General Announcement
and Call for Papers
Deadline: December 31, 2008

Seventh International Conference on

Enhanced, Compact and Ultra-Compact Heat Exchangers: From Microscale Phenomena to Industrial Applications

San Jose, Costa Rica

September 14-18, 2009

Chair:
R.K. Shah, Indian Institute of Technology Bombay, Mumbai, India

Co-Chairs:
M. Ishizuka, Toyama Prefectural University, Toyama, Japan
A.M. Jacobi, University of Illinois at Urbana-Champaign, Urbana, IL, USA
V.V. Wadekar, HTFS, Aspen Technology Ltd, Reading, UK

Conference Theme

The conference focuses on promoting the engineering development and application of enhanced, compact, and ultra-compact heat exchanger technology, on the basis of a clear understanding of the underlying mesoscale and microscale physics of heat transfer and fluid flow phenomena. Thus, the conference theme spans a wide spectrum of topics from the investigation of microscale science to industrial applications of this important class of heat exchange equipment which can provide cost effective solutions to complex contemporary heat transfer challenges in a way that serves the energy and sustainability needs of society.

Conference Objectives

I. To provide a forum for discussion of novel applications of enhanced, compact, and ultra-compact heat exchangers for automotive, process (e.g., refining, chemical), electronics cooling, fuel cells, power conversion, air-conditioning and refrigeration, aerospace, and other industrial applications.
II. To provide a forum for dissemination of the latest advances in microscale heat transfer leading to better understanding and modeling of enhanced and compact heat exchangers
III. To identify present applications of advanced heat exchanger technology in traditional and emerging industrial applications, evaluating the benefits and drawbacks; and to identify further areas where such advanced technology could be used.
IV. To identify barriers, both real and perceived, to wider applications of advanced heat exchanger technology, and to identify areas where further research is needed.
V. To identify actions which can be taken by the various parties and disciplines to overcome these barriers and to provide communication channels between academic and industrial segments of the technical community.

Background

There is renewed interest in application of high performance Compact Heat Exchangers (CHE) due to high energy costs, concern for environmental protection, and social impetus for sustainable development. On the other hand, emerging technologies, such as fuel cells, microturbines, etc. have spurred significant interest in better understanding microscale phenomena and their application to develop newer types of CHEs for cost, space and energy savings. In general, CHEs with gas flows are characterized by high heat transfer area per unit volume (above 700 m^2/m^3; hydraulic diameter $D_h \leq 6$ mm) and per unit mass, usually achieved by construction techniques that result in a large number of small channels. Channel sizes are now advancing to mini and microchannels, with significant improvement in heat transfer surface area density (meso heat exchangers ≥ 3000 m^2/m^3 and $D_h \leq 1$ mm; micro heat exchangers $\geq 15{,}000$ m^2/m^3 and $D_h \leq 100$ μm). Liquid-phase change heat exchangers are considered compact for having heat transfer surface area density greater than 400 m^2/m^3. The resistance to application of these technologies is based on concerns about fouling and cleanability, ruggedness, safety (especially in high temperature and pressure applications), and cost. However, continuing advances at both fundamental and equipment-development levels and a growing database of successful plant experiences have demonstrated that significant capital and operating cost savings can be achieved by the reasoned applications of CHEs, microscale and enhanced heat exchangers.

This is the seventh conference in the series: the previous ones were held in Snowbird, Utah; Banff, Canada; Davos, Switzerland; Crete, Greece; Whistler, Canada; and Potsdam, Germany. They were sponsored by Engineering Conferences International, Hoboken, NJ, USA. Each of these conferences was attended by 70 to 90 specialists with 30 to 50% of the participants from industry. The conference programs included invited lectures, tutorial lectures/short course, panel discussions, and contributed technical papers. These conferences were highly successful and unique, bringing together an effective mix of technical specialists from industry, universities and government organizations worldwide for technically focused discussions.

