NEWSLETTER

ASHRAE SINGAPORE CHAPTER

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Publicity Committee
Lal Jayamaha
Raymond Chang
Adrian Wang
Chris Tham

Mailing address:
ASHRAE Singapore Chapter
Bukit Merah Central PO Box 626
Singapore 911535.

MESSAGE FROM THE PRESIDENT

Dear Fellow Members and Friends,

As we move into the new millennium and look back through our Singapore Chapter's history, we have indeed come a long way.

The incoming Chapter Officers and the Committee Chairs have begun work to plan for the various tasks, short courses and activities for this fiscal year. Please watch out for them. The details and updates can be found in the calendar of activities.

We will also want to keep you updated on the revisions and updates of the relevant local codes on Air-Conditioning and Mechanical Ventilation systems as well as any latest happenings in the Refrigeration industry. The aim is to keep our members informed of the trends and developments in these fields.

If you have suggestions, please forward them to me. We hope to serve you better.

Leong Cheng Wee
President 2000-2001
ASHRAE Singapore Chapter

EDITORIAL

This is the first Newsletter of the new Millennium (the previous newsletter was delayed from December 1999) and was put together by the new Publicity Committee. We hope to publish at least another two issues during our 2000/2001 term to bring you more news and articles covering Chapter activities.

In this issue, we have a message from the new President, articles covering the various activities such as technical talks & family day, the BOC directory and the planned calendar of activities for 2000. This issue also includes an article written by one of our past-presidents, Mr. Loh Peng Sum and an article on the History of Refrigeration in Singapore written by Mr. G.S. Tan. The latter article was originally written for the Chapter's video production on "Air-conditioning and Refrigeration Development in Singapore". We are hoping to publish some more articles written for the video project in future issues of the Newsletter.

The Publicity Committee is also working on upgrading the Chapter's web site to include more up to date information for members. Once upgrading is complete, the web site will have a new address (we will keep you informed) and would also have a link from the Society's home page.

Editor
Lal Jayamaha (2000 – 2001, Chairman Publicity)

NOTICES

Complementary VCD on "ASHRAE Singapore Chapter: Air-Conditioning and Refrigeration Development in Singapore"

We are pleased to announce that the above video production has successfully been completed and was screened at our 18th Annual Installation Dinner and Dance on 22 April 2000. This is a 13 minutes corporate video commemorating the air-conditioning and refrigeration development in Singapore, a brief history of this chapter, and its aspirations in the 21st century.

This video production was made possible with generous support from sponsors and credit mentioned of organisations and individuals, as listed in the VCD back-cover and inlay prints.
We hope that this video will create a sense of awareness and interest in this segment of the history of Singapore. The provision of air-conditioning has often been taken for granted - almost everywhere we need air-conditioning comfort in our life-style; homes, offices, transport, etc.

In conjunction to the Millennium celebration, our members who have paid their dues for Year 2000-2001 are entitled to have a **free** VCD copy. Until December 2000, members may collect their VCD copy during our 'Technical Talk' events.

Membership Data
Please inform Mr Soo Hin Teck, Chairman, Membership (see page 11 for address) any changes in your personal data such as address so that we can update the Membership database.

Apology
ASHRAE Singapore Chapter would like to apologise for the error in printing Mr. Lam Seng Heng's name (company representative) instead of Kaltech Engineering & Refrigeration Pte Ltd under the 'Silver' category of sponsorship for the VCD.

TECHNICAL TALKS

'e'-Seminar for ASHRAE Members

An evening e-seminar was held on 25th May 2000 at the Hotel Grand Central.

In the knowledge-based economy, there is no doubt that Information Technology (IT) is driving the growth of any business and will make the difference between success and failure.

exo-net International Ltd CEO, Mr. David McKee Wright presented a session on a web-based integrated e-business / accounting system which will take businesses into the forefront in the e-commerce era.

Channel Relations Manager - Adalynn Tan HY also demonstrated the ease of using the exo-net3000 ***web-enabled*** ERP (Enterprise Resource Planning) business and accounting software that featured a full suite of functionalities inclusive of Debtors, Creditors, Stock-Inventory Management, General Ledger, Multi-currency, Bill of Materials, Point-of-Sale, Job-Costing, Contact Relation Management (CRM), Time-Billing, Power Reporting, Document Manager, Internet Auctioning, etc.

