VOLUME 1 ISSUE 2
NOVEMBER, 2006

HKIE Mechanical, Marine, Naval Architecture & Chemical Division

Newsletters

Sustained Excellence in the Engineering Profession

Technical Seminar on Preemptive Diagnostics

Date	Tentative Activities
25 Nov 06	Technical Visit to KMB Depot
30 Nov 06	MMNC Reception 2006
16 Dec 06	Technical Visit to Cathay Flight Simulator
9 Dec 06	Technical visit to EMSD HQ
Jan 07	Technical Visit to Sewage Treatment Plant in Ngong Ping
Feb 07	Marine Pollution or New Structural Rules for Ships
Feb 07	Container Manufacturing & Guangzhou Honda plant
7 Mar 07	廣洲海事展覽和論壇
Mar 07	2nd IMMEX 2007 exhibition and conference in Guangzhou , March 2007
Mar/ May 07	Overseas Delegation to Korea
April 07	AGM/Annual Dinner

(By Mr. Duncan Chan)

A Technical Seminar on Preemptive Diagnostics was held by the Mechanical, Marine, Naval Architecture & Chemical Division (MMNC) on 9 June 2006. The seminar was mainly focused on preventing breakdowns and enhancing life of power plant engines. The speaker, Ir Jeremy S.F. Ho first introduced the two major diagnostics, namely Specification-based Diagnosis (Preventive) and Symptom-based Diagnosis (Preemptive). The aim of the seminar was to explain some of the advantages preemptive diagnostics has over preventive diagnosis.

The idea of preemptive diagnostics is to monitor actual operating conditions, focus on improving overall effectiveness and optimize operation. The advantages include reducing repair bills, reducing catastrophic failures, increasing machinery life, reducing non-scheduled downtime, thus increase in production since maintenance is only performed when needed. Therefore, time driven schedule maintenance is very inflexible.

Power plant failures are usually caused by excessive vibration, temperature, lube oil degradation, mechanical looseness, leaks etc. So a successive preemptive program should be able to monitor the above situations. The technologies used in preemptive diagnostics are something we are very familiar with:

1) Vibration Analysis
Use to check for imbalance and misalignment
2) Airborne Ultrasonics
Use to check for leaks, bearings/gears impacts and electrical arcing. It detects noise in the 20-100,000 Hz range.
3) Infrared Thermography
Measures differential or absolute temperature
4) Oil Analysis
Consists of viscosity, contamination, oxidation tests and particle count. Use to check for all kinds of wear and tear.
5) Visual Inspection
Check for corrosion, erosion, cracks, defective welds etc.
6) Non destructive test (NDT)
Includes hydrostatic, eddy current testing (electromagnetic). The testing is sensitive to small defects, provides immediate result, requires only portable equipment and minimum preparation, and costs are marginal.

Ir Jeremy S.F. Ho introduces the two major diagnostics, namely Specification-based Diagnosis (Preventive) and Symptom-based Diagnosis (Preemptive)

Ir Ho went on to talk more about visual inspection and eddy current testing. He used a steam turbine generator condenser as an example. Lots of problems will occur overtime including blistering and damaged coating, surface pitting, cavitation erosions, peeling, marine growth, corroded fittings, tube end and plate corrosions. The condenser is an important part of a power plant and its failure could lead to an overall shutdown of the generator. Therefore economical and time efficient methods are required. Visual inspection plus eddy current testing are perfect for these cases. An optimum power plant should be of high reliability and availability, low initial cost and economical operation, and high degree of maintainability. As a summary, preemptive diagnostics facilitates predictive maintenance for power plant engines through constant monitoring of the conditions of the equipment to identify faulty units.

The MMNC Division would like to thank Ir Ho for introducing this interesting topic on preemptive diagnostics as to extend the production life of a power plant.

Technical Visit to Tung Chung Cable Car

Tung Chung Cable Car is one of Hong Kong's newest and most exciting attractions for local and overseas visitors in the coming few years. To allow members to get the most update information on the design and construction of the system, a technical visit to Tung Chung Cable Car was organized by MMNC Division on 11 March 2006.

Tung Chung Cable Car is a 5.7km cableway linking Tung Chung and Ngong Ping on Lantau Island where the Tian Tan

Buddha Statue and Po Lin Monastery are located. The cable car has a capacity of about 3,500 persons per hour per direction, and is a bi-cable design with 8 supporting towers.

The cable car cabin has a modern design with seating for 10 passengers and standing room for another 7. By using the new cable car, the journey from Tung Chung Town Centre to Ngong Ping will be shortened to around 20-25 minutes when compared with the 1-hour journey by using public bus.

During the visit, members visited the Tung Chung Terminal and Airport Island Angle Station to familiarize the design of the new cable car. Furthermore, members had chance to discuss with the project engineer of MTRCL to gain knowledge and experience in the construction of the project.

We would like to this opportunity to give our warmest thanks to Mr Calum SMITH, and Ir Kenny PANG of MTRCL for this great and impressive technical visit.

Technical Course Product Platform for Engineering Design and Applications

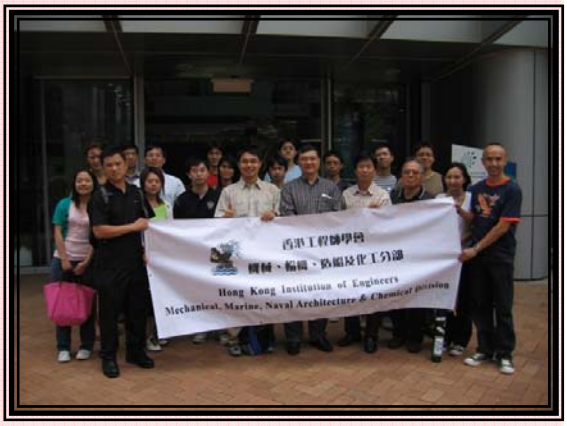
By Ir Dr. K. T. Lau

A 2-day technical course "Product Platform for Engineering Design and Applications" was organized by the Department of Mechanical Engineering, The Hong Kong Polytechnic University, MTech Engineering Co., Ltd, Institution of Engineering Designers (IED) and MMNC Division on 15 and 12 August 2006 at Product Innovation Laboratory, The Hong Kong Polytechnic University. This course aimed at providing engineering industrialists who are working in small and medium enterprises (SMEs) a fundamental knowledge on how to use product family and platform designs to enhance their efficiency in designing products. The platform designs are able to keep design's knowledge and history, and also allow sharing similar parts and components for different products, which means, the engineering designers do not need to start designing similar products from a zero ground. This is an essential technique for engineering product design to keep short design and processing time, and has been well adopted by large companies. CATIA V5 was used as a base for building up platforms.

The first day was focused on the basic concept of the product family and platform. An introduction and demonstration were given by Ir Dr. K. T. Lau and Mr. Horace Chan from the Department of Mechanical Engineering, The Hong Kong Polytechnic University, respectively. The second day was practical trainings to provide participants a real feeling on how to establish a platform to design good engineering products. A total of 40 participants from electronic, toys and domestic product industries joined the course. On behalf of HKIE MMNC division, we would like to express our gratitude to Ir Dr. Alan K. T. Lau for his kind assistance in arranging this professional course for our members.

Technical visit to Hong Kong Science Park

On 13 May 2006, the MMNC Division organized a technical visit to the Hong Kong Science Parks (HKSP) located in Pak Shek Kok, New Territories. The visit was to introduce the design characteristics, construction details of HKSP and tour the shared laboratory inside. The park is divided into three phases. Phase 1 was inaugurated in 2004 and is now fully equipped. Phase 2 is scheduled for completion in 2008 with the first two buildings in full operation in early 2007.



As the HKSP website* mentioned, the purpose of the park is to provide a knowledge-based and campus-like environment where high-technology enterprises and talented people can converge to generate synergistic forces. It is designed to accommodate companies of all sizes and stages of development and to promote interaction and innovation at both local and global level.

The visit was focused on two of the three support technology-focused buildings (Total 10 buildings) in Phase 1. The three technology-focused buildings are: IC Design/Development Centre, Bio-Informatics Centre and Photonics Development Centre. The IC Design/ Development Centre is to support IC companies from design start to production release, upgrading their product offering thus enhance Hong Kong's capabilities in high-value added electronics industry. The IC Design Centre includes the following facilities: EDA Centre, Data Centre, Design Engineering Office, and IC Design Training Centre. The IC Development Center consists of the Multi-Project Wafer Service, Intellectual Property Services, Probe and Test Development Centre, Test/Product Engineering Support Service, R/F and Analog Engineering Support Laboratory, Reliability Laboratory and Product Analysis Laboratory. Both labs are equipped with sophisticated equipments and have experienced engineers to assist clients on design debug and failure analysis.

The Photonics Development Support Centre provides a full range of technology supports to photonics and optoelectronics industries on research and development of advanced product. The goal is to assist product development in areas of optical communications and interconnect, display devices and panels, light emitting devices, solid-state lighting and optoelectronic sensors. The Photonics Development Centre is also equipped with a Product Analysis Lab. All the technology support laboratories in HKSP are operated under ISO9001: 2000 quality management system.

The HKSP is committed to provide laboratory facilities, engineering support, consultancy service and professional training to worldwide customers with customer focus and timely response. We are looking forward for the opening of Phase 2 and 3, as it will sure inspire more intelligent minds.

*For more information about the park, the HKSP website is http:// www.hkstp.org.

Fun Corner

PSP vs NDS

(By Stephen Pak)

Don't get frustrated if you can't recall what these abbreviations stand for in engineering! Just ask your children or any kids nearby and you will get the answer. They are two dominating handheld game consoles in the market. These two little monsters' charm extends from kids to mature minds like you. Read the next few hundred words and you'll see why.

The PlayStation Portable (PSP) is produced

by Sony Computer Entertainment and was unveiled in 2004. PSP is not merely a game-playing console but a multi-media center. You can watch your favorite movies, browse high-quality photos, dive in the world of music and even surf the internet via the Wi-Fi infrastructure connection to a Sony server. The 16:9 aspect ratio lovely looking display is perfect for driving and RPG games, but most punters will see it as "more than perfect" for watching movies on.

Released in the same year, the Nintendo DS (NDS), developed by Nintendo, is the major

rival of PSP. To fight against PSP's strong multi-media capabilities, NDS presents a brilliant dual screen design with one of which acts as a touch screen. The letters "DS" in the name are meant to stand for "Dual Screen". A popular dog simulation

video game of NDS, Nitendogs, has illustrated a perfect use of such a touch pad. You are going to raise your own lovely puppy in the game. You can reward it a "massage" through the touch pad if it performs well in a competition. Utilizing NDS's internal microphone, your puppies can be trained to listen to your commands like real pets. My grandma was shocked to see the little virtual Chihuahua laying down after she shouted "Sit!".

The wireless multiplayer aspect is one of the most exciting areas of modern handheld game consoles. Combined with the amazing processing powers, PSP and NDS bring us an acme of perfection in multiplayer games. Let's look forward to seeing what kinds of apex the engineers in this sector will bring us shortly! By the way, don't ask your kids "PSP or NDS?"! This will take them years to consider but finally come up with saying nothing but "Both!"

Table Tennis History (By Frederick Cho)

Like many other sports, table tennis began as a mild social diversion. It was popular in England in the second half of the nineteenth century under its present name and various trade names such as Gossima and Whiff-Whaff. After the name Ping-Pong (an imitation of the sound made by the ball striking the table and the vellum bats that were used) was introduced by J. Jaques & Son, the game became a fashionable craze. The game was popular in Central Europe in 1905-10, and even before this is a modified version had been introduced to Japan, where it later spread to China and Korea.

After a period when it had dropped out of favour in Europe, the game was revived in England and Wales in the early twentieth century. By that time 'Ping-Pong' had been registered as a trademark, so the earlier name of table tennis was re-introduced. National associations were formed and standardization of the rules began, both in Europe and the Far East.

Then, over the next sixty years, table tennis developed into a major worldwide sport, played by perhaps thirty million competitive players and by uncountable millions who play less seriously. However, the game itself has not changed in essence since its earliest days, though it is faster, more subtle and more demanding than it was even only twenty years ago. A constant concern of the International Table Tennis Federation (ITTF) has always been to insure that table tennis remains a contest of human skills and that technological developments which add a new factor to the game do not give too great an advantage to the players who have the first opportunity of making use of them. Thus, equipment specifications are carefully laid down, and rigorously enforced.

Leisure Session

Other changes - a lowering of the net, a rule to avoid protracted games between defensive players, and rules preventing excessive advantage being gained by the server - were introduced in the thirtieth century and further minor changes are made from time to time. Changes to the rules of the sport can be made only at the ITTF's Biennial General Meeting, and are never made without the agreement of a substantial majority of the hundred or so member Associations represented at the BGM, all of whom have an equal vote.

Modern table tennis at national and international level is a rigorous as any sport in its demands for the highest degree of physical fitness and mental concentration, attained only by arduous training to develop natural skill. Fred Perry, World Men's Singles Table Tennis Champion in 1928-29, later achieved even greater fame at Wimbledon; perhaps it would not be quite true to say that he moved to the larger court when his play became too slow for the table, but it is certainly true that no sport requires faster reactions and more delicate muscular co-ordination than table tennis.

Students and Young Engineers' Affairs (SYEA)

In summer 2006, the MMNC Division sponsored the orientation activities of the mechanical engineering societies of the HKU, HKUST and HKPU. Committee members, Ir CY Shiu and Ir Eric Tong also met those fresh mechanical engineering undergraduates during their orientation program for the membership promotion of HKIE and the introduction of mechanical engineering profession in Hong Kong.

In session 2006-07, SYEA has planned to organize a series of activities which helps to promote the mechanical engineering profession to youngsters in secondary schools and tertiary institutions. It includes membership talks at IVE together with AMC, competition for secondary school students to arouse their interest and applications in mechanical engineering, social gathering, career talks and mock interviews for engineering students…etc. Please feel free to contact Ir CY Shiu, SYEA Group Leader of Session 2006/07, for SYEA's activities (Email: cy-shiu@vtc.edu.hk).

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