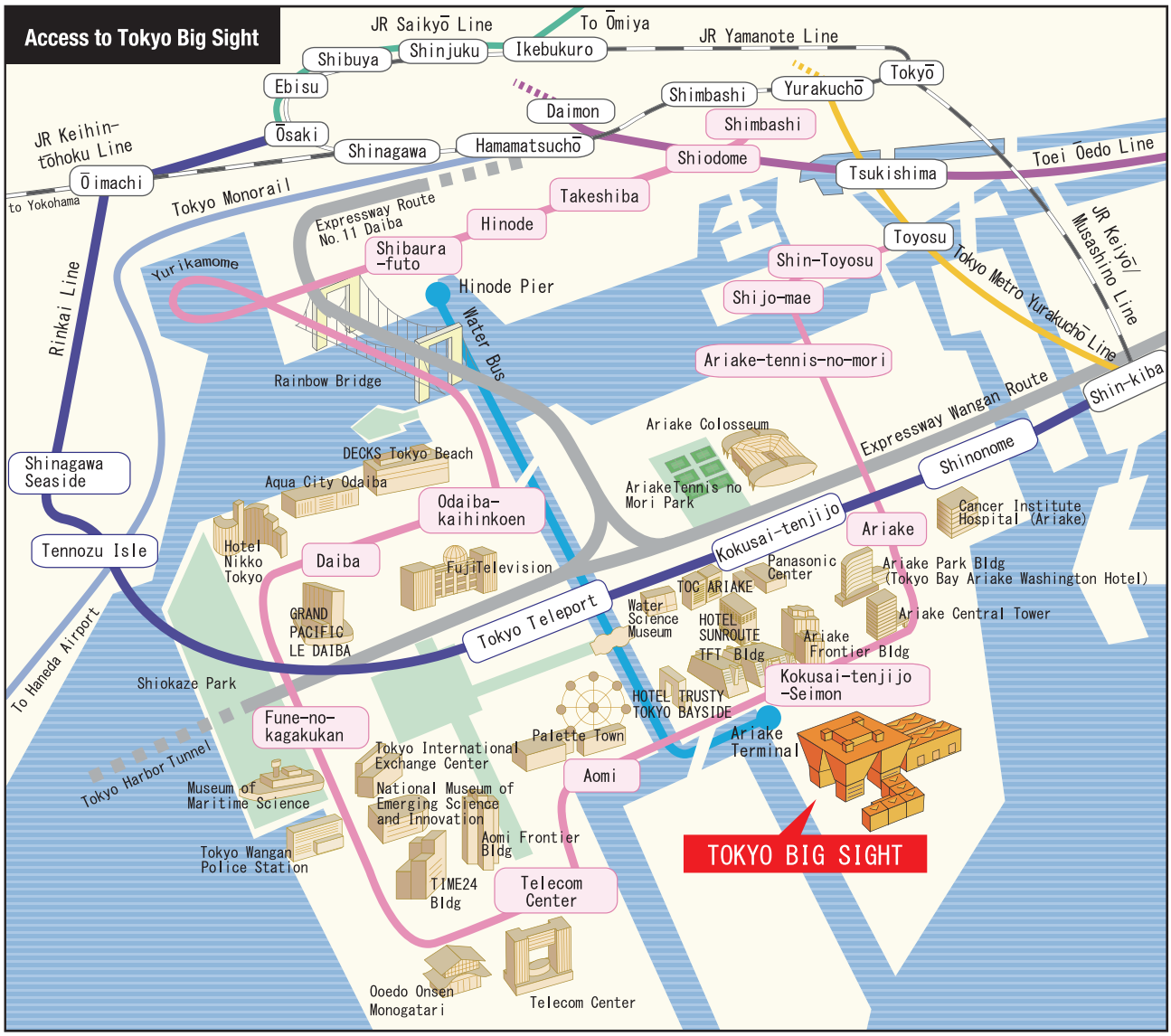
■ **Lee & Yamada Lab. Department of Mechanical Engineering, College of Science & Technology, Nihon University**
Proposal of on-machine measuring methods of cutting edge distributions

■ **On-demand Manufacturing System Group, Advanced Manufacturing Research Institute, National Institute of Advanced Industrial Science and Technology (AIST)**
Smart manufacturing by using advanced technology and monitoring

■ **Micro and Nano Engineering Laboratory (HASE Laboratory), Department of Mechanical Engineering, Faculty of Engineering, Saitama Institute of Technology**
Studies on AE Sensing for Making Smart Factory and IoT System in Machine Tools

■ **Precision Machining Laboratory, Department of Mechanical Engineering, Meiji University**
Study on the optical probe with the high lateral resolution by the collecting laser irradiation

■ **Saito Laboratory, Department of mechanical engineering, College of engineering, Nihon University.**
3-dimensional measurement of positioning accuracy of machine tools by using image matching



Rinkai Line

Shin-kiba (JR, Subway)	Approx. 5minutes	Kokusai-tenjijo	Approx. 7-minutes walk from Kokusai-tenjijo Sta.	Tokyo Big Sight
Osaki (JR)	Approx. 13minutes			

Yurikamome

Shimbashi (JR,Subways)	Approx. 22minutes	Kokusai-tenjijo -Seimon	Approx. 3-minutes walk from Kokusai-tenjijo-Seimon Sta.	Tokyo Big Sight
Toyosu (Subway)	Approx. 8minutes			

Toei Bus

Tokyo Sta.Yaesu Exit (JR)	Approx. 40minutes	Tokyo Big Sight
Monzennakacho (Subway)	Approx. 30minutes	
Hamamatsucho (JR)	Approx. 40minutes	

Airport Bus (Limousine Bus, Keihin Kyuko Bus)

Haneda Airport	Approx. 25minutes	Tokyo Big Sight
Narita Airpost	Approx. 60minutes	Tokyo Bay Ariake Washington Hotel (3 minutes walk)
Tokyo City Air Terminal (TCAT)	Approx. 20minutes	Tokyo Big Sight

Express Bus (Keihin Kyuko Bus)

Yokohama Sta. (East Exit, JR)	Approx. 50minutes	Tokyo Big Sight

Water Bus

Hinode Pier (Approx.7-minutes walk from JR Hamamatsucho Sta.)	Approx. 25minutes	Ariake Terminal	Approx. 2-minutes walk from Ariake Terminal	Tokyo Big Sight

Car

From center of Tokyo	Expressway Route No.11 Daiba	Approx. 5 minutes from Daiba Exit
Yokohama/Haneda	Expressway Wangan Route	Approx. 5 minutes from Rinkai Fukutoshin Exit.
	Expressway Route No.10 Harumi	Approx. 5 minutes from Toyosu Exit
From Chiba/Kasai	Expressway Wangan Route	Approx. 5 minutes from Ariake Exit.
	Expressway Route No.10 Harumi	Approx. 5 minutes from Toyosu Exit

JMTBA

Contact

Secretary of IMEC, Technical Department, Japan Machine Tool Builders' Association (JMTBA)
3-5-8, Shibakoen, Minato-ku, Tokyo 105-0011, Japan
Tel: +81-3-3434-3961 Fax: +81-3-3434-3763
E-Mail: IMEC17@jmtba.or.jp URL: http://www.jmtba.or.jp/english/events/1543

JIMTOF 2016
2016年11月17日(木)→11月22日(火)