INTER faces
Mechanical and Production Engineering
April 2001 No. 15

# MOU signed between SIA & NTU

On 2 April 2001 a Memorandum of Understanding (MOU) was signed among Singapore Airlines (SIA), NTU and the Art Center College of Design based in California for, they have teamed up in a research and development project which aims to improve the travelling experience of SIA's passengers. This research project is the brainchild of six undergraduates from NTU's School of Mechanical and Production Engineering.

MPE will innovate designs for cabin products such as the baby bassinet and meal cart. The former relieves the cabin crew from storing or assembling the bassinet while the innovative meal cart solves the problem of maneuverability, providing easier accessibility.

SIA will award a grant of $260,000 for NTU's projects for three years and $140,000 to the Art Center for a year initially. This is the first time in history that SIA collaborates with two academic institutions.

Another six new projects, all focusing on aircraft internal inflight environment and involving close to twenty MPE students are expected to materialize in the near future. Professor Lim Mong King , NTU deputy president hopes that the project will assist these students venture beyond the functional aspect of design.

*From second left to right - A/p Stephen Lee, Peputy President Prof. Lim Mong King, Yap Kim Wah(Senior Vice President Marketing Services SIA), Martin Smith (Art Center College of Design), Imre Molnar (Art Center College) & Tom Boozer (Vice President Product Innovation SIA)*

# Moulding a New Breed of Engineers in MPE

> *"Professionals in the new economy need a more broad-based education, so that they can handle issues which cut across traditional disciplines."*
>
> *Deputy Prime Minister*
> ***Dr Tony Tan***
> *The Straits Times,*
> *17 February 2001*

The knowledge-based economy and developments in life sciences are the waves of the future. To reflect such momentous changes, Nanyang Technological University is launching a new broad-based engineering curriculum. This will ensure that its engineering graduates are equipped with a broad understanding of the fundamentals required to meet the new challenges in the market place.

The new programme will include a two-year common engineering curriculum for students of NTU's engineering schools, starting this July. Under the new programme, the emphasis on training engineering students to acquire knowledge on their own, to innovate and to be creative in solving problems will be further enhanced. Integration and synthesis within and across disciplines will be further encouraged.

The two key features of the new programme are a broader coverage of engineering fundamentals and an introduction to basic elements in the physical and biological sciences. Complementing the two features are essential subjects useful for the modern engineer.

To achieve this, there will be a reduction in content in the existing engineering subjects in the respective schools. There will be no increase in workload. Applicants with outstanding A-level results may be exempted from common engineering subjects such as *Mathematics 1A*, *Mathematics 1B*, *Engineering Chemistry*, *Engineering Physics* and *Principles of Economics*. Polytechnic applicants will continue to be admitted directly into the second year.

Streaming will be conducted at the end of the first year. Undergraduates will be streamed into an engineering discipline based on their choice and performance. In the second year, they will take a limited number of subjects in their specific discipline in order to prepare them for their specialization in later years. Students may specialize in their final year of study.

The School of Mechanical and Production Engineering is currently revising the curriculum for its third and fourth years under its mainstream, design and mechatronics specialisations. It will be streamlining the many final year optional groups into fewer but broader groups. Other changes in the pipeline include changing our current T-21 (IHPT) programme to a 2-AU *Inter-Semestral Project* to be undertaken in the second year and the introduction of subjects on entrepreneurship. Full-time and Part-Time direct entry polytechnic applicants for the coming academic year 2001-2002 will still follow the existing curriculum.

In summary, the new curriculum at the school and university level aims to

- **produce MPE graduates for the knowledge-based economy** through a broad-based engineering curriculum plus specialization,
- **prepare MPE graduates for new challenges and developments in the life sciences** by including on subjects in basic physical and biological sciences, and
- **prepare MPE graduates for life-long learning** through an integrated approach in teaching and learning.

