

SUMMARY OF

A CHINA-JAPAN-USA Workshop on Commissioning and Operation Optimization for Energy Efficiency on Public and Commercial Buildings

1. OBJECTIVE

A two-day workshop on commissioning and operation optimization for energy efficiency on public and commercial buildings with invited speakers and audiences was held in Hong Kong in Feb. 1st and 2nd, 2010. The vision of this workshop is assigned to establish a platform for detailed discussion on commissioning in buildings and their HVAC systems among world class researchers in the three countries, USA, Japan and China. Experience sharing and new idea of study for future cooperative research work are the most expectable deliverables of the workshop.

2. ORGANIZATION

The workshop is organized by:

Tsinghua University, China

Swire Properties Limited

And cooperative organized by:

Building Services Commissioning Association, Japan

Texas A&M University, USA

Advisory Committee:

Prof. Yi Jiang, CHINA

Mr. Cary Chan, HKSAR, CHINA

Prof. Nakahara, JAPAN

Prof. Claridge, USA

Prof. Lebrun, BELGIUM

Prof. Yingxin Zhu, CHINA

Prof. Shengwei Wang, HKSAR, CHINA

Mr. Tokita, JAPAN

Prof. Okumiya, JAPAN

Secretaraites:

Dr. Wei Qingpeng, qpwei@tsinghua.edu.cn

Dr. Jean Qin, jeanqin@swireproperties.com

3. WORKSHOP PROGRAM

DAY 1: 1st Feb, Monday

8:30	Reception
9:00 – 9:15	Welcome speech by Prof. Jiang Yi, Tsinghua University
	Welcome speech by Mr. Dominic Purvis, Swire Properties Limited
	Greetings from Dr. David Claridge, Texas A&M Univ. by Mr. Zhou Jijun
	Roll call of attendees
	Introduction the workshop agenda by Dr. Wei Qingpeng
9:15 – 11:15	Session 1A: Data of Energy Consumption in Operated Public and Commercial Buildings – State-Of-The-Arts in The Three Countries, Chaired by Dr. Wei Qingpeng
	Prof. Jiang Yi (CN), Actual Building Energy Use Data in China and Comparison to That in The World
	Prof. Okumiya (JP), Actual Figures of Building Energy Consumption in JAPAN
	Dr. Zhou (US), “The cost-effectiveness of Continuous Commissioning® over the past ten years”, Prepared by Bynum and Claridge.
	Mr. Cary Chan (HK-SAR), Energy Use Data in Commercial Buildings in HK and That in SPL-managed Buildings
	Discussion
11:15 – 11:30	Coffee and Tea
11: 30 – 13: 00	Session 1B: Cooling and Heating Demand /Consumption Data in

	Operated Commercial Buildings, Chaired by Dr. Wei Qingpeng
	Dr. Yoon (JP), Proposal and case study of useful application for BEMS data in real buildings
	Ms. Yan Bin (US) / Mr. Chang Liang (CN), Analysis on Cooling and Heating Consumption on UPENN Campus Buildings
	Dr. Wang FL / Dr. Wei QP, Breakout and Comparison Analysis on Cooling and Heating Consumption in Office Buildings in China, JAPAN, HK-SAR and US
	Discussion
13:00 – 14:00	Lunch Break
14:00 – 15:45	Session 2A: Commissioning and Study on Chilling /Heating Plant, Chaired by Prof. Jean Lebrun
	Dr. Zhou (US), “Optimization of thermal storage tank under a multi-tiered utility rate structure”, Prepared by Zhou and Wei.
	Prof. Okumiya (JP), Energy management at the design phase of retro-fit project for heat generating plant using LCEM program
	Prof. SW Wang (HK-SAR), Chiller plant and cooling tower system commissioning and optimal control
	Dr. Wei QP(CN), Chiller operation optimization and retrofitting
	Discussion
15:45 – 16:00	Coffee and Tea
16:00 – 17:45	Session 2B: Commissioning and Study on Chilled Water Loop, Chaired by Prof. Jean Lebrun
	Mr. Chang Cheng (CN), Observations on Chilled Water Loop in Actual Operated Buildings
	Dr. Jiang Ziyang (CN) / Prof. Jiang Yi, New Understanding on Chilled Water Loop Features with Different Regulation Scheme of AC Terminals
	Prof. SW Wang (HK), Commissioning and optimal control of complex