Building on the highly successful earlier conferences, this conference will continue to focus on compact heat exchangers, with an expanded scope to include mesoscale and microscale heat exchangers with applications in automotive, process (e.g., refining, chemical), electronics cooling, fuel cells, power, air-conditioning and refrigeration, aerospace, and other industrial applications. Some of these areas demand further miniaturization of current compact heat exchangers. Most require significant reductions in cost. The organizers of this Conference intend to bring together a select group of users (present and potential), manufacturers, designers, contractors, consultants and researchers to share their knowledge, experience, and ideas to support the theme of the conference.

Scope of the Conference

A. To disseminate and discuss basic and applied research, engineering and technology developments in compact and ultra-compact heat exchangers for conventional and emerging technologies. These CHEs could also include various types of enhanced heat transfer (EHT) concepts and devices that result in significant reduction of heat exchanger size compared to traditional technology. The scope of the conference will include fundamental research, thermal and mechanical design and development, manufacturing technology, and field experience. Papers are solicited for a variety of CHEs describing advanced technology, basic phenomena at traditional and microscale, single-phase and phase change heat transfer, analysis and numerical modeling, flow and temperature visualization, experimental and computational methods, heat transfer enhancement in single-phase and multiphase flows, design methods and operating problems, and mechanical design aspects. Papers dealing with case studies and applications are also encouraged in areas such as electronics cooling, automotive, air-conditioning and refrigeration, aerospace, process integration. .
B. The uncertainty arising from fouling is a major barrier/concern for wider use of CHEs in industrial applications. Papers are solicited on fouling characteristics, mitigation methods and design approaches with fouling to clearly show the advances made in the recent past for potential applications of CHEs.
C. Cost has become an extremely important consideration for CHEs. Many innovative and simplified methods of manufacturing have emerged in the last decade. Papers are invited to present the latest advances in manufacturing technology developments and associated intricacies.
D. Alternative materials for construction, such as polymers, ceramics, composites, and carbonaceous and metallic foams have emerged as promising for CHEs. Papers are invited to present advances in the use of such materials, to explore their potential or report their application.
E. There are many barriers and concerns related to durability, reliability and safety in the use of CHEs in industrial applications. Papers are solicited dealing with these topics–including case studies–directed at surmounting these barriers.
F. Papers in related areas other than those listed above are also welcome.

Technical Sessions

Single-phase Flows
Fundamental Studies of Single-phase Flow and Heat Transfer
Single-Phase Heat Transfer Enhancement – Shell-and-Tube, Plate-Fin, Tube-Fin, Primary Surface and Other Advanced Heat Exchangers
Micro-channel Flow, Heat Transfer and Pressure Drop
High-Temperature and Low-Temperature Heat Exchangers
Single-Phase Heat Exchanger Development and Applications

Multi-phase Flows
Fundamental Studies of Condensation
Enhancement Studies in Condensation
Condensation Heat Exchanger Applications
Fundamental Studies of Boiling and Vaporization
Boiling and Vaporization Heat Exchanger Developments
Boiling and Vaporization Heat Exchanger Applications
Enhancement Studies in Boiling and Vaporization
Boiling and Condensation in Microchannels
Other Multi-phase Flows: Nano-fluids, Slurries, Micro-phase-change materials, mixture of fluids, and
Other Emerging and Novel Fluids

Design, Construction, Characterization and Operation
Recent Developments in Heat Exchanger Design and Construction
Heat Exchanger Design Data
Micro-scale Heat Exchanger Studies and Application
Measurement Techniques for Heat Exchangers – Single-phase and Multi-phase Applications
Computational Techniques for Heat Exchangers – Single-phase and Multi-phase Applications
Data Reduction and Representation for Heat Exchangers – Single-phase and Multi-phase Applications
Fouling Studies and Remedial/Minimization Techniques – Single-phase and Multi-phase Applications
Cost Effective HX Designs for Low Volume Production, and High Durability and Reliability.