The seminar ended with active responses from the audience during the lively question-answer session.

An Overview of Smoke Control

A technical talk titled "An Overview of Smoke Control" by Dr. John Klote was held on 7 June, 2000 at the Le Meridien Hotel.

Dr. John Klote is an ASHRAE distinguished lecturer and his firm provides consulting services to fire protection engineers, mechanical engineers and code officials concerning practical solutions to various fire protection problems.

The speaker presented the basic principles of smoke control, such as, mechanisms of smoke control, airflow & pressure difference, door opening forces, design pressure differences, smoke control systems and reliability of systems.

The talk described the different mechanisms of smoke control, namely, compartmentation, dilution, pressurisation, airflow and buoyancy together with their respective advantages and disadvantages for different applications.

The talk also covered the reliability of smoke control systems in terms of the mean life of commissioned systems and was explained using a number of examples.

Asia-Pacific Regional Workshop on Energy Efficiency

The Asia-Pacific Regional Workshop on Energy Efficiency organised by the Germany - Singapore Environmental Technology Agency was held from 23 to 25 May, 2000, at the Sheraton Towers in Singapore.

This workshop was also co-organised by Ministry of The Environment and the Building and Construction Authority (BCA) of Singapore. More than 70 participants, mainly from the Asia-Pacific region and Germany attended the workshop.

The opening address was made by the Guest-of-Honour, Assoc. Prof. Koo Tsai Kee, Senior Parliamentary Secretary, Ministry of National Development, Singapore.

The participants from different countries presented papers on energy efficiency programmes and role of the state in promoting energy efficiency in their respective countries and included papers by representatives from the Public Utilities Board and the Building and Construction Authority of Singapore.

Technical papers were also presented at the workshop by three ASHRAE Singapore Chapter Members; A/Prof. S.K. Chou, Dr. Lal Jayamaha and A/Prof. Wong Yew Wah. The titles of the papers were "Building energy simulation for energy efficiency", "Improving building energy efficiency through intelligent control strategies" and "Energy targets for commercial buildings in Singapore", respectively.

The workshop was successfully concluded with a site visit to a building with a well-established energy efficiency programme.

Singapore & Malaysia Bilateral meeting cum Family Day on 11 & 12 December 1999 held at Malacca Village Paradise Resort.

Written by Tan Sze Wah
(On behalf of Program Committee Chaired by Mr Philip Chua)

This year we took the opportunity to combine the Singapore & Malaysia annual bilateral meeting with a Family Day. The meeting cum family day was held at Malacca Village Resort in Malacca. The resort had a fantastic view of the golf course, lakes and forest. There was lots of entertainment for all.

This was the first time we had an overseas family day and we had a good response from our members. Altogether, we had 27 adults and 19 children travelling to Malacca for the meeting on 11 & 12 Dec 1999. The journey there was smooth with nearly all our members driving or hitching a ride. All arrived safely and there was a smooth check-in with the help of the Malaysian Chapter's arrangements.

The meeting kicked-off with a round of introductions and a jungle hike on Saturday afternoon. A guide took our members and children to a nearby forest trail. This was followed by a delicious seafood dinner in Malacca town in the evening. After dinner, we proceeded to the resort for a durian party where we consumed more than 100 kg of durians. No wonder no one dared to come near us after that!

View of the Resort

The Executive committee members then discussed serious matters during the bilateral meeting with the Malaysian counterparts whilst the rest of participants took a well earned rest to prepare for the next day.

The planned activities for the next day were games after breakfast and golf after lunch. We had games like searching for items, Tele-match and putting golf balls. The ASHRAE members were found to be really talented, finding mosquitoes and women bras within 2 minutes. The games really broke the ice and everybody came out winners.

The games were very well selected. They were not difficult and the children could also join in. It is very fortunate for us to have very sporting members. Special mention to Mr Hing, Mr Hean, Arthur Chay and Norman Ng for being so sporting and humorous.

After the games, we gathered for a group photo and prize presentation. The prizes had been wrapped by the Malaysian members and everybody got a prize!

ASHRAE Members in action

The golf game did not materialise. The exciting morning games had physically exerted some of our members that they needed a good rest! Jokes aside, some of golfing members had to travel back to Singapore early. My initial worry was that some members would be very disappointed because they specially told me that they would not come unless there was golf!