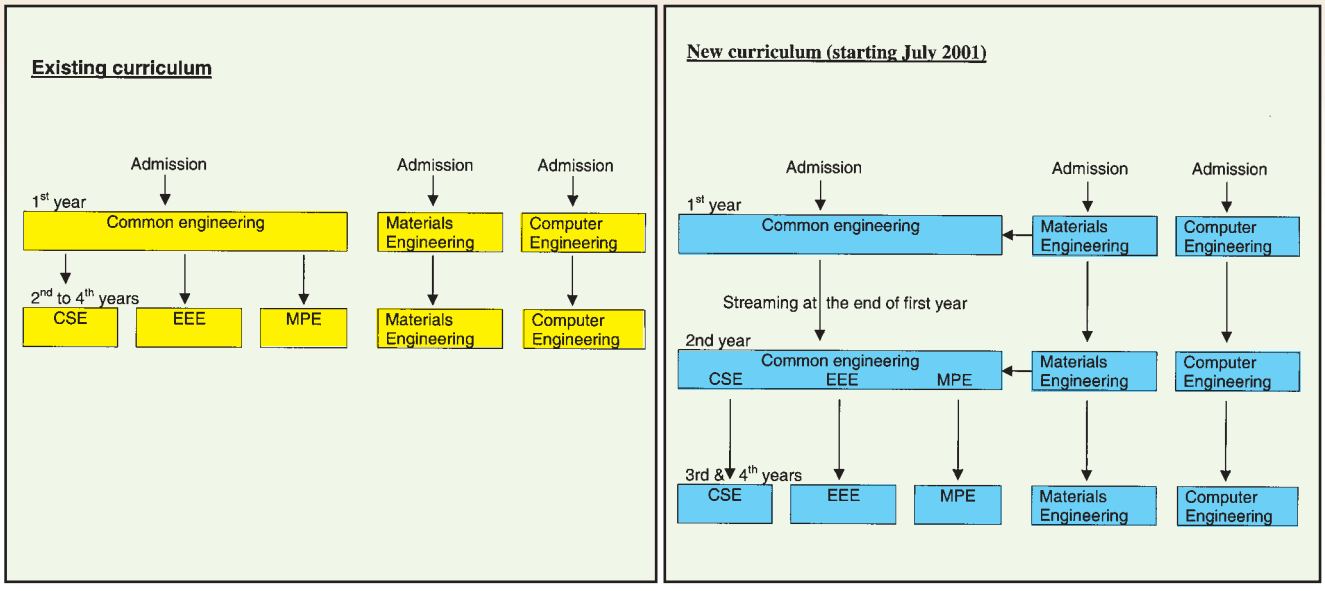



**Figure 1: Existing and new curriculums at NTU**

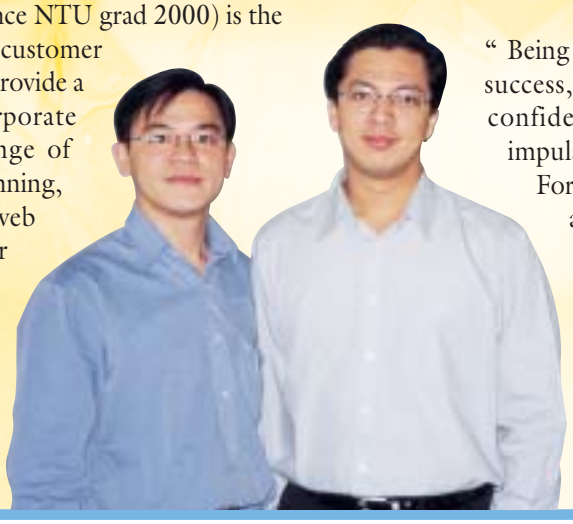
# Dare to be different

# MPE Alumna

After graduation in 2000, Cary Andrae started to build his career by starting up his own company in July 2000. Reaction Media & Management (Pte) Ltd. consists of two other partners who are his buddies from NTU. Throughout his 4 years spent in NTU, he had steadily gained skills and knowledge that allowed him to start off his career. ECAs in NTU Students' Union provided him the management skills, whereas his education and projects had given him the computer skills.

Cary handles all of the company's media projects. Mr. Koh Eng Siah, (School of Mechanical and Producation Engineering NTU grad year 2000), is responsible for operational deployment during events while Mr. Lim Keng Chong (School of Applied Science NTU grad 2000) is the account director handling all customer liaisons. Their philosophy is to provide a one-stop solution for all corporate needs. They offer a wide range of services from special event planning, multimedia creation for video, web and CD-Rom, design services for web and print, channel management and PR consultancy. Since Reaction Media's incorporation, they have been fortunate in their businesses. Clients include companies like MPHOnline.com and F&N Coca-Cola. The business has been a continuous learning process. As they do not have formal training, the journey has its share of hiccups. However, they manage to form strategic partnerships with established companies to better enhance their services to clients.

"Early periods had been tough for we used our own capital to start up the company," admitted Cary. "Finance had always been a limiting factor in our business. Many sacrifices were made and there were times when I wondered if I had made the wrong choice. However, it was perseverance and the support of my friends that pulled me through the tough times, " added Cary.