Conference Format

The conference will be held for 4-1/2 days. Sessions will be scheduled in the mornings, afternoons, and/or evenings, with breaks in the formal program to allow small group interactions. There will be Keynote lectures, technical presentations, panel discussions and informal sessions. There may be a Poster session for personal interactions. There will be no parallel sessions. There will be an Open Forum session to include presentations that do not go into the conference proceedings. Attendance at the conference will be limited to about 80 to 100 participants to encourage maximum interaction among the participants. All participants will stay at the conference site. Conference registration fee will include complete room and board, conference proceedings and other related conference material, and two coffee/tea breaks per day. This format employed in conferences of Engineering Conferences International allows maximum interaction, discussion and networking among the conference participants.

Everyone invited to participate in the conference and will be expected to make contributions throughout the conference. These contributions may be oral or written, formal or informal, with the goal that every participant contributes positively to the discussions and the success of the conference.

Submission, Selection, Publication and Presentation of Contributed Papers

Researchers, users, manufacturers, designers, contractors and consultants are invited to submit abstracts and eventually papers for this focused conference to learn from the latest developments from a variety of industries. In particular, papers from industrial authors are most welcome. However, those from industry who would like to make a presentation without submission/publication should also send an abstract so that it can be arranged in the Industrial/Open Forum session.

Authors should submit abstracts of up to 1000 words electronically, with supporting figures and tables as appropriate, to the Regional Scientific Committee member or Co-Chair geographically close to the authors. The cover letter (e-mail) should include the name, complete postal address, phone and fax numbers, and e-mail address of the author to whom correspondence should be directed. The abstract should clearly state the objectives, results and conclusions. The papers will go through a peer review of the complete manuscript. The accepted papers will be prepared electronically in the pre-specified format in *English* only.

The Conference Proceedings will include all accepted papers (provided that at least one author of a single or multiple authored papers has registered for the conference) and will be distributed to the participants at the conference. Abstracts of the presentations in the Open Forum Session will also be distributed separately at the conference.

Deadlines

October 27, 2008	An electronic copy of the abstracts (no longer than 1000 words) to be sent to the Regional Scientific Committee member or the Co-Chair; the authors will then be notified of the abstract acceptance within a few days. Authors who would like to make a presentation without submission/publication should also send an abstract so that it can be arranged in the Open Forum session.
December 31, 2008	Full manuscript prepared electronically in the specific format to be sent to the Scientific Committee members.
February 23, 2009	Notification of the manuscript acceptance and the reviews to be sent to authors.
March 4, 2009	Complete author-prepared electronic version of the paper both in Word and pdf format to be sent to Regional Scientific Committee members.

Language: The official language of the Conference will be English.

Conferences Scientific Committee

Conference Chair:

Dr. Ramesh K. Shah, Department of Energy Science and Engineering, Indian Institute of Technology Bombay, Mumbai, 400 076, India. Tel: +91-22-2576-7879, Cell: +91-981-924-7229; Fax: +91-22-2576-4890; E-mail: rkshah@gmail.com.

Conference Co-Chairs:

Professor Masaru Ishizuka, Mechanical Systems Engineering, Toyama Prefectural University, 5180 Kurokawa, Kosugi, Toyama 939-0398, Japan; Tel.: 81-766-56-7500; Fax: 81-766-56-6131; Email: ishizuka@pu-toyama.ac.jp. *Region: Pacific Region countries.*

Professor Anthony Jacobi, Mechanical Science and Engineering, University of Illinois, 1206 West Green Street, Urbana, Illinois 61801, USA, Tel: 1-217-333-4108; Fax: 1-217-244-6534; Email: a-jacobi@uiuc.edu. *Region North and South American countries.*

Dr. Vishwas V. Wadekar, HTFS, Aspen Technology Ltd, C1, Reading International Business Centre, Basingstoke Road, Reading, Berkshire RG2 6DT, United Kingdom, Tel: +44 118 9226414; Fax: +44 118 9226401;, E-mail: Vishwas.Wadekar@aspentech.com *Region: Europe, Middle East, Africa and India*.