	chilled water system
	Dr. Jiang Ziyang (CN), Understanding Back flow Phenomenon in Secondary Pump System
	Discussion
17:45 – 18:00	Summary of DAY 1, by Prof. Zhu Yingxin and Prof. Okumiya

DAY 2: 2nd Feb, Tuesday

8:30	Reception
9:00 – 11:00	Session 3A: Commissioning and Study on VAV System, Chaired by Prof. Jiang Yi
	Prof. Zhu YX (CN), Discussion on VAV system
	Dr. Zhou (US), “Optimization of Supply Air Temperature Reset Schedule for Single Duct VAV Systems”, Prepared by Fan, Zhou, Wei.
	Mr. Watanabe (JP), Availability of HVACSIM+(J) for Life Cycle Management (includes VAV system)
	Dr. Xia Jianjun (CN), HVAC Terminals Comparison : FCU, VAV, CAV, VRF, THIC
	Discussion
11:00 – 11:15	Coffee and Tea
11: 15 – 12: 30	Session 3B: Commissioning and Study on AHU, Chaired by Prof. Jiang Yi
	Dr. Zhou (US), “Air-side Economizer – control strategies and misconceptions”, Prepared by Zhou, Wei, Claridge.
	Dr. Xia Jianjun (CN), Commissioning and Sensor FDD in AHU in US
	Dr. Jiang Ziyang (CN) / Ms. Chang Cheng (CN), AHU control logic and application in a multi-AHU served atriums
	Discussion
12:30 – 13:30	Lunch Break
13:30 – 15:15	Session 4A: Methodology of Commissioning, Chaired by Prof. Zhu Yingxin
	Prof. Lebrun (BE), Tools for Energy Audit
	Mr. Tokita (JP), Practice of HVAC simulation as a tool for Life Cycle Energy Management of Public buildings
	Ms. Yang (JP), Comparative verification of LCEM and DeST, representative HVAC simulation programs in Japan and China, for

	analyzing energy performance
	Mr. Chang Liang (CN), Using simulation to understand energy saving potentials in an office building in US
	Discussion
15:15 – 15:30	Coffee and Tea
15:30 – 17:30	Session 4B: Methodology of Commissioning, Chaired by Prof. Zhu Yingxin
	Dr. Zhou(US), Development and Testing of an Automated Building Commissioning Analysis Tool (ABCAT)”, Prepared by Curtin and Claridge
	Mr. Wang Xin (CN), On-line monitoring on energy end users in buildings – the methodology
	Prof. Jiang Yi (CN), Data Reporting Formant and Normalization: Introduction of ISO Standard and Annex 53 related issues
	Prof. Nakahara (JP), Framework of Continual Commissioning to Produce and Maintain Energy-efficient Buildings - definition and examples.
	Discussion
17:30 – 17:45	Summary of DAY 2, by Prof. Jean Lebrun and Prof. Shengwei Wang
17:45 – 18:00	Closing Speeches by Mr. Tokita (JP), Dr. Zhou Jijun (US), Prof. Jiang Yi (CN) and Mr. Cary Chan (CN)
18:30	Adjourn

4. SUMMARY OF SESSIONS

There are four sessions in this workshop and each of them occupied half-day including presentations and detailed discussion. The topics are:

Session 1: Data: electricity consumption data, heating and cooling consumption data

This session contains eight free speeches highly focus on real energy consumption

data by sectors across China, Hong Kong, Japan and the United States. Participation in the kickoff session was enthusiastic. Few questions were asked during or following the briefing. Professor Yi JIANG focused on the importance contrast of two approaches for built environment; Mr. JJ CHOU and Mr. Cary CHEN shared precious experience and data of continuous commissioning and building management; Dr. Liang CHANG and Dr. Bin YAN revealed the different energy cons. status by comparing two similar campuses in US and China. Prof. Okumiya furnished actual energy data and carbon dioxide emission figure in Japan, which gave the audiences a distinct view with the help of empirical simulation by Dr. Yoon. The Statistical energy cons. data was gathered, explained and compared in the breakout period, also gave tripartite sides a great panel of insights.