*right to left:*
*Cary Andreas & Mr. Koh Eng Siah*

" Being daringly different is the motto to success," said Cary. Other tips are "be confident of yourself and never make impulsive decisions about your career. Formulate your objectives with short and long-term goals. If you want to start up your own business, check out the market first and build a team of committed people to work with. Always listen to what people have to say and keep on learning."

# Research on hard-disk drives in Centre for Mechanics of Micro-Systems (CMMS)

Since CMMS was established in June, 1999, it has kept a very close relationship with DSI (Data Storage Institute, an Research Institute sponsored by NSTB). Currently, out of the 13 research projects being carried out in CMMS, 6 are on or related to problems of hard disk drives (HDD), including

- structural dynamics and control of reading arms
- Topological Optimization of structure of reading arms
- fluttering of disks
- nano-tribology between recording media and reading head
- noise reduction of disk drives, etc.

CMMS supports DSI with its expertise and know-how on problems in Mechanics of disk drives through regular meetings, technical presentations, and exchanging research staff. In September, 2001, a joint seminar on mechanics of Hard Disk Drives will be held between two research institutes.

CMMS also has discussed and is finalizing its contract negotiation with 2 world-wide leading HDD manufacturers in Singapore on research collaborations. Researchers in these projects will be working on Mechanics problems in the new generation of HDDs which are under development.

# Sailing Away On ASME Day

Ever wondered how you can transform styrofoam, used bottles, ice cream sticks and rubber bands into a sailing boat which can win you attractive cash prizes? Participants to the 'Sail Sail Away' Make-A-Boat Design Competition on 8th March 2001 organized by ASME NTU Student Section amazed a large curious crowd of students with their design and their creativity. The participants are given a budget of $10 for their raw materials to build a boat that is propelled by rubber bands to 'sail' the boat across 3 metres carrying an egg.

A total of 8 teams came up with final products which impressed the crowd and our 3 judges with their creativity and design. The boats are judged based on the following criteria: their outlooks, the total time taken to sail 3 metres as well as their ability to transport an egg safely across the distance.

The grand winner of the competition is Mr Alvin Lee, who not only bagged the first prize of $500 cash, but also emerged winner in the fastest boat and best weight taker categories.

This competition held on 8th March 2001, was also held in conjunction with ASME Day. The highlights of the day include the exhibition on ASME International, ASME S'pore Section and also encompassed the activities organized by the NTU Student Section.

*MPE's Boat Competition on ASME DAY*

NTU students (including non MPE students) can also obtain a bottle of free mineral water and an NTU Student Section postcard by giving the correct answers to 2 simple questions on ASME.A total of 1000 bottles of mineral water kindly sponsored by Ocean are given out during the event.

The main objective of ASME Day is to create awareness of ASME and what it stands for. ASME International is a nonprofit educational and technical organisation serving a worldwide membership of over 120,000, including mechanical engineering students in over 390 universities around the globe. The NTU Student Section formed in 1995 is the first ASME Student Section outside of North America.

The activities organised by the student section and the benefits of being an ASME student member are also introduced and explained to the NTU student population. Besides information from the brochures and newsletters available at our booths, interested students can address any queries directly to the committee members, greatly enhancing personal communication between ASME members and the MPE student population. Based on the response from the enthusiastic crowd and their active participation, the event has indeed succeeded in achieving its objectives. It is hoped that students who have a more global outlook will take the opportunity to link up with one of the largest network of engineering resources worldwide. More information can be obtained from the following websites:

http://www.ntu.edu.sg/studorgn/Asme/
http://web.singnet.com.sg/~asmesg/
http://www.asme.org/

# Welcome back for sabbatical stay

It has been seven years since Pearl Sullivan left MPE NTU to join the Department of Mechanical Engineering at the University of New Brunswick (UNB) in Canada. "It's almost as if I had left for a week. All my colleagues who joined NTU along with me in 1991 haven't aged a bit! "said Pearl who recently returned to MPE for her sabbatical. She was a Lecturer in MPE for nearly four years before leaving in 1994 for Fredericton, the capital city of New Brunswick.