The Scientific Committee consists of specialists working in the field as follows.

Regional Scientific Committee Members for North and South America

Dr. Zahid Ayub, P.E.
Isotherm, Inc.
Arlington, TX, USA
Tel: +1-817-472-9922
E-mail-mail: zahid@iso-therm.com

Prof. B. Rabi Baliga
Department of Mechanical Engineering
817 Sherbrooke Street West, Room 370
Montreal, Quebec H3A 2K6, Canada
Tel.: +1-514-398-6287; Fax: +1-514-398-4476
Email: bantwal.baliga@mcgill.ca

Dr. Steven B. Beale
Inst. for Chemical Process & Environmental Tech.
National Research Council, Montreal Road
Ottawa ON K1A 0R6, Canada
Tel: +1-613-993-3487; Fax: +1-613-941-1571
E-mail: steven.beale@nrc-cnrc.gc.ca

Prof. Ahmad Fakheri
Department of Mechanical Engineering
Bradley University
Peoria, IL 61625
Tel: +1-309-677-2719; Fax: +1-309-677-3453
E-mail: ahmad@bradley.edu

Dr. William Fox
Principal Heat Transfer Engineer
Ingersoll Rand, Trane Commercial Systems
3600 Pammel Creek Rd
La Crosse, WI USA 54601-7599
Tel: +1-608-787-2460; Fax: +1-787-2669
E-mail: bfox@trane.com

Prof. José Luiz Gasche
Department of Mechanical Engineering
Universidade Estadual Paulista – UNESP
Av. Brasil Centro 56
15385-000 Ilha Solteria, SP, Brazil
Tel. +55-18-3743-1035 : Fax: +55-18-3742-2992
E-mail: gasche@dem.feis.unesp.br

Dr. Satish Kulankara
Johnson Controls – Building Efficiency
631 S. Richland Avenue – 361ª
York, PA, USA 17403
Tel: +1-717-771-7425; Fax: +1-717-771-6794
E-mail: Satheesh.Kulankara@jci.com

Dr. Arun Muley
R&D Manager, Koch Heat Transfer Company
4111 East 37TH Street North, Mail Drop: F1
Wichita, KS, 67206
Tel: +1-316-828-6434; Fax: +1-316-828-8266
Email: arun.muley@khtlp.com

Prof. Gherhardt Ribatski
Department of Mechanical Engineering
Escola de Engenharia de São Carlos
Universidade de São Paulo
Av. Trabalhador Sãocarlense, 400 Centro
13566-970 São Carlos, Brazil
Tel. +55-16-3373-9415 : Fax: +55-16-3373-9402
E-mail: ribatski@sc.usp.br

Prof. Andrew Sommers
Mechanical & Manufacturing Engineering
Miami University
Oxford, OH 45056
Tel: +1-513-529-0718
Fax: +1-513-529-0717
E-mail: sommerad@muohio.edu

Dr. Danesh K. Tafti
Department of Mechanical Engineering
Virginia Polytechnic Institute and State University
Blackburg, VA 24061, USA
Tel. +1-540-231-9975; Fax: +1-540-231-9100
E-mail: dtafti@vt.edu

Dr. Michael F. Taras
Manager of Technology, Carrier Corporation
Syracuse, NY USA 13201
Tel: +1-315-432-6785; Fax: +1-860-998-0923
E-mail: Michael.Taras@carrier.utc.com

Dr. Hailing Wu
United Technologies Research Center
411 Silver Lane, MS 129-19
East Hartford, CT 06108, USA
Tel: +1-860-610-7575; Fax: +1-860-998-3706
E-mail: WuHL@utrc.utc.com

Regional Scientific Committee Members for Pacific Rim Region

Dr. Takeshi Ebisu
Director, Daikin Industries,Ltd
Umeda Center Bldg.,2-4-12,Nakazaki-Nishi
Kita-Ku,Osaka,530-8323 Japan
Tel: +81-6-6373-4371/ Fax:+81-6-6374-9287
E-mail: takeshi.ebisu@daikin.co.jp