Fortunately, the disappointment was limited as most of them had a great time and they said that they would make up for it when they get back.

We must thank the Malaysian Chapter of ASHRAE for their help in making this event a success. The total number of participants from Singapore and Malaysia was 50 adults and 37 children.

Group Photograph taken at the end of games

The History of Refrigeration in Singapore

By G.S. Tan

The advent of refrigeration and air-conditioning in Singapore was in the year 1932. At that time both Carrier and York were the two U.S brands to arrive in Singapore. Carrier was represented by United Engineers and York by Sime Darby. These were followed subsequently by Worthington represented by Jardine Waugh and Chrysler by Kian Gwan. These were mainly for Air-conditioning applications.

The story of refrigeration in Singapore began in the 1930s. Only York was very strong in Refrigeration work and among the very early projects were the ice making plants. The first being the Singapore Ice Works which was located at Sungei Road. It used both large Carrier and York VSA Compressors. This was followed by Alexandra Ice Works and Tuck Lee Ice Works in the 1950s, both factories were in the Havelock/Alexandra Road area. Shortly after, Singapore Cold Storage installed another ice plant and cold storage/freezer room facility in Teck Guan Street. In the early 1960s, Jurong Ice Works re-located to Jurong Fishery Port. The Singapore Cold Storage Complex in Teck Guan Street, was demolished only quite recently, to make way for the present United Engineer's Development at the corner of River Valley Road and Clemenceau Avenue. Around this time another ice factory, Nanyang Chinese Ice Factory, was built at Tanjong Rhu. This company was also in the cold storage business. Eventually, this plant also fell victim to re-development.

All of these plants were Ammonia refrigeration systems employing large heavy duty, slow speed VSA type compressors, producing "block ice" which was the only known system in those days, and used mainly by the fishing industry. The blocks of ice were crushed for use by the fishermen to preserve their "catch" during periods when their fishing boats were out at sea. Seafood products were preserved by packing them in crushed ice in the vessels' holds or in baskets, in order to maintain them at temperatures low enough to prevent "spoilage" of the catch.

Of the earlier Ice Plants only Alexandra / Jurong Ice Works and Tuck Lee are still in business, using re-designed plants employing high speed modern compressors and equipment. Tuck Lee Ice has expanded their operations to include the first fully automated Packaged Tube Ice manufacturing plant in Singapore. They still retain the original Block Ice system to serve their many loyal customers. Jurong Ice has modernised their plant and continues to manufacture Block ice. However they are now also branching out to manufacture tube ice.

The original Singapore Ice Works at Sungei Road was demolished and the plant operations re-located in the 1970s to Auric Pacific, also at Fishery Port Road, using more update equipment. This facility has since closed down after being in use for over twenty years..

Apart from ice making plants the other major application for refrigeration in the 1930s was refrigerated warehouses for food storage and distribution, and in the early 50s with the advent of supermarkets, refrigeration was required to refrigerate display cases/coldrooms in food retail outlets, hotels and restaurants.

Among the earlier users of refrigeration for Food Storage/Distribution were Cold Storage, Fitzpatricks, Ben Food, Malayan Refrigeration Co. These were mainly Food Wholesalers and Retailers.

The first real "Supermarket" was installed in the mid 1950s by Bill Fitzpatrick and George Holt and was a "mini" version located in a grocery shop, in Oldham Lane. Singapore Cold Storage was quick to follow suit with a larger Supermarket at Orchard Road. Smaller installations soon followed at their Holland Road and Naval Base outlets.

In the 1950s, there were only 3 "major" Supermarkets in Singapore, namely Cold Storage Supermarket, which was located at Orchard Road, the current Centrepoint. The store had under gone 6 re-models over the last 40 years to its present modern Shopping Centre. The other major supermarket was Fitzpatricks which built a new large Cold Storage and Walls Ice Cream manufacturing Complex, and a large modern U.S. style Supermarket at Orchard Road, at the location currently occupied by The Promenade. The third supermarket was the NAAFI Shop at the Orchard Road site currently occupied by the Orchard Building. The NAAFI shop was mainly patronised by the British Army staff in those days. There were also some smaller installations such as Tay Buan Guan Supermarket in Katong, which was well patronised by the well educated and the richer population, who happened to live in the Eastern part of Singapore.