Currently an Associate Professor at UNB, Pearl Sullivan was awarded the UNB Merit Award in 1999 for contributions in teaching, research and service. She implemented a Manufacturing Option within the Mechanical Engineering program and established research facilities for plastics and composite materials, using substantial funding from the Natural Science and Engineering Research Council of Canada (NSERC). She also acted as the Canadian coordinator of the NAFTA (North American Free Trade Agreement) Student Mobility program. Besides these new niches, she had a new baby girl Christina joining the family. "1999 was indeed a very busy year for me, " added Pearl. Altogether, Pearl has three children

Pearl has been a Visiting Senior Fellow at MPE NTU since September 2000 and will be returning to Fredericton with her family at the end of June. Impressed with the extraordinary research progress and quality of infrastructure at MPE, she hopes to initiate international research collaboration between MPE NTU and Canadian universities in the near future. She has recently been appointed to serve on the Natural Science and Engineering Research Council of Canada University Faculty Awards Committee.

*from left to right: Michael, Pearl, Veronica, Tom and Christina.*

# Snow-in Canada- a truly unique experience!

When I got news that my application for the exchange program to Canada was approved, my initial reaction was ecstatic. However, bad thoughts started to surface and I began to have second thoughts about venturing into a far-away foreign land all by myself. In the end, I found myself on a 30 hours flight to Canada.

After touching down at the Persian Airport in Toronto, I experienced the cool air of Canada for the first time! Immediately, I knew that I was in for something exciting and interesting and I would never regret my decision.

At the University of Waterloo, where I was studying during the exchange program, I met many different kinds of people and was exposed to different cultures. The Canadians were all so friendly. Each time whenever I lost my way, there was always somebody nice to offer help. The lecturers and tutors were equally kind and helpful. If one had any doubts, one can approach the lecturers and tutors easily.

Besides meeting Canadians, I was also given the chance to meet other exchange students from France, Germany, Korea and Australia. Each of them shared about life in their country. It was then that I realize that the Singaporean culture is so different from that of other cultures.

The study environment at Waterloo is extremely different from that of Nanyang Technological University (NTU). A lecture group would consist of not more than 85 students. In comparison, NTU's lectures consist of a few hundred students in a lecture group. Moreover, instead of being equipped with overhead projection (OHP), pens, and transparencies, the lecturers would use pieces of chalk to write on the blackboard during lessons. Students who had doubts would raise their hands boldly and pose their questions to the lecturers. They were not afraid of being laughed at for asking silly questions.

Within the school, there were cafes in each faculty. The foods sold were of reasonable price. So, each morning, if a student woke up late, he or she can just pop by any one of the cafes and grab a bite. The best part is that it was legal for the students to eat in the classroom under the nose of the lecturers! Isn't that amazing? The School believe that while studying, eating helps to stimulate the minds.

Throughout my stay in Canada, I was considered quite fortunate as I had the opportunity to experience the three seasons: summer, fall and winter. Winter was the most interesting of all. During the exam period in December, it started to snow. There was a snowstorm one night and the next morning, roads were impassable as the snow was approximately 50 cm thick! Hence, shopping malls, stores, childcare centers and schools were all closed. Waterloo was not an exception. Even the exams for the day were postponed!

Today, I still reminisce about the good times and scenes of Canada: the captivating natural landscape of God's amazing creation. It was definitely an enriching and priceless experience that I would not exchange for anything else.

*Canada Niagara Falls : Jine Tan Cheng on a Student Exchange Program*

# Innovations in CAR Design

MPE's car design competition was held in January 2001. The competition concerned the fabrication of small vehicles that would be judged on the following criteria:-performance over a four section obstacle course, the shortest time to cover a distance of 20m, the maximum tractive force up a $20^0$ incline and aesthetics performance.

The eight teams taking part could use any source of energy, except electrical and human, as the driving source for the propulsion of the fabricated vehicle that must be made entirely of scrap material.

In the event, students used various mechanisms to solve the problems at hand such as using an ingenious system that utilizes the energy of compressed air housed in a plastic bottle. The air then forced water out of an orifice onto a paddle wheel to provide torque to the driving wheels. The principle resembled that of a Pelton wheel. Another one used was the stored energy of strained elastic bands.

The students did very well under constrained conditions. A special thanks to the sponsors Tan Chong Motors, FMC Pte Ltd and MPE School.

The results announced are: 1st prize went to Johan Jingga(MPE 2), 2nd prize was won by Patrick Koh(MPE 4), 3rd prize went to Chua Chee Poh (MPE 3). Best Aesthetics went to Johan Jingga(MPE 2) and Patrick Koh (MPE 4) won the best design category.