Prof. Kazuyoshi Fushinobu
Department of Mechanical and ControlEngineering,
Mail Box # I6-3
Tokyo Institute of Technology
Meguro-ku, Tokyo 152-8552, Japan
Tel: +81-3-5734-2500/Fax: +81-3-5734-2893
E-mail: fushinok@mech.titech.ac.jp

Prof. Zengyuan Guo
Department of Engineering Mechanics
Tsinghua University
Beijing 100084 China
Tel: +86-10-62782260/Fax: +86-10-62781610
E-mail: demgzy@tsinghua.edu.cn

Prof. Ji Hwan Jeong, Ph.D.
School of Mechanical Engineering, Pusan National University
San 30, Jangjeon-Dong, Geumjeong-Gu, Busan, 609-735 Korea
Tel: +82-51-510-3050 /Fax: +82-51-512-5236
E-mail**:** jihwan@pusan.ac.kr

Prof. Nobuhide Kasagi
Department of Mechanical Engineering
University of Tokyo, 7-3-1 Hongoh,
Bunkyo-ku, Tokyo 113-8656, Japan
Tel: +81-3-5841-6417/Fax: +81-3-5800-6999
E-mail: kasagi@thtlab.t.u-tokyo.ac.jp

Prof. Moohwan Kim
Department of Mechanical Engineering
Pohang University of Science and Technology
San 31, Gikok-Dong
Pohang, Kyungbuk 790-784, South Korea
Tel: +82-562-279-2165/Fax: +82-562-279-3199
E-mail: mhkim@postech.ac.kr

Prof. Sang Yong Lee
Department of Mechanical Engineering
KAIST, Science Town
Daejon 305-701, South Korea
Tel: +82-42-869-3026/Fax: +82-42-869-8207
E-mail: e_hyunny@cais.kaist.ac.kr

Prof. Koji Miyazaki
Graduate School of Life Science and Systems Engineering
Kyushu Institute of Technology
2-4 Hibikino, Wakamatsu-ku,
Kitakyushu, Fukuoka 808-0196, Japan
Tel: +81-93-695-603/ Fax: +81-93-695-603
E-mail: miyazaki@life.kyutech.ac.jp

Prof. Koichi Suzuki
Department of Mechanical Engineering
Tokyo University of Science
2641 Yamazaki, Noda, Chiba 278-8510 Japan
Tel: +81-4-7124-1501/Fax: +81-4-7123-9814
E-mail : suzuki@rs.noda.tus.ac.jp

Prof. Wen-Quan Tao
School of Energy and Power Engineering
Xi'an Jiaotong University
Xi'an, Shaanxi 710049 China
Tel: +86-29-266-8722/Fax: +86-29-266-8789
E-mail: wqtao@mail.xjtu.edu.cn

Prof. Yasuyuki Takata
Department of Mechanical Engineering Science
Kyushu University
Fukuoka 819-0395, Japan
Tel: +81-092-802-3100/Fax: +81-092-802-3100
E-mail: takata@mech.kyushu-u.ac.jp

Dr. Chi-Chuan Wang
Energy and Environment Laboratories

Industrial Technology Research Institute
D100 EEL/ITRI, Bldg. 64, 195-6, Section 4
Chung Hsing Road, Chutung, Hsinchu 310
Taiwan, R.O.C.
Tel: +886-3-591-6294/Fax: +886-3-582-0250
E-mail: ccwang@itri.org.tw

Professor Somchai Wongwises
King Mongkut's University of Technology Thonburi
126, Prachauthit Road,
Bangmod, Thung Kharu, Bangkok 10140, Thailand
Tel: +662-470-9115/ Fax:+662-470-9111
E-mail: somchai.won@kmutt.ac.th

Regional Scientific Committee Members for Europe, Africa and India

Mr. Carlos Pérez Caseiras
Valeo Engine Cooling Spain
Carretera de Logrono km 8,900
50011 Zaragoza
Spain
Tel:: +34 976248857
Fax: +34 976248701
E-mail: carlos.perez@valeo.com

Prof. Boris V. Dzyubenko
Department of Aviation and Space Thermal Technics,
Moscow Aviation Institute ,
4, Volokolamskoe shosse, Moscow, 125993
Russia.
Tel: +7-495-158-4314
Fax: +7-495-158-2977
E-mail: heat@mai.ru

Prof. Stephan Kabelac
Institute for Thermodynamics
Helmut-Schmidt University of the
Federal Armed Forces Hamburg
D - 22039 Hamburg, Germany
Tel: +49-40-6541-2735

Fax: +49-40-6541-2005
E-mail: Kabelac@hsuhh.de

Prof. Tassos G. Karayiannis
School of Engineering and Design
Brunel University
Uxbridge, Middlesex UB8 3PH, UK
Tel: +44-1895-267132/Fax: +44-1895-256392
Email: tassos.karayiannis@brunel.ac.uk**Prof. Dr.-Ing.**

Dr.-Ing. Sameer Khandekar
Department of Mechanical Engineering
Room: SL-109
Indian Institute of Technology Kanpur
Kanpur (UP) 208016, India
Tel: +91-512-259-7038
Fax: +91-512-259-7408
E-mail: samkhan@iitk.ac.in

Dr Henrik Kockum
Alfa Laval Lund AB, P.O. Box 74,
SE-221 00 Lund
Sweden
Tel : +46 46 36 68 13
Fax: +46 46 32 35 79
Email : henrik.kockum@alfalaval.com

Dr. Daniela Lavric
Corning S.A.S.
Corning European Technology Center
7 bis Avenue de Valvins
F - 77210 Avon Cedex, France
Tel: +33 1 64 69 73 75
Fax: 33(0) 1 64 69 74 55
Email: lavricd@corning.com

Mr Gajanan K Sadekar
Product & technology Development Centre
Heavy Engineering Division,
Larsen & Toubro Limited.
Powai Campus, Gate No. 1
Saki Vihar Road,
Mumbai-400072, India
Phone No +91 22 67052614
Fax No +91 22 67051404
Email: gajanan.sadekar@hed.ltindia.com

Prof. Stephan Scholl
Institute for Chemical & Thermal Process Engineering
Technical University of Braunschweig
Langer Kamp 7
D - 38106 Braunschweig, Germany
Tel: +49-531-391-2780/
Fax: +49-531-391-2792
E-Mail: s.scholl@tu-braunschweig.de

Dr. Khellil Sefiane
School of Engineering & Electronics
University of Edinburgh
Kings Buildings
Mayfield road
Edinburgh, EH9 3JL, UK
Tel: +44 131 6504873
Fax : +44 131 6506551
E-mail: k.sefiane@ed.ac.uk

Prof. Teodor Skiepko
Bialystok Technical University
Dept. of Thermodynamics and Fluid Mechanics
Wiejska 45C, 15-351 Bialystok, Poland
Tel: +48-85-746-9271
Fax: +48-85-746-9210
E-Mail: tskiepko@pb.bialystok.pl

Prof. Bengt Sundén
Division of Heat Transfer
Lund Institute of Technology
Box 118
22100 Lund, Sweden
Tel: +46-46-222-8605/Fax: +46-46-222-8612
E-mail: bengts@emvox2.vok.lth.se

Prof. G. Venkatarathnam
Refrigeration and Air-conditioning Laboratory
Department of Mechanical Engineering
IIT Madras
Chennai 600036
India
Tel: + +91 44 2257 4685
Fax: +91 44 2257 4652
Email: gvenkat@iitm.ac.in

Mr Marc Wagner
Air Liquide
Centre de Recherche Claude Delorme
1, Chemin de la porte des Loges
78354 Les Loges en Josas, France
Tel: + 33.1.39.07.60.75
Fax: + 33.1.49.83.58.08
E-mail: marc.wagner@airliquide.com