It was not until 1973 that the supermarket industry in Singapore began to "boom". NTUC, the Union Co-operative started the first "Welcome" Supermarket at Lorong 4 Toa Payoh (subsequently re-named NTUC Fairprice). "Supreme" supermarket in Supreme House was next followed immediately by "Yaohan" at Plaza Singapura in December 1973. From then onwards refrigeration for the supermarket industries grew by leaps and bounds until to-day where we have more than 200 stores of varying sizes.

Following the tremendous growth of the food storage/distribution and retail industries, it is natural for the food processing industries to take off. In the early 1930s, the demand for frozen and chilled food was very limited and was mainly, consumed by Expatriates. It was only in the 1950s, after the war (from 1942 - 1945), that refrigeration really play a very important part in our daily lives. The availability of domestic refrigerators/freezers in the market such as Kelvinator, Frigidaire, Westinghouse, Philco, etc gave impectus to the growth of Processing and Preservation of Food items.

The early pioneers in the food manufacturing industries were Singapore Poultry Processing in the early sixties. This was followed rapidly by others such as Lee Poultry, Hellaby & Lee Meat Processing. Many of these have been over taken by others and were no longer in existence today.

The beverage industries were other areas where refrigeration played a major role in the early fifties. I remembered the first Pepsi plant where they have a large refrigeration plant was located at the old Havelock Road and F& N at the end of River Valley/Alexandra Road. Then there were the Amoy Canning (Green Spot) and Yeo Hiap Seng in Bukit Timah Road, Framroz in Jalan Besar and Sinalco (National Aerated Water Co.) in Serangoon Road. All have some kind of refrigeration plant with cooling tower or evaporative condensers. Other than Yeo Hiap Seng and F & N, both located in their modern facilities, the rest have closed down or over taken by new players like Malaysian Dairies, Australian Fruit Juices, etc.

The Pharmaceutical & Drugs manufacturing, Petro-Chemical and Marine Industries were also the early users of refrigeration in most of their process and still are today. All of the various "Processes" involve some sort of refrigeration. Many of these installations employ refrigeration systems of very large capacities exceeding several thousand kW connected power loads.

In Medicine, we also find a multitude of requirements for refrigeration from "blood" banks to mortuary cabinets, Cryogenics to complex freezing techniques for Specialist Surgical Procedures, Transplantation's, Hypothermia treatments, etc.

Although the petrol chemical and the marine industries were among the early users of refrigeration in their processes, it was in food and beverage processing, and distribution that saw the first application of refrigeration in Singapore and the focus of this story.

After seventy years of refrigeration it is no wonder that in any supermarket today, it is possible to find a whole range of all kinds of refrigerated food products ranging from ice cream to popiah skin to spring roll, curry puffs, noodles, tofu, pau, etc. All these are made possible with the development of the total refrigerated food supply chain brought about by advancement of food technology and refrigeration.

CRYSTAL BALL GAZING

By P S Loh

(This article was originally written for publication in 1999 but could not be included in the December 1999 issue due to space constraints).

As the millennium draws to a close (contrary to popular belief, 2000 marks the end of the present millennium and not the start of the new) perhaps it is an appropriate time to do some crystal ball gazing and see what may be in store for the air-conditioning industry in the next 5 to 10 years. In the third of a century that I have been in the industry I have not seen any revolutionary change, rather the changes have been evolutionary, so I expect the same to be true in the near future. I will first address some issues and then look into specific developments I expect to see.

Energy Conservation
In the mid-70s when the cost of crude oil shot up suddenly there was an immediate boost to energy conservation driven by economic reasons. At the time the doomsayers also foresaw an end to the seemingly limitless supply of fossil fuels. Today, crude oil prices have more or less stabilized at an acceptable level the impetus for energy conservation comes from the concern over the emission of greenhouse gases. Of course natural sources of fossil fuels are been depleted albeit at a reduced rate from the energy guzzling 50s and 60s.
Therefore, efforts towards more energy conservative air-conditioning systems cannot diminish. Manufacturers are producing more energy efficient equipment. System designers will also need to design more energy efficient systems utilizing these equipment. A more holistic approach to building design is required. Engineers need to be involved very early in the development of building design. Building orientation, shape and size, façade design all impact seriously upon energy consumption for a particular building. In the Singapore context, because of small fluctuation in diurnal and annual temperatures, these are some of the few energy conservation options available.