*A beaming winning team*

# MPE Goes Fiesta Fiesta

February saw the MPE family gather for their annual staff lunch. On Saturday, the 10th of February, the staff of MPE had a fiesta in the ballroom of Grand Copthorne Waterfront Hotel. In all, 253 people turned up for this luncheon. By 1:15, most of the guests, including the VIPs had arrived in their Sunday best. Judging by the attire of the crowd, it is safe to conclude that Hawaiian shirts, bermuda shorts and straw hats are not the preferred style of MPE's staff! Nonetheless, fiesta was in the air as the Dean, Professor Yue Chee Yoon, warmly welcomed the family of MPE staff and all the guests to an afternoon of food and fun.

Professor Yue's opening address exhorted the value of teamwork and camaraderie within the school. He envisions exciting challenges and encouraged staff to help each other meet these challenges as one united family. After the opening, Professor Yue presented the long service and employee of the year awards. The Administrative Staff or of the Year award went to Shanty d/o Valayuatham and the Technician of the Year award was clinched by Mr Eng Keok Soon and Mr Leong Kwok Phui. There was much clapping and cheering which set the relaxed tone for the rest of the afternoon. Throughout the lunch, the guests were entertained by magic tricks, Latin music and stage games. Everybody let their hair down and got into the mood of the fiesta. Apart from being wined and dined, 52 guests were lucky enough to go home with prizes from the lucky draw. The fun couldn't last all day and 4:30pm saw the happy gathering make their way home.


*MPE Staff lunch: Long service award recipients (15 years)*

## *MPE Graduates' Club Update:* ALUMNI RESOURCE DATA SURVEY

Our thanks to the 263 MPE alumni who have returned the survey forms. The information is being processed and the summary will be presented in the next available opportunity. For alumni who wish to participate in the survey, it still not too late to submit their forms. If you would like to have a copy of the survey form, you can request them from Dr Hoon Kay Hiang by email mkhhoon@ntu.edu.sg or tel: 7905523. You can also download a copy from the MPE homepage http://www.ntu.edu.sg/MPE/Others/alumni/1index.htm.

# Welcome Aboard

**From July 2000 to March 2001, the following new staff joined the School of MPE. We would like to extend a warm welcome to them.**

*from left to right: Appa Siva Kumar, Ma Yong Sheng, Alvin Lai CK, Georg Thimm, Pearl Sulliran, Nguyen Nam Trung, Zhou Tongming, Saman, Chong CK*

# Welcome Aboard

**DR. APPA IYER SIVAKUMAR, SIVA**
B.Eng, PhD, C.Eng, MIMechE, MIEE(Lond)

Siva's research area is in manufacturing systems, logistics and supply chain with the current focus on optimization of logistics, inventory, and scheduling in supply chains. In his previous attachment at Gintic he has led a research team, developing an object oriented on-line simulation engine and used it for near-real-time schedule optimization. He also held technical and managerial positions at Lucas, UK and was responsible for re-engineering, planning and scheduling projects. Siva is a SMA fellow and involved in Nanyang Business School MBA(MOT) programme. He was the technical chair and co-edited the proceedings of the 3rd and 4th International Conference on Computer Integrated Manufacturing (ICCIM '95 and ICCIM'97), Singapore.

**DR. AU CHI KIT** received his B.Sc. (1985) and M.Sc. (1992) from the University of Hong Kong, and Ph.D. (1998) from Hong Kong University of Science and Technology. These were all awarded for Mechanical Engineering. His research interests are geometric modelling for sculptured objects, physical-based modelling., design analysis integration and plastic injection moulding.

**DR. CHONG CHUH KHIUN** received his B.Sc. in Chemical Engineering from National Central University, Taiwan in 1994 and has worked at Veterans General Hospital, Taipei, in research related to heart valves. He obtained his Ph.D. from the Department of Clinical Engineering, Liverpool University, UK in 1999, studying issues related to endovascular treatment of abdominal aortic aneurysms, including training simulator, aneurysm sac pressure, and the fluid mechanics of stent grafts. He joined NTU in February 2001. His research interests include biofluid mechanics, tissue engineering, biomaterials, medical devices and training simulator for endovascular techniques.

**Dr. DHANJOO N. GHISTA** is Editor-in-Chief of AUTOMEDICA (an international journal on high-tech medicine). He has published over 300 publications in the fields of engineering-science, biomedical-sciences and societal sciences. He is also author/editor of over 20 books on biomedical engineering, engineering-physiology, cardiovascular physics, orthopaedic mechanics, medical & life physics, and spinal-injury biomedical engineering.

**DR. GEORG THIMM** performed his undergraduate studies in computer science at the the University of Karlsruhe/Germany. The EPFL/Switzerland awarded him in 1997 a Doctors degree for his work on ontogenic neural networks. He joined the Nanyang Technological University in 1999 as research fellow. His research interest include evolutionary programming and other AI techniques to computer aided process planning problems.

**DR. ALVIN LAI CHI KEUNG** completed his bachelor and master degrees in Hong Kong. Then he went to Imperial College and obtained his Ph.D. in 1997. He spent three years working as a post-doctorate fellow in University of California, Berkeley before joining NTU as an Assistant Professor in December of 2000. His main research area is indoor air quality with the emphasis on airborne particles.

**Dr. CHUAN LI** joined MPE in Oct. 2000. He obtained his PhD and MSc degrees from Univ. Of Mich. at Ann Arbor USA in 1998. He then worked at Ford Motor Co. and Daimler Chrysler Corp. until Aug. 2000. His specialty includes the following research areas: Thermal contact and associated stability analysis, Stability analysis of dynamic systems, Electronic packaging design and Heat transfer and thermal stress analysis.

# Welcome Aboard

**DR. MA YONG SHENG** joined MPE in Sept. 2000. His main research areas include intelligent modelling and object technology for engineering IT solutions. Graduated from Tsing Hua University, Beijing with B. Eng degree in 1986. He achieved his Msc and PhD degrees in 1990 and 1994 respectively. He started his career as a Lecturer in Ngee Ann Polytechnic in Singapore from 1993 to 1996. Since then, he was working with Gintic Institute of Manufacturing Technology. Before joining NTU, he was a Manager and a Senior Research Fellow in Gintic.

**DR. NGUYEN NAM-TRUNG** received the M.Sc. and Ph.D. Degrees from Chemnitz University of Technology (Germany) in 1993 and 1997, respectively. From 1992 to 1993 he worked with Robert Bosch GmbH in Reutlingen (Germany). In 1996, he was a visiting scientist at the MESA institute (University of Twente, Netherlands). From 1996 to 1997, he led the microfluidics group of the Department of Microsystems and Precision Engineering and the Center of Micro Technology at the Chemnitz University of Technology. From 1997 to 1998, he worked as a postdoctoral researcher in the Berkeley Sensor and Actuator Center (University of California at Berkeley). In May 1999, he joined the School of Mechanical and Production Engineering of the Nanyang Technological University as a research fellow. He was converted to a teaching staff in January 2001.

**DR. SAMAN K. HALGAMUGE** is presently on sabbatical leave from The University of Melbourne, Australia, where he is a Senior Lecturer in Mechatronics. He holds B.Sc. (1984) in Electronics and Telecommunication Engineering (Moratuwa, Sri Lanka), and Diplom-Ing. (1990) and Dr.-Ing. (1994) in Computer Engineering (Darmstadt, Germany). His present research interests also include Data Mining, Bio-Computing, Image Processing and Multi Sensor Data Fusion. In Melbourne he holds major research grants from Australian Research Council and international and Australian industry.

**DR. SHU JIAN JUN** is a recipient of the British Institution of Mechanical Engineers 1992 BFPA Prize for Young Engineers. He has published over 60 technical papers. His research research interests are in Biological Mechanics, Nano and Micro Fluids, DNA Modelling and Red Tides.

**DR. SUNIL CHANDRAKANT JOSHI** received his Ph.D. in 1999 from Monash University, Australia, for his work on composites manufacturing processes. Prior to that, after completing M. Tech. in Aeronautical Engineering from IIT, Bombay (India),worked as a Scientist for 6 years in National Aerospace Laboratories, Bangalore, one of India's foremost research organisations in aerospace.

His current research interests include engineering analysis, testing and integration of micro-satellite subsystems, numerical simulation and optimization of manufacturing processes, LCP-polymer blends, and fibre reinforced composites.

**DR. ZHOU TONG MING** received his BEng in Civil Engineering from Dalian University of Technology, China (1987) and his MEng in Hydraulic Engineering from Tsinghua University, China (1989). After working in Institute of Environmental Sciences, Beijing Normal University, China, as a lecturer for nearly 6 years (1989-1995), he went to Australia to study for PhD. In 1999, he graduated from The University of Newcastle, Australia. His research interests include momentum and heat transfer in various shear flows, Structure of turbulence and turbulent flow controls and applications.




*Interfaces is sponsored by NTU Alumni & Endowment Funds*



*Design, Colour Separation & Printed by Oxford Graphic Printers Pte Ltd*