Session 2: Commissioning & Study on Waterside: chillers, pumps

Session two includes eight speeches discussing operation problems and phenomenon of waterside. Both of the speakers shared the significant results about system optimization and retrofiting. Professor Okumiya shared experience of energy management at the design phase of a retro-fit project for heat generating plant using LCEM program. Prof. Q.P. WEI, S.W. WANG, Dr. Z.Y. JIANG and Dr. Cheng CHANG analyzed similar ill-conditioned chilled water system and summarized the suitable commissioning method. Some special topics, for instance, the optimization of thermal storage system, heating generating plant or control of cooling tower were also chosen and presented to the participants. This session is more practical and technical, which also accompanied good participation and questions from audiences. After that, Prof. Zhu and Prof. Okumiya summarized the discussion for the first day.

Session 3: Commissioning & Study on Airside: HVAC Terminals (VAV, FCU, etc.) and air handling process

Following the train of thought on waterside, this session covered seven speeches and a free discussion. Prof. Y.X. ZHU, Mr. J.J. CHOU and Dr. J.J. XIA discussed VAV system from different aspects of view. More discussions about advantages and handicaps of VAV system were modulated by Prof. Yi JIANG. Those comments centered around two concerns, the huge fan power compared to FCU system and the energy wasting for

environment maintenance, like the using of reheat coil. Meanwhile, during discussion, Mr. Peter Ma and Professor Okumiya addressed that fire control of HVAC system in different countries may also influence on the zoning of VAV system. The control optimization and FDD method of AHU was also became a hotspot of presentation and discussion. Dr. J.J. XIA and Dr. Z.Y. JIANG gave the relevant speeches under this topic.

Session 4: Methodology of commissioning and simulation

On the basis of previous discussion, the methodology of both the process simulation and data analysis were worth thoroughly excavating in the last session. A tool for energy audit based on HVAC components analysis was introduced by prof. Jean LEBRUN in the beginning. Two simulation tools, LCEM in Japan and DeST in China, were compared by a simulate experiment by Mr. Tokita, Ms. Yang Zhan as well. Dr. L. CHANG simulated the energy cons. of an US campus and analyzed the rationality, while Prof. Y.X ZHU introduced analysis tool for automated building commissioning. Dr. X. WANG provided a fresh idea or energy efficiency index among those speeches. As the final speech, the distinguished expert Prof. Nakahara talked about the history of commissioning since 1970's and the framework of continual commissioning for energy conservation in buildings.

Prof. Jean LEBRUN presented a concise and crucial summary after the two-day discussion accompanied with Prof. Shengwei Wang. Guests and speakers provided a fitting finale to this CHINA-JAPAN-USA workshop.

5. CONCLUSIONS AND FUTURE ACTIONS

The participants are quite satisfied with the presentations as well as discussion in the workshop. Fresh presentations referring the latest study results and free discussion focusing on the assigned topics from different perspectives of different counties are treasurable of this workshop. Essentially, people believe that collection and sharing of energy use data within a structured energy efficiency index system (EEI) such as energy use intensity (EUI) including electricity, gas, cooling and heating, in terms of

per floor area or per person, in different type of buildings with different systems, or in different climate, in different countries, etc., can enhance the understanding and knowledge of commissioning and operation optimization in public and commercial buildings. A sustained periodically workshop is highly expected.

Drafted by:

Dr. Qingpeng Wei gpwei@tsinghua.edu.cn,

Ms. He Xiao xiao-h04@mails.thu.edu.cn