As Singapore is wholly dependant on imported fuel for all her energy needs, energy conservation is of prime importance in all building designs. Singapore developed legislation for energy conservation in buildings relatively early, in 1982 when the OTTV (overall thermal transfer value) limits were adopted. With the ready availability of computer simulation software for energy utilization in buildings a review of the concepts previously introduced will be timely.

Perhaps a more performance based rather than a prescriptive based approach towards legislation for energy conservation in buildings needs to be introduced. I expect this will happen in the near future. Studies are also being carried out to determine an energy utilization index for Singapore buildings, which can be used as a base for the design of future buildings.

Refrigerants
The Montreal Protocol for phase out of CFC refrigerants is on schedule. Alternate refrigerants are being developed to replace CFCs. Azeotropic mixtures will become more common as production rates increase. Perhaps ammonia will also become a viable alternative as manufacturers produce suitable equipment. As CFCs are being phased out and the ozone layer stabilizes the concern is now turned to refrigerants, which contribute to the greenhouse effect.

I expect that over the next few years the refrigerant issue will be settled and the choice will become limited to a few more commonly used refrigerants as production rates match demand. Costs can then be brought to the same level, or lower than, as the refrigerants currently in general use.

Indoor Air Quality
Indoor air quality has been a concern over the last decade or so. Filters to remove particulates up to sub-micron sizes (HEPA and ULPA) are available. Filters may also be treated with biocides to control microbials in the air. We may see the development of filters perhaps using micropore material which can remove VOCs (volatile organic contaminants) and odours.

Introduction of standards such as ASHRAE 62 (being reviewed) would help to ensure the ideal indoor air quality can be maintained in air-conditioned buildings to reduce the effects of poor ventilation and the sick building syndrome.

Controls
With the proliferation of microprocessors and digital systems, we will see these chips embedded at the components level. We will see "smart" thermostats, humidistats, motors, etc. Thermostats will have the control intelligence built-in in the form of an embedded chip. Motors will be "intelligent" eliminating the need for separate starters or VSDs (variable speed controllers); embedded chips and power electronics will control all such functions. Built-in intelligence would include self-diagnostics or perhaps even self-repair. All this will lead to cheaper, maintenance free and more energy efficient operation of air-conditioning systems.

Individual components can be networked together on a common bus system eliminating the need for BAS/BMS (building automation or management systems) or DDC (direct digital control) systems, only a man-machine interface system need to be tacked on at the front end. Such networking will extend beyond the air-conditioning system and include other services such as fire protection, security, CCTV (closed-circuit TV), vertical transportation, telecommunications, computer networks, etc. The ASHRAE BACnet (which took a decade to develop) and similar standards would help to ensure interoperability between the various systems and services.

Refrigerant Equipment
Reciprocating compressors are being replaced by rotary, scroll and screw compressors and will probably be phased out completely. Centrifugal chillers with efficiencies approaching the theoretical cycle efficiencies are now produced. In the short term we will probably see more improvement in operating efficiencies. "Smart" motors will be introduced; better heat transfer in condensers will be achieved.

The Carnot cycle is the basis for all refrigeration systems. Perhaps we will see systems based on, say, the Stirling cycle or other yet to be invented refrigeration method being developed although I do not see this happening soon.

The latent heat load is very high in Singapore; alternative dehumidification systems, which are more energy efficient, may see greater application as costs are reduced. Moisture absorption or adsorption systems like the thermal wheel may become more common. Current technology can produce cost effective systems already. System designers need to incorporate these equipment into their designs.

Due to the low approach temperature, cooling towers need to be over-sized for Singapore applications. Also, water is a valuable resource in Singapore. We have not seen much development in cooling tower technology. Perhaps this will change in the next few years. An air-conditioning system is merely a device that removes heat from the interior of a building and rejects this heat to the atmosphere through the cooling tower, in a water-cooled system.

Overall COP (coefficient of performance) of systems will be improved through the use of more efficient chillers, pumps, fans and motors. Again, the technology is already available and it is up to the system designers to apply these technologies in their designs.

These developments will probably take place within a timeframe of, at most, the next decade. To venture further into the future may be into the realm of science fiction and I am not game to go that far.

BOC DIRECTORY

Name	Position	Working Organisation	Office TelNo.	E-mail Address
Leong Cheng Wee	President	Murray -North (SEA) Pte Ltd	3453055 Ext 117	cwleong@mnsea.com.sg
Steven Chan Kwang Meng	President-Elect	Airklean Engineering Pte Ltd	3826619	schan@airklean.com.sg
Chen Siew Ik Ong Chau Tuang	Immediate Past President Hon. Secretary	COM Consultants Ngee Ann Polytechnic	7356028 4606651	chesiky@pacific.net.sg oct@np.edu.sg
Albert Sin Yew Tek	Hon. Treasurer	Land Transport Authority	3962716	albert_sin@lta.gov.sg
Soo Hin Teck	Chairman, Membership	Ngee Ann Polytechnic	4606807	sht@np.edu.sg
Bobby Han Chao Juan	Chairman, Program	Danfoss Industries Pte Ltd	2638216	bobbyhan@danfoss.com
Loh Sin Foo	Chairman, Education	Singapore Polytechnic	7721741	lohsf@sp.edu.sg
Lal Jayamaha	Chairman, Publicity	Johnson Controls (S) Pte Ltd	7406750	sharmilal.jayamaha@jci.com
Arthur Chay Kwok Weng	Chairman, Research Promotion	Airmetric Engineering Pte Ltd	5690177	ametric@singnet.com.sg
Henry Lee Hui Seng Tan Gek Suan	Hon. Auditor Chapter Historian Region XIII, Historian Chairman, Refrigeration	- Hussman Tempcool Pte Ltd	4675522 7459911 7462867	hhslee@pacific.net.sg gstan@tempcool.com.sg
Hawlader M N A	Hon. Auditor	National University of Singapore	8742218	mpehawla@nus.edu.sg
Lee Siew Kee	Region XIII, Treasurer	Singapore MRT Ltd	3311049	Leesk001@singnet.com.sg
Raymond Wong Yew Wah	Region XIII RVC, TEGA	Nanyang Technological University	7905543	mywwong@ntu.edu.sg
Sunny Tan	Region XIII RVC, Student Activities	Building Services Consultant	4664000	Vicsun@singnet.com.sg
Ng Eng Hong	Region XIII Nominating Committee Chairman	Singapore Polytechnic	7721566	enghong@sp.edu.sg
Chou Siaw Kiang	Chairman, Asia Pacific Conference 2001, Singapore Organising Committee	National University of Singapore	7726503	

For more information on matters such as Education, Membership, Programmes (Technical talks) and Publicity (Newsletter & Website), please contact the respective Chairmen.

CALENDAR OF ACTIVITIES

Planned Calendar of Activities

Date	Activity	Committee In-Charge
July 29	TECH Month, Seminar on Cleanroom Technology: Testing, Certification and Equipment	Program
August	Newsletter	Publicity
August 25& 26	CRC in Kuala Lumpur, Malaysia	
August	Technical Talk – Cleanroom Standards	Program
September	ASHRAE Fundamentals of Water Systems	Education
October	Technical Talk – Carpark exhaust systems (latest CP13)	Program
November	Newsletter	Publicity
November	Technical Talk Cold room design, energy savings	Program
November	ASHRAE Fundamentals of HVAC Control Systems	Education
November	Members Nite	Membership
December 9	Family Day – Water Carnival	Program
February	Technical Talk – Performance Contracting / Energy Efficiency	Program
March	Newsletter	Publicity
May	Technical Talk – Financial Planning	Program

18TH ANNUAL INSTALLATION DINNER AND DANCE

Singapore Chapter held its 18th Annual Installation Dinner and Dance on the 22 April, 2000 at Grand Copthorne Waterfront Hotel. More than 500 members and guests attended this gala event.

The event commenced with the Welcome address by Dr. Jeremy Chia, Chairman, Dinner & Dance Organising Committee. Thereafter, the Guest of Honour Mr. Teo Nam Kuan, General Manager (Standards & Metrology), Productivity and Standards Board addressed the gathering.

Installation of the incoming President and his Board of Council members was the highlight of the evening with the Outgoing President Mr Chen Siew Ik handing over the gavel to the new President Mr. Leong Cheng Wee during the ceremony.

During dinner, a video produced by the Chapter on "History of Air-Conditioning and Refrigeration Development in Singapore" was also screened.

This was followed by presentation of 10 year Singapore Chapter membership certificates, golf tournament prizes, many fun filled games and the lucky